Analyst Earnings Forecasts in BRIC Countries

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We examine time-series variations in the accuracy of earnings forecasts made by financial analysts in BRIC countries and factors that have traditionally been used to explain these variations. Our analysis shows that the analyst earnings forecast accuracy is high and has stayed relatively constant over our sample period (1994-2009). While the timeliness of the forecasts has also stayed relatively constant, the frequency of forecasts and the experience of the analysts making the forecast have shown improvement. Finally, while the number of companies covered by analysts and the extent of industry specialization has stayed relatively constant in the aggregate, there is greater convergence amongst the countries. These results challenge the conventional notion that some analyst-specific characteristics can influence an analyst's ability to make accurate forecasts.

INTRODUCTION

In this paper, we examine time-series variation in the accuracy of annual earnings forecasts made by financial analysts in BRIC countries (Brazil, Russia, India and China) and the reasons for this variation. Analysts aggregate both financial and non-financial information to derive earnings estimates (Schipper, 1991) which help investors make sound financial decisions. Thus, financial analysts are important information intermediaries and play a significant role in making financial markets efficient. Since analysts serve such a critical function, research aimed at better understanding the factors that influence the accuracy of earnings estimates, and changes in forecast accuracy over time, is important to investors and other market participants.

Prior research conducted using U.S. data suggests that analyst forecast accuracy has improved over time (Ramnath, Rock and Shane, 2008). In addition, prior research also documents a relationship between the accuracy of analyst forecasts and characteristics of the analysts and the brokerage house for which they work. Jacobs, Lys and Neale (1999) and Clement (1999) show that analyst forecast accuracy is affected by factors such as frequency and timeliness of forecasts, experience, industry specialization, number of companies an analyst follows and brokerage house characteristics. While this line of research demonstrates a relation between forecast accuracy and analyst characteristics, it fails to examine whether

time-series changes in analyst-specific characteristics explain the observed improvements in analyst forecast accuracy.

The catchy acronym "BRIC" gained prominence after 2001; it denoted the four largest emerging market economies; and initiated a still ongoing investment boom in these economies. The BRIC markets differ from U.S. markets in many respects, including weaker rule of law standards (Li, Miller, Eden, and Hitt, 2012) and more informal, culturally based ethical standards (McCarthy, Puffer, Dunlap, and Jaeger, 2012).

We study the time-series changes in analyst forecast accuracy in BRIC countries and the characteristics of analysts using I/B/E/S data from 1994-2009. The preliminary results of our analysis suggest that earnings forecast accuracy is high and has stayed relatively constant over our sample period. While the forecast horizon (i.e. the timeliness of the forecasts, also referred to as forecast age) has stayed relatively constant, the frequency of forecasts and the experience of the analysts making the forecasts has improved. Finally, while the number of companies covered by analysts and the extent of industry specialization has stayed relatively constant in the aggregate, there is greater convergence amongst the BRIC countries. Research documenting analyst forecast accuracy is especially important to emerging economies as they try to develop efficient markets and mechanisms in support of increasing capital market investments.

PREVIOUS RESEARCH

Jacob *et al*. (1999) examined factors that explain variations in analyst forecast accuracy and attempted to explain forecast accuracy using analyst characteristics. Specifically, analyst forecast accuracy is regressed on the forecast horizon (the number of calendar days between the date the forecast was issued and the earnings announcement date), change in analyst (occurs when an analyst leaves a brokerage house), experience (the number of years an analyst has issued forecasts for a company), companies followed (the number of companies followed by an analyst), specialization (the percentage of companies followed by an analyst in the same industry), frequency (the number of forecasts issued by an analyst for a company in the year), broker house size (ranking of the total number of analysts employed by the brokerage house to which an analyst belongs), industry specialization of broker house (the brokerage house-specific percentage of analysts that follow companies in a given industry) and turnover in brokerage house (portion of new analysts that come from outside the brokerage house and the portion of analysts who left the brokerage house). Using these variables, Jacob *et al*. (1999) found a significant relationship between many of the analyst-specific characteristics and forecast accuracy.

Clement (1999) also examined the impact of analyst specific characteristics on analyst forecast accuracy. In addition to the analysts' forecasting experience with a specific firm, Clement (1999) incorporated a measure of general experience into the model. This general experience variable represents the number of years in which at least one forecast has been supplied by an analyst. Using this specification, Clement (1999) obtained results which were fairly consistent with Jacob *et al*. (1999).

The models developed by Jacob *et al*. (1999) and Clement (1999) have been incorporated in many recent studies. For example, Baea, Stulzb and Tanc (2008) examined the foreign versus domestic analyst's ability to make accurate earning forecasts after controlling for analyst-specific characteristics. Janakiraman, Radhakrishnon and Szwejkowski (2007) incorporated the Jacob and Clement models in their examination of the impact of Regulation Fair Disclosure (Reg. FD) on analyst forecasting ability. Finally, Jacob, Rock and Weber (2008) used components of the Jacob and Clement models to investigate whether analysts affiliated with investment banks make more accurate forecasts. In contrast, we focus on the time-series changes in analyst forecast accuracy and analyst-specific characteristics in BRIC countries.

Many international studies investigate cross-country differences in forecast accuracy. For example, Sonney (2009) finds analysts that specialize in forecasting in specific countries make more accurate forecasts. Using a sample of firms from 22 countries, Hope (2003) finds that analysts' forecast accuracy is associated with level of firm-specific disclosure and country-level enforcement of standards. Black and

Carnes (2006) find an association between macroeconomic factors, accounting systems and forecast accuracy. Finally, Barniv, Myring and Thomas (2005) examine the association between forecast accuracy and analyst characteristics and find that the relation is affected by legal and financial reporting environments. While prior research examines analysts performance in many countries, little research has investigated these relationships in BRIC countries.

RESEARCH QUESTIONS AND MODELS

It is commonly suggested that analyst earnings forecasts in the U.S. have become more accurate in recent years (Ramnath *et al*., 2008). However, to the best of our knowledge, no studies have formally attempted to document if accuracy has improved in the BRIC countries or document how factors that may influence accuracy have changed. We hypothesize that the improvement in analyst's forecast accuracy is due, in part, to changes in analyst-specific characteristics. Analyst-specific characteristics, such as experience and specialization, have been shown to have a significant influence on the accuracy of forecasts in the U.S. (Jacob *et al*., 1999; Clement, 1999). This research therefore examines changes in these factors over time, and analyzes the relation between analyst-specific characteristics and forecast accuracy in the BRIC countries.

We proceed as follows: We first examine changes in analyst forecast accuracy over time for each of the BRIC countries and for the group in aggregate. We then examine the time-series characteristics of each of the five attributes that have been previously shown to influence the accuracy of analyst forecasts. Specifically, the five attributes which we examine are: forecast age, forecast frequency, analyst experience, number of companies followed and industry specialization.

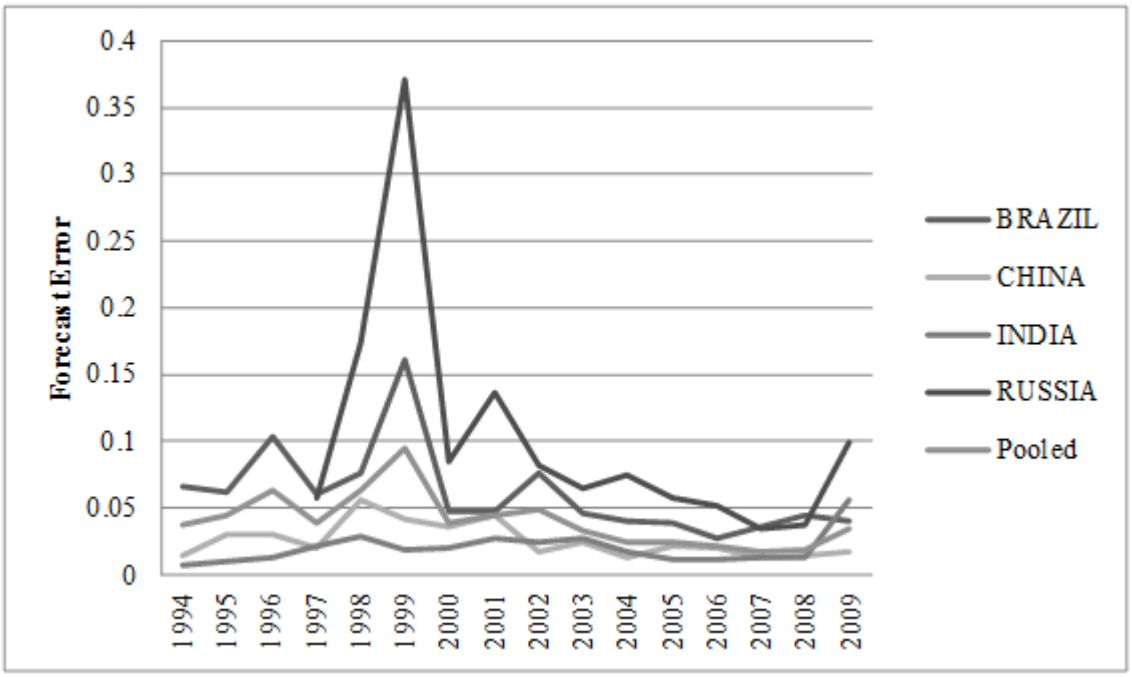
Forecast age represents the number of days between when an analyst makes an earnings forecast and the announcement of actual earnings by the firm, and is expected to be negatively related to forecast accuracy. Forecast frequency is the number of forecasts issued by an analyst for a specific company in a year, and is expected to be positively related to forecast accuracy. The experience variable measures analyst expertise with a particular firm, and is calculated as the number of years that an analyst has forecast earnings for a particular company, and is expected to be positively related to forecast accuracy. The last two variables measure the complexity of the analyst's assignments. The number of companies followed is measured by the number of forecasts the analyst issues for unique companies during the year, and is expected to be negatively related to forecast accuracy. The specialization variables represent the percentage of companies followed by the analyst which are in the same industry, and is expected to be positively related to forecast accuracy.

Trends in analyst forecast accuracy and characteristics are first described using graphical analysis. The association between analyst forecast accuracy and analyst characteristics is then examined using correlation analysis. Finally, univariate and bivariate regressions are used to further examine the relation between analyst forecast accuracy and analyst characteristics.

DATA AND RESULTS

The data used in this study is collected from the I/B/E/S detail files. Data is collected from 1994 to 2009 for all countries other than Russia where data was not available prior to 1997. Analyst forecast errors are defined as the absolute value of an analyst's forecast of annual EPS less actual annual EPS, and this number is then deflated by the stock price. Note that by construction, forecast error is the opposite of forecast accuracy. The time-series of analyst forecast errors for each of the BRIC countries individually and the pooled aggregate for all BRIC countries as a group are presented in Figure 1.

FIGURE 1
FORECAST ERROR

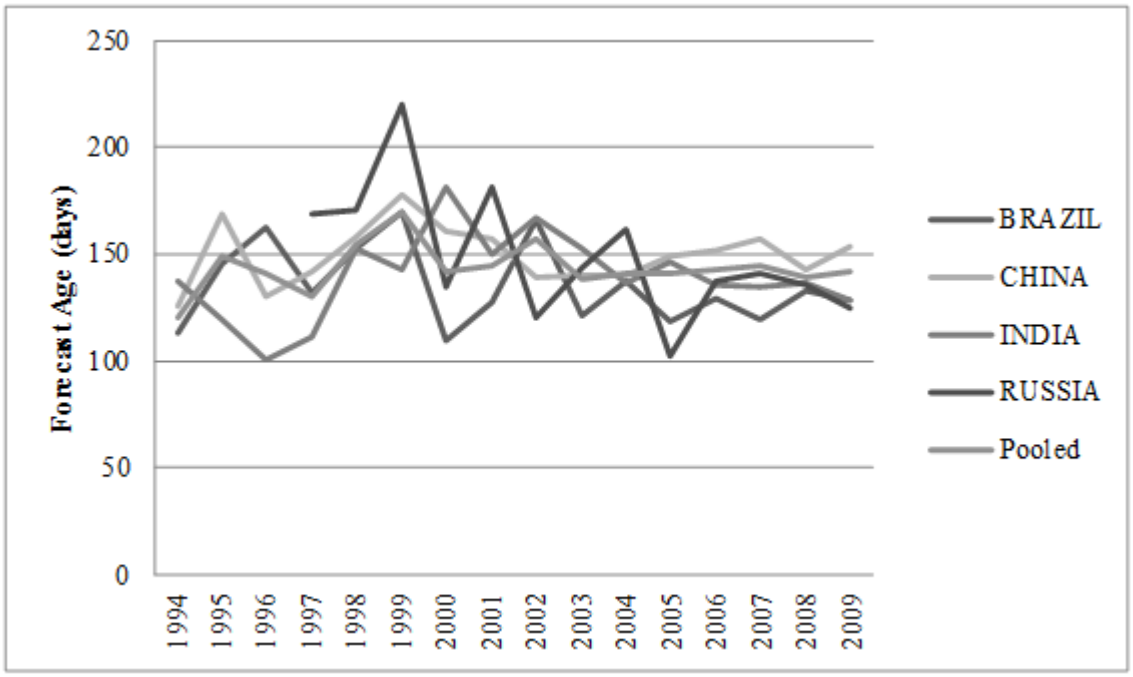


Based on the chart, it appears that analyst forecast errors are relatively low (i.e. forecast accuracy is high) for each country and in the aggregate. Data on forecast accuracy in Russia was available from 1997 and forecast errors in Russia tend to be higher than in the other BRIC countries in earlier years. The forecast error for the BRIC countries in aggregate is generally less than 0.05. In comparison, forecast error in the U.S. has generally been approximately 0.15 in the post-2002 period. We attribute the differences in analyst forecast accuracy to country-specific differences in the amount of non-public information that company management can provide to analysts and differences in the extent and manner in which each country was affected by the financial crises beginning in 1999 and 2009.

We have previously hypothesized that forecast accuracy is a function of five analyst-specific attributes. These analyst-specific attributes include forecast age, forecast frequency, analyst experience, number of companies followed and industry specialization. The following figures present the time-series of each of these five analyst-specific attributes and provide visual perspective on changes in the analyst-specific attributes over time.

Figure 2 shows that the timeliness of analyst forecasts has stayed relatively constant across time. While early data on Russian forecasts shows a higher forecast age, over time, the age of the Russian forecasts is similar to the other countries in the group. As in the case of the forecast error, there is greater convergence of forecast age during this period. In recent years, the pooled forecast age for the BRIC countries has been about 140 days, which is somewhat higher than the approximately 110 days in the case of U.S. forecasts. Despite not being as timely as the U.S. forecasts, it is surprising that BRIC forecasts show evidence of greater accuracy. This observation is somewhat at odds with our expectations since more timely forecasts have been shown to be more accurate.

FIGURE 2
FORECAST AGE



For the BRIC countries as a group, Figures 3 and 4 demonstrate a small increase both in the frequency of analyst forecasts and the experience of analysts. In 2009, on average, analysts made about 2.5 earnings forecasts per company. Increases in the frequency of forecasts are typically associated with increases in forecast accuracy. In 2009, on average, analysts had about two years of experience in making earnings forecasts for a given company. Increases in experience are typically associated with increases in forecast accuracy. Analysts following U.S. companies on the other hand, make approximately four forecasts each year and have approximately 3.5 years of experience for the companies they follow.

FIGURE 3
FORECAST FREQUENCY

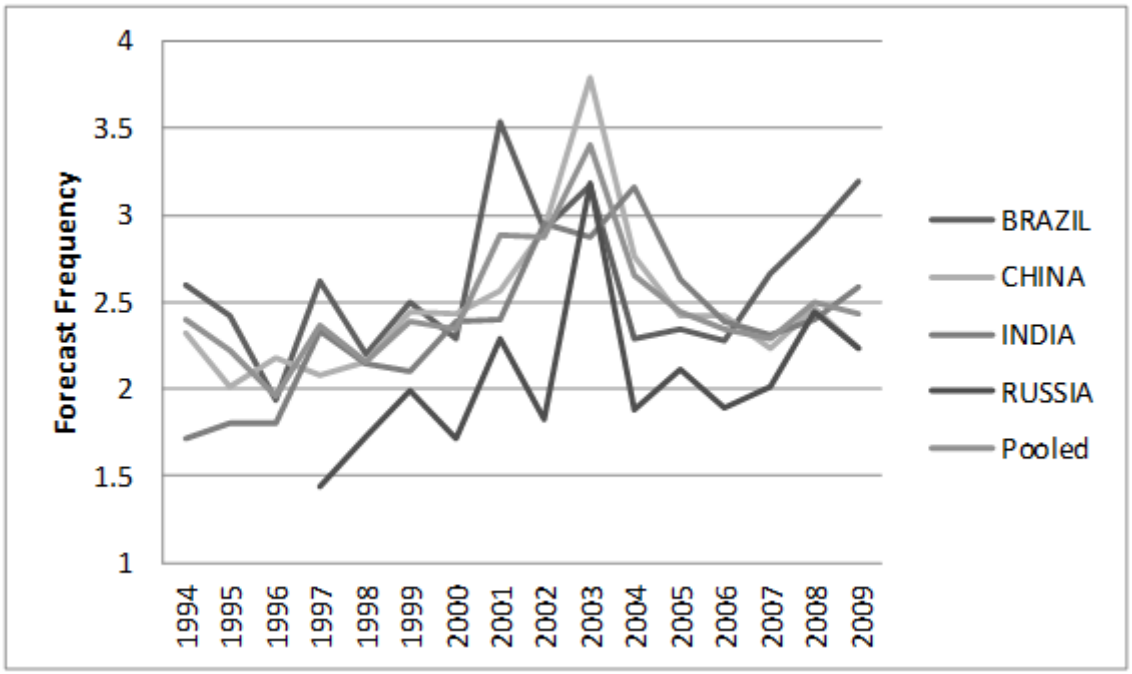
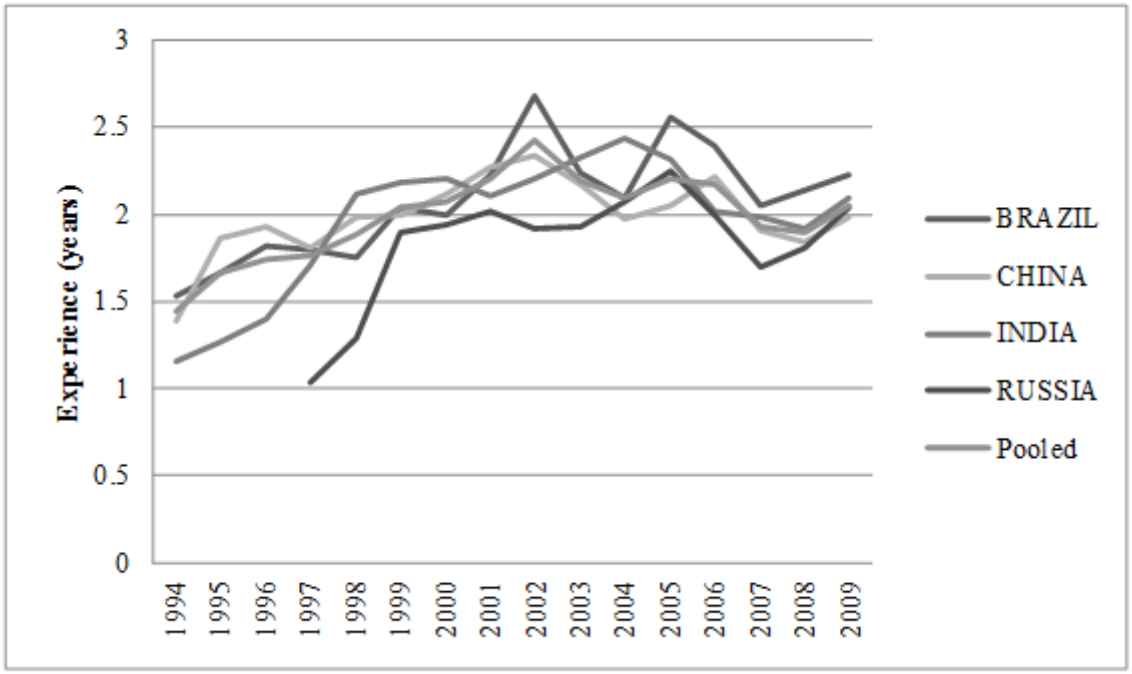
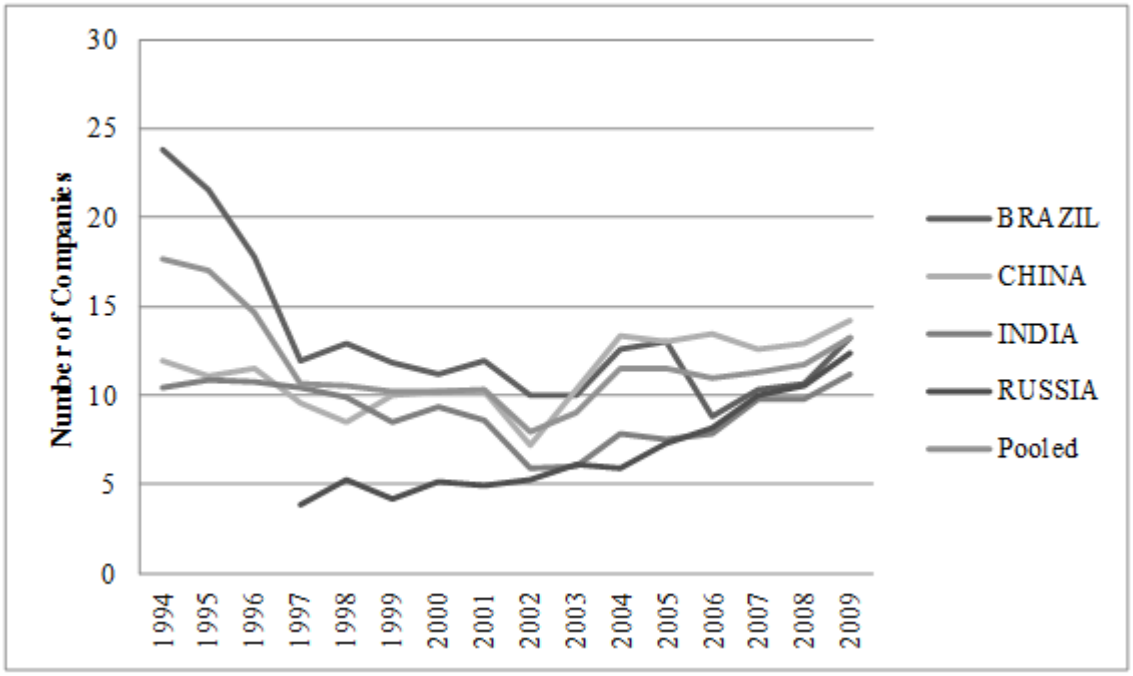


FIGURE 4
ANALYST EXPERIENCE (YEARS)



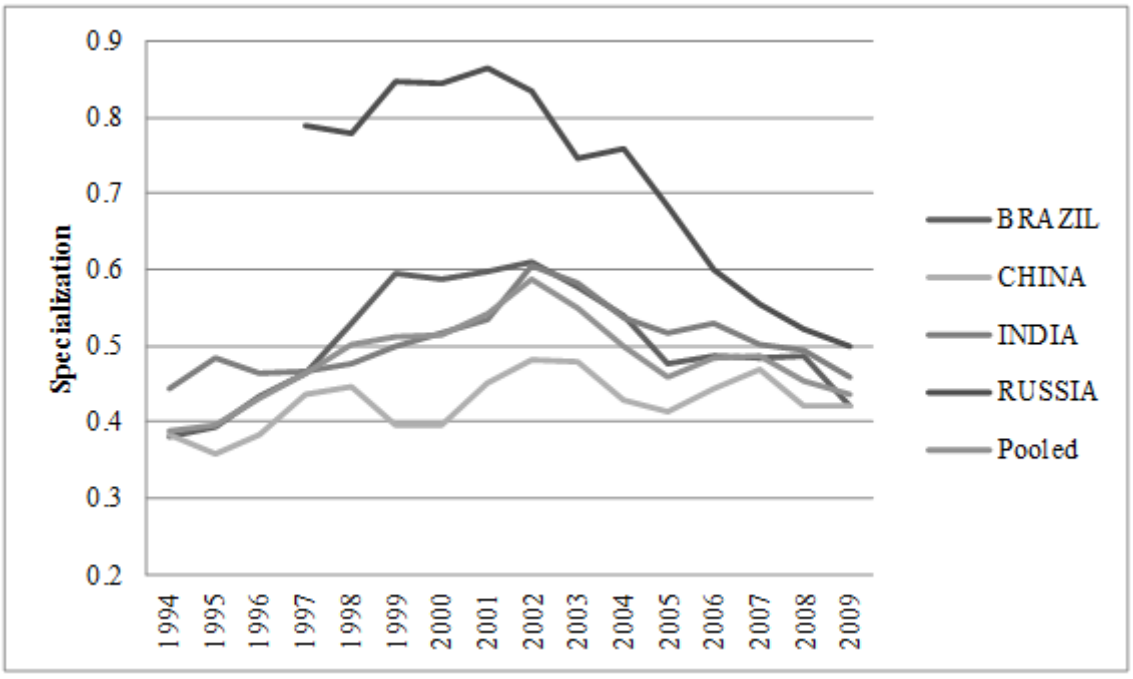
The last two charts examine the time-series trend in number of companies followed (Figure 5) and industry specialization (Figure 6). The number of companies followed has stayed relatively constant at approximately 10-15 companies. However, there is a greater convergence amongst the BRIC countries over time. Generally, analysts who followed a greater number of companies tended to produce less accurate earnings forecasts.

FIGURE 5
NUMBER OF COMPANIES FOLLOWED



Industry specialization has also stayed relatively constant over time in the 40%-50% range (note that a reading of 100% for this variable indicates that all companies followed by an analyst are in the same industry). As before, there is a greater convergence amongst the BRIC countries. Prior research shows that greater industry specialization is associated with greater forecast accuracy. In the U.S., the number of companies followed is approximately 15 and the extent of specialization is in the 65%-70% range. Surprisingly, the number of companies followed has increased and the extent of specialization has decreased somewhat in recent years.

FIGURE 6
EXTENT OF INDUSTRY SPECIALIZATION



The number of observations that were available to us across the BRIC countries range from 1,135 observations in the year 1994 to 7,998 observations in the year 2009. For each year we had calculated the average forecast error for each BRIC country and pooled for all BRIC countries. We had also calculated the averages for each of the five analyst-specific attributes include forecast age, forecast frequency, analyst experience, number of companies followed and industry specialization. The annual averages for these six variables (pooled across all BRIC countries) are presented in Table 1.

We also averaged these observations by country and by year, producing 61 country-year averages (16 years for Brazil, India and China, and 13 years for Russia) of forecast error and each of the five analyst-specific attributes (forecast age, forecast frequency, analyst experience, number of companies followed and industry specialization). We used these 61 country-year average values of each of the six variables mentioned above in a correlation analysis to determine the strength and direction of relationships amongst these six variables. In addition, a variable called 'year' (corresponding to the years 1994 to 2009) is included to analyze for any trends in the data over time. The results of this correlation analysis are provided in Table 2.

TABLE 1
AVERAGE FORECAST ERROR AND ANALYST ATTRIBUTES

Year	Observations	Forecast Error	Forecast Age	Forecast Frequency	Years of Experience	Companies Followed	Industry Specialization
1994	1135	0.0378	120.556	2.403	1.438	17.725	0.388
1995	1906	0.0445	148.942	2.220	1.668	17.002	0.396
1996	2409	0.0636	140.649	1.960	1.746	14.686	0.430
1997	2313	0.0379	129.829	2.369	1.758	10.707	0.467
1998	2619	0.0628	154.845	2.154	1.886	10.594	0.502
1999	2112	0.0946	169.662	2.384	2.043	10.265	0.511
2000	2109	0.0388	142.348	2.341	2.076	10.251	0.514
2001	2294	0.0441	144.440	2.888	2.203	10.336	0.541
2002	1427	0.0482	157.319	2.878	2.426	7.938	0.587
2003	1629	0.0334	138.403	3.401	2.196	9.012	0.549
2004	2321	0.0245	140.711	2.655	2.095	11.573	0.499
2005	2666	0.0234	140.652	2.438	2.202	11.558	0.460
2006	3083	0.0213	143.155	2.343	2.176	10.933	0.485
2007	4892	0.0174	145.031	2.291	1.926	11.343	0.487
2008	6859	0.0190	139.597	2.500	1.894	11.732	0.453
2009	7998	0.0341	141.957	2.434	2.046	13.209	0.436

TABLE 2
CORRELATION ANALYSIS

	FE	FA	FF	YE	CF	IS	T
FE	1	0.526	-0.197	-0.090	-0.217	0.584	-0.162
		(0.001)	(0.129)	(0.493)	(0.093)	(0.001)	(0.213)
FA		1	0.064	0.196	-0.152	0.031	-0.049
			(0.622)	(0.126)	(0.239)	(0.815)	(0.707)
FF			1	0.630	0.216	-0.330	0.354
				(0.001)	(0.092)	(0.009)	(0.005)
YE				1	-0.024	-0.175	0.540
					(0.856)	(0.175)	(0.001)
CF					1	-0.708	-0.079
						(0.001)	(0.539)
IS						1	-0.028
							(0.828)
T							1

FE=Forecast Error, FA=Forecast Age, FF=Forecast Frequency, YE=Years of Experience, CF=Companies Followed, IS=Industry Specialization, and T=Year. N=61; p-values in parenthesis.

The correlation analysis shows significant relationships amongst the variables analyzed. Specifically, the correlation coefficient between forecast error and forecast age is 0.526 (which is significant at the 1% level), indicating that reductions in forecast age are associated with increases in forecast accuracy. This observation is consistent with prior research conducted using U.S.-based companies (Clement 1999). Surprisingly, the relationship between forecast error and companies followed is negative, as is the relationship between forecast error and industry specialization. We speculate that these results will obtain if relatively inexperienced analysts (who are more likely to have larger forecast errors) are assigned fewer companies and companies within a common sector. This observation can also be confirmed by observing the positive relationship between forecast frequency and experience, *viz.* experienced analysts can take advantage of their competencies to make more frequent forecasts. As can be expected, the relationship between forecast error as well as time and between forecast error and experience is negative, and the relationship between experience and time is positive, suggesting that BRIC analysts' experience will be built over time, and an increase in experience will lead to a decrease in forecast error.

Note that significant correlation exists among many analyst specific characteristics, making multiple regressions difficult due the potential for multicolinearity. We therefore performed univariate regressions of forecast errors on each of the five analyst-specific variables individually. Because these regressions contained a single independent variable, the only incremental information obtained is the relative strength of the relationship, as represented by adjusted R^2. The results of these regression analysis are provided in Table 3. These results confirm that both forecast age and industry specialization have explanatory power, while forecast frequency and experience do not.

TABLE 3
UNIVARIATE REGRESSION ANALYSIS

		Dependent Variable = Forecast Error				
Independent Variable	FA	0.001** (4.75)				
	FF		-0.023 (-1.54)			
	YE			-0.015 (-0.69)		
	CF				-0.003* (-1.71)	
	IS					0.248** (5.53)
	Intercept	-0.142** (-3.48)	0.105** (2.85)	0.079* (1.80)	0.083** (3.98)	-0.082** (-3.36)
	Adj. R^2	0.26	0.02	0.00	0.03	0.33

FA=Forecast Age, FF=Forecast Frequency, YE=Years of Experience, CF=Companies Followed, and IS=Industry Specialization. N=61; ** significant at the 1% level; * significant at the 10% level; t-statistics in parenthesis.

We also conducted bivariate regressions as part of our analysis. Recall that because of the potential for multicolinearity, along with the small sample size in our analysis, a regression including all five analyst specific characteristics is not possible. However, while forecast age was related to forecast error, it was not related to any of the other four analyst-specific independent variables. We can thus use both forecast age and each of the other four analyst-specific independent variables in turn, to explain forecast error. The results of this bivariate analysis are presented in Table 4.

TABLE 4
BIVARIATE REGRESSION ANALYSIS

		Dependent Variable = Forecast Error			
Independent Variable	FA	0.001** (4.60)	0.001** (4.79)	0.001** (4.35)	0.001** (4.08)
	FF	-0.016 (-1.25)			
	YE		-0.019 (-1.02)		
	CF			-0.001 (-0.64)	
	IS				0.203** (4.91)
	Intercept	-0.096* (-1.78)	-0.106* (-1.96)	-0.122* (-2.42)	-0.203** (-5.53)
	Adj. R^2	0.27	0.26	0.26	0.47

FA=Forecast Age, FF=Forecast Frequency, YE=Years of Experience, CF=Companies Followed, and IS=Industry Specialization. N=61; ** significant at the 1% level; * significant at the 10% level; t-statistics in parenthesis.

The results of the bivariate regression analysis provide additional context to prior findings. The four models have a relatively high adjusted R^2, ranging from 0.26 to 0.47. The intercept is negative and significant in all models. The coefficient on forecast age is positive (as expected) and significant in each of the four models. The coefficients on the forecast frequency, years of experience and companies followed variables are all insignificant. As before, the coefficient on the industry specialization variable is positive and significant; indicating that in the case of the BRIC countries, a greater degree of industry specialization is currently associated with greater forecast error.

CONCLUSION

In this paper, we examine changes in analyst forecast accuracy in the BRIC countries during the period 1994-2009. We also use analyst-specific variables (which have been previously shown to impact forecast accuracy in the U.S.) to explain forecast accuracy in the BRIC countries. BRIC countries increasingly rely on capital markets to finance their growth opportunities, and analysts play an important role in making the capital markets informational efficient by applying their expertise in processing public and proprietary information into earnings forecasts.

We find that the level of forecast accuracy in BRIC countries is fairly high and shows some signs of improvement. We also find that analysts in BRIC countries are making forecasts with greater frequency. We also find some surprising disparities in capital market practices in BRIC countries, *viz.* higher levels of specialization and fewer companies followed leads to lower forecast accuracy. Finally, analysts tend to issue forecast for companies for longer periods of time (i.e., are more experienced in the companies for which they issue forecasts). Our analysis also indicates that in BRIC countries, analyst forecast accuracy can be largely explained by forecast age. Forecast frequency and years of experience are not significant determinants of forecast accuracy. Interestingly, while there are country-specific differences in forecast age, forecast frequency, years of experience, number of companies followed and industry specialization, these differences have narrowed during the period of our study, i.e. there is some evidence of convergence.

Sound capital market practices are important for economic development. This is all the more important in the case of the developing BRIC economies which need effective capital markets and foreign institutional investment to support their high growth rates. It is therefore important to understand capital market practices in the BRIC countries, the evolution of these practices, and comparisons of these practices with those in developed markets. Future research in this area should attempt to develop a comprehensive model (which would include analyst-specific, company-specific, brokerage-specific, and country-specific factors) to explain the level of forecast accuracy and improvements in the level of forecast accuracy.

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