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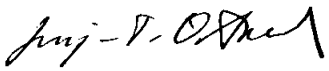
Dissertation Supervisor: Dr. Lucjan T. Orlowski Signature: 

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Doctor of Business Administration in Finance

Doctoral Dissertation Paper

The Legend of WARA and Benchmarking Purchase Price Allocation Data

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Abstract:

This paper examines the relationship of the relative weightings of intangible assets recorded in purchase price allocations by industry based upon a weighted average rate of return ("WARA") framework to determine if there is a statistical relationship between the value weightings and discount rates and if benchmarking the value weightings to industry data can be used as a reliable indicator of reasonableness. Both the WARA process and benchmarking assume that the relative values of intangibles impact the discount rate selected or that there is commonality in the industry ratios. Intuitively, the use of WARA and Benchmarking for financial reporting both make sense. Yet, based upon private company data examined, the relative value weightings of intangible assets generally do not have a relationship with the implied discount rate from private company transaction data and benchmarking does not support the values. Although these findings note the current WARA process is flawed, it is established practice for financial reporting. Yet, the development of WARA can be improved by using market data and assessing the variation to support a selection of discount rates in conformity with accounting guidance. Consequently, this paper outlines the problem with the WARA methodology, as well as a policy recommendation to improve the process.

Keywords: benchmarking intangibles; intangible discount rates; fair value; purchase price allocation; weighted average cost of capital; weighted average return on assets.

JEL Classification: G12, G32, G34, M41, M42.

Disclaimer: The views expressed in this presentation are my own and do not in any way represent those of my employer Marshall & Stevens, Inc.

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I. 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 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.

[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 as 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.

II. WARA Process Explained

To properly identify the problem with WARA, a discussion of what exactly 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 paper.

The methodologies to value intangibles can be extensive, but in general there are three approaches to value assets - the income, market and cost approaches. The income approach is based upon a principal of anticipated economic benefits. The market approach is based upon a principal of substitution, where by alternatives are considered. The cost or "asset" approach is based upon the principal of cost avoidance. Within the income approach, the discounted cash flow ("DCF") method and its variants are most commonly used. Since market indications for intangibles are rare, the market approach is generally not applied, but the income and cost approaches are often applied. This paper focuses primarily on the income approach and its principal input the discount rate.

In **Exhibit 1**, a valuation of a brand or "Trade Name" acquired in a transaction of an Enterprise[3] is performed using an income approach known as the relief from royalty method, a variant of the DCF method. 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.

[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: $TAB = \frac{15}{[15-(\Sigma\ Cash\ Flow\ Factor\ x\ t)]}$

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 5.0% for ten-years, and 3.0% afterwards into perpetuity. A royalty rate of 10.0% based upon market research is used. The relief of royalty assumes if the Trade Name is licensed elsewhere, it would command a royalty and since the buyer is acquiring the intangible, it has avoided the licensing process. It is expected that approximately 1.0% of Revenues are a reasonable estimate of future advertising and legal costs to maintain the Trade Name's standing. Corporate taxes are assumed to be at a rate of 40.0% [6]and the Net Royalties savings represent the after-tax cash flow net cash flows ("NCF") during the forecast period of ten (10) years. The value beyond the forecast period is referred to as the "Terminal Value."

As the NCF represents future not present NCF, a Present Value Factor ("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 discount rate is based upon WACC plus a premium. The premium is added to WACC, because intangibles, separated from the Enterprise are deemed riskier than the Enterprise as an assemblage of assets. This premium and WARA process is iterative process outlined on **Exhibit 2.** Premiums can be altered or revised as necessary, iteratively to achieve a desired result. As noted,

[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 21%. This example would require a revision because of this new legislation.

the discount rate used to value the intangible is 18.9%, which is based upon a premium of 5.0% 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 backlog and customer relationship, but less risky than technology and other intangibles. If the rates reconcile, the theory states that the process supports the valuation in accordance with the fair value standard.[8] But, does it? Virtually no market data is used to support the premium above WACC.

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 and different standing in the hierarchy. As presented in **Exhibits 3 and 4** by lowering the premium attributed to the Trade Name from 5.0% to 3.0% and increasing the premium attributable to the Customer Relations from 4.0% to 6.0%, the resulting value is $28.903 million, an increase in value of $3,929 million or 15.7%, which could 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.

[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 are preferred.

Given that the values can be altered significantly, and the process still works, it is questionable whether this process really provides any reasonableness. A proposed alternative method ("Recommended") for determining a value based upon private company transaction data is presented on **Exhibits 4 and 5**. 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, this assessment of risk is now based upon data 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.

III. 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 guidance is not Generally Accepted Accounting Principles ("GAAP") as promulgated by the FASB, 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. In addition, as intangibles don't 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

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

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.[13] 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[14], 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[15] 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, which prompts the question, is a premium above WACC an invalid assumption?

A discussion of exactly what types of intangibles[16] are recognized is useful. **Table 2** presents ASC 805 intangibles:

Table 2	
Type	**Description**

[13] FASB ASC 820 indicates a hierarch of inputs: Level 1, 2 and 3 where observable market data is given preference.
[14] 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.
[15] 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.
[16] As provided in FASB ASC 805.

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; b. Books, magazines, newspapers, other literary works; c. Musical works such as compositions, song lyrics, advertising jingles; d. Picture, photographs; 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 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.[17] This concept is validated under an assumption that there is a hierarchy[18] 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"), whereby the United States Treasury developed a methodology to determine the excess earnings of a business attributable to intangibles, which was then used to compensate distilleries and breweries

[17] See Smith and Parr (2006) page 769.
[18] As discussed on section 4.1.02 of the Appraisal Foundations publication "The Identification of Contributory Assets and the Calculation of Economic Rents."

for their loss of value during prohibition. According to Treasury guidance, "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."[19] This guidance assumes that intangibles by their nature possess greater risk than their tangible counterparts.

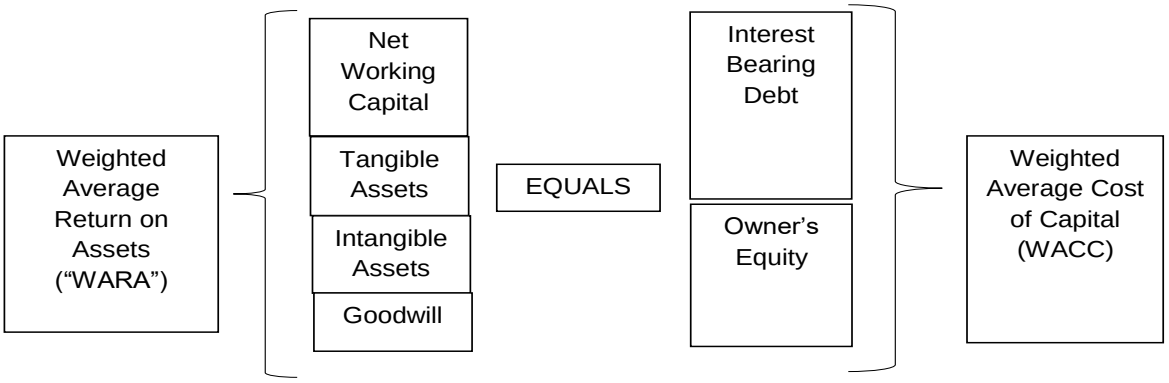
The selection of a discount rate for intangibles has been widely debated. Smith and Parr (2005) discuss the use of the unlevered cost of equity as a surrogate for intangible rates of return as intangibles are financed with equity. Stegink, Schauten & de Graff (2007) demonstrate empirically that Smith 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 is an important finding, 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 & 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 & 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 & Miller introduced, but the concept as of WACC as the starting point as a discount rate for the firm is widely accepted. Reilly & 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.

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.

[19] Revenue Ruling 59-60.

Although the selection of a discount rate as a starting point for an intangible is debated, in the U.S., 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 the 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[20], 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

[20] 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."

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 (Weighted Average Cost of Capital)…Selection of an overall rate of return for the entity (the weighted average cost of capital, or 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 best explained by the idea that the different classes of monetary, tangible and intangible assets (i.e. marketing, customer, artistic, contract and technology based) have different risk profiles. For instance, net working capital as a monetary asset, cash is expected to have the least risk and accounts receivables are expected to have greater risk than cash. 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. As a business cannot operate without a trained assembled workforce, workforce is generally not an intangible that has a return greater than WACC, but it is also not recognized apart from goodwill, either.[21] 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.

IV. Literature Review - Benchmarking

Auditors also have problems testing the reasonableness of the purchase price allocation. One way for the auditors to test the reasonableness of the outcome of the valuation is to compare the

[21] As indicated in FASB Accounting Standard Update No. 2014-18 (2014).

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.

This relative value is a related concept to the discount rate because the relative value under a WARA concept is expected to influence the discount rate. Higher levels of intangibles generate greater returns, which 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 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 0% to 173% and 0% to 96%, respectively and averaging 35% and 36%, 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 paper, 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 reasonable for the relative weighting of intangibles, the variation in pricing intangibles supplied from market data can be used

as a measurement of risk refine the intangibles discount rate, which is detailed in the policy recommendation section of this paper.

V. Literature Review - Conversion of Private Company Market Multiples to WACC

Although there is no observable data on intangible discount rates, there is market data on transactions of private companies and resulting market multiples. In practice WACC most often utilizes 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 if the discount rates for public and private companies are similar. Private Equity ("PE") Rates of Returns in contrast to publicly company returns are widely debated. 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 14.0% to 33.8%. Venture Capital Rates are even greater ranging from 15.0% to 60.0%.

Data from private company transactions does 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 Discounted Cash Flow ("DCF") method, which forecasts economic benefits over a period of years. 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 20% as presented below:

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

A data problem is that as growth is not revealed within 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 paper, I use the Capitalization Rate as the discount rate, instead of WACC and refer only to WACC for simplicity.

VI. Description of Private Company Data

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.

It's necessary to analyze the data by industry groupings because discount rates are considered to vary to account for industry risk.[22] 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 do so would significantly reduce the data in each industry. Consequently, for the purposes of this paper, 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
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 to pare the data down to 10,449 transactions.

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

VII. Model for Determining the Discount Rate

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

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

The Market Value of Invested Capital ("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 Earnings Before Interest and Taxes ("EBIT"), Weighted Average Cost of Capital ("WACC").[23] Although the growth in EBIT is not disclosed by the data, the use of Capitalization Rates instead of WACC directly is acceptable, because they are directly related.

Another simplifying assumption is the exclusion of tax rates. Discount rates generally are 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, which is the standard practice.

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

VIII. Model to Determine Relative Weightings of Individual Assets

To determine whether there is a relationship between the Capitalization Rate as a surrogate for WACC, the dependent variable and the weighting of assets as independent variables, an ordinary least squares regression is performed using the following independent variables:

$$\beta_0 + \frac{x_1}{\sum_{i=1}^{11} x_i} * \beta_1 + \frac{x_2}{\sum_{i=1}^{11} x_i} * \beta_2 + \frac{x_3}{\sum_{i=1}^{11} x_i} * \beta_3 + \frac{x_4}{\sum_{i=1}^{11} x_i} * \beta_4 + \frac{x_5}{\sum_{i=1}^{11} x_i} * \beta_5$$

$$+ \frac{x_6}{\sum_{i=1}^{11} x_i} * \beta_6 + \frac{x_7}{\sum_{i=1}^{11} x_i} * \beta_7 + \frac{x_8}{\sum_{i=1}^{11} x_i} * \beta_8 + \frac{x_9}{\sum_{i=1}^{11} x_i} * \beta_9 + \frac{x_{10}}{\sum_{i=1}^{11} x_i}$$

$$* \beta_{10} + \frac{x_{11}}{\sum_{i=1}^{11} x_i} * \beta_{11} + \mathcal{E} = WACC$$

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 ($\mathcal{E}$):

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[24] (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
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

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

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 variables are not robust, which is the case, the conclusion that intangibles are not necessarily risky assets is supported.

Of the 13,136 transactions are analyzed 2,687 or 20.5% 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) $\mu = 0.492$ $R^2 = 0.037$ N = 509	Mining (B) $\mu = 0.132$ $R^2 = 0.166$ N = 67	Construct. (C) $\mu = 0.361$ $R^2 = 0.035$ N = 501	Manufact. (D) $\mu = 0.232$ $R^2 = 0.025$ N = 1349	Trans. Com. (E) $\mu = 0.357$ $R^2 = 0.017$ N = 532	Wholesale (F) $\mu = 0.288$ $R^2 = 0.035$ N = 626	Retail (G) $\mu = 0.498$ $R^2 = 0.054$ N = 2325	Fin. Insur. (H) $\mu = 0.293$ $R^2 = 0.070$ N = 517	Services (I) $\mu = 0.391$ $R^2 = 0.010$ N = 4020	Pub. Adm. (J) $\mu = 0.405$ $R^2 =$ 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. An interesting result from a review of this data is that there is wide variation in average WACC rates ranging from 0.132 for Mining to 0.498 for Retail, with industries that have large intangible components such as Services, with a WACC of 0.391 having less risk than Retail. Retail is a currently a sector that is in distress. So, it makes sense that this industry would require a significant return.

These results do compare similar to the PE rates of returns, previously cited and not surprising, given that Private Equity Rates of return on an after-tax basis are generally significantly greater than equity rates of return in the Public Markets.[25] Additionally, pre-tax rates of returns are always above after-tax returns. If one were to use this data to determine WACC, to covert a pre-tax rate of return for Division A of 49.2% and assuming a corporate tax rate of 35.0%, 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 Squared 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 as measured by the Standard Deviation (σ) of the weightings is Technology (0.008) and the intangible with the greatest risk is Goodwill (0.354).

[25] Grabowski, Nunes & 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.

Division B: Mining

For this division, the selected sample is 67 transactions out of 88. The R Squared 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 as measured by the Standard Deviation (σ) of the weightings is the Trade Name (0.002) and the intangible with the greatest risk is Goodwill (0.287).

On an individualized basis, only non-competes (0.003) have 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 Squared 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 as measured by the Standard Deviation (σ) of the weightings is the Backlog (0.003) and the intangible with the greatest risk is Goodwill (0.354).

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 Squared 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 as measured by the Standard Deviation (σ) of the weightings is the Backlog (0.015) and the intangible with the greatest risk is Goodwill (0.328).

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 Squared 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 as measured by the Standard Deviation (σ) of the weightings is the Backlog (0.002) and the intangible with the greatest risk is Goodwill (0.369).

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 Squared 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 as measured by the Standard Deviation (σ) of the weightings is the Backlog (0.001) and the intangible with the greatest risk is Goodwill (0.335).

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 Squared 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 as measured by the Standard Deviation (σ) of the weightings is the Technology (0.004) and the intangible with the greatest risk is Goodwill (0.294).

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 Squared 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 as measured by the Standard Deviation (σ) of the weightings is the Backlog (0.001) and the intangible with the greatest risk is Goodwill (0.425).

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 Squared 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 as measured by the Standard Deviation (σ) of the weightings is the Backlog (0.012) and the intangible with the greatest risk is Goodwill (0.370).

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 3 transactions out of 3. Given the lack of data the model has no statistical validity and cannot be analyzed.

IX. Conclusion on Data

The results show that only current assets, non-competes and customer relationships have any statistical predictability to WACC in limited industries. In general, when intangibles do have significance, their coefficients are negative, which reduces WACC and implied risk. This finding supports the view stated by Lev and Gu (2008) that there are several industries do rely on intangibles and investment in intangibles are associated with reduce risk. Therefore, based upon this data, the concept that intangible always should have a premium above WACC is unfounded.

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, as 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., & 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 paper now focuses on a proposed solution to the use of premiums based upon the market data analyzed.

X. Policy Recommendation

My suggestion is to use the 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 paper.

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 within the industry. Since

Stegink, Schauten & 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 amongst 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** 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 albeit based upon its limitations 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.

References:

American Society of Appraiser. (2009). Business Valuation Standards Glossary. https://www.appraisers.org/docs/default-source/discipline_bv/bv-standards.pdf?sfvrsn=0

Best Practices For Valuations in Financial Reporting: Intangible Asset Working Group – Contributory Assets. (2010, May 31). Retrieved from https://www.appraisalfoundation.org/imis/docs/Valuation_Advisory_1_Identification_of_Contributory_Assets_and_Calculation_of_Economic_Rents.pdf

Dohmeyer, B. & Butler, P. (2012) The Implied Private Company Pricing Line: Empirically Observing the Cost of Capital COC = FCFF/P + G. Business Valuation Review: Spring 2012, Vol. 31, No. 1, pp. 35-47.

Grabowski, R. J., Nunes, C., & Harrington, J. P. (2017). 2017 Valuation Handbook: U.S. Guide to Cost of Capital. Newark: John Wiley & Sons, Incorporated.

Everett, C. (2017). 2017 Private Capital Markets Report. Pepperdine Private Capital Markets Project. Pepperdine University

FASB, Financial Accounting Standards Board. (n.d.). Retrieved December 23, 2017, from http://www.fasb.org/

Hitchner, J. (2003). Financial valuation handbook: applications and models. New York: Wiley.

International Financial Reporting Standards. (n.d.). Retrieved December 23, 2017, from http://www.ifrs.org/

International Valuation Standards Council – International Valuation Standards Copia CMS. (n.d.). Glossary. Retrieved March 18, 2018, from https://www.ivsc.org/standards/glossary

Jacobs, J.F. (2014). The One and Only Standard WACC. Social Science Research Network. http://ssrn.com/abstract=756105.

Lev, B., & Gu, F. (2016). The end of accounting and the path forward for investors and managers. Hoboken, NJ: John Wiley & Sons, Inc.

Mard, M. J., Hitchner, J. R., & Hyden, S. D. (2007). Valuation for financial reporting: fair value, measurements and reporting, intangible assets, goodwill and impairment. Hoboken, NJ: John Wiley & Sons.

Modigliani, F. & M.H. Miller. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. The American Economic Review. Vol 48, pp. 261- 297.

Pratt Stats. Business Valuation Resources. https://www.bvresources.com/

Pratt, S. P., Grabowski, R. J., & Brealey, R. A. (2014). Cost of Capital, Website Applications and Examples. Somerset: Wiley.

Pratt, S. P., Niculita, A. V., Reilly, R. F., & Schweihs, R. P. (2008). Valuing a business: the analysis and appraisal of closely held companies. New York: McGraw Hill.

Reilly, R. F., & Schweihs, R. P. (1999). Valuing intangible assets. New York: McGraw-Hill.

Sharpe, W.F. (1966). Mutual Fund Performance. Journal of Business. Vol. 39 No. 1.

Sharpe, William F. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. Journal of Finance. 19:3, pp. 425–42.

Smith, G., & Parr, R. (2005). Intellectual Property. Hoboken/N.J: Wiley.

Smith, G. V., & Parr, R. L. (2006). Intellectual property: Valuation, exploitation, and infringement damages. Hoboken, NJ: Wiley.

Robert T. Slee (2004). Private Capital Markets – Valuation, Capitalization, and Transfer of Private Business Interests. Hoboken, NJ: Wiley.

Statements on Auditing Standards. (n.d.). Retrieved March 05, 2018, from https://www.aicpa.org/research/standards/auditattest/sas.html

Standard Industry Classifications. United States Department of Labor https://www.osha.gov/pls/imis/sicsearch.html

Stegink, R., Schauten, M. & de Graaff, G. (2007). The discount rate for discounted cash flow valuations of intangible assets. Erasumus School of Economics. Rotterdam, Netherlands.

Zyla, M. L. (2013). Fair value measurement: practical guidance and implementation. Hoboken, NJ: Wiley.

APPENDICES

Exhibit 1

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

($000)

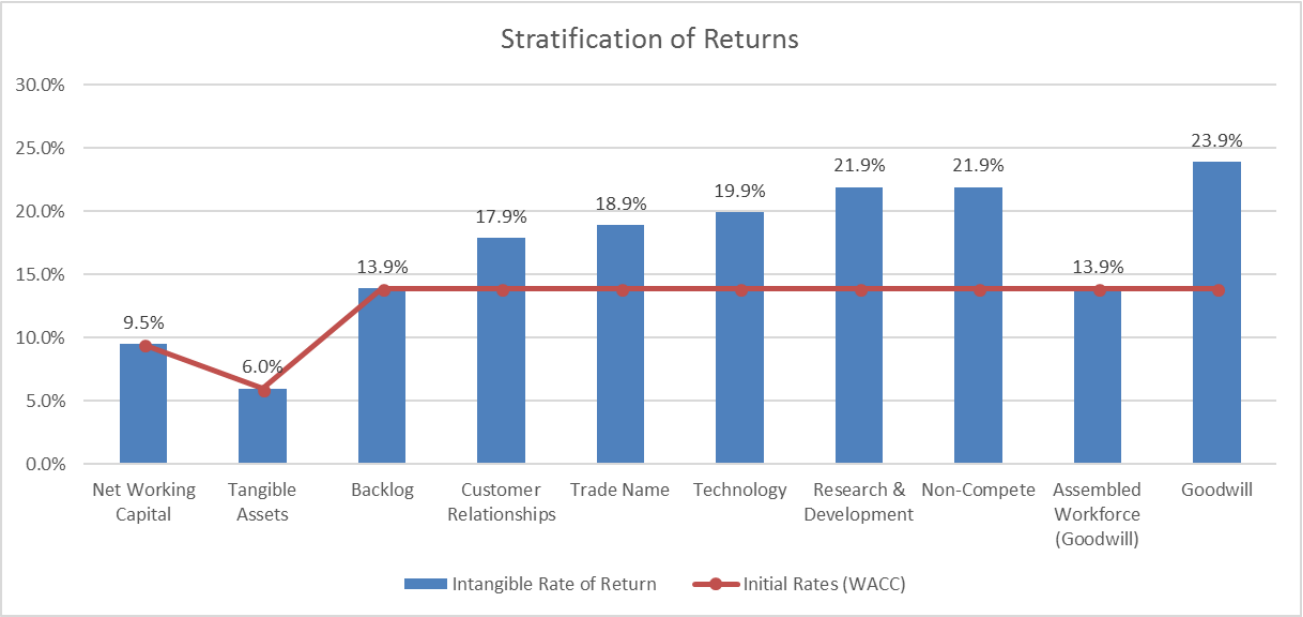
Year	Revenue 5% Growth	Royalty Rate	Royalty Savings	Maint. Costs @ 1%	Taxes @ 40%	Net Royalty Savings	Fraction of Year	Discount Period	PV Factor (@18.9%)	PV Royalty Savings	Tax Amortization Benefit: Mid-Year Discount	Tax Amortization Benefit: Cash Flow Factor
Year 1	$ 52,798	10.0%	$ 5,280	$ 528	$ 1,901	$ 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)

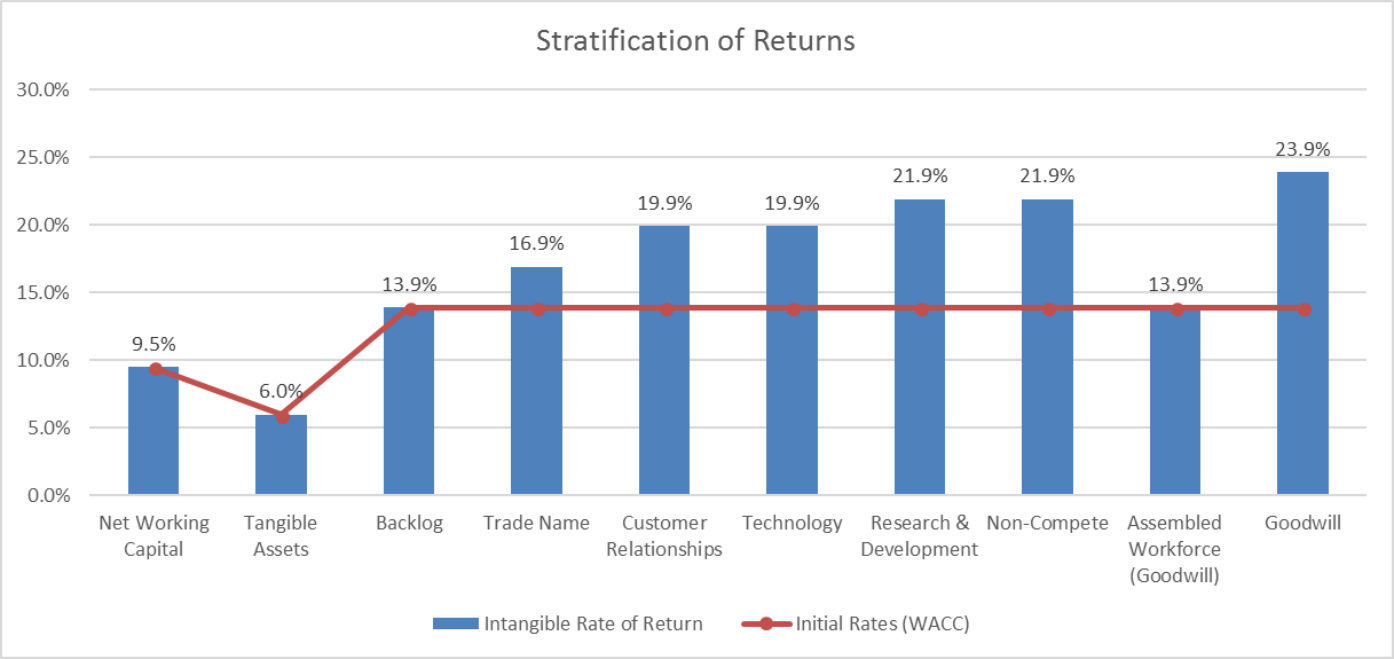
Year	Revenue 5% Growth	Royalty Rate	Royalty Savings	Maint. Costs @ 1%	Taxes @ 40%	Net Royalty Savings	Fraction of Year	Discount Period	PV Factor (@16.9%)	PV Royalty Savings	Tax Amortization Benefit: Mid-Year Discount	Tax Amortization Benefit: Cash Flow Factor
Year 1	$ 52,798	10.0%	$ 5,280	$ 528	$ 1,901	$ 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