**The New ROME: Teaching DuPont Analysis in an Intangible World**

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**ABSTRACT**

*The traditional ROE and the accompanying DuPont analysis provide a measure of return for investors and a means to explain changes in profitability, respectively. We demonstrate that the traditional DuPont components of ROE, profit margin, asset turnover, and financial leverage omit a crucial piece of firm’s ability to generate profit: intangible assets. Because of technology and a variety of other reasons, firms’ assets are becoming increasing more intangible. We propose a new measure of profitability, Return on Market Equity (ROME), which should be more relevant to analysts and investors, and should make understanding investor returns more meaningful for students in the classroom. This measure incorporates a fourth component to the DuPont analysis, Book to Market Equity, a proxy for a firm’s level of intangible assets which are valued by the market, but may not appear on corporate balance sheets. We illustrate how the ROME is a more effective measure of profitability for a number of firms and industry sectors.*

**INTRODUCTION**

Since the 1920s, firms and analysts have been using the DuPont analysis which decomposes a firm’s Return on Equity (ROE) into key components: profit margin measuring profitability, asset turnover assessing operational efficiency, and the equity multiplier indicating financial leverage. However, the U.S. economy has changed tremendously since the industrial 1920s. In the current technological business environment, many firms have more intangible assets which are crucial to generating sales and profits. The ROE we currently teach in finance classes fails to incorporate these assets which are typically valued in the market, but not on corporate balance sheets. This traditional DuPont analysis also does not reflect other classroom teaching that finance students should focus on market values versus book values.

However the U.S. economy has changed tremendously since the industrial 1920s. In the current technological business environment, many firms have more intangible assets which are crucial to generating sales and profits. The ROE we currently teach in finance classes fails to incorporate these assets which are typically valued in the market, but not on corporate balance sheets. This traditional DuPont analysis also does not reflect other classroom teaching that finance students should focus on market values versus book values

To correct these issues, we propose a new measure of profitability: Return on Market Equity (ROME), the ratio of net income to market equity rather than book equity. This new measure explicitly accounts for the valuable intangible assets that add to a firm’s bottom line. The DuPont Analysis can easily be extended to the ROME measure by adding a fourth component, a firm’s book-to-market ratio. The intuition behind the use of market value of equity in the denominator of the book-to-market ratio is that the market more efficiently incorporates information about a firm’s future earnings potential arising due to intangibles that do not necessarily appear on accounting books, such as new patents or approvals for drug firms, the hiring of a top CEO, or a technological advancement. Consequently, the book-to-market ratio is often used in financial literature as a proxy for the growth opportunities of a firm, since it reflects valuable information that may not be incorporated in financial statements.

The literature has acknowledged for a long time that intangible assets are an important component of a firm that can be overlooked by investors and traditional performance measures. Chan, Lakonsihok, and Sougiannis (2001) find companies with a large amount of intangible assets earn large excess returns. Barth, Kasznik, and McNichols (2001) find that firms with a large amount of intangible assets experience more analyst coverage than other firms. More recently, Elbannan (2013) highlights the importance of valuing intangible assets as we have seen the rise in their use by firms in recent years; he confirms that analysts continue to have incentive to follow firms with higher intangible assets. Daniel and Titman (2006) find that future performance of stock returns depends heavily on the “intangible” return component; further more they find that the book-to-market ratio forecasts future returns well because it is a good proxy for the intangible return. These findings provide ample motivation as to why the book-to-market ratio should be included in the DuPont Analysis, and is our proxy for intangible assets. A meaningful DuPont analysis that hopes to provide analysts and investors with important information about a firm’s future performance is thus missing a crucial component for firms with high levels of intangible assets.

Extant literature also recognizes the limitations of the existing measure of ROE and the current DuPont Analysis. Sur, Mitra, and Maji (2014) propose adding two additional components to the existing DuPont formula to capture the impact of additional firm characteristic important to accountant, namely the interest burden ratio and the tax burden ratio. Chang, Chichernea, and HassabElnaby (2014) find that the informativeness of the DuPont components about future profitability is reduced in the healthcare setting. Since the healthcare industry is one with a notoriously large amount of intangible assets, their findings provide additional evidence of the need to incorporate intangible assets into performance measures and the DuPont Analysis.

In addition to academic papers which find a weak link between ROE and current stock prices, the financial media has also noted that ROE is not a good predictor of future stock prices. A 2013 Forbes article identifies that ROE is only a good measure of future profitability for firms in the top and bottom quintiles when firms are sorted by ROE, meaning that for the majority of firms in the middle quintiles, there was no direct correlation between ROE and stock performance.1 The article elaborates that one of the limitations of ROE is that it lacks comparability across industries, which is why we examine the differences in ROE and the new ROME across industries. A 2010 Harvard Business Review Case also notes the potential pitfalls of ROE noting that companies manipulate accounting values to artificially maintain a healthy ROE and hide performance issues in business fundamentals. The case also points out a firm can employ leverage and stock buybacks funded through accumulated cash to help to maintain a company’s ROE in spite of decreasing operational profitability.2

To fully examine the merits of our new measure, we present the following in the remainder of this paper. First we provide a detailed description of the new measure decomposed via DuPont Analysis and discuss the importance of the addition of the book-to-market ratio. Next we illustrate the differences between ROE and the new ROME and the importance of this model through illustrations of traditional ROE and the new ROME measure for a few select firms. Finally we evaluate the differences between ROE and ROME for a variety of industries.

**THE NEW ROME**

ROE is designed to measure how well a firm can utilize its investments to generate earnings. The numerator of this ratio contains net income, and the denominator is the book value for stockholders’ equity of the firm. However as finance academics and practitioners, we know market value of equity, the product of current market share price and shares outstanding, matters more to investors than accounting book value. Given this knowledge we propose a new measure, Return on Market Equity (ROME), which has the market value of equity in the denominator instead of book value of equity. This ROME measure ties more closely to what we teach in finance classes: that market value matters more than book value.

The traditional DuPont Analysis decomposes ROE into Profit Margin, Asset Turnover and Financial Leverage:

$ROE = \frac{Net Income}{Sales} x \frac{Sales}{Assets} x \frac{Assets}{Book Equity}$ (1)

Most past studies by researchers and analysts extend the traditional DuPont ROE Analysis by adding additional ratios to focus on specific areas of company or industry performance. For example, the following five-step extended DuPont version further decomposes Profit Margin into Tax Burden (the ratio of Net Income to Earnings before Taxes), Interest Burden (defined as the ratio of Earning Before Taxes to Earnings before Interest and Taxes), and Operating Income Margin (the ratio of EBIT to Sales):

$ROE = \frac{Net Income}{EBT} x \frac{EBT}{EBIT} x \frac{EBIT}{Sales} x \frac{Sales}{Assets} x \frac{Assets}{Book Equity}$ (2)

We instead propose extending the ROE definition itself to better reflect the dramatic changes in the U.S. and global economy, and instead propose using ROME which indicates actual return to stockholders. The DuPont Analysis can be applied to this new measure by adding the component of the firm’s book-to-market ratio.

$ROME = ROE x \frac{Book Equity}{Market Equity}=\frac{Net Income}{Sales} x \frac{Sales}{Assets} x \frac{Assets}{Book Equity} x \frac{Book Equity}{Market Equity}$ (3)

As the decomposition of ROME in Figure 1 shows, this measure highlights that significant differences in returns to stockholders may arise when using the accounting calculation of equity instead of actual market values.

**Figure 1: DuPont Decomposition of The New ROME**

The book-to-market ratio is often used to proxy for intangible assets and growth opportunities: two things that the market may value differently from accounting statements which can lead to material difference between market values and book values and hence the ratio. A low book-to-market ratio implies a high number of intangible assets and/or growth opportunities. Figure 2 shows that book-to-market ratios for U.S. firms have reduced dramatically over time.

**Figure 2: Book to Market Ratio**

*Ratios of Book Value of Common Equity (BE) to Market Value of Market Equity (ME) breakpoints are computed at the end of each June. The BE used in June of year t is the book equity for the last fiscal year end in t-1. ME is price times shares outstanding at the end of December of t-1. The breakpoints for year t use all NYSE stocks for which we have ME for December of t-1 and (positive) BE for the last fiscal year end in t-1 Data for the 50th, 25th, and 5th percentile breakpoints presented. All data is obtained from Kenneth French’s website.*

Falato, Kadyrzhanova, and Sim (2014) find that this decrease in book-to-market ratios corresponds with the documented rise in intangible assets. Consequently, we argue that ROE is omitting a very important component of a firm’s ability to generate revenues, intangible assets. Even though balance sheets may not reflect the value, the market recognizes the importance of intangible assets like patents, trademarks, internet domain names, customer lists, software and trade secrets, and incorporates news and information about these intangible assets into the stock’s market price in the current increasingly service-oriented economy. Consider for example a biotech company that decides to increase investments on research and development (R&D) to cultivate new patented drugs, and on advertising and marketing (A&M) to build the brand value of its drugs portfolio. Under US GAAP, net income would be reduced correspondingly, but the company’s assets would not reflect the increased value in its drugs portfolio of assets. However, when we use the market value of equity in the denominator to calculate ROME, we reflect more accurately the return to investors on a firm’s investments in all assets.

Another reason for the disparity between ROE and actual return to shareholders is the growing use of stock buybacks; stock buybacks reduce book value of common equity which in turn raises ROE for most firms. But, given the accounting treatment of treasury stock, this may dramatically lower the book value of common equity. For some firms, it may even force the book value of common equity to a negative value.

These issues with calculating a more meaningful return to stockholders are mitigated when using ROME. As Golec and Gupta (2014) show, the market value of common equity should reflect the impact of increased investments in R&D or A&M through an implicit increase in the value of the company’s drug portfolio or increased brand value creation efforts. Also, the market value of common equity immediately accounts for the common shares outstanding after a stock buyback, providing a more meaningful number for stockholder investment.

**ILLUSTRATION OF THE NEW ROME**

The issues with a traditional DuPont Analysis, and using ROE to screen for stocks, are apparent when looking at even large companies such as Wal-Mart, Apple, Pfizer, Citigroup, and Chevron. In Table 1, we present a comparison of ROME and ROE for these firms.

**Table 1: ROME versus ROE for some select firms**

*Return on Market Equity (ROME) is defined as the ratio of Net Income from Continuing Operations to Market Value of Common Equity, Return on Equity (ROE) is defined as the ratio of Net Income from Continuing Operations to Average Total Common Equity, and Book to Market (B/M) is the ratio of Average Total Common Equity and Market Value of Common Equity. Data for fiscal year 2015 is obtained in FactSet for Apple, Chevron, Citigroup, Pfizer, and Wal-Mart.*

|  |  |  |
| --- | --- | --- |
|  |  |  |
|   | ROME = | ROE x | B/M |
| Apple (Ticker: AAPL) | 7.96% | 46.25% | 0.172 |
| Chevron (Ticker: CVX) | 2.69% | 2.98% | 0.901 |
| Citigroup (Ticker: C) | 10.53% | 7.90% | 1.333 |
| Pfizer (Ticker: PFE) | 3.32% | 10.22% | 0.325 |
| Wal-Mart (Ticker: WMT) | 6.95% | 18.15% | 0.383 |

For firms with low book-to-market ratios such as Wal-Mart, Apple, and Pfizer, though ROE is high, the actual return to stockholders is dramatically lower. These firms each have at least one prominent source of intangible assets. Walmart has a large amount of A&M which has created and maintained brand loyalty; Apple has a vast portfolio of intangible assets spanning patents, software, intellectual capital, among others; and Pfizer is a classic example from the healthcare industry that has high intangibles throughout the R&D pipeline. For Citigroup on the other hand, actual return to shareholders is higher than ROE indicates. Citigroup is one of an increasingly small number of firms in the US stock market which has a high book-to-market ratio. This high book-to-market is not just evidence of a low amount of intangibles, but also reflects the delayed accounting recognition of bad assets, the negative investor sentiment for banking stocks following the financial crisis, and various other accounting differences for financial firms. Chevron shareholder actual returns, measured by ROME, are about the same as indicated by ROE, which would be the case for all firms whose book-to-market ratios hovers around one.

We also examine the impact of the use of ROME versus ROE for all industry sectors. First in Table 2, we compute the average ROE and DuPont components for each industry sector and rank them by ROE for year-end 2015 with data obtained from FactSet. This initial screen of sectors reveals that Transportation, Consumer Non-Durables, Electronic Technology, and Retail Trade would be the highest ranked sectors and most desirable for investment.

**Table 2: DuPont Analysis of The Traditional ROE**

*Return on Equity (ROE) is defined as the ratio of Net Income from Continuing Operations to Average Total Common Equity, Profit Margin (PM) is the ratio of Net Income from Continuing Operations to Sales, Asset Turnover (TATO) is the ratio of Sales to Average Total Assets, and Equity Multiplier (EM) is the ratio of Average Total Assets to Average Total Common Equity. Data is obtained for all industry sectors listed in FactSet. All ratios are for North America for the year ended December 2015.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|   | Rank | **ROE =** | PM x | TATO x | EM |
| Transportation | 1 | **25.88%** | 10.28% | 0.74 | 3.415 |
| Consumer Non-Durables | 2 | **23.32%** | 11.68% | 0.70 | 2.862 |
| Electronic Technology | 3 | **20.96%** | 11.77% | 0.73 | 2.434 |
| Retail Trade | 4 | **20.10%** | 3.49% | 1.89 | 3.055 |
| Process Industries | 5 | **18.99%** | 6.91% | 0.89 | 3.082 |
| Consumer Services | 6 | **18.98%** | 10.23% | 0.55 | 3.377 |
| Consumer Durables | 7 | **17.81%** | 5.58% | 0.75 | 4.271 |
| Technology & Health Services | 8 | **16.66%** | 13.25% | 0.56 | 2.242 |
| Commercial & Distribution Services | 9 | **14.62%** | 5.96% | 0.79 | 3.105 |
| Health Technology | 10 | **13.81%** | 16.31% | 0.37 | 2.290 |
| Producer Manufacturing | 11 | **12.21%** | 6.69% | 0.57 | 3.180 |
| Utilities | 12 | **9.10%** | 9.27% | 0.27 | 3.640 |
| Finance | 13 | **9.05%** | 13.51% | 0.07 | 9.628 |
| Communications | 14 | **8.76%** | 4.33% | 0.44 | 4.612 |

**Table 2: DuPont Analysis of The Traditional ROE (continued)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|   | Rank | **ROE =** | PM x | TATO x | EM |
| Industrial Services | 15 | **7.52%** | 5.04% | 0.55 | 2.724 |
| Energy Minerals | 16 | **3.98%** | 3.27% | 0.57 | 2.149 |
| Non-Energy Minerals | 17 | **1.47%** | 1.44% | 0.47 | 2.192 |

Table 3 ranks the sector industries based on the ROME factor. As with Table 2, components of the DuPont Analysis are included along with the addition of book-to-market. While Transportation and Electronic Technology remain in the top quartile of sectors, Consumer Non-Durable and Retail Trade have dropped out to be replaced by Finance and Consumer Durables. It is important to highlight here that the ROME rankings in Table 3, are not merely a re-ranking of firms by book-to-market. The table also highlights that the book-to-market ratio does not solely drive these rankings; similar to a traditional DuPont analysis, it is the combination of the various components. For example, the Finance sector ranked #3 has one of the highest book-to-market ratios while the Electronic Technology sector at #4 has one of the lowest ratios; Non-Energy Minerals with the highest book-to-market ratio is at the bottom of the rankings, while Transportation with a very low book-to-market ratios is at the top. Also, the ROME measure narrows the return spread across industries; the range of the ROME measures is 7.03%, while the range of the ROE measures was 24.41%.

**Table 3: DuPont Analysis of The New ROME**

*Return on Market Equity (ROME) is defined as the ratio of Net Income from Continuing Operations to Market Value of Common Equity, Profit Margin (PM) is the ratio of Net Income from Continuing Operations to Sales, Asset Turnover (TATO) is the ratio of Sales to Average Total Assets, Equity Multiplier (EM) is the ratio of Average Total Assets to Average Total Common Equity, and Book to Market (B/M) is the ratio of Average Total Common Equity and Market Value of Common Equity. Data is obtained for all industry sectors listed in FactSet. All ratios are for North America for the year ended December 2015.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | Rank | **ROME =** | PM x | TATO x | EM x | B/M |
| Transportation | 1 | **8.46%** | 10.28% | 0.74 | 3.415 | 0.327 |
| Consumer Durables | 2 | **6.82%** | 5.58% | 0.75 | 4.271 | 0.383 |
| Finance | 3 | **6.65%** | 13.51% | 0.07 | 9.628 | 0.735 |
| Electronic Technology | 4 | **6.59%** | 11.77% | 0.73 | 2.434 | 0.314 |
| Process Industries | 5 | **6.27%** | 6.91% | 0.89 | 3.082 | 0.330 |
| Utilities | 6 | **5.55%** | 9.27% | 0.27 | 3.640 | 0.610 |
| Producer Manufacturing | 7 | **5.53%** | 6.69% | 0.57 | 3.180 | 0.452 |
| Industrial Services | 8 | **4.91%** | 5.04% | 0.55 | 2.724 | 0.654 |
| Consumer Non-Durables | 9 | **4.91%** | 11.68% | 0.70 | 2.862 | 0.211 |

**Table 3: DuPont Analysis of The New ROME (continued)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | Rank | **ROME =** | PM x | TATO x | EM x | B/M |
| Consumer Services | 10 | **4.85%** | 10.23% | 0.55 | 3.377 | 0.256 |
| Retail Trade | 11 | **4.39%** | 3.49% | 1.89 | 3.055 | 0.218 |
| Commercial & Distribution Services | 12 | **3.83%** | 5.96% | 0.79 | 3.105 | 0.262 |
| Technology & Health Services | 13 | **3.47%** | 13.25% | 0.56 | 2.242 | 0.208 |
| Communications | 14 | **3.38%** | 4.33% | 0.44 | 4.612 | 0.386 |
| Health Technology | 15 | **3.36%** | 16.31% | 0.37 | 2.290 | 0.243 |
| Energy Minerals | 16 | **2.90%** | 3.27% | 0.57 | 2.149 | 0.730 |
| Non-Energy Minerals | 17 | **1.43%** | 1.44% | 0.47 | 2.192 | 0.971 |

Table 4 summarizes the change in ranking from ROE to ROME in the rank change column. Consumer Durables moved up five positions from being in a middle quartile to the top, and the Finance sector increased ten spots in the rankings from the bottom quartile to the top; other sectors such as Transportation, Electronic Technology, Communications and Energy, experience minimal movement. The ROME measure tends to improve the ranking of more tangible industries like Producer Manufacturing, Utilities, and Industrial Services while depressing the ranking of the industries that have more intangible assets. This highlights that ROME more accurately reflects investors’ returns today but, similar to its reciprocal the P/E ratio, also captures the potential for future growth opportunities or potential over-valuation.

**Table 4: Industry Sector Rank Changes for ROME versus ROE**

*Return on Market Equity (ROME) is defined as the ratio of Net Income from Continuing Operations to Market Value of Common Equity, and Return on Equity (ROE) is defined as the ratio of Net Income from Continuing Operations to Average Total Common Equity. Rank Change is difference in industry sector rank using ROME versus ROE. Data is obtained for all industry sectors listed in FactSet. All ratios are for North America for the year ended December 2015.*

|  |  |  |  |
| --- | --- | --- | --- |
|   | **Rank Change** | ROME Rank | ROE Rank |
| Transportation | **0** | 1 | 1 |
| Consumer Durables | **5** | 2 | 7 |
| Finance | **10** | 3 | 13 |
| Electronic Technology | **-1** | 4 | 3 |
| Process Industries | **0** | 5 | 5 |
| Utilities | **6** | 6 | 12 |
| Producer Manufacturing | **4** | 7 | 11 |
| Industrial Services | **7** | 8 | 15 |
| Consumer Non-Durables | **-7** | 9 | 2 |
| Consumer Services | **-4** | 10 | 6 |
| Retail Trade | **-7** | 11 | 4 |

**Table 4: Industry Sector Rank Changes for ROME versus ROE (continued)**

|  |  |  |  |
| --- | --- | --- | --- |
|   | **Rank Change** | ROME Rank | ROE Rank |
| Commercial & Distribution Services | **-3** | 12 | 9 |
| Technology & Health Services | **-5** | 13 | 8 |
| Communications | **0** | 14 | 14 |
| Health Technology | **-5** | 15 | 10 |
| Energy Minerals | **0** | 16 | 16 |
| Non-Energy Minerals | **0** | 17 | 17 |

**CONCLUSION**

We demonstrate that over the past forty years, book values of equity have diverged significantly from market values of equity, making ROE a less meaningful measure of investor returns. This divergence has been largely driven by an increase in intangible assets within firms. The corresponding DuPont Analysis is then less valuable, particularly for industries that have higher levels of intangible assets. We instead propose using ROME which better captures shareholder returns, and still retains the benefits of a traditional DuPont Analysis by adding the component of book-to-market to the analysis.

**ENDNOTES**

1 <http://www.forbes.com/sites/investor/2013/01/18/beware-weak-link-between-return-on-equity-and-high-stock-price-returns/#426856e213e8>

2 <https://hbr.org/2010/03/the-best-way-to-measure-compan.html>

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