Profitability Analysis

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Abstract

This study describes a comprehensive profitability analysis that introduces several novel ratios and decompositions. Key innovations relate to the separation and analysis of activities other than operating and financing, and, most importantly, to the decomposition of operating profitability. Three drivers of operating profitability are analyzed: profit margin, asset turnover, and a funding ratio that measures the proportion of operating assets funded by capital. The empirical analysis demonstrates the informativeness of the various decompositions as well as the effectiveness of the methodology used for estimating transitory income and other components of the reformulated financial statements.

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1. Introduction

Profitability analysis involves decomposing the book rate of return on common equity (*ROCE*) into components representing the contributions of different business activities. This study describes a comprehensive profitability analysis that introduces several novel ratios and decompositions, and it explains the insights that can be obtained from each part of the analysis. The empirical analysis, which utilizes and informs on the reformulated financial statements constructed in Nissim (2022b), demonstrates the usefulness of the decompositions.

Key innovations of the profitability decomposition proposed in this study relate to the separation and analysis of activities other than operating and financing and, most importantly, to the decomposition of operating profitability. Unlike common shareholders' profitability, which is universally defined as the ratio of net income attributable to common shareholders to average common equity, operating profitability is measured using alternative metrics. Perhaps the most common measure of operating profitability is return on assets (*ROA*)—operating income divided by average total assets. Another commonly used measure of operating profitability—referred to either as return on net operating assets (*RNOA*) or return on invested capital (*ROIC*)—removes from the denominator of *ROA* nonoperating assets (e.g., excess cash and nonoperating investments) and also subtracts operating liabilities (e.g., accounts payable, accrued expenses, and deferred revenue).[1] A less common approach is to measure the investment in operations (i.e., the denominator of the operating profitability metric) using operating assets, and add to the numerator an estimate of the cost of operating liabilities; the resulting measure is referred to as return on operating assets or *ROOA* (e.g., Nissim and Penman 2003).

[1] As shown below, if all assets and liabilities are either operating or financing, net operating assets is equal to net capital, and return on net operating assets is equal to return on invested capital (*ROIC*). *ROIC* is also referred to as return on capital employed or return on net capital.

The rationale for the denominator (*RNOA* or *ROIC*) and numerator (*ROOA*) adjustments is that the cost of operating credit reduces reported operating income. When suppliers or other vendors provide credit, they often increase the net price of the goods or services provided, resulting in an increase in the firm's cost of goods sold or operating expenses. For example, when extending credit, a supplier may not offer the same discount that it would otherwise provide, increasing cost of goods sold. Customers that pay in advance of receiving the goods or services are another source of operating credit, with its cost generally reflected in reported revenue (paying cash in advance of receiving the goods or services often yields substantial discounts). Employees provide credit to the company by receiving payments after they provide services (resulting in accrued compensation liabilities) as well as through unfunded pension and other postretirement benefit plans.[2] Several other operating liabilities, including asset retirement obligations and some restructuring liabilities, are measured at present value with the accretion expense included in operating expenses. Therefore, to obtain a meaningful measure of operating profitability one should either compare operating profit to the net investment in operations (i.e., after subtracting the credit provided by operating creditors) or "undo" the cost of operating credit from reported operating profit.[3]

[2] Until 2017, the interest cost component of pension and other postretirement benefits was included in the cost of goods produced (and therefore in COGS and inventory) and in operating expenses. In March 2017 the FASB issued Accounting Standards Update No. 2017-07, which changed the reporting of pension and other postretirement benefits expenses. Under the new standard (effective 2018), only the service cost component of postretirement benefits is included in operating costs and expenses.

[3] Operating credit is also provided by governments, primarily through tax incentives that create deferred tax liabilities. The difference between accelerated tax depreciation and straight-line book depreciation, as well as other temporary book-tax differences that create a net deferred tax liability, are effectively interest-free credit from governments. In making investment decisions companies consider this benefit and are willing to accept low profitability projects if the tax benefit is sufficiently large. Thus, for instance, companies with large deferred tax liabilities may have a low ratio of operating profit to operating assets, but they may still be economically profitable because a significant portion of the assets is effectively funded by the government. Therefore, adjusting measures of operating profitability to reflect the benefit of tax deferrals, similar to the adjustments with respect to other operating liabilities discussed above (i.e., either by subtracting the liability from the denominator or by adding imputed interest to the numerator), may result in more correct profitability measures.

Each of the two alternative approaches for adjusting operating profitability ratios for the cost of operating credit has its advantages and disadvantages. The primary shortcoming of *RNOA* is that some companies obtain substantial operating credit relative to reported operating assets, which makes net operating assets small or even negative.[4] When net operating assets is small compared to the scale of operations, the impact of any measurement error in the numerator or denominator of *RNOA* is magnified and *RNOA* becomes a "noisy" measure of operating profitability. And when net operating assets is negative, *RNOA* is meaningless.

Unlike *RNOA*, *ROOA* is measured relative to total operating assets, which typically provides a reasonable measure of scale and is never negative. However, *ROOA* suffers from its own shortcomings. Most importantly, measuring *ROOA* requires one to estimate the cost of operating credit, which is at least partially unobservable. In addition, even when measured properly, *ROOA* does not reflect the *net* profitability of operations because the amount of capital invested in operations is smaller than operating assets (the difference is operating credit). In practice, the net approach for measuring operating profitability (*RNOA* or *ROIC*) is more commonly used than the gross approach (*ROOA*), probably due to the unobservability of the cost of most operating liabilities.

The small denominator issue that undermines *RNOA* also affects net operating asset turnover (sales divided by average net operating assets), which together with the operating profit margin (operating profit divided by sales), determines *RNOA*. Thus, when net operating assets is small or negative one cannot meaningfully decompose operating profitability into the effects of margin and (net) turnover. Moreover, even when net operating assets is "reasonable," measuring turnover relative to net operating assets is problematic. Sales are generated by operating assets,

[4] Koller et al. (2020, Chapter 24) suggest several approaches to mitigating this issue, including capitalizing R&D costs. See also Iqbal et al. (2021), and Sections 2.11.5 and 5.5 in Nissim (2023).

and whether the assets are funded by operating credit (reducing net operating assets) or capital (no effect on net operating assets) has no direct implications for their sales-generating ability. Accordingly, turnover should be measured relative to operating assets.

This study develops a novel approach for decomposing operating profitability, which incorporates the advantages of both the net and gross approaches. Specifically, turnover is measured relative to operating assets, and a new driver of operating profitability is introduced: the ratio of net operating assets to operating assets. This ratio—referred to as the *Operations Funding Ratio*—measures the proportion of the investment in operating assets that is funded with capital (as opposed to operating credit), and it provides insight regarding the impact of operating credit on profitability. As will be shown, because it involves only balance sheet information, the *Operations Funding Ratio* is typically highly stable over time and therefore easy to forecast. The three drivers of operating profitability—*Operating Profit Margin*, *Operating Asset Turnover*, and *Operations Funding Ratio* (*RNOA = Operating Profit Margin × Operating Asset Turnover / Operations Funding Ratio*)—are always meaningful and have robust statistical properties. Thus, these drivers facilitate the analysis and forecasting of operating profitability in essentially all cases.

The empirical analysis starts by describing the distributions of and correlations among the various ratios, to evaluate the significance of the different determinants of shareholders' profitability. To the extent that the ratios differ in their persistence or stability, or exhibit cross-correlations or lead-lag relationships, profitability decompositions may help in forecasting profitability. Like prior studies (e.g., Nissim and Penman 2001), the paper documents substantial differences in persistence across the ratios. Unlike prior work, the study also shows that there are large differences in the stability of the ratios over time, and that these differences are not the same as the differences in persistence. While difficult to demonstrate in a large sample non-contextual

analysis, differences in stability across ratios are relevant for forecasting and valuation because they help in (1) identifying the components that require particular attention, (2) deciding the weight to assign to the most recent ratio versus past ratios and other information, and (3) gauging the likely accuracy of the forecasts. Despite the limitations of a non-contextual analysis, the study shows that its innovative approach for decomposing operating profitability, and the methodology used for reformulating the financial statements from Nissim (2022b), provide considerable improvement in the accuracy of profitability forecasts. In particular, the approach used for estimating transitory income yields substantial improvement relative to commonly used proxies such as special items.

The study also provides direct evidence on the two premises underlying the novel decomposition: sales are more strongly related to operating assets than to net operating assets, and operating liabilities are more strongly related to operating assets than to sales. One implication of these results is that, when forecasting balance sheets, one should first predict operating assets (generally based on revenue forecasts) and then predict operating liabilities in relation to operating assets.

The paper proceeds as follows. Section 2 explains the motivations for conducting profitability analysis. Section 3 reviews the reformulated financial statements used in calculating profitability ratios. Section 4 describes each step in the profitability analysis and the insights it may provide, except the analysis of operating profitability. Section 5 develops a novel decomposition of operating profitability and compares it to alternative approaches. Section 6 presents the empirical evidence, and Section 7 concludes.

2. Motivations for conducting profitability analysis

Profitability decompositions provide relevant information in several ways.[5] First, the component ratios that interact to generate *ROCE* ***inform on different aspects of profitability and related activities***. For example, some ratios are used to evaluate operating profitability, while others are used to analyze the effects of borrowing. In addition, some components of operating profitability inform on the link between investment and revenue, while others focus on the relationship between revenue and operating profit. Analyzing component ratios of operating profitability is important because they evolve differently over time, and they drive free cash flow. Thus, profitability analysis ***helps in forecasting free cash flow, estimating value, and predicting stock returns*** (e.g., Nissim and Penman 2001, Binz et al. 2022).[6,7] Similarly, understanding the leverage effect on profitability is critical to ***understanding financial risks and other borrowing effects*** (e.g., Nissim and Penman 2003).

Second, because business activities are reflected in different ways in *ROCE* components, *ROCE* decompositions ***help in understanding and evaluating the underlying activities***. For example, outsourcing of manufacturing increases asset turnover (by reducing the investment in

[5] Given the important insights that profitability analysis may provide, many textbooks on financial analysis and valuation devote significant space to describing profitability decompositions and linking them to relative and fundamental valuation models. Examples include Easton et al. (2018), Koller et al. (2020), Lundholm and Sloan (2019), Palepu et al. (2020), and Wahlen et al. (2017).

[6] In his letter to Berkshire Hathaway Shareholders, included in the 2020 10-K, Warren Buffett explains the importance of evaluating components of operating profitability: "Our leadership in fixed-asset ownership, I should add, does not, in itself, signal an investment triumph. The best results occur at companies that require minimal assets to conduct high-margin businesses – and offer goods or services that will expand their sales volume with only minor needs for additional capital. We, in fact, own a few of these exceptional businesses, but they are relatively small and, at best, grow slowly." That is, according to Buffett, the best businesses are those that have high asset turnover ("require minimal assets"), high profit margin ("conduct high-margin businesses"), low operations funding ratio ("minor needs for additional capital"), and high sales growth ("expand their sales volume").

[7] Profitability analysis helps in forecasting stock returns in several ways. First, as noted above, it informs on intrinsic equity value, and thus—to the extent that price gravitates to intrinsic value over time—it should help predict stock returns. Second, profitability analysis informs on financial and operating risks, which are likely to be priced by investors (i.e., command risk premium in returns). Third, profitability ratios are increasingly used in quant investing (that is, linking factors directly to subsequent stock returns instead of through the intermediate step of first calculating intrinsic value estimates).

fixed assets) but reduces profit margin (cost of goods sold includes the manufacturer's profit); outsourcing of services may increase profit margin but heighten operating risks and potentially reduce sales growth;[8] "just-in-time inventory" improves asset turnover but may reduce sales growth (e.g., Baños-Caballero et al. 2014); operating credit increases net asset turnover but lowers profit margin (the cost of operating credit is embedded in costs and operating expenses); business combinations increase revenue but reduce asset turnover (acquired intangibles are recognized and tangible assets are marked up); and organic investments increase revenue but reduce profit margin, at least in the short-term (e.g., Fairfield et al. 2002). Therefore, examining the levels of and changes in profitability ratios is useful for understanding management's decisions and the company's success in implementing the decisions. Moreover, comparing the ratios to those of other firms in the industry (e.g., Schröder and Yim 2018, Jackson et al. 2018), and evaluating the ratios in the context of the company's business environment (e.g., Selling and Stickney 1989), ***helps in assessing the likelihood of success of alternative strategies***. For example, the extent to which a firm is subject to competition or capacity constraints affects its ability to improve profitability by increasing profit margin via product differentiation strategies, or by increasing asset turnover via cost leadership strategies.

Third, the decomposition of operating profitability ***informs on operating risks***. Each of the three main components of operating profitability analyzed in this study captures an important risk dimension. Operating profit margin is an important determinant of the degree of operating leverage (i.e., the sensitivity of the percentage change in operating profit to a given percentage change in sales), and asset turnover is correlated with operating leverage (the proportion of fixed cost), the

[8] Outsourcing of services may also have offsetting effects within components of the profit margin. For example, it may reduce SG&A expenses but also reduce the gross margin due to a reduction in overall customer experience and pricing power.

other determinant of the degree of operating leverage (Li et al. 2014). In addition, the operations funding ratio (i.e., the proportion of operating assets funded by capital) is negatively related to the firm's power over its operating counterparts, which is an important determinant of operating flexibility (e.g., Nissim and Penman 2003).[9]

Fourth, the firm's profile—as reflected in the levels of and trends in its financial ratios—helps in ***evaluating the average life-cycle stage*** of the company's products as well as its ***growth prospects*** (e.g., Klepper 1996, Dickinson 2011). For example, as firms progress through the growth stage, their operating margin, asset turnover and financial leverage all tend to increase. Relatedly, profitability analysis applied at the aggregate level provides insight relevant for forecasting real economic activity (Konchitchki and Patatoukas 2014), essentially by ***informing on the economy's stage in the business cycle***. Similarly, aggregating profitability ratios at the industry level helps in ***understanding the stage of the industry's life cycle and the industry's characteristics***. For example, industries with significant operating leverage and high entry barriers tend to have low asset turnover and high profit margin, while industries with low capital intensity and commodity-like products tend to have high asset turnover and low profit margin (e.g., Selling and Stickney 1989).

Fifth, *ROCE* decomposition helps in ***predicting profitability and evaluating its sustainability*** (e.g., Fairfield and Yohn 2001, Esplin et al. 2014). This follows because the different *ROCE* components vary in their persistence and cross-correlations. For example, "special items" are less persistent than other income statement items (e.g., Dechow and Ge 2006); operating profitability is more persistent than the financial leverage effect (e.g., Nissim and Penman 2001);

[9] The operations funding ratio is also negatively related to total leverage, implying negative association with risk. However, if one controls for total leverage, the operations funding ratio is likely to be positively associated with risk due to the financial flexibility effect discussed above.

asset turnover is more persistent than profit margin (e.g., Soliman 2008, Amir at al. 2011); negative special items predict earnings increases (e.g., Burgstahler et al. 2002, Cready et al. 2012) but lower profit margin for high profitability firms (e.g., Fairfield at el. 2009); and increases in operating liabilities (debt) are often associated with subsequent increases (decreases) in operating profitability (e.g., Nissim and Penman 2003, Chen at al. 2019). Evaluating the persistence or sustainability of earnings is at the core of earnings quality analysis, and it is relevant for both relative and fundamental valuation as well as for various risk-related analyses (e.g., when evaluating debt capacity). In addition, some patterns of and relationships among component ratios are indicative of earnings management (e.g., Jansen et al., 2012).[10]

Finally, ***in many cases ratios higher in the hierarchy are problematic or even meaningless, while component ratios still provide useful information***. For example, if common equity is negative, *ROCE* cannot be interpreted but profit margin and asset turnover are still informative. This is an important benefit of profitability decompositions because negative book values are quite common and are due to different reasons, including substantial share repurchases by successful companies. As another example, some companies obtain more operating credit than their investment in operating assets, resulting in negative net operating assets and thus inability to measure the rate of return earned in operations. In such cases, component ratios of operating profitability (e.g., profit margin) are still meaningful.

[10] Profitability analysis may inform on earnings management or earnings quality for additional reasons (see Section 2.8 in Nissim 2023). For example, executives of firms with deteriorating operating profitability may have stronger than average incentives to overstate earnings (e.g., Donelson et al. 2021). Profitability decomposition may also inform on the source of earnings sustainability—persistent profitability versus additional investments—which is another aspect of earnings quality (e.g., Estridge et al. 2009).

3. Reformulated financial statements

Conducting informative profitability and valuation analyses requires reformulating the financial statements to separate operating activities—the core of value creation—from financing and other nonoperating activities. It also requires distinguishing between recurring and transitory items in the income statement. Nissim (2022b) provides a step-by-step explanation of the reformulation process, and he describes how the reformulated financial statements can be measured using Compustat data items. The analysis in this paper uses the reformulated financial statements constructed in Nissim (2022b). The following is a short description.

Reformulating the balance sheet involves classifying assets and liabilities as either operating, financing, or other nonoperating, as shown in Exhibit A. Appendix A lists the items comprising the different categories.

Exhibit A. Reformulated Balance Sheet

	Operating assets		Operating liabilities
+	Financial assets	+	Debt
+	Other nonoperating assets	+	Other nonoperating liabilities
			Total liabilities
		+	Equity
	Total assets		Total liabilities and equity

The reformulated balance sheet can also be presented in a net format, derived by subtracting financial assets, operating liabilities, and other nonoperating liabilities from both sides of the balance sheet:

Exhibit B. Reformulated Balance Sheet (net presentation)

	Operating assets		Debt
-	Operating liabilities	-	Financial assets
	Net operating assets		Net debt
+	Net other nonoperating assets	+	Equity
	Net assets funded by net capital		Net capital

Net operating assets—that is, the difference between operating assets and operating liabilities—measures the amount of net capital invested in operations. Net capital is also used to fund investments in net other nonoperating assets (i.e., other nonoperating assets, such as equity method investments, minus other nonoperating liabilities, such as reserves for unusual litigation). Net capital is also referred to as invested capital or capital employed.

Like the reformulated balance sheet, the reformulated income statement distinguishes between operating, financing, and other nonoperating items. However, unlike the balance sheet, another layer of analysis is required. Because recurring earnings have greater impact on value than transitory items, and they help predict future profits, it is important to identify and separate out transitory components before classifying items by the nature of activity. Once transitory items are separated out, the classification is (mostly) straightforward. Revenue generated in operations is classified as operating, while income earned on financial assets (e.g., interest income on long-term marketable securities) is classified as financing, and income earned from other nonoperating activities (e.g., equity method income) is classified as other nonoperating. Similarly, expenses representing consumption of operating assets (e.g., depreciation of fixed assets or cost of inventory sold), incurrence of operating liabilities (e.g., accrued compensation), or payments for operations-related services (e.g., utilities) are classified as operating, while interest on debt is classified as financing. Income taxes are allocated to transitory, operating, financing, and other nonoperating activities based on the related income and tax rates. Exhibit C presents the reformulated income statement, and Appendix B lists the items comprising each category.

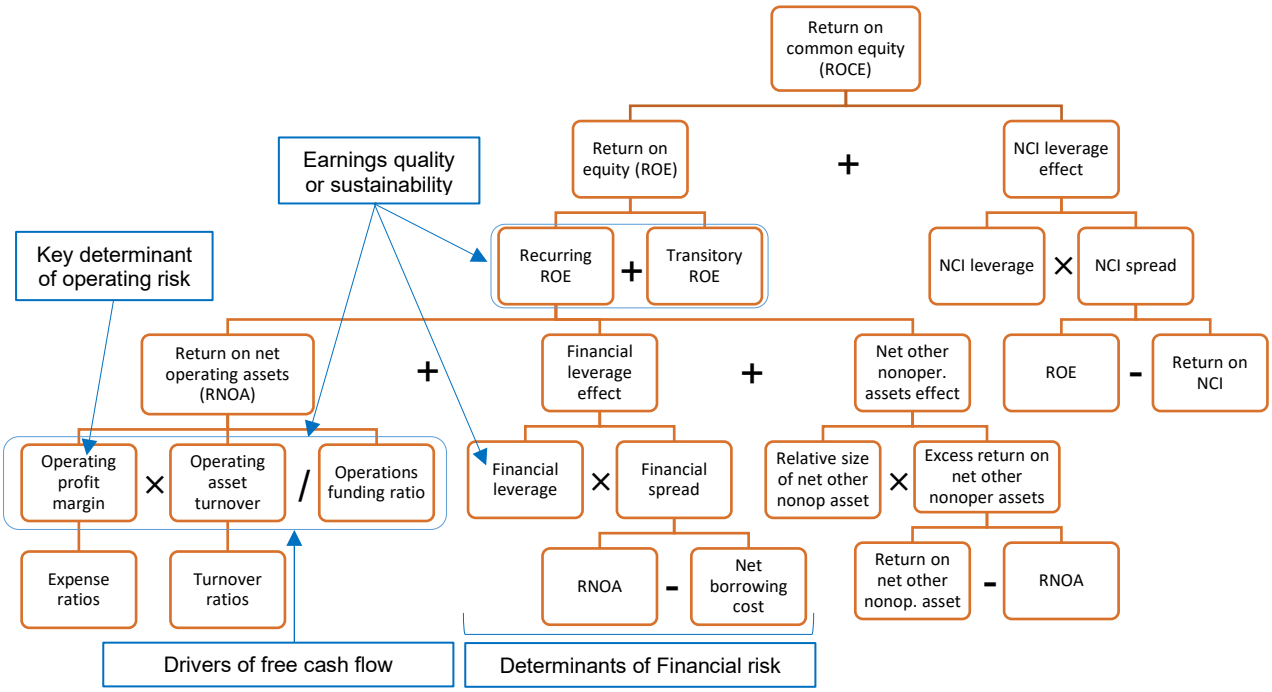
Exhibit C. Reformulated Income Statement

	Operating revenue
-	Operating costs and expenses (including income taxes on operating profit)
	Net Operating Profit After Tax (NOPAT)
-	Net Financial Expense (NFE)
+	Income from other nonoperating activities
	Recurring income
+	Transitory income
	Net income after preferred dividend
-	Net income attributable to noncontrolling interest
	Net income attributable to common equity

4. Profitability decomposition

Given the reformulated balance sheet and income statement, conducting profitability analysis is straightforward. Exhibit D presents the profitability ratios and the relationships among them.

Exhibit D. Profitability Analysis



The key ratios in the decomposition are defined as follows:

Ratio	Reformulated balance sheet		Reformulated Income Statement
Operating asset turnover	Operating assets	⇦	Operating revenue
			Oper. costs & expenses (COGS, SG&A, tax)
RNOA	Net operating assets	⇦	Net operating profit after tax (NOPAT)
Net borrowing costs	Net debt	⇦	Net financial expense (NFE)
Return on net other nonoperating assets	Net other nonoperating assets	⇦	Income from other nonoperating activities
Recurring ROE	Total equity	⇦	Recurring income
Transitory ROE	Total equity	⇦	Transitory income
Return on equity (ROE)	Total equity	⇦	Net income after preferred dividend
Return on noncontrolling interest	Noncontrolling interests	⇦	Net income attributable to noncontrolling interest
Return on common equity	Common equity	⇦	Net income attributable to common equity

The starting point when evaluating profitability is the return on common equity:[11]

$$ROCE = \frac{Net\ income\ attributable\ to\ common\ equity}{Average\ common\ equity}$$

ROCE measures the return from all activities (recurring and transitory; operating, financing, and other nonoperating) per dollar of common equity investment. Profitability analysis decomposes *ROCE* into components representing the contributions of the different business activities. Subsection 4.1 distinguishes between the profitability of common equity and that of noncontrolling interests, while Subsection 4.2 decomposes *ROE* into recurring and transitory components. Subsection 4.3 describes the components of recurring profitability. Subsections 4.4 and 4.5 elaborate on two of the components of recurring profitability: the financial leverage effect, and the

[11] Theoretically, if there are no incremental investments during the year, profitability ratios should be measured relative to the beginning-of-period investment that generated the profits, not relative to the average balance. To see why, consider a $100 investment in a savings account made at the beginning of the year. Assuming a 10% interest rate, at the end of the year the balance in the account is $110. The rate of return is 10/100, not 10/110 or 10/105. But what if additional investments or withdrawals are made during the year? For example, what would be the impact on the profitability measure if another $100 is deposited in the savings account at the middle of the year? If profitability is measured using the beginning of year balance, the rate of return is 15% (=15/100). In this case, a more correct calculation would be to use the average of the beginning- and end-of-year balances, which gives a rate of return of 9.5% (=15/([100+215]/2)). That is, using the average balance effectively assumes that changes in the investment occur at the middle of the year. Because firms often add or withdraw capital or assets during the period, profitability ratios should generally be measured relative to the average balance of the investment during the year.

impact of other nonoperating activities. The analysis of the core component of recurring profitability—operating activities—is provided in a separate section, Section 5.

4.1 Profitability of common equity versus noncontrolling interests

Equity consists of common equity and noncontrolling interests.[12] Accordingly, the dollar return earned on total equity is divided between common equity and noncontrolling interests (NCI). To the extent that the profitability of NCI (*Return on NCI*) is different from that of common equity, return on common equity (*ROCE*) will be different from return on equity (*ROE*). This is often the case because NCI represents ownership in partially owned subsidiaries, while common equity represents interests in the parent company and all its subsidiaries. The extent to which *ROCE* differs from *ROE* in any given year (*NCI Leverage Effect*) depends on the significance of NCI relative to common equity (*NCI Leverage*) and the difference in profitability between that of overall equity (*ROE*) and the noncontrolling interests (*Return on NCI*). Specifically,

$$NCI\ Leverage\ Effect = ROCE - ROE = NCI\ Leverage \times NCI\ Spread$$

Where $ROE = \frac{Net\ income\ after\ preferred\ dividends}{Average\ equity}$, $NCI\ Leverage = \frac{Average\ NCI}{Average\ common\ equity}$,

$NCI\ Spread = ROE - Return\ on\ NCI$, and $Return\ on\ NCI = \frac{Noncontrolling\ interest\ in\ income}{Average\ noncontrolling\ interests}$.

For most companies, NCI is relatively small or nonexistent, so *ROCE* is close to or equal to *ROE*. However, for some companies NCI is significant (e.g., Nissim 2021). In such cases, it is important to understand the impact of NCI on *ROCE*. The above analysis provides relevant insight by evaluating the significance of NCI and the extent to which it earns a return different than that on overall equity.

[12] As explained in Nissim (2022b), in the reformulated balance sheet temporary equity and preferred stock are included in debt.

4.2 Recurring versus Transitory ROE

When evaluating profitability, it is important to distinguish recurring profitability from transitory effects, because recurring items have greater impact on value and they help predict future profits. Accordingly, *ROE* should be decomposed as follows:

$$ROE = Recurring\ ROE + Transitory\ ROE$$

Where $Recurring\ ROE = \frac{Recurring\ income}{Average\ equity}$, and $Transitory\ ROE = \frac{Transitory\ income}{Average\ equity}$. *Recurring ROE* is a summary measure of recurring profitability from all business activities. It is measured by excluding from net income after preferred dividends (the numerator of *ROE*) items that are deemed transitory. *Transitory ROE* measures the impact of transitory items on shareholders' profitability. Perhaps the most difficult part of profitability analysis is identifying and measuring transitory items. Nissim (2022b) develops an algorithm for measuring transitory income, which is used in the empirical analysis below.

4.3 Decomposition of Recurring ROE

The next step in the profitability analysis is to decompose *Recurring ROE* into the effects of operating, financing, and other nonoperating activities:

$$Recurring\ ROE = RNOA + Financial\ Leverage\ Effect + Net\ Other\ Nonoperating\ Assets\ Effect$$

Where *RNOA* measures the rate of return earned in operations; *Financial Leverage Effect* measures the impact of financing activities on shareholders' profitability (i.e., the additional return to shareholders from earning a spread on borrowed funds); and *Net Other Nonoperating Assets Effect* measures the impact on shareholders' profitability of investments other than operating or financing (e.g., equity method investments, real estate not used in operations). I next define and decompose the last two components, and then discuss *RNOA* in a separate section (Section 5).

4.4 Financial Leverage Effect

The *Financial Leverage Effect* is calculated as follows:

$$Financial\ Leverage\ Effect = Financial\ Leverage \times Financial\ Spread$$

Where $Financial\ Leverage = \frac{Average\ net\ debt}{Average\ equity}$, $Financial\ Spread = RNOA - Net\ Borrowing\ Cost$, and $Net\ Borrowing\ Cost = \frac{Net\ financial\ expense}{Average\ net\ debt}$. *Financial Leverage* measures the amount of net borrowing per dollar of equity; *Net Borrowing Cost* measures the after-tax cost of each dollar borrowed (net of amounts invested in financial assets); and *Financial Spread* measures the additional return that accrues to shareholders per dollar of borrowing.

The decomposition of the financial leverage effect informs on the trade-off between risk and return that financial leverage entails. Shareholders earn the difference between *RNOA* and *Net Borrowing Cost* (i.e., *Financial Spread*) on each dollar of debt, but they also absorb the volatility of the excess return, as lenders generally receive a constant return independent of the profitability of operations. In other words, holding net operating assets constant, leverage reduces the amount of equity but does not reduce the variability of net income (because debtholders' claims are fixed), thereby by increasing the volatility of *ROE*. Moreover, when *RNOA* is lower than *Net Borrowing Cost*, leverage has a negative effect on shareholders' profitability.

While *RNOA* is typically higher than *Net Borrowing Cost*, leading to a positive leverage effect on shareholders' profitability, the leverage impact on volatility (and the associated negative effects) at least partially offset the profitability effect on value.[13] Evaluating components of the

[13] In his letter to Berkshire Hathaway Shareholders, included in the 2018 10-K, Warren Buffett notes: "We use debt sparingly. Many managers, it should be noted, will disagree with this policy, arguing that significant debt juices the returns for equity owners. And these more venturesome CEOs will be right most of the time. At rare and unpredictable intervals, however, credit vanishes and debt becomes financially fatal. A Russian-roulette equation – usually win, occasionally die – may make financial sense for someone who gets a piece of a company's upside but does not share in its downside. But that strategy would be madness for Berkshire. Rational people don't risk what they have and need for what they don't have and don't need."

financial leverage effect—including the amount of leverage, cost of borrowing, and financial spread—shed light on the benefits and costs of leverage (e.g., Section 2.8.5 in Nissim 2023).

4.5 Net Other Nonoperating Assets Effect

This effect is calculated as follows:

$$Net\ Other\ Nonoperating\ Assets\ Effect = Relative\ Size\ of\ Net\ Other\ Nonoperating\ Assets \times Excess\ Return\ on\ Net\ Other\ Nonoperating\ Assets$$

Where $Relative\ Size\ of\ Net\ Other\ Nonoperating\ Assets = \frac{Average\ net\ other\ nonoperating\ assets}{Average\ equity}$,

$Excess\ Return\ on\ Net\ Other\ Nonoperating\ Assets = Return\ on\ Net\ Other\ Nonoperating\ Assets - RNOA,$

and $Return\ on\ Net\ Other\ Nonoperating\ Assets = \frac{Income\ from\ other\ nonoperating\ activities}{Average\ net\ other\ nonoperating\ assets}$.

Return on Net Other Nonoperating Assets measures the profitability of activities other than operating or financing. For example, if net other nonoperating assets consists solely of equity method investments, then *Return on Net Other Nonoperating Assets* = equity method income / average equity method investments.

5. Analysis of operating profitability

Measuring operating profitability (*RNOA*) for a given period involves comparing net operating profit after tax (NOPAT) to the net investment in operations that generated it:

$$RNOA = \frac{Net\ operating\ profit\ after\ tax\ (NOPAT)}{Average\ net\ operating\ assets}$$

Where NOPAT is calculated by removing transitory, financing, and other nonoperating items from net income (including the related income taxes), as described in Nissim (2022b). Accordingly, *RNOA* is a summary measure of recurring profitability from operating activities.

RNOA is measured relative to net operating assets (i.e., operating assets minus operating liabilities)—rather than relative to operating assets—because NOPAT is the dollar return from

operations after deducting the cost of operating credit, which is included in operating expenses (see Section 1). For example, suppliers and other vendors often charge higher prices (or do not offer discounts) when they extend credit, resulting in higher cost of sales and SG&A expenses. Moreover, some operating liabilities are reported discounted, with the interest cost included in operating expenses (e.g., the accretion expense on asset retirement obligations). Thus, NOPAT measures the dollar return on net operating assets, which in turn flows or accrues to shareholders and debtholders.

RNOA is generally less volatile than *Recurring ROE*. Unlike *Recurring ROE*, *RNOA* is not directly affected by financial leverage as it excludes the impact of financial activities. As explained in Section 4.4 above, financial leverage magnifies the impact of operating shocks on shareholders' profitability by reducing the amount of equity (the denominator of *Recurring ROE*) without reducing the variability of recurring income (the numerator of *Recurring ROE*). That is, compared to *RNOA*, *Recurring ROE* has the same variability of the numerator (recurring income versus NOPAT), spread over a smaller denominator (equity versus net operating assets). Financial leverage does not affect the variability of recurring income because debtholders' claims on NOPAT are fixed (aftertax interest expense).

5.1 The standard decomposition of operating profitability

To obtain insight into the drivers of operating profitability, *RNOA* can be decomposed into margin and net turnover, which are defined as follows:[14]

$$Operating\ Profit\ Margin = \frac{Net\ operating\ profit\ after\ tax\ (NOPAT)}{Operating\ revenue}$$

[14] This decomposition is different from the traditional DuPont decomposition which does not distinguish between operating and financing activities but rather measures profitability and turnover relative to total assets.

$$Net\ Operating\ Assets\ Turnover = \frac{Operating\ revenue}{Average\ net\ operating\ assets}$$

Multiplying the two drivers together yields *RNOA*:

$$RNOA = Operating\ Profit\ Margin \times Net\ Operating\ Assets\ Turnover$$

Net Operating Asset Turnover measures the amount of sales generated per dollar invested in operations, while *Operating Profit Margin* gages the portion of each dollar of sales that flows or accrues to the providers of capital.

Net Operating Asset Turnover is generally less volatile and more persistent over time than the profit margin. This follows because balance sheet quantities (like net operating assets) are generally less volatile than income statement metrics (like revenue and earnings). In addition, percentagewise, changes in income are more volatile than changes in sales due to (1) fixed costs, which reduce earnings without offsetting the variability in revenue (i.e., the impact of operating leverage), and (2) the inclusion of volatile expenses, gains, and losses in earnings. Excluding transitory items from NOPAT increases the persistence of profit margin and so reduces the difference in persistence between profit margin and asset turnover. In addition, as discussed below, when net operating assets is relatively small, *Net Operating Asset Turnover* is quite volatile. Still, in most cases, net asset turnover is more persistent than the profit margin (e.g., Nissim and Penman 2001). Thus, decomposing RNOA into these two components provides useful information for forecasting. The disaggregation of *RNOA* is informative also because business strategies and activities, as well as accounting effects, are reflected in different ways in profit margin and net asset turnover (e.g., Selling and Stickney 1989, Fairfield and Yohn 2001, Dickinson 2011, Jansen et al. 2012, Vorst and Yohn 2018, and Anderson et al. 2023; for a summary of these effects see, e.g., Section 2.8.5 in Nissim 2023).

5.2 An alternative decomposition of operating profitability

The decomposition of *RNOA* discussed in the previous section has several shortcomings. When *Net Operating Assets* is small, *Net Operating Asset Turnover* is "noisy," and when *Net Operating Assets* is negative, *Net Operating Asset Turnover* is meaningless. In addition, *Net Operating Asset Turnover* is based on an inaccurate rationale, because sales are generated by all operating assets, not just by the portion funded with capital (which is equal to net operating assets). Thus, a more informative turnover ratio is:

$$Operating\ Assets\ Turnover = \frac{Operating\ revenue}{Average\ operating\ assets}$$

To relate this turnover measure to *RNOA*, I define

$$Operations\ Funding\ Ratio = \frac{Average\ net\ operating\ assets}{Average\ operating\ assets}$$

This latter ratio measures the proportion of operating assets that is funded by the providers of capital (equity and debt holders). Because net operating assets is equal to operating assets minus operating liabilities, a low *Operations Funding Ratio* indicates that a high proportion of operating assets is funded by operating creditors (accounts payable, deferred revenue, accrued expenses, other working capital liabilities, deferred taxes, and other long-term operating liabilities; See Appendix A). Accordingly, a low *Operations Funding Ratio* (i.e., relatively large operating liabilities) may reflect or indicate:

- ***Market power***. Bargaining power over suppliers, employees, customers, and other operating creditors may enable the firm to fund much of its operations using operating credit.
- ***Financial stability***. Operating creditors (e.g., suppliers and customers), which often have superior information about the firm, are not likely to extend substantial credit to companies in financial difficulties.

- ***Future earnings increase***. A low ratio may be due to overstated estimated liabilities that are likely to reverse (thereby increasing earnings), such as restructuring charges, deferred revenue, and warranty reserves (e.g., Nissim and Penman 2003).
- ***Little or no M&A***. M&A activities substantially increase operating assets (intangibles are recognized and tangible assets are market to fair value), while the marking-to-market effect on operating liabilities is typically small.

These two new ratios—*Operating Assets Turnover* and the *Operations Funding Ratio*—are related to *Net Operating Assets Turnover* as follows:

$$Net\ Operating\ Assets\ Turnover = \frac{Operating\ Assets\ Turnover}{Operations\ Funding\ Ratio}$$

And so

$$RNOA = \frac{Operating\ Profit\ Margin \times Operating\ Assets\ Turnover}{Operations\ Funding\ Ratio}$$

Unlike *RNOA* and *Net Operating Assets Turnover*—which are meaningless when net operating assets is negative and noisy when net operating assets is small—all three ratios in the above *RNOA* decomposition are always meaningful and have robust statistical properties.

6. Empirical analysis

6.1 Sample and data

I start with the Compustat North America Fundamental Annual file and select all observations with consolidated data (CONSOL = "C"), industry format (INDFMJ = "INDL"), standardized data format (DATAFMJ = "STD"), domestic company (POPSRC = "D;" including U.S., Canada, and ADR), and USD currency (CURCD = "USD"). I then obtain and merge data on pension and other

postretirement benefits from the Compustat Pension Annual file, and data on operating lease assets and obligations from the Compustat Snapshot Annual file.[15]

I identify industry membership using MSCI's Global Industry Classification (GIC). I then exclude financial firms (GIC sector 40) utilities (GIC sector 55) and REITs (GIG sector 60 since 2017, previously included in GIC 40).[16] I next construct the reformulated financial statement as described in Nissim (2022b), and I measure the ratios as described in Sections 4 and 5. Finally, I apply the following filters:

- I delete observations with fiscal years outside the 22 years 2001 through 2022. (Like Compustat, I assign observations to fiscal year *t* if the fiscal year ended between June/*t* and May/*t*+1.) I delete pre-2001 observations because detailed information on special items, which is used in measuring transitory income, is consistently available only starting 2001 (see Nissim 2022d).[17]

[15] Starting 2019 (ASC 842), public companies report the present value of future operating lease payments as a liability, and Compustat includes it in their debt variables (DLC and DLTT). For reasons explained in Nissim (2022b), I classify this liability as operating and therefore undo the Compustat's adjustment. Unfortunately, the Compustat Fundamental Annual file does not provide the operating lease liability. However, it is available in the Compustat Snapshot Annual file (data items OLNPV or LLC+LLLT).

[16] Financial firms are excluded because for these firms operating and financing activities are intertwined, and financing activities are essential for value creation. Utilities are excluded because rate regulation affects the time-series of profitability ratios (e.g., a negative profitability shock may enable regulated utilities to charge higher rates and thus increase subsequent profitability). REITs other than mortgage REITs (which remained in the financial sector) are operating companies and should therefore be included in the analysis. However, for REITs Compustat doesn't provide many of the variables of the industrial format (INDL). Rather, they record most variables in the financial services format, which does not allow for the measurement of the variables used in this study. Another issue with including REITs is that mortgage REITs were not identified separately from other REITs prior to 2008.

[17] In addition, lease commitment information, which is needed for the measurement of operating assets, is fully available on Compustat only starting 2000 (see Nissim 2022c). Also, combined statutory tax rates, which are used in the measurement of transitory, financial, and other nonoperating items, are available from the OECD starting 2000 (see Nissim 2022a).

- I delete observations relating to small firms (annual revenue less than 100 million USD in December 2022 prices), because the distributions of financial ratios are often poorly behaved for these firms.[18]

Starting the sample period in 2001 implies that there is no overlap with the samples used in Nissim and Penman (2001, 2003). Because some of the analyses in this study are related to those in the Nissim and Penman studies, the findings inform on the out-of-sample validity of the original results.

6.2 Distribution statistics

Table 1 provides summary statistics for the ratios described in Sections 4 and 5, and Table 2 presents time-series means (over the 22 years, 2001-2022) of cross-sectional correlation coefficients (Spearman above the diagonal, Pearson below). In Table 1, the statistics are presented in seven panels, corresponding to the decompositions in Exhibit D. To facilitate meaningful comparisons across the variables, in each panel only observations with non-missing values for all the variables in that panel are used.

Panel A of Table 1 presents statistics for *ROCE* and its two components: *ROE* and *NCI Leverage Effect*. The distributions of *ROCE* and *ROE* are almost identical, and the two profitability measures have very high correlation (Table 2) as most companies have little if any NCI equity.[19] Still, for some observations *NCI Leverage Effect* is quite significant (Panel B of Table 1), due to

[18] To further mitigate the effects of outliers, I identify and trim extreme values of ratio variables using the following procedure. For each variable, I calculate the 5th and 95th percentiles of the empirical distribution (P5 and P95 respectively) and trim observations outside the following range: P5 – 1 × (P95 – P5) to P95 + 1 × (P95 – P5). For normally distributed variables, this range covers approximately 5 standard deviations from the mean in each direction (= 1.65 + 1 × (1.65 – (-1.65)), which includes more than 99.99% of the observations. However, for poorly behaved variables a relatively large proportion of the observations is deleted.

[19] These statistics understate the economic significance of NCI. Nissim (2021) shows that (1) the relative magnitude of NCI is strongly correlated with size, and (2) the relative frequency of NCI has increased substantially over time. The equal-weight pooled statistics in Table 1 do not reflect these effects. In addition, in many countries NCI are much more significant compared to the U.S.

either substantial *NCI Leverage* or large *NCI Spread*. The significant dispersion in the distribution of *NCI Spread* indicates that for many firms the profitability of NCI is very different from that of common equity. This is due to differences between the profitability of partially owned subsidiaries (as reflected in *Return on NCI*) and that of the parent and its fully owned subsidiaries (*ROE* reflects the profitability of the parent and all subsidiaries).

Panel C of Table 1 presents statistics for the recurring and transitory components of *ROE*. *Transitory ROE* has a mean and median that are both close to zero, and its distribution is quite symmetric. These distributional characteristics are different from those of special items, which have negative mean and negative skewness (e.g., Dechow and Ge 2006); they are due to the "smoothing" approach used in measuring transitory items (see Nissim 2022b). Importantly, excluding transitory items significantly reduces the dispersion of profitability across firms and over time (the standard deviation of *Recurring ROE* is 23.3% compared to 25.6% for *ROE*). It also significantly reduces the negative skewness of profitability—for *Recurring ROE* the difference between the mean and median is substantially smaller than it is for *ROE*. The significant reduction in the dispersion and skewness of *Recurring ROE* compared to *ROE* suggests that the algorithm developed in Nissim (2022b) to estimate transitory items performs well. I conduct more direct tests below.

Statistics for the decomposition of *Recurring ROE* are presented in Panel D of Table 1. The distribution of *RNOA* is less dispersed and more symmetric than that of *Recurring ROE*. *Recurring ROE* is driven primarily by *RNOA*—it has a much stronger correlation with *RNOA* (Pearson .73, Spearman .91; Table 2) than it has with either of its other two components, *Financial Leverage Effect* (Pearson .45, Spearman .40) and *Net Other Nonoperating Assets Effect* (Pearson .07, Spearman .10). Still, the standard deviation of *Financial Leverage Effect* is not negligible

relative to that of *RNOA* (13.8% compared to 19.0%, respectively), indicating that for many firm-year observations financial leverage has large (positive or negative) effect on shareholder profitability. In contrast, *Net Other Nonoperating Assets Effect* is small both on average and in the cross section (mean .1%, standard deviation 1.2%).

The distribution statistics for the drivers of *RNOA* (Panel E of Table 1), and the correlation coefficients between the drivers and *RNOA* (Table 2), suggest that each of the three drivers of operating profitability—*Operating Profit Margin*, *Operating Asset Turnover*, and *Operations Funding Ratio*—has significant effect on operating profitability. They each exhibit substantial variability and have the expected directional Pearson and Spearman correlations with *RNOA*. Still, the cross-sectional correlations between RNOA and its drivers are substantially larger for *Operating Profit Margin* compared to *Operating Asset Turnover* and *Operations Funding Ratio*; the time-series mean cross-section Pearson (Spearman) correlation is .69 (.80) for *Operating Profit Margin*, compared to .17 (.24) for *Operating Asset Turnover* and -.06 (-.12) for *Operations Funding Ratio*. In addition, the correlations among the three drivers are consistent with expectations—profit margin is negatively correlated with asset turnover (e.g., Nissim and Penman 2001) and positively correlated with the operations funding ratio (operating liabilities reduce the operations funding ratio, and their cost reduces the profit margin; Nissim and Penman 2003).[20]

Operating liabilities are on average very significant; for the average (median) firm, net capital funds 64.1% (67.3%) of operating assets, with operating liabilities funding the rest (recall that *Operations Funding Ratio* measures the proportion of operating assets funded by net capital). However, this effect varies substantially across firms, with standard deviation (inter-quartile range) of 17.1% (21.8% = 76.4%-54.6%). Given that *RNOA* is inversely proportional to the *Operations*

[20] Note that there is no overlap with the samples used in Nissim and Penman (2001 and 2003), so the above statistics provide evidence of out-of-sample validity.

Funding Ratio, these statistics imply that increasing *Operations Funding Ratio* by one standard deviation from its mean would reduce *RNOA* by 2.1 percentage points (= -.077×.171/.641), from 7.7% to 5.6%. These statistics highlight the importance of evaluating the effect of operating credit on operating profitability, which is a novel aspect of the profitability decomposition developed in this study.

Panel F presents statistics for the decomposition of *Financial Leverage Effect*. At the center of the distribution, *Financial Leverage* is quite significant (mean of .531, median of .307). In addition, for most firms *Net Borrowing Cost* is significantly lower than *RNOA*, resulting in substantial *Financial Spread* (mean 3.8%, median 3.5%). Yet, for the median firm, *Financial Leverage Effect* is close to zero (-.1%), and it is significantly negative on average (-1.2%). The reason for this apparent contradiction becomes clear when considering the correlation coefficients among the ratios. As shown in Table 2, there is a strong negative correlation between *Financial Leverage* and *Financial Spread* (Pearson -.14, Spearman -.26). *Financial Leverage* is low or even negative for companies with high profitability and low cost of borrowing, and it is large for companies with low or negative *Financial Spread*. This result is consistent with the pecking order theory of capital structure and is well documented in the literature (e.g., Fama and French 2002).

The final panel of Table 1 (Panel G) presents statistics for the decomposition of *Net Other Nonoperating Assets Effect*. Net other nonoperating assets that can be identified using Compustat data include equity method investments, assets of discontinued operations, and net-of-tax pension and OPB assets and liabilities (Nissim 2022b). Many firms either do not report these items or report relatively small amounts. Accordingly, *Net Other Nonoperating Assets Effect* is zero or close to zero for most observations (see Panel D). Moreover, even for firms that report these items (Panel G), the effect on *Recurring ROE* is small (mean .1%, standard deviation 1.5%). Therefore,

in the remaining sections I provide limited analysis of this decomposition as well as that of common versus NCI equity (for the same reason—relatively small effect on *ROCE* for most firms).

6.3 Incremental information

As noted earlier, a primary motivation for conducting profitability analysis is to help in forecasting future profitability (e.g., Fairfield and Yohn 2001). To the extent that different *ROCE* components vary in their persistence or volatility over time, one may obtain more precise forecasts of *ROCE* by generating separate forecasts for the drivers of *ROCE* and then combine them to build a *ROCE* forecast (e.g., Esplin et al. 2014). Prior studies have focused on the persistence of profitability ratios and evaluated it using either (1) the slope coefficient from a cross-sectional regression of the ratio on its lagged value (e.g., Fama and French 2000); or (2) the time-series patterns of average profitability ratios calculated for portfolios sorted based on the value of the ratio in a base year (e.g., Nissim and Penman 2001). However, another characteristic of the time-series behavior of profitability ratios that affects their forecasting ability is volatility over time, as explained next.

Consider the following time-series model:

$$y_{t+1} = \alpha + \beta \times y_t + \varepsilon_{t+1}$$

where y is a component of shareholders profitability (e.g., *RNOA*) and β is its persistence coefficient. Unlike β, the variance of ε does not affect the expected value of predicted profitability, but it does affect the accuracy of the forecast. Information about the absolute and relative accuracy of forecasts of profitability components is especially relevant in contextual settings where additional information besides the past behavior of profitability ratios is incorporated in the analysis. In essence, the volatility of the ratio over time affects the weight given to its past values

relative to other information in predicting future values.[21] Therefore, when evaluating the information content of profitability components about future profitability, it is important to examine their time-series volatility in addition to their persistence.

In the empirical analysis that follows, I evaluate both determinants of the predictability of profitability components. Specifically, in Table 3 I examine the persistence coefficients from regressions of profitability ratios in future years $t + j$, for $j = 1, 2, \ldots 7$, on their value in year t. In Table 4, I evaluate the stability of the profitability ratios by examining the distributions of their coefficient of variation. I calculate each coefficient of variation by dividing the firm-specific standard deviation of the profitability ratio over the last seven years by the absolute value of the mean over the last seven years (a minimum of five non-missing values is required). For ratios that tend to be stable over time, the pooled distribution (across firms and years) of the coefficient of variation should have low mean and low median. In contrast, for ratios that tend to be volatile over time, the mean and median should be relatively high.

Consistent with prior studies, Table 3 shows considerable differences in persistence across the profitability ratios. In general, ratios that are based only on balance sheet numbers (*NCI Leverage*, *Operations Funding Ratio*, *Financial Leverage*, and *Relative Size of Net Other Nonoperating Assets*) are more persistent than other ratios, consistent with the stock (as opposed to flow) nature of these measures (e.g., Lemmon et al. 2008). Another expected result is the

[21] Relatedly, the volatility or stability of ratios also has implications for HOW to extrapolate from past values. For example, for relatively stable ratios the most recent ratio is often the best forecast, while for volatile ratios (e.g., the ratio of special items to revenue) the average over recent years provides a more accurate forecast (see Nissim 2022d).

significant initial persistence of most profitability ratios (the coefficient relating profitability in year $t + 1$ to profitability in year t), which is followed by a gradual decline as j increases.[22]

The potential contribution of profitability analysis to the prediction of future profitability is evident in several of the decompositions. *Transitory ROE* has very little persistence, and *Recurring ROE* is substantially more persistent than overall *ROE* (Panel C). The very low persistence of *Transitory ROE* and the higher persistence of *Recurring ROE* compared to *ROE* indicate that the algorithm developed in Nissim (2022b) to estimate transitory items performs well. As expected, *RNOA* is more persistent than *Financial Leverage Effect* and *Net Other Nonoperating Assets Effect* (Panel D); however, it is not more persistent than *Recurring ROE*. Turning to the drivers of *RNOA* (Panel E), *Operating Profit Margin* is substantially less persistent than the other two component ratios of operating profitability, *Operating Asset Turnover* and *Operations Funding Ratio*.

The distribution statistics for the coefficients of variation, presented in Table 4, are mostly consistent with the persistence coefficients. There are several significant exceptions, however. First, unlike the persistence coefficients in Table 3, Panel D of Table 4 shows that *RNOA* is substantially less volatile over time than *Recurring ROE*. Thus, although on average *RNOA* and *Recurring ROE* have similar persistence (Panel D of Table 3), one may extrapolate from past *RNOA* with greater confidence than from *Recurring ROE* or its other components (*Financial Leverage Effect* and *Net Other Nonoperating Assets Effect*). Another important difference between the persistence and variability results relate to the decomposition of operating profitability (Panel

[22] Numerous studies (e.g., Freeman et al. 1982, Fama and French 2000, Nissim and Penman 2001) provide evidence on the partial persistence and mean-reversion tendency of profitability ratios. The mean reversion is due to both economic forces (competition, more "normal" profitability of new investments, sales volatility, transitory items, operating and financing leverage, cost stickiness, and real options) and accounting effects (fair value accounting, conservatism, and "big bath" charges). See Section 2.8.4 in Nissim (2023) for a comprehensive discussion.

E). The *Operations Funding Ratio* has, by far, the lowest levels of time-series variation. Yet, its persistence coefficients (Panel E of Table 3) are similar to those of *Operating Asset Turnover*.

The results of Tables 3 and 4 suggest that profitability decompositions may help improve the forecasts of ratios higher in the hierarchy, as component ratios vary in their persistence and stability over time. Table 5 evaluates this conjecture, focusing on the persistence effect.[23] Specifically, it reports results of regressing profitability ratios on lag values of components from their decomposition. If a decomposition adds information, the component ratios should have significantly different coefficients. This can occur either because the component ratios have different persistence (as reported in Table 3), or if one component is correlated with future year values of another component.[24] Conversely, lead-lag correlations across component ratios may offset the effect of differential persistence, potentially resulting in insignificant differences across the coefficients and implying that the decomposition does not help in forecasting.

Panel A of Table 5 reports the times-series means and HAC t-statistics of coefficients estimated using cross-sectional (annual) regressions of the following model:

$$ROE_{t+j} = \beta_0 + \beta_1 Recurring\ ROE_t + \beta_2 Transitory\ ROE_t + \varepsilon$$

for j = 1, 3, 5, and 7. If decomposing *ROE* into recurring and transitory components provides useful information for predicting *ROE* (because of differential persistence or a correlation structure), then the difference between the two coefficients should be significant. Indeed, the regression estimates in Panel A of Table 5 demonstrate that the coefficient on *Recurring ROE* is large and highly significant in each of the four regressions, while that on *Transitory ROE* is close

[23] While evaluating the persistence effect on the forecast accuracy of ratios higher in the hierarchy is relatively straightforward (discussed below), demonstrating the variability effect using non-contextual analysis is difficult. Yet, as discussed in the conclusion section, information on the differential variability of component ratios is relevant for contextual forecasting and valuation.

[24] Amir et al. (2011) refer to this effect as a determinant of "conditional persistence."

to zero and only marginally significant in three of the four regressions. In addition, the difference between the two coefficients is large and highly significant in each of the four regressions. These results suggest that *Transitory ROE* provides little information about future *ROE* incremental to *Recurring ROE*, indicating that the algorithm developed in Nissim (2022b) to estimate transitory items performs well.

Panel B of Table 5 reports the results one level down in the hierarchy, focusing on the decomposition of *Recurring ROE*. As expected, the *RNOA* coefficient is significantly larger than the coefficient on *Financial Leverage Effect* in each of the four regressions. Strangely, the coefficient on *Net Other Nonoperating Assets Effect* is larger than the other two coefficients, although the differences are statistically insignificant after $j = 1$. Considering the very low mean and standard deviation of *Net Other Nonoperating Assets Effect* (Panel D of Table 1), and the high standard errors of its estimated coefficient (as indicated by the relatively low t-statistics in Panel B of Table 5), this result is not noteworthy.

Evaluating the incremental information of the *RNOA* decomposition is more difficult due to its non-additive nature. To address this issue, I apply the natural log function to $RNOA_{t+j}$ and to the three component ratios, *Operating Profit Margin*$_t$, *Operating Asset Turnover*$_t$, and *Operations Funding Ratio*$_t$. To make the results easier to interpret, I use the negative of the log *Operations Funding Ratio*. These transformations convert the decomposition of *RNOA* into an additive one.[25] Panel C of Table 5 reports the results. The coefficients on all component ratios are positive and highly significant in each of the four regressions. However, the coefficient on *Operating Profit Margin* is significantly smaller than the other two, consistent with its lower persistence (see Panel E of Table 3). Interestingly, the coefficient on *Operations Funding Ratio* is significantly larger—

[25] Note that log (X*Y/Z) = log(X) + log(Y) - log(Z).

both economically and statistically—than that of *Operating Asset Turnover*, despite the slightly higher persistence of turnover (see Panel E of Table 3). This result is consistent with the positive correlation between operating liability leverage (which is inversely related to the operations funding ratio) and future operating profitability documented in Nissim and Penman (2003).[26]

6.4 Evaluating out-of-sample predictions

The results in Table 5 suggest that the three decompositions examined here—recurring verses transitory, operating versus nonoperating (including financing and other nonoperating), and profit margin versus asset turnover versus operations funding—provide useful information for predicting future profitability. However, these in-sample findings may not hold out of sample due to estimation error or to instability of the coefficients. Therefore, I next compare out-of-sample forecasts generated using the models of Table 5, which use component ratios, with models that use the decomposed ratio as the only predictor. Each year I estimate the models using all observations for which the dependent variable relates to that year or to one of the prior four years, and I apply the estimated coefficients to the current values of the ratios to generate forecasts of future profitability. These forecasts are then used to calculate forecast errors, which in turn are compared across the forecasting models. (For the *RNOA* model I first apply the exponential function to the log *RNOA* forecasts.)

Table 6 compares the forecasting models. As shown in Panel A, decomposing *ROE* into recurring and transitory components provides a substantial improvement in the accuracy of out-of-sample forecasts of future *ROE* throughout the error distribution, as is evident by the significant decreases in both the median and mean squared errors. Decomposing operating profitability into margin, turnover, and funding ratios provides an even larger improvement in the mean squared

[26] Note that since operating liability leverage (OLLev) = OL / NOA, *Operations Funding Ratio* = 1 / (1 + OLLev).

error but not in the median (Panel C), suggesting that this decomposition is particularly useful in reducing large errors. Finally, while the decomposition of *Recurring ROE* provides statistically significant improvement in the mean squared error (Panel B), the magnitude of the improvement is small. This later result is likely due to the relatively small difference in persistence between *RNOA* and *Financial leverage Effect* (Table 3).

Overall, the results indicate that decomposing profitability ratios leads to improvement in the accuracy of out-of-sample forecasts. For reasons discussed in the conclusion section, the forecasts generated here understate the usefulness of profitability decompositions. Still, even in the simple, linear, non-contextual analysis conducted here, the decompositions help improve forecast accuracy.

6.5 Evaluating the assumptions underlying the decomposition of operating profitability

Section 5 motivates the proposed decomposition of operating profitability on three grounds: (1) the decomposition is meaningful even when net operating assets is negative or small; (2) sales are likely to be more strongly related to operating assets than to net operating assets; and (3) operating liabilities are likely to be more strongly related to operating assets than to sales. The first advantage is straightforward. While only 2.2% of the observations that satisfy the sample selection criteria have negative net operating assets, the proportion increases to 10% when the size threshold is removed. In addition, many observations have small positive net operating assets (relative to the size of their operations), yielding "noisy" measures of operating profitability and net operating assets turnover. I next evaluate the other two premises.

Panel A of Table 7 reports the median and mean absolute percentage error when estimating sales based on operating assets, that is, as the product of operating assets (OA) and the median ratio of sales to operating assets. It also reports the median and mean absolute percentage error

when estimating sales based on net operating assets (NOA), and it compares the two sets of statistics. The median ratios of sales to operating assets and sales to net operating assets are calculated using either firms from the same industry-year (first row) or using the time-series of the firm (second row). The percentage error is calculated as the ratio of the difference between actual and estimated sales to actual sales. As shown, using operating assets instead of net operating assets leads to a large and statistically significant decrease in the magnitude of errors, both when evaluating the relationship within industry-year or over time. In each of the two analyses, the mean and median absolute percentage error decline by more than a quarter. These results confirm the hypothesis that sales are more strongly related to operating assets than to net operating assets, which in turn supports measuring turnover relative to operating assets rather than relative to net operating assets.

I next turn to evaluating the third motivation for the decomposition—namely, that operating liabilities are more strongly related to operating assets than to sales. Panel B of Table 7 reports the median and mean absolute sales-deflated error when estimating operating liabilities based on operating assets, that is, as the product of operating assets and the median ratio of operating liabilities to operating assets. It also reports the median and mean absolute percentage error when estimating operating liabilities as the product of sales and the median ratio of operating liabilities to sales, and it compares the two sets of statistics. The median ratios of operating liabilities to operating assets and to sales are calculated using either firms from the same industry-year (first row) or using the time-series of the firm (second row). The deflated error is the ratio of the difference between actual and estimated operating liabilities to sales. As shown, the improvement from using operating assets instead of sales to estimate operating liabilities is statistically and economically significant, both when evaluating the relationship within industry-

year and over time. In each of the two analyses, the absolute deflated error declines by about 10%. These finding confirm the hypothesis that operating liabilities are more strongly related to operating assets than to sales, giving further credence to the use of the *Operations Funding Ratio*.

7. Conclusion

This study suggests several modifications to the specification and implementation of profitability analysis. While some parts of the analysis are relevant only for a subset of firms (e.g., the analysis of noncontrolling interests or of other nonoperating assets such as equity method investments), two innovations are relevant for most firms: the method used to distinguish between recurring and transitory items (which is developed in Nissim 2022b and tested here), and the decomposition of operating profitability.

Removing transitory items from shareholders profitability (*ROE*) reduces the dispersion and skewness of the resulting profitability measure (*Recurring ROE*). In addition, *Recurring ROE* is substantially more persistent and less volatile than *ROE*, and decomposing *ROE* into its recurring and transitory components yields significant improvement in out-of-sample forecasts of *ROE*. Finally, *Transitory ROE* provides little if any information about future *ROE* incremental to *Recurring ROE*. This evidence demonstrates the effectiveness of the method used to estimate transitory income.

The study also describes a new approach for decomposing operating profitability. Like the standard decomposition of operating profitability, the method suggested here distinguishes between profit margin and turnover. However, unlike the standard approach, turnover is measured relative to operating assets, and a new driver—called operations funding ratio—is introduced: net operating assets (i.e., operating assets minus operating liabilities) divided by operating assets. The

empirical analysis shows that the operations funding ratio is remarkably stable over time, implying that when forecasting balance sheets one should first predict operating assets (generally based on revenue forecasts) and then forecast operating liabilities in relation to operating assets. Indeed, decomposing operating profitability (*RNOA*) into the three drivers results in substantial improvement in the accuracy of *RNOA* forecasts. In addition, the study provides direct evidence on the two premises underlying the decomposition: sales are more strongly related to operating assets than to net operating assets, and operating liabilities are more strongly related to operating assets than to sales.

While the empirical analysis demonstrates the usefulness of profitability decompositions for predicting future profitability, it likely understates their usefulness. For one reason, it uses linear regressions, while more sophisticated statistical analyses or machine learning methods may yield larger improvements (e.g., Binz et al. 2022). Secondly, the percentage improvement is calculated by comparing the magnitude of the error from the decomposition model to that of a model that uses the decomposed variable as the only predictor. If additional information is considered, the base estimation error is likely to be smaller, and thus the same reduction in forecast error would translate into a larger percentage improvement.[27] Thirdly, as Bernard and Stober (1989) noted: "it is possible that the links between detailed earnings components and valuation are so highly contextual that no parsimonious model would ever capture more than a small portion of the story" (p. 648). When implementing valuation, analysts incorporate additional information besides current and past ratios, and they do so in a contextual way. This study provides insights

[27] For example, several studies show that considering industry membership and life cycle stage improves predictions of operating profitability (e.g., Dickinson 2011, Vorst and Yohn 2018, and Anderson et al. 2023). In addition, the relationship between future and past profitability varies over the business cycle and under different economic conditions. Thus, considering macroeconomic, industry-specific, and firm-specific factors may yield a large decrease in the magnitude of base error.

for integrating information from profitability ratios and other sources. For example, it documents differences in time-series variability across ratios, which are relevant for (1) identifying components that require more attention when forecasting, (2) deciding the weight to assign to the most recent ratio versus past ratios and other information, and (3) gauging the likely accuracy of the forecasts. Unfortunately, demonstrating these benefits in a large-sample non-contextual analysis is difficult. Future research may use specific settings to provide more direct evidence.

Appendix A. Reformulated Balance Sheet (detailed version)

Assets	Liabilities and Equity
Operating assets *Assets related to operating revenue and/or to operating expenses* Required liquid funds Accounts receivable Inventory Other working capital assets (e.g., prepaid expenses, deferred costs) PP&E Right-of-use operating lease assets Goodwill and other intangible assets Other long-term operating assets	**Operating liabilities** *Liabilities related to operating revenue and/or to operating expenses* Accounts payable Accrued liabilities Deferred revenue Other working capital liabilities (e.g., income taxes payable) Deferred taxes Operating lease liabilities Other long-term operating liabilities
Financial assets *Financial instruments that (1) are not needed for operations, and (2) are relatively liquid and/or represent fixed (rather than residual) claims* Cash, cash equivalent & ST investments in excess of amounts needed for operations Long-term investments in marketable securities Illiquid fixed income instruments (other than operating receivables)	**Debt** *Borrowings from financial institutions & capital markets (including preferred stock and temporary equity)* Interest and dividends payable Short-term debt & current maturities of long-term debt Long-term debt (excluding conversion features) Temporary equity & preferred stock (excluding conversion features)
Other nonoperating assets *Illiquid assets that neither contribute to operating profit nor represent fixed claims* Equity method investments (investments in associates) Investments in unlisted equity securities Real estate not used in operations Assets of discontinued operations Net pension assets Some tax loss carryforwards Some litigation assets	**Other nonoperating liabilities** *Non-debt liabilities that do not affect operating profit* Pension and OPB net obligations Liabilities of discontinued operations Some litigation liabilities
	Equity Common stock Noncontrolling interest Contingent claims (options & warrants, conversion features)

Appendix B. Reformulated Income Statement (detailed version)

Operating revenue
Sales and other recurring revenue generated by activities whose costs are recognized in cost of revenue and operating expenses

Cost of revenue
The cost of products and services delivered in generating operating revenue

Operating expenses
Recurring operating expenses other than cost of revenue and income taxes
- Selling, general and administrative expenses
- R&D
- Operating expenses that are reported separately from SG&A and R&D (e.g., amortization is often reported separately)

Other recurring operating income
- Normalized quasi-recurring operating income (e.g., [-] recurring portion of restructuring charges)
- Interest and dividend income on required liquid funds
- Other (e.g., rental income derived from properties classified as operating assets)

Pretax operating profit

Tax on operating profit

Net operating profit after tax (NOPAT)

Net financial expense
- Interest expense
- Interest and dividend income (excluding interest income on required liquid funds)
- Income taxes on net interest expense
- Preferred dividends

Income from other nonoperating activities
- Recurring income from other nonoperating activities (e.g., equity method income, operating income from discontinued operations), net of tax

Recurring income

Transitory items
- Volatile nonoperating income (e.g., gain from selling investments)
- Transitory operating income (e.g., [-] losses from natural disasters or expropriation of assets)
- Abnormal portion of quasi-recurring operating income (e.g., [-] abnormal portion of restructuring charges)
- Income taxes on transitory pretax income (transitory pretax income = sum of above three components)
- Abnormal income taxes (e.g., impact of TCJA tax reform on the 2017 income tax expense)
- Income from discontinued operations (excluding operating income from discontinued operations if disclosed)

Net income after preferred dividends

Net income attributable to noncontrolling interest

Net income attributable to common equity

References

Amir, E., Kama, I. and Livnat, J., 2011. Conditional versus unconditional persistence of RNOA components: implications for valuation. *Review of Accounting Studies*, 16(2), 302-327.

Anderson, M., Hyun, S., Muslu, V. and Yu, D., 2023. Earnings prediction with DuPont components and calibration by life cycle. *Review of Accounting Studies*, pp.1-35.

Baños-Caballero, S., García-Teruel, P.J. and Martínez-Solano, P., 2014. Working capital management, corporate performance, and financial constraints. *Journal of Business Research*, 67(3), pp.332-338.

Barton, J., and P.J. Simko. 2002. The Balance Sheet as an Earnings Management Constraint. *The Accounting Review* 77: 1-27.

Bernard, V., and T. Stober, 1989. The Nature and Amount of Information Reflected in Cash Flows and Accruals. *The Accounting Review* 64 (4), 624-652.

Binz, O., Schipper, K. and Standridge, K., 2022. What Can Analysts Learn from Artificial Intelligence about Fundamental Analysis? *Available at SSRN 3745078*.

Burgstahler, D., Jiambalvo, J., and Shevlin, T. 2002. Do stock prices fully reflect the implications of special items for future earnings? *Journal of Accounting Research*, 40(3), 585–61.

Chen, Z., Harford, J. and Kamara, A., 2019. Operating Leverage, Profitability, and Capital Structure. *Journal of Financial and Quantitative Analysis*, *54*(1), pp.369-392.

Cready, W.M., Lopez, T.J. and Sisneros, C.A., 2012. Negative special items and future earnings: expense transfer or real improvements? *The Accounting Review*, *87*(4), pp.1165-1195.

Dechow, P., and Ge, W. 2006. The persistence of earnings and cash flows and the role of special items: Implications for the accrual anomaly. *Review of Accounting Studies*, 11, 253–296.

Dickinson, Victoria. 2011. Cash flow patterns as a proxy for firm life cycle. *The Accounting Review*, 86(6), 1969-1994.

Donelson, D.C., Kartapanis, A., McInnis, J. and Yust, C.G., 2021. Measuring accounting fraud and irregularities using public and private enforcement. *The Accounting Review*, *96*(6), pp.183-213.

Easton, P.D., McAnally, M.L., Sommers, G.A. and Zhang, X.J., 2018. *Financial statement analysis & valuation*, 5th Edition. Boston, MA: Cambridge Business Publishers.

Esplin, A., Hewitt, M., Plumlee, M. and Yohn, T.L., 2014. Disaggregating operating and financial activities: Implications for forecasts of profitability. *Review of Accounting Studies*, 19(1), 328-362.

Estridge, J., T.S. Harris, and Nissim, D., 2009. ModelWare's Approach to Intrinsic Value: Focusing on Risk-Reward Trade-offs. In *Equity Valuation: Models from Leading Investment Banks*, edited by Jan Viebig, Thorsten Poddig and Armin Varmaz, Part IV, 193-252, Wiley Publishing.

Fairfield, P.M., Kitching, K.A. and Tang, V.W., 2009. Are special items informative about future profit margins? *Review of Accounting Studies*, 14(2-3), 204-236.

Fairfield, P., Whisenant, J., and Yohn, T. 2003. Accrued earnings and growth: implications for future profitability and market mispricing. *The Accounting Review, 78*(1), 353–371.

Fairfield, P., and Yohn, T. 2001. Using asset turnover and profit margin to forecast changes in profitability. *Review of Accounting Studies, 6*(4), 371–385.

Fama, Eugene F, and Kenneth R French. 2000. Forecasting Profitability and Earnings. *The Journal of Business* 73 (2): 161–75.

Fama, E. F., and K. R. French. 2002. Testing Trade-Off and Pecking Order Predictions about Dividends and Debt. *Review of Financial Studies*, 15, 1–33.

Freeman, R.N., Ohlson, J.A. and Penman, S.H., 1982. Book rate-of-return and prediction of earnings changes: An empirical investigation. *Journal of Accounting Research*, pp.639-653.

Greene, W.H. 2012. *Econometric Analysis*, 7th edition. Prentice Hall, Upper Saddle River, NJ.

Iqbal, A., Rajgopal, S., Srivastava, A. and Zhao, R., 2021. Value of Internally Generated Intangible Capital. *Available at SSRN 3917998*.

Jackson, A.B., Plumlee, M.A. and Rountree, B.R., 2018. Decomposing the market, industry, and firm components of profitability: implications for forecasts of profitability. *Review of Accounting Studies*, 23(3), 1071-1095.

Jansen, I.P., Ramnath, S. and Yohn, T.L., 2012. A diagnostic for earnings management using changes in asset turnover and profit margin. *Contemporary Accounting Research*, 29(1), 221-251.

Klepper, S., 1996. Entry, exit, growth, and innovation over the product life cycle. *The American Economic Review*, pp.562-583.

Koller, T., Goedhart, M., and D. Wessels. 2020. *Valuation: Measuring and Managing the Value of Companies*, 7th Edition. Wiley Finance.

Konchitchki Y. and P.N. Patatoukas. 2014. Taking the Pulse of the Real Economy Using Financial Statement Analysis: Implications for Macro Forecasting and Stock Valuation. *The Accounting Review* 89:2, 669-694.

Lemmon, M. L., M. R. Roberts, and J. F. Zender. 2008. Back to the Beginning: Persistence and the Cross-Section of Corporate Capital Structure. *Journal of Finance*, 63, 1575–1608.

Li, M., Nissim, D., and Penman, S.H., 2014a. Profitability Decomposition and Operating Risk. Available at https://ssrn.com/abstract=3778720

Lundholm, R. and Sloan, R., 2019. *Equity valuation and analysis*, 5th Edition.

Nissim, D. 2021. Valuing minority interests. Columbia Business School. Available at https://ssrn.com/abstract=3472592.

Nissim, D., 2022a. Normal tax rate. Columbia Business School. Available at https://ssrn.com/abstract=4514622.

Nissim, D. 2022b. Reformulated financial statements. Columbia Business School. Available at https://ssrn.com/abstract=4064722.

Nissim, D., 2022c. Right-of-use assets. Columbia Business School. Available at https://ssrn.com/abstract=4512195.

Nissim, D., 2022d. Special items: Implications for forecasting. Columbia Business School. Available at https://ssrn.com/abstract=4076136.

Nissim, D. 2023. Earnings quality, fundamental analysis and valuation. Columbia Business School. Available at https://ssrn.com/abstract=3794378.

Nissim, D., and Penman, S. H. 2001. Ratio analysis and equity valuation: From research to practice. *Review of Accounting Studies, 6*, 109–154.

Nissim, D. and Penman, S.H., 2003. Financial statement analysis of leverage and how it informs about profitability and price-to-book ratios. *Review of Accounting Studies*, 8(4), 531-56.

Palepu, K.G., Healy, P.M., Wright, S., Bradbury, M. and Coulton, J., 2020. *Business analysis and valuation: Using financial statements*. Cengage AU.

Petersen, Mitchell A. 2009. Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. *Review of Financial Studies* 22 (1): 435-48.

Richardson, S.A., Sloan, R.G., Soliman, M.T. and Tuna, I., 2005. Accrual reliability, earnings persistence and stock prices. *Journal of Accounting and Economics*, 39(3), pp.437-485.

Schröder, D. and Yim, A., 2018. Industry effects in firm and segment profitability forecasting. *Contemporary Accounting Research*, *35*(4), pp.2106-213.

Selling, T.I. and Stickney, C.P., 1989. The effects of business environment and strategy on a firm's rate of return on assets. *Financial Analysts Journal*, *45*(1), pp.43-52.

Soliman, M. T. 2008. The use of DuPont analysis by market participants. *The Accounting Review, 83*, 823–853.

Vorst, P. and Yohn, T.L., 2018. Life cycle models and forecasting growth and profitability. *The Accounting Review*, *93*(6), pp.357-381.

Wahlen, J.M., Baginski, S.P. and Bradshaw, M., 2017. *Financial reporting, financial statement analysis and valuation: A strategic perspective*, 9th Edition. South-Western Cengage Learning.

Table 1
Distribution statistics

Panel A: Decomposition of *ROCE* (observations = 56,391)

	Mean	StdDev	P5	Q1	Median	Q3	P95
ROCE	6.10%	27.78%	-42.42%	-0.20%	9.31%	17.60%	39.37%
ROE	6.13%	27.73%	-42.22%	-0.13%	9.33%	17.59%	39.24%
NCI Leverage Effect	-0.02%	0.44%	-0.58%	0.00%	0.00%	0.00%	0.38%

Panel B: Decomposition of *NCI Leverage Effect* (observations = 17,491)

	Mean	StdDev	P5	Q1	Median	Q3	P95
NCI Leverage Effect	-0.06%	0.71%	-1.39%	-0.21%	0.00%	0.13%	1.11%
NCI Leverage	0.0365	0.0558	0.0004	0.0036	0.0133	0.0432	0.1624
NCI Spread	-3.34%	39.08%	-67.70%	-14.25%	-0.16%	11.91%	47.40%
ROE	9.36%	21.40%	-23.00%	3.20%	10.62%	17.98%	36.25%
Return on NCI	12.70%	36.35%	-31.12%	0.00%	8.33%	22.12%	69.11%

Panel C: Decomposition of *ROE* (observations = 57,796)

	Mean	StdDev	P5	Q1	Median	Q3	P95
ROE	6.70%	25.63%	-39.00%	-0.05%	9.45%	17.79%	39.44%
Recurring ROE	6.65%	23.28%	-32.35%	-0.31%	8.69%	16.67%	36.71%
Transitory ROE	0.04%	9.94%	-14.03%	-1.25%	0.08%	1.68%	13.47%

Panel D: Decomposition of *Recurring ROE* (observations = 55,336)

	Mean	StdDev	P5	Q1	Median	Q3	P95
Recurring ROE	6.36%	21.41%	-30.31%	-0.28%	8.50%	16.14%	34.05%
RNOA	7.66%	18.96%	-20.91%	1.83%	7.76%	14.47%	34.93%
Financial Leverage Effect	-1.37%	13.77%	-23.31%	-3.44%	-0.19%	2.72%	14.36%
Net Other Nonoperating Assets Effect	0.08%	1.19%	-1.38%	-0.02%	0.00%	0.08%	1.93%

Panel E: Decomposition of *RNOA* (observations = 60,187)

	Mean	StdDev	P5	Q1	Median	Q3	P95
RNOA	7.63%	20.01%	-23.02%	1.43%	7.71%	14.78%	36.92%
Operating Profit Margin	4.83%	13.37%	-16.27%	0.84%	4.92%	10.28%	24.14%
Operating Asset Turnover	1.1368	0.7227	0.2968	0.6458	0.9918	1.4237	2.5416
Operations Funding Ratio	64.05%	17.12%	29.83%	54.60%	67.34%	76.38%	86.62%

Panel F: Decomposition of *Financial Leverage Effect* (observations = 54,654)

	Mean	StdDev	P5	Q1	Median	Q3	P95
Financial Leverage Effect	-1.24%	14.06%	-23.79%	-3.46%	-0.09%	2.95%	15.35%
Financial Leverage	0.5307	1.0106	-0.5329	-0.0910	0.3066	0.8122	2.4726
Financial Spread	3.75%	20.63%	-27.61%	-3.64%	3.48%	11.47%	35.48%
RNOA	7.77%	19.27%	-20.98%	1.84%	7.81%	14.58%	35.65%
Net Borrowing Cost	4.02%	6.19%	-3.56%	0.85%	3.85%	6.12%	13.59%

Panel G: Decomposition of *Net Other Nonoperating Assets Effect* (observations = 29,860)

	Mean	StdDev	P5	Q1	Median	Q3	P95
Net Other Nonoperating Assets Effect	0.13%	1.49%	-2.09%	-0.27%	0.02%	0.47%	2.67%
Relative size of Net Other Nonop. Assets	0.0052	0.1092	-0.1673	-0.0299	0.0007	0.0379	0.1963
Excess prof. of Net Other Nonop. Assets	-3.99%	34.10%	-54.29%	-14.74%	-4.22%	7.00%	45.35%
Return on Net Other Nonoper. Assets	4.52%	31.76%	-38.59%	-1.64%	3.17%	11.78%	49.55%
RNOA	8.51%	14.64%	-11.70%	3.26%	8.11%	13.98%	29.36%

The sample consists of annual observations for non-financial/REIT/utility firms during the period 2001 through 2022, with sales of at least $100MM in December 2022 prices. Data for each panel includes only observations with non-missing values for each of the variables in the panel. All ratios are defined in Sections 4 and 5 and are calculated using reformulated financial statements constructed as described in Nissim (2022b).

Table 2
Correlation coefficients

		V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20
V1	*ROCE*		1.0	.17	.07	.45	.21	.89	.30	.82	.33	.09	.68	.19	-.07	.02	.72	-.07	-.05	-.36	.08
V2	*ROE*	.99		.15	.07	.42	.25	.89	.30	.82	.34	.09	.68	.19	-.07	.03	.72	-.07	-.05	-.36	.08
V3	*NCI Leverage Effect*	.12	.10		-.03	.82	-.52	.12	.08	.10	.08	.00	.09	.03	-.01	.00	.09	-.02	-.01	-.07	-.01
V4	*NCI leverage*	.03	.04	-.07		-.05	.08	.08	-.02	.05	.09	.05	.11	-.12	.03	.15	.02	.11	.13	.01	.03
V5	*NCI spread*	.41	.41	.43	.00		-.63	.33	.20	.29	.23	.00	.24	.07	-.03	.00	.27	-.06	-.02	-.16	.00
V6	*Return on NCI*	.13	.16	-.30	-.01	-.70		.27	.03	.25	.14	.06	.20	.08	-.03	.01	.21	-.01	-.03	-.05	.09
V7	*Recurring ROE*	.84	.84	.07	.04	.30	.17		.03	.91	.40	.10	.77	.19	-.06	.02	.80	-.09	-.05	-.40	.09
V8	*Transitory ROE*	.37	.37	.07	-.01	.18	.02	.02		.03	.00	.02	.01	.04	-.02	-.01	.03	.00	-.02	-.03	-.01
V9	*RNOA*	.62	.63	.04	.02	.21	.17	.73	.03		.14	.03	.80	.24	-.12	-.17	.88	-.17	-.03	-.49	.07
V10	*Financial Leverage Effect*	.35	.35	.05	.03	.21	.07	.45	.02	-.13		.08	.21	-.03	.07	.26	.11	.00	-.03	-.10	.05
V11	*Net Other Nonoperating Assets Effect*	.06	.06	.01	.01	.01	.03	.07	.02	-.01	.04		.01	.03	.00	.06	.02	.01	-.21	.10	.10
V12	*Operating Profit Margin*	.55	.55	.04	.05	.15	.16	.64	.02	.69	.08	-.02		-.20	.22	.02	.70	-.07	.02	-.38	.06
V13	*Operating Asset Turnover*	.13	.13	.02	-.08	.03	.06	.13	.04	.17	-.03	.00	-.07		-.41	-.25	.24	-.16	-.09	-.12	.02
V14	*Operations Funding Ratio*	.00	.00	-.01	.03	-.03	.00	.02	-.01	-.06	.07	.00	.18	-.32		.29	-.10	.12	.02	.09	.02
V15	*Financial leverage*	-.01	-.01	.00	.09	-.02	.00	-.02	.00	-.10	.04	.05	.03	-.16	.25		-.26	.57	-.01	.11	.03
V16	*Financial spread*	.54	.54	.03	.01	.18	.13	.63	.03	.86	-.13	-.01	.59	.16	-.05	-.14		-.44	-.03	-.43	.06
V17	*Net Borrowing Cost*	-.06	-.06	-.01	.05	-.04	.00	-.07	-.01	-.09	-.06	.01	-.03	-.08	.08	.26	-.33		.01	.10	.02
V18	*Relative size of Net Other Nonoperating Assets*	-.03	-.03	-.02	.09	-.02	-.02	-.03	-.01	-.01	-.03	-.14	.02	-.05	.01	.00	-.01	.02		.09	.05
V19	*Excess profit. of Net Other Nonop. Assets*	-.19	-.19	-.03	.02	-.08	-.01	-.23	.00	-.36	.02	.10	-.24	-.06	.06	.06	-.33	.04	.04		.72
V20	*Return on Net Other Nonoperating Assets*	.06	.06	.00	.02	.00	.06	.07	.01	.05	.03	.09	.06	.01	.01	.02	.04	.00	.03	.81	

The table presents time-series means of cross-sectional correlation coefficients (Spearman above the diagonal, Pearson below). The sample consists of annual observations for non-financial/REIT/utility firms during the period 2001 through 2022, with sales of at least $100MM in December 2022 prices. All ratios are defined in Sections 4 and 5 and are calculated using reformulated financial statements constructed as described in Nissim (2022b).

Table 3
Persistence coefficients from regressions of X_{t+j} on X_t

Panel A: Decomposition of *ROCE*

	j = 1	j = 2	j = 3	j = 4	j = 5	j = 6	j = 7
ROCE	0.553	0.386	0.321	0.278	0.233	0.217	0.197
ROE	0.554	0.387	0.321	0.278	0.233	0.217	0.197
NCI Leverage Effect	0.486	0.323	0.26	0.197	0.167	0.144	0.119
Observations	48,479	42,771	37,980	33,760	30,059	26,751	23,834

Panel B: Decomposition of *NCI Leverage Effect*

	j = 1	j = 2	j = 3	j = 4	j = 5	j = 6	j = 7
NCI Leverage Effect	0.500	0.367	0.301	0.228	0.193	0.163	0.139
NCI Leverage	0.916	0.825	0.751	0.691	0.671	0.644	0.627
NCI Spread	0.495	0.359	0.3	0.258	0.233	0.196	0.181
ROE	0.548	0.412	0.353	0.318	0.254	0.23	0.214
Return on NCI	0.504	0.369	0.305	0.262	0.238	0.191	0.182
Observations	13,947	11,744	10,092	8,776	7,685	6,758	5,967

Panel C: Decomposition of ROE

	j = 1	j = 2	j = 3	j = 4	j = 5	j = 6	j = 7
ROE	0.626	0.443	0.376	0.347	0.287	0.260	0.256
Recurring ROE	0.764	0.596	0.519	0.465	0.397	0.349	0.328
Transitory ROE	0.146	0.054	0.010	0.008	-0.016	0.009	0.000
Observations	49,923	44,210	39,337	34,973	31,131	27,751	24,716

Panel D: Decomposition of *Recurring ROE*

	j = 1	j = 2	j = 3	j = 4	j = 5	j = 6	j = 7
Recurring ROE	0.763	0.590	0.500	0.441	0.375	0.330	0.299
RNOA	0.748	0.588	0.499	0.434	0.376	0.333	0.303
Financial Leverage Effect	0.675	0.491	0.388	0.335	0.271	0.246	0.222
Net Other Nonoperating Assets Effect	0.560	0.375	0.286	0.238	0.193	0.186	0.179
Observations	47,619	41,971	37,298	33,150	29,484	26,240	23,368

Panel E: Decomposition of *RNOA*

	j = 1	j = 2	j = 3	j = 4	j = 5	j = 6	j = 7
RNOA	0.741	0.594	0.506	0.443	0.379	0.341	0.315
Operating Profit Margin	0.723	0.569	0.513	0.461	0.388	0.349	0.329
Operating Asset Turnover	0.946	0.900	0.870	0.840	0.810	0.784	0.761
Operations Funding Ratio	0.955	0.896	0.851	0.815	0.785	0.762	0.743
Observations	52,674	46,787	41,760	37,201	33,176	29,586	26,376

Panel F: Decomposition of *Financial Leverage Effect*

	j = 1	j = 2	j = 3	j = 4	j = 5	j = 6	j = 7
Financial Leverage Effect	0.689	0.502	0.403	0.348	0.283	0.258	0.236
Financial Leverage	0.922	0.816	0.737	0.679	0.631	0.593	0.569
Financial Spread	0.736	0.577	0.492	0.429	0.374	0.339	0.306
RNOA	0.745	0.588	0.500	0.434	0.377	0.337	0.302
Net Borrowing Cost	0.487	0.309	0.244	0.206	0.184	0.170	0.168
Observations	46,382	40,860	36,289	32,263	28,703	25,561	22,788

Panel G: Decomposition of *Net Other Nonoperating Assets Effect*

	j = 1	j = 2	j = 3	j = 4	j = 5	j = 6	j = 7
Net Other Nonoperating Assets Effect	0.578	0.401	0.301	0.242	0.192	0.194	0.184
Relative size of Net Other Nonop. Assets	0.913	0.791	0.719	0.647	0.586	0.529	0.487
Excess prof. of Net Other Nonop. Assets	0.367	0.206	0.160	0.138	0.105	0.102	0.093
Return on Net Other Nonoper. Assets	0.316	0.162	0.120	0.105	0.073	0.069	0.065
RNOA	0.754	0.573	0.484	0.416	0.339	0.288	0.273
Observations	24,814	21,564	19,043	16,935	15,088	13,475	12,050

The table presents slope coefficients from regressions of each variable on its value t years ago, for j = 1, …, 7. The sample consists of annual observations for non-financial/REIT/utility firms during the period 2001 through 2022, with sales of at least $100MM in December 2022 prices. All ratios are defined in Sections 4 and 5 and are calculated using reformulated financial statements constructed as described in Nissim (2022b).

Table 4
Coefficients of variation

Panel A: Decomposition of *ROCE* (observations = 15,774)

	Mean	StdDev	P5	Q1	Median	Q3	P95
ROCE	1.800	3.015	0.140	0.343	0.711	1.802	7.547
ROE	1.790	3.026	0.140	0.340	0.701	1.787	7.559
NCI Leverage Effect	2.735	3.307	0.455	1.092	1.825	2.828	9.051

Panel B: Decomposition of *NCI Leverage Effect* (observations = 7,861)

	Mean	StdDev	P5	Q1	Median	Q3	P95
NCI Leverage Effect	2.562	3.445	0.364	0.831	1.419	2.633	9.235
NCI Leverage	0.560	0.438	0.080	0.237	0.448	0.774	1.410
NCI Spread	2.651	3.831	0.355	0.778	1.357	2.715	9.992
ROE	1.604	2.947	0.131	0.316	0.609	1.453	6.781
Return on NCI	1.546	2.199	0.174	0.425	0.819	1.654	5.711

Panel C: Decomposition of *ROE* (observations = 32,790)

	Mean	StdDev	P5	Q1	Median	Q3	P95
ROE	1.847	3.069	0.144	0.358	0.764	1.881	7.493
Recurring ROE	1.301	2.078	0.116	0.287	0.586	1.337	5.057
Transitory ROE	5.815	8.054	0.893	1.841	2.982	5.895	21.523

Panel D: Decomposition of *Recurring ROE* (observations = 30,327)

	Mean	StdDev	P5	Q1	Median	Q3	P95
Recurring ROE	1.298	2.105	0.115	0.283	0.581	1.325	5.080
RNOA	1.057	1.621	0.115	0.263	0.505	1.078	4.098
Financial Leverage Effect	1.949	2.740	0.258	0.600	1.067	1.991	6.979
Net Other Nonoperating Assets Effect	3.240	4.310	0.392	1.064	1.861	3.279	11.814

Panel E: Decomposition of *RNOA* (observations = 35,559)

	Mean	StdDev	P5	Q1	Median	Q3	P95
RNOA	1.059	1.574	0.118	0.271	0.527	1.117	3.956
Operating Profit Margin	1.054	1.700	0.081	0.206	0.454	1.101	4.200
Operating Asset Turnover	0.152	0.101	0.042	0.080	0.124	0.195	0.355
Operations Funding Ratio	0.079	0.088	0.013	0.029	0.051	0.093	0.247

Panel F: Decomposition of *Financial Leverage Effect* (observations = 28,538)

	Mean	StdDev	P5	Q1	Median	Q3	P95
Financial Leverage Effect	1.873	2.627	0.254	0.583	1.040	1.940	6.528
Financial Leverage	0.767	1.030	0.110	0.251	0.439	0.805	2.668
Financial Spread	1.791	2.678	0.165	0.437	0.881	1.886	6.748
RNOA	1.087	1.676	0.114	0.261	0.505	1.095	4.284
Net Borrowing Cost	1.068	1.677	0.106	0.218	0.423	1.162	4.250

Panel G: Decomposition of *Net Other Nonoperating Assets Effect* (observations = 15,048)

	Mean	StdDev	P5	Q1	Median	Q3	P95
Net Other Nonoperating Assets Effect	2.684	3.992	0.303	0.752	1.395	2.725	9.988
Relative size of Net Other Nonop. Assets	0.906	1.104	0.131	0.294	0.526	1.030	3.126
Excess prof. of Net Other Nonop. Assets	2.988	4.597	0.291	0.738	1.453	3.021	11.665
Return on Net Other Nonoper. Assets	2.830	4.158	0.256	0.726	1.464	2.899	10.928
RNOA	0.956	1.572	0.105	0.232	0.436	0.927	3.742

The table presents statistics from the pooled distribution (across firms and years) of the coefficients of variation of each of the profitability ratios. The coefficient of variation is calculated by dividing the firm-specific standard deviation of the profitability ratio over the last seven years by the absolute value of the mean over the last seven years (a minimum of five non-missing values is required). The sample consists of annual observations for non-financial/REIT/utility firms during the period 2001 through 2022, with sales of at least $100MM in December 2022 prices. Data for each panel includes only observations with non-missing values for each of the variables in the panel. All ratios are defined in Sections 4 and 5 and are calculated using reformulated financial statements constructed as described in Nissim (2022b).

Table 5
Regressions evaluating the informativeness of profitability decompositions

Panel A: Shareholders' profitability (ROE_{t+j})

	j = 1	j = 3	j = 5	j = 7
Intercept	0.008	0.037	0.051	0.059
	1.0	4.0	6.3	6.0
Recurring ROE$_t$ (1)	0.731	0.468	0.359	0.288
	30.3	16.0	19.8	14.3
Transitory ROE$_t$ (2)	0.247	0.063	0.037	0.061
	7.8	1.5	1.7	2.2
(1)-(2)	0.483	0.405	0.322	0.228
	12.1	9.0	9.9	8.9
Average R-squared	0.345	0.129	0.072	0.046
Average observations	2,411	2,102	1,861	1,675

Panel B: Recurring profitability ($Recurring\ ROE_{t+j}$)

	j = 1	j = 3	j = 5	j = 7
Intercept	0.004	0.022	0.035	0.044
	0.7	3.9	6.0	7.3
RNOA$_t$ (1)	0.811	0.577	0.452	0.348
	55.0	26.5	14.8	21.3
Financial Leverage Effect$_t$ (2)	0.722	0.428	0.339	0.239
	36.9	29.5	11.2	12.0
Net Other Nonoperating Assets Effect$_t$ (3)	1.044	0.674	0.491	0.550
	11.9	3.2	2.5	1.8
(1)-(2)	0.089	0.149	0.152	0.109
	11.2	10.6	10.6	6.1
(1)-(3)	-0.233	-0.097	-0.039	-0.202
	-2.8	-0.5	-0.2	-0.7
(2)-(3)	-0.322	-0.246	-0.191	-0.311
	-3.8	-1.2	-0.9	-1.0
Average R-squared	0.516	0.22	0.128	0.077
Average observations	2,319	2,026	1,797	1,619

Panel C: Operating profitability ($Ln\ of\ RNOA_{t+j}$)

	j = 1	j = 3	j = 5	j = 7
Intercept	-0.868	-1.395	-1.660	-1.830
	-25.0	-26.6	-28.8	-51.8
Ln of Operating Profit Margin$_t$ (1)	0.675	0.463	0.365	0.313
	46.3	20.5	15.6	28.7
Ln of Operating Asset Turnover$_t$ (2)	0.733	0.533	0.434	0.379
	73.6	20.9	11.9	15.6
Negative of Ln of Operations Funding Ratio$_t$ (3)	0.937	0.791	0.727	0.712
	53.8	42.3	32.5	23.8
(1)-(2)	-0.058	-0.070	-0.070	-0.065
	-6.9	-6.5	-4.0	-2.6
(1)-(3)	-0.262	-0.329	-0.362	-0.399
	-11.3	-20.6	-22.3	-14.9
(2)-(3)	-0.203	-0.258	-0.292	-0.334
	-10.6	-14.1	-10.4	-7.7
Average R-squared	0.539	0.284	0.191	0.152
Average observations	1,878	1,620	1,436	1,301

The table presents the times-series means and t-statistics of coefficients estimated using cross-sectional (annual) regressions. The t-statistics are calculated using Heteroscedasticity and Autocorrelation Consistent standard errors with two lags (see Greene (2012), page 960, concerning the selection of number of lags). The sample consists of annual observations for non-financial/REIT/utility firms during the period 2001 through 2022, with sales of at least $100MM in December 2022 prices. All ratios are defined in Sections 4 and 5 and are calculated using reformulated financial statements constructed as described in Nissim (2022b).

Table 6
Out-of-sample predictability

Panel A: Shareholders' profitability (ROE_{t+j})

	Median squared error			Mean squared error				
	No decomp.	With decomp.	%Δ	No decomp.	With decomp.	%Δ	t-stat	Obs.
Future year j = 1	0.0045	0.0038	-16.5%	0.0516	0.0493	-4.6%	-5.0	37,220
Future year j = 3	0.0064	0.0060	-7.2%	0.0597	0.0583	-2.4%	-7.1	24,090
Future year j = 5	0.0077	0.0074	-4.2%	0.0678	0.0666	-1.8%	-4.9	13,899
Future year j = 7	0.0090	0.0090	0.2%	0.0754	0.0749	-0.6%	-1.8	6,074

Panel B: Recurring profitability ($Recurring\ ROE_{t+j}$)

	Median squared error			Mean squared error				
	No decomp.	With decomp.	%Δ	No decomp.	With decomp.	%Δ	t-stat	Obs.
Future year j = 1	0.0021	0.0020	-1.5%	0.0247	0.0246	-0.6%	-2.6	35,697
Future year j = 3	0.0044	0.0044	0.5%	0.0376	0.0373	-0.9%	-3.7	23,119
Future year j = 5	0.0059	0.0060	2.7%	0.0457	0.0455	-0.5%	-2.0	13,376
Future year j = 7	0.0075	0.0077	2.0%	0.0539	0.0540	0.2%	0.5	5,843

Panel C: Operating profitability ($RNOA_{t+j}$)

	Median squared error			Mean squared error				
	No decomp.	With decomp.	%Δ	No decomp.	With decomp.	%Δ	t-stat	Obs.
Future year j = 1	0.0007	0.0007	3.5%	0.0375	0.0345	-8.0%	-2.9	28,878
Future year j = 3	0.0014	0.0014	1.7%	0.0615	0.0589	-4.3%	-3.1	18,619
Future year j = 5	0.0018	0.0018	-2.1%	0.0698	0.0671	-3.8%	-2.5	10,893
Future year j = 7	0.0022	0.0023	1.4%	0.0479	0.0456	-4.9%	-2.7	4,742

The sample consists of annual observations for non-financial/REIT/utility firms during the period 2001 through 2022, with sales of at least $100MM in December 2022 prices. All ratios are defined in Sections 4 and 5 and are calculated using reformulated financial statements constructed as described in Nissim (2022b). The t-statistics are calculated using two-ways (firm and year) clustered standard errors (Petersen 2009).

Table 7
Evaluating the assumptions underlying the decomposition of operating profitability

Panel A: Comparison of the strength of the relationship of sales with operating assets (OA) versus with net operating assets (NOA)

	Median absolute % error			Mean absolute % error				
	NOA	OA	%Δ	NOA	OA	%Δ	t-stat	Obs.
Industry-year analysis	34.4%	25.7%	-25.2%	52.7%	39.5%	-25.1%	-30.4	64,246
Firm-specific analysis	14.3%	10.3%	-27.9%	25.4%	18.1%	-28.6%	-18.0	63,526

Panel B: Comparison of the strength of the relationship of operating liabilities with operating assets (OA) versus with sales

	Median absolute deflated error			Mean absolute deflated error				
	Sales	OA	%Δ	Sales	OA	%Δ	t-stat	Obs.
Industry-year analysis	0.097	0.085	-13.2%	0.158	0.147	-6.6%	-4.8	65,030
Firm-specific analysis	0.037	0.034	-9.6%	0.078	0.070	-9.5%	-6.5	64,318

Panel A reports the median and mean absolute percentage error when estimating sales based on operating assets (that is, as the product of operating assets and the median ratio of sales to operating assets). It also reports the median and mean absolute percentage error when estimating sales based on net operating assets, and it compares the two metrics. The median ratios of sales to operating assets and to net operating assets are calculated using either firms from the same industry-year (first row) or using the time-series of the firm (second row). The percentage error is calculated as the ratio of the difference between actual and estimated sales to actual sales. Panel B reports the median and mean absolute sales-deflated error when estimating operating liabilities based on operating assets (that is, as the product of operating assets and the median ratio of operating liabilities to operating assets). It also reports the median and mean absolute percentage error when estimating operating liabilities based on sales (that is, as the product of sales and the median ratio of operating liabilities to sales), and it compares the two metrics. The median ratios of operating liabilities to operating assets and to sales are calculated using either firms from the same industry-year (first row) or using the time-series of the firm (second row). The deflated error is the ratio of the difference between actual and estimated operating liabilities to sales. The sample consists of annual observations for non-financial/REIT/utility firms during the period 2001 through 2022, with sales of at least $100MM in December 2022 prices. Observations belonging to industry-year (firm) with only one observation are excluded from industry-year (firm-specific) analysis. Operating assets and liabilities are measured as described in Nissim (2022b). The t-statistics are calculated using two-ways (firm and year) clustered standard errors (Petersen 2009).