How Do Equity Research Analysts Value Banks?
Evidence from North American and European Banks

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Abstract

Despite the important role of banks in the economy, there is no study focusing on how financial analysts value banks, perhaps mainly due to its complexity. To fill the gap, using manually collected data of 2,263 equity research reports on 23 large North American and European banks, this study examines how analysts value banks, whether as a stand-alone entity or as sum-of-the-parts (SOTP) and what the most frequently used valuation models are. We find that analysts covering European banks prefer (SOTP) approach when valuing banks, while analysts covering North American banks are more likely to employ stand-alone entity approach. We also document that analyst teams led by those who have CFA designations are more likely to employ SOTP approach to value North American banks than their non-CFA counterparts, however, we do not find such an effect in the European bank sample. Regarding valuation model choice, equity analysts predominantly use single-period multiple models to value banks, regardless of whether they follow SOTP or stand-alone entity approach.

Keywords: Valuation model; Bank; Target price accuracy; Sum-of-the-Parts (SOTP); Financial analysts; Equity research reports

JEL Classification: G24, G32, M41

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"Banks are among the most complex businesses to value, especially from the outside in."
(McKinsey et al, 2015, p. 713)

1. Introduction

Banks play important roles in the economy, channelling capital throughout the economy, facilitating production activities and enable efficient consumption (Levine, 1991). Widespread failures and losses of financial institutions can impose significant losses on the rest of the economy (Acharya et al, 2017). Despite the importance of banks in the economy and the complicated valuation, there are few studies on bank valuations. While Copeland et al (2000) and Damodaran (2009) provide some theoretical guidelines about bank valuation approaches, we still do not understand well how practitioners value banks and whether those practices are consistent with theoretical predictions. This literature gap motivates our study since we believe that we need to understand more about how practitioners value banks. As banks are generally opaque (Beatty and Liao, 2014; Dang et al, 2013), and are often complex to analyse and evaluate, even for experienced analysts (McKinsey, 2015; Chang et al, 2016; Clatworthy et al, 2021) and auditors (Bratten et al., 2019), further understandings on bank valuation will benefit both the academic literature and wider community.

Given bank's complexity, often operating in several different business segments, such as commercial bank, corporate and investment bank, asset management, a natural question to ask is whether one should value a bank as a stand-alone entity or one should value each segment of a bank and then add up them up to get the value of the bank, which is the sum-of-the-part (SOTP) approach. We argue that this is an important decision valuers/analysts need to make and arguably can affect their subsequent valuation model choice. However, this problem remains unexplored. To address this gap in the literature, we proceed to investigate the following questions in our papers: (1) Do analyst prefer single entity approach or SOTP

approach when valuing banks? (2) What determines the choice of SOTP versus single entity approach? and (3) Does the valuation approach choice really affect target price accuracy?

To answer these research questions, we employ manual content analysis approach to collect a sample of 2,263 equity research reports on 23 largest North American and European banks from 2014 to 2017. As valuation models are presented in different sections in equity analyst reports and the terminologies as well as text pattern vary across reports, manual content analysis allows us to identify valuation models with higher reliability compared to computer-assisted content analysis approach. We then apply the regression analysis to explore the research questions above.

We find that, interestingly, analysts covering European banks prefer sum-of-the-parts (SOTP) approach when valuing banks while analysts covering North American banks are more likely to employ stand-alone entity approach. Only 8 percent of equity reports on US banks are associated with SOTP approach while the method is employed in 63 percent of reports in European bank. We do not find any reports on Canadian banks using SOTP. Regarding the valuation models analysts prefer, consistent with the literature on industrial firms (Demirakos et al, 2004; 2010), we document that equity analysts predominantly use single-period multiple models to value banks, regardless whether they follow SOTP or stand-alone entity valuation approach. The use of multi-period discounted cash flow model is mostly limited to dividend discount model (DDM) and residual income valuation model (RIV). We also find evidence that P/E and P/BV are the most popular multiple models employed by analysts to value banks. This finding indicates that earnings is still an important input for equity analysts to value banks, supporting the argument by Clatworthy et al (2021) that while empirical accounting research

on banks focuses primarily on the balance sheet and asset/liability composition, earnings information is still useful for valuation purposes and should attract more attention.

Regarding the determinants of valuation approaches, i.e. whether analysts prefer SOTP or stand-alone approaches, we find that analysts following larger banks and European banks are more likely to employ SOTP approach. Analyst team led by those who have CFA designation are more likely to employ SOTP approach to value North American banks than their non-CFA counterparts, however we do not find such an effect in the European bank sample. Furthermore, star analysts are not more likely to use SOTP approach. These findings are inconsistent with the argument that analysts with more resources and trainings are more likely to employ SOTP approach or combine SOTP with stand-alone entity approach to value banks.

Finally, we also examine whether valuation approach choice affect target price forecast errors and the probability whether target prices are met within the 12-month period after the forecast issuance date. We do not find evidence that the choice of SOTP versus single entity valuation approach significantly affect the accuracy of target prices. Our findings are inconsistent with findings by Erkilet et al (2021) that target price accuracy is higher when analysts apply the holistic rather than the SOTP valuation approach. However, our findings are in line with findings by previous studies by Demirakos et al (2010) and Asquith et al (2005) that the methods analysts choose to value the firms does not have impact on target price forecast accuracy.. Based on our findings, we suggest that the debate whether valuation approach choice and valuation model choice affect target price accuracy is still far from settled.

Our paper contributes to the literature in several ways. First, to our best knowledge, we are the first to empirically examine how equity analysts value banks, and whether they prefer to use SOTP or stand-alone entity valuation approach. Chlomou and Demirakos (2020) note that despite its popularity among sophisticated practitioners and investors, SOTP is mostly

ignored by researchers and academics. Our study contributes to our understanding about how SOTP is employed to value bank in practice. We also show that earnings-based multiples are among the popular valuation models employed by equity analysts and confirm the important role of earnings in bank valuation, suggesting that empirical accounting research should pay more attention to banks' earnings and other income statements' items, not just balance sheet's items.

Our second contribution is exploring determinants of banks valuation approaches. We find that geographical location plays an important role in determining the choice of valuation approach. In particular, analysts covering European banks are significantly more likely to choose SOTP to value banks than their counterparts following North American banks. This phenomenon is intriguing and has not been documented in the literature. We also document that CFA designation is also associated with certain valuation model preferences, particularly in the US sample. This suggests that professional training does have an impact on how analysts value firms in practices and we suggest that future studies should pay more attention into this issue. Finally, we contribute to the debate whether analysts' choices regarding valuation approaches or valuation models affect target price accuracy by providing new empirical evidence based on a sample of banks, which are usually excluded in previous studies.

The paper proceeds in Section 2 with an illustration of analysts' use of SOTP approach to value a bank. Section 3 presents the review of the relevant literature and the proposal of testable hypotheses. In Section 4, we outline our research methodology and data, while Section 5 presents the descriptive statistics and empirical results. Our concluding remarks are set out in Section 6.

2. Illustration of bank valuation using SOTP method

Prior to proceeding to the review of relevant literature and our main hypotheses, it is worthwhile to present the implementation of sum-of-the-parts (SOTP) approach by analysts to

value a bank and derive a target price for the stock of a bank. Figure 1 provides the illustration of the analysis from a Barclays equity research report on Deutsche Bank on 14th May 2018. In the analysis, Goel (2018) identify three main product-related segments: Corporate and Investment Bank (CIB), Private & Commercial Bank (PCB), Deutsche Asset Management (DeAM). Besides these key business segments, the analyst also make forecasts for the Consolidation & Adjustments (C&A) as a separated business segment. This segment contains the balances from the Non-Core Operational Unit (NCOU) which ceases to exist as a separate corporate division from 2017 onwards (Deutsche Bank, 2017). The segments employed in the analysis of Goel (2018) are generally consistent with the number of segments provided in the segmental structure provided by Deutsche Bank (2017). Panel A for the figure 1 provides the information provided by Deutsche Bank (2017) about these segments, while Panel B presents the information employed by Goel (2018) about the fundamentals of these business segments.

Our key interest of the analysis lies in the panel C, which presents the valuation of Deutsche Bank through the SOTP analysis. First, the analyst highlights that the 12 month ahead target price of EUR 8.0 is derived from the SOTP analysis and then the target prices is discounted with the horizon of one year to achieve the target price. It is also important to note that, within the SOTP approach, each segment is valued with a different valuation model. For example, the CIB and PBC segment are valued by P/TNAV approach, while the AM and C&A segment are valued by P/E multiples. The analyst also takes into account the dividends in the valuation. In other words, within the SOTP framework, the analyst uses different valuation models, including single period multiple based valuation models and discounted cash flow techniques. Given the insights gained from this finding, it is hard to attribute the valuation of Deutsche Bank in this analysis to any single valuation model that can be considered 'dominant' valuation model. This raises the concern that the practice employed by some previous studies

by identifying the dominant valuation model attributed to a target price may not be possible in certain cases.

3. Related Studies and Hypotheses

3.1 Bank valuation approaches

Banks are arguably optimally opaque (Beatty and Liao, 2014), and are often complex to analyze and evaluate, even for experienced analysts (McKinsey, 2015, Chang et al, 2016; Clatworthy et al, 2021) and auditors (Bratten et al., 2019).

According to Damodaran (2009), the reason why financial institutions, are difficult to value is due to (1) difficulties in estimating cashflows because items like capital expenditures, working capital and debt are not clearly defined, and (2) the regulatory framework that these institutions operate under affects their values, so banks' value tend to change when regulatory framework changes. The high level of leverage of banks compared with industrial companies also creates difficulty in valuing banks. Non-equity financing carries a much larger weight than equity financing on the balance sheet and the cost of capital of non-interest bearing deposits is difficult to determine (Copeland et al, 2000). Damodaran (2009) suggests that, it is 'far easier' to value the equity directly in a financial services firm, rather than trying to estimate firm value. Nevertheless, despite these theoretical and methodological suggestions, we do not know much about how practitioners actually value banks. This knowledge gaps motivates our research.

The literature on analysts' choice of valuation methods only focuses on the valuation model choice, but fails to appreciate that analysts also have to make a choice between valuing the firm as a single entity or valuing the firm as the sum of different business segments, and each segment may be valued differently. Chlomou and Demirakos (2020) suggest that academics tend to focus more on stand-alone entity valuation approach and neglect sum-of-the-parts (SOTP) valuation approach, which is popular among sophisticated practitioners and

investors. There are only a few studies examining whether analysts prefer valuing the company by the sum of its parts or as stand-alone entity, and these studies show inconsistent conclusions (Chlomou and Demirakos, 2020; Erkilet et al, 2021). Specifically, Chlomou and Demirakos (2020) find that analysts covering UK firms are more likely to consider SOTP as their preferred valuation approach while Erkilet et al (2021), find that 70 percent of analyst reports in their German sample tend to employ holistic (stand-alone entity) valuation methodology and only 30 percent of reports use SOTP. As both studies only focus on industrial firms and they provide inconsistent conclusions, there is still a gap in the literature regarding whether analysts prefer SOTP or stand-alone entity approach in valuing banks. To fill in this gap, in this paper, we will test the hypothesis *H*1, stated in its null form as follows,

Hypothesis H1: Analysts is equally likely to use SOTP as stand-alone entity approach.

3.2 Determinants of valuation model approach

As the implementation of SOTP approach involves an analysis of different business segments as well as an understanding of segmental accounting (Chlomou and Demirakos, 2020), it may provide more benefits to analysts following larger banks with more business segments and operating in different countries. Therefore, it is possible that analysts are more likely to employ SOTP to value larger banks as the benefits may outweigh the costs associated with this valuation model approach.

In addition, as the SOTP approach involves analysing each business segment, it may require more work and resources available to analysts. As a result, it is possible that analyst teams led by CFA analysts or star analyst teams are more likely to employ SOTP due to two possible reasons. First, CFA charter-holders may improve their productivity during the CFA program (De Franco and Zhou, 2009) and star analysts are usually more capable analysts with more firm-specific information (Xu et al, 2013), they may be able to handle additional

workload to better analyse firms' multiple business segments. Second, it is plausible that star teams and CFA teams are more likely to be employed by larger brokerage firms, which have more resources to conduct in-depth segmental analysis. Therefore, we expect that analysts team led by CFA analysts and star analyst teams are more likely to use SOTP valuation approach. Following these discussions, we propose the following hypotheses,

Hypothesis H2: Analysts are more likely to employ SOTP to value larger banks.

Hypothesis H3a: Analyst teams led by CFA analyst are more likely to employ SOTP to value banks.

Hypothesis H3b: Star analyst teams are more likely to employ SOTP to value banks.

3.3 Bank valuation approach and target price accuracy

Several studies examine choices on valuation methods analysts make when valuing companies and their target price forecast accuracy (Bradshaw 2004; Asquith et al, 2005; Demirakos et al, 2010; Gleason et al, 2006; Gleason et al (2013); Imam et al, 2013). Despite the large literature on this topic, the empirical results are mixed. Table 1 summarises the studies of valuation model choice and target price accuracy.

Based on these studies, the empirical findings regarding the relationship between analysts' choice of valuation methods and target price forecast accuracy is mixed. Furthermore, these studies focus mainly on the valuation model choice rather than the valuation approaches, i.e. the choice of single entity versus SOTP approach that we focus on in our paper. Very few papers examine analysts' valuation approach choice and target price accuracy. A recent study based on 867 analyst reports on German publicly listed companies by Erkilet et al (2021) suggests that target price accuracy is higher when analysts apply the holistic rather than the SOTP valuation approach to determine the fundamental value of the companies. On the contrary, in an earlier study of 265 UK equity research reports, Chlomou and Demirakos (2020) find that despite analysts are more likely to use SOTP as the dominant or preferred valuation

model, analysts who employ SOTP do not provide more accurate target prices compared to those who use discounted cash flow (DCF) models.

According to the discussion above, the empirical findings on the valuation approach choice-target price accuracy relationship is mixed as best. Furthermore, these studies rely on a sample of industrial firms while there is no evidence based on a bank sample. As we still know very little about analysts' preference about bank valuation approachess, and how it may affect their target price forecast performance, it is an empirical question whether analyst choice between single entity versus SOTP approach may affect target price accuracy in the bank industry. This motivates us to examine the following hypothesis *H*4,

Hypothesis H4: There is no relation between analyst valuation approach choice and target price accuracy.

4. Research methodology and sample selection

4.1 Sample selection and manual content analysis procedure

We employ manual content analysis to identify valuation models used by equity analysts to value banks. First, we obtain from Thomson Reuters' Eikon platform 2,475 equity research reports covering the 23 largest banks in North America and Europe in the period between July 2014 and July 2017. The equity reports employed in this study are those that are published 60 days before and after an earnings announcement date. We identify the largest banks based on total assets. Our focus in largest banks allow us to obtain equity research reports from several

brokerage firms, thus, lower the likelihood that our findings are driven by practices adopted by a few brokerage companies.

We then follow the content analysis approach to manually code the valuation models. The manual coding procedure has two steps. First, the valuation model is coded by a research assistant with accounting and finance background. Then, two members of the research team with extensive knowledge about the valuation model literature review the coded data and check the cases where the coder indicated as not classifiable. These members also randomly check the reports and identify possible area of classification errors. Any corrections for errors will be applied systematically for all reports.

After this procedure, we remove observations where we cannot identify the valuation models or we do not have available data to calculate target price accuracy and control variables. Our final sample include 2,263 equity research reports. To our best knowledge, our study examine the largest sample of equity research reports compared to previous studies which adopt manual content analysis.

4.2 Empirical models to test hypotheses *H*2-*H*4

To test the hypothesis *H*2 regarding the association between analysts' valuation approach choice and bank size, we use probit estimation of the following model:

$$SOTP = \beta_0 + \beta_1 Size + \beta_2 EU + \beta_3 ROE + \beta_4 Volatility + \varepsilon_i \qquad (1)$$

where *SOTP* indicates Sum-of-the-part valuation approach; *Size* is bank size measured by log of total asset; *EU* is the indicator of European banks; *ROE* is return on equity; *Volatility* is return volatility in the three months before the forecast date. The detailed definitions of these variables are presented in the Appendix A. Based on the hypothesis *H*2, we expect β_1 to be positive and statistically significant.

We control for the EU banks indicator to allow for possible valuation approach preference differences between European and US banks, which might be driven by variations in investors' preferences or analysts' familiarity with SOTP approach. As banks that are more profitable and associated with less return volatility may be associated with better information environment and are more straightforward to value, analysts might face less costs to obtain information on business segments to apply the SOTP, we control for *ROE* and *Volatility* in the model. We also control for bank, year and broker fixed effects in the model to allow for unobserved heterogeneity.

To test the hypothesis *H3a* and *H3b* regarding the association between analysts' valuation approach choice and CFA and star team analysts, we use probit estimation of the following models:

$$SOTP = \alpha_0 + \alpha_1 CFA + \alpha_2 CFA \times EU + \alpha_3 EU + \alpha_4 Size + \alpha_5 ROE + \alpha_6 Volatility + \varepsilon_i \qquad (2)$$

$$SOTP = \gamma_0 + \gamma_1 Star + \gamma_2 Star \times EU + \gamma_3 EU + \gamma_4 Size + \gamma_5 ROE + \gamma_6 Volatility + \varepsilon_i \qquad (3)$$

where *CFA* is the indicator of CFA led analysts; *Star* is the star ranking of the analyst team. Besides *Star*, we will also estimate model (3) using *Star_dummy* which is indicator of star analyst team. We interact these variables with EU banks indicator to allow for possible

valuation approach preference differences between European and US banks. Other variables are as described in the model (1).

Finally, to test the hypothesis *H*4, we estimate the following model

$$\begin{aligned} Accuracy = \ & \delta_0 + \delta_1 Approach + \delta_2 Approach \times EU + \delta_3 CFA + \delta_4 CFA \times EU + \ \delta_5 Star \\ & + \delta_6 Star \times EU + \ \delta_7 EU + \delta_8 Size + \ \delta_9 ROE + \delta_{10} Volatility \\ & + \delta_{11} Target\_Premium + \ \delta_{12} Rating + \varepsilon_i \end{aligned} \quad (4)$$

where *Accuracy* is target price accuracy, *Approach* is valuation approach choice; *Target_premium* is the premium of target price over the current price.; *Rating* is indicator of positive stock recommendations.

Following previous studies (Bilinski et al., 2013; Bradshaw et al., 2013), we employ three measures of target price accuracy: absolute target price forecast error (AFE), *Met_any* and *Met_end*. The first measure *AFE* is the absolute difference between the target price and the actual closing price at the end of the 12-month forecast period, scaled by the current price obtained on the target price issue date. *Met_any* indicates target prices is met at any time within the next 12 month while *Met_end* indicates target prices is met at the end of next 12 month. When we estimate the model with AFE, we use OLS estimation while we use probit estimation for *Met_any* and *Met_end*. For the valuation model choice, we employ three different variables *SOTP_only*, *SDL_only* and *Combine,* indicating the use of only SOTP approach, only stand-alone entity approach or combination of the two approaches respectively.

5. Empirical Findings

5.1 Descriptive statistics on which valuation approaches analysts use to value banks

Table 2, Panel A presents the descriptive statistics of valuation approaches employed by equity research analysts to value banks. The first column of table 1 presents the number and percentage of equity research reports associated with sum-of-the-parts (SOTP) and those associated with stand-alone entity approach using our full sample. We find that SOTP is

employed in only 499 equity reports (22 percent), while stand-alone entity approach is employed in 1764 reports (78 percent). Therefore, the null form of hypothesis *H*1 is rejected in the full sample and we find that analysts are more likely to use stand-alone entity approach than SOTP approach. Nevertheless, when we examine the sub-samples of each country in our sample, an interesting pattern emerges. We find that 63 percent of analyst reports on European banks (400 reports) are associated with SOTP approach while there is only 8 percent of reports are associated with SOTP in the US sample, and there is no report using SOTP in the Canadian sample. This finding is intriguing. While it is possible that analysts' use of SOTP is affected by either analysts' familiarity with the approach or investors' preferences, or both (Demirakos et al, 2004; Imam et al, 2008), we think that the level of difference is so large to be justified by either of these factors.

Panel B and C of the Table 1 provide further information about the distribution of SOTP across the top 10 contributors of analyst reports and all of banks in our sample. These tables show that there are significant variations in the preferences of SOTP across brokerage firms. Specifically, some brokerage firms such as Morgan Stanley, Societe Generale, Deutsche Bank employ SOTP in over 60 percent of their reports while some of other brokerage firms such as Barclays and Jefferies employ SOTP in less than 4 percent of their reports. Some European brokerage firms such as Barclays and Jefferies are still less likely to employ SOTP, therefore, while SOTP is more popular in Europe, not all European brokerage firms prefer this approach when valuing banks. The statistics of panel C of table 2 show that European banks are more likely to be associated with SOTP approach, with many banks are associated with more than 50 percent of reports with SOTP, consistent with the findings of panel A. The statistics on the

use of combination approach (combining SOTP with stand-alone approach) suggest that certain banks prefer using a hybrid approach when valuing banks.

Although in our paper, we are mainly interested in the valuation approach choice by equity analysts, we also explore which valuation models analysts tend to use after they have decided to value the banks as single entity or SOTP approaches. As the literature is generally interested in the use of single period multiple based valuation models compared with multi-period discounted cash flow model, we examine which of these valuation models are preferred when analysts value banks. Table 3 reports statistics on valuation models employed to value banks. Panel A, Table 3 shows that of single period multiple based valuation models are predominantly used to value banks, regardless whether analysts use SOTP or stand-alone entity approach. When analysts use multi-period discounted cash flow models, they tend to use either dividend discount model (DDM) or residual income valuation model (RIV). These findings are partially consistent with Damodaran (2009) who suggests to use dividends as cash flows to value banks. Interestingly, when analysts covering US banks use multi-period discounted cash flow models as stand-alone entity approach, they prefer RIV model while analysts covering European banks prefer DDM when valuing a bank following stand-alone entity approach. When using SOTP approach, North American analysts predominantly use multiple based valuation models.

Panel B presents statistics on which multiples are employed when analysts use SOTP approach to value banks, we find that P/E and P/Book-value are the most common multiples used to value banks, consistent with Damodaran (2009)'s suggestions. We find that analysts tend to employ different versions of book value of equity in their valuation, ranging from tangible net asset value to Tier 1 common equity.

5.2 Other summary statistics

Table 4 presents summary statistics for variables in regression models we use to test the hypothesis *H*2-*H*4. It is worthwhile to note that more than 29 percent of reports in our sample are issued by star analysts, which is not surprising given that we focus on the largest banks in North America and Europe, which tend to attract coverage of top analysts. Nearly one-third of reports in our sample are written by CFA led teams and most of these reports tend to be associated with positive recommendations. On average, analysts forecast a target price premium of 18.7 percent, with a maximum of over 200 percent, consistent with analyst optimism documented in the literature.

Table 5 present the correlations between variables employed in our regression analysis. We find that the SOTP variable is negatively correlated with dummies indicating star and CFA analyst team, absolute target price forecast error and positively correlated with bank size, return volatility. These statistics are consistent with the hypothesis H2 that analysts are more likely to use SOTP when valuing large banks. However, they do not support the hypotheses H3a and H3b. Based on these statistics, CFA and team analysts are actually do not prefer to use SOTP approach, contrary to our predictions. Nevertheless, as these correlations do not take into account for impacts of other factors on both SOTP and these variables, we cannot draw meaningful conclusion from this univariate analysis.

5.3 Bank characteristics, analyst characteristics and valuation model choice

Table 6 presents the empirical results of the test for the hypothesis *H*2. Column 1 shows the probit estimation for the equation (1). We find that the coefficient on *Size* is positive and statistically significant at 1 percent, supporting our hypothesis *H*2 that SOTP is a more popular approach to value larger banks which are more likely to have multiple business segments. We

also find that EU banks are more likely to be associated with SOTP, consistent with our findings in table 1 and table 3.

Nevertheless, when we replace *SOTP* by *Combine* which indicates analysts' combination both SOTP and stand-alone entity approaches, we do not find any significant impact of bank size or European bank dummy on the valuation model choice. This suggests that the choice of combining SOTP and stand-alone approach is not explained by bank size or geographic location of the head quarters.

Table 7 presents the test for the hypothesis *H3a* and *H3b* regarding analyst characteristics and valuation approach choice. Column 1 of table 7 shows that the coefficient on *CFA* is positive and significant, consistent with our hypothesis *H3a* that CFA analyst team are more likely to employ SOTP in the North American sample. However, the coefficient on *CFA*×*EU* is negative and significant, and the combine effect is not statistically different from zero. This indicate that in the European sub-sample, our hypothesis *H3a* is not supported. Column 2 and 3 show that neither coefficients on *Star_dummy* or *Star*, or their interactions with the *EU* dummy are significantly correlated with *SOTP*. This finding rejects hypothesis *H3b*, suggesting that star analyst team are not more likely to use SOTP valuation approach. Overall, we find very limited evidence that CFA team and star analyst team are more likely to use SOTP to value banks.

5.4 Valuation model choice and target price accuracy

Table 8 reports the test of valuation approach on target price accuracy. Panel A reports the OLS estimation of model (4) using absolute target price forecast error (*AFE*) as the dependent variable, while in panel B and C, we use *met_any* and *met_end* respectively as dependent variables and employ probit estimation.

Panel A, table 8 shows that valuation approach choice does not have any significant effect on target price absolute forecast error. In panel B and C, while there are limited evidence

that the choice of using only SOTP or only stand-alone entity valuation approach may affect the probability of meeting target prices in US or EU sample separately, the findings tend to be contrary to each other. As a result, in the full sample, there is at best mixed conclusion about the impact of valuation approach choice and target price accuracy. Our findings are inconsistent with findings by Erkilet et al (2021) that target price accuracy is higher when analysts apply the holistic rather than the SOTP valuation approach, however, it is consistent with eariler studies which suggest that analyst valuation model choice or valuation approach does not have significant impact on target price accuracy Asquith et al, 2005; Demirakos et al, 2010; Chlomou and Demirakos, 2020).

6. Conclusion

In this study, we examine how analysts value banks and whether their valuation approach choice affect bank forecast accuracy. Interestingly, we find that analysts covering European banks prefer sum-of-the-parts (SOTP) approach when valuing banks while analysts covering North American banks are more likely to employ stand-alone entity approach. We also find that analysts of certain brokerage firms tend to combine both SOTP and stand-alone entity approaches to value banks.

Regarding the determinants of valuation approach choice, we find that analysts following larger banks and European banks are more likely to employ SOTP approach. However, contrary to our expectations, analyst team led by those who have CFA designation and star analyst team are generally not more likely to use SOTP in our full sample, despite some limited evidence in the European sample. These findings are inconsistent with the argument that

analysts with more resources and trainings are more likely to employ SOTP approach or combine SOTP with stand-alone entity approach to value banks.

Finally, we do not find substantial evidence that valuation approach choices significantly affect the accuracy of target prices. Based on our findings, we suggest that the debate whether valuation approach choice affects target price accuracy is still far from settled. Throughout our paper, although there is very limited evidence that valuation approaches significantly affect analysts' ability to issue more accurate target prices, there are substantial variations in valuation approaches, and suggest that we should not just focus on what valuation models predominantly use to value banks, but we also need to understand better why analysts choose to value banks as stand alone entity or sum-of-the-parts approach.

These findings lead to several possible venues for future research. First, the intriguing large differences in term of SOTP model use to value European banks and US banks should attract attention of future studies. We suggest that researchers should interview analysts covering European banks and US banks to find out possible reasons for their preferences towards SOTP in European banks as well as why analysts tend to not use the SOTP approach to value North American banks. Second, our sample only covers largest US and European banks, and therefore the generalizations of the valuation model choice could be limited to banks only. Future studies can extend this study to other financial institutions such as insurance companies and mutual funds.

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Figure 1. Illustration of Sum-of-The-Parts Valuation Approach in Banking

Panel A. Segmental Structure in Deutsche Bank 2017 Financial Data Supplement

Q1 2017 Financial Data Supplement

Q2 2017 Segmental Structure

In accordance with our strategy announcement on March 5, 2017, our business operations have been reorganized from the second quarter 2017 onwards under a new divisional structure comprising the divisions:

- Corporate & Investment Bank (CIB),
- Private & Commercial Bank (PCB) and
- Deutsche Asset Management (Deutsche AM).

This Financial Data Supplement (FDS) provides historical financial information restated to reflect our new divisional structure for the full years 2015 and 2016 and for the quarters from the first quarter 2016 through the first quarter 2017.

The key changes compared to Deutsche Bank's previously reported divisional information are outlined below:

- The new corporate division "Corporate & Investment Bank" combines the former segments "Global Markets" and "Corporate & Investment Banking". It comprises the bank's Corporate Finance, Global Markets and Global Transaction Banking businesses.
- The corporate division "Private & Commercial Bank" combines the businesses with private and commercial clients of Deutsche Bank and Postbank, which formerly had been reported separately, and the wealth management activities for wealthy clients, foundations and family offices.
- The corporate division "Deutsche Asset Management" remains materially unchanged and contains the asset management activities of Deutsche Bank. It focuses on providing investment solutions to individual investors and institutions that serve them.

Accordingly total net revenues by division are presented broken down into the following categories:

CIB:

- Global Transaction Banking
- Origination and Advisory (Equity Origination, Debt Origination, Advisory)
- Financing (certain financing activities previously reported within "Loan Products and Other" and "Sales & Trading (debt and other products)")
- Sales & Trading (Equity, Fixed Income and Currencies/FIC)
- Other (will also include revenues associated with assets identified as portfolios not consistent with our new corporate-led CIB strategy)

PCB:

- Private & Commercial Clients (PCC)
- Postbank
- Wealth Management
- HuaXia (which was sold at the end of 2016)
- In addition, PCB total revenues are presented broken down into Net interest income, Commission and fee income, Remaining income

DeAM:

- Management Fees
- Performance & Transaction Fees
- Other Revenues
- Mark-to-market movements on policyholder positions in Abbey Life (which was sold at the end of 2016)

The changes above, and a number of smaller changes as part of the normal course of business, will be reflected in the external reporting for the second quarter 2017 and onwards.

Panel B. Segmental Structure in Goel (2018)

When we look at the business divisions, the picture is not much better

On a divisional basis the picture is not much better, as illustrated below.

FIGURE 3

Deutsche Bank: Divisional underlying earnings in 2017 (EURm)

	CIB	PCB	DeAM	C&A	Total
Revenues	14,495	10,045	2532	-270	26,801
Costs*	-12,941	-9,054	-1,785	-112	-23,892
Provisions	-213	-313	1	0	-525
Other	-26	12	-1	16	0
PBT*	**1,314**	**690**	**745**	**-365**	**2,386**
Tax	-434	-228	-246	121	-787
Net	880	462	499	-245	1,597
Leverage Exposure	1,029,946	344,087	2,870	17,983	1,394,899
TNAV allocation	39,925	13,338	111	697	54,072
RoTE	**2.2%**	**3.5%**	**449.0%**	**-35.1%**	**3.0%**

Source: Company reports, Barclays Research estimates. *Note this is before the Q118 reclassification which allocated more cost to corporate center from the business units. Our estimates in Figures 13 & 14 are after reclassification.

Panel C. Illustration of Sum-of-The-Parts Valuation Approach in Banking

Valuation

Our 12-month forward target price of EUR8.0 is based on our 2020e SotP analysis, discounted back to one-year forward, as illustrated below.

We value the CIB and PBC businesses using a T/NAV approach, and AM using peer average P/E multiples.

FIGURE 10

Deutsche Bank: Sum-of-the-parts valuation, based on 2020 estimates

EUR mn	Net Profit	Avg CET1	Avg TNAV	TNAV	RoTE	P/TNAV	PE	Method	Valuation	Val/sh
CIB	591	36,252	35,842	39,839	1.6%	0.30	20.2	P/TNAV	11,952	5.8
PBC	574	14,110	13,951	15,507	4.1%	0.78	21.0	P/TNAV	12,061	5.8
AM	376	118	116	129			13.0	PE	4,882	2.4
C&A	-396	737	729	810			9.0	PE	-3,562	-1.7
Subtotal (2020)	1,144	51,217	50,638	56,285	2.3%		22.1		25,332	12.3
Restructuring	-201						9.0	PE	-1,809	-0.9
Litigation	-200						8.0	PE	-1,600	-0.8
Other	-15						10.0	PE	-154	-0.1
Capital			2,786	-2,612				P/TNAV	-2,612	-1.3
Total (2020)	728	51,217	53,423	53,673	1.4%		26.3		19,158	9.3
Discount factor									1.21	
Discounted									15,854	7.7
Dividends									682	0.3
Overall									16,535	8.0

Source: Barclays Research

- We allocate TNAV and capital based on a 4% CET1 leverage ratio. This is based on a 4.5% group Tier 1 leverage ratio requirement in 2022, and assuming 50bps of AT1 capital (similar to current levels).
- Group excess/deficit capital is measured relative to this 4% leverage benchmark.
- The Asset Management contribution is reduced to reflect the 25% disposal.
- We use a 10% discount rate for the business, in line with our aggregate CoE estimate.

At the current price (EUR11.6) the shares are trading at 0.45x 2018e TNAV. Assuming a CoE of 10%, this suggests the market is discounting a Group RoTE of c4-5%, i.e. materially higher than our estimate for 2020.

Table 1.

The table summarizes the methods and main findings of selected studies in terms of valuation model choice, valuation approach choice, and target price accuracy. Papers in Panel A reports a relationship between valuation model and target price accuracy. Papers in Panel B suggests no relationship between them, while Panel C reports findings on valuation approach choice and target price accuracy.

Reference	Method	Main findings
Panel A. Papers suggesting there is a relationship between valuation model choice and forecast accuracy		
Bradshaw (2004)	Archival, First Call Database, 1994-1998, US sample	Residual income model is more accurate than price-earnings-to-growth model.
Gleason, Johnson and Li (2006)	Archival, I/B/E/S,1997-2003, US sample	More rigorous valuation approach generates higher target price accuracy.
Gleason, Johnson and Li (2013)	Archival, First Call database,1997-2003, US sample	Target prices that are closer to residual income model are more accurate than those closer to price-earnings-to-growth model.
Imam, Chan, and Shah (2013)	Content analysis, Investext database, 2005-2007, European sample	Using accrual based multiple along side a cash flow based model improves the forecast error.
Panel B. Papers suggesting there is no relationship between valuation model and forecast accuracy		
Asquith, Mikhail and Au (2005)	Content analysis, Investext database, 1997-1999, US sample	There is no significant association between valuation model and analyst accuracy.
Demirakos, Strong and Walker (2010)	Content analysis, Investext database, 2002-2004, UK sample	Price-to-earnings multiples outperform discount cash flow model unconditionally. After controlling the variables that capture the valuation difficulty, there is a remarkable improvement of discount cash flow model.
Panel C. Papers examining relationship between valuation approach choice and forecast accuracy		
Erkilet, Janke, Kasperzak (2021)	Content analysis, Investext database, 2014-2017, German sample	Target price accuracy is higher when analysts apply the holistic rather than the sum of the parts valuation approach

Chlomou and Demirakos (2020)	Content analysis, Investext database, Jan 2016 - Dec 2016, UK sample	SOTP, despite being the preferred valuation approach, does not help analysts to provide more accurate target prices compared to DCF model.

Table 2: Descriptive statistics: Bank Valuation Models

This table presents the descriptive statistics of bank valuation models employed by analysts in our sample. Panel A presents the distribution of sum-of-the-parts (SOTP) approach and other approaches across our full sample, and North American and European subsamples. Panel B presents distribution of valuation approaches across the top 15 brokerage firms in our sample while panel C shows the number of reports and valuation approaches associated with each bank of our full sample.

Panel A: The use of SOTP approach across continents

	Total	North America		Europe
		US	CAN	
SOTP	499	99	0	400
%	*22%*	*8%*	*0%*	*63%*
Stand-alone	1,764	1,143	387	234
%	*78%*	*92%*	*100%*	*37%*
Total	2263	1242	387	634

Panel B: Top contributors of analysts reports

Contributor	*N. of*	*SOTP*		*Combine*	
	Reports	N	% of report	N	% of SoTP
CREDIT SUISSE	240	49	20.4%	3	6.1%
UBS RESEARCH	201	50	24.9%	2	4.0%
BARCLAYS	190	3	1.6%	0	0.0%
CFRA EQUITY RESEARCH	181	0	0.0%	0	0.0%
RBC CAPITAL MARKETS	134	14	10.4%	1	7.1%
MORGAN STANLEY	122	77	63.1%	36	46.8%
MACQUARIE RESEARCH	113	18	15.9%	0	0.0%
JPMORGAN	104	59	56.7%	1	1.7%
SOCIETE GENERALE	94	72	76.6%	18	25.0%
EVERCORE ISI	93	2	2.2%	0	0.0%
SANDLER ONEILL & PARTNERS	91	0	0.0%	0	0.0%
DEUTSCHE BANK	61	40	65.6%	0	0.0%
BMO CAPITAL MARKETS	59	0	0.0%	0	0.0%
BUCKINGHAM RESEARCH GROUP, INC.	52	0	0.0%	0	0.0%
JEFFERIES	52	2	3.8%	0	0.0%

Panel C: Analyst report distribution across banks

Banks	Location	*N. of Reports*	SoTP		Combine	
			N	% of report	N	% of SoTP
JPMORGAN CHASE & CO	N. America	202	20	9.9%	12	60.0%
DEUTSCHE BANK	Europe	184	103	56.0%	12	11.7%
CITIGROUP INC	N. America	146	16	11.0%	8	50.0%
WELLS FARGO & CO	N. America	131	3	2.3%	2	66.7%
BANK OF AMERICA CORP	N. America	129	18	14.0%	14	77.8%
STATE STREET CORP	N. America	108	6	5.6%	6	100.0%
CANADIAN IMPERIAL BANK	N. America	105	0	0.0%	0	0.0%
ING GROEP	Europe	101	83	82.2%	2	2.4%
MORGAN STANLEY	N. America	98	15	15.3%	0	0.0%
PNC FINANCIAL SVCS GROUP	N. America	97	6	6.2%	1	16.7%
U S BANCORP	N. America	96	1	1.0%	1	100.0%
BNP PARIBAS	Europe	90	59	65.6%	6	10.2%
TORONTO DOMINION BANK	N. America	81	0	0.0%	0	0.0%
BANK OF MONTREAL	N. America	80	0	0.0%	0	0.0%
BANK OF NEW YORK MELLON	N. America	80	3	3.8%	2	66.7%
CAPITAL ONE FINANCIAL	N. America	80	1	1.3%	1	100.0%
BANK OF NOVA SCOTIA	N. America	74	0	0.0%	0	0.0%
CREDIT AGRICOLE	Europe	74	40	54.1%	6	15.0%
GOLDMAN SACHS GROUP INC	N. America	73	10	13.7%	5	50.0%
BANCO SANTANDER	Europe	69	41	59.4%	0	0.0%
BBV.ARGENTARIA	Europe	58	41	70.7%	1	2.4%
KBC GROUP	Europe	58	33	56.9%	1	3.0%
ROYAL BANK OF CANADA	N. America	49	0	0.0%	0	0.0%

Table 3. Valuation models and different approaches

This table examines which valuation models are employed to value banks across three different valuation approaches, namely sum-of-the-parts (*SOTP*), stand-alone entity (*SDL*) and an approach that combine both of these (*Combine*). Panel A presents these statistics while Panel B explores which types of multiples are employed under the *SOTP* approach to value banks.

	SOTP			*Standalone entity (SDL)*		
	Full sample	NA	EU	Full sample	NA	EU
Multiples	350	48	302	1,704	1,526	178
RIV	11	0	11	80	75	5
DDM	63	0	63	94	0	94

Panel B. Multiples employed under the sum-of-the-parts *(SOTP)* valuation approach

	SOTP		
	Total	NA	EU
P/E	**217**	**29**	**188**
P/E only	*111*		
P/E combine with other multiples			
P/Book value	**239**	**24**	**215**
P/B	*153*	*18*	*135*
P/TBV	*42*	*3*	*39*
P/TNAV	*33*	*2*	*31*
P/NAV	*8*	*0*	*8*
P/CET1	*9*	*1*	*8*
P/B3CET1	*4*	*0*	*4*
P/AuM	*1*	*0*	*1*

Table 4. Summary Statistics

This table presents the summary statistics of variables employed in the regression analysis of our study. *SOTP* indicates Sum-of-the-part valuation model use. *SDL* indicates stand-alone entity valuation model use. *Combine* indicates combination of SOTP and stand-alone entity valuation model. CFA is indicator of CFA led analyst team; *Star_dummy* is indicator of star analyst team; *Star* is the star ranking of the analyst team; AFE is absolute target price forecast error; *Met_any* indicates target prices is met at any time within the next 12 month; *Met_end* indicates target prices is met at the end of next 12 month; *Size* is bank size; *ROE* is return on equity; *Volatility* is return volatility in the three months before the forecast date; *Target_premium* is the premium of target price over the current price; *Rating* is indicator of positive stock recommendations. The definitions of variables can be found in the Appendix A.

Variables	N	Mean	Min	P25	Median	P75	Max	SD
SOTP	2,263	0.221	0.000	0.000	0.000	0.000	1.000	0.000
SDL	2,263	0.815	0.000	1.000	1.000	1.000	1.000	0.000
Combine	2,263	0.035	0.000	0.000	0.000	0.000	1.000	0.000
CFA	2,263	0.315	0.000	0.000	0.000	1.000	1.000	0.000
Star_dummy	2,263	0.292	0.000	0.000	0.000	1.000	1.000	0.000
Star	2,263	0.946	0.000	0.000	0.000	2.000	5.000	2.000
AFE	2,148	0.214	0.000	0.084	0.177	0.308	1.176	0.164
Met_any	2,254	0.632	0.000	0.000	1.000	1.000	1.000	0.482
Met_end	2,254	0.399	0.000	0.000	0.000	1.000	1.000	0.490
Size	2,148	13.740	12.313	13.046	13.808	14.396	14.761	0.726
ROE	2,148	0.089	-0.104	0.059	0.090	0.126	0.220	0.054
Volatility	2,132	0.015	0.006	0.011	0.014	0.017	0.039	0.005
Target_premium	2,148	0.187	0.000	0.073	0.144	0.266	2.031	0.156
Rating	2,263	0.927	0.000	1.000	1.000	1.000	1.000	0.261

Table 5. Correlation matrix

This table presents the correlation between key variables employed in our regression analysis. *SOTP* indicates Sum-of-the-part valuation model use. *SDL* indicates stand-alone entity valuation model use. *Combine* indicates combination of SOTP and stand-alone entity valuation model. CFA is indicator of CFA led analyst team; *Star_dummy* is indicator of star analyst team; *Star* is the star ranking of the analyst team; AFE is absolute target price forecast error; *Met_any* indicates target prices is met at any time within the next 12 month; *Met_end* indicates target prices is met at the end of next 12 month; *Size* is bank size; *ROE* is return on equity; *Volatility* is return volatility in the three months before the forecast date; *Target_premium* is the premium of target price over the current price.; *Rating* is indicator of positive stock recommendations. The definitions of variables can be found in the Appendix A.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)	*SOTP*	1													
(2)	*Combine*	0.359*	1												
(3)	*SDL*	-0.896*	0.091*	1											
(4)	*CFA*	-0.062*	0.081*	0.105*	1										
(5)	*Star_dummy*	-0.095*	0.019	0.111*	0.018	1									
(6)	*Star*	-0.094*	-0.001	0.100*	-0.027	0.915*	1								
(7)	*AFE*	0.047*	0.046*	-0.029	0.116*	-0.150*	-0.113*	1							
(8)	*Met_any*	0.033	-0.002	-0.037	-0.211*	0.014	0.002	-0.401*	1						
(9)	*Met_end*	-0.012	0.010	0.018	-0.129*	-0.049*	-0.060*	-0.216*	0.618*	1					
(10)	*Size*	0.154*	0.090*	-0.122*	-0.156*	-0.059*	-0.014	0.116*	-0.138*	-0.096*	1				
(11)	*ROE*	-0.39*	-0.100*	0.371*	0.272*	-0.039	-0.049*	-0.183*	-0.005	0.061*	-0.367*	1			
(12)	*Volatility*	0.388*	0.071*	-0.379*	-0.222*	-0.030	-0.022	0.126*	0.161*	0.136*	0.153*	-0.619*	1		
(13)	*Target_premium*	-0.049*	0.036	0.069*	0.226*	-0.032	-0.012	0.336*	-0.475*	-0.229*	0.0430*	0.094*	0.0630*	1	
(14)	*Rating*	-0.165*	-0.065*	0.145*	0.001	0.027	0.017	-0.048*	-0.053*	-0.022	-0.049*	0.135*	-0.153*	0.017	1

Table 6. Bank valuation approach choice and bank characteristics

This table presents the probit estimation of the model (1) presented in the section 4.2. *SOTP* indicates sum-of-the-parts valuation approach use. *Combine* indicates combination of SOTP and stand-alone entity valuation model. CFA is indicator of CFA led analyst team; *Star_dummy* is indicator of star analyst team; *Star* is the star ranking of the analyst team; AFE is absolute target price forecast error; *Met_any* indicates target prices is met at any time within the next 12 month; *Met_end* indicates target prices is met at the end of next 12 month; *Size* is bank size; *ROE* is return on equity; *Volatility* is return volatility in the three months before the forecast date; *Target_premium* is the premium of target price over the current price.; *Rating* is indicator of positive stock recommendations. The definitions of variables can be found in the Appendix A. Robust standard errors are reported in the parentheses. *, **, *** denote significant at 10, 5, and 1 percent level.

Dep. Var. =	*SOTP*	*Combine*
	(1)	(2)
Size	2.612***	2.047
	(0.768)	(1.418)
EU	2.971***	3.089
	(0.278)	(2.573)
ROE	0.067	-5.611
	(1.178)	(3.906)
Volatility	-17.956	-42.710*
	(18.215)	(24.294)
Constant	-39.436***	-28.233
	(10.793)	(19.923)
Observations	2,132	774
Year FE	Yes	Yes
Broker FE	Yes	Yes
Bank FE	Yes	Yes
Pseudo R^2	0.456	0.407

Table 7. CFA analyst team, star analyst team, and valuation approaches

This table presents the probit estimation of the model (2) and (3) presented in the section 4.2. *SOTP* indicates sum-of-the-parts valuation approach use. *Combine* indicates combination of SOTP and stand-alone entity valuation model. CFA is indicator of CFA led analyst team; *Star_dummy* is indicator of star analyst team; *Star* is the star ranking of the analyst team; AFE is absolute target price forecast error; *Met_any* indicates target prices is met at any time within the next 12 month; *Met_end* indicates target prices is met at the end of next 12 month; *Size* is bank size; *ROE* is return on equity; *Volatility* is return volatility in the three months before the forecast date; *Target_premium* is the premium of target price over the current price.; *Rating* is indicator of positive stock recommendations. The definitions of variables can be found in the Appendix A. Robust standard errors are reported in the parentheses. *, **, *** denote significant at 10, 5, and 1 percent level.

Dep. Var. =	*SOTP*	*SOTP*	*SOTP*
	(1)	(2)	(3)
CFA	1.438***		
	(0.460)		
CFA×EU	-1.413*		
	(0.740)		
EU	3.576***	3.001***	3.078***
	(0.402)	(0.319)	(0.328)
Size	2.327***	2.523***	2.686***
	(0.738)	(0.768)	(0.819)
ROE	0.078	0.013	0.111
	(1.102)	(1.235)	(1.189)
Volatility	-24.053	-21.943	-24.731
	(18.945)	(23.593)	(24.814)
Star_dummy		-0.379	
		(0.339)	
Star_dummy×EU		-0.208	
		(0.483)	
Star			-0.158
			(0.107)
Star×EU			-0.056
			(0.147)
Constant	-36.062***	-38.333***	-40.764***
	(10.506)	(10.830)	(11.511)
Observations	1,339	1,339	1,339
Year FE	Yes	Yes	Yes
Broker FE	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
Pseudo R^2	0.484	0.464	0.469

Table 8. Valuation approach choice and target price forecast accuracy

This table presents the estimation of various versions of the model (4) presented in the section 4.2. Panel A present OLS estimation with the absolute target price forecast error as the dependent variable (*AFE*). Panel B and C show probit estimation where *Met_any* and *Met_end* are employed as dependent variables respectively.

SDL_only indicates that only stand-alone entity valuation model is used. *SOTP_only* indicates that only sum-of-the-parts valuation approach is used. *Combine* indicates combination of SOTP and stand-alone entity valuation model. CFA is indicator of CFA led analyst team; *Star_dummy* is indicator of star analyst team; *Star* is the star ranking of the analyst team; AFE is absolute target price forecast error; *Met_any* indicates target prices is met at any time within the next 12 month; *Met_end* indicates target prices is met at the end of next 12 month; *Size* is bank size; *ROE* is return on equity; *Volatility* is return volatility in the three months before the forecast date; *Target_premium* is the premium of target price over the current price.; *Rating* is indicator of positive stock recommendations. The definitions of variables can be found in the Appendix A. Robust standard errors are reported in the parentheses. *, **, *** denote significant at 10, 5, and 1 percent level.

Panel A: Target price forecast error			
	AFE	*AFE*	*AFE*
Dep. Var. =	(1)	(2)	(3)
SOTP_only	0.021		
	(0.046)		
SOTP_only×EU	-0.045		
	(0.053)		
SDL_only		-0.022	
		(0.029)	
SDL_only×EU		0.041	
		(0.041)	
Combine			0.019
			(0.035)
Combine×EU			0.006
			(0.035)
CFA	0.015	0.014	0.015
	(0.012)	(0.012)	(0.011)
CFA×EU	0.029	0.031	0.027
	(0.026)	(0.026)	(0.026)
Star_dummy	-0.052***	-0.052***	-0.052***
	(0.014)	(0.014)	(0.014)
Star_dummy×EU	0.066**	0.067**	0.070**
	(0.027)	(0.027)	(0.029)
EU	0.075	0.033	0.067
	(0.080)	(0.073)	(0.075)
Size	0.023	0.021	0.017
	(0.073)	(0.073)	(0.071)

ROE	0.321	0.321	0.327
	(0.309)	(0.307)	(0.309)
Volatility	-1.462	-1.507	-1.322
	(4.189)	(4.219)	(4.052)
Target_premium	0.261***	0.261***	0.260***
	(0.076)	(0.077)	(0.076)
Rating	0.008	0.009	0.010
	(0.036)	(0.036)	(0.038)
Constant	-0.056	-0.014	0.011
	(0.990)	(0.970)	(0.955)
Observations	2,132	2,132	2,132
Year FE	Yes	Yes	Yes
Broker FE	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
Adjusted R-squared	0.496	0.496	0.495

Panel B: Probability of target prices being met at any time within the next 12 months			
Dep. Var. =	*Met_any*	*Met_any*	*Met_any*
	(1)	(2)	(3)
SOTP_only	-0.795***		
	(0.295)		
SOTP_only×EU	0.813**		
	(0.374)		
SDL_only		0.370**	
		(0.150)	
SDL_only×EU		-0.405	
		(0.267)	
Combine			0.196
			(0.241)
Combine×EU			-0.046
			(0.338)
CFA	-0.025	-0.023	-0.086
	(0.163)	(0.164)	(0.153)
CFA×EU	-0.463	-0.468	-0.368
	(0.285)	(0.289)	(0.272)
Star_dummy	0.245	0.256	0.267
	(0.206)	(0.206)	(0.196)
Star_dummy×EU	-0.239	-0.256	-0.283
	(0.346)	(0.349)	(0.345)
EU	0.787	1.147	0.814
	(1.481)	(1.436)	(1.465)
Size	-1.775	-1.752	-1.784
	(1.765)	(1.773)	(1.791)
ROE	10.296***	9.992***	9.908***
	(3.490)	(3.567)	(3.497)
Volatility	69.261*	68.535*	66.971*
	(36.131)	(35.795)	(35.426)
Target_premium	-7.863***	-7.812***	-7.776***
	(0.650)	(0.652)	(0.665)
Rating	-0.647	-0.636	-0.624
	(0.514)	(0.511)	(0.520)
Constant	29.738	29.064	29.841
	(23.470)	(23.623)	(23.807)
Observations	2,046	2,046	2,046
Year FE	Yes	Yes	Yes
Broker FE	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
Pseudo R^2	0.437	0.435	0.434

Panel C. Probability of target prices being met at the end of the next 12 months			
Dep. Var. =	*Met_end*	*Met_end*	*Met_end*
	(1)	(2)	(3)
SOTP_only	-0.932***		
	(0.307)		
SOTP_only×EU	1.148***		
	(0.371)		
SDL_only		0.602***	
		(0.227)	
SDL_only×EU		-0.828***	
		(0.309)	
Combine			-0.093
			(0.324)
Combine×EU			0.273
			(0.433)
CFA	-0.076	-0.038	-0.095
	(0.115)	(0.115)	(0.100)
CFA×EU	-0.692**	-0.721**	-0.614*
	(0.336)	(0.328)	(0.328)
Star_dummy	-0.153	-0.146	-0.133
	(0.159)	(0.162)	(0.156)
Star_dummy×EU	0.240	0.231	0.178
	(0.305)	(0.314)	(0.301)
EU	1.005	1.763	1.056
	(1.319)	(1.416)	(1.330)
Size	-1.104	-1.039	-0.959
	(1.829)	(1.823)	(1.805)
ROE	12.848***	12.676***	12.536***
	(2.807)	(2.850)	(2.731)
Volatility	44.108	44.941	40.514
	(43.034)	(42.606)	(43.069)
Target_premium	-3.942***	-3.908***	-3.835***
	(0.455)	(0.464)	(0.476)
Rating	-0.225	-0.230	-0.214
	(0.418)	(0.421)	(0.435)
Constant	16.953	15.443	14.985
	(24.624)	(24.512)	(24.266)
Observations	1,958	1,958	1,958
Year FE	Yes	Yes	Yes
Broker FE	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
Pseudo R^2	0.311	0.310	0.305

Appendix A. Definition of variables

Variables	Description
Valuation model variables	
SOTP	Equals one if the sum of the parts approach is used to evaluate the company and zero otherwise
SOTP_only	Equals one if the sum of the parts approach is the only approach used to evaluate the company and zero otherwise
SDL	Equals one if a valuation model or several models are used to evaluate the busniess as a whole instead of combining different parts of the business and zero otherwise
SDL_only	Equals one if only a valuation model or several models are used to evaluate the business as a whole instead of combining different parts of the business and zero otherwise
Combine	Equals one if both SOTP and standalone approaches are used to evaluate the bank
Target price accuracy variables	
AFE	Target price forecast error, which equals the absolute difference between the target price and the actual share price at the end of the 12-month forecast period, scaled by the current price at the target price issue date
Met_any	A dummy variable that equals one if the target price is met at any time in during the 12-month forecast period. It equals zero if the target price is not met
Met_end	A dummy variable that equals one if the target price is met at the end of the 12-month forecast period and the value zero otherwise
Other variables	
CFA	Equals one if the analyst team is led by a CFA designated analyst
Star_dummy	Equals one if the analyst team is rated as star analysts in the Investext data, zero otherwise
Star	Equals the number of stars associated with the analyst team in the Investext data
Volatility	Return volatility in the three months before the forecast date
ROE	Return on equity, obtained from Eikon
Size	Bank size, measured as log of total assets, obtained from Eikon
Rating	A dummy variable that equals one if the stock rating of the report is positive, such as Outperform, Overweight, Strong Buy or Buy, and zero if the stock rating is negative or neutral, such as Sell, Underperform, Hold, or Market perform
Target_premium	The absolute difference between the target price and the current price at the target price issue date, scaled by the current price on the target price issue date