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Cash-Backed Earnings Quality and Price-to-Book Valuation among Global Clean200 Firms

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Abstract
This study examines whether cash-backed earnings quality (CBQ) is associated with the price-to-book (P/B) valuation of global Clean200 firms. CBQ is measured by combining the difference between operating cash flow relative to assets (OCF/Assets) and return on assets (ROA) with the difference between operating cash-flow margin (OCF Margin) and net profit margin (NP Margin). Using a cross-sectional sample of 198 firms, the study estimates regression models controlling for profitability, growth, operating efficiency, leverage, firm size, sector, and region. The results show that firms whose reported profitability is more strongly supported by OCF tend to have higher P/B valuations. OCF also provides incremental valuation information beyond conventional profitability measures. The main finding remains generally consistent across alternative cash-quality measures, country fixed effects, heteroskedasticity-consistent standard errors, stricter winsorization, and leave-one-country-out analyses, although the evidence is weaker under equal-country weighting and for some alternative valuation multiples. The study extends earnings-quality research to environmentally oriented firms and introduces a composite measure that captures the cash support of earnings from both asset-based and revenue-based perspectives. The findings suggest that CBQ can complement traditional profitability indicators when investors and analysts evaluate the financial credibility of clean-economy firms.

Keywords: Cash-backed earnings quality, Operating cash flow, Price-to-book ratio, market valuation, Clean200

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1. Introduction

The transition toward a low-carbon economy has increased investor interest in firms that generate revenue from environmentally beneficial products, services, and technologies. The Clean200 provides a prominent global universe of such firms by identifying publicly listed companies with substantial exposure to sustainable economic activities. However, inclusion in the Clean200 reflects participation in the clean economy rather than the financial quality of the earnings generated from those activities (Corporate Knights & As You Sow, 2025).

Accounting earnings remain central to equity valuation because they summarize corporate performance and provide information about future economic benefits. Nevertheless, reported profitability may differ from cash generated through current operations because of accrual accounting, working-capital movements, investment timing, and managerial estimates. Earnings

quality is therefore important because investors may value similar levels of reported profit differently depending on their credibility, persistence, and ability to represent underlying economic performance (Dechow et al., 2010; Nezlobin et al., 2022). International evidence also indicates that higher earnings quality is generally associated with stronger firm valuation, although the relationship varies across firms and institutional settings (Gaio & Raposo, 2011; Fassas et al., 2023). Operating cash flow (OCF) provides a complementary perspective on reported profitability. Accrual-based earnings improve performance measurement by matching revenues and expenses to the periods in which economic activities occur, whereas OCF indicates whether those activities generate cash. Earnings and OCF should therefore be viewed as complementary rather than competing measures of performance. Their alignment may reveal the extent to which reported profitability is supported by current operating outcomes (Ball & Nikolaev, 2022).

Clean200 firms provide a particularly relevant setting for examining the relationship between earnings quality and market valuation. Unlike a general sample of listed firms, these companies have substantial exposure to products, services, and technologies associated with the sustainable economy. Their market valuations may therefore incorporate expectations regarding clean-market expansion, technological innovation, and future growth opportunities. However, the financial realization of these expectations is not necessarily immediate. Sustainability-oriented investments may require substantial expenditures, involve long payback periods, and generate uncertainty regarding future cash flows. Consequently, strong environmental positioning or reported profitability does not necessarily indicate that current performance is supported by operating cash generation. This distinction makes the Clean200 particularly informative for earnings-quality research: membership identifies participation in the clean economy, but it does not indicate whether the earnings generated by that participation are financially supported by current operations. Examining the alignment between reported profitability and OCF therefore provides an additional financial dimension through which the valuation of these firms can be understood (Corporate Knights & As You Sow, 2025; Gregory, 2022).

Despite extensive research on earnings quality, accounting value relevance, and sustainability-related performance, limited attention has been given to whether the cash support of reported earnings is associated with the valuation of global clean-economy firms. Existing studies confirm that earnings, book value, and other accounting information remain central to equity valuation (Dunham & Grandstaff, 2022). However, Clean200 membership does not indicate whether reported profitability is supported by operating cash generation. Examining this issue connects two distinct dimensions of corporate performance: participation in the sustainable economy and the financial quality of the earnings generated by that participation. This study addresses this gap by examining the association between cash-backed earnings quality (CBQ) and price-to-book (P/B) ratio, defined as the market value of equity divided by its book value, among global Clean200 firms. CBQ is measured by combining two dimensions: the difference between operating cash flow relative to assets (OCF/Assets) and return on assets (ROA), and the difference between operating cash-flow margin (OCF Margin) and net profit margin (NP Margin). Higher values indicate that reported profitability is more strongly supported by operating OCF from both asset-based and revenue-based perspectives. The empirical results show that CBQ is positively associated with P/B valuation after controlling for profitability, growth, operating efficiency, leverage, firm size, sector, and region. OCF also provides valuation information beyond conventional profitability measures. The main result remains generally consistent across alternative measures and robustness procedures, although the evidence is weaker under equal-country weighting and for some alternative valuation outcomes.

This study contributes to the literature in three ways. First, it extends earnings-quality research to a global sample of firms with substantial exposure to the clean economy. Second, it develops a CBQ measure that evaluates the alignment between profitability and OCF from both asset-based and margin-based perspectives. Third, it shows that the cash support of reported profitability provides relevant information for understanding the P/B valuation of environmentally oriented firms.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature and develops the hypothesis. Section 3 describes the sample, variables, and empirical methods. Section 4 presents the empirical results and robustness analyses. Section 5 discusses the interpretation, contributions, and practical implications, while Section 6 concludes the study.

2. Literature review and hypothesis development

2.1. Earnings quality, operating cash flow and market valuation

Earnings quality reflects the extent to which reported earnings provide decision-useful information about a firm's underlying economic performance. It is a multidimensional concept commonly evaluated through properties such as persistence, predictability, accrual quality, smoothness, and value relevance. Because each proxy captures a different attribute, earnings quality should be assessed in relation to the specific decision context rather than treated as a single universal construct (Dechow et al., 2010). Recent research also emphasizes the need to establish the construct validity of earnings-quality measures before drawing conclusions from their estimated economic consequences (Nezlobin et al., 2022).

OCF provides an important perspective for evaluating earnings quality because it indicates the extent to which reported profitability is supported by cash generated from core operations. A large divergence between earnings and OCF may arise from normal accrual accounting, working-capital changes, investment cycles, or managerial discretion. Therefore, such differences should not automatically be interpreted as poor reporting quality (Sudheesh & Nidheesh, 2021). Recent evidence shows that accrual-based operating earnings can outperform OCF in predicting future OCFs because accruals help allocate cash receipts and payments to the periods in which the related economic activities occur (Ball & Nikolaev, 2022). At the same time, accrual quality remains closely connected to OCF volatility and the uncertainty involved in estimating and reversing accruals (Christensen et al., 2023).

Earnings and OCF should therefore be viewed as complementary rather than competing measures of performance. Recent evidence further suggests that investors use cash-flow and accrual information jointly, although their relative valuation importance may depend on the extremity of the underlying components (Mostafa & Dixon, 2024). Earnings summarize economic performance after applying accrual-accounting adjustments, whereas OCF provides evidence about the cash realization of that performance. The disclosure of OCF information has been associated with greater earnings comparability, lower analyst forecast errors and more efficient investment decisions, demonstrating that cash-flow information can improve the interpretation of reported earnings (Caban-Garcia et al., 2020). Market-valuation research further indicates that investors price both the level and quality of accounting information. International evidence documents a positive association between aggregate earnings quality and firm valuation, although the strength of this relationship varies across institutional environments and firm characteristics (Gaio & Raposo, 2011). More recent reviews confirm that earnings, book value and supplementary

accounting information remain central to explaining equity values, while their relative importance depends on economic conditions and the characteristics of the firms being evaluated (Dunham & Grandstaff, 2022).

These arguments suggest that investors may assign higher valuations to firms whose reported profitability is more strongly supported by OCF. Cash-backed earnings may be perceived as more credible and sustainable because they combine the performance-measurement benefits of accrual earnings with evidence of operating cash generation. This relationship is especially relevant for P/B valuation, which reflects the market's assessment of a firm's capacity to generate future returns relative to its recorded equity base. Accordingly, the present study examines whether CBQ is positively associated with the P/B valuation of global Clean200 firms.

2.2. Cash-backed earnings quality in the Clean200 context

The Clean200 comprises publicly listed companies ranked by the value of revenues generated from products and services aligned with the sustainable economy. Eligible firms must obtain more than 10% of their total revenue from clean activities and pass several exclusionary screens related to fossil fuels, environmental harm, and other controversial business activities. Thus, Clean200 membership reflects firms' exposure to the clean economy, but it does not directly indicate the quality of their earnings or their ability to convert reported profitability into OCF (Corporate Knights & As You Sow, 2025). This distinction is important because the valuation of environmentally oriented firms may incorporate expectations regarding green innovation, expanding clean markets, and future growth opportunities. Prior studies find that green innovation can enhance firm value, partly through improvements in profitability and reductions in environmental compliance costs. However, these effects vary across firms, performance measures, and operating conditions, suggesting that environmental positioning alone does not guarantee stronger financial outcomes (Hao et al., 2022; Tian et al., 2023; Casciello et al., 2024).

Sustainability-related activities may also affect the timing and composition of corporate cash flows. International evidence shows that environmental, social, and governance (ESG) activities are associated with firms' free cash-flow generation, while ESG risk influences how investors assess the value relevance of earnings and book equity (Gregory, 2022; Cheng & Micale, 2022). Accordingly, investors evaluating Clean200 firms may consider not only the amount of clean revenue or reported profit but also whether that profit is supported by cash generated from core operations. CBQ provides a financial dimension that complements the environmental criteria underlying Clean200 membership. In this study, it captures the alignment between ROA and OCF/Assets, together with the alignment between net margin and OCF Margin. Higher CBQ suggests that reported profitability is more strongly supported by operating cash generation. Conversely, a weaker alignment may reflect working-capital movements, investment timing, or limited cash realization and should not necessarily be interpreted as accounting manipulation.

Despite growing research on green innovation, ESG performance, and firm value, limited evidence directly examines whether the cash support of reported earnings is associated with the valuation of global green firms. Examining Clean200 companies therefore helps connect two related but distinct dimensions of corporate performance: participation in the clean economy and the financial quality of the earnings generated by that participation.

2.3. Hypothesis development

Reported earnings are more informative when they are supported by cash generated from core operations. Although accrual accounting improves performance measurement by matching revenues and expenses across periods, OCF provides additional evidence that reported profitability has been realized through business activities. Accordingly, earnings and cash flows offer complementary information about firm performance and future cash-generating capacity (Ball & Nikolaev, 2022). A closer alignment between profitability and OCF may increase the credibility and perceived sustainability of reported performance. OCF information can also help investors and analysts interpret accrual-based earnings and improve the comparability of financial information used in valuation decisions (Caban-Garcia et al., 2020). Consistent with this reasoning, international evidence shows that firms with higher earnings quality tend to receive higher market valuations, although the strength of the relationship varies across institutional settings (Gaio & Raposo, 2011).

This relationship may be particularly relevant for Clean200 firms because their valuations can reflect expectations regarding clean-market expansion, innovation, and future growth, while sustainability-related activities may also affect cash-flow generation (Gregory, 2022). In this context, CBQ helps distinguish profitability supported by current operating performance from profitability not yet converted into OCF. Investors may therefore assign higher P/B multiples to Clean200 firms whose reported earnings are more strongly supported by operating cash generation.

Accordingly, the study proposes the following hypothesis:

H_1: CBQ is positively associated with the P/B valuation of Clean200 firms.

3. Research design

3.1. Sample, data and variable measurement

This study uses a cross-sectional sample based on the 200 companies included in the Clean200 list. The firm is the unit of analysis. The Clean200 list provides the sampling frame and company-identification information, while the financial and market variables used in the empirical analysis were obtained from Yahoo Finance. The resulting initial dataset contains 200 firms from 30 countries and 11 sectors.

Yahoo Finance provides the firm-level accounting, cash-flow and market information required for the analysis. The financial metrics include ROA, NP Margin, OCF, OCF/Assets, OCF Margin, revenue growth, asset turnover, total debt, total assets, the number of full-time employees and several market-valuation ratios. The analysis primarily uses financial ratios rather than absolute monetary amounts because the sample includes companies listed in different countries and reporting in different currencies. Firm size is measured by the number of full-time employees and is therefore also unaffected by differences in reporting currency.

The principal dependent variable is the natural logarithm of the P/B ratio (LNPB). The P/B represents the market value of equity relative to its book value:

$$PB_i = \frac{Market\ Value\ of\ Equity_i}{Book\ Value\ of\ Equity_i} \quad (1)$$

Two companies reported non-positive P/B ratios and were excluded from the principal analysis. Such values generally arise when the book value of equity is non-positive, have a different economic interpretation from positive valuation multiples and cannot be transformed using the natural logarithm. The final sample for the baseline P/B regressions therefore consists of 198 firms. For observations with a positive P/B ratio, the dependent variable is defined as:

$$LnPB_i = \ln(PB_i), \qquad PB_i > 0 \tag{2}$$

The logarithmic transformation reduces the strong right skew commonly observed in valuation multiples and allows the estimated coefficients to be interpreted approximately as proportional differences in P/B valuation. Non-positive P/B observations were removed before winsorization and logarithmic transformation so that the outlier-treatment procedure did not mechanically alter their signs or economic meaning.

The principal explanatory variable is CBQ. It captures the extent to which reported accounting profitability is supported by contemporaneous OCF. CBQ consists of two components: an asset-based component and a revenue-based component. The asset-based component compares OCF/Assets with ROA:

$$CBQ_i^{Assets} = Z(OCFToAssets_i - ROA_i) \tag{3}$$

where:

$$OCFToAssets_i = \frac{OCF_i}{Total\ Assets_i} \tag{4}$$

and:

$$ROA_i = \frac{Net\ Income_i}{Total\ Assets_i} \tag{5}$$

A higher value of CBQ^{Assets} indicates that the firm generates stronger OCF from its asset base relative to its reported accounting profitability.

The revenue-based component compares OCF margin with NP Margin:

$$CBQ_i^{Margin} = Z(OCFMargin_i - NetMargin_i) \tag{6}$$

where:

$$OCFMargin_i = \frac{OCF_i}{Total\ Revenue_i} \tag{7}$$

and:

$$NetMargin_i = \frac{Net\ Income_i}{Total\ Revenue_i} \tag{8}$$

A higher value of CBQ^{Margin} indicates that the accounting profit generated from revenue is accompanied by comparatively stronger OCF.

The principal CBQ measure is constructed as the equally weighted mean of the two standardized components and is standardized again:

$$CBQ_i = Z\left(\frac{CBQ_i^{Assets} + CBQ_i^{Margin}}{2}\right) \quad (9)$$

The standard-score transformation is defined as:

$$Z(X_i) = \frac{X_i - \overline{X}}{s_X} \quad (10)$$

where $\bar{X}$ and s_X denote the sample mean and sample standard deviation, respectively. The final CBQ measure therefore has a mean of approximately zero and a standard deviation of one. A one-unit increase in CBQ represents an increase of one standard deviation in CBQ. Higher values indicate that reported accounting performance is more strongly supported by OCF across both the firm's asset base and revenue-generating activities.

The equal-weighted composite is used because the two components capture related but distinct aspects of cash support. The asset-based component evaluates whether profitability generated from the firm's economic resources is supported by OCF, whereas the margin-based component evaluates whether accounting profit generated from revenue is accompanied by OCF. Combining both components also reduces the study's dependence on a single scaling variable.

The empirical models include several firm-level control variables that may influence market valuation. ROA controls for the level of accounting profitability (Minimol & Khong, 2021; Mutascu & Murgea, 2020). Although ROA is used in constructing the asset-based component of CBQ, it is also included separately in the regressions to distinguish the level of reported profitability from the extent to which that profitability is supported by OCF. Revenue growth controls for recent business expansion and potential growth opportunities. It is measured as the rate of change in revenue:

$$Growth_i = \frac{Revenue_i - Revenue_{i-1}}{Revenue_{i-1}} \quad (11)$$

Asset turnover controls for operating efficiency and is defined as:

$$ATO_i = \frac{Total\ Revenue_i}{Total\ Assets_i} \quad (12)$$

Financial leverage is measured by total debt relative to total assets:

$$Leverage_i = \frac{Total\ Debt_i}{Total\ Assets_i} \quad (13)$$

Firm size is measured using the natural logarithm of the number of full-time employees:

$$Size_i = ln(Full\text{-}Time\ Employees_i) \quad (14)$$

The employee-based size measure is appropriate for the international sample because it does not depend on reporting currency. Sector fixed effects are included to account for systematic differences in capital intensity, business models, operating performance and valuation across the 11 sectors represented in the sample. Regional fixed effects control for broad geographic

differences in economic and market conditions. Country fixed effects are introduced as a robustness specification rather than in the baseline model.

All continuous financial variables were converted to numeric form, and infinite values were treated as missing. In the principal analysis, continuous variables were winsorized at the 1st and 99th percentiles to reduce the influence of extreme observations while retaining most of the cross-sectional variation. For the construction of CBQ, the underlying profitability and cash-flow ratios were winsorized before their differences were calculated and standardized. As a robustness test, the models were re-estimated using more restrictive winsorization at the 5th and 95th percentiles. Missing observations were handled on a model-specific basis. Each regression was estimated using firms with complete information for the dependent variable and all explanatory variables included in the respective specification. Consequently, the effective sample size may vary across additional analyses involving alternative valuation multiples or alternative measures of CBQ. Table 1 summarizes the definitions, construction procedures, empirical roles and expected signs of the variables used in the study.

Table 1 - Variable definitions and measurement

Variable	Measurement	Unit/Scale	Role	Expected sign
LnPB	Natural logarithm of the positive P/B ratio	Log-transformed ratio (dimensionless)	Dependent	-
CBQ	Standardized mean of CBQ_Assets and CBQ_Margin	Standardized score (SD units)	Main explanatory	+
CBQ_Assets	Standardized OCF-to-assets minus ROA	Standardized score (SD units)	Alternative explanatory	+
CBQ_Margin	Standardized OCF margin minus net margin	Standardized score (SD units)	Alternative explanatory	+
ROA	Net income divided by total assets	Ratio (decimal)	Control	+
Growth	Revenue growth rate	Ratio (decimal)	Control	+
ATO	Revenue divided by total assets	Times	Control	+/-
Leverage	Total debt divided by total assets	Ratio (decimal)	Control	-
Size	Natural logarithm of full-time employees	Log employees	Control	+/-

3.2. Empirical models and robustness procedures

The empirical analysis examines whether CBQ is associated with the P/B valuation of Clean200 firms. Because the data are cross-sectional, the estimated coefficients are interpreted as conditional associations rather than causal effects. The inclusion of firm-level controls and sector and regional fixed effects helps account for observable firm characteristics and systematic cross-sectional differences. However, these controls do not fully eliminate potential endogeneity arising from omitted variables or reverse causality. Accordingly, the study does not claim causal identification. The baseline models are estimated using ordinary least squares, with the natural logarithm of the positive P/B ratio as the dependent variable. The baseline specification is expressed as follows:

$$LnPB_i = \alpha + \beta_1 CBQ_i + \beta_2 ROA_i + \beta_3 Growth_i + \beta_4 ATO_i + \beta_5 Leverage_i + \beta_6 Size_i + \gamma_s + \delta_r + \varepsilon_i \quad (15)$$

where $LnPB_i$ is the natural logarithm of the P/B ratio of firm i; CBQ_i is the standardized composite measure of CBQ; ROA_i represents accounting profitability; $Growth_i$ is revenue growth; ATO_i is asset turnover; $Leverage_i$ is total debt relative to total assets; and $Size_i$ is the natural logarithm of full-time employees. The terms γ_s and δ_r represent sector and regional fixed effects, respectively, while ε_i is the error term. The coefficient of primary interest is β_1. A positive value of β_1 indicates that firms whose reported profitability is more strongly supported by OCF tend to have higher P/B valuation multiples, after controlling for accounting profitability and other firm characteristics. Because CBQ is standardized, β_1 represents the difference in LnPB associated with a one-standard-deviation increase in CBQ. For economic interpretation, the percentage difference in the P/B ratio can be calculated as:

$$\%\Delta PB = 100[exp(\beta_1) - 1] \tag{16}$$

The baseline analysis is estimated sequentially to assess the stability of the association between CBQ and valuation. The first specification includes CBQ and sector fixed effects. The second adds ROA to distinguish the cash backing of earnings from the level of accounting profitability. The third specification adds revenue growth, asset turnover, leverage and firm size. The fourth and principal specification additionally includes regional fixed effects. This sequential approach shows whether the estimated association changes materially as further determinants of valuation are introduced.

The sample contains firms located in 30 countries. Companies operating in the same country may be exposed to common capital-market conditions, reporting practices, investor environments and macroeconomic influences. The baseline regressions therefore use standard errors clustered by country. The covariance estimator applies a finite-sample correction, and statistical inference is based on the t-distribution. This approach allows regression residuals to be correlated among firms from the same country while maintaining independence across country clusters.

In addition to the composite CBQ model, two specifications examine whether OCF provides incremental valuation information beyond accounting profitability. The first model uses variables scaled by total assets:

$$LnPB_i = \alpha + \beta_1 ROA_i + \beta_2 OCFToAssets_i + \beta_3 Growth_i + \beta_4 ATO_i + \beta_5 Leverage_i + \beta_6 Size_i + \gamma_s + \delta_r + \varepsilon_i \tag{17}$$

In this specification, β_2 captures the association between OCF/Assets and P/B valuation after controlling for ROA. A positive and statistically significant coefficient would indicate that OCF contains valuation information beyond the amount of accounting income generated from the firm's asset base. The second incremental-information model uses variables scaled by revenue:

$$LnPB_i = \alpha + \beta_1 NetMargin_i + \beta_2 OCFMargin_i + \beta_3 Growth_i + \beta_4 ATO_i + \beta_5 Leverage_i + \beta_6 Size_i + \gamma_s + \delta_r + \varepsilon_i \tag{18}$$

Here, β_2 measures the association between OCF margin and valuation after controlling for NP Margin. This specification evaluates whether the market valuation multiple is more closely associated with the firm's ability to convert revenue into OCF than with the accounting profit margin alone. The two incremental-information models also use country-clustered standard errors and the same sector and regional fixed effects as the principal specification.

Several robustness procedures are employed to assess whether the results depend on the construction of CBQ, the estimation method, the treatment of influential observations or the selected valuation measure. First, the composite measure is replaced separately by its two underlying components:

$$CBQ_i^{Assets} = Z(OCFToAssets_i - ROA_i) \tag{19}$$

$$CBQ_i^{Margin} = Z(OCFMargin_i - NetMargin_i) \tag{20}$$

These models show whether the association with valuation is evident in both the asset-scaled and revenue-scaled dimensions of cash backing. A principal component analysis (PCA)-based measure is also constructed from the two standardized components. The first principal component is oriented so that a higher score represents stronger CBQ (Greenacre et al., 2022). This test evaluates whether the findings depend on the equal-weighting procedure used in the principal CBQ index.

Second, alternative estimation procedures are applied. The baseline regional fixed effects are replaced with country fixed effects to control for time-invariant national characteristics more comprehensively. Because CBQ varies across firms within countries, its coefficient remains identifiable in the country-fixed-effects model. The alternative specification is:

$$LnPB_i = \alpha + \beta_1 CBQ_i + \beta_2 ROA_i + \beta_3 Growth_i + \beta_4 ATO_i + \beta_5 Leverage_i + \beta_6 Size_i + \gamma_s + \theta_c + \varepsilon_i \tag{21}$$

where θ_c denotes country fixed effects.

The principal model is also estimated using heteroskedasticity-consistent HC3 standard errors. HC3 inference does not rely on within-country clustering and is included to assess whether the conclusion is sensitive to the covariance estimator. In addition, all continuous variables are winsorized at the 5th and 95th percentiles instead of the 1st and 99th percentiles. This more restrictive treatment examines whether the results are disproportionately influenced by extreme financial ratios.

The number of Clean200 firms differs substantially across countries. Consequently, countries containing more firms contribute more observations to the baseline estimates. To reduce this imbalance, a weighted least-squares model assigns each firm a weight equal to the inverse of the number of sampled companies in its country:

$$w_i = \frac{1}{n_c} \tag{22}$$

where n_c is the number of Clean200 firms from country c. Under this weighting scheme, each country has approximately the same total influence on the estimation, regardless of the number of firms it contributes to the sample. The equal-country weighted results are reported transparently as a robustness test rather than treated as the principal estimates.

A leave-one-country-out analysis is further conducted to determine whether the main coefficient is driven by a single national group. The baseline model is re-estimated repeatedly after excluding one country at a time. For country c, the corresponding estimate can be represented as $\hat{\beta}_{1,(-c)}$. The distribution of $\hat{\beta}_{1,(-c)}$ is compared with the full-sample estimate. Stability in the sign and

magnitude of the coefficient across these iterations would indicate that the result is not attributable to any single country.

Third, alternative dependent variables are used to evaluate whether CBQ is associated with valuation beyond the P/B ratio. These outcomes include the natural logarithms of the market-to-revenue ratio, the market-to-assets ratio and the positive price-to-earnings ratio:

$$LnMTR_i = \ln(MarketToRevenue_i) \tag{23}$$

$$LnMTA_i = \ln(MarketToAssets_i) \tag{24}$$

$$LnPE_i = \ln(PE_i), \qquad PE_i > 0 \tag{25}$$

These measures are treated as supplementary outcomes because they reflect different dimensions of market valuation and may be affected by different accounting denominators.

Quantile regressions are also estimated at the 25th, 50th and 75th percentiles of the LnPB distribution:

$$Q_\tau(LnPB_i \mid X_i) = \alpha_\tau + \beta_{1,\tau}CBQ_i + \beta_{2,\tau}ROA_i + \beta_{3,\tau}Growth_i + \beta_{4,\tau}ATO_i + \beta_{5,\tau}Leverage_i + \beta_{6,\tau}Size_i + \gamma_{s,\tau} + \delta_{r,\tau} \tag{26}$$

where:

$$\tau \in \{0.25,\ 0.50,\ 0.75\} \tag{27}$$

These models examine whether the association between CBQ and valuation differs across firms with relatively low, median or high valuation multiples. Because the quantile-regression standard errors are not clustered by country, these results are interpreted as exploratory rather than confirmatory evidence.

Finally, adjustments for multiple hypothesis testing are applied within related families of robustness tests. The Benjamini-Hochberg procedure is used to control the false discovery rate, while Bonferroni-adjusted p-values provide a more conservative comparison. The Benjamini-Hochberg adjusted values are obtained by ranking the original p-values and evaluating them relative to the number of tests in the relevant family:

$$p_{(j)}^{BH} = \min\left(1, \frac{m}{j} p_{(j)}\right) \tag{28}$$

where $p_{(j)}$ is the j-th ordered p-value, j is its rank and m is the number of tests in the family. Bonferroni-adjusted values are calculated as:

$$p_j^{Bonf} = \min(1, mp_j) \tag{29}$$

Together, the baseline, incremental-information and robustness models assess whether the observed relationship between CBQ and valuation is stable across alternative variable definitions, estimation methods, country compositions, outlier treatments and valuation outcomes. Nevertheless, all estimates remain based on cross-sectional observational data and are therefore interpreted as associations rather than causal effects.

4. Empirical results

4.1. Descriptive statistics and preliminary analysis

Table 2 presents the descriptive statistics and Pearson correlation coefficients for the variables used in the empirical analysis. Panel A reports mean, standard deviation (SD), minimum and maximum, while Panel B presents the pairwise correlations.

Table 2 - Descriptive statistics and Pearson correlations

Panel A. Descriptive statistics

Variable	Mean	SD	Min	Median	Max
LnPB	0.9320	1.0120	(1.2878)	0.7852	3.8199
CBQ	0.0000	1.0025	(2.8651)	(0.1218)	2.8832
CBQ_Assets	0.0000	1.0025	(3.1599)	(0.0830)	4.0329
CBQ_Margin	(0.0000)	1.0025	(2.9021)	(0.1893)	4.4303
ROA	0.0468	0.0420	(0.0420)	0.0407	0.1946
OCF/Assets	0.0932	0.0626	(0.0753)	0.0832	0.3327
Net Margin	0.0876	0.1077	(0.1778)	0.0658	0.4660
OCF Margin	0.1865	0.1538	(0.0734)	0.1503	0.7841
Growth	0.0530	0.1687	(0.3431)	0.0365	0.7320
ATO	0.6610	0.3524	0.0710	0.5689	1.7195
Leverage	0.2937	0.1626	0.0067	0.2879	0.6864
Size	10.3167	1.1257	7.1768	10.3577	13.3061

Panel B. Pearson correlations

Variable	LnPB	CBQ	CBQ_Assets	CBQ_Margin	ROA	OCF/Assets	Net Margin	OCF Margin	Growth	ATO	Leverage	Size
LnPB	1	0.0751	0.1862	(0.0633)	0.5842	0.5192	0.3669	0.2046	0.4238	0.1712	0.0010	0.0750
CBQ	0.0751	1	0.8189	0.8189	(0.0671)	0.5155	(0.0729)	0.6281	0.0589	(0.1394)	0.1333	(0.0245)
CBQ_Assets	0.1862	0.8189	1	0.3412	0.0887	0.7440	0.0339	0.3067	0.2107	0.1897	(0.0579)	0.1309
CBQ_Margin	(0.0633)	0.8189	0.3412	1	(0.1986)	0.1003	(0.1533)	0.7220	(0.1143)	(0.4180)	0.2762	(0.1711)
ROA	0.5842	(0.0671)	0.0887	(0.1986)	1	0.7316	0.6686	0.3035	0.2399	0.1828	(0.0178)	0.0888
OCF/Assets	0.5192	0.5155	0.7440	0.1003	0.7316	1	0.4718	0.4135	0.3052	0.2525	(0.0516)	0.1492
Net Margin	0.3669	(0.0729)	0.0339	(0.1533)	0.6686	0.4718	1	0.5730	0.2025	(0.2235)	0.0136	0.0203
OCF Margin	0.2046	0.6281	0.3067	0.7220	0.3035	0.4135	0.5730	1	0.0470	(0.5031)	0.2386	(0.1277)
Growth	0.4238	0.0589	0.2107	(0.1143)	0.2399	0.3052	0.2025	0.0470	1	0.2331	(0.1290)	(0.0245)
ATO	0.1712	(0.1394)	0.1897	(0.4180)	0.1828	0.2525	(0.2235)	(0.5031)	0.2331	1	(0.3369)	0.1017
Leverage	0.0010	0.1333	(0.0579)	0.2762	(0.0178)	(0.0516)	0.0136	0.2386	(0.1290)	(0.3369)	1	(0.1220)
Size	0.0750	(0.0245)	0.1309	(0.1711)	0.0888	0.1492	0.0203	(0.1277)	(0.0245)	0.1017	(0.1220)	1

The mean LnPB is 0.9320, with a standard deviation of 1.0120, indicating substantial variation in the valuation of Clean200 firms. The standardized CBQ, CBQ_Assets, and CBQ_Margin measures have means close to 0.0000 and standard deviations of 1.0025 by construction. On average, OCF/Assets (0.0932) exceeds ROA (0.0468), while OCF Margin (0.1865) exceeds Net Margin (0.0876), indicating considerable variation in the extent to which accounting profitability is supported by OCFs. The correlation analysis shows that LnPB is positively associated with ROA (r=0.5842), OCF/Assets (r=0.5192), Growth (r=0.4238), and Net Margin (r=0.3669). Its unconditional correlation with the composite CBQ is positive but weak (r=0.0751). The correlation between CBQ_Assets and CBQ_Margin is 0.3412, suggesting that the two components capture related but distinct dimensions of CBQ. Overall, the correlations among the variables included jointly in the baseline model do not indicate serious multicollinearity.

4.2. Baseline and incremental cash-flow results

Table 3 presents the baseline estimates of the association between CBQ and P/B valuation. The models introduce the control variables sequentially to assess whether the estimated coefficient on CBQ remains stable across alternative specifications.

Table 3 – CBQ quality and P/B valuation

Variable	Model (1)	Model (2)	Model (3)	Model (4)
CBQ	0.1589**	0.1651***	0.1154**	0.1439***
	(0.0656)	(0.0519)	(0.0438)	(0.0443)
ROA		13.5972***	11.8724***	9.8999***
		(1.4594)	(1.3248)	(1.4901)
Revenue growth			1.7299***	1.4750**
			(0.4126)	(0.6272)
Asset turnover			0.0686	0.1178
			(0.1653)	(0.1721)
Debt-to-assets			0.5104	0.0090
			(0.3644)	(0.4177)
Log employees			0.0225	0.0227
			(0.0876)	(0.0920)
Sector fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	No	No	No	Yes
R-squared	0.1119	0.3865	0.4590	0.5020
Adjusted R-squared	0.0593	0.3468	0.4112	0.4458

Notes: (*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1%

Model (1) includes CBQ and sector fixed effects. The coefficient on CBQ is positive and statistically significant $(\beta = 0.1589, SE = 0.0656)$, indicating that firms with stronger cash support for reported earnings tend to have higher P/B valuations.

Model (2) adds ROA. The coefficient on CBQ increases slightly to 0.1651 and remains significant at the 1% level. ROA is also strongly positive and significant $(\beta = 13.5972, SE = 1.4594)$. This shows that CBQ contains valuation information beyond the level of accounting profitability.

Model (3) additionally controls for revenue growth, asset turnover, debt-to-assets, and firm size. The coefficient on CBQ declines to 0.1154 but remains positive and significant at the 5% level. ROA and revenue growth are both positive and significant, whereas asset turnover, debt-to-assets, and firm size are not statistically significant.

Model (4) is the full specification and adds region fixed effects. CBQ remains positive and significant at the 1% level $(\beta = 0.1439, SE = 0.0443)$. Because CBQ is standardized and the dependent variable is logarithmic, a one-standard-deviation increase in CBQ is associated with approximately: $100[\exp(0.1439) - 1] = 15.4773\%$ higher P/B valuation, holding the other variables and fixed effects constant.

ROA remains strongly positive in Model (4) $(\beta = 9.8999, SE = 1.4901)$, while revenue growth is also positive and significant $(\beta = 1.4750, SE = 0.6272)$. Asset turnover, debt-to-assets, and firm size remain statistically insignificant. The explanatory power of the models rises as additional

controls are introduced. R^2 increases from 0.1119 in Model (1) to 0.5020 in Model (4), while adjusted R^2 increases from 0.0593 to 0.4458. Overall, the persistence of the positive CBQ coefficient across all four specifications provides consistent support for the study's hypothesis.

In addition, Figure 1 illustrates the adjusted relationship between CBQ and P/B valuation based on the principal specification. The predicted P/B ratio increases as CBQ rises, with the other continuous variables held constant and the categorical variables fixed at their reference values.

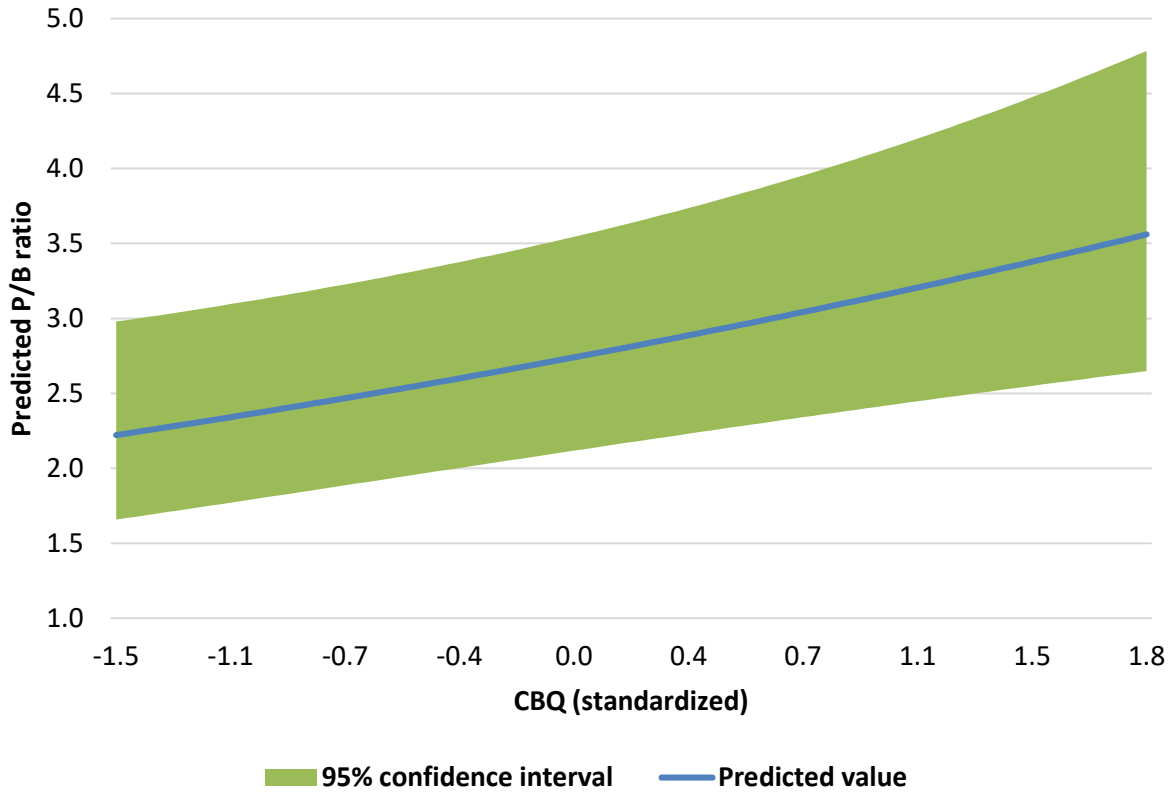

Figure 1 - Adjusted association between CBQ and P/B valuation

To examine whether OCF provides valuation information beyond accounting profitability, Table 4 reports two additional models. Panel A compares ROA with OCF/Assets, while Panel B compares NP Margin with OCF margin. Both models include the full set of control variables, sector fixed effects, regional fixed effects, and country-clustered standard errors.

Table 4 - Incremental valuation relevance of OCF

Panel A. Asset-scaled measures		*Panel B. Revenue-scaled measures*	
Variable	Asset-scaled model	Variable	Revenue-scaled model
ROA	7.4512***	Net margin	0.2976
	(1.6213)		(0.5764)
OCF/Assets	2.3566**	OCF margin	2.2595***
	(1.0167)		(0.6302)
R-squared	0.4955	R-squared	0.4310

In Panel A, both ROA and OCF/Assets are positively associated with LBPB. The coefficient on ROA is 7.4512 ($SE = 1.6213,\ p = 0.0001$), while the coefficient on OCF/Assets is 2.3566 ($SE = 1.0167,\ p = 0.0277$). The positive coefficient on OCF/Assets indicates that OCF contains valuation information beyond that conveyed by accounting profitability. Because OCF/Assets is expressed as a ratio, a one-percentage-point increase corresponds to an increase of 0.01 in the variable. Its estimated association with the P/B ratio is therefore: $100[\exp(2.3566 \times 0.01) - 1] = 2.3846\%$. Accordingly, a one-percentage-point increase in OCF/Assets is associated with a 2.3846% higher P/B ratio, holding ROA and the remaining controls constant. The asset-scaled model has an R^2 of 0.4955.

Panel B provides stronger evidence regarding the incremental relevance of cash flow. The coefficient on NP Margin is positive but statistically insignificant ($\beta = 0.2976, SE = 0.5764, p = 0.6095$). In contrast, OCF Margin has a positive and statistically significant coefficient of 2.2595 ($SE = 0.6302, p = 0.0012$). A one-percentage-point increase in OCF Margin is associated with an approximate increase in the P/B ratio of: $100[\exp(2.2595 \times 0.01) - 1] = 2.2852\%$. The revenue-scaled model has an $R^2$of 0.4310. The contrasting results for NP Margin and OCF margin suggest that the market valuation of Clean200 firms is more closely associated with the ability to convert revenue into OCF than with accounting profit margin alone.

Taken together, the baseline and incremental-information results indicate that CBQ is positively associated with P/B valuation. The direct cash-flow models further show that OCF provides information beyond conventional accounting profitability measures. Nevertheless, because the analysis is based on cross-sectional observational data, these findings represent conditional associations and should not be interpreted as evidence of a causal effect of CBQ on firm valuation.

4.3. Robustness and additional analyses

Table 5 reports the robustness and additional analyses. The tests examine whether the main result is sensitive to the measurement of CBQ, the estimation method, the treatment of extreme observations, the choice of valuation outcome, or the position of a firm within the P/B distribution.

Table 5 - Robustness and additional analyses

Specification	Coefficient	Std. Error	p-value
Panel A. Alternative cash-quality measures			
Cash_Quality_Assets	0.1008	0.0435	0.0277
Cash_Quality_Margin	0.1889	0.0610	0.0043
Cash_Quality_PCA	0.1439	0.0443	0.0029
Panel B. Alternative estimators and sample treatments			
Baseline country-clustered model	0.1439	0.0443	0.0029
Country fixed effects	0.1431	0.0471	0.0050
HC3 standard errors	0.1439	0.0678	0.0339
Equal-country WLS	0.1125	0.0995	0.2676
Winsorization at 5%–95%	0.1309	0.0452	0.0071
Panel C. Alternative valuation outcomes			
Ln_Price_To_Book	0.1439	0.0443	0.0029
Ln_Market_To_Revenue	0.1186	0.0625	0.0678
Ln_Market_To_Assets	0.0925	0.0604	0.1364
Ln_PE_Ratio	0.1144	0.0616	0.0735
Panel D. Quantile regressions (exploratory)			
Quantile 0.25	0.1026	0.0623	0.1010
Quantile 0.50	0.1424	0.0594	0.0175
Quantile 0.75	0.1716	0.0734	0.0205

The coefficients obtained from the asset-based, margin-based, and PCA-based cash-quality measures are all positive and statistically significant, ranging from $\beta = 0.1008$ to $\beta = 0.1889$. This consistency indicates that the positive association with P/B valuation is not driven by a particular construction of CBQ. The result also remains significant when country fixed effects, HC3 standard errors, and more restrictive winsorization are applied. For example, the country fixed-effects estimate is $(\beta = 0.1431, p = 0.0050)$, which is close to the baseline coefficient: $(\beta = 0.1439, p = 0.0029)$. However, the equal-country weighted estimate is not statistically significant: $(\beta = 0.1125, p = 0.2676)$. This suggests that the evidence becomes less precise when countries with small and large numbers of firms are given equal influence. The coefficients remain positive when alternative valuation measures are used, but their statistical significance is weaker. Therefore, the relationship appears to be most clearly reflected in the P/B ratio rather than uniformly across all valuation multiples. The quantile regressions further indicate that the association is stronger in the middle and upper parts of the P/B distribution. The coefficient increases from $\beta_{0.25} = 0.1026$ at the 25th percentile to $\beta_{0.50} = 0.1424$ at the median and $\beta_{0.75} = 0.1716$ at the 75th percentile. This pattern suggests that CBQ may be more relevant for the valuation of firms already receiving moderate or high market multiples. Overall, the analyses support the baseline conclusion, although the insignificant equal-country weighted result and weaker alternative-outcome results indicate that the finding should be interpreted specifically in relation to P/B valuation.

Figure 2 presents the leave-one-country-out analysis. The baseline model was re-estimated 30 times, with one country excluded in each iteration. The estimated CBQ coefficients range from 0.1119 when Germany is excluded to 0.1615 when Spain is excluded. All estimates remain positive and statistically significant at the 5% level.

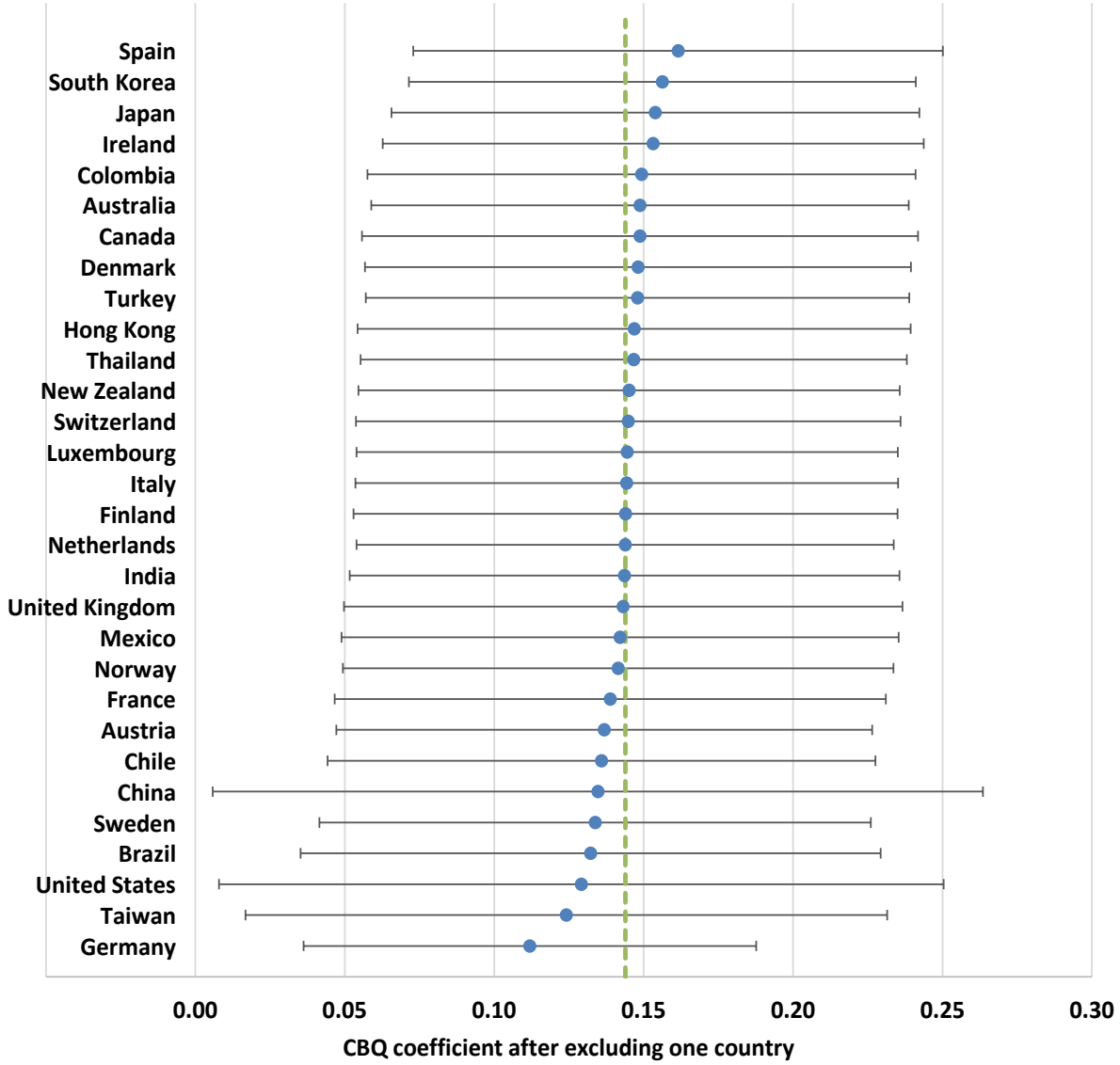

Figure 2 - Leave-one-country-out estimates of the CBQ coefficient

The estimate remains positive when either of the two largest national groups is excluded. After excluding China, the coefficient is 0.1347 $(SE = 0.0629, p = 0.0411)$, while excluding the United States produces a coefficient of 0.1292 $(SE = 0.0592, p = 0.0377)$. Although these two estimates are less precise than the full-sample result, neither changes sign or becomes statistically insignificant at the 5% level. The leave-one-country-out analysis therefore indicates that the principal association is not generated by a single country.

Overall, the robustness analyses provide substantial, though not universal, support for the baseline finding. The positive association between CBQ and P/B valuation remains under alternative CBQ measures, country fixed effects, HC3 standard errors, more restrictive winsorization, and the sequential exclusion of individual countries.

5. Discussion

5.1. Interpretation and contributions

The findings indicate that firms whose reported profitability is more strongly supported by OCFs tend to receive higher P/B valuations. Importantly, this association remains after controlling for profitability, growth, operating efficiency, leverage, firm size, sector, and region. The result therefore suggests that investors consider not only the level of reported earnings but also the extent to which those earnings are supported by cash-generating activities. The incremental cash-flow analyses reinforce this interpretation. OCF remains positively associated with valuation after accounting for ROA or NP Margin, indicating that cash-flow information provides additional valuation relevance beyond conventional profitability measures. This distinction is particularly important for Clean200 firms, whose valuations may partly reflect expectations about future green growth and investment opportunities. In such firms, cash-backed earnings may provide a stronger signal that reported performance is supported by current operations rather than accounting recognition alone.

The study makes three main contributions. First, it extends the earnings-quality literature by examining the valuation relevance of CBQ in a global sample of environmentally oriented firms. Second, it develops a composite measure that captures cash support for earnings from both asset-based and revenue-based perspectives. The consistent results obtained from the composite, individual components, and PCA-based measure support the usefulness of this approach. Third, the study provides evidence that the relationship is most clearly reflected in P/B valuation. The weaker results for alternative valuation ratios suggest that CBQ may be particularly relevant to how the market values firms relative to their accounting book equity. The quantile results also suggest that this association is more pronounced among firms with medium and high P/B multiples. Overall, the findings contribute to understanding how the credibility and cash support of reported earnings are associated with market valuation among global green firms.

5.2. Practical implications

The findings have practical implications for investors, managers, and market analysts. For investors, CBQ may provide a useful complement to conventional profitability indicators when evaluating green firms. Firms reporting similar levels of ROA or profit margin may differ substantially in the extent to which those earnings are supported by OCFs. Assessing both earnings and cash-flow performance may therefore improve the evaluation of valuation quality and reduce reliance on accounting profit alone.

For managers, the results highlight the importance of converting reported profitability into OCF. Strong earnings growth may not receive the same valuation recognition when it is accompanied by weak cash generation. Managers should therefore pay attention to working-capital management, cash conversion, and the sustainability of operating performance, while providing transparent explanations when temporary investment or growth conditions create differences between earnings and cash flows.

The results are also relevant to analysts, rating agencies, and sustainability-oriented fund managers. Cash-backed earnings measures can be incorporated into screening, benchmarking, and valuation procedures for environmentally oriented firms. However, the weaker findings for alternative valuation multiples and the equal-country weighted model suggest that the measure should be used

as a supplementary indicator rather than as a stand-alone investment rule. Its interpretation should remain sensitive to national context, sector characteristics, and the valuation metric being examined.

6. Conclusion

This study examines whether CBQ is associated with P/B valuation among global Clean200 firms. Using a cross-sectional sample of 198 firms with positive P/B ratios, the analysis combines asset-based and margin-based measures of the extent to which accounting profitability is supported by OCFs. The results show a positive and statistically significant association between CBQ and P/B valuation after controlling for profitability, growth, operating efficiency, leverage, firm size, sector, and region. The incremental analyses further indicate that OCF provides valuation information beyond ROA and NP Margin. The findings remain generally consistent across alternative cash-quality measures, country fixed effects, HC3 standard errors, stricter winsorization, and leave-one-country-out tests. However, the insignificant equal-country weighted estimate and weaker results for alternative valuation multiples suggest that the conclusion is most applicable to P/B valuation and may vary across national contexts.

Several limitations should be acknowledged. First, the cross-sectional design identifies conditional associations rather than causal effects. Potential endogeneity arising from omitted variables or reverse causality cannot be fully excluded because the study does not employ an instrumental-variable or other causal-identification strategy. Second, the sample is restricted to Clean200 firms and may not represent the broader population of listed companies or environmentally oriented firms. Third, the financial variables are derived from publicly available secondary data, which may contain differences in reporting periods, accounting practices, or data coverage across countries. Finally, the proposed CBQ measure captures the alignment between profitability and OCF but does not directly distinguish between discretionary accruals, temporary working-capital effects, and firm-specific investment cycles.

Overall, the findings suggest that the market valuation of environmentally oriented firms reflects not only reported profitability but also the extent to which that profitability is supported by operating cash generation. CBQ may therefore provide a useful supplementary indicator for investors, analysts, and managers evaluating the credibility and sustainability of firm performance. Future research can extend this study in several directions. First, longitudinal or panel data could be used to examine how changes in CBQ are associated with subsequent changes in firm valuation and to address potential endogeneity more rigorously through appropriate causal-identification strategies. Second, future studies could extend the analysis beyond Clean200 firms to broader samples of environmentally oriented and conventional firms, allowing comparisons of whether the valuation relevance of CBQ differs according to firms' exposure to the clean economy. Third, CBQ could be examined alongside established earnings-quality measures, such as accrual quality, earnings persistence, and discretionary accruals, to assess its incremental informational value. Fourth, future research could investigate whether institutional characteristics, accounting regimes, investor protection, and sustainability performance moderate the relationship between CBQ and valuation across countries. Finally, alternative valuation measures and more detailed indicators of environmental performance could be considered to determine whether the relevance of cash-backed earnings varies across valuation dimensions and levels of sustainability performance.

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Conflict of interest

No conflict of interest.

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