Target Price Accuracy: International Evidence

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ABSTRACT: This paper shows that analysts exhibit differential and persistent ability to issue accurate target prices (TPs) and that institutional and regulatory differences across countries affect TP accuracy. Using a sample of 16 countries, we find that better past TP forecasters, analysts with higher forecasting experience, following more firms, country-specialized, and employed by a large broker issue more accurate TPs. With respect to the country's institutional and regulatory setting, we find that factors such as the quality of financial reporting, the enforcement of accounting standards, and ownership concentration explain cross-country differences in TP forecast accuracy. Also, we show that the mandatory adoption of the International Financial Reporting Standards has improved TP accuracy.

Keywords: target prices; forecast accuracy; analyst characteristics; institutional and regulatory differences across countries.

Data Availability: Data are available from public sources indicated in the text.

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I. INTRODUCTION

A target price (TP) forecast reflects the analyst's estimate of the firm's stock price in 12 months, providing easy to interpret, direct investment advice. Target prices are valuable to investors[1], yet we know little about what determines TP accuracy. In particular, questions such as—do analysts exhibit differential and persistent ability to issue accurate target prices after controlling for analyst earnings-per-share (EPS) forecast accuracy, and how institutional and regulatory differences across countries, e.g. differences in reporting quality and enforcement of accounting standards, affect TP forecast accuracy—remain unexplored. The two questions are tightly interrelated as the institutional setting that firms operate in influences the amount and quality of information available to analysts, which is likely to have a direct effect on TP accuracy. Thus it is essential to examine both questions together to provide a more complete picture of the factors that explain the differences in analyst TP accuracy across countries.

Using data from 16 countries—the US, 12 European countries, Japan, Australia and Hong Kong—over the period 2002–2009, we study the determinants of analyst TP accuracy. We use two main TP accuracy measures. First, an indicator variable that equals one if the TP forecast is met by the actual stock price over the 12-month period after the forecast issue, *Met_any*. We document that during the 12-month forecast period the stock price reaches the target price in 55.9% of cases, with US firms having the lowest proportion of met TPs, 52.9%, and Australian firms the highest, 66.1%. Our second TP accuracy measure is the absolute difference between the TP forecast and the stock price at the end of the forecast horizon scaled by the stock price at the forecast issue date, *aTPE*. The mean absolute TP error is 47.7%, ranging from 37.4% for Japanese firms to 58.7% for Danish companies. The distribution in TP accuracy measures remains qualitatively the same when we

[1] Brav and Lehavy (2003) and Asquith et al. (2005) document strong incremental price reaction to TP revision announcements, controlling for concurrent stock recommendation and earnings-per-share revisions.

recalculate *Met_any* and *aTPE* using a shorter forecast period to account for TP revisions made before the end of the 12-month forecast period.

We examine analysts' ability to issue accurate target prices in two steps. First, we compare the accuracy of analyst TPs to the accuracy of simple price forecasts that investors can form based on information available at the TP issue date. If the accuracy of simple price forecasts is higher than that of analyst TPs, the latter offer no value to investors. We find that on average analyst TP forecast accuracy is higher than the accuracy of a naïve price forecast, which predicts that the stock price in twelve months will be equal to the stock price on the forecast issue date times one plus the previous 12-month firm buy-and-hold return. Specifically analyst TPs meet or exceed the accuracy of naïve price forecasts in 72% of cases, and the analysts' absolute TP forecast error is 8% lower compared to the absolute forecast error of the naïve price forecast. The accuracy of analyst TPs is also superior to other simple price forecasts such as those formed based on the industry price-to-earnings ratios and the market return over the preceding 12-month period.

Second, our multivariate analysis shows that analyst characteristics associated with superior forecasting skill predict TP accuracy. Analyst firm-specific forecasting experience reduces the TP forecast error, which means that analysts learn to produce more precise TPs over time for the firms they follow. However, analyst experience has no effect on the likelihood that a target price is met over the 12-month forecast horizon. Analysts following more firms issue more accurate TPs based on both TP accuracy measures. This is consistent with the international evidence on EPS forecast accuracy in Clement et al. (2003) and Bolliger (2004), and points to the existence of information spill-over effects from following multiple firms. Further, analysts who cover firms located in fewer countries—country specialized analysts—are more accurate TP forecasters. The evidence that country-specialization improves TP accuracy complements the results in Sonney (2009), who reports that country-specialized analysts produce more accurate EPS forecasts. Target prices made by

analysts employed by large brokers, who have access to a greater resource pool, are more likely to be met over the 12-month forecast period. Finally, looking at the persistence in analyst TP forecasting ability, we find that better past TP forecasters issue more accurate future TPs.

The relation between analyst characteristics and TP accuracy remains qualitatively similar when we recalculate *Met_any* and *aTPE* to account for TP revisions made before the end of the 12-month forecast period (*Met_any_rev* and *aTPE_rev*). For *aTPE_rev*, we also observe that TPs issued by analysts employed by larger brokers have lower TP error. Together, the results confirm that better quality analysts have persistent and differential ability to issue precise TP forecasts.

For characteristics related to institutional and regulatory differences across countries, we find that for both *Met_any* and *Met_any_rev*, TP forecasts are more likely to be met by the actual stock price in countries with higher quality reporting disclosure. Also, when we adjust TP error for TP revisions, we find that TPs issued for firms operating in countries with higher disclosure quality have on average lower error. This confirms the positive effect that higher disclosure has on TP accuracy. We report that target prices in countries with strong enforcement of accounting standards are less accurate. We attribute this result to the lower predictability of future firm earnings in countries with strong enforcement of accounting standards, which reduces the quality of earning-based inputs into valuation models that analysts use to arrive at target prices. This is consistent with Leuz et al. (2003), who find that enforcement reduces the propensity of firms to manage earnings, e.g. by smoothing earnings using accruals, which is likely to increase the variability of firm earnings and to reduce the predictability of future earnings. High ownership concentration increases the TP forecast error. This is because ownership concentration may promote private channels of communication between managers and blockholders, at the expense of public disclosure (La Porta et al. 2000), which reduces the amount and quality of information available to analysts in forecasting future stock prices. Finally,

we find that TP forecast accuracy improves after the mandatory IFRS adoption for the fourteen countries in our sample that implemented IFRS starting on January 2005.

Together, our analysis reveals that a country's institutional and regulatory environment affects TP forecast accuracy. This study complements previous evidence that finds that the degree of enforcement of accounting standards and disclosure quality influence EPS forecast accuracy (Hope, 2003a, 2003b), and that the mandatory IFRS implementation has improved EPS forecast accuracy (Byard et al. 2011; Horton and Serafeim 2010; and Preiato et al. 2010).

Our results are robust to a battery of sensitivity tests, which include using instrumental variable analysis to adjust for endogeneity in the analyst's projected price change estimate and using country fixed-effect regressions. We control for the accuracy of analyst EPS forecasts and document that better earnings forecasters issue more accurate target prices. This is consistent with better quality inputs into analyst valuation models improving TP accuracy. All regressions include firm characteristics that could predict TP forecast accuracy, such as proxies for the quality of the firm's information environment and analyst competition (firm market capitalization and the number of analysts covering the firm), firm total risk (stock price volatility), and predictable stock price patterns (price momentum). We also control for the magnitude of the forecasted stock price change, the ex-post stock market performance, industry and year dummies, and the effect of recent financial crisis. The analysis reveals that TP forecast accuracy is lower in all countries we investigate during the financial crisis 2007–2009.

This study will be of interest to both academic researchers and market participants. First, to date, the accuracy of target price forecasts have received very limited attention by the literature. This is surprising considering that TPs provide more direct and granular investment advice to investors compared to earnings forecasts or stock recommendations. A recent review of the analyst forecasting literature by Bradshaw (2010) emphasizes this point. His literature search identifies only

14 papers on analyst target prices listed in ABI/INFORM, and only three that look at target prices and earnings forecasts together. In particular, of the three published studies that provide some evidence on TP accuracy, Asquith et al. (2005) report only summary statistics on TP accuracy, and Demirakos et al. (2010) and Bonini et al. (2010) do not examine whether analyst and broker characteristics determine TP accuracy. In a working paper, Bradshaw and Brown (2007) investigate whether past TP accuracy can predict current TP accuracy, but they do not control for analyst or broker characteristics. Furthermore, none of these studies explore whether differences in institutional and regulatory settings influence TP accuracy, nor do they control for the contemporaneous relation between EPS and TP accuracy. Our paper fills this gap in the literature and documents that analysts exhibit differential and persistent ability to forecast target prices accurately. Further, compared to previous research, our study tests the largest set of potential TP forecast accuracy predictors providing the most comprehensive analysis of TP forecast determinants to date.

Second, this study is the first to provide evidence that institutional and regulatory differences between countries, such as the average reporting disclosure quality and the strength of enforcement of accounting standards, influence TP forecast accuracy. This adds important evidence to the literature on the effects that differences in disclosure and enforcement have on capital markets. Hope (2003b, 237) argues that "[A]lthough accounting researchers extensively explain variations in disclosure levels among firms and countries, research on the effects of differences in disclosure levels is more limited, especially in international settings (Saudagaran and Meek [1997])". Our findings should also be of interest to regulators, as forecast precision may reflect the level of informational efficiency of a market and the efficacy of local regulation. Finally, we document that the introduction of IFRS has improved analysts' ability to forecast accurate TPs, which contributes to the international debate on the capital-markets consequences of this regulation. Thus our study

responds to the call by Ramnath et al. (2008, 68), who state that "[F]inally, we expect to see more international research describing the institutional and regulatory factors that create cross-country differences in the role of analysts and the properties of their forecasts".

Third, the study has important implications for finance and accounting research that employs target prices: (1) to estimate the equity cost-of-capital (Brav et al. 2005; Botosan and Plumlee 2002, 2005; Botosan et al. 2011), or (2) as a predictor of within-industry variation in stock mispricing (Da and Schaumburg 2011). First, identifying more accurate target prices can increase the precision of the cost-of-capital estimates. Second, tests of association between the equity cost-of-capital proxies derived from target prices and other variables, e.g. firm size in Brav et al. (2005) and Botosan and Plumlee (2002, 2005), are subject to the classic error-in-variables problem. Consequently, we advocate that future research in this field controls for TP accuracy when estimating the equity cost-of-capital to ensure the consistency of estimates in the subsequent analysis. Further, studies that derive equity cost-of-capital estimates from TPs implicitly assume (but do not test) that analyst TPs reflect market expectations and that TP forecasts are superior to simple benchmarks based on past price performance (e.g. past realized returns). Our study provides evidence in support of the latter assumption.

Fourth, the findings are valuable to investors, allowing them to form more efficient estimates of future stock prices by attaching higher weight to more precise TP forecasts. This is likely to improve their capital allocation decisions. Our results also explain why we should find differences in the usefulness of target prices to investors across countries. In particular, the results are relevant for studies on the information content of target prices, as the market reaction to TP revisions should be a function of the forecast information content and the forecast precision, and for studies on the long-term investment value of analyst TPs.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature, and Section 3 outlines the research design. We describe the data in section 4, and Section 5 reports the empirical results. Section 6 presents the sensitivity analysis. We explore whether analysts can persistently issue more accurate target prices in Section 7 and section 8 shows the effect of IFRS adoption on TP forecast accuracy. We conclude in Section 9.

II. LITERATURE REVIEW

This section first outlines the previous TP accuracy studies that followed from the literature on EPS forecast precision.[2] This is followed by a review of studies that examine the relation between EPS forecast accuracy and the institutional and regulatory setting that firms operate in.

Compared to EPS forecast accuracy studies, the literature on target price accuracy is much more recent and substantially less populated. In the US market, Asquith et al. (2005) report that 54.3% of target prices by All American analysts made during 1997–1999 are achieved by the stock price by the end of the 12-month period, and the proportion of met TPs decreases with the forecast boldness, i.e. the magnitude of the projected price change. Asquith et al. find no relation between target price accuracy and the valuation model that analysts use to justify target price forecasts. Bradshaw and Brown (2007) find that 45% of target prices issued over the period 1997–2002 in the US are met during the 12-month forecast period, but find no evidence that analysts have persistent ability to forecast accurate target prices. Bradshaw and Brown argue that target price accuracy does not factor into analyst compensation, thus analysts have no incentive to issue accurate TPs. In another study, Gleason et al. (2008) find a positive association between concurrent earnings forecast

[2] For a comprehensive overview of EPS forecast accuracy studies, see Schipper (1991) and Brown (1993) who review the early literature in the field, Ramnath et al. (2008) who review the analyst forecasting literature since 1992, and Bradshaw (2010) for the most recent survey of the literature. As the accuracy of stock recommendations is difficult to quantify, the research on stock recommendations is centered on their investment value (Womack 1996; Mikhail et al. 2004), and their relation to EPS accuracy (Loh and Mian 2006).

accuracy and the investment value of target prices, which highlights the potential link between EPS and TP accuracy.

The international evidence with respect to target prices is equally limited. In an Italian study, Bonini et al. (2010) report that target price inaccuracy is larger for TPs predicting strong price increases, for larger firms, for loss-making ones, and for stocks with better analyst coverage and stronger momentum. Demirakos et al. (2010) find that after controlling for the difficulty of the valuation task, TPs derived from discounted cash flow valuation models are relatively more accurate than TPs produced from price-to-earnings multiples for one out of four TP accuracy measures, using a sample of 94 UK firms during the period 2002–2004. None of the previous studies examine whether analysts exhibit differential and persistent ability to issue accurate target prices, controlling for EPS accuracy and using analyst characteristics that proxy for superior analyst skill.

The relation between the institutional and regulatory setting and analyst EPS forecast accuracy

The evidence on how differences in institutional and regulatory settings across countries, e.g. differences in reporting quality and in the enforcement of accounting standards, affect the accuracy of analyst forecasts is limited. Basu et al. (1998) were among the first to examine the effects that country-differences in accounting disclosure have on EPS forecast accuracy. Using a sample of ten countries over 1987–1994, they report that countries with more frequent and higher quality disclosure have greater earnings forecast accuracy. Similarly to Basu et al., Hope (2003a, 2003b) reports that the consensus one-year ahead EPS forecast accuracy improves with high accounting disclosure quality for a sample of 18 and 22 countries respectively. Hope (2003b) also shows that the EPS forecast error is lower in countries with strong enforcement of accounting standards. Hope (2003b) concludes that higher quality disclosure increases analysts' understanding of the firm's

current and future performance, and stronger enforcement is more likely to ensure that managers comply with accounting rules, which reduces the uncertainty that analysts face about managers' accounting choices in financial statements. However, contrary to Hope (2003a, 2003b), Preiato et al. (2010) find a negative relation between EPS forecast accuracy and a self-constructed enforcement index that measures the country's auditing and accounting enforcement. The results from the above studies are consistent with Kothari (2000), who argues that the quality of firm financial reporting depends both on disclosure quality and regulatory enforcement, i.e. appropriate enforcement mechanisms must ensure actual firm compliance with the prescribed disclosure standards.

To date, no prior study has investigated how variations in institutional and regulatory settings across countries influence TP accuracy. This evidence is important because compared to one-year ahead EPS forecasts, target prices also incorporate the analyst's long-term view of firm earnings and of firm risk. Regulatory and institutional differences across countries can affect analysts' ability to forecast future earnings and risk, having an incremental effect on TP accuracy beyond their effect on EPS forecast accuracy.

III. RESEARCH DESIGN

We employ two main measures to capture analyst target price accuracy. The first measure is an indicator variable (*Met_any*) which is equal to one if the actual stock price, *P*, reaches the target price, *TP*, at any time over the 12-month forecast horizon, and zero otherwise. *Met_any* is constructed as follows:

$$\begin{aligned} &\text{for } {}^{TP}\!/_{P_s} - 1 > 0 : Met\_any = 1 \text{ if } TP - P \le 0 \,\big|\, \text{12-month forecast horizon}, \\ &\qquad\qquad Met\_any = 0 \text{ otherwise} \\ &\text{for } {}^{TP}\!/_{P_s} - 1 \le 0 : Met\_any = 1 \text{ if } TP - P \ge 0 \,\big|\, \text{12-month forecast horizon}, \\ &\qquad\qquad Met\_any = 0 \text{ otherwise} \end{aligned} \tag{1}$$

where P_s is the stock price on the forecast issue date. *Met_any* provides a simple measure of TP accuracy, but ignores the magnitude of the forecast error. For example, a "conservative" forecast that predicts a small price increase is more likely to be met over the 12-month period, but may strongly deviate from the actual stock price at the end of the forecast period. An investor following a limit-order strategy of selling a stock when it reaches the target price may have to forsake a larger proportion of a potential profit for a "conservative" forecast compared to a "bolder" forecast that is closer to the actual stock price at the end of the forecast period.

The second TP accuracy measure, *aTPE*, measures the magnitude of the forecast error. *aTPE* is the absolute difference between the target price and the actual price at the end of the 12-month forecast horizon, P_{12}, scaled by the stock price at the forecast issue date P_s,

$$aTPE = \frac{\left|TP - P_{12}\right|}{P_s} \tag{2}$$

Intuitively, *aTPE* reflects the investment error for a limit-order trading strategy. The actual price overshooting the target price reflects the loss of (potential) income from not holding the stock for the entire 12-month period; the actual price below the TP shows the difference between the actual and the expected payoff when holding the stock for 12-months. The absolute TP forecast error reflects that TPs far above the actual price are equally inaccurate as forecasts far below the stock price.[3]

The two TP accuracy metrics, *Met_any* and *aTPE*, capture forecast accuracy during the 12-month forecast period and at the end of the 12-month forecast period respectively, providing a more complete assessment of analyst forecasting accuracy compared to using only one forecast accuracy measure, as is common in EPS accuracy studies. Figure 1 graphically illustrates the relation

[3] An investor who follows a buy-and-hold investment strategy and holds a stock for 12 months after the target price release incurs only the risk of the downside error, i.e. the risk that the stock price is below (above) the target at the end of 12-month period when the analyst predicts a stock price appreciation (decline). In robustness tests, we replicate the analysis for this measure of TP forecast error.

between the target price forecast, the actual stock price and the two accuracy measures over the 12-month forecasting period.

A TP forecast revision made before the end of the forecast period "starts" a new 12-month forecast period. If the magnitude and the direction of the new forecast differ from the preceding TP, leaving the forecast horizon of the preceding TP intact is likely to negatively bias TP accuracy estimates. To account for TP revisions made prior to the end of the 12-month forecast period, we construct a variation of our two main TP accuracy measures. We calculate an indicator variable called TP-revision-adjusted *Met_any*, i.e. *Met_any_rev*, which is equal to one if the actual stock price, *P*, reaches the target price, *TP*, over the actual forecast period, i.e. the period from the forecast issue date to the forecast revision date. *Met_any_rev* measure is defined as:

$$\begin{aligned}
&\text{for } {}^{TP}\!/_{P_s} - 1 > 0 : Met_any_rev = 1 \text{ if } TP - P \le 0 \,|\, \text{actual forecast horizon}, \\
&\qquad\qquad Met_any_rev = 0 \text{ otherwise} \\
&\text{for } {}^{TP}\!/_{P_s} - 1 \le 0 : Met_any_rev = 1 \text{ if } TP - P \ge 0 \,|\, \text{actual forecast horizon}, \\
&\qquad\qquad Met_any_rev = 0 \text{ otherwise}
\end{aligned} \tag{3}$$

If an analyst does not revise her TP forecast over the 12-month forecast period after the TP issue, *Met_any_rev* = *Met_any*. The TP-revision-adjusted *aTPE, aTPE_rev,* is defined as:

$$aTPE\_rev = \frac{\left|TP - P_{rev}\right|}{P_s} \tag{4}$$

where P_{rev} is the stock price at the TP revision date. If an analyst does not revise her TP forecast over the 12-month period after the issue, *aTPE_rev* = *aTPE*.

Explanatory variables

To explain differences in target price accuracy across analysts, we use analyst and broker characteristics that previous studies associate with EPS forecast accuracy. This is because TP and EPS forecast accuracy predictors are likely to be correlated as they reflect, primarily, analyst

forecasting skill. We also identify variables related to the country's institutional and regulatory setting that can explain between-country variations in TP accuracy. The set of controls include the accuracy of the EPS forecast, the projected stock price change, and other variables that could explain target price accuracy. For ease of exposition, we divide the independent variables into five categories: (1) analyst- and broker-specific variables, (2) institutional and regulatory characteristics, (3) EPS and TP forecast-specific, (4) firm-specific, (5) and other controls.

Analyst and broker characteristics

We identify four analyst characteristics that previous studies have associated with EPS forecast accuracy. We use analyst firm-specific forecasting experience (*A_exp*) as a proxy for analyst forecasting skill and knowledge gained over time (Clement 1999).[4] We calculate the number of firms (*A_#Firm*) an analyst follows as Clement (1999) suggests that it is more onerous and complex to actively follow and produce research reports for a large number of companies. Clement (1999) finds that analysts who follow more firms produce less accurate EPS forecasts. However, Clement et al. (2003) and Bolliger (2004) find that outside the US market, analysts who follow more firms produce more accurate EPS estimates, which suggests that analysts may benefit from information spill-over effects from following multiple firms. Sonney (2009) reports that country-specialized financial analysts produce more accurate EPS. We count the number of countries (*A_#Count*) where the firms followed by the analyst are domiciled to measure the analyst country specialization. The number of analysts employed by a broker (*B_#Ana*) reflects the amount of resources available to analysts. Clement (1999) and Jacob et al. (1999) find that analysts with access to a large resource pool issue more accurate EPS forecasts.

[4] We use analyst firm-specific experience because Clement (1999) reports that analyst firm-specific experience has a consistent positive relation with EPS accuracy compared to analysts general forecasting experience, which shows a negative relation with EPS accuracy in the early sample period and only a weak positive association with EPS forecast accuracy in the latter period.

Institutional and regulatory characteristics

We use three variables to capture variations in the institutional and regulatory environment that may affect the average TP forecast accuracy. The disclosure index (*Disclosure*) and the index of enforcement of accounting standards (*Enforcement*) are from Hope (2003b) and capture country variations in the average firm reporting quality and enforcement of accounting standards, respectively. The disclosure index is based on aggregate annual financial statement disclosure scores from CIFAR (1993, 1995), and the degree of enforcement of accounting standards is based on a factor analysis of (1) country-level audit spending, (2) judicial efficiency, (3) rule of law, (4) insider trading laws, and (5) shareholder protection. We expect analysts to produce more accurate TPs for firms in countries with high disclosure quality. Strong enforcement of accounting standards may reduce the uncertainty that analysts face about managers' accounting choices (Hope 2003b), which should improve TP forecast accuracy. However, enforcement may also increase the variation in firm earnings and decrease the propensity for earnings smoothing. These effects are likely to reduce the predictability of future firm earnings and, consequently, reduce the quality of earning-based inputs into valuation models that analysts use to arrive at target prices. This is particularly important as (1) target prices reflect the analyst's view of the firm's *current* and *future* earnings, and as (2) discounted cash flow models and earnings-based valuation models are becoming more important among analysts to produce target prices (Imam et al. 2008). Ownership concentration (*Owner con*) from La Porta et al. (1998) measures the proportion of shares owned by the three largest shareholders among the top ten largest privately owned (non-financial) firms in a given country. Large blockholders may have privileged access to firm management, which can limit the firm's incentive to provide timely and high quality disclosure to the public.

Other explanatory variables: EPS and TP forecast characteristics

An EPS forecast is the main input into the valuation model used to produce a target price, independently of whether analysts uses simple heuristics, such as price-to-earnings ratios, to justify their target prices (Bradshaw 2002) or more sophisticated models, such as the residual income model (Gleason et al. 2008). Further, Gleason et al. (2008) find that analyst EPS forecast accuracy positively correlates with the TP forecast investment value, which highlights the potential link between EPS and TP accuracy. If analysts do not exhibit differential ability to issue accurate target prices, TPs will only reflect the accuracy of earnings forecasts. We measure EPS forecast error (*aEPS*) as the absolute difference between the forecasted and actual earnings, scaled by the stock price at the end of the previous fiscal year.[5] We use the ratio of the target price to the concurrent stock price at the TP issue date less one, to measure the projected stock price change (*TP/P*). TPs that are further away from the concurrent price are more difficult to be met by the actual stock price and are more likely to be ex-post inaccurate.

Other explanatory variables: firm characteristics

Firm characteristics include firm market capitalization (*MV*) and the number of analysts following a firm (*F_#Ana*), which proxy for the quality of the firm's information environment and competition among analysts respectively. We expect analysts to produce more accurate forecasts for firms with a rich information environment and when competition among analysts is high. We use price momentum, *MOM*, to capture predictable price patterns. Continuation (reversal) in price momentum may increase (decrease) TP accuracy. We use stock price volatility scaled by the mean price level to measure firm total risk (*COV*).[6] Option theory suggests that higher stock price

[5] Firm actual and forecasted earnings, and stock prices are expressed in the company's reporting currency on IBES.
[6] Using the stock price coefficient of variation (*COV*) to capture price variation adjusts for differences in price levels and currency across firms.

volatility should increase the likelihood the stock price will meet the target price over the TP forecast horizon (Bradshaw and Brown 2007). At the same time, the absolute TP error should be larger for more volatile, i.e. less predictable, stocks.

Other control variables and regression specification

We use the performance of the leading market index for the (primary) exchange where the firm's stock lists, over the 12 months after the TP issue date to capture the target price accuracy component that is due to the (random) ex-post performance of the equity market (*Mkt ret*). Unexpectedly poor (good) market performance means that TPs predicting a stock price decline (appreciation) will have a higher chance of being ex-post accurate, even if individual analysts have no differential ability to forecast target prices accurately. A dummy variable (*Fin cris*) flags the recent financial crisis period. We mark the beginning of the financial crisis period in September 2007.[7] The financial crisis continues until the end of our sample period. To control for time and industry effects, we include a set of annual dummies (*Year dummies*) and ten industry dummies (*Industry dummies*). Industry dummies are based on the sector code from IBES SIG code. Table 1 provides detailed variable definitions. All continuous dependent and explanatory variables are winsorized at the 1% level.

[Insert Table 1 around here]

The empirical specification of our multivariate regression that examines the determinants of TP forecast accuracy is:

[7] September 2007 is the month in which Swiss Bank UBS announced a third quarter pre-tax loss of $690 million and a $3.42 billion write-down of mortgage backed securities. Announcements of losses on mortgage backed securities by other large international banks followed shortly, leading to the subprime crisis.

$$
\begin{aligned}
Accuracy\ measure = {} & \varphi_0 + \varphi_1 \ln A\_exp + \varphi_2 \ln A\_\#Firm + \varphi_3 \ln A\_\#Count + \varphi_4 \ln B\_\#Ana \\
& + \varphi_5 \ln Disclosure + \varphi_6 Enforcement + \varphi_7 \ln Owner\ con \\
& + \varphi_8 \ln aEPS + \varphi_9 \frac{TP}{P} + \varphi_{10} \ln MV + \varphi_{11} \ln F\_\#Ana + \varphi_{12} MOM + \varphi_{13} COV \\
& + \varphi_{14} Mkt\ ret + \varphi_{15} Fin\ cris + \sum_{k=0}^{10} \varphi_{16+k} Industry\ dummies + \sum_{k=0}^{14} \varphi_{27+k} Year\ dummies + \varepsilon
\end{aligned}
\tag{5}
$$

where the *Accuracy measure* is one of the TP accuracy measures defined above, and ln denotes a logarithmic transformation of the variable.[8] Also, in regressions where the TP forecast accuracy measures are adjusted for the actual length of the holding period (*Met_any_rev* and *aTPE_rev*), the return on the market index (*Mkt ret*) is calculated over the same period as the accuracy measures.

IV. DATA AND SAMPLE

Target price forecasts for firms domiciled in 16 countries are collected from the IBES International Detail files from January 1, 2002 to July 1, 2009.[9] We select only target prices with a 12-month forecast horizon, for firms where the actual stock price is non-missing for 12 months before and 12 months after the forecast issue date. We retain target prices accompanied by one-year-ahead EPS forecasts, where the accompanying EPS forecast is issued within the past 90 days, and the TP issue date is prior to the EPS review date (the date on which the analyst last confirmed that her EPS forecast is still outstanding).[10] Further, as in Clement (1999), we retain EPS forecasts issued between 30 days and 330 days prior to the fiscal-year-end date. We use the US and international versions of

[8] For *aTPE*, *aTPE_rev, aEPS*, and *A_exp* we use log 1 + corresponding variable.

[9] IBES international files are scarcely populated with target prices before 2002. The other commonly used source of target price data, First Call, was acquired by Thomson Reuters in June 2001 and was subsequently merged with IBES (verified by email correspondence with Thomson Reuters). First Call target price data was discontinued in 2004.

[10] Our correspondence with the IBES representative confirms that a TP forecast issued without an accompanying EPS forecast on IBES implies that the analyst considers her latest EPS forecast to be still outstanding, provided that the TP forecast is issued prior to the EPS review date. We use EPS at most 90 days prior to the TP forecast issue to eliminate stale EPS estimates.

the broker translation file to match broker names between the target price and EPS files.[11] Analyst and broker characteristics are constructed using the IBES detail EPS file starting from January 1995, which avoids eliminating observations in the early sample to construct our explanatory variables and produces more reliable measures (Clement 1999). Our final sample includes 579,497 target price forecasts for 9,499 firms issued by 13,025 analysts employed by 605 brokers.

[Insert Table 2 around here]

Table 2 describes the sample breakdown by country. Firms from the largest capital markets—the US, the UK and Japan—dominate the sample (70.6% of sample TPs), with US firms alone making up 56.17% of the sample target prices and 43.78% of the sample firms. Firms from the US and the UK enjoy large broker (328 and 132) and analyst coverage (5,312 and 2,117), consistent with New York and London playing a dominant role in international financial markets. The proportion of Hong Kong domiciled firms in the sample is similar to that of the more mature European markets, such as France and Germany, which reflects the importance of Hong Kong as a financial hub in Asia.

Descriptive statistics for TP accuracy measures

Panel A of Table 3 presents the descriptive statistics for the analyst TP and EPS forecast accuracy measures. Across the pooled sample, 55.9% of TP forecasts are met at some point during the 12-month forecast period. The lowest proportion of met TPs can be found in the US (52.9%)[12], while the highest proportion of met TPs is in Australia (66.1%) and Hong Kong (64.3%).[13] Our sample

[11] The broker translation file is from 2005, which eliminates broker houses covered by IBES after that date. We lose less than 4% of target price forecasts due to this limitation.

[12] This is consistent with prior US evidence. The proportion of target price forecasts met at some point during the 12-month forecast period is 45% in Bradshaw and Brown (2007), who examine TP accuracy in the US over the period 1997–2002, and 54.3% in Asquith et al. (2005) for Institutional Investor All-American analysts in the US over the period 1997–1999.

[13] A contributing factor to the relatively high *Met_any* TP accuracy for Australian firms could be the commodity boom, which resulted in the Sydney All Ordinaries Index outperforming the S&P500 index by 4.2% p.a. over the period

mean absolute TP forecast error is 47.7%, and ranges from 58.7% in Denmark to 37.4% in Japan. Mean *aTPE* in the US is among the highest in the sample at 50.6%, which mirrors the low frequency of met TPs in this market.

[Insert Table 3 around here]

Using the TP-revision-adjusted *Met_any*, i.e. *Met_any_rev*, the average proportion of met TPs reduces to 40.5%. This reflects that, conditional on the magnitude of projected price change (*TP*/*P*), the TP forecast is less likely to be met by the actual stock price over shorter horizons. The lowest proportion of met TPs is found in the US (37.3%) and the highest proportion is found in Finland (47.7%). Using the TP-revision-adjusted absolute TP error measure, *aTPE_rev*, the mean absolute forecast error reduces to 41.4%, compared to 47.7% for the *aTPE* measure, and is the highest in Denmark (47.3%) and the US (46.5%), and the lowest in Finland (29.9%) and France (29.7%).[14] In unreported results, we find that the sample mean EPS error is 2% of the stock price at the end of the previous fiscal year. The lowest mean EPS forecast error is in the US, 1.5%, and is statistically lower compared to the mean EPS error of 2.6% for the remaining 15 countries based on a *t*-test and Wilcoxon test. This suggests that even though EPS forecasts are on average more accurate in the US, they do not necessarily translate into more accurate TPs.

Panel B presents the average TP accuracy measures for each year in the sample. *Met_any* improves, in general, over the period 2002–2006, from 38.3% to 63.1%, but deteriorates during the financial crisis period 2007–2009. The dramatic recovery in *Met_any* during 2009 likely reflects the

January 2002–January 2009. High TP accuracy for firms in Hong Kong is likely driven by the double-digit growth in China, with Hang Seng outperforming the S&P500 by 6.5% p.a. over the same period as above. This reflects the importance of controlling for the market return performance after the TP forecast issue when examining TP forecast accuracy.

[14] In unreported results, we find that the average singed TP error is 8.2%. The signed TP error is the highest in Italy (14%) and Japan (11.6%) and the lowest in Hong Kong (−10.9%) and Sweden (−2.3%). We do not use the signed TP forecast error as: (1) the signed TP error does not properly distinguish between more and less accurate analysts over our sample period because it averages out the low or negative TP error over the boom years (2003–2007) and the positive TP error due to the financial crisis, and (2) previous EPS accuracy studies use absolute EPS error to measure forecast precision.

effect of the spring 2009 market rally. Average absolute TP error reduces from 59.4% in 2002 to 35.4% in 2006, and levels out at 54.4% over 2007–2009. The patterns for *Met_any_rev* and *aTPE_rev* mirror that of *Met_any* and *aTPE* respectively.

Panel C evaluates the correlation coefficients among the various TP forecast accuracy measures. There is a strong positive correlation between *Met_any* and *Met_any_rev* (0.732) and between *aTPE* and *aTPE_rev* (0.755), which suggests that TP revisions have little effect on the construct validity of our main TP accuracy measures. Consequently, the specification of the TP accuracy measures should have relatively little influence on the validity of our inferences. Further, the indicator and continuous TP forecast accuracy measures are significantly correlated, which indicates that they capture complementary dimensions of TP accuracy.

Descriptive statistics for explanatory variables

Table 4 reports the summary statistics for the explanatory variables. The average analyst firm-specific forecasting experience is slightly over 3 years, and analysts following US and Japanese firms have the longest mean experience following a firm (3.2 and 3.5 years). Also, analysts following US and Japanese firms produce research reports for the largest number of firms (around 14 firms) compared to the pooled sample mean of slightly over 12 firms. On average, Dutch firm analysts follow companies from over 2.3 countries, which likely reflects the relatively small domestic equity market in the Netherlands. Analysts for US and Japanese firms show the highest country-specialization as they are the least likely to forecast across multiple countries. Brokerage firms employ on average over 83 analysts. The UK has the highest accounting disclosure index (0.831) and Austria the lowest (0.607). The mean ownership concentration index is 0.207, and the US has the most dispersed ownership structure. Italy and Spain have the lowest values of the enforcement index (−3.55 and −3.65 respectively), and the US and the UK the highest (1.21 and 1.16 respectively).

[Insert Table 4 around here]

On average, analysts project an 18.6% increase in the stock price over the next 12 months, with *TP*/*P* ranging from 23.3% for Swiss firms to 9.5% for firms domiciled in Belgium. The mean *TP*/*P* ratio for US firms is 20.6%, which is considerably lower compared to earlier US evidence (30.9% during 1997–2002 in Bradshaw and Brown, 2007, and 32.9% during 1997–1999 in Asquith et al., 2005). The lower projected price increase found in our sample for US firms may reflect the effect of the NASD 2711 regulation and the SEC rule 472 introduced in 2002. The rules were intended to reduce conflicts of interests in analyst research and promote less biased sell-side equity research. These rules prohibit members of the NASD and NYSE from tying analyst compensation to the broker's investment banking transactions and from offering favorable research to a firm as an incentive to elicit future investment banking business. Even though the regulation was specific to the US market, it is likely that global brokerage houses implemented these rules across their US and overseas divisions.

The mean firm capitalization is $9,587.5m and sample firms are followed on average by approximately 16 analysts. Target prices are released following an average 0.2% decline in the stock price over the prior 90 days, while the prior one-year mean stock (standardized) price volatility preceding the TP issue is 8.3%. The mean market return is 4.1% for the 12-month period following the TP forecast issue and reduces to 2.3% when truncating the returns on the TP revision date (results untabulated). Over 36% of TP forecasts have been issued during the financial crisis. Overall, Table 4 shows that our sample reflects a variety of institutional settings and that there is a strong variation in analyst, broker and firm characteristics. Consequently, our sample provides an ideal research setting to test for determinants of within- and across-country variations in TP forecast accuracy.

V. EMPIRICAL RESULTS

We examine analysts' ability to issue accurate target price forecasts in two steps. First, we compare the accuracy of analyst TPs to the accuracy of simple price forecasts that investors could form based on the information available at the TP issue date. If the accuracy of simple price forecasts is higher than that of analyst TPs, the latter offer no value to investors. Second, to examine if analysts have differential ability to produce accurate target prices, we estimate the TP forecast accuracy model specified in equation (5).

Do analyst TP forecasts beat simple price forecasts based on past stock performance?

This section examines if analyst TPs beat the accuracy of simple price forecasts based on the information available at the TP issue date. A simple Bayesian forecast extrapolates past stock performance into the future and is our naïve price forecast, which we pitch against analysts' TP forecasts.

Table 5 compares the accuracy of analysts' TPs to the accuracy of naïve price forecasts across the 16 countries in our sample. The naïve price forecasts predict that the stock price in 12 months will be equal to the stock price at the forecast release date times one plus the previous 12-month buy-and-hold return, *naïve price forecasts*. For each *naïve price forecast*, we calculate the four TP accuracy measures from Section 3, *naive Met_any, naive aTPE, naive Met_any_rev* and *naive aTPE_rev*.

[Insert Table 5 around here]

The second column of Panel A presents the proportion of analyst TPs that meet or exceed the accuracy of *naïve price forecasts*. We find that, on average, analyst TPs meet or exceed the accuracy of simple price forecasts in 72% of cases. The highest proportion of analysts TPs that meet or exceed *naïve price forecasts* is for firms in Hong Kong and the lowest is for Italian firms. The fourth column shows that analysts' absolute TP forecast error is 9.4% lower compared to the absolute

forecast error of a naïve forecast.[15] The difference between TP error and the error of the naive price forecasts, *aTPE* − *naive aTPE*, ranges between −18.7% for firms domiciled in Hong Kong and 1.5% for Danish firms. The differences in forecast accuracy between the TP-revision-adjusted TP measures and the naïve price forecasts show a similar pattern to that of our main TP accuracy measures.

We perform four further sensitivity tests (results untabulated). First, we remove the top 5% of stocks with the highest price momentum before the forecast issue. This examines if *naïve price forecasts* pick up the momentum effect, which could bias the results in Table 5 in favor of analyst superiority. The mean difference between the TP error and the error of the simple price forecasts reduces to −7.08%, but still remains highly significant. The conclusions are unchanged when we use a 10% cut-off point. Second, we remove the top 5% of *naive aTPE* to test if the results are not affected by extreme naive price forecasts due to potential data errors. The results for this subsample remain qualitatively similar to that in Table 5. Third, we form the naïve price forecast based on the (country-specific) industry mean P/E ratio, calculated at the forecast issue, times the analyst one-year ahead EPS estimate. This is because Bradshaw (2002) reports that analysts frequently compute target prices using simple heuristics, such as P/E ratios. If analysts simply convert their current EPS estimates into target prices using simple heuristics, TPs should not offer any incremental value to investors beyond EPS forecasts. The mean (median) difference between TP error and the error of the price forecasts from the P/E ratios is −70.7% (−33.9%), which shows that (1) analyst TPs are not simple transformations of analyst EPS forecasts and that (2) analyst TPs are more accurate than heuristic-based price forecasts using P/E ratios.[16]

[15] The results are unchanged when we compare the median difference between *aTPE* and the naïve price forecast error, which is −7.05% for the pooled sample and negative in all countries we investigate.

[16] The error of the price forecasts from the P/E ratios is winsorized at 5% to eliminate extreme naïve price forecasts due to potential data errors. Also, in calculating P/E ratios we exclude stocks with zero earnings, which reduces the sample to 526,247 observations.

As a fourth sensitivity test, we examine if analyst TPs beat *index price forecasts* which predict that the stock price in 12 months will be equal to the stock price at the forecast release date times one plus the return on the market index over the preceding 12 month period. Index price forecasts impose less data requirements and are less affected by individual stock price momentum or data errors. We find that, on average, analyst TPs meet or exceed the accuracy of the *index price forecast* in 70.7% of cases based on *Met_any*, and the mean (median) analyst TP error is lower than that of *index price forecast* in eleven (thirteen) countries. In the analysis, we do not consider martingale price forecasts that predict that a stock price in 12 months' time is equal to the stock price today. This is because in efficient markets, investors require a premium for holding stocks (risk free rate plus beta times the market premium). Only stocks with negative market beta that would offset the risk free rate would justify using a martingale benchmark. Consequently, martingale price forecasts are unlikely to be used by investors.

Based on the results in Table 5 and the further sensitivity tests, we conclude that, on average, analyst TP accuracy exceeds that of naïve price forecasts. This means that investors are better off following analyst target prices compared to naïve price forecasts.

The determinants of TP forecast accuracy

Next, we examine if analysts have differential ability to produce accurate target prices based on regression model in equation (5). The first columns of Table 6 report the regression results for the main TP accuracy measures (*Met_any* and *aTPE*) and the latter columns describe results for the two TP-revision-adjusted TP accuracy measures (*Met_any_rev* and *aTPE_rev*). The *Exp.sign* column specifies the predicted coefficient signs, while the *St.Eff* column provides the standardized coefficient estimates, i.e. the effect that a one standard deviation change in the explanatory variable has on the TP accuracy measure. The regressions use firm- and analyst- dual clustered standard

errors as in Petersen (2009) to control for the cross-sectional dependence of observations. In reviewing the results, we first discuss the evidence on analysts' differential ability to forecast accurate target prices. This is followed by the review of the results on the relation between institutional and regulatory characteristics and TP accuracy.

Do analysts have differential ability to forecast accurate target prices?

For our main TP accuracy measures, Table 6 indicates that TPs issued by analysts with higher firm-specific experience have lower error. This confirms that analysts learn to produce more accurate TPs over time, as their forecasting experience for the firms they follow increases. However, analyst experience does not correlate with the likelihood that the actual stock price will meet or surpass the target price. Analysts following more firms issue more accurate TPs based on the two main TP accuracy measures, which suggests that information spill-over effects from following multiple firms improves TP accuracy. This complements the international evidence in Clement et al. (2003) and Bolliger (2004), who find that analysts who follow more firms produce more accurate EPS forecasts. Country-specialized analysts are more likely to issue more accurate TPs, and TPs by analysts employed by large brokers are more likely to be met by the actual price.

[Insert Table 6 around here]

The regression results for the TP-revision-adjusted TP accuracy measures are qualitatively similar to the results for the main TP accuracy measures. However, controlling for TP revisions, analyst country-specialization is no longer significant in predicting *Met_any_rev*. For the TP-revision-adjusted absolute TP error, *aTPE_rev*, we also find that analysts from large brokerage houses issue TPs with smaller absolute forecast error. This confirms that access to a larger pool of resources at the broker improves TP accuracy. Together, the results of the TP-revision-adjusted TP accuracy

measures reinforce the results of the main TP accuracy measures that better quality analysts issue more accurate TPs.

Inspecting the economic significance of analyst and broker characteristics, we find that access to a large resource pool at the broker has the largest standardized effect on *Met_any*, i.e. a one standard deviation increase in ln *B_#Ana* leads to 6.12% higher likelihood that the stock price will meet the target price; analyst forecasting experience has the largest standardized effect on TP forecast error (ln *A_exp*=−1.94%). Based on the results in Table 6 we conclude that, on average, higher quality analysts have differential ability to issue precise TP forecasts. In particular, analysts with higher forecasting experience, following more firms, country-specialized, and employed by a large broker issue more accurate TPs.

Do institutional and regulatory characteristics affect target price accuracy?

For the main TP accuracy measures, Table 6 documents that higher reporting disclosure increases the likelihood that the stock price will meet or surpass the target price. Further, disclosure has a positive effect on TP-revision-adjusted accuracy, increasing the likelihood that the target price is met and reducing the absolute forecast error. This confirms that disclosure has a positive effect on TP accuracy.

We find that target prices in countries with strong enforcement of accounting standards are less accurate. We attribute this result to the lower predictability of future firm earnings in countries with strong enforcement of accounting standards, which reduces the quality of earning-based inputs into the valuation models that analysts use to arrive at target prices. This is because when producing a target price, analysts need to account for the effect *current* and *future* earnings have on firm value. Below we describe one of the ways by which stronger enforcement can adversely affect analysts' ability to accurately forecast future firm earnings, thereby reducing the accuracy of TP forecasts.

Leuz et al. (2003) find that stronger enforcement reduces the firm's propensity to manage earnings, e.g. by smoothing earnings using accruals, which is likely to increase the variability of firm earnings and to reduce the predictability of future firm earnings (Lys and Soo 1995; Basu et al. 1998; Das et al. 1998).[17] Consistent with this prediction, Hope (2004) shows that EPS forecast accuracy reduces with the degree of accrual accounting in a sample of 18 countries. Also, he finds that higher accrual accounting reduces earnings volatility.[18] In section VI we provide additional tests to support the prediction that enforcement lowers the predictability of future earnings and consequently TP accuracy.

High ownership concentration increases the TP forecast error, *aTPE*. High ownership concentration may promote private channels of communication between managers and blockholders, at the expense of public disclosure (La Porta et al. 2000), which reduces the amount and quality of information available to analysts when forecasting future stock prices. When using the TP-revision-adjusted accuracy measures, however, ownership concentration does not correlate with TP accuracy.

Among the institutional and regulatory characteristics, enforcement has the strongest standardized effect on both TP accuracy measures: a one standard deviation change in enforcement reduces the chances that a stock price will meet the target price by −6.13% and increases the TP forecast error by 9.1%.

[17] Lambert et al. (2009) report that in forecasting future firm earnings, analysts increasingly anchor on historic earnings as the EPS forecasting horizon increases. They report that historic earnings explain 39% of the magnitude in one-year ahead median consensus EPS forecast, 51% in two-year ahead EPS and 85% in the implied long-run EPS forecast backed out from long-run EPS growth estimates.

[18] Enforcement can also affect TP accuracy through other channels. For example, stronger enforcement is likely to magnify the effect that accounting conservatism and timeliness has on the predictability of future firm earnings (Ball et al. 2000). Specifically, stronger enforcement means that firms are more likely to incorporate economic losses in earnings in a more timely fashion, which increases earnings volatility and reduces the predictability of future earnings leading to lower TP accuracy.

Regarding the control variables, we note that better earnings forecasters issue more accurate target prices, but analysts who attempt to hype the stock price by forecasting a strong price increase issue less accurate TPs. Looking at firm characteristics, we observe that TP forecasts for larger firms are less likely to be met by the actual stock price, but exhibit lower error. Higher analyst coverage increases the likelihood that a target price will be met by the actual stock price, which suggests that competition among analysts may incentivize them to exert more effort into producing more accurate TPs. However, high analyst competition also increases the average TP forecast error. There is a positive relation between price momentum and TP accuracy. In addition, TPs for firms with higher stock price volatility are more likely to be met. However, high price volatility also leads to higher TP error. The return on the local market index has a strong positive relation with TP forecast accuracy, i.e. better ex-post market performance increases TP forecast precision. Finally, we find that the unexpected fall in stock prices during the recent financial crisis has on average decreased TP accuracy. The effect of the control variables in the accuracy regressions where *Met_any_rev* and *aTPE_rev* are used is qualitatively similar.

To sum up, the results from Table 6 suggest that characteristics commonly associated with analyst ability, such as experience, the number of firms an analyst follows, country specialization, and broker size influence TP forecast accuracy. This confirms that more able analysts produce more accurate forecasts of future stock prices. Further, we find support for our prediction that the country's institutional and regulatory setting has an effect on average TP forecast accuracy.

VI. ROBUSTNESS ANALYSIS

To examine the determinants of EPS forecast accuracy, Clement (1999) uses the proportional mean absolute EPS forecast error, which compares the individual analyst's EPS forecast error to the mean forecast error of other analysts following the same firm in a given year. He argues that this increases

the model's ability to identify systematic differences in EPS forecasts accuracy relative to a model that controls for firm fixed effects and year fixed effects. Later EPS accuracy studies largely adopted this research design. To test if our results are sensitive to using this measure of TP accuracy, we construct the mean-adjusted TP error (*aTPE_ma*), which is the individual TP forecast error scaled by the mean TP forecast error of all TP forecasts issued for a firm in a calendar year. Higher (lower) values of *aTPE_ma* represent worse (better) than average performance.

[Insert Table 7 around here]

The first columns of Table 7 report the estimates from a TP accuracy regression (equation 5) where *aTPE_ma* is used as the dependent variable. We retain only firm-years with at least five analyst TP forecasts, which reduces the sample to 535,906 observations. The results are similar to *aTPE* in Table 6, however, we also find that analysts employed by larger brokers issue relatively more accurate TP forecasts and that disclosure improves TP accuracy. In addition, country-specialization is not associated with the mean-adjusted TP error. Overall, we conclude that the Table 6 results are generally robust to using Clement's (1999) specification of the forecast accuracy measure.

Instrumental variable regression

It is possible that analysts may be more optimistic about the prospects of certain firms and, as a result, forecast overly high target prices, compared to what their valuation models would dictate. To test for the possibility that *TP/P* is endogenously determined in the TP accuracy regressions, we run a Wald test of exogeneity. We reject the exogeneity of *TP/P* for the *Met_any* regression, but not for the *aTPE* regression. To assess whether our results are robust controlling for the endogeneity in *TP/P*, we re-estimate the *Met_any* regressions using an instrumental variable (IV) method. This is particularly important as *TP/P* has the largest economic effect on *Met_any* (*TP/P*=−50.53%). We use the mean *TP/P* of all forecasts issued by a given analyst in the preceding 12 month period as our

instrument for the current period *TP/P*. The past mean *TP/P* should average out the analyst's (positively and negatively) biased TPs, while it is also unaffected by the current period market and/or analyst sentiment. Larcker and Rusticus (2010) advocate the use of a partial *R*-square test to assess the validity of the instrument, which produces a significant *F*-test of 1123.57 (p-value=0.000), and a partial R^2 from the first stage regressions of 12.27%. This confirms that the instrument is properly specified.

Columns *2SLS* of Table 7 report the *Met_any* and *Met_any_rev* regression results using the IV estimation approach. The results for analyst and broker characteristics from the IV regression are qualitatively similar to the basic models in Table 6, and in particular, the coefficient on *TP/P* remains negative and significant.[19] Also, the significance and sign of the coefficients on the institutional and regulatory characteristics that explain TP accuracy remain similar, with the exception of insignificant coefficient on disclosure in *Met_any_rev* regression. Collectively, the results from the IV estimation approach support our main conclusions.

Heterogeneity in analyst forecasting environment across countries

Our analysis so far assumes that accounting disclosure quality, the enforcement of accounting standards, and ownership concentration explain country-variations in analyst average TP forecast accuracy. To test if the relation between analyst and broker characteristics and TP accuracy is sensitive to the specification of controls used for the information environment in which analysts operate, we substitute our institutional and regulatory characteristics for country dummies. Country effects capture the heterogeneity in the analysts' forecasting environment specific to each country, without identifying the individual factors that explain the average cross-country differences in TP accuracy.

[19] For the *2SLS* results, we only use analyst-clustered standard errors, which may explain the generally higher coefficient significance levels.

The *Country effects* columns of Table 7 report the results for the *Met_any* and *aTPE* regressions after including country dummies. The results for analyst and broker characteristics remain unchanged for both TP accuracy measurers, with the exception of the coefficients on country specialization becoming insignificant. This means that our main inferences on the relation between analyst and broker characteristics and TP accuracy are mostly unaffected by the specification of the institutional and regulatory characteristics.

Additional analysis

In unreported results, we perform two further analyses. First, we calculate the TP error for an investor who follows a buy-and-hold investment strategy and holds a stock for 12 months after the target price release, *bh_aTPE*. The investor in this setting incurs only the downside error, i.e. the risk that the stock price is below (above) the target price at the end of 12-month period for a positive (negative) TP forecast. The mean *bh_aTPE* is 36.8% and the forecast error distribution across countries closely mirrors that of *aTPE*. Using *bh_aTPE* as the dependent variable in equation (5) produces results qualitatively similar to Table 6. In addition, we also find that analysts employed by larger brokers produce TPs that have smaller downside error, which corroborates our main conclusions. However,

Second, we replicate the regression analysis presented in Table 6 for a subsample of 354,809 TPs where the accompanying EPS forecast was issued on the same date. This serves to test if the results are sensitive to the recency of EPS estimates. The results are qualitatively similar to that in Table 6, with the exception that country-specialization does not explain the variation in TP accuracy across analysts, a result which could also reflect the smaller sample size.

Further tests of the effect that the enforcement of accounting standards has on TP forecast accuracy

We provide three additional results to support the prediction that enforcement lowers the predictability of future earnings and consequently reduces TP accuracy (results untabulated). First, the coefficient of variation in price-scaled actual EPS is higher for firms in the top (bottom) 50% of countries with strong (weak) enforcement of accounting standards (53.189 vs. 52.238). This is consistent with enforcement increasing the uncertainty about future earnings. In computing the earnings variation we use the actual EPS provided by IBES, which are stripped of any transitory items that could artificially inflate earnings volatility and that analysts could identify and adjust for in their earnings estimates.

Second, the mean OLS regression coefficient between future and current fiscal year price-scaled EPS is 0.216 for firms in countries with weak enforcement of accounting standards compared to 0.11 for firms in countries with strong enforcement. Higher earnings autocorrelation should aid analysts in accurately predicting future earnings, improving the precision of inputs into analyst valuation models to produce target prices leading to higher TP accuracy.

Third, we include the earnings smoothing proxies from Leuz et al. (2003) and Brown and Higgins (2001) in regression model (5) and find that countries with lower earnings smoothing have lower TP accuracy. This supports the prediction that earnings smoothing is likely to (1) reduce earnings variation (Ball et al. 2000) and (2) increase the predictability of future earnings using current earnings, which has a positive effect on TP accuracy. Controlling for earnings smoothing, enforcement continues to predict lower TP accuracy.

VII. PERSISTENCE IN ANALYST TARGET PRICE ACCURACY

A track record of past TP forecasting accuracy could provide an incremental signal to investors as to

which contemporaneous TP forecasts are more likely to be *ex post* accurate. However, in a working paper examining whether US analysts have persistent ability in forecasting accurate TPs during 1997–2002, Bradshaw and Brown (2007) find no evidence that past TP accuracy leads to superior current TP accuracy. This section revisits this question.

Panel A of Table 8 presents the prior and current period TP accuracy measures for quintile sorts based on the average analyst *aTPE* in the past year. The sorts are independent for each of the 16 countries. We observe a positive relation between past TP accuracy and current period TP accuracy, both for *Met_any* and *aTPE*. Specifically, moving from the lowest to the highest past TP accuracy portfolio, *Met_any* improves by 42.4% (from 45.7% to 65.1%) and *aTPE* reduces by 67.1% (from 84.7% to 27.9%).

[Insert Table 8 around here]

Panel B of Table 8 replicates the main TP accuracy regressions of Table 6 with the addition of the analyst's mean prior year *aTPE* variable ($aTPE_{t-1}$), which is used to measure the analyst's past TP accuracy. We find that higher past TP error leads to a lower likelihood of the current TP being met and results in a higher current TP error. Analyst and broker characteristics have a similar predictive power as in Table 6, with the exception of the size of analyst brokerage house, which has a positive effect on the TP forecast error. Also, the signs and significance of institutional and regulatory characteristics are similar to that in Table 6 for *aTPE*, however, disclosure and enforcement do not influence the likelihood that the actual stock price will meet or surpass the target price.

In unreported results, instead of $aTPE_{t-1}$ we use the residuals from within country and industry regressions of the past TP forecast error on the past EPS forecast error. This is because the relation between the concurrent and past TP forecast accuracy may reflect analysts' persistent ability to forecast accurate earnings. Including the residuals from the past TP forecast accuracy regressions

leaves our inferences intact. Further, the results in Table 8 persist when we use the prior year mean *Met_any* measure, and the TP-revision-adjusted accuracy measures as proxies for prior period TP accuracy. In addition, estimating the regressions from Table 8 only for US firms generates qualitatively similar results.[20] Overall, we conclude that higher TP accuracy in the past year predicts higher contemporaneous TP forecast precision, consistent with analysts exhibiting persistent ability to issue accurate target prices.

VIII. TP FORECAST ACCURACY AFTER THE MANDATORY IFRS ADOPTION

Fourteen countries in our sample implemented IFRS starting from January 2005. The implementation of IFRS was anticipated to increase cross-country comparability and transparency of accounting disclosure, and result in higher quality information about firm performance becoming available to analysts and investors. Subsequently, better quality inputs into analyst valuation models should lead to an improvement in analyst TP forecast accuracy. The question whether the adoption of IFRS has improved analysts' ability to issue more accurate TPs remains unanswered so far.

To date, there is limited evidence about how the mandatory IFRS adoption has affected analysts' EPS forecast accuracy. Byard et al. (2011) and Preiato et al. (2010) find a reduction in the EPS forecast error and forecast dispersion following the adoption of IFRS for 20 and 13 European countries respectively. Horton and Serafeim (2010) extend this evidence outside the EU market.

Table 9 reports the results from the TP accuracy regressions in equation (5) for the 14 IFRS adopting countries, after including analyst past TP accuracy and an indicator variable, *IFRS*, equal to 1 if the TP is issued after the IFRS mandatory adoption date and zero otherwise. We also include an

[20] Bradshaw and Brown (2007) report that analysts do not exhibit persistent ability to issue accurate TPs in their sample of target prices for US firms issued over the period 1997–2002. The differences in our results compared to Bradshaw and Brown (2007) are likely due to us using (1) a more recent sample period and (2) a more comprehensive set of control variables. In particular, we believe that the NASD 2711 regulation and the SEC rule 472 introduced in the wake of the Enron and World.com accounting scandals and the burst of the internet bubble may have motivated analysts to exert more effort to produce more accurate TP forecasts.

interaction term between the log EPS forecast error and the IFRS dummy, *IFRS** ln *aEPS*. This is because after IFRS adoption, the mean *aEPS* reduces by 0.81% and the IFRS dummy, had it not been also interacted, may simply be capturing the lower EPS forecast error after the mandatory IFRS adoption.

[Insert Table 9 around here]

Table 9 shows that the mandatory IFRS adoption reduces the TP forecast error, but has no effect on the likelihood that a target price is met by the actual price over the 12-month forecast period. The results signify that the implementation of IFRS has improved TP accuracy, even after controlling for the improvement in EPS forecast accuracy. We attribute this finding to the higher comparability of financial statement information across firms and countries after the IFRS adoption, which is likely to have aided the analyst's valuation task. Overall, we conclude that the mandatory adoption of IFRS has improved analysts' ability to forecast accurate TPs, which complements previous evidence on the effect that IFRS has had on EPS forecast accuracy.

IX. CONCLUSIONS

This study adds important international evidence to the fledging literature on the properties of analyst research outputs other than EPS forecasts. Using target prices from 16 countries—including the US, 12 European countries, Japan, Australia and Hong Kong—we examine if analysts have differential and persistent ability to forecast accurate target prices, controlling for the accuracy of their concurrent EPS forecasts. First, we show that TP accuracy exceeds that of naïve price forecasts formed by extrapolating past stock performance. Second, we find that analyst past TP accuracy, forecasting experience, the number of firms an analyst follows, country specialization, and broker size predict TP forecast accuracy.

We also document that a country's institutional and regulatory setting has an effect on TP accuracy. Factors such the quality of financial reporting, the enforcement of accounting standards, and ownership concentration explain cross-country differences in TP forecast accuracy. Further analysis reveals that the mandatory adoption of the International Financial Reporting Standards has improved TP forecast accuracy, even after controlling for the increase in the precision of EPS forecasts.

Our evidence that analysts have differential and persistent skill to issue accurate TP forecasts stands in strong contrast to early claims made by the popular press about analysts' opportunistic use of target prices and low TP forecast accuracy—with headlines such as "'Price Targets are Hazardous to Investors' Wealth" (New York Times 08/06/2001) or "Forget Analysts' Price Targets. They're Really Just for Show" (Forbes 12/11/2000) dominating the press. In addition, the study responds to a call by Ramnath et al. (2008, 68), who in a comprehensive review of the analyst forecasting literature emphasise that "further research is required to describe the behaviour of the forecasts that have higher price impacts, such as long-term growth forecasts and target prices". Finally, our research can aid investors in identifying more skilled analysts who produce more accurate TPs, in order to improve estimates of future firm value which can lead to more efficient capital allocation decisions.

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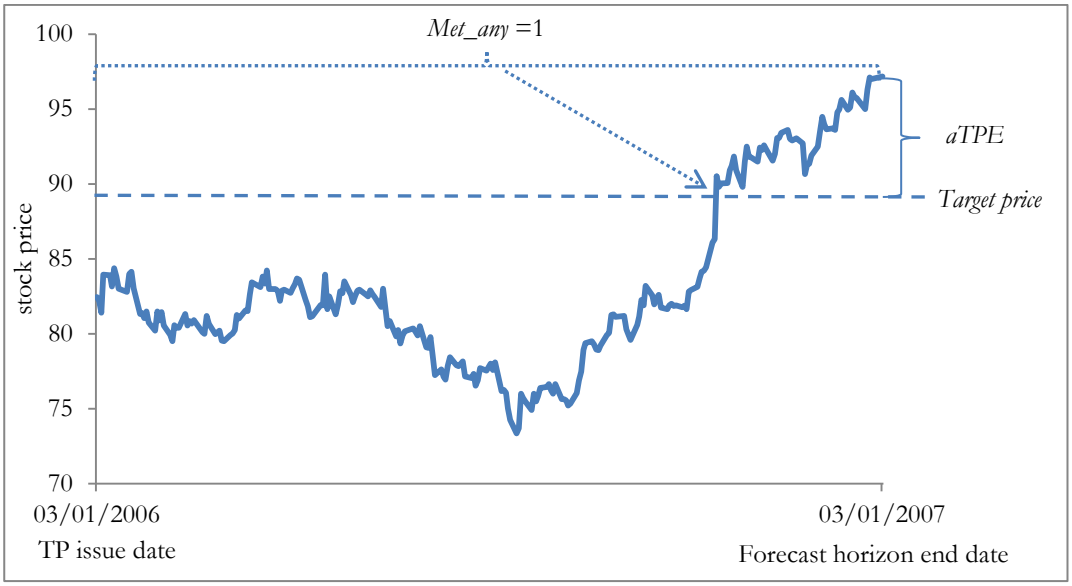
FIGURE 1
Target price accuracy metrics relative to the actual stock price



The figure illustrates the two main analyst target price accuracy measures. *Met_any* equals one if the actual stock price reaches the target price at any time during the 12-month forecast period, and zero otherwise. *aTPE* is the absolute difference between the target price and actual price at the end of 12-month period, scaled by the stock price on the forecast issue date.

TABLE 1
Variables definition

Variable	Definition
1.	**Dependent variables: TP forecast accuracy measures**
Met_any	An indicator variable equal to one if the actual stock price reaches the target price, TP, at any time over the 12 month period after the TP forecast issue, and zero otherwise.
aTPE	The absolute difference between the TP forecast and the stock price at the end of the 12-month forecast period, P_{12}, scaled by the stock price at the forecast issue date, P_{st}.
Met_any_rev	An indicator variable equal to one if the actual stock price reaches the target price, TP, at any time between the TP forecast issue date and the subsequent TP forecast revision date, and zero otherwise. If a TP forecast has not been revised over the 12-month forecast horizon, *Met_any_rev= Met_any*.
aTPE_rev	The absolute difference between the TP forecast and the stock price on the TP forecast revision date subsequent to the TP forecast issue, P_{rev}, scaled by the stock price at the forecast issue date, P_{st}. If a TP forecast has not been revised over the 12-month forecast horizon, *aTPE_rev= aTPE*.
2.	**Independent variables: Analyst and broker characteristics**
A_exp	The number of years an analyst has issued at least one EPS forecasts for a given firm.
A_#Firm	The number of companies for which an analyst issued at least one EPS forecast over the previous 12 months.
A_#Count	The number of countries where the firms followed by the analyst are domiciled in. A firm is followed by the analyst if the analyst has issued at least one EPS forecasts for a given firm over the previous 12 months.
B_#Ana	The number of analysts at the broker that issued at least one EPS forecast in the previous 12 months.
3.	**Independent variables: Institutional and regulatory characteristics**
Disclosure	The index of accounting disclosure quality based on aggregate annual financial statement disclosure scores from CIFAR (1993, 1995). The index ranges between 0 (lowest disclosure) to 1 (highest disclosure). Sourced from Hope (2003b).
Enforcement	The index of enforcement of accounting standards. The index is based on the factor analysis of (1) country-level audit spending, (2) judicial efficiency, (3) rule of law, (4) insider trading laws, and (5) shareholder protection. Higher values reflect stronger enforcement. Sourced from Hope (2003b).
Owner con	Ownership concentration index, which is the median proportion of common shares owned by the three largest shareholders in the ten largest privately owned non-financial firms. Sourced from La Porta et al. (1998).
4.	**Independent variables: TP and EPS forecast characteristics**
aEPS	The absolute difference between the actual and forecasted EPS scaled by stock price at the end of the previous fiscal year.
TP/P	The ratio of target price to actual price on the forecast issue date less one.
5.	**Independent variables: Firm characteristics**
MV	Firm market capitalization at the end of the previous fiscal year in $ million.
F_#Ana	The number of analysts issuing at least one EPS forecasts for a firm over the previous 12 months.
MOM	Buy-and-hold stock returns for 90-days prior to the forecast issue date.
COV	Stock price standard deviation over 90-days prior to the forecast issue date scaled by the mean price level over this period.

(*continued on next page*)

TABLE 1 (continued)

6. **Independent variables: Other controls**

Mkt ret	The return on the leading market index for the primary exchange where the firm's stock lists over 12 months after the forecast issue date.
Fin cris	An indicator variable equal to 1 if the forecast is issued after 1st September 2007 and zero otherwise.
Year dummies	Year dummy variables.
Industry dummies	Ten industry dummies based on the sector code from IBES SIG code.
Mkt dummies	Country dummy variables.

The table presents the definitions of the main variables used in the study. We divide the variables into six categories: (1) TP forecast accuracy measures, (2) analyst and broker characteristics, (3) institutional and regulatory characteristics, (4) TP and EPS forecast characteristics, (5) firm characteristics, and (6) other controls.

TABLE 2
Distribution of sample target prices, firms, brokerage houses and analysts by country

	No TP	*No firms*	*No brokers*	*No analysts*
Australia	24587	647	54	651
Austria	2543	58	68	361
Belgium	4356	104	56	477
Denmark	4961	86	54	386
Finland	8041	110	59	465
France	25232	425	99	1810
Germany	23496	386	95	1520
Hong Kong	22578	402	67	1192
Italy	10535	215	62	787
Japan	40625	1202	39	895
Netherlands	10695	145	81	907
Spain	8987	127	56	698
Sweden	12627	198	83	726
Switzerland	11841	187	105	868
United Kingdom	42887	1064	132	2117
United States	325506	4159	328	5312
Total	579497	9499	605	13025

The table presents the distribution of target prices, sample firms, brokerage houses and analysts across 16 countries. *No TP* stands for the number of target prices. *No firms* is the number of unique firms, *No brokers* the number of unique brokerage houses, and *No analysts* the number of unique analysts.

TABLE 3
Summary statistics of target price accuracy measures

Panel A: Mean values of TP forecast accuracy measures

		Main TP forecast accuracy measures		Alternative TP forecast accuracy measures	
	N	*Met_any* (%)	*aTPE* (%)	*Met_any_rev* (%)	*aTPE_rev* (%)
Australia	24587	66.1%	47.6%	45.6%	35.6%
Austria	2543	59.7%	50.7%	46.2%	37.7%
Belgium	4356	59.0%	40.8%	44.0%	31.3%
Denmark	4961	56.1%	58.7%	40.7%	47.3%
Finland	8041	62.6%	44.9%	47.7%	29.9%
France	25232	58.1%	38.2%	42.5%	29.7%
Germany	23496	60.7%	44.7%	44.6%	35.2%
Hong Kong	22578	64.3%	48.4%	47.1%	36.1%
Italy	10535	53.8%	38.5%	41.1%	31.7%
Japan	40625	59.3%	37.4%	47.3%	30.9%
Netherlands	10695	59.5%	38.6%	43.4%	31.5%
Spain	8987	59.8%	39.9%	43.6%	34.3%
Sweden	12627	59.3%	47.5%	43.5%	34.5%
Switzerland	11841	54.7%	46.7%	38.6%	38.5%
United Kingdom	42887	57.6%	48.4%	43.8%	41.2%
United States	325506	52.9%	50.6%	37.3%	46.5%
Total	579497	55.9%	47.7%	40.5%	41.4%
Panel B: TP accuracy over time					
2002	36963	38.3%	59.4%	27.6%	60.8%
2003	52760	59.0%	46.8%	41.5%	38.2%
2004	67650	54.0%	41.1%	36.3%	37.0%
2005	71919	62.2%	37.4%	42.2%	31.9%
2006	79607	63.1%	35.4%	41.9%	30.6%
2007	89054	50.1%	50.2%	36.2%	44.7%
2008	119944	48.5%	56.0%	35.6%	53.1%
2009	61600	72.4%	56.9%	63.6%	35.2%

Panel C: Pearson correlation coefficients between TP accuracy measures

	Met_any	*aTPE*	*Met_any_rev*	*aTPE_rev*
aTPE	−0.308	1		
	0.000			
Met_any_rev	0.732	−0.189	1	
	0.000	0.000		
aTPE_rev	−0.332	0.755	−0.246	1
	0.000	0.000	0.000	

The table presents the summary statistics of the target price accuracy measures. Panel A presents the mean values for the four TP accuracy measures expressed in %. *Met_any* equals one if the actual stock price reaches the target price at any time over the 12-month forecast period and zero otherwise. a*TPE* is the absolute target price forecast error. *Met_any_rev* and *aTPE_rev* are the TP-revision-adjusted target price forecast accuracy measures. Panel B presents the annual TP forecast accuracy values in %. Panel C presents the Pearson correlation coefficients between the TP forecast accuracy measures.

TABLE 4
Descriptive statistics for explanatory variables

Panel A: Analyst and broker, and institutional and regulatory characteristics

	A_exp	*A_#firm*	*A_#Count*	*B_#Ana*	*Disclosure*	*Owner_con*	*Enforcement*
Australia	2.794	10.781	1.235	87.843	0.806	0.28	−0.25
Austria	2.255	7.623	2.183	116.280	0.607	0.51	−1.65
Belgium	2.714	7.572	2.212	91.498	0.695	0.62	−1.89
Denmark	2.786	6.736	1.862	89.767	0.729	0.40	−0.56
Finland	2.932	9.310	1.854	90.366	0.810	0.34	−0.22
France	2.965	8.892	2.165	111.846	0.770	0.24	−0.99
Germany	2.869	8.678	2.044	94.578	0.678	0.50	−2.92
Hong Kong	2.523	8.677	1.339	95.115	0.730	0.54	0.10
Italy	2.554	8.385	1.647	94.132	0.680	0.60	−3.55
Japan	3.546	13.899	1.027	93.148	0.709	0.13	0.16
Netherlands	2.965	8.977	2.307	102.084	0.732	0.31	−0.19
Spain	2.471	8.879	1.937	101.300	0.697	0.50	−3.65
Sweden	3.004	8.183	2.077	101.915	0.830	0.28	0.55
Switzerland	3.070	8.890	2.141	107.058	0.761	0.48	−0.39
United Kingdom	2.795	10.121	1.962	125.995	0.831	0.15	1.16
United States	3.213	14.091	1.256	69.018	0.738	0.12	1.21
Total	3.085	12.266	1.464	83.555	0.745	0.207	0.459

(*continued on next page*)

TABLE 4 (continued)

Panel B: Other explanatory variables

	TP/P (%)	*MV*	*F_#Ana*	*MOM*	*COV*	*Mkt ret*	*Fin cris*
Australia	19.4%	4931.140	11.640	−0.007	0.082	0.071	0.454
Austria	17.3%	6824.460	14.343	−0.028	0.096	0.074	0.560
Belgium	9.5%	11775.807	16.251	−0.012	0.069	0.032	0.455
Denmark	20.8%	6375.801	15.580	−0.020	0.082	0.058	0.576
Finland	10.7%	8126.476	17.242	−0.020	0.076	0.010	0.504
France	15.6%	15223.780	18.065	−0.009	0.070	0.025	0.446
Germany	16.9%	13938.459	19.164	−0.014	0.086	0.082	0.501
Hong Kong	14.5%	6835.279	17.064	0.048	0.080	0.151	0.269
Italy	13.9%	13867.473	17.012	−0.026	0.075	−0.035	0.550
Japan	14.7%	8880.315	13.739	−0.018	0.079	−0.017	0.411
Netherlands	14.3%	14537.431	18.654	0.000	0.071	0.050	0.359
Spain	17.1%	15649.490	19.101	0.003	0.064	0.084	0.413
Sweden	14.9%	7923.017	16.802	0.010	0.078	0.103	0.534
Switzerland	23.3%	19210.773	17.824	−0.009	0.070	0.046	0.460
United Kingdom	16.1%	11696.827	16.165	0.000	0.076	0.048	0.456
United States	20.6%	8512.890	15.574	−0.001	0.087	0.035	0.298
Total	18.6%	9587.543	15.868	−0.002	0.083	0.041	0.361

The table presents the descriptive statistics for the explanatory variables related to analyst TP forecast accuracy. Panel A presents the mean values of the independent variables related to analyst and broker characteristics, and institutional and regulatory characteristics. *A_exp* is analyst firm-specific forecasting experience, *A_#firm* is the number of firms the analyst follows, *A_#Count* measures in how many countries the firms that an analyst follows are located, and *B_#Ana* is the number of analysts employed by a broker. *Disclosure* is the country's accounting disclosure quality index, *Owner con* is the ownership concentration index, and *Enforcement* is the accounting enforcement index. Panel B presents the mean values for the remaining explanatory variables. *TP/P* is the ratio of target price to actual price at the forecast issue date less one expressed in %. *MV* ($) is the firm market capitalization at the end of the previous fiscal year in $ million, *F_#Ana* is the number of analysts following a firm. *MOM* is buy-and-hold return for 90-days before the TP issue date, and *COV* is the (standardized) stock price variation. *Mkt ret* is the market index return over 12-months after the forecast issue date, and *Fin cris* is an indicator variable equal to 1 if the forecast is issued after 1st September 2007.

TABLE 5

Accuracy of analyst TP forecasts compared to the accuracy of naïve price forecasts

	Met_any≥naïve Met_any		*aTPE − sim_aTPE*		*Met_any_rev≥naïve Met_any_rev*		*aTPE_rev − sim_aTPE_rev*	
	Mean	*p*	*Mean*	*p*	*Mean*	*p*	*Mean*	*p*
Australia	0.782	0.000	−0.172	0.000	0.677	0.000	−0.137	0.000
Austria	0.726	0.000	−0.181	0.000	0.655	0.000	−0.169	0.000
Belgium	0.722	0.000	−0.052	0.000	0.665	0.000	−0.072	0.000
Denmark	0.710	0.000	0.015	0.141	0.627	0.000	0.021	0.109
Finland	0.780	0.000	−0.139	0.000	0.702	0.000	−0.170	0.000
France	0.738	0.000	−0.103	0.000	0.672	0.000	−0.110	0.000
Germany	0.759	0.000	−0.130	0.000	0.689	0.000	−0.129	0.000
Hong Kong	0.811	0.000	−0.187	0.000	0.732	0.000	−0.182	0.000
Italy	0.665	0.000	−0.039	0.000	0.610	0.000	−0.037	0.000
Japan	0.741	0.000	−0.091	0.000	0.679	0.000	−0.083	0.000
Netherlands	0.747	0.000	−0.114	0.000	0.676	0.000	−0.106	0.000
Spain	0.721	0.000	−0.013	0.048	0.659	0.000	−0.011	0.125
Sweden	0.759	0.000	−0.135	0.000	0.690	0.000	−0.128	0.000
Switzerland	0.731	0.000	−0.033	0.000	0.672	0.000	−0.032	0.000
United Kingdom	0.726	0.000	−0.007	0.022	0.671	0.000	0.011	0.005
United States	0.699	0.000	−0.095	0.000	0.615	0.000	−0.030	0.000
Total	0.720	0.000	−0.094	0.000	0.643	0.000	−0.055	0.000

The table compares the accuracy of analyst target prices to the accuracy of naïve price forecasts that extrapolate past firm performance into the future. The naïve price forecast predicts that the stock price in twelve months will be equal to the stock price at the forecast release date times one plus the previous 12-month buy-and-hold return. We calculate *Met_any* and *aTPE,* and *Met_any_rev* and *aTPE_rev* equivalents of the naïve price forecast, i.e. *naive Met_any* and *naive aTPE*, and *naive Met_any_rev* and *naive aTPE_rev*. The *Met_any≥naïve Met_any* columns present the average proportion of TP forecasts that meet or exceed the accuracy of naïve price forecasts based on the *Met_any* accuracy measure. The *aTPE − naïve aTPE* columns present the average difference between the absolute TP error and the error of the naïve price forecast. Columns *Met_any_rev≥naïve Met_any_rev* and *aTPE_rev − sim_aTPE_rev* replicate the analysis for *Met_any_rev* and *aTPE_rev*. *p* is the *p*-value for the significance of the difference between the accuracy of the analysts' TP forecasts and of the naïve price forecasts.

TABLE 6
Analyst target price accuracy regressions

		Main TP accuracy measures						TP accuracy measures adjusted for TP forecast revisions			
		Met_any			*aTPE*			*Met_any_rev*		*aTPE_rev*	
	Exp.sign	*Est*	*St.Eff*	*p*	*Est*	*St.Eff*	*p*	*Est*	*p*	*Est*	*p*
Intercept		0.795		0.000	0.324		0.000	0.940	0.000	0.185	0.000
ln *A_exp*	+/−	−0.003	−0.21%	0.765	−0.009	−1.94%	0.000	−0.014	0.177	−0.008	0.000
ln *A_#Firm*	?/?	0.049	3.13%	0.000	−0.008	−1.87%	0.000	0.024	0.058	−0.008	0.000
ln *A_#Count*	−/+	−0.053	−2.30%	0.026	0.006	0.89%	0.082	0.018	0.399	0.013	0.000
ln *B_#Ana*	+/−	0.057	6.12%	0.000	0.000	−0.14%	0.638	0.043	0.000	−0.004	0.000
ln *Disclosure*	+/−	0.712	3.63%	0.014	−0.047	−0.86%	0.286	0.428	0.076	−0.135	0.002
Enforcement	?/?	−0.049	−6.13%	0.012	0.020	9.10%	0.000	−0.063	0.000	0.017	0.000
ln *Owner con*	−/+	0.054	2.95%	0.244	0.029	5.60%	0.000	−0.014	0.729	0.005	0.362
ln *aEPS*	−/+	−1.582	−5.74%	0.000	0.825	10.66%	0.000	−0.996	0.000	0.609	0.000
TP/P	−/+	−1.031	−50.53%	0.000	0.271	47.40%	0.000	−1.279	0.000	0.338	0.000
ln *MV*	+/−	−0.070	−11.82%	0.000	−0.015	−9.00%	0.000	−0.098	0.000	−0.011	0.000
ln *F_#Ana*	+/−	0.066	4.05%	0.005	0.015	3.19%	0.000	0.051	0.010	0.010	0.002
MOM	?/?	0.177	4.36%	0.000	−0.020	−1.79%	0.000	0.104	0.000	−0.006	0.156
COV	+/+	2.747	17.11%	0.000	0.482	10.70%	0.000	2.431	0.000	0.306	0.000
Mkt ret	+/−	1.761	41.24%	0.000	−0.116	−9.66%	0.000	0.936	0.000	−0.150	0.000
Fin cris	−/+	−0.073	−3.51%	0.025	0.075	12.92%	0.000	−0.052	0.064	0.061	0.000
Industry dummies		Yes			Yes			Yes		Yes	
Year dummies		Yes			Yes			Yes		Yes	
N		579497			579497			579497		579497	
p-value		0.000			0.000			0.000		0.000	
R^2		6.97%			33.78%			6.42%		40.25%	

The table presents the coefficient estimates (*Est*) from the analyst TP accuracy regressions outlined in Equation (5). *Exp.sign* shows the predicted direction of the relation, and *p* are *p*-values based on analyst- and firm-clustered standard errors (Petersen, 2009). *St.Eff* are the standardized coefficients when variables are standardized so that their variances equal one. The *Met_any* columns present the results from the logit model predicting the likelihood that the stock price will meet the target price at any time over the 12-month forecast period. The *aTPE* columns present the results from OLS regressions where the dependent variable is the absolute TP forecast error in log form, *aTPE*. Columns *Met_any_rev* and *aTPE_rev* show results for the TP forecast accuracy measures *Met_any* and *aTPE* that account for the TP forecast revisions before the end of the 12-month forecast period. *aTPE_rev* is used in log form. The explanatory variables are described in Table 1 and ln indicates a logarithmic transformation of a variable. *N* is the number of observations, *p-value* the corresponding *p*-value for model specification and R^2 is the *R*-squared.

TABLE 7
Robustness analysis for analyst target price accuracy regressions

			2SLS				*Country effect*			
	aTPE_ma		*Met_any*		*Met_any_rev*		*Met_any*		*aTPE*	
	Est	*p*	*Est*	*p*	*Est*	*p*	*Est*	*p*	*Est*	*p*
Intercept	1.042	0.000	0.423	0.000	0.491	0.000	0.399	0.000	0.302	0.000
ln *A_exp*	−0.007	0.003	0.008	0.277	0.004	0.557	−0.003	0.761	−0.009	0.000
ln *A_#Firm*	−0.004	0.066	0.037	0.000	0.019	0.037	0.041	0.002	−0.007	0.000
ln *A_#Count*	−0.005	0.139	−0.043	0.001	0.001	0.939	0.005	0.824	0.002	0.466
ln *B_#Ana*	−0.006	0.000	0.037	0.000	0.030	0.000	0.052	0.000	0.000	0.777
ln *Disclosure*	−0.068	0.000	0.319	0.004	0.151	0.132				
Enforcement	0.007	0.000	−0.028	0.000	−0.038	0.000				
ln *Owner con*	0.006	0.066	0.022	0.204	−0.016	0.309				
ln *aEPS*	0.184	0.000	−1.171	0.000	−0.815	0.000	−1.788	0.000	0.850	0.000
TP/P	0.090	0.000	−0.519	0.000	−0.613	0.000	−1.034	0.000	0.271	0.000
ln *MV*	−0.005	0.000	−0.045	0.000	−0.064	0.000	−0.078	0.000	−0.014	0.000
ln *F_#Ana*	0.013	0.000	0.047	0.000	0.046	0.000	0.091	0.000	0.011	0.000
MOM	−0.160	0.000	0.154	0.000	0.140	0.000	0.182	0.000	−0.023	0.000
COV	−0.570	0.000	1.477	0.000	1.306	0.000	2.786	0.000	0.477	0.000
Mkt ret	−0.036	0.000	1.017	0.000	0.518	0.000	1.776	0.000	−0.123	0.000
Fin cris	0.057	0.000	−0.062	0.000	−0.038	0.013	−0.077	0.019	0.074	0.000
Industry dummies	No		Yes		Yes		Yes		Yes	
Year dummies	No		Yes		Yes		Yes		Yes	
Mkt dummies	No		No		No		Yes		Yes	
N	535906		457915		457915		579497		579497	
p-value	0.000		0.000		0.000		0.000		0.000	
R^2	2.97%						7.16%		34.00%	

This table presents the results of sensitivity analysis for the TP accuracy regressions. *Est* are the coefficient estimates and *p* are *p*-values based on analyst- and firm-clustered standard errors (Petersen, 2009), and for analyst-clustered standard errors for *2SLS* regression. Columns *aTPE_ma* present the results from an OLS regression where the dependent variable is the mean-adjusted TP forecast error, *aTPE_ma*. Columns *2SLS* presents the results from instrumental variable regressions for *Met_any* and *Met_any_rev*. The *Country effect* columns present the results for TP accuracy regressions where we substitute the institutional and regulatory characteristics for country dummies. Variable definitions are in Table 1 and ln indicates a logarithmic transformation of a variable. *N* is the number of observations, *p-value* is the *p*-value for model specification and R^2 is the *R*-squared.

TABLE 8
Persistence in analyst target price forecasting ability

Panel A: Quintile sorts on past TP accuracy

	N	$aTPE_{t-1}$ (%)	*Met_any* (%)	*aTPE* (%)
$aTPE_{t-1}$ 1	64046	65.2%	45.7%	84.7%
$aTPE_{t-1}$ 2	64038	49.0%	55.5%	48.3%
$aTPE_{t-1}$ 3	64025	42.9%	58.8%	39.2%
$aTPE_{t-1}$ 4	64034	36.5%	61.3%	32.9%
$aTPE_{t-1}$ 5	63989	32.2%	65.1%	27.9%
p($aTPE_{t-1}$ 1 − $aTPE_{t-1}$ 5)			0.000	0.000

Panel B: Persistence in analyst ability to issue accurate target prices

	Met_any		*aTPE*	
	Est	*p*	*Est*	*p*
Intercept	0.664	0.000	0.379	0.000
ln $aTPE_{t-1}$	−0.161	0.000	0.045	0.000
ln *A_exp*	0.009	0.466	−0.011	0.000
ln *A_#Firm*	0.067	0.000	−0.014	0.000
ln *A_#Count*	−0.063	0.013	0.007	0.042
ln *B_#Ana*	0.051	0.000	0.003	0.001
ln *Disclosure*	0.464	0.128	−0.009	0.831
Enforcement	−0.030	0.153	0.017	0.000
ln *Owner con*	0.057	0.245	0.027	0.000
ln *aEPS*	−1.631	0.000	0.823	0.000
TP/P	−1.054	0.000	0.266	0.000
ln *MV*	−0.078	0.000	−0.015	0.000
ln *F_#Ana*	0.067	0.005	0.017	0.000
MOM	0.221	0.000	−0.030	0.000
COV	2.840	0.000	0.405	0.000
Mkt ret	1.659	0.000	−0.119	0.000
Fin cris	−0.094	0.008	0.076	0.000
Industry dummies	Yes		Yes	
Year dummies	Yes		Yes	
N	457915		457915	
p-value	0.000		0.000	
R^2	6.53%		33.77%	

The table examines the relation between past and current period target price accuracy. Panel A presents the results from quintile sorts on mean *aTPE* for all TP forecasts issued by the analyst in the past calendar year, $aTPE_{t-1}$. *N* is the number of observations, *Met_any* equals one if the actual stock price reaches the target price at any time over the 12-month forecast period and zero otherwise, and a*TPE* is the absolute target price forecast error. *p*($aTPE_{t-1}$ 1 − $aTPE_{t-1}$ 5) is the *p*-value for the difference between the two extreme $aTPE_{t-1}$ quintiles. Mean TP accuracy measures are expressed in %. Panel B presents the regression results (*Est*) for target price accuracy regressions when we include average past *aTPE* of all forecasts issued by the analyst, $aTPE_{t-1}$. The *Met_any* columns present the results from the logit model predicting the likelihood that the stock price will meet the target price at any time over the 12-month forecast period. The *aTPE* columns present the results from an OLS regression where the dependent variable is the absolute TP forecast error in log form, *aTPE*. *p* are *p*-values based on analyst- and firm-clustered standard errors (Petersen, 2009). Variable definitions are in Table 1 and ln indicates a logarithmic transformation of a variable. *N* is the number of observations, *p-value* is the *p*-value for model specification and R^2 is the *R*-squared.

TABLE 9

The effect of IFRS adoption on analyst target price forecast accuracy

	Met_any		*aTPE*	
	Est	*p*	*Est*	*p*
Intercept	1.093	0.001	0.335	0.000
ln $aTPE_{t-1}$	−0.090	0.007	0.047	0.000
ln *A_exp*	0.037	0.063	−0.016	0.000
ln *A_#Firm*	0.063	0.013	−0.011	0.000
ln *A_#Count*	−0.061	0.062	0.005	0.214
ln *B_#Ana*	0.017	0.130	0.000	0.770
ln Disclosure	1.005	0.102	−0.175	0.032
Enforcement	−0.045	0.082	0.020	0.000
ln Owner con	0.042	0.642	0.011	0.384
ln aEPS	−1.138	0.149	0.689	0.000
TP/P	−1.492	0.000	0.216	0.000
ln *MV*	−0.125	0.000	−0.012	0.000
ln *F_#Ana*	0.180	0.000	0.009	0.085
MOM	−0.023	0.757	−0.064	0.000
COV	2.688	0.000	0.540	0.000
Mkt ret	1.678	0.000	−0.081	0.000
Fin cris	−0.238	0.000	0.087	0.000
IFRS	−0.053	0.647	−0.023	0.083
*IFRS**ln *aEPS*	−0.577	0.513	−0.014	0.922
Industry dummies	Yes		Yes	
Year dummies	Yes		Yes	
N	159759		159759	
p-value	0.000		0.000	
R^2	9.38%		25.45%	

This table documents the effect of IFRS adoption on target price forecast accuracy for 14 countries that adopted IFRS. Column *Est* reports the coefficient estimates from TP forecast accuracy regressions. The *Met_any* columns present the results from the logit model predicting the likelihood that the stock price will meet the target price at any time over the 12 month forecast period. The *aTPE* columns present the results from an OLS regression where the dependent variable is the absolute TP forecast error in log form, *aTPE*. *p* are *p*-values based on analyst- and firm-clustered standard errors (Petersen, 2009). Variable definitions are in Table 1 and ln indicates a logarithmic transformation of a variable. *IFRS* is an indicator variable equal to one if the forecast is issued after 1 September 2007, and zero otherwise. *IFRS**ln *aEPS* is the interaction term between *IFRS* dummy and ln *aEPS*. $aTPE_{t-1}$ is the average *aTPE* of all forecasts issued by the analyst in the previous calendar year. *N* is the number of observations, *p-value* is the *p*-value for model specification and R^2 is the *R*-squared.