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The Legend of Weighted Average Return on Assets and Benchmarking Purchase Price Allocation Data

*Matthew D. Crane**

Introduction

Although intangible assets such as non-competes, technology, brands, customer relationship, and others are recognized for financial reporting purposes,[1] the methodology used for purchase price allocations is problematic. A purchase price allocation assigns fair value to the individual assets and liabilities acquired in a business combination. Under current valuation guidance, a subjective method known as the weighted average return on assets (WARA) is applied. WARA assumes that sum of the relative values or "weightings" of all assets (monetary, tangible, and intangible) multiplied by their respective rates of return should reconcile back to the weighted average cost of capital (WACC), the discount rate associated with the business enterprise.[2] Accordingly, the relative value weightings of intangibles and the selected discount rates are key considerations. Benchmarking or the comparison of the relative values of the intangibles as a percentage of assets or purchase price consider is also used in the audit process. WARA and benchmarking are both considered tests of reasonableness under audit standards.

Intangibles as an asset class do not trade within organized markets, such as NASDAQ or New York Stock Exchange or in secondary markets such as over the counter (OTC). In general, intangibles are licensed or leased between parties in private transactions or acquired through mergers and acquisition transactions. Given the lack of data for intangibles, the selection of data to use in the valuation process is highly subjective.

WARA Process Explained

To identify the problem with WARA, a discussion of how discount rates for intangibles are determined is necessary. An example of an intangible valuation is the best way to accomplish this. Exhibits detailing a sample valuation are attached as Appendices at the end of this article.

The methodologies to value intangibles can be extensive, but in general there are three approaches to value: the Income, Market, and Cost Approaches. The Income Approach is based upon a principle of anticipated economic benefits. The Market Approach is based upon a principal of substitution, where alternatives are considered. The Cost or "Asset" Approach is based upon the principle of cost avoidance or the amounts required to reproduce a similar asset. Within the Income Approach, the discounted cash flow (DCF) method and its variants are most commonly used. The Cost Approach is also commonly used. Since market indications for intangibles are rare, the Market Approach is generally not directly applied, but market royalty rates are often considered. This article focuses primarily on the Income Approach and its principal input the discount rate.

[1] Intangibles are valued for business combinations, impairment testing and as assets under the Financial Accounting Standards Board's Accounting Standard Codifications Codes Nos. 350, 805 and 820.

[2] Business enterprise is defined by the International Valuation Standards a "a commercial, industrial, service, or investment entity (or a combination thereof) pursuing an economic activity." It is considered either the sum of the market values of equity and net debt or the sum of net working capital, tangible, and intangible assets.

*The author is a Managing Director at MSG Consultants, NY, NY and extends his thanks to the faculty at Sacred Heart University for approval of this dissertation topic in completion of a Doctoral Degree (DBA) in Finance.

In Exhibit 1 [see pg 18], a valuation of a brand or "trade name" acquired as part of an enterprise[3] is performed using an Income Approach known as the relief from royalty method, a variant of the DCF method, which considers market inputs for royalty rates. The key inputs to the valuation are revenue, revenue growth, a royalty rate, taxes, and a present value factor (PV factor) based upon a selected discount rate. As intangibles are amortized for tax purposes over fifteen years,[4] a tax amortization benefit (TAB) is also applied. This TAB[5] provides additional value as the buyer is allowed an amortization deduction, which reduces taxes.

Within this sample valuation, the trade name is considered a significant asset to the transaction. Revenues attributed to the trade name are expected to be $52.798 annually in the initial year and are expected grow at an annual rate of five percent for ten-years, and three percent afterwards into perpetuity. A royalty rate of ten percent based upon market research is used. The relief of royalty assumes that by acquiring the trade name outright, the buyer is avoiding the economic costs of licensing the trade name. It is expected that approximately one percent of revenues is reasonable for future advertising and legal costs to maintain the trade name's standing. Corporate taxes are assumed to be at a rate of forty percent [6]and the net royalties savings represent the after-tax cash flow net cash flows (NCF) during the forecast period of ten years. The value beyond the forecast period is referred to as the "terminal value."

As the NCF represents an economic benefit in the future, a PV factor is applied to the future NCF to determine present value, based upon the formula below:

$$PV\ Factor = \frac{1}{(1+r)^t}$$

Where:

r= intangible discount rate
t=time period to receipt (assuming mid-period)

After the multiplication of the PV factor to the future NCF and the addition of the TAB, the resulting value for the trade name is $24.974 million.

The selected intangible discount rate is based upon WACC plus a premium. The premium is added to WACC, because intangibles, separated from the Enterprise are assumed to be riskier than the Enterprise as an assemblage of assets. WARA is an iterative process outlined on Exhibit 2 [see pg 19]. Premiums can be altered or revised as necessary, iteratively to achieve a desired result. As noted, the discount rate used to value the intangible is 18.9%, which is based upon a premium of five percent above WACC of 13.9%. The use of market data to establish this premium is not required by any accounting or valuation guidance. Based upon current valuation guidance[7], the WARA process supports the selected rate by reconciling the WARA to WACC, both at 13.9%. The components of WACC includes pre-tax returns rates for debt of 9.5% and equity of 36.9% resulting in a pre-tax WACC of 23.2%, which is converted to an after-tax rate of 13.9%. Returns are segregated by asset classes consisting of monetary, tangible and intangible assets, all contributing to the overall return on assets (ROA), which is assumed equivalent to WACC. The assumption is that the relative value weighting of the assets times their selected discount rates should reconcile to the same rate of return for the enterprise based upon WACC. In addition, there is a hierarchy of returns where the trade name is deemed to be riskier than the sales backlog and customer relationship, but less risky than technology and other intangibles. If the rates reconcile, the theory assumes the process supports the valuation in accordance with the fair value standard.[8] But, does it? Virtually no market data or robustness tests are used to support the premium above WACC.

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[3] Enterprise is considered to be the market value of equity plus net debt (debt minus cash). See International Valuation Standards Council's Glossary.

[4] Internal Revenue Code §197 provides for an amortization period of fifteen years, regardless of the type of intangible.

[5] A TAB is calculated using the following formula: $TAB = \frac{15}{[15-(\Sigma\ Cash\ Flow\ Factor\ x\ t)]}$

[6] The author notes that subsequent to the preparation of this example, the 2017 Tax Cut and Jobs Act reduced federal corporate taxes to a rate of twenty-one percent. Under the revised regime, a corporate tax rate of forty percent is reduced to a lower combined tax rate considering state income taxes to approximately twenty-six percent. This example would require a revision because of this new legislation.

[7] There is a discussion on guidance issued by the Appraisal Foundation in the literature review of this paper.

[8] FASB ASC 820 and other guidance states that within the fair valuation process market inputs is preferred.

Although this process is in conformity with the guidance previously discussed, by simply revising the premiums between another intangible, customer relationships and the trade name, the rates can still be reconciled and the trade name can have a significant greater value. As presented in Exhibits 3 and 4 [see pgs 20–21] by lowering the premium attributed to the trade name from five percent to three percent and increasing the premium attributable to the customer relations from four percent to six percent, the resulting value is $28.903 million, an increase in value of $3,929 million or 15.7%, which under most circumstances would be over a threshold of materiality for the audit. All of this is done without any real risk analysis for the intangibles, which is the problem. If a dispute focuses on the value of the trade name and a subsequent impairment, shareholders may claim that the overvaluation actually occurred because the initial valuation was aggressive. Earnings management also may be suspected, as some trade names, similar to goodwill, are considered indefinite lived assets, not subject to amortization. Management could be accused of attempting to increase earning by reducing amortization expense. Damages to the brand can also be asserted and the starting point for any damages would be a prior valuation.

Given that the values can be altered significantly, and the process still works, it is questionable whether this process really provides any support. A proposed alternative method (recommended) for determining a value based upon private company transaction data is presented on Exhibits 4 and 5 [see pgs 21–22]. Using market data the resulting value is $29.413 million, supported by a discount rate of 16.7% based upon a premium of 2.8%. Unlike the prior two valuations, the selection of a premium is based upon an assessment of risk, rather than intuition.

The results of the preliminary, revised and recommended results are presented in Table 1 below:

Table 1

Trade Name Valuation - Comparative Valuation as of June 30, 2017

($000)

	Preliminary (Exhibits 1/2)	Revised (Exhibits 3/4)	Recommended (Exhibits 5/6)
Trademark Value	$ 24,974	$ 28,903	$ 29,413
Increased over prelim.	n/a	$ 3,929	$ 4,439
% increase	n/a	15.7%	17.8%
Discount Rate	18.9%	16.9%	16.7%
Premium over WACC	5.0%	3.0%	2.8%

As minor changes in the discount rate can generate substantial differences in the value of the trade name, the purpose of this paper is to perform a detailed examination of data and the appropriateness of the methodology, as well as propose alternatives. However, before describing how the inputs for this recommended solution are discussed, an overview of how the WARA process came into being is relevant.

Literature Review

Purchase Price Allocations

The current accounting guidance for purchase price allocations is the International Accounting Standards Board's (IASB) International Financial Reporting Standard No. 3 (IFRS 3) and within the United States, the Financial Accounting Standards Board's (FASB's) Accounting Standard Codification No. 805 (ASC 805). Both accounting standards use the purchase accounting method. In addition to the accounting standards, the Appraisal Foundation issued "Best Practices for Valuations in Financial Reporting: Intangible Asset Working Group—Contributory Assets." (2010), which is the primary source of valuation guidance on purchase price allocations in the U.S. The Appraisal Foundation is the primary issuer of Appraisal Standards and is appointed by Congress to promulgate business valuation standards.[9] Although the Appraisal Foundation

[9] The Appraisal Foundation's guidance includes the Uniform Standards of Professional Appraisal Practice (USPAP).

guidance is not codified as Generally Accepted Accounting Principles (GAAP), it is considered best practices. Consequently, auditors and valuation specialist generally seek to conform to that guidance.

The purchase accounting method holds that all business combinations are acquisitions and regardless of type of transaction (i.e., equity or assets), the same approach is applied by using fair value procedures.[10] Fair value is further defined by the accounting guidance as:

> "The amount at which an asset (or liability) could be bought (or incurred) or sold (or settled) in a current transaction between willing parties, that is, other than in a forced or liquidation sale."[11]

Fair value also considers the "exit price"[12] for an asset, which adds an element of conservatism as it infers value should be based upon what the asset or liability can sell or be settled for. Unlike fair market value, where both parties have to be "willing", under the fair value standard, a willing seller is not a requirement.[13] In addition, as intangibles do not have any observable pricing in active or inactive markets, pricing generally is based upon management's or the valuation specialist's unobservable assumptions. The specific criteria for identifying intangible is that the assets must meet either a separability or contractual or legal criterion. In other words, the intangibles should possess the ability to be sold or licensed or exist in a legal contract. Within the fair value standards, there is a preference for market inputs.[14] Yet, when determining a premium over WACC for intangibles, the use of market data is not required by valuation guidance.

Although intangibles may exist in going concerns,[15] the guidance only allows recognition of these assets when acquired individually or within a business combination as an assemblage of assets. Previously, conservatism, as a fundamental principle of accounting, prohibited the recognition of separate intangibles[16] and all intangibles were included in goodwill. So, this recognition of distinct intangibles as assets is a relatively new concept. However, accounting guidance still prohibits recognition for internally developed assets. From an investor perspective this poses problems. Baruch and Feng (2016) argue the current economy has developed into the information age, better disclosures and recognition of these assets should be discussed. Excluding disclosures makes financial statements less relevant, given the accounting for such assets is outdated. The other interesting observation made by Baruch and Feng is that perhaps intangibles are sometimes less risky than other assets, and can be the primary motivation for an acquisition. This observation prompts the question, is a premium above WACC a valid assumption?

A discussion of exactly what types of intangibles[17] are recognized is useful. Table 2 presents ASC 805 intangibles:

Table 2	
Type	**Description**
Marketing-related	a. Trademarks, trade names, service marks, collective marks, certification marks; b. Trade dress (unique color, shape, package design); c. Newspaper mastheads; d. Internet domain names; and e. Noncompetition agreements.
Customer-related	a. Customer lists; b. Order or production backlog; c. Customer contracts and related customer relationships; and d. Noncontractual customer relationships.
Artistic-related	a. Plays, operas, ballets;

[10] Author's note: There are elections in U.S. GAAP that exempt privately held companies from recognizing specific assets under the Private Company Council Guidance (PCC). The PPC guidance allows private companies to exclude recognition of customer relations and non-competes. Publicly listed companies cannot make this election.
[11] See the Financial Accounting Standards Board's Accounting Codification Standards Glossary, www.fasb.org
[12] Both the IASB in IFRS No. 13 and FASB's guidance within ASC 820 recognize this exit price concept.
[13] Revenue Ruling 59-60 and other related Treasury Guidance states that both parties are "willing."
[14] FASB ASC 820 indicates a hierarch of inputs: Level 1, 2, and 3 where observable market data is given preference.
[15] A going concern issue exists where "when conditions and events…indicate that it is probable that the entity will be unable to meet its obligations as they become due within one year after the financial statements are issued"—FASB ASC 205-40-20.
[16] FASB issued Financial Accounting Standard 141 in June of 2001 was revised in December 2007, began to recognize intangibles apart from goodwill. Under APB 16 issued on August 1970 only recognized goodwill as the residual intangible.
[17] As provided in FASB ASC 805.

	b. Books, magazines, newspapers, other literary works; c. Musical works such as compositions, song lyrics, advertising jingles; d. Picture, photographs; and e. Video and audiovisual material, including motion pictures or films, music videos, and television programs.
Contract-based	a. Licensing, royalty, standstill agreements; b. Advertising, construction, management, service or supply contracts; c. Lease agreements (whether the acquirer is the lessee or the lessor); d. Construction permits; e. Franchise agreements; f. Operating and broadcast rights; g. Servicing contracts such as mortgage servicing contracts; h. Employment contracts; and i. Use rights such as drilling, water, air, timber cutting, and route authorities.
Technology based	a. Patented technology; b. Computer software and mask works; c. Unpatented technology; d. Databases, including title plants; and e. Trade secrets, such as secret formulas, processes, recipes.

Smith and Parr (2006) describe the WARA as the rate of return of a portfolio of assets, including "monetary…tangible…intangible" included in a business enterprise.[18] This concept is validated under an assumption that there is a hierarchy[19] of returns similar to the security market line, whereby there is a risk/return function.

Although purchase price allocations for financial reporting are not tax related, the methodology has its roots in Treasury Guidance in Appeals and Review Memorandum No. 34 (ARM 34), which introduced a methodology to estimate excess earnings attributable to intangibles. The purpose of ARM 34 was to compensate distilleries and breweries for their loss of going concern value or goodwill as a result of prohibition. According to ARM 34, "excess earnings are based the presence of goodwill and its value, therefore, rests upon the excess of net earnings over and above a fair return on the net tangible assets."[20] This guidance assumes that intangibles by their nature possess greater risk than their tangible counterparts. Back in the day, intangibles were viewed as ancillary assets formed as a result of the acquisition of tangible assets. During the industrial age, factories were built, and as a result of building the plant, going concern intangibles like goodwill or assembled workforce were created. In modern times this has changed. Software companies create intangibles and then buy tangible assets later.

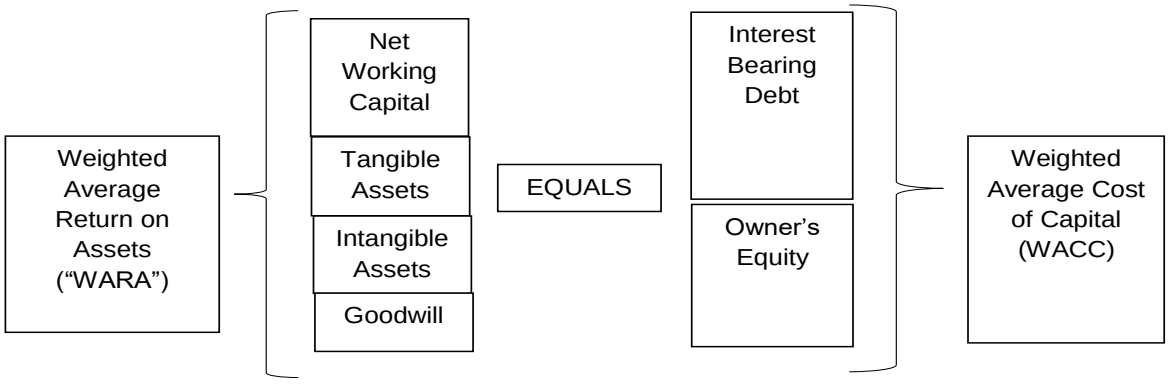
The selection of a discount rate for intangibles has been widely debated. Smith and Parr (2005) discuss the use of the unlevered cost of equity as a surrogate for intangible rates of return as intangibles are financed with equity. Stegink, Schauten, and de Graff (2007) demonstrate empirically that Smith and Parr's premise is not correct and that the discount rate for intangibles is best supported by the levered cost of equity, which is greater than WACC. This finding is important because if intangibles can be estimated by a levered cost of equity, this rate of return can be used to further assess intangible discount rates. Others, notably Reilly and Schweihs (1999), hold that the use of WACC as the starting point for intangibles is more appropriate, given that DCF valuations of Business Enterprises are based upon WACC. The use of WACC to develop firm value is concept introduced by Modigliani and Miller (1958) and this concept is widely implemented into practice as well as studied in literature. Some such as Jacobs (2014), debate the propositions Modigliani and Miller introduced, but the concept as of WACC as the starting point as a discount rate for the firm is widely accepted. Reilly and Schweihs (1999) argue that there is a hierarchy of returns rates for intangibles above WACC but provide no empirical support for this assertion. Due to the lack of market data for intangibles, the literature is largely based upon the intuition of the authors.

[18] See Smith and Parr (2006) p. 769.
[19] As discussed on section 4.1.02 of the Appraisal Foundations publication, "The Identification of Contributory Assets and the Calculation of Economic Rents."
[20] Revenue Ruling 59-60.

The concept of a premium above a return rate for investments is widely acknowledged in the literature, particularly by Sharpe (1966), where the returns in excess of the risk-free rate can be compared to the assets standard deviation (σ) to determine relative risk.

Although the selection of a discount rate as a starting point for an intangible is debated, the Appraisal Foundation guidance requires the use of WACC as the starting point. Consequently, to be in conformity with best practices, the use of WACC is mandatory.

The rationale for the WARA to WACC reconciliation process is best explained by the following chart presented by Zyla (2013).



As presented above, the consensus is that the left side of an economic balance sheet return (assets or WARA) should equate to the left side of the balance sheet (invested capital or WACC). As previously noted, there is no requirement in the accounting or valuation guidance to quantify the premium for the intangible and selection can be an iterative process, but in "the end, the WACC, IRR[21], and WARA must be reconciled"—Appraisal Foundation (2010). The theory is that if a market participant is buying the enterprise value at fair value, there is a no arbitrage assumption. In other words, the market prices the assets fairly and a buyer cannot acquire assets on day zero to then sell them on the day after to recognize a profit.

> The guidance issued by the Appraisal Foundation (2010) states:
>
> "The purpose of the WARA is the assessment of the reasonableness of the asset-specific returns for separately identified intangible assets and the implied (or calculated) return on the goodwill (excess purchase price). The WARA then should be compared to the derived market-based WACC…Selection of an overall rate of return for the entity (WACC) is a necessary starting point prior to consideration of the stratification of the rates of return."

This stratification or "hierarchy" of returns concept is based on the idea that different classes of monetary, tangible, and intangible assets (i.e., marketing, customer, artistic, contract, and technology based) have different risk profiles. For instance, cash is expected to have no risk and accounts receivables is expected to have risk. Land as a tangible asset is expected to have less risk than office equipment. For intangibles assets, if the primary intangible asset in the business combination is its trade name, the trade name is expected to have less risk than the company's technology. Premiums above WACC are added to compensate for risk for the other intangibles. The greater the level of risk the greater the premium. After considering the premiums to WACC, it is expected that WARA will approximate WACC and both will be similar to the buyer's expected rate of return, which is the IRR.

[21] IRR stands for Internal Rate of Return. It is the anticipated rate of return from the expected net cash flows or prospective financial information (PFI) or the "discount rate at which the present value of the future cash flows of the investment equals the cost of the investment."

Benchmarking

Auditors also have problems testing the reasonableness of the purchase price allocation and fair value measurements in general. As a result, the Public Company Accounting Oversight Board (PCAOB) is issuing new standards to deal with the issue.[22] One way for the auditors to test the purchase price allocation is to compare the relative value to industry averages based upon the intangibles' percentage of total assets or purchase price consideration. The comparison is made for audit testing after, not before the valuation occurs.

In addition to audit problems, valuation specialists under the federal rules of evidence as expert witnesses have an obligation to present methodologies that are: (1) whether the theory or technique in question can be and has been tested; (2) whether it has been subjected to peer review and publication; (3) its known or potential error rate; (4) the existence and maintenance of standards controlling its operation; and (5) whether it has attracted widespread acceptance within a relevant scientific community.[23] As it pertains to WARA, some of these factors can be debated. DiGabriele (2011) notes that this standard is important to litigation proceedings. The use of WARA does not detail a potential error rate, which may pose problems in litigation.

This relative value of benchmarking is related to the discount rate, because the weightings of assets under WARA are expected to influence the discount rate. Higher levels of intangibles generate greater returns, and increases risk, or so the theory goes. Therefore, a study of intangibles as a percentage of purchase price consideration is sometimes used as a way of "benchmarking" intangibles to determine if a particular's intangible value is within "industry norms."

A common study referred to is published annually by Houlihan Lokey presents the various intangibles and their relationship to total purchase price consideration. The ranges of this data are quite large. In the 2016 study in all industries, intangibles and goodwill as a percentage of total consideration ranged from zero to 173% and zero to ninety-six percent, respectively and averaging thirty-five percent and thirty-six percent, respectively. Consequently, intangibles can comprise a large percentage of the purchase consideration or a relatively small percentage. There is no "rule of thumb" to be used.

The use of benchmarking by auditors is summarized in the audit standards issued by the American Institute of Certified Public Accountants in issued Audit Standards AU 320 and No. 336 (AU 320 and AU 336). AU 320 suggests auditors use benchmarks to assess the materiality of misstatement in financial statements. Therefore, the overall value of each intangible asset is compared to industry data to see whether it fits within a reasonable range. However, as explained in the conclusion section of this article, this benchmarking practice is misguided as there really is no significant statistical relationship between the relative values or weightings of the intangibles to total assets within industries groupings. Although benchmarking may not be useful to test the relative weighting of intangibles, variation in pricing intangibles supplied from market data can be used as a measurement of risk to refine the intangibles' discount rate. This is detailed in the policy recommendation section of this paper.

The significance of this study is that use of private transactional data to examine the assumption of reliability of the WARA.

Private Company Transactional Data

Although there is no observable data for intangible discount rates, there is market data on transactions of private companies and resulting market multiples. In practice, WACC is primarily developed from public company data to value intangibles. However, private company transactional data also can be examined to determine an initial discount rate. Not all companies are publicly traded and there is a good amount of debate regarding the use of public company data to develop value for private companies. private equity (PE) rates of returns are viewed by many to be significantly different than publicly company. Evidence of PE return rates are studied by Everett (2017). Dohmeyer and Butler (2012) used private transactional data to measure PE rates of return. The debate that private debt and equity are different than public markets is detailed by Slee (2004). In the most recent study, Everett (2017), PE rates of return range from fourteen percent to 33.8%. Venture capital rates are even greater ranging from fifteen percent to sixty percent

[22] Changes in audit procedures are evolving and new standards are being issued. PCAOB (2014) recently issued.
[23] See *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579 (1993).

Data from private company transactions do not directly disclose what WACC or IRR is for the transaction. However, there is a way to determine an implied WACC from the transaction data from the market multiples disclosed in the data. Once WACC is estimated, a statistical comparison to intangibles can occur. Hitchner (2003) and others, view market multiples such as earnings before interest and taxes (EBIT) and earnings before interest, taxes, depreciation, and amortization (EBITDA) to the market value of invested capital (MVIC) as the reciprocal of a capitalization rate, which is directly related to WACC. Pratt (2008), Reilly (1999) and others define WACC as the rate of return to all claimants in the capital structure of an entity—debt, preferred and common stockholders and warrant holders. The difference between WACC and a capitalization rate is its application. WACC and capitalization rates are both used in the DCF method, which considers value to be the present value of economic benefits a forecast period and a residual value at the end of the forecast period. In the residual or terminal year of the DCF model, a capitalization rate is used to a single period of economic benefit. Below is a DCF formula using EBIT or pre-tax debt free income to determine value over a five-year period mid-period assumption:

$$Value = \frac{EBIT_1}{(1+WACC)^{0.5}} + \frac{EBIT_2}{(1+WACC)^{1.5}} + \frac{EBIT_3}{(1+WACC)^{2.5}} + \frac{EBIT_4}{(1+WACC)^{3.5}} + \frac{EBIT_5}{(1+WACC)^{4.5}} + \frac{\frac{EBIT_f \; x \; (1+g)}{WACC-g}}{(1+WACC)^{4.5}}$$

The capitalization method only considers the terminal or final year calculation in a single stable period, below:

$$\frac{EBIT_f \; x \; (1+g)}{WACC-g}$$

Growth is the variable that distinguishes WACC from a capitalization rate. By use of market multiples from private transactions, an implied capitalization rate can be determined by using the reciprocal of the MVIC/EBIT market multiple as presented below:

$$Capitalization\ Rate\ (WACC-g) = \frac{1}{\left(\frac{MVIC}{EBIT}\right)}$$

For example, an MVIC to EBIT multiple of 5x infers a capitalization rate of twenty percent as presented below:

$$0.20\ or\ 20\% = \frac{1}{(5)}$$

Growth as an input is not disclosed by the private company data. Only a capitalization rate can be estimated from the market multiples. However, a capitalization rate is directly related to WACC. Therefore, for the purposes of this study, I use the capitalization rate as the discount rate, instead of WACC and refer only to WACC for simplicity.

To determine whether WACC is influenced by the relative weightings of intangibles or if there is any usefulness of relative weightings of intangibles by industry, I used private company transactional data. Pratt's Stats is a subscription data base that obtains transactions of private companies from three general sources: (1) business brokers providing data (2) inspection of data from the details from the intermediaries' files, and (3) research on the Security and Exchange Commission's (SEC) website. To study WARA a cross-section of the purchase price allocation by industry is examined.

One must analyze the data by industry groupings, because discount rates are considered to vary to account for industry risk.[24] A key variable in this cross-sectional data are the general Division Codes and Standard Industry Classification (SIC) Groups, which categorize data by general and specific industries. An analysis of the detailed SIC codes is more meaningful to analyze the data by specific industries. However, to analyze each SIC code would significantly reduce the data in each industry. Consequently, for the purposes of this article, only the general Division Codes are analyzed. The Division Codes are described as follows:

a. Agriculture, Forestry, and Fishing
b. Mining
c. Construction
d. Manufacturing

[24] Industry risk is a key concept in the development of Beta as discussed in the Capital Asset Pricing Model—Sharpe (1964).

e. Transportation, Communications, Electric, Gas, and Sanitary Services
f. Wholesale Trade
g. Retail Trade
h. Finance, Insurance, and Real Estate
i. Services
j. Public Administration

To determine the evidence of intangible rates of return by industry, an initial search resulted in 24,933 transactions occurring from January 16, 1990 to August 21, 2017. Further refinement of the data resulted in purchase price allocations for both tangible and intangible value from 13,136 transactions dating from January 4, 1993 to October 31, 2017. This data is further reduced to account for other missing data fields, which pares the data down to 10,449 transactions.

Model for Determining the Discount Rate

To determine an overall firm value for a transaction a simplified formula is applied:

$$MVIC = \frac{EBIT}{Capitalization\ Rate}$$

The MVIC is the sum of debt and equity in a business. To estimate potential components of how the value may be derived, the target's EBIT, WACC.[25] Although the growth in EBIT is not disclosed by the data, the use of capitalization rates instead of WACC is acceptable, because they are directly related.

Another simplifying assumption is the exclusion of tax rates. Discount rates are generally calculated on an after-tax basis, yet EBIT is pre-tax. However, within the data are transactions of many pass-through and smaller entities, which do not pay regular corporate rates of tax. Consequently, to use a pre-tax rate of return also minimizes the affect that varying taxes that would have an impact on WACC. Given these varying tax rates, I elected not to consider after-tax rates of return for WACC.

Model to Determine Relative Weightings of Individual Assets

To determine whether there is a relationship between the capitalization rate as the dependent variable and the weighting of assets as independent variables. An ordinary least squares regression is performed as presented below:

$$\beta_0 + \frac{x_1}{\sum_{i=1}^{11} x_i} * \beta_1 + \frac{x_2}{\sum_{i=1}^{11} x_i} * \beta_2 + \frac{x_3}{\sum_{i=1}^{11} x_i} * \beta_3 + \frac{x_4}{\sum_{i=1}^{11} x_i} * \beta_4 + \frac{x_5}{\sum_{i=1}^{11} x_i} * \beta_5 + \frac{x_6}{\sum_{i=1}^{11} x_i} * \beta_6 + \frac{x_7}{\sum_{i=1}^{11} x_i} * \beta_7 + \frac{x_8}{\sum_{i=1}^{11} x_i} * \beta_8 + \frac{x_9}{\sum_{i=1}^{11} x_i} * \beta_9 + \frac{x_{10}}{\sum_{i=1}^{11} x_i} * \beta_{10} + \frac{x_{11}}{\sum_{i=1}^{11} x_i} * \beta_{11} + \mathcal{E} = WACC$$

The independent variable is the individual weightings of the intangibles as a percentage of total assets divided by the sum of all intangibles weightings. The intercept β_0 is increased by the independent variables times their corresponding coefficient plus an error term (Ɛ):

Asset	**Independent Variable (Weighting of Asset/Sum of Weightings)**	**Coefficient**
Total Current Assets (TCA)	X_1/Total Assets/$\sum_{i=1}^{11} x_i$	β_1
Tangible Assets[26] (TA)	X_2/Total Assets/$\sum_{i=1}^{11} x_i$	β_2
Customer Relationships (CR)	X_3/Total Assets/$\sum_{i=1}^{11} x_i$	β_3
Backlog (BL)	X_4/Total Assets/$\sum_{i=1}^{11} x_i$	β_4
Technology (T)	X_5/Total Assets/$\sum_{i=1}^{11} x_i$	β_5

[25] As previously noted, growth is unknown and excluded. In practice, the following formula is applied: $MVIC = \frac{EBIT}{WACC-g}$

[26] Tangible assets include fixed asset and real estate included in the Pratt Stats data.

Research and Development (RD)	X_6/Total Assets/$\sum_{i=1}^{11} x_i$	β_6
Trade Name (TN)	X_7/Total Assets/$\sum_{i=1}^{11} x_i$	β_7
Non-Competes (NC)	X_8/Total Assets/$\sum_{i=1}^{11} x_i$	β_8
Other Intangibles (OI)	X_9/Total Assets/$\sum_{i=1}^{11} x_i$	β_9
Goodwill (GW)	X_{10}/Total Assets/$\sum_{i=1}^{11} x_i$	β_{10}
Other Non-Current Assets (ONCA)	X_{11}/Total Assets/$\sum_{i=1}^{11} x_i$	β_{11}

The purpose of using an ordinary least squares (OLS) regression is to determine the strength or weakness of the relationship between WACC as the dependent variable and the weighting of the intangibles as independent variables. Where coefficients are positive it will indicate increased proportions of intangibles are associated with greater risk as expressed by the associated WACC. Conversely, where the coefficients are negative, the associated WACC and risk are reduced. However, if the relationship between the variable is not robust, the conclusion that intangibles are risky assets is supported. The lack of a relationship produces uncertainty, which increases risk.

Of the 13,136 transactions analyzed, 2,687 transactions are removed as variables were missing. The adjusted data set included 10,449 transactions. The results of the regressions for the various industries along with the R squared (R^2), number of transactions (N), coefficient for the independent variable (β), significance or the p-value (Sig.), and the standard deviation (σ) are presented on the following page.

		Agricult. (A) μ = 0.492 R^2 = 0.037 N = 509	Mining (B) μ = 0.132 R^2 = 0.166 N = 67	Construct. (C) μ = 0.361 R^2 = 0.035 N = 501	Manufact. (D) μ = 0.232 R^2 = 0.025 N = 1349	Trans. Com. (E) μ = 0.357 R^2 = 0.017 N = 532	Wholesale (F) μ = 0.288 R^2 = 0.035 N = 626	Retail (G) μ = 0.498 R^2 = 0.054 N = 2325	Fin. Insur. (H) μ = 0.293 R^2 = 0.070 N = 517	Services (I) μ = 0.391 R^2 = 0.010 N = 4020	Pub. Adm. (J) μ = 0.405 R^2 = nmf N = 3
TCA	β	-0.141	0.089	-0.085	-0.114	-0.037	-0.158	-0.105	-0.124	-0.056	-
	Sig.	0.002	0.489	0.064	<0.001	0.410	<0.001	<0.001	0.005	<0.001	-
	σ	0.109	0.190	0.150	0.225	0.150	0.278	0.142	0.197	0.141	0.410
TA	β	-	-	0.126	-	-	-	-	-	-	-
	Sig.	-	-	0.008	-	-	-	-	-	-	-
	σ	0.385	0.303	0.352	0.348	0.396	0.375	0.351	0.445	0.405	0.069
CR	β	0.026	-0.216	-0.003	-0.062	-0.068	-0.092	-0.022	-0.107	-0.045	-
	Sig.	0.786	0.369	0.941	0.028	0.137	0.025	0.273	0.020	0.006	-
	σ	0.015	0.041	0.081	0.097	0.088	0.096	0.010	0.116	0.076	-
BL	β	-	-	-0.029	-0.005	-0.006	-0.028	-	-0.021	-0.001	-
	Sig.	-	-	0.528	0.895	0.896	0.496	-	0.633	0.946	-
	σ	-	0.000	0.003	0.015	0.002	0.001	-	0.001	0.012	-
T	β	-0.140	-0.055	-0.031	-0.044	-0.001	0.010	-0.009	-0.063	-0.029	-
	Sig.	0.785	0.736	0.488	0.126	0.979	0.812	0.657	0.155	0.071	-
	σ	0.008	0.003	0.025	0.060	0.015	0.019	0.004	0.022	0.047	-
RD	β	-	-	-	-0.022	-0.009	-	-	-0.033	-0.014	-
	Sig.	-	-	-	0.435	0.831	-	-	0.444	0.383	-
	σ	-	-	-	0.037	0.003	-	-	0.026	0.017	-
TN	β	-0.089	0.165	-0.049	-0.049	-0.007	-0.020	-0.032	-0.098	-0.016	-
	Sig.	0.335	0.531	0.286	0.080	0.877	0.632	0.117	0.025	0.319	-
	σ	0.033	0.002	0.032	0.066	0.050	0.039	0.029	0.118	0.026	-
NC	β	-0.101	0.378	0.037	-0.030	-0.025	-0.031	-0.093	0.078	-0.035	-
	Sig.	0.022	0.003	0.423	0.286	0.566	0.438	<0.001	0.072	0.027	-
	σ	0.091	0.092	0.138	0.124	0.101	0.121	0.094	0.088	0.120	0.087
OI	β	-0.019	0.070	0.014	-0.029	-0.051	-0.056	-0.022	-0.010	-0.007	-
	Sig.	0.669	0.568	0.753	0.296	0.244	0.166	0.280	0.819	0.663	-
	σ	0.059	0.099	0.073	0.074	0.078	0.830	0.076	0.092	0.068	-
GW	β	-0.054	0.108	-	-0.115	-0.091	-0.062	-0.178	-0.132	-0.050	-
	Sig.	0.227	0.411	-	<0.001	0.044	0.144	<0.001	0.004	0.002	-
	σ	0.370	0.287	0.354	0.328	0.369	0.335	0.294	0.425	0.370	0.355
ONCA	β	-0.044	0.066	-0.001	-0.026	-0.065	0.002	-0.064	-0.126	-0.014	-
	Sig.	0.318	0.621	0.981	0.341	0.140	0.952	0.002	0.004	0.384	-
	σ	0.099	0.085	0.101	0.091	0.139	0.122	0.140	0.147	0.122	0.045

nmf = not meaningful

The following paragraphs describe the relationships of the independent variables to WACC by industry. The variation in average WACC rates is wide, ranging from Mining (0.132) to Retail (0.498). Industries with concentrations in intangibles do not have necessarily have greater return rates than industries with less reliance on intangibles. For example, the indicated WACC of Services (0.391) is lower than that of Retail (0.498). Retail is reliant on tangible inventory and real estate leases. Yet, retailers also do rely heavily on brand, and the emergence of online retailing is an industry phenomenon that is disruptive, and retail is a sector that is in distress. So, it makes sense that the retail industry would require a significant return. At any rate, this data shows that the intangibles do play a pivotal role in industries, and to view them as ancillary assets no longer makes sense.

The range of WACC results (0.132 to 0.498) compare similarly to PE rates of returns (0.140 to 0.338). This result is not surprising, given that PE rates of return on an after-tax basis are generally greater than equity rates of return in the public markets.[27] Additionally, pre-tax rates of returns are always above after-tax returns. If one were to use this data to determine after-tax WACC for the Agriculture industry (pre-tax WACC= 49.2%) and assuming a corporate tax rate of thirty-five percent, the following equation is used:

$WACC_p(1-t) = WACC_A$ or 49.2% (1-0.35) = 24.6%

Where:

$WACC_p = Pre-Tax\ WACC$

$WACC_A = After-Tax\ WACC$

t =Assumed Tax Rate

The following is a detailed discussion on the data's analysis for specific industries.

Division A: Agriculture, Forestry, and Fishing

For this division, the selected sample is 509 transactions out of 576. The model has a low $R^2$of 0.037; an indication that the overall fit of the relationship between the weightings and WACC is not good.

On an individualized basis, only current assets and non-competes have statistical significance (p-value) of 0.002 and 0.022 and coefficients of -0.141 and -0.101, respectively. The other variables did not have statistical significance. Tangible assets indicated collinearity with other variables and are removed from the regression.

The relative risk of the intangible assets measured by the σ of the weightings ranges from Technology (0.008), with the lowest risk to goodwill (0.354) having the greatest risk.

Division B: Mining

For this division, the selected sample is sixty-seven transactions out of eighty-eight. The R^2 is low at 0.166; an indication that the overall fit of the relationship between the weightings and WACC is not good.

The relative risk of the intangible assets measured by the σ of the weightings ranges from the trade name (0.002) having the least risk to goodwill (0.287) having the greatest.

On an individualized basis, only non-competes (0.003) has statistical significance. Tangible assets indicated collinearity with other variables and are removed from the regression.

Division C: Construction

For this division, the selected sample is 501 transactions out of 566. The R^2 is low at 0.035; an indication that the overall fit of the relationship between the weightings and WACC is not good.

The relative risk of the intangible assets measured by the σ of the weightings ranges from backlog (0.003) having the lowest risk to goodwill (0.354) having the greatest.

On an individualized basis, only tangible assets have statistical significance at 0.008 and a coefficient of 0.126. The other variables did not have statistical significance. Goodwill indicated collinearity with other variables and is removed from the regression.

Division D: Manufacturing

For this division, the selected sample is 1,349 transactions out of 1,870. The R^2 is low at 0.025; an indication that the overall fit of the relationship between the weightings and WACC is not good.

The relative risk of the intangible assets measured by the σ of the weightings ranges from backlog (0.015) having the least risk to goodwill (0.328) having the greatest risk.

[27] Grabowski, Nunes, and Harrington (2017) indicate an equity risk premium above the risk-free rate for 2017 of 2.72% ranging from 5.50% to 6.94% for U.S. equities for an extended period.

On an individualized basis, total current assets, customer relationships, and goodwill have statistical significance of <0.001, 0.028 and <0.001 with coefficients of -0.114, -0.062, and 0.115, respectively. The other variables did not have statistical significance. Tangible assets indicated collinearity with other variables and are removed from the regression.

Division E: Transportation, Communications, Electric, Gas, and Sanitary Services

For this division, the selected sample is 532 transactions out of 659. The R^2 is low at 0.017; an indication that the overall fit of the relationship between the weightings and WACC is not good.

The relative risk of the intangible assets measured by the σ of the weightings ranges from Backlog (0.002) having the least risk to goodwill (0.369) having the greatest risk.

On an individualized basis, goodwill has statistical significance of 0.044 with a coefficient of -0.091. The other variables do not have statistical significance. Tangible assets indicated collinearity with other variables and are removed from the regression.

Division F: Wholesale Trade

For this division, the selected sample is 626 transactions out of 764. The R^2 is low at 0.035; an indication that the overall fit of the relationship between the weightings and WACC is not good.

The relative risk of the intangible assets measured by the σ of the weightings ranges from backlog (0.001) having the least risk to goodwill (0.335) having the greatest risk.

On an individualized basis, total current assets and customer relationships have statistical significance at <0.001 and 0.025 with coefficients of -0.158 and -0.092, respectively. The other variables do not have statistical significance. Tangible assets indicated collinearity with other variables and are removed from the regression.

Division G: Retail Trade

For this division, the selected sample is 2,325 transactions out of 2,878. The R^2 is low at 0.054; an indication that the overall fit of the relationship between the weightings and WACC is not good.

The relative risk of the intangible assets measured by the σ of the weightings ranges from Technology (0.004) having the least risk to goodwill (0.294) having the greatest risk.

On an individualized basis, total current assets, non-competes, and goodwill have statistical significance all at <0.001 with coefficients of -0.105, -0.093, and -0.178, respectively. The other variables do not have statistical significance. Tangible assets indicated collinearity with other variables and are removed from the regression.

Division H: Finance, Insurance, and Real Estate

For this division, the selected sample is 517 transactions out of 648. The R^2 is low at 0.070, an indication that the overall fit of the relationship between the weightings and WACC is not good.

The relative risk of the intangible assets measured by the σ of the weightings ranges from backlog (0.001) having the least risk to goodwill (0.425) having the greatest risk.

On an individualized basis, total current assets, trade name, and goodwill have statistical significance at 0.005, 0.025, and 0.004 with coefficients of -0.124, -0.098, and -0.132, respectively. The other variables do not have statistical significance. Tangible assets indicated collinearity with other variables and are removed from the regression.

Division I: Services

For this division, the selected sample is 4,020 transactions out of 5,084. The R^2 is low at 0.010; an indication that the overall fit of the relationship between the weightings and WACC is not good.

The relative risk of the intangible assets measured by the σ of the weightings ranges from backlog (0.012) having the lowest risk to goodwill (0.370) having the greatest risk.

On an individualized basis, total current assets, customer relationships, non-compete and goodwill have statistical significance at <0.001, 0.006, 0.027, and 0.002, with coefficients of -0.056, -0.045, -0.035, and -0.050, respectively. The other variables do not have statistical significance. Tangible assets indicated collinearity with other variables and are removed from the regression.

Division J: Public Administration

For this division, the selected sample is three transactions out of three. Given the lack of data the model has no statistical validity and cannot be analyzed.

Conclusion

The results show that only current assets, non-competes, and customer relationships have any predictability to WACC in limited industries. In general, when intangibles have significance, their coefficients are negative, which reduces WACC and implied risk. This finding supports the claim by Lev and Gu (2008) that intangibles are important assets, which reduce, not increase risk. The concept that intangible always should have a premium above WACC is unfounded, and the premise of ARM 34 that intangibles are ancillary assets is outdated.

As the regression models do not consistently support a wide range of intangibles relationship to WACC, benchmarking the relative values is not a practice that auditors should consider in their testing, without doing other procedures. There is no real statistical relationship of the weighting of the intangibles within the industries. However, benchmarking can and should take place for the selected discount rates based upon the standard deviation of the purchase price allocation data.

Despite a lack of empirical evidence by Reilly, R. F., and Schweihs, R. P. (1999), the concept of a hierarchy of returns for intangible assets does hold true. A clear majority of the industries indicated that backlog is the least risky asset, with goodwill being the riskiest. A sales backlog for an acquirer should be a less risky asset, given that it can be quantified and used in a limited amount of time, while goodwill is an indefinitely lived asset with a speculative or "residual" calculation. Consequently, the suggestion that there is a hierarchy of returns is correct. However, as previously stated, based upon current valuation guidance, the valuation specialist can use their independent judgement or intuition in what the hierarchy is, without reference to any data. As this finding does support the hierarchy of returns, this study now focuses on a proposed solution to the use of premiums based upon the market data analyzed.

Alternative Methodology

My suggestion is to use purchase price allocation data to support the selection of premiums above WACC. To do so, this discussion now returns to the sample valuation explained at the beginning of this article.

An example of the excess return concept that Sharpe (1966) introduced using returns above a risk-free rate can be modified to use WACC as the benchmark. The assumption is that the variation of the pricing within the industry is a measurement of the risk of mispricing. Since Stegink, Schauten, and de Graff (2007) concludes that the cost of equity (levered) is an acceptable proxy for intangible rates of return (R_i), the premium above WACC can be allocated among the intangible assets based upon their standard deviations (σ_i) individually as compared to the weighted average standard deviation(σ_{wtd}) of all intangibles acquired. The process for the intangible discount rate (R_i) is presented as:

$$R_i = COE_L - WACC\ x \left(\frac{\sigma_i}{\sigma_{wtd}}\right) + WACC$$

This process is detailed on Exhibits 5 and 6 [see pgs 22–23] and results in a premium for the trade name of 16.7% based upon a premium of 2.8%. The resulting value for the trade name from the example outlined is $29.413. This process is better than intuition alone. As the FASB's guidance states a preference for market inputs, the process is an improvement that contributes to the body of valuation knowledge.

This model could alleviate controversy in audit issues and litigation that may occur as a result of intangible assets being sold, acquired, abandoned or damaged through impairment or other events subsequent to acquisition. The intangibles initially recorded values are a key reference points for later valuations of the same intangible's assets. This fact holds true, whether for purchase price allocations, shareholder litigation, or damages claimed. Auditors, litigators, and forensic accountants would seek to understand what the particular intangible's value was previously.

Further avenues of research would be to compare intangible returns from initial acquisitions to subsequent acquisitions of the same intangibles. Such a study could assess actual returns on intangibles. However, this data is limited, and bias may exist as management and valuation specialists may seek to accomplish something done similar to the past. However, such a study would provide an understanding of potential intangible return rates as well as potential evidence of their economic lives.

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Appendices

Exhibit 1

Trade Name Valuation - Preliminary
Valuation as of June 30, 2017

($000)

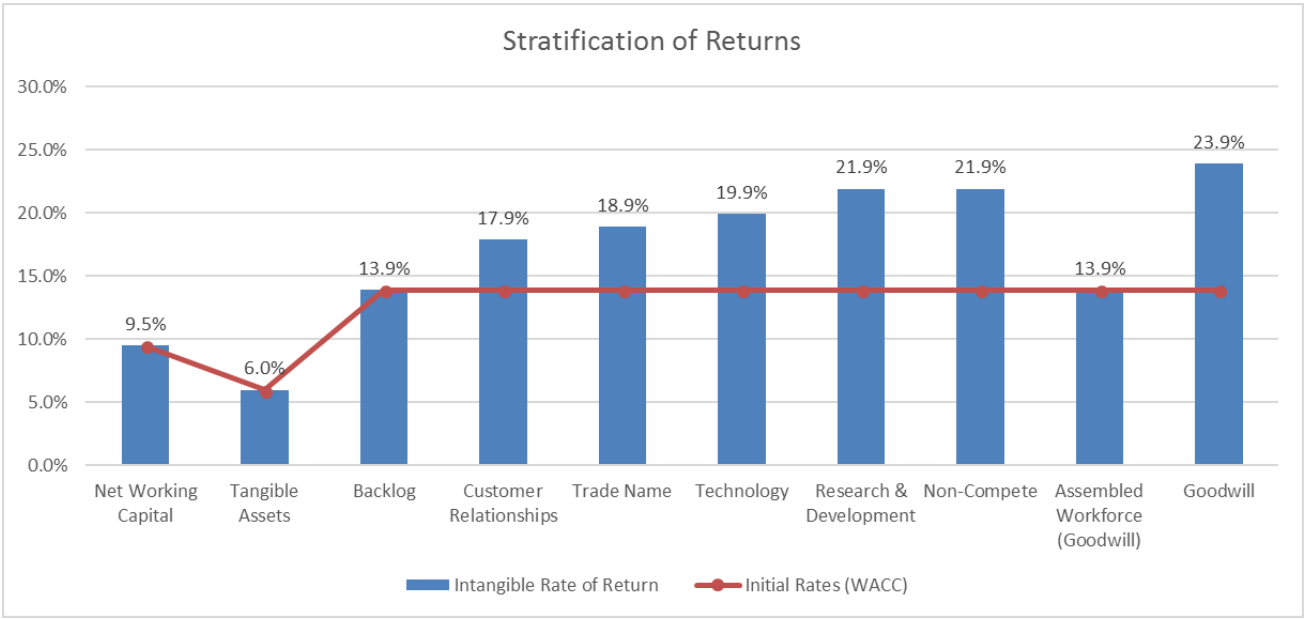
Year	Revenue 5% Growth	Royalty Rate	Royalty Savings	Maint. Costs @ 1%	Taxes @ 40%	Net Royalty Savings	Fraction of Year	Discount Period	PV Factor (@18.9%)	PV Royalty Savings	Tax Amortization Benefit: Mid-Year Discount	Tax Amortization Benefit: Cash Flow Factor
Year 1	$ 52,798	10.0%	$ 5,280	$ 528	$ 1,901	$ 2,851	1.00	0.50	0.9170	$ 2,614	0.50	0.9170
Year 2	$ 55,438	10.0%	$ 5,544	$ 554	$ 1,996	$ 2,994	1.00	1.50	0.7711	$ 2,309	1.50	0.7711
Year 3	$ 58,210	10.0%	$ 5,821	$ 582	$ 2,096	$ 3,143	1.00	2.50	0.6484	$ 2,038	2.50	0.6484
Year 4	$ 61,120	10.0%	$ 6,112	$ 611	$ 2,200	$ 3,300	1.00	3.50	0.5453	$ 1,799	3.50	0.5453
Year 5	$ 64,176	10.0%	$ 6,418	$ 642	$ 2,310	$ 3,466	1.00	4.50	0.4585	$ 1,589	4.50	0.4585
Year 6	$ 67,385	10.0%	$ 6,739	$ 674	$ 2,426	$ 3,639	1.00	5.50	0.3856	$ 1,403	5.50	0.3856
Year 7	$ 70,754	10.0%	$ 7,075	$ 708	$ 2,547	$ 3,821	1.00	6.50	0.3242	$ 1,239	6.50	0.3242
Year 8	$ 74,292	10.0%	$ 7,429	$ 743	$ 2,675	$ 4,012	1.00	7.50	0.2726	$ 1,094	7.50	0.2726
Year 9	$ 78,007	10.0%	$ 7,801	$ 780	$ 2,808	$ 4,212	1.00	8.50	0.2293	$ 966	8.50	0.2293
Year 10	$ 81,907	10.0%	$ 8,191	$ 819	$ 2,949	$ 4,423	1.00	9.50	0.1928	$ 853	9.50	0.1928
					Present Value of Net Royalty Savings - Forecast Period					$ 15,904	10.50	0.1621
				Terminal Value:							11.50	0.1363
				Net Royalty Savings - Final Year		$ 4,423					12.50	0.1146
				Terminal Growth @ 3%		$ 4,556					13.50	0.0964
				Divided by: Capitalization Rate		15.9%		$ 28,616	0.1928	$ 5,517	14.50	0.0811
										$ 21,421		5.3353
						Multiplied by: Income Tax Amortization Benefit				1.1659		
						Fair Value of the Trade Name				**$ 24,974**		**1.1659**

Appendices

Exhibit 2
WARA Analysis - Preliminary

Asset	Value ($000)	%	Initial Rate	Intangible Premium	Adjusted Rate	WARA
Net Working Capital	$1,590	1.3%	9.5%		9.5%	0.1%
Tangible Assets	43,000	34.5%	6.0%		6.0%	2.1%
Backlog	1,500	1.2%	13.9%	0.0%	13.9%	0.2%
Customer Relationships	31,731	25.5%	13.9%	4.0%	17.9%	4.6%
Trade Name	**24,974**	**20.1%**	**13.9%**	**5.0%**	**18.9%**	**3.8%**
Technology	4,051	3.3%	13.9%	6.0%	19.9%	0.6%
Research & Development	1,500	1.2%	13.9%	8.0%	21.9%	0.3%
Non-Compete	20	0.0%	13.9%	8.0%	21.9%	0.0%
Assembled Workforce (Goodwill)	10,450	8.4%	13.9%	0.0%	13.9%	1.2%
Goodwill	5,684	4.6%	13.9%	10.0%	23.9%	1.1%
	$124,500	100.0%				13.9%

Invested Capital	Weight	Pre-tax Rate	After-tax Rate (1*0.6)	Return on Assets		ROA Contrib.
Debt	50%	9.5%	5.70%	Monetary	1.3%	0.2%
Equity	50%	36.9%	22.1%	Tangible	34.5%	4.8%
		23.2%	13.9%	Intangible	64.2%	8.9%
				Total	100.0%	13.9%



Appendices

Exhibit 3

Trade Name Valuation - Revised
Valuation as of June 30, 2017

($000)

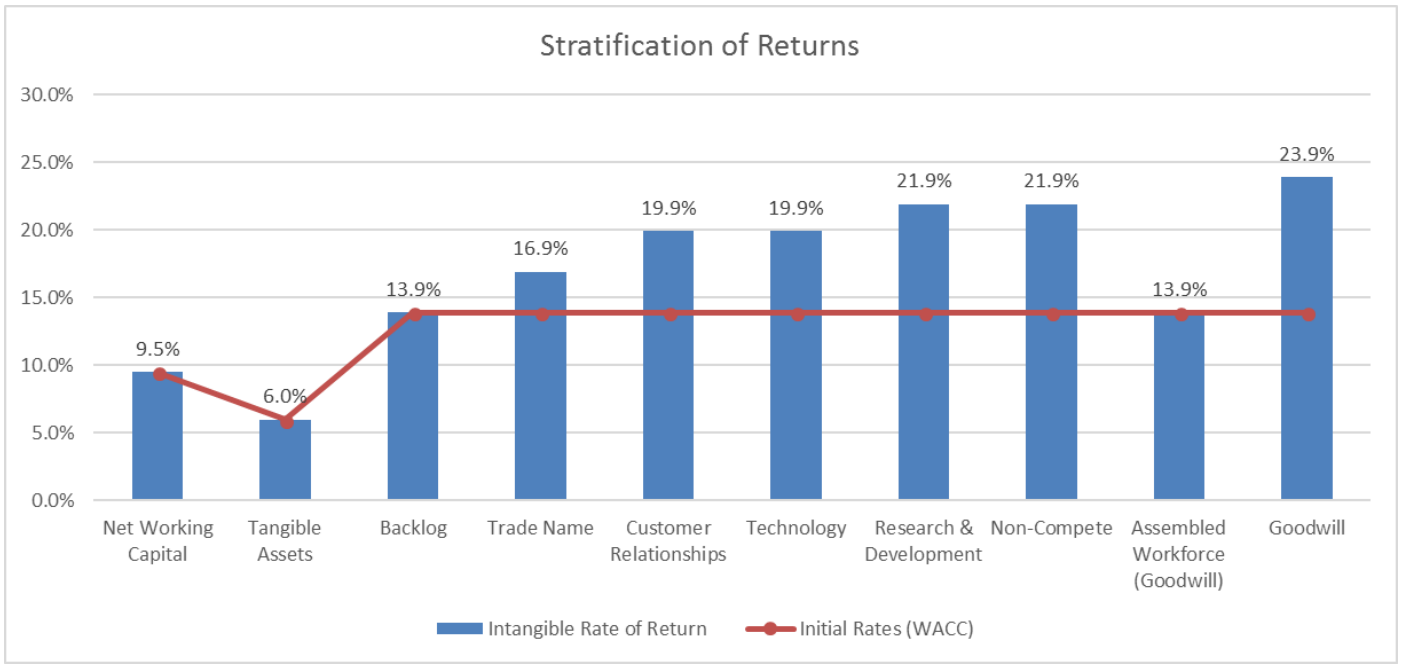
Year	Revenue 5% Growth	Royalty Rate	Royalty Savings	Maint. Costs @ 1%	Taxes @ 40%	Net Royalty Savings	Fraction of Year	Discount Period	PV Factor (@16.9%)	PV Royalty Savings	Tax Amortization Benefit: Mid-Year Discount	Tax Amortization Benefit: Cash Flow Factor
Year 1	$ 52,798	10.0%	$ 5,280	$ 528	$ 1,901	$ 2,851	1.00	0.50	0.9248	$ 2,637	0.50	0.9248
Year 2	$ 55,438	10.0%	$ 5,544	$ 554	$ 1,996	$ 2,994	1.00	1.50	0.7910	$ 2,368	1.50	0.7910
Year 3	$ 58,210	10.0%	$ 5,821	$ 582	$ 2,096	$ 3,143	1.00	2.50	0.6765	$ 2,126	2.50	0.6765
Year 4	$ 61,120	10.0%	$ 6,112	$ 611	$ 2,200	$ 3,300	1.00	3.50	0.5786	$ 1,909	3.50	0.5786
Year 5	$ 64,176	10.0%	$ 6,418	$ 642	$ 2,310	$ 3,466	1.00	4.50	0.4949	$ 1,715	4.50	0.4949
Year 6	$ 67,385	10.0%	$ 6,739	$ 674	$ 2,426	$ 3,639	1.00	5.50	0.4233	$ 1,540	5.50	0.4233
Year 7	$ 70,754	10.0%	$ 7,075	$ 708	$ 2,547	$ 3,821	1.00	6.50	0.3620	$ 1,383	6.50	0.3620
Year 8	$ 74,292	10.0%	$ 7,429	$ 743	$ 2,675	$ 4,012	1.00	7.50	0.3096	$ 1,242	7.50	0.3096
Year 9	$ 78,007	10.0%	$ 7,801	$ 780	$ 2,808	$ 4,212	1.00	8.50	0.2648	$ 1,115	8.50	0.2648
Year 10	$ 81,907	10.0%	$ 8,191	$ 819	$ 2,949	$ 4,423	1.00	9.50	0.2265	$ 1,002	9.50	0.2265
					Present Value of Net Royalty Savings - Forecast Period					$ 17,037	10.50	0.1937
				Terminal Value:							11.50	0.1657
				Net Royalty Savings - Final Year		$ 4,423					12.50	0.1417
				Terminal Growth @ 3%		$ 4,556					13.50	0.1212
				Divided by: Capitalization Rate		13.9%		$ 32,728	0.2265	$ 7,413	14.50	0.1037
										$ 24,450		5.7780
						Multiplied by: Income Tax Amortization Benefit				1.1821		
						Fair Value of the Trade Name				**$ 28,903**		**1.1821**

Appendices

Exhibit 4
WARA Analysis - Revised

Asset	Value ($000)	%	Initial Rate	Intangible Premium	Adjusted Rate	WARA
Net Working Capital	$1,590	1.3%	9.5%		9.5%	0.1%
Tangible Assets	43,000	34.5%	6.0%		6.0%	2.1%
Backlog	1,500	1.2%	13.9%	0.0%	13.9%	0.2%
Trade Name	**28,903**	**23.2%**	**13.9%**	**3.0%**	**16.9%**	**3.9%**
Customer Relationships	28,241	22.7%	13.9%	6.0%	19.9%	4.5%
Technology	4,051	3.3%	13.9%	6.0%	19.9%	0.6%
Research & Development	1,500	1.2%	13.9%	8.0%	21.9%	0.3%
Non-Compete	20	0.0%	13.9%	8.0%	21.9%	0.0%
Assembled Workforce (Goodwill)	10,450	8.4%	13.9%	0.0%	13.9%	1.2%
Goodwill	5,245	4.2%	13.9%	10.0%	23.9%	1.0%
	$124,500	100.0%				13.9%

Invested Capital	Weight	Pre-tax Rate	After-tax Rate (1*0.6)	Return on Assets		ROA Contrib.
Debt	50%	9.5%	5.70%	Monetary	1.3%	0.2%
Equity	50%	36.9%	22.1%	Tangible	34.5%	4.8%
		23.2%	13.9%	Intangible	64.2%	8.9%
				Total	100.0%	13.9%



Appendices

Exhibit 5

Trade Name Valuation - Recommended
Valuation as of June 30, 2017

($000)

Year	Revenue 5% Growth	Royalty Rate	Royalty Savings	Maint. Costs @ 1%	Taxes @ 40%	Net Royalty Savings	Fraction of Year	Discount Period	PV Factor (@16.7%)	PV Royalty Savings	Tax Amortization Benefit: Mid-Year Discount	Tax Amortization Benefit: Cash Flow Factor
Year 1	$ 52,798	10.0%	$ 5,280	$ 528	$ 1,901	$ 2,851	1.00	0.50	0.9257	$ 2,639	0.50	0.9257
Year 2	$ 55,438	10.0%	$ 5,544	$ 554	$ 1,996	$ 2,994	1.00	1.50	0.7932	$ 2,375	1.50	0.7932
Year 3	$ 58,210	10.0%	$ 5,821	$ 582	$ 2,096	$ 3,143	1.00	2.50	0.6797	$ 2,136	2.50	0.6797
Year 4	$ 61,120	10.0%	$ 6,112	$ 611	$ 2,200	$ 3,300	1.00	3.50	0.5825	$ 1,922	3.50	0.5825
Year 5	$ 64,176	10.0%	$ 6,418	$ 642	$ 2,310	$ 3,466	1.00	4.50	0.4991	$ 1,730	4.50	0.4991
Year 6	$ 67,385	10.0%	$ 6,739	$ 674	$ 2,426	$ 3,639	1.00	5.50	0.4277	$ 1,556	5.50	0.4277
Year 7	$ 70,754	10.0%	$ 7,075	$ 708	$ 2,547	$ 3,821	1.00	6.50	0.3665	$ 1,400	6.50	0.3665
Year 8	$ 74,292	10.0%	$ 7,429	$ 743	$ 2,675	$ 4,012	1.00	7.50	0.3140	$ 1,260	7.50	0.3140
Year 9	$ 78,007	10.0%	$ 7,801	$ 780	$ 2,808	$ 4,212	1.00	8.50	0.2691	$ 1,133	8.50	0.2691
Year 10	$ 81,907	10.0%	$ 8,191	$ 819	$ 2,949	$ 4,423	1.00	9.50	0.2306	$ 1,020	9.50	0.2306
						Present Value of Net Royalty Savings - Forecast Period				$ 17,171	10.50	0.1976
					Terminal Value:						11.50	0.1693
					Net Royalty Savings - Final Year	$ 4,423					12.50	0.1451
					Terminal Growth @ 3%	$ 4,556					13.50	0.1243
					Divided by: Capitalization Rate	13.7%		$ 33,255	0.2306	$ 7,669	14.50	0.1065
										$ 24,840		5.8310
						Multiplied by: Income Tax Amortization Benefit				1.1841		
						Fair Value of the Trade Name				**$ 29,413**		**1.1841**

Appendices

Exhibit 6
WARA Analysis - Recommended

Asset	Value ($000)	%	Initial Rate	Intangible Premium	Adjusted Rate	WARA
Net Working Capital	$1,590	1.3%	9.5%		9.5%	0.1%
Tangible Assets	43,000	34.5%	6.0%		6.0%	2.1%
Backlog	1,500	1.2%	13.9%	**0.6%**	14.6%	0.2%
Research & Development	1,500	1.2%	13.9%	**1.6%**	15.5%	0.2%
Technology	4,051	3.3%	13.9%	**2.5%**	16.4%	0.5%
Trade Name	**29,413**	**23.6%**	**13.9%**	**2.8%**	**16.7%**	3.9%
Customer Relationships	31,731	25.5%	13.9%	**4.1%**	18.0%	4.6%
Non-Compete	20	0.0%	13.9%	**5.2%**	19.1%	0.0%
Assembled Workforce (Goodwill)	10,450	8.4%	13.9%	0.0%	13.9%	1.2%
Goodwill	5,684	4.6%	13.9%	**10.0%**	23.9%	1.1%
	$124,500	103.6%				13.9%

Invested Capital	Weight	Pre-tax Rate	After-tax Rate (1*0.6)	Return on Assets		ROA Contrib.
Debt	50%	9.5%	5.70%	Monetary	1.3%	0.2%
Equity	50%	36.9%	22.1%	Tangible	34.5%	4.8%
		23.2%	13.9%	Intangible	64.2%	8.9%
				Total	100.0%	13.9%

Intangibles	**Div. D Table 7 σ**	Intangible %	After-Tax Equity	Excess Return > WACC (a)	σ / Weighted Average σ (b)	Intangible Premium (a x b)
Customer Relationships	0.098	13.5%	22.1%	8.2%	0.502	**4.1%**
Backlog	0.015	2.1%	22.1%	8.2%	0.077	**0.6%**
Technology	0.060	8.2%	22.1%	8.2%	0.307	**2.5%**
Research & Development	0.037	5.1%	22.1%	8.2%	0.190	**1.6%**
Trade Name	0.066	9.1%	22.1%	8.2%	0.338	**2.8%**
Non-Compete	0.124	17.0%	22.1%	8.2%	0.635	**5.2%**
Goodwill	0.328	45.1%				
Total σ / % IA	0.728	100.0%				
Weighted Average σ	0.195