Available online at www.sciencedirect.com
ScienceDirect
J. Finan. Intermediation 17 (2008) 198–228
Journal of Financial Intermediation
www.elsevier.com/locate/jfi

Corporate governance quality: Trends and real effects ☆

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Received 16 January 2007

Available online 5 January 2008

Abstract

This paper constructs a composite index of corporate governance quality, documents its evolution during the 1994–2003 period in selected emerging and developed economies, and assesses its impact on growth and productivity of the economy and its corporate sector. Our investigation yields three main findings. First, corporate governance quality in most countries has overall improved, although in varying degrees and with a few notable exceptions. Second, the data exhibit cross-country convergence in corporate governance quality with countries that score poorly initially catching up with countries with high corporate governance scores. Third, the impact of improvements in corporate governance quality on traditional measures of real economic activity—GDP growth, productivity growth, and the ratio of investment to GDP—is positive, significant and quantitatively relevant, and the growth effect is particularly pronounced for industries that are most dependent on external finance.

JEL classification: G30; G34

Keywords: Corporate governance; Disclosure; Transparency; Economic growth; Productivity

☆ The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They should not be attributed to the International Monetary Fund.

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1042-9573/$ – see front matter
doi:10.1016/j.jfi.2007.10.002

1. Introduction and summary

Corporate governance reform has ranked high on policymakers' agendas in many countries around the world since the late 1990s. New laws and regulations aimed at improving corporate governance have been introduced in many countries, and particularly in several Asian countries in the aftermath of the East Asian financial crisis of 1997–1998.[1]

Yet, have governance practices *actually* improved? And, do improvements in corporate governance contribute to higher output, investment and productivity growth in the corporate sector? To date, these key questions have not been addressed in the literature. This paper addresses these questions. We first construct a composite corporate governance quality (CGQ) index and document its evolution for major emerging markets and developed economies during the period 1994–2003. Then, we assess the impact of measured improvements in corporate governance quality on output growth, productivity growth and investment at a country level, and on industry growth.

Our CGQ index is constructed at a country level using accounting and market data of samples of non-financial firms listed in the relevant domestic stock markets. Hence, it captures corporate governance quality specific to a universe of firms which are likely to be comparatively more exposed to market discipline. For this reason, the finding of no improvement in governance for these firms would likely signal the lack of improvements for the corporate sector as a whole. On the other hand, the finding of improvements for these firms could signal either that improvements have occurred in the corporate sector as a whole, or that improvements are likely to be found especially among firms subject to market discipline. In either case, the evolution of the index is informative about changes in governance in the corporate sector.

The CGQ index is a simple average of three proxy measures of *outcomes* of corporate governance in the dimensions of *accounting disclosure* and *transparency*. Disclosure and transparency are necessary, albeit not sufficient, conditions of good corporate governance, since the extent of information asymmetries among managers and stakeholders pointed out by the corporate governance literature are likely to be less severe with enhanced transparency and disclosure.[2] By focusing on indicators capturing necessary conditions for good corporate governance, we aim at capturing in a parsimonious, yet informative way, the dynamics of dimensions of corporate governance quality that are likely to be correlated with other determinants of efficient governance arrangements. As detailed below, these indicators are derived from selected studies in the finance and accounting literature.

Considering outcome-based measures of corporate governance, as opposed to *de jure* measures, is advantageous and informative for at least two reasons. First, tracking changes in corporate governance with *de jure* measures is difficult, since improvements may not necessarily occur because of lags in implementation and/or enforcement, as stressed by Berglöf and Claessens (2006), who more generally point out that it is hard to measure enforcement of corporate governance rules. Second, firms may indeed choose to improve their corporate governance *prior* to or *independently of* the enactment of new rules whenever the benefits of good corporate governance, especially in terms of easier and less costly access to finance, are critical for their growth prospects. In other words, firms can choose to improve corporate governance beyond the minimum standards set by the country.

[1] See Claessens and Fan (2003) and OECD (2003).

[2] For reviews of the literature on corporate governance, see Shleifer and Vishny (1997), Zingales (1998), Tirole (2001), Becht et al. (2003), and Berglöf and Claessens (2006).

In essence, corporate governance quality may be viewed partly as an "endogenous" firm's choice, as pointed out by Himmelberg et al. (1999) and Coles et al. (2006). Ultimately, shareholders' or stakeholders' values will be maximized when managerial incentives are set in a right direction, and a good corporate governance helps it happen, if not necessary (e.g., Jensen, 1986, and Tirole, 2001). Thus, it is a broad set of underlying rules and practices that determine corporate governance and influence managerial incentives. Our aim is not to identify and quantify each of these underlying factors and the specific channels through which they operate to affect corporate governance and managerial incentives. Our contribution is to develop an outcome-based corporate-governance measures based on accounting and market data, as those data measure the outcomes of managerial decisions.

We investigate the relationship between corporate governance quality and economic performance at the country-level, although most of the literature relates measures of corporate governance to firm-level performance (see, for example, Gompers et al., 2003). Our choice is supported by empirical evidence in Doidge et al. (2007) who show that most of the variation in firm level governance can be explained by country-level characteristics. Furthermore, Core et al. (2006) show that investors discount values of weakly governed firms and that weak governance does not cause poor stock market returns at the firm-level. Our work is further motivated by Bushman and Smith (2001) who review the literature on the role of publicly reported financial accounting information in the governance processes of corporations and propose areas for future research. They argue that "the use of financial accounting information in corporate governance mechanisms is one channel by which financial accounting information potentially enhances the investment decisions and productivity of firms" and "propose cross-country research to investigate more directly the effects of financial accounting information on economic performance through its role in governance."

Our investigation yields three main findings. First, the CGQ index exhibits improvements in corporate governance quality in most countries considered since 1994, with the exception of few countries, where either no significant changes have occurred, or a worsening is recorded. While improvements in accounting disclosure have been more limited, corporate governance quality has improved especially in the dimension of transparency, that is in terms of the reliability of accounting and market information.

Second, the data exhibit cross-country convergence in corporate governance quality with countries that score poorly initially catching up with countries with high corporate governance scores.

Third, improvements in corporate governance quality affect the aggregate economic activities positively and significantly, as shown in regression analysis of per capita GDP growth, Total Factor Productivity (TFP) growth, and the ratio of investment to GDP on the CGQ index. Moreover, when we gauge the impact of changes in corporate governance quality on sales growth and growth opportunities of firms grouped by industry, we find a positive effect of improvements in corporate governance on the growth of financially dependent industries. This result is consistent with the idea that improvements in corporate governance quality benefit most those industries whose growth crucially depends on external finance.

Overall, the answers to the two questions we wished to address are both positive. Actual improvements in corporate governance, as captured by our indicators, have indeed occurred in most countries, although in varying degrees and with some notable exceptions. More importantly, improvements in corporate governance quality yield tangible benefits in terms of enhanced growth, productivity and investment, and these benefits are large for those industries which rely most on

external finance. Thus, effective implementation of corporate governance reform appears to be an important contributing factor to countries' well-being.

The remainder of the paper is composed of three sections. Section 2 details the construction of the CGQ index and its components. Section 3 depicts the evolution of our measures of corporate governance quality within and across countries and regions. Section 4 presents country and industry regressions relating the CGQ index and its components to measures of growth, productivity growth and investment for the economy and the corporate sector. Section 5 concludes.

2. The CGQ index

The CGQ index is a simple average of three indicators, called *Accounting Standards* (AS), *Earning Smoothing* (ES), and *Stock Price Synchronicity* (SPS). These indicators are constructed from accounting and market data for samples of non-financial companies listed in stock markets taken from the Worldscope and Datastream databases.

2.1. Accounting standards

The first indicator is a simple measure of the amount of accounting information firms disclose, and is constructed similarly to the index reported by the Center for International Financial Analysis and Research (CIFAR) until 1993. This indicator captures the degree of accounting disclosure of firms in the country.

CIFAR uses information based on the top 8 to 40 companies (depending on data availability) and on 90 items selected by professional accountants (CIFAR, 1993). Our indicator is given by the number of reported accounting items as a fraction of 40 accounting items selected from CIFAR's 90 items based on availability in the Worldscope database. We use information for the top ten manufacturing companies in terms of total asset for each year and in each country.[3]

2.2. Earning smoothing

The second indicator is a measure of "earnings opacity" proposed by Leuz et al. (2003) and Bhattacharya et al. (2003). It tracks the extent to which managers may conceal the true performance of firms using accruals to smooth fluctuations of annual profits. Specifically, it is the rank correlation between cash flows (before any accounting adjustments) and profits (after accounting

[3] We checked the robustness of the AS indicator by constructing variants in several ways. For example, eliminating the accounting items that are reported by 95% of all firms in 1995, we construct the index using only those 16 items that are reported by less than 95% of all firms. This index has more variation, compared to original index that is based on 40 accounting items, but the correlation with the original index is very high, more than 0.95. We also constructed an alternative index using the percentage of the 10 largest firms in each country (in terms of market capitalization) that reports all of the 24 items that are reported by 95% or more of all firms, but there is very little variation. We calculate these two variants using a threshold of 85 percent instead of 95 percent 85%, but this does not alter our findings. Finally, we constructed an index based on the 100 largest firms (or less when not available) instead of the 10 largest firms, but sample selection bias appears severe, as the number of firms covered by Worldscope typically grows over time in emerging market economies. However, using this alternative measure of accounting standards based on the largest 100 firms does not alter our main findings.

adjustments) across a set of firms at each point in time. This indicator is an important complement to the first indicator, since a large number of reported accounting items may be meaningless if accounts are seriously manipulated or misrepresented.

Unlike these authors, who use a pooled cross section data for each country, our measures are calculated for each year and each country. Accruals (AS) are estimated as

$$AS_{ikt} = (\Delta CA_{ikt} - \Delta Cash_{ikt}) - (\Delta CL_{ikt} - \Delta STD_{ikt} - \Delta TP_{ikt}) - Dep_{ikt},$$

where *CA* denotes current assets, *Cash* is cash and cash equivalents, *CL* are current liabilities, *STD* is short-term debt and the current portion of long-term debt, *TP* is income tax payable, and *Dep* denotes depreciation and amortization.

Since cash flow statements are not widely reported in many developing countries, cash flow from operations (ECF) are estimated by subtracting accruals (AS) from operating income (OI): $ECF_{ikt} = OI_{ikt} - AS_{ikt}$. Cross-sectional earnings smoothing is then measured by a Spearman rank order correlation between changes in accruals and changes in estimated cash flow (both normalized by total asset). It is defined for each year and each country as

$$EarningSmoothing = 1 - \frac{6\sum_{i,t}^{N}(Rank(\frac{\Delta AS_{ikt}}{TA_{ikt-1}}) - Rank(\frac{\Delta ECF_{ikt}}{TA_{ikt-1}}))^2}{N(N^2-1)}.$$

The ES indicator is standardized so that its values fall in the unit interval and increases as earning smoothness declines (i.e. firm performance is less opaque). Thus, an increase of this indicator signals an improvement in transparency.

2.3. Stock price synchronicity

The third indicator is a measure of stock price synchronicity proposed by Morck et al. (2000), given by the average goodness-of-fit (R^2) of regressions of each company's stock return on country-average return in each year.[4] These authors show that after controlling for other drivers of co-movements in stock prices not necessarily related to corporate governance,[5] more synchronous stock prices are found in countries in which corporate governance is poor and financial systems are less developed. More recently, Jin and Myers (2006) analyze a larger data set and find a positive relationship between stock price synchronicity and lack of transparency. Intuitively, if the accounting information is opaque, investors find it difficult to distinguish good performers from bad performers. *Ceteris paribus*, in the event of a shock to the market or the arrival of new information, the inability of investors to discriminate among firms would induce them to trade most stocks, prompting movements in stock prices to become more synchronous. We use this measure of stock price synchronicity as a proxy for the degree of accounting transparency in the country.

We should note that synchronicity can also occur if there is cross-subsidization among firms belonging to the same group. Cross-subsidization may stem from optimal allocation of funds in internal capital markets. Yet, in a poor governance environment, cross-subsidization is likely

[4] Morck et al. (2000) report a second measure, given by the share of stocks whose prices move in the same direction (either up or down). Our results are invariant to the use of this measure.

[5] Synchronicity may be observed if a country specializes in specific industries. In this case, industry specific shocks would drive overall movements of stock prices, in contrast with the case of a highly diversified country. In addition, if aggregate shocks are large (e.g., overall boom and bust, oil shocks, or currency crisis), then stock prices may move more in those countries which are most sensitive to aggregate shocks.

to be associated with inefficient connected lending: this governance-specific feature is likely captured by the SPS indicator, but it is not by the AS and ES indicators. In this sense, the SPS indicator complements the two indicators previously described.

For each year, the SPS indicator is computed in five steps. First, we calculate weekly return r_{ikt} for each firm (t = week), dropping firms with less than 30 weeks observation, and dropping an observation if the absolute value of r_{ikt} is greater than 0.25. Second, we calculate market capitalization-weighted weekly returns for each country k, ρ_{kt}, using weekly stock price indexes is from Datastream, and weekly net exchange rate appreciation rates for each country, e_{kt}. Third, for each firm we run the regressions: $r_{ikt} = \alpha_i + \beta_i \rho_{kt} + \gamma_i(\rho_{USt} + e_{kt}) + \varepsilon_{it}$, and retrieve the relevant goodness of fit R^2_{ik}.

Fourth, we calculate the total variation for each firm, given by

$$SST_{ik} = \sum_{t=1}^{T} \left(r_{ikt} - \frac{1}{T} \sum_{t=1}^{T} r_{ikt} \right)^2,$$

and compute the country level common variation, given by:

$$R^2_k = \sum_i \left(R^2_{ik} \times SST_{ik} \right) \Big/ \sum_i SST_{ik}.$$

To avoid sample selection bias, R^2_k is computed for the same sample size over years (but possibly for different companies) based on the rank order of market capitalization. Finally, the SPS indicator is standardized so that its range is the unit interval, it increases as synchronicity *declines* (i.e. transparency improves), and is computed based on an equal number of (but different) firms selected by their market capitalization at each date.[6]

Three measurement issues deserve further discussion. First, while our measures of corporate governance are widely accepted proxies for various aspects of corporate governance, we cannot rule out that they also capture other aspects of firm performance. For example, stock price synchronicity may be affected by abrupt declines in capital inflows, also known as sudden-stops. We try to mitigate this in our empirical work by investigating various sub-samples of our data, such as dropping countries that experienced a crisis or that do not have well-developed stock markets.

Second, by construction, our CGQ index does not capture all aspects of corporate governance but focuses on two important aspects of corporate governance: disclosure and transparency. The choice of our variables has been determined by three criteria:

(1) they are based on widely accepted methodologies developed in the finance literature;
(2) they are based on widely available financial data and can easily be replicated and updated;
(3) they can be computed annually so we can track changes over time.

We have considered a number of other variables considered by the corporate governance literature but these were not included because they did not meet any of the above criteria. These

[6] This selection criterion takes into account changes in stock price synchronicity due to changes in the number of firms that are listed in the stock exchange at each point in time. This is important especially in the case of countries that experienced a crisis. By construction, a balanced sample would not reflect exits of bankrupt firms (possibly characterized by poor corporate governance) and entry of new firms (possibly characterized by good corporate governance).

variables include ownership structures,[7] American Depository Receipts (ADR) premiums,[8] and the value of cash holdings.[9]

Finally, as already mentioned, we focus on *de facto* measures of corporate governance and do not include *de jure* measures such as shareholder rights and those based on securities laws (see La Porta et al., 1998, 2006). The reason is that we want to capture changes in corporate governance at the firm-level rather than changes in laws that are generally made at the country-level, and most importantly, we aim to capture real rather than legal changes in corporate governance quality. Changes in laws often merely reflect changes on the book, because they are not effectively enforced, rather than real changes that affect firm performance.

3. Trends in corporate governance quality

The time series of the CGQ index and its components for 10 Asian Countries (China, Hong Kong, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Singapore and Thailand), seven Latin American countries (Argentina, Chile, Brazil, Colombia, Mexico, Peru and Venezuela), 22 developed countries[10] and two other emerging markets (South Africa and Turkey) are reported in Tables A.1 to A.4 in the Appendix of the working paper version of this paper, De Nicolò et al. (2006).

As shown in Fig. 1, improvements in corporate governance quality have been recorded in *most* emerging markets economies and developed economies, although with varying intensity. With regard to emerging market economies, it is worth noting that improvements in the CGQ index in Asian countries have been larger on average than those witnessed by Latin American countries, which also exhibit levels of the index generally lower than in Asia. Yet, in both emerging market regions, as well as in some developed economies, the level of the index remains about 15 to 20 percent below that of the first quartile of developed economies.

The case of Asia is of interest with regard to the information content of our CGQ index relative to changes in *de jure* measures. As shown in Fig. 2, the CGQ index exhibits an upward trend in all Asian countries except China, where the index exhibits a decline. However, notable improvements have been recorded in Hong Kong, Malaysia, Philippines, Singapore and Thailand, while improvements in India, Indonesia, Korea and Pakistan have been more muted.

[7] Although there exists a large literature on the relationship between ownership and firm performance (see, for example, Shleifer and Vishny, 1997; Claessens et al., 2000; and Gompers et al., 2003), we do not consider ownership structures of firms because data on ownership structures is not widely available and because ownership structures do not change much over time, except when dramatic events such as mergers and acquisitions occur.

[8] We do not consider ADR premiums because this measure does not exhibit a consistent pattern across countries. In theory, ADR premiums (i.e., the stock price premium of ADRs over domestically listed shares) for foreign firms cross-listed in the United States should be higher for firms with worse corporate governance (see, for example, Doidge et al., 2004). However, of all the countries included in our study we find that UK and Canadian firms display the highest premiums, and that premiums of firms in these countries are significantly higher than for firms in countries that one would expect to have poor corporate governance.

[9] The value of cash holdings measure proposed by Pinkowitz et al. (2006) is based on the premise that one dollar in the corporate balance sheet is valued less than one dollar by the stock market in countries where corporate governance is weak. This measure appears highly volatile when estimated over time and therefore does not seem to capture well changes in corporate governance over time.

[10] The developed countries are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, UK and the US.

These patterns contrast with those exhibited by measures of shareholder and creditor rights during a similar period.[11] As shown in Table 1, minority shareholder rights appear to have been strengthened in some countries, but not in others. By contrast, measures of creditor rights do not appear to have improved, and they have even worsened in some countries. On average, minority

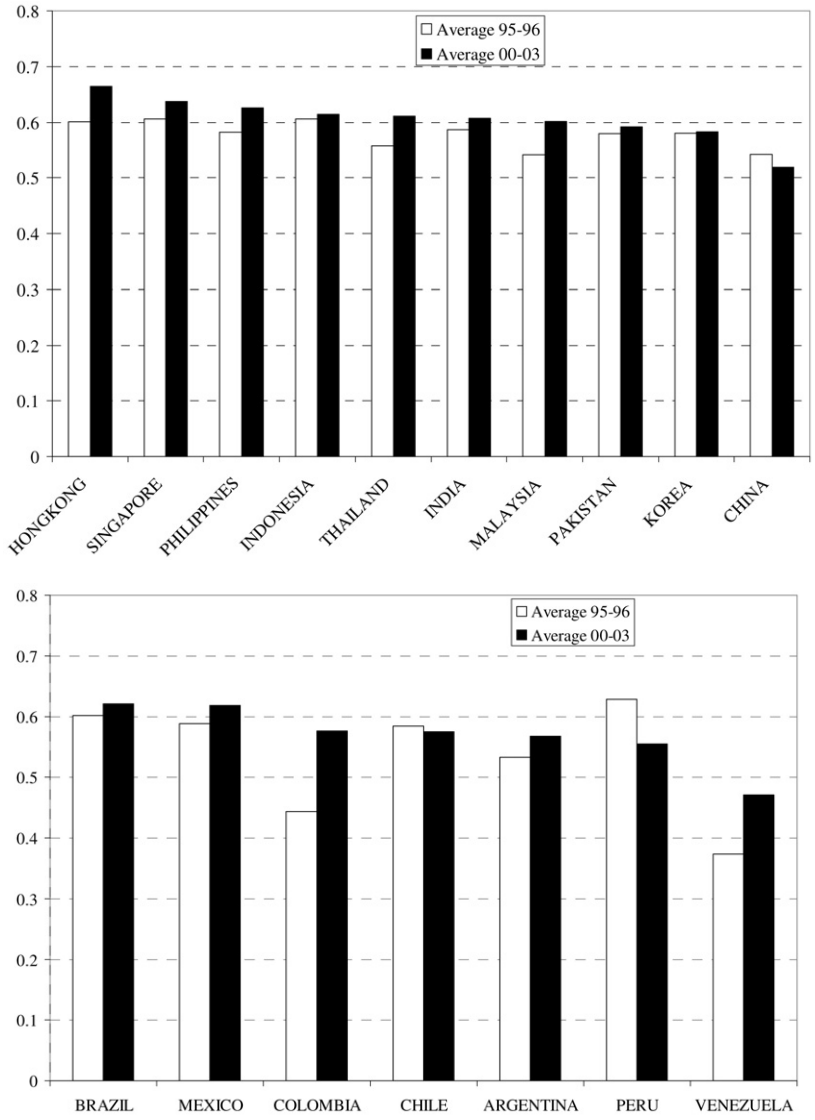

Fig. 1. CGQ index, subperiod averages. This figure shows the average of the CGQ index for each country for the two periods 1995 to 1996 and 2000 to 2003. The countries are grouped by region. The complete data set on the CGQ index and underlying indicators is available at: http://www.luclaeven.com/Data.htm.

[11] Time series data on creditor rights are compiled by Djankov et al. (2007). Time series data on minority shareholders' rights are from Spamann (2006) following the work by La Porta et al. (1998).

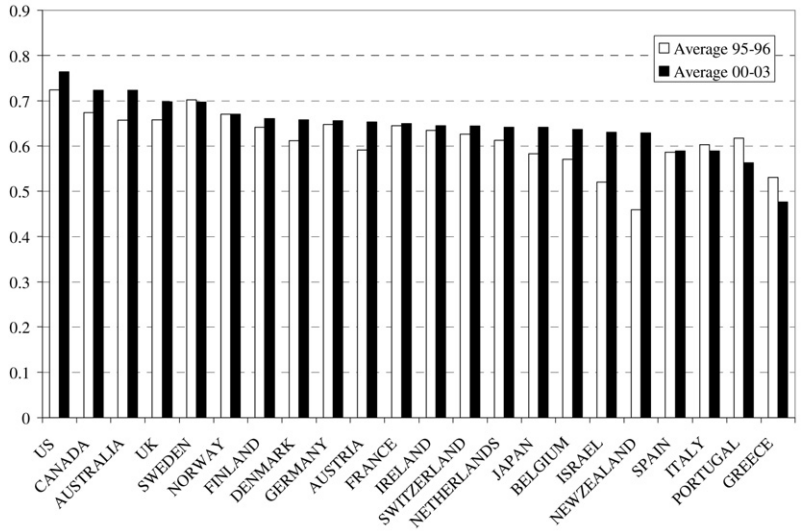

Fig. 1. (*continued*)

shareholder rights have improved somewhat and creditor rights have deteriorated somewhat for our sample of countries. In general, these *de jure* indexes of shareholder rights and creditor rights are very stable over the sample period for our sample of countries, with little or no changes in most cases. Yet, there appears to be no relationship between the direction of change recorded by *de jure* type measures and that recorded by our outcome-based measure. Panel A of Table 2 shows that the correlation between the CGQ index and the *de jure* measures is low (−0.17 in the case of creditor rights and −0.01 in the case of shareholder rights) and statistically insignificant. This difference between *de jure* and *de facto* measures suggests the importance of taking into account the endogeneity of firms' governance choices in evaluating trends in corporate governance quality.

In which dimension corporate governance quality has changed most? As noted, each component of the CGQ index captures different, albeit complementary, aspects of corporate governance quality, as witnessed by the fact that their cross-correlation is relatively low, ranging from 0.16 to 0.28 (panel B of Table 2). Thus, it is informative to look at the evolution of each component separately.

As shown in Fig. 3, improvements in the ES indicator have occurred in Asia, and they have been substantial in developed economies, while progress has been either slow, or non-existent, in the Latin American countries. Thus, in the dimension of transparency captured by the ES indicator, progress has been slower on average in emerging markets. Observe that the value of the ES indicator for the median Asian and Latin American countries remains about one third lower than the median of the developed country group as of 2003. By contrast, progress in the transparency dimension captured by the SPS indicator has been more pronounced in emerging markets than in developed economies (Fig. 4). Indeed, Asian countries exhibit levels closer to those exhibited by other developed countries, while for Latin American countries SPS levels remain significantly lower than those of developed countries, despite recent improvements. Lastly, the AS indicator exhibits some improvement, albeit small, in most Asian countries, while the indicator exhibits virtually no change in both Latin American and developed economies (Fig. 5).

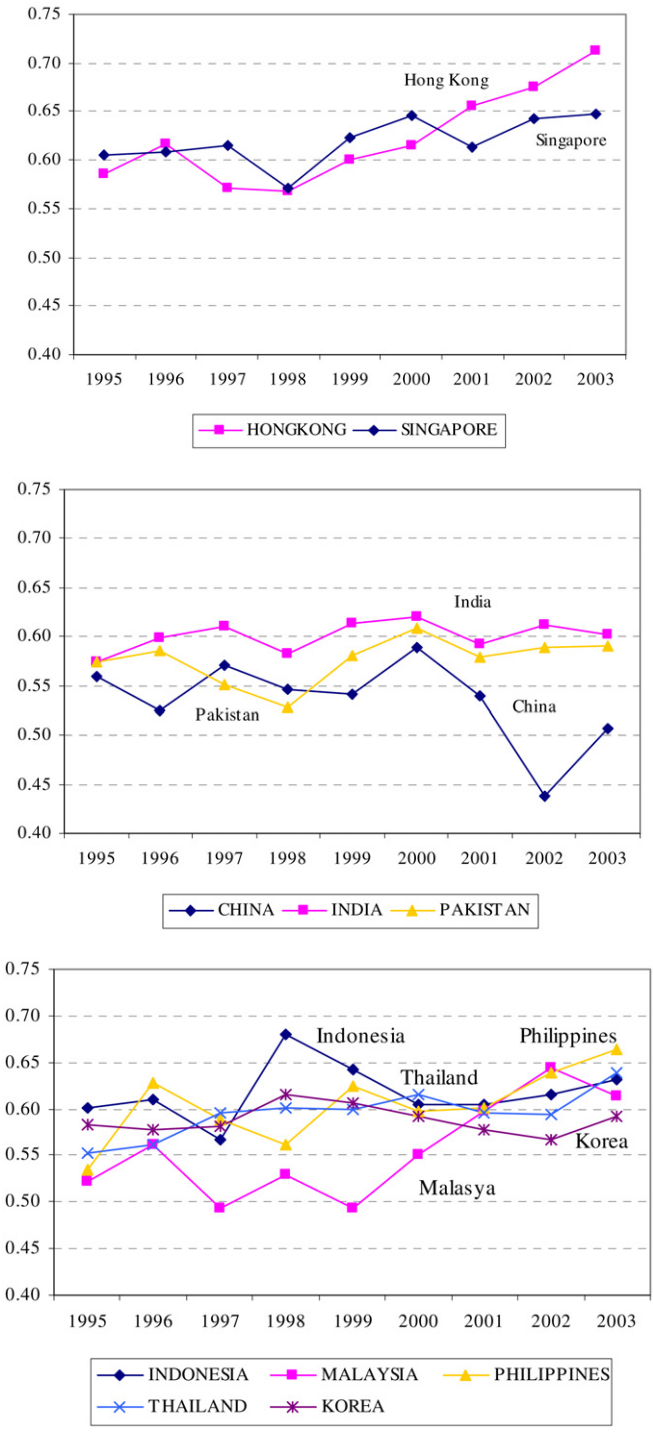

Fig. 2. CGQ index in Asia. This figure shows the evolution of the CGQ index over the period 1995 to 2003 for a select number of countries in Asia.

Table 1
Changes in creditor rights and shareholder protection

Country	Change in creditor rights, 1995–2002	Change in shareholder protection, 1997–2005
Argentina	0	0
Australia	0	0
Austria	0	0
Belgium	0	0
Brazil	0	0
Canada	0	0
Chile	0	0
China	0	N.a.
Denmark	0	0
Finland	0	0
France	0	0
Germany	0	1
Greece	0	0
Hong Kong, China	0	0
India	0	1
Indonesia	−1	N.a.
Ireland	0	0
Israel	−1	1
Italy	0	1
Japan	−2	0
Korea, Rep.	0	1
Malaysia	0	0
Mexico	0	1
Netherlands	0	0
Norway	0	0
Pakistan	0	0
Philippines	0	0
Portugal	0	0
Singapore	0	0
South Africa	0	0
Spain	0	1
Sweden	−1	0
Switzerland	0	0
Taiwan, China	0	0
Thailand	−1	0
Turkey	0	0
United Kingdom	0	0
United States	0	0
Average change	−0.16	0.19

This table lists the changes over the period 1995 to 2002 in the index of creditor rights from Djankov et al. (2007) and the changes over the period 1997 to 2005 in the index of anti-directors rights (shareholder protection) from Spamann (2006) for the sample of countries included in our study. N.a. denotes data not available.

Despite the noted regional and country differences in the evolution of the index, *convergence* towards higher values of the CGQ index has occurred, as indicated by the negative and relatively large cross-country correlation (−0.53) between the average growth rate of the CGQ index during the 1994–2003 period and the 1995 level. On average, countries with the fastest average rate of increase of the index were indeed those witnessing the lowest levels of the index in 1995. For example, the gap between the CGQ index in Asian countries and that recorded for the United

Table 2
Correlation matrix of creditor rights, shareholder protection, and CGQ index
Panel A. Correlation among Changes in Creditors' Right, Shareholder Protection, and CGQ Index

	Change in creditor rights, 1995–2002	Change in shareholder protection, 1997–2005
Change in shareholder protection, 1997–2005	−0.005	
	(36)	
Change in CGQ index, 1995–2003	−0.172	−0.006
	(38)	(36)

Panel B. Correlation between Creditor Rights, Shareholder Protection, CGQ Index, and Its Components

	Creditor rights	Shareholder protection	CGQ index	Accounting standards	Earnings smoothing
Shareholder protection	0.124				
	(40)				
CGQ index	0.024	−0.057			
	(320)	(36)			
Accounting standards	0.170**	0.106	0.538**		
	(354)	(36)	(361)		
Earnings smoothing	−0.130**	−0.107	0.747**	0.267**	
	(336)	(40)	(361)	(361)	
Price synchronicity	0.022	0.164	0.754**	0.276**	0.157**
	(378)	(40)	(361)	(395)	(378)

Panel A reports correlations between changes over the period 1995 to 2002 in the index of creditor rights from Djankov et al. (2007), changes over the period 1997 to 2005 in the index of anti-directors rights (shareholder protection) from Spamann (2006), and changes over the period 1995 to 2003 in the CGQ index. *Panel B* reports correlations over the sample period (when data are available) between the levels of the index of creditor rights from Djankov et al. (2007), the index of anti-directors rights (shareholder protection) from Spamann (2006), and the CGQ index and its components. Number of observations in parentheses.
** Significance at the 5% level.

States, which is the highest among all countries in all years, has narrowed since 1994. Notably, convergence has occurred at a relatively faster rate in the transparency dimension, as the correlations between initial levels of the ES and SPS indicators and their average growth rates, equal to −0.74 and −0.67 respectively, are substantially higher in absolute value than the relevant correlation for the CGQ index.

In sum, corporate governance quality of non-financial firms listed in domestic stock markets has overall improved in almost every country considered during the 1994–2003 period, and improvements have been witnessed primarily in the transparency dimension captured by the ES and SPS indicators. Remarkably, convergence in corporate governance quality has indeed occurred within the set of countries considered.

A critical question is whether improvements in corporate governance quality have "real" effects. We address such question next by measuring the impact of our indicators on real economic outcomes.

4. The real effects of corporate governance quality

Corporate governance quality may affect aggregate economic activity through several channels. For example, improvements in corporate governance quality may impact positively on growth by lowering firms' cost of funds and possibly increasing the supply of credit, thereby

encouraging investment. Moreover, better governed firms may align managers' and claimholders' interests more closely, providing stronger incentives for managers to achieve high firm's productivity growth by the adoption of frontier technologies. As a result, capital in the corporate sector may be allocated more efficiently, and economy-wide productivity growth may increase.

More generally, corporate governance arrangements can be viewed as *technologies* that firms may adopt subject to the constraints of the institutional environment in which they operate. Recently, Comin and Mulani (2005) formulate an endogenous growth model which embeds firms' choices of "general innovations," defined as innovations that are available and applicable to several firms and sectors, and whose "rents" or "benefits" are not privately appropriable, as in the case of patentable research and development. Their model rationalizes several empirical facts

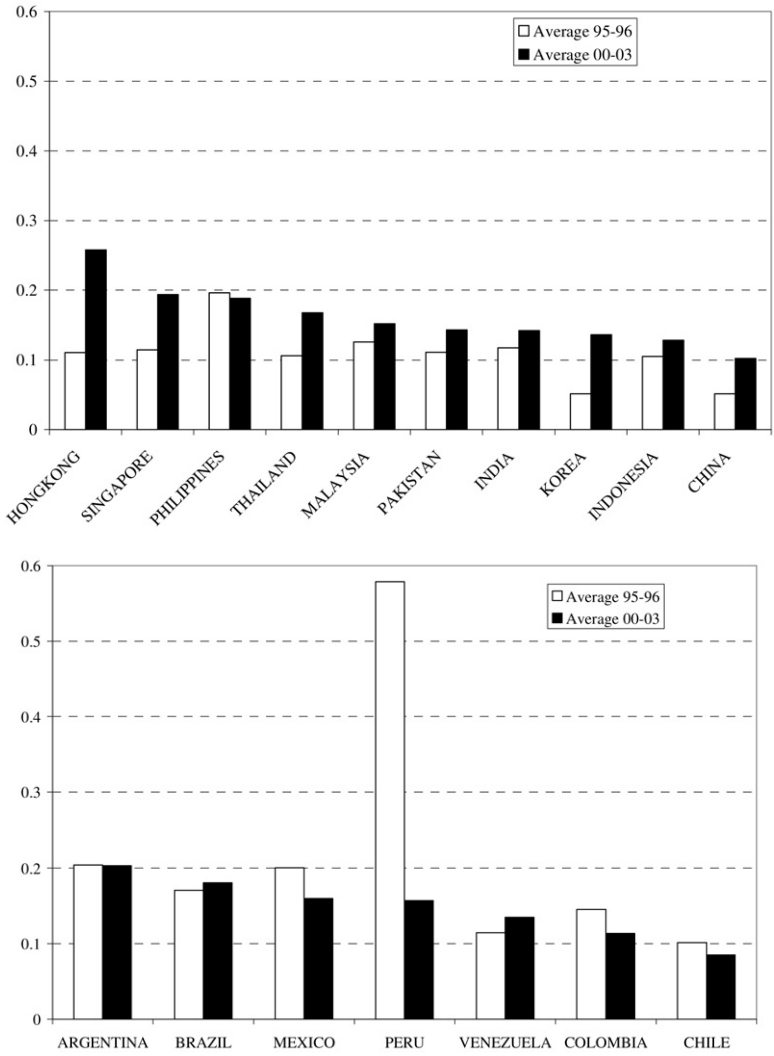

Fig. 3. Earning smoothing indicator, sub-period averages. This figure shows the average of the Earnings Smoothing indicator for each country for the two periods 1995 to 1996 and 2000 to 2003. The countries are grouped by region.

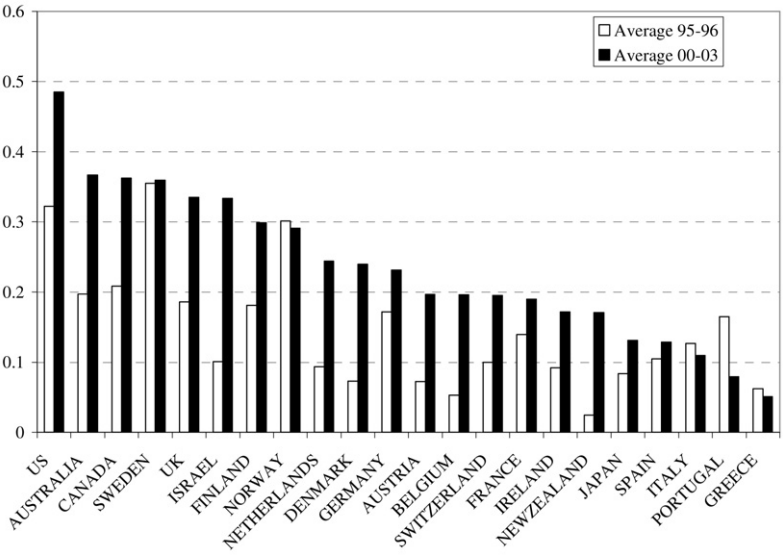

Fig. 3. (*continued*)

concerning the dynamics of productivity growth at the aggregate level, as well as at an industry and firm level. Managerial and organizational innovations are prominent examples of "general innovations." If corporate governance arrangements are viewed as "general innovations" in the sense of Comin and Mulani, then they may have a significant impact on macroeconomic activity and productivity growth.

To assess the link between corporate governance quality and macroeconomic activity, we estimate two complementary statistical models that can be viewed as generic empirical counterparts of models of endogenous growth partly driven by "general innovations" such as corporate governance arrangements. The first model is a simple dynamic panel model that exploits both the time and cross sectional dimensions of the data. We use this setup to explore the impact of our measures of corporate governance quality on GDP growth, on estimates of TFP growth, and on the ratio of investment to GDP. The second model exploits only the cross sectional dimension of the data, but expands such dimension by including industry level data. We use it to explore the impact of changes in our corporate governance indicators on the growth of industries most dependent on external finance.

4.1. Impact on growth, productivity and investment

Our benchmark statistical setup is given by the following standard autoregressive dynamic panel model:

$$Y_{it} = \alpha_i + CGQ_{it-1}\beta + \ln(X_{it})\gamma + \delta_1 Y_{it-1} + \delta_2 Y_{it-2} + \varepsilon_{it},$$
$$t \in [1, \ldots, T],\ i \in \{1, \ldots, N\}. \tag{1}$$

The dependent variable, Y_{it}, denotes either GDP growth, TFP growth[12] and the investment-to-GDP ratio for country $i \in \{1, \ldots, N\}$ (N denotes the number of countries) in year $t \in [1, \ldots, T]$ (T denotes the terminal date of the sample). The constants α_i capture time-invariant, unobserved

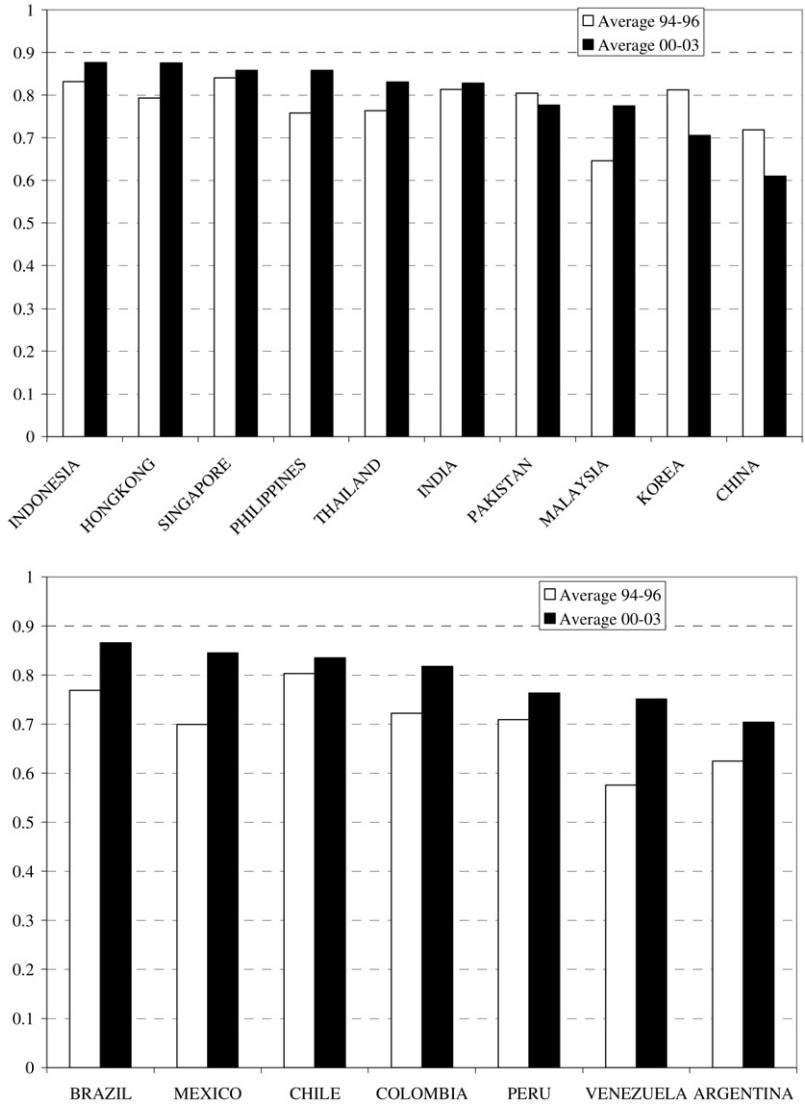

Fig. 4. Stock price synchronicity indicator, sub-period averages. This figure shows the average of the Stock Price Synchronicity indicator for each country for the two periods 1995 to 1996 and 2000 to 2003. The countries are grouped by region.

[12] We estimate TFP growth based on the standard method used by Klenow and Rodriguez-Clare (2005) without correcting for changes in educational attainments, as they vary little in the sample period for our sample countries. The underlying data are from Penn World Table 6.1 and the IMF's World Economic Outlook database.

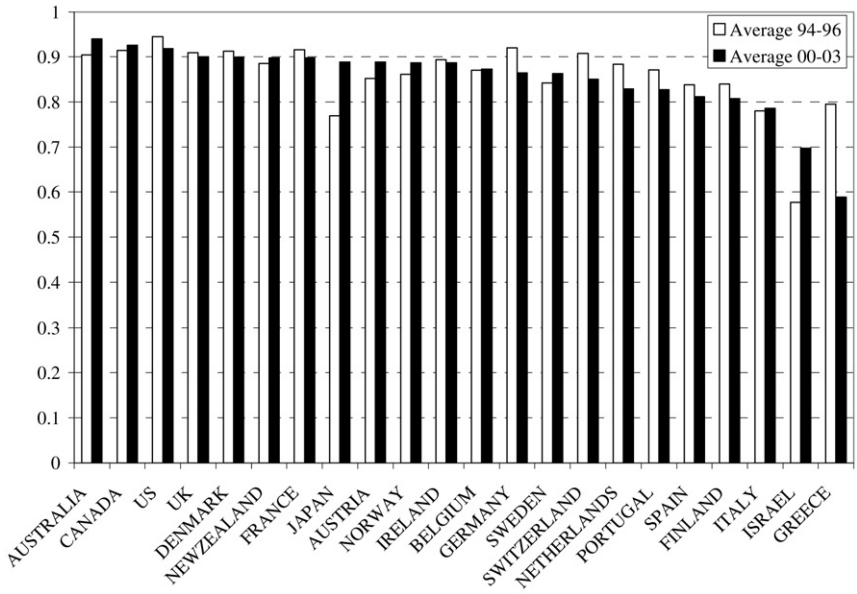

Fig. 4. (*continued*)

country specific effects. CGQ_{it-1} denotes the CGQ index or the vector of its components, and it is lagged since we assume it takes time to translate the effects of a change in corporate governance in a given year into macroeconomic outcomes. Of course, such a change will affect values of the dependent variable beyond the subsequent year via its autoregressive term. X_{it} denotes a vector that includes *all* other variables that affect Y_{it}, and are log-transformed for the reasons detailed below. We include two lags of the dependent variable to deal with potential serial correlation of the residuals.[13] The errors ε_{it} are assumed to be identically, independently distributed and uncorrelated over time and across countries. Our focus is on estimates of the parameter vector β.[14]

We accomplish this estimation following two steps. First, using the difference operator $\Delta x_t \equiv x_t - x_{t-1}$, Eq. (1) can be expressed as:

$$\Delta Y_{it} = \Delta CGQ_{it-1}\beta + \Delta \ln(X_{it})\gamma + \delta_1 \Delta Y_{it-1} + \delta_2 \Delta Y_{it-2} + \Delta\varepsilon_{it}. \tag{2}$$

Note that if we could control exhaustively for each relevant country component of the vector X_{it}, we would be able to obtain precise unbiased estimates of β using Eq. (2). However, controlling for all relevant variables is likely to be a daunting task. Even if this could be done, we would rapidly exhaust our degrees of freedoms.

Alternatively, we can approximate, and control for, the effects of these variables by making assumptions on the data generating process of X_{it}. Specifically, we assume that the vector X_{it} satis-

[13] When including only one lag of the dependent variable, we obtain similar results but the Arellano and Bond (1991) test for second-order serial correlation rejects the null hypothesis of zero autocorrelation in several specifications of our basic model.

[14] As stressed by Bond (2002), one advantage of this type of autoregressive-distributed lag model is that it does *not* require modeling the series on the right hand side of the equation to estimate the relevant coefficients.

fies $\Delta \ln(X_{it}) = G_i + v_{it}$, where v_{it} are identically, independently distributed. and uncorrelated over time and across countries. This amounts to assuming that the continuously compounded growth rates of the variables in X_{it} are random. Next, define $A_i \equiv G_i\gamma$ and $\eta_{it} \equiv v_{it}\gamma + \Delta\varepsilon_{it}$. We make the further assumption that *all* v_{it} are uncorrelated with CGQ_{it-1} and $\Delta\varepsilon_{it}$. Under this set of assumptions, we obtain the following fixed (country) effect dynamic panel regression model in differenced variables:

$$\Delta Y_{it} = A_i + \Delta CGQ_{it-1}\beta + \delta_1 \Delta Y_{it-1} + \delta_2 \Delta Y_{it-2} + \eta_{it}. \tag{3}$$

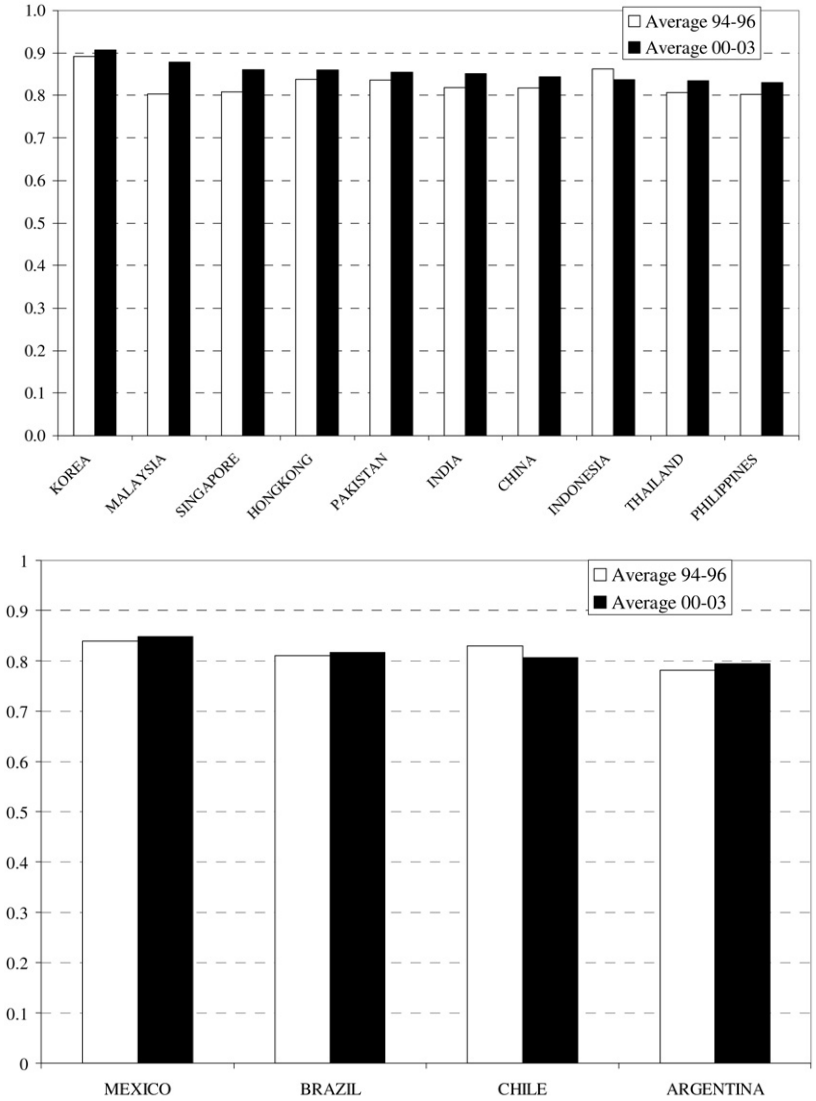

Fig. 5. Accounting standards indicator, sub-period averages. This figure shows the average of the Accounting Standards indicator for each country for the two periods 1995 to 1996 and 2000 to 2003. The countries are grouped by region.

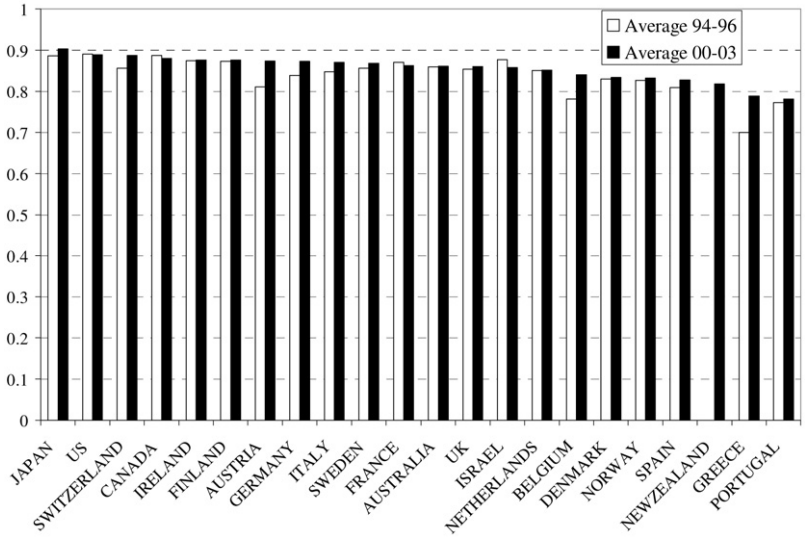

Fig. 5. (*continued*)

Using (3), we effectively control for time-invariant country characteristics by including country fixed effects.[15] Furthermore, to the extent that any time-varying country characteristic that we have not controlled for is not correlated with changes in our corporate governance index, our inference remains valid.[16]

We estimate β by applying the *difference* GMM estimation procedure developed by Arellano and Bond (1991) to Eq. (3). Since such estimation is carried out on differenced variables, it is actually implemented through differencing of Eq. (3), which is equivalent to "double" differencing Eq. (1). In this way, we are able to introduce an additional layer of country specific effects that are used to control for the deterministic component of all variables X_{it}. Only in the regressions of the ratio of investment to GDP as the dependent variable, we have added the lagged value of GDP growth to control for business cycle effects.

Estimations are carried out using an unbalanced panel composed of annual data of country-year observations for all countries listed previously for which data could be constructed or were available (about 40 countries) during the period 1993–2004. In all estimations, we treat both the lagged dependent variables and all independent variables as endogenous and instrument these variables using their lags at time $t-3$, $t-4$, and so on, up to a maximum of nine lags. We report results for the one-step Arellano–Bond (1991) estimator, while Sargan specification tests are based on the relevant two-step estimator.[17] We first present the results for the benchmark

[15] When including time fixed effects, all specification tests remain valid. Moreover, the sign of the coefficients is unchanged, but there is a loss of precision in the estimates, as significance levels drop. This is not surprising, since these variables in part capture the synchronicity of changes in corporate governance arrangements across several countries.

[16] Standard control variables used in the growth literature, such as schooling and population growth, tend not to vary much over short periods of time, and are unlikely to be highly correlated with our corporate governance index. However, a large aggregate shock, for example one resulting in a currency crisis, may be correlated with the CGQ index, and below we conduct robustness checks to account for this possibility.

[17] One assumption underlying the Arellano and Bond (1991) model is the stationarity of the dependent and independent variables. Standard Dickey–Fuller unit root tests indeed confirm that the variables of interest are stationary.

model, and subsequently we assess whether, and in what way, these results change under some modifications of the benchmark model. In all the benchmark estimates, as well as in virtually all subsequent ones, the autocorrelation and specification tests indicate that coefficient estimates are unbiased and the specification of the model is satisfactory.

4.1.1. Benchmark results

As shown in Table 3, estimates of the benchmark model yield three main results. First, GDP growth, TFP growth and the ratio of investment to GDP vary positively and significantly with lagged values of the CGQ index. Second, changes in corporate governance quality have a significant economic impact on GDP, TFP growth and the ratio of investment to GDP. Namely, a one-standard deviation increase in the CGQ index in the current year results in an increase in GDP growth of about two percentage points ($0.02 = 0.21 * 0.09$), an increase in TFP growth of about two percentage points ($0.02 = 0.24 * 0.09$), and an increase in the ratio of investment to GDP of about one percentage points ($0.93 = 10.306 * 0.09$), in the following year. These are substantial effects compared to the averages for these variables (see Table A.1 for the summary statistics of the main regression variables). Third, the positive dynamic relationship between all measures of macroeconomic outcomes and corporate governance quality appears importantly

Table 3
Aggregate economic activity and corporate governance: benchmark model

	Dependent variables					
	GDP growth$_{(t)}$		TFP growth$_{(t)}$		INV to GDP $_{(t)}$	
	(1)	(2)	(3)	(4)	(5)	(6)
CGQ index$_{(t-1)}$	0.209*		0.238**		10.306**	
	(1.88)		(2.10)		(2.06)	
Earnings smoothing$_{(t-1)}$		0.029		−0.005		0.352
		(0.93)		(−0.14)		(0.34)
Price synchronicity$_{(t-1)}$		0.082**		0.101***		5.639**
		(2.01)		(3.09)		(2.26)
Accounting standards$_{(t-1)}$		−0.081		−0.417		5.847
		(−0.42)		(−1.25)		(0.97)
GDP growth$_{(t-1)}$					11.143***	11.062***
					(3.09)	(3.26)
Dependent variable$_{(t-1)}$	−0.496***	−0.513***	−0.494***	−0.525***	0.195*	0.168
	(−6.41)	(−6.63)	(−7.40)	(−7.25)	(1.91)	(1.60)
Dependent variable$_{(t-2)}$	−0.322***	−0.317***	−0.355***	−0.348***	−0.153***	−0.149***
	(−6.01)	(−5.93)	(−9.01)	(−7.26)	(−3.60)	(−3.64)
No. of countries/obs.	40/271	40/271	40/234	40/234	40/271	40/271
M1 (p-value)	0.00	0.00	0.00	0.00	0.01	0.01
M2 (p-value)	0.33	0.34	0.33	0.92	0.93	0.97
Sargan test (p-value)	1.00	1.00	0.85	1.00	1.00	1.00

Estimates are obtained by the (difference) GMM one-step estimator of Arellano and Bond (1991) applied to Eq. (3), where both the lagged dependent and independent variables are treated as endogenous and are instrumented with all their lags at $t-3$, $t-4$, and so on, up to a maximum of nine lags. Robust t-statistics are reported in brackets; M1 and M2 are the p-values of the Arellano–Bond statistics for second order correlation of residuals; Sargan test is the p-value obtained by estimates of the two-step version of the model.

* Significance at the 10% level.
** Idem, 5%.
*** Idem, 1%.

driven by improvements in transparency, since the coefficients associated with the SPS indicator are positive and significant in all regressions. In this specification, the SPS indicator appears the main component driving the significance of the overall CGQ index. Given the lack of significance of the AS indicator, this suggests that what matters for firm performance is the transparency of the accounting information disclosed (as captures by the SPS indicator) rather than the amount of information disclosed (as captured by the AS indicator).[18] The Sargan test for overidentifying restrictions and the Arellano and Bond (1991) m_2 test for second-order serial correlation of the error term both support the benchmark model specification and do not detect any problems.[19]

4.1.2. Accounting for financial crises

We wish to establish whether the benchmark results are primarily driven by observations sampled during "crisis" years, defined as years characterized by either output drops, sharp currency devaluations, stock market crashes, systemic bank failures, or combinations of all these occurrences. If this were the case, the impact of corporate governance quality on macroeconomic outcomes (parameter β) would likely be estimated imprecisely, since even shocks that are "temporary" relative to a long time span would necessarily appear as "long-lasting" in the short time dimension of our data. Moreover, and related to some of the components of our CGQ index, our estimates could capture effects not necessarily related to corporate governance. For example, the high synchronicity of individual stock returns occurring during stock market crashes may coincide with sharp declines in GDP per capita, generating a temporarily high co-movement between GDP growth and synchronicity in stock returns.[20] In addition, during crisis periods firms may try even harder not to disclose information and overstate firm performance, resulting in an unusually high reporting of accounting accruals. Again, this could generate a temporarily high co-movement between ES and macroeconomic outcomes, which would be reflected as a relatively "long-lasting" shock in our estimation.

To cope with this issue, we first defined "crises" country-years if there was *either* a negative value of GDP growth (an output drop), *or* a negative change in stock market capitalization (a stock market drop), *or* a banking crisis, identified as the initial year and the year subsequent to a banking crisis date as classified by Laeven and Honohan (2005). Then, we estimated the benchmark model on a sample where all "crisis" country-years were dropped, that is, on a sample of "non-crisis" country-years.

As shown in Table 4, all our parameter estimates remain virtually unchanged, although the significance of the results of TFP growth is somewhat reduced. Thus, our results do not appear to be driven by crisis periods.

[18] Note, however, that greater synchronicity may also be related to other factors than accounting transparency (as mentioned earlier), such as the degree of industry specialization or the degree of uncertainty about monetary policy in the country, and should thus be interpreted with this caveat in mind.

[19] We should note that the test of second order serial correlation indicates the absence of second order serial correlation. If the errors in the model in levels (Eq. (1)) are serially uncorrelated, then the double differenced model (Eq. (3)) may exhibit second order serial correlation. Being this not the case, our results suggest that the errors in the model in levels are close to a random walk, which may generate only first order serial correlation in the double differenced model.

[20] The data on stock price synchronicity and GDP growth for the East Asian crisis countries during the crisis years 1998–1999 are consistent with this: the stock market crash in late 1998 coincided with high synchronicity in stock returns, and a sharp decline in GDP was recorded with one year lag in 1999, generating an exceptionally high co-movement between stock price synchronicity and GDP per capita growth during the crisis period.

Table 4
Aggregate economic activity and corporate governance: excluding "crisis" country-years observations

	Dependent variables					
	GDP growth$_{(t)}$		TFP growth$_{(t)}$		INV to GDP $_{(t)}$	
	(1)	(2)	(3)	(4)	(5)	(6)
CGQ index$_{(t-1)}$	0.255*		0.173		8.035**	
	(1.70)		(1.47)		(2.03)	
Earnings smoothing$_{(t-1)}$		0.041		−0.011		0.062
		(1.16)		(−0.36)		(0.51)
Price synchronicity$_{(t-1)}$		0.105**		0.109***		4.318***
		(2.01)		(2.60)		(2.73)
Accounting standards$_{(t-1)}$		−0.035		−0.596		2.539
		(−0.23)		(−1.54)		(0.38)
GDP growth$_{(t-1)}$					10.903***	12.265***
					(3.03)	(2.95)
Dependent variable$_{(t-1)}$	−0.550***	−0.576***	−0.407***	−0.521***	0.058	0.016
	(−4.88)	(−4.95)	(−6.05)	(−5.93)	(0.31)	(0.09)
Dependent variable$_{(t-2)}$	−0.384***	−0.409***	−0.336***	−0.385***	−0.341***	−0.308***
	(−5.66)	(−4.71)	(−7.06)	(−7.55)	(−3.89)	(−3.49)
No. of countries/obs.	40/225	40/225	40/198	40/198	40/225	40/225
M1 (p-value)	0.00	0.02	0.00	0.02	0.03	0.00
M2 (p-value)	0.06	0.12	0.63	0.91	0.13	0.11
Sargan test (p-value)	1.00	1.00	0.78	1.00	1.00	1.00

See Notes in Table 3.
* Significance at the 10% level.
** Idem, 5%.
*** Idem, 1%.

4.1.3. Accounting for complex dynamics

In the benchmark model a change in corporate governance quality affects macroeconomic outcomes with a one-year lag, and impacts on their future values through the persistence parameters δ_1 and δ_2. In reality, changes in corporate governance may take a longer time to exert their effects on macroeconomic outcomes and could be highly persistent. In addition, crisis and recovery from crisis may well create complicated dynamic paths which might not be effectively captured by the simple lag structure of the benchmark model. For example, if improving governance is costly to the firm, but its cost varies according to whether or not a crisis is unfolding, then a firm dynamic decision to improve governance could create a complex interaction with the level of macroeconomic activity. Statistically, in these cases the assumption of independent distribution of the errors over time in Eq. (3) may be too strong.

To assess whether the benchmark model is a reasonable approximation of the data generating process in this dimension, we augmented the lags structure of the model subject to the constraints imposed by the time span of our data. Specifically, we estimated Eq. (1) with two additional lagged values of the corporate governance indicator, and one additional autoregressive term (at time $t-3$), both for the whole sample and the "non-crisis" sample defined previously.

As shown in Table 5, the qualitative results obtained previously remain unchanged. In addition, these estimates provide some useful insights. First, higher lagged values of the CGQ index do not enter significantly, indicating that the benchmark specification of the lagged structure for this variable is not off the mark. Second, all three lags of the dependent variable are statistically significant, indicating a high persistence of the impact of improvements in corporate governance.

Table 5
Aggregate economic activity and corporate governance: accounting for complex dynamics

	Dependent variables					
	GDP growth$_{(t)}$ (1)	TFP growth$_{(t)}$ (2)	INV to GDP $_{(t)}$ (3)	GDP growth$_{(t)}$ (4)	TFP growth$_{(t)}$ (5)	INV to GDP $_{(t)}$ (6)
	Whole Sample			*"Non-Crisis" Sample*		
CGQ index$_{(t-1)}$	0.226*	0.200*	8.721*	0.276*	0.169	8.589**
	(1.81)	(1.72)	(1.90)	(1.62)	(1.43)	(2.12)
CGQ index$_{(t-2)}$	0.045	0.048	−0.523	−0.007	0.045	0.291
	(0.59)	(0.45)	(−0.17)	(−0.11)	(0.59)	(0.08)
GDP growth$_{(t-1)}$			11.967***			11.530***
			(3.60)			(3.05)
Dependent	−0.618***	−0.722***	0.093	−0.643***	−0.642***	0.034
variable$_{(t-1)}$	(−6.20)	(−10.38)	(0.74)	(−5.54)	(−9.06)	(0.18)
Dependent	−0.469***	−0.559***	−0.137***	−0.546***	−0.516***	−0.306***
variable$_{(t-2)}$	(−5.38)	(−8.11)	(−3.59)	(−7.09)	(−5.75)	(−3.89)
Dependent	−0.227***	−0.281***	−0.114**	−0.233***	−0.242***	−0.002
variable$_{(t-3)}$	(−3.67)	(−6.26)	(−2.05)	(−2.92)	(−4.46)	(−0.05)
No. of countries/obs.	40/231	40/194	40/231	30/196	30/165	30/196
M1 (p-value)	0.00	0.04	0.01	0.01	0.00	0.06
M2 (p-value)	0.21	0.16	0.79	0.03	0.17	0.13
Sargan test (p-value)	1.00	0.96	0.77	1.00	0.97	1.00

See Notes in Table 3.
* Significance at the 10% level.
** Idem, 5%.
*** Idem, 1%.

Third, the coefficients for the "non-crisis" sample are comparable in size to those of the whole sample, suggesting that during crisis periods the effects of improvements in corporate governance may not be all that different from during "non-crisis" periods.[21]

4.1.4. Accounting for financial development

Identifying the impact of corporate governance quality *per se* on aggregate economic activity is complicated since other interrelated factors may be at play. Among these, financial development is of particular importance, since such development may be both a function, and a potentially important determinant, of corporate governance quality. For example, if firms cannot achieve the potential reduction in borrowing costs arising from improvements in corporate governance because the capacity of the financial sector to price risk is underdeveloped, then their incentives to improve corporate governance may be limited. There is also a growing literature on how transparency improves the operation of banks and other financial intermediaries (e.g., Barth et al., 2004, 2006; Demirgüç-Kunt et al., 2004; and Beck et al., 2006). Given that banks as creditors and equity holders play an important role in governing firms, an improvement in the transparency and governance of banks may also increase the likelihood that banks exert sound governance over the firms they fund. In addition, financial development *per se* may be an important determinant of macroeconomic outcomes. In terms of the benchmark model, variables related to financial development may be dynamically correlated with our corporate governance

[21] Note that in Tables 4 and 5, there is evidence of second order serial correlation for some specifications, consistent with the assumptions of lack of serial correlation of the disturbances in the model in levels (see footnote 19).

indicators, making necessary to take them explicitly into account to mitigate the potential biases in the estimates.

To account for financial development and its potential interaction with corporate governance, we consider the following extension of the benchmark model:

$$Y_{it} = \alpha_i + \beta_1 CGQ_{it-1} + \beta_2 FD_{it-1} + \beta_3 CGQ_{it-1} FD_{it-1} + \ln(X_{jt})\gamma + \delta_1 Y_{it-1} + \delta_2 Y_{it-2} + \varepsilon_{it}, \quad (4)$$

where FD_{it-1} is the lagged value of a proxy measure of financial development, given by the sum of private credit and stock market capitalization to GDP. As before, we estimate parameters β_1, β_2 and β_3 by applying the difference GMM estimator to the regression:

$$\Delta Y_{it} = A_i + \beta_1 \Delta CGQ_{it-1} + \beta_2 \Delta FD_{it-1} + \beta_3 \Delta(CGQ_{it-1} FD_{it-1}) + \delta_1 \Delta Y_{it-1} + \delta_2 \Delta Y_{it-2} + \eta_{it}. \quad (5)$$

As shown in Table 6, while the qualitative results are essentially the same as those obtained with the benchmark model, they provide evidence of the complementarities between corporate governance and financial development we have emphasized. In fact, the interaction terms between these variables are positive and significant in all regressions except the ones with the ratio of investment to GDP as the dependent variable. That is, the economic impact of improvements in corporate governance on macroeconomic outcomes is greater the more developed is the financial sector. Furthermore, while the "autonomous" impact of the SPS indicator continues to be positive and significant in all regressions, now the ES measure too exhibits a positive and significant effects on GDP growth and TFP growth when interacted with the financial development proxy. This result is consistent with the role of a developed financial sector in enhancing the impact of improvements in corporate governance. The SPS measure exhibits a positive and significant effects only on TFP growth when interacted with the financial development proxy. The AS measure enters positively and significantly in the investment to GDP regression at low levels of financial development and turns negative or insignificant at high levels of financial development. However, the AS variables turn insignificant when not controlling for the ES and SPS variables and interaction terms, suggesting that this result is due to collinearity between the three governance measures.

4.1.5. Long-run effects

The "long-run" effects of corporate governance quality on macroeconomic outcomes is given by estimates of the parameter $\beta/(1-\delta_1-\delta_2)$. While we have established that such parameter is positive and significant, the time span of our data is too short to allow us to measure these long-run effects with precision. Moreover, pinning down such effects with cross-country regressions would be difficult, since one would need to identify through theory, and control explicitly for, a host of country specific, possibly endogenous, variables. Besides, with only about 40 observations in the sample and the potential need to consider many control variables, our degrees of freedom would be rapidly exhausted and the precision of our estimates would likely be unsatisfactory. Rather than pursuing this avenue, we complement the foregoing analysis by expanding the cross sectional dimension of the data in order to focus on the differential effect of improvements of corporate governance on long-run industry growth.

Table 6
Aggregate economic activity and corporate governance: accounting for financial development

	Dependent variables					
	GDP growth$_{(t)}$		TFP growth$_{(t)}$		INV to GDP $_{(t)}$	
	(1)	(2)	(3)	(4)	(5)	(6)
CGQ index$_{(t-1)}$	0.147		0.134*		8.169**	
	(1.57)		(1.79)		(2.13)	
Financial development$_{(t-1)}$	0.027**	0.029**	0.026**	0.024**	1.019	1.424**
	(2.19)	(2.54)	(2.58)	(2.39)	(1.58)	(2.29)
CGQ index$_{(t-1)}$ *	0.736***		0.527***		−2.925	
Financial development$_{(t-1)}$	(3.56)		(5.91)		(−0.13)	
Earnings smoothing$_{(t-1)}$		−0.005		0.002		−0.572
		(−0.22)		(0.08)		(−0.69)
Price synchronicity$_{(t-1)}$		0.080**		0.054**		5.671**
		(2.00)		(2.07)		(2.29)
Accounting standards$_{(t-1)}$		−0.125		−0.431		7.535*
		(−0.98)		(−1.67)		(1.75)
Earnings smoothing$_{(t-1)}$ *		0.295***		0.190***		4.294
Financial development $_{(t-1)}$		(3.26)		(3.42)		(0.73)
Price synchronicity$_{(t-1)}$ *		0.137		0.223**		−3.484
Financial development $_{(t-1)}$		(0.70)		(2.19)		(−0.29)
Accounting standards$_{(t-1)}$ *		−0.014		0.538		−49.194***
Financial development $_{(t-1)}$		(−0.03)		(1.14)		(−3.02)
GDP growth$_{(t-1)}$					11.705***	11.585***
					(3.21)	(3.45)
Dependent variable$_{(t-1)}$	−0.578***	−0.589***	−0.549***	−0.567***	0.142	0.108
	(−6.95)	(−7.32)	(−9.41)	(−9.68)	(1.31)	(0.90)
Dependent variable$_{(t-2)}$	−0.379***	−0.364***	−0.377***	−0.365***	−0.162***	−0.147***
	(−6.44)	(−5.84)	(−8.53)	(−7.07)	(−3.72)	(−2.93)
No. of countries/obs.	39/251	39/251	39/216	39/251	39/251	39/251
M1 (p-value)	0.00	0.00	0.01	0.00	0.01	0.01
M2 (p-value)	0.38	0.37	0.49	0.88	0.63	0.93
Sargan test (p-value)	1.00	1.00	1.00	1.00	1.00	1.00

See Notes in Table 3.
* Significance at the 10% level.
** Idem, 5%.
*** Idem, 1%.

4.2. Impact on growth of financial dependent industries

As noted, the returns of good corporate governance are likely to be the largest when firms are able to attain easier and less costly access to finance, and such access is critical for their growth prospects. Therefore, we would expect that the benefits of improvements in corporate governance quality would be the largest for financially dependent industries.

To assess this conjecture, consider the following industry level counterpart of model (1):

$$Y_{ijt} = \hat{\alpha}_i + \hat{\alpha}_j + X_{it-1}\beta_1 + Z_{jt-1}\beta_2 + W_{ijt-1}\beta_3 + \delta_1 Y_{ijt-1} + \delta_2 Y_{ijt-2} + \eta_{ijt}, \quad (6)$$

with $t \in [1, \ldots, T]$, $i \in \{1, \ldots, N\}$, $j \in \{1, \ldots, M\}$, where M is the number of industries, Y_{ijt} is the continuously compounded real growth rate of industry j in country i, $\hat{\alpha}_i$ and $\hat{\alpha}_j$ are fixed country and industry effects respectively, X_{it} are firm-specific variables, Z_{jt} are country specific variables, W_{ijt} are firm-country specific variables, and η_{ijt} is the error term.

Under the assumption that *all* right-hand side variables grow at a constant deterministic rate during the period $[1, \ldots, T]$, in a steady state we obtain the following regression model:

$$Y_{ij} = \alpha_i + \alpha_j + W_{ij}\hat{\beta} + \varepsilon_{ij}, \tag{7}$$

where $\alpha_i = (1-\delta)^{-1}(\hat{\alpha}_i + X_i\beta_1)$, $\alpha_j = (1-\delta)^{-1}(\hat{\alpha}_j + Z_j\beta_1)$, $\hat{\beta} = (1-\delta)^{-1}\beta_3$ and $\varepsilon_{ij} = T^{-1}\sum_{t=1}^{T}\eta_{ijt}$, and all variables without time subscript denote their relevant constant growth rates.

As noted previously, precise and unbiased estimates of $\hat{\beta}$ would be obtained if we could control exhaustively for each relevant component of the vector W_{ij}. Yet, this is a task even more difficult than that we faced before, since it would require identification of a host of country *and* industry specific variables. For these reasons, we employ an approach similar to the one developed by Rajan and Zingales (1998), and estimate the following benchmark industry level regression:

$$Growth_{ij} = \alpha_i + \alpha_j + \gamma * Share_{ij} + \beta * CGQ_i * ED_j + \delta * FD_i * ED_j + \varepsilon_{ij}, \tag{8}$$

where $Growth_{ij}$ is real sales growth over the period 1995 to 2003 of industry j in country i, calculated at the ISIC industry level and weighted by the lagged value of market capitalization of individual firms, $Share_{ij}$ is the share of the industry in total real sales of the country in 1995, CGQ_i is the level of corporate governance of country i in 1995, FD_i is the level of financial development of country i in 1995, and ED_j is the Rajan and Zingales (1998) measure of external financial dependence, calculated at the 2- or 3-digit ISIC industry level over the period 1980 to 1989. The sample consists of the 36 manufacturing industries covered by Rajan and Zingales (1998) in a total of 34 countries. We include the industry share in total sales to capture a potential convergence effect, since industries that are large relatively to other industries in the country are expected to grow at lower rates. Rajan and Zingales (1998) show that the growth of financially dependent industries is disproportionally higher in countries with more financial development.

By augmenting the specification in Rajan and Zingales (1998) with the interaction between the level of corporate governance quality and external financial dependence, we can disentangle the effect of corporate governance from the effect of financial development on growth and assess the differential effect of corporate governance quality on growth net of the impact of financial development. Following Rajan and Zingales (1998) we use the sum of private credit and stock market capitalization to GDP as measure of financial development.[22]

This specification has the advantage over a pure cross-country regression in that it controls for country and industry fixed effects. However, it rests on the assumption that the vector W_{ij} is only composed of three elements, the variable $Share_{ij}$ and the interaction terms $CGQ_i * ED_j$ and $FD_i * ED_j$, that is, $W_{ij}\hat{\beta} = \gamma * Share_{ij} + \beta * CGQ_i * ED_j + \delta * FD_i * ED_j$. In what follows, we also consider a richer specification of the vector W_{ij} which includes a triple interaction between financial dependence, corporate governance, and financial development.

It is worth stressing that this specification only allows us to measure the differential effect of corporate governance (controlling for financial development) on outcome measures of economic performance, but not level effects. That is, we can measure whether improvements in corporate governance disproportionately affect the growth of industries that are most likely to benefit from such improvements, but we cannot measure whether improvements in corporate governance directly affect the growth of all industries.

[22] We obtain similar results when using Private credit to GDP as measure of financial development.

Table 7
Industry growth, financial dependence, and corporate governance

	(1)	(2)	(3)	(4)	(5)
Share in industry sales	0.053	0.053	0.050	0.049	0.054
	(0.034)	(0.032)	(0.033)	(0.032)	(0.033)
CGQ index ∗	0.409***				
Financial dependence	(0.121)				
Earnings smoothing ∗		0.088*			0.119**
Financial dependence		(0.044)			(0.052)
Price synchronicity ∗			0.148**		0.171***
Financial dependence			(0.060)		(0.056)
Accounting standards ∗				0.124	0.068
Financial dependence				(0.197)	(0.210)
Financial development ∗	0.007	0.009	0.006	0.006	0.007
Financial dependence	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
No. of countries	33	33	33	33	33
No. of industries	36	36	36	36	36
No. of country-industry observations	586	586	586	586	586
R-squared	0.58	0.57	0.57	0.57	0.58

The dependent variable is real sales growth over the period 1995 to 2003, calculated at the ISIC industry level. Share in industry sales is the share of the industry in total real sales of the country in 1995. Financial dependence is the Rajan and Zingales (1998) measure of external financial dependence, calculated at the 2- or 3-digit ISIC industry level. CGQ index is our country-level index of corporate governance, and is the average of the Earnings smoothing, Price synchronicity, and Accounting standards indicators. We include the value of these corporate governance scores in 1995 in the regressions. Financial development is private credit plus stock market capitalization to GDP in 1995. We lose two countries due to missing data on financial development: we do not have data on private credit for China and we do not have data on stock market capitalization for Ireland. All regressions include country and industry fixed effects. We report White's heteroskedasticity-consistent standard errors in brackets. Standard errors are corrected for clustering at the industry level.

* Significance at the 10% level.
** Idem, 5%.
*** Idem, 1%.

The industry characteristic of interest is the degree of external financial dependence, measured as the share of investment not financed by operating cash-flow (see Rajan and Zingales, 1998), because we expect industries that rely more on outside finance to benefit most from improvements in corporate governance because it should help them to attract external financing for investment.

Table 7 reports the regressions results of our basic specification in model (8). In addition to using our overall index of corporate governance, we also run regressions for each component of the governance index. We include the level of the AS, ES and SPS indicators in 1995 in the regressions. To reduce outliers, we restrict growth rates in real sales to -1 and $+2$.

We find a strong and positive effect of corporate governance on the growth of financially dependent industries. The effect is statistically significant at the 5% level (column (1) of Table 7). We also find a disproportionate positive and significant effect on the growth of financial dependent industries for the indexes of earnings smoothing and stock price synchronicity. For the index of accounting standards, the effect, though positive, is not measured precisely and is not statistically significant from zero. The interaction between financial development and financial dependence also does not enter significantly. In column (5), we include all three sub-components of the corporate governance index and find similar results.

The economic effect of the result on stock price synchronicity is also significant. Take the regression in column (1) of Table 7. The coefficient of this regression suggests that an industry

Table 8
Industry growth, financial dependence, and corporate governance: excluding crisis countries

	(1)	(2)	(3)	(4)	(5)
Share in industry sales	0.026	0.028	0.025	0.022	0.026
	(0.047)	(0.047)	(0.045)	(0.038)	(0.046)
CGQ index ∗	0.281**				
Financial dependence	(0.110)				
Earnings smoothing ∗		0.144**			0.116
Financial dependence		(0.064)			(0.090)
Price synchronicity ∗			0.086		0.047
Financial dependence			(0.092)		(0.109)
Accounting standards ∗				0.225	0.133
Financial dependence				(0.239)	(0.260)
Financial development ∗	0.003	0.005	0.005	0.002	0.003
Financial dependence	(0.008)	(0.008)	(0.008)	(0.011)	(0.008)
No. of countries	25	25	25	25	25
No. of industries	36	36	36	36	36
No. of country-industry observations	453	453	453	453	453
R-squared	0.47	0.47	0.47	0.47	0.47

See Notes in Table 7. We report results for the subset of countries that did not experience a banking crisis during the period 1995–2003. We use data from Laeven and Honohan (2005) to identify banking crises. All regressions include country and industry fixed effects. We report White's heteroskedasticity-consistent standard errors between brackets. Standard errors are corrected for clustering at the industry level.

** Significance at the 5% level.

at the 75th percentile of financial dependence in a country at the 75th percentile of the corporate governance index has a growth rate that is 0.10 ($= 0.409 * (0.625 * 0.452 - 0.571 * 0.070)$) higher than an industry at the 25th percentile of financial dependence in a country at the 25th percentile of corporate governance (see Table A.2 for the summary statistics of the main regression variables). This is a substantial effect compared to the average growth rate of 0.10 (i.e., about one times average growth).

In Table 8, we wish to assess whether the effect depends on whether countries where affected by a banking crisis or not, as we did in the panel regressions in Table 4. As noted, we wish to check that the results are not driven by the crisis countries. In fact, Kroszner et al. (2007) show that the positive effect of financial development on the growth of financially dependent industries identified by Rajan and Zingales (1998) disappears during crises, and the same may be true for the effect of corporate governance on the growth of financially dependent industries. We use data from Laeven and Honohan (2005) to identify banking crises. In columns (1) to (5), we rerun the regressions for the subset of countries without banking crises during the sample period 1995–2003. We confirm our previous result on the overall corporate governance index (although the size of the effect decreases somewhat), suggesting that the effect we find is not driven by crisis countries. The interaction between earnings smoothing and financial dependence now enters positively and significantly at the 5% level (column (2)), while the interaction between stock price synchronicity and financial dependence no longer enters significantly at the 10% level.

Thus far, we have tested whether the governance effect we identify is independent of the financial development effect identified by Rajan and Zingales (1998). In Table 9 we further corroborate the results in Rajan and Zingales (1998) by including a triple interaction term between financial dependence, corporate governance quality, and financial development to test whether

Table 9
Controlling for financial development

	(1)	(2)	(3)	(4) No crisis	(5) No crisis	(6) No crisis
Share in industry sales	0.055	0.055	0.054	0.029	0.025	0.023
	(0.033)	(0.033)	(0.032)	(0.046)	(0.045)	(0.044)
CGQ index ∗	−0.337			−0.846*		
Financial dependence	(0.442)			(0.470)		
Earnings smoothing ∗		−0.112	−0.211		−0.401	−0.584
Financial dependence		(0.165)	(0.256)		(0.243)	(0.704)
Price synchronicity ∗		−0.110	−0.106		−0.448**	−0.331
Financial dependence		(0.180)	(0.224)		(0.175)	(0.238)
Accounting standards ∗		−0.116	−0.295		−0.042	−0.051
Financial dependence		(0.198)	(0.357)		(0.186)	(0.566)
Financial development ∗	−0.268*	−0.267	−0.373**	−0.468**	−0.594**	−0.568*
Financial dependence	(0.157)	(0.173)	(0.166)	(0.185)	(0.227)	(0.294)
CGQ index ∗	0.468*	0.466		0.789**	0.992**	
Financial development ∗						
Financial dependence	(0.263)	(0.289)		(0.312)	(0.378)	
Earnings smoothing ∗			0.261			0.449
Financial development ∗						
Financial dependence			(0.175)			(0.413)
Price synchronicity ∗			0.118			0.257*
Financial development ∗						
Financial dependence			(0.111)			(0.132)
Accounting standards ∗			0.302*			0.357
Financial development ∗						
Financial dependence			(0.172)			(0.272)
No. of countries	33	33	33	25	25	25
No. of industries	36	36	36	36	36	36
No. of country-industry observations	586	586	586	453	453	453
R-squared	0.58	0.58	0.58	0.48	0.48	0.48

See Notes in Table 7. In regressions (4) to (6), we report results for the subset of countries that did not experience a banking crisis during the period 1995–2003. We use data from Laeven and Honohan (2005) to identify banking crises. All regressions include country and industry fixed effects. We report White's heteroskedasticity-consistent standard errors between brackets. Standard errors are corrected for clustering at the industry level.

* Significance at the 10% level.
** Idem, 5%.

the effect we find for corporate governance is conditional on the level of financial development of the country. This is indeed what we find. The sign of the coefficient on the triple interaction term is positive, suggesting that the effect we found previously on the interaction between financial dependence and the CGQ index is more pronounced in more financially developed countries, although the effect is not statistically significant in all cases.[23] The estimates indicate that this effect operates only at high levels of financial development.

[23] We have also analyzed whether the effect is different for the subset of East Asian countries in our sample. The reason for focusing on the East Asian countries is that growth and changes in corporate governance quality may have followed different paths in these countries in response to governance problems arising from the East Asian financial crisis in 1997 to 1998. However, we do not find a significant difference in the results for East Asian countries compared to the rest of the world.

5. Conclusions

The paper has constructed new measures of corporate governance quality for a broad set of developed and emerging market countries based on recent advances in the finance literature. Contrary to existing indicators of corporate governance based on tracking changes *de jure* governance laws and regulations, our index reflects the actual outcome of governance in the marketplace. This is important, because legal changes may not necessarily reflect actual outcomes owing to implementation lags, and because corporate governance quality may be an important firm's *decision*, which can change relatively independently of the institutional environment in which firms operate. For a large set of countries during the period 1994 to 2003, our measures indicate that corporate governance quality has improved in almost all countries, and there is evidence of convergence.

We have gauged the "real" effects of corporate governance quality through estimation of a set of dynamic panel regression models for GDP growth, TFP growth, and the ratio of investment to GDP, and cross sectional regressions of growth at the industry level.

Overall, our evidence suggests that improvements in corporate governance quality have a positive and significant effect on all measures of macroeconomic outcomes considered. This is true especially in the transparency dimension, as shown by the positive and significant impact of the SPS indicator, although all dimensions of corporate governance captured by our measures show a similar impact in countries with more developed financial sectors. In addition, at the industry level, we find that improvements in corporate governance appear to positively affect the performance of industries that depend on external finance.

These results are consistent with the notion that well-governed firms incorporate better managerial incentives that are likely to spur corporate sector growth and improve its productivity independently of the level of financial development. However, we also find that a higher level of financial development boosts the positive effects of improvements of corporate governance on macroeconomic outcomes, consistent with the notion that well-governed firms are better able to attract outside financing.

In sum, these findings suggest that it is actual, not necessarily legal, changes in corporate governance that really matter. Thus, our findings call for additional work to collect new data and compare a broad set of de jure and outcome-based measures of corporate governance rules and practices. We believe that such comparisons would enhance our understanding of the drivers of improvements in the quality of corporate governance and their real effects.

Acknowledgments

We would like to thank Ross Levine (the Editor), two anonymous referees, Franklin Allen, Thorsten Beck, Patrick Bolton, Stijn Claessens, Simon Johnson, Laura Kodres, Jonathan Ostry, Eswar Prasad, Raghuram Rajan, René Stulz, and seminar participants at the International Monetary Fund, the 2006 IMF/World Bank annual meeting in Singapore, the 2007 GCGF/AICG Corporate Governance in Emerging Markets conference in Istanbul, and the 6th Annual Conference on Emerging Markets at the Darden School of Business at the University of Virgina for comments on earlier drafts of this paper. Excellent research assistance by Nese Erbil, Juanita Riano, Junko Sekine, and Wellian Wiranto is gratefully acknowledged.

Appendix A

Table A.1
Summary statistics of main variables in country panel regressions

Variable	Obs.	Mean	Median	Std. Dev.	25th percentile	75th percentile
GDP growth	328	0.021	0.021	0.035	0.007	0.038
TFP growth	287	0.009	0.012	0.032	−0.000	0.023
INV to GDP	328	21.493	20.713	4.694	18.769	23.504
CGQ index	328	0.553	0.564	0.095	0.493	0.618

Table A.2
Summary statistics of main variables in industry panel regressions

Variable	Obs.	Mean	Median	Std. Dev.	25th percentile	75th percentile
Real sales growth	601	0.093	0.086	0.093	0.033	0.141
CGQ index	36	0.596	0.595	0.049	0.571	0.625
Earnings smoothing	36	0.146	0.121	0.108	0.080	0.187
Price synchronicity	36	0.810	0.824	0.115	0.782	0.902
Accounting standards	36	0.834	0.839	0.041	0.810	0.860
Financial development	34	1.418	1.136	0.905	0.744	2.074
Financial dependence	36	0.319	0.231	0.406	0.070	0.452

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