THE MISUSE OF ACCOUNTING-BASED APPROXIMATIONS OF TOBIN'S q IN A WORLD OF MARKET-BASED ASSETS

ABSTRACT

Accounting-based approximations of Tobin's q (AATQ) are increasingly popular in marketing. AATQ differ from Tobin's original conception in that they use accounting data to assess the replacement cost of a firm's assets; the core problem with this is that valuable assets go unrecorded in external reports, including systematic under-recording of market-based assets.

This research examines the extensive erroneous claims made about AATQ in marketing studies. We note the widespread use of the metrics and demonstrate that the AATQ used in marketing (1) are not comparable across industries, (2) do not use only tangible assets in their denominator, and (3) should not find equilibrium at 1. AATQ are often described as performance metrics and can respond appropriately to certain types of positive performance. Unfortunately, they also respond positively to performance-neutral strategic choices. Furthermore, whenever AATQ exceed 1, as is typical, they increase even with completely wasted investments. We note that AATQ are especially problematic measures of performance for marketers because they are biased towards reporting that investments in market-based assets (e.g., brand equity and customer satisfaction) are effective. The misuse of AATQ we document suggests the need for marketing scholars to pay greater attention to the theoretical underpinnings of their metrics.

Keywords: marketing strategy; firm performance; Tobin's q; marketing accountability; intangible assets; marketing metrics

Marketing scholars commonly use accounting-based approximations of Tobin's q (AATQ) and we show numerous cases where AATQ are used in marketing. However, these metrics are problematic when firms rely on market-based assets like brands. We detail incorrect assertions made about AATQ, indeed many of the justifications for the use of AATQ rely upon citations to different metrics than the ones used by the marketing researchers. We demonstrate that the AATQ used in marketing (1) are not comparable across industries, (2) do not use only tangible assets in their denominator, and (3) show no theoretical reason to find equilibrium at 1. AATQ are often described as performance metrics and can respond appropriately to certain types of positive performance. Unfortunately, they also respond positively to performance-neutral strategic choices. We illustrate problems marketing scholars have overlooked in using AATQ as performance metrics, such as the considerable confusion as to whether AATQ measure past performance or future growth expectations. The key problem we note is that external reports typically do not record market-based assets; accountants under-record such assets to guard against overstating values, which leads to higher AATQ for firms focused on marketing. This biases AATQ towards giving evidence of the effectiveness of investments in market-based assets. Further, whenever AATQ exceed 1, as is the case for the average firm, the metrics increase even with wasted investments.

In this article, we explain various versions of Tobin's q, describe a generic AATQ model, and use it to illustrate problems that stem from using accounting data as an input to Tobin's q. We note the current confusion about these metrics and what this means for the results of past research using AATQ. We argue that, given current accounting policies, AATQ should not be used as a performance metric for questions relating to market-based assets.

The Use of Accounting-Based Approximations of Tobin's q in Marketing

Table 1 lists marketing studies using AATQ since the *Journal of Marketing* invigorated marketing/finance research with the 2004 special section, "Linking Marketing to Financial Performance and Firm Value." To create this list, we searched academic databases (e.g., JSTOR, top-tier marketing journal websites, and search engines like Google Scholar), for articles with hypotheses involving Tobin's q (searching "Tobin," "Tobin's q," "Q ratio," "q ratio," "Tobin's q in Marketing," "Marketing Metrics," "Measuring Marketing," and "Firm Performance"). It is clear that AATQ are widely used in marketing, a usage that shows little evidence of declining.

AATQ are a popular way to link marketing to firm performance, as noted by Park et al.: "Tobin's q has received wide acceptance in the current marketing literature as an appropriate measure of performance" (2013, p. 184). Marketers may have accepted Tobin's q but great confusion exists around what the AATQ used as measures of Tobin's q actually capture. A key problem is that the denominator of the original Tobin's q—replacement cost of assets—is unknown, so AATQ employ accounting-based estimates. Unfortunately, financial accounting statements omit important assets (Sinclair, 2016; Srivastava, Shervani, and Fahey, 1998), which means estimates of asset replacement cost are biased downwards in predictable ways, creating an upward bias in AATQ. Furthermore, as we will show, AATQ are impacted by (1) assessments of future performance, (2) historic performance, and (3) performance-neutral strategic choices. All three elements impact AATQ but have very different strategic implications. Failure to disentangle these impacts has led to misuse of the metrics.

Table 1. Key Marketing Studies Using AATQ Since 2004

Study	In	AATQ	Investigates
Rao, Agarwal, & Dahlhoff (2004)	JM	C&P	Branding Strategy
Anderson, Fornell, & Mazvancheryl (2004)	JM	C&P	Customer Satisfaction
Lee & Grewal (2004)	JM	C&P	Advertising & Comms.
Gruca & Rego (2005)	JM	C&P	Customer Satisfaction
Mittal et al. (2005)	MS	C&P	Customer Satisfaction
Luo & Bhattacharya (2006)	JM	C&P	CSR
Srinivasan (2006)	JM	C&P	Dual Distribution
Morgan & Rego (2006)	MS	C&P	Customer Satisfaction
Luo & Donthu (2006)	JM	C&P	Advertising & Comms.
Luo & Homburg (2007)	JM	C&P	Customer Satisfaction
Sorescu & Spanjol (2008)	JM	K&Z	Innovations
Hsu & Jang (2008)	IJHM	C&P	Advertising & Comms.
Fang, Palmatier, & Steenkamp (2008)	JM	C&P	Transition to Services
Nath & Mahajan (2008)	JM	C&P	CMO Impact
Morgan & Rego (2009)	JM	C&P	Branding Strategy
Lee & Chen (2009)	PIM	C&P	New Products
Krasnikov, Mishra, & Orozco (2009)	JM	C&P	Brand Identity
Wang, Zhang, & Ouyang (2009)	JAMS	C&P	Advertising & Comms.
Koh, Lee, & Boo (2009)	IJHM	C&P	Branding
Erickson & Rothberg (2009)	IMM	M/B*	Intellectual Capital
Grewal, Chandrashekaran, & Citrin (2010)	JMR	C&P	Customer Satisfaction
Torres & Tribó (2011)	JBR	M/B	Customer Satisfaction
Dotzel, Shankar, & Berry (2013)	JMR	C&P	Customer Satisfaction
Park et al. (2013)	JBR	C&P	Brand Identity
Kashmiri & Mahajan (2014)	IJRM	C&P	Family Ownership
Sridhar, Narayanan, and Srinivasan (2014)	JAMS	B&O	Advertising & Comms.
Germann, Ebbes, & Grewal (2015)	JM	C&P	CMO Impact
Malshe & Agarwal (2015)	JM	C&P#	Customer Satisfaction
Larivière et al. (2016)	JMR	M/B	Customer Satisfaction
Groening, Mittal, & Zhang (2016)	JMR	C&P	Customer & Employees
McAlister et al. (2016)	JMR	C&P	Advertising & Comms.
Sridhar et al. (2016)	JM	C&P	Advertising & Comms.
Kang, Germann, & Grewal, (2016)	JM	C&P	CSR

C&P=Chung & Pruitt; M/B=Market-to-Book; B&O = Berger & Ofek; K&Z= Kaplan & Zingales; # assumed from citations; * assumed from description.
JM=Journal of Marketing; MS=Marketing Science; JMR=Journal of Marketing Research; IJHM=International Journal of Hospitality Management; PIM=Product Innovation Management; IMM=Industrial Marketing Management; JAMS=Journal of the Academy of Marketing Science; JBR=Journal of Business Research; IJRM=International Journal of Research in Marketing.

We are not the first to note problems with Tobin's q (Dybvig & Warachka, 2015; Edeling & Fischer, 2016). Indeed, Mizik and Jacobson (2009a) countered Srinivasan and Hanssens' (2009a) advice to use Tobin's q, citing measurement error. We argue that, while this is true, problems with AATQ go well beyond simple measurement error. Bias gives false positives, making results easier to find using AATQ.

Prior criticism of Tobin's q has not impacted marketing's agenda. Table 1 shows 11 papers using AATQ published in the last five years; JMR and JM together saw seven in 2015/16 alone. Such research often cites papers recommending Tobin's q, such as Rust et al. (2004) or Srinivasan and Hanssens (2009b) (1,115 and 522 citations, respectively, on Google Scholar, 11/24/2017). Meanwhile, Mizik and Jacobson (2009a), which criticizes Tobin's q, and Srinivasan and Hanssens (2009a), which largely accepts the criticism, are not cited by the papers in Table 1 and have only 28 citations together. Marketing has enthusiastically embraced AATQ.

Tobin's q and Its Variants: An Overview

Nobel Prize-winning economist James Tobin introduced "q," a theoretical measure of the ratio of market value to replacement cost of a firm's assets (Tobin, 1969). The usefulness of Tobin's q relies upon market valuations being relatively accurate so in this research, we adopt the assumption of market efficiency, which allows for the possibility that Tobin's q-based measures could be useful.

1) Tobin's Original q $= \frac{Market\ Value}{Replacement\ Cost\ of\ Assets}$

We use a marketing definition, rather than a financial accounting definition, of an asset. In this an asset is something with economic value that currently exists. Our definition includes

market-based assets (Srivastava, Shervani, and Fahey, 1998) and other assets where value exists but is unrecorded. Obvious examples include most brands and customer relationships.

To relate this back to Tobin's q, consider an unknown parameter, Ψ. This parameter equals a firm's market value less its assets' replacement cost; so it captures firm value in excess of asset value. We call this *market judgment*, as it is driven by assessments of how effectively the firm will use its assets. If Tobin's q exceeds (is less than) 1, the market judgment about the future is positive (negative) and the firm is worth more (less) than the sum of its assets. We can rewrite Tobin's original q as follows:

$$2)\ \text{Tobin's original q} = \frac{Replacement\ Cost\ of\ Firm's\ Assets + \Psi}{Replacement\ Cost\ of\ Firm's\ Assets}$$

Unfortunately, the replacement cost of a firm's assets is unknown, so scholars often use the asset values recorded in the external reports. As Erickson and Rothberg observe, "Since replacement cost is often hard to get, a common variation on the measure is to use book value of the assets" (2009, p. 162). All of the AATQ used in the papers in Table 1 employ a variant of book value.

Lindenberg and Ross (1981) and Berger and Ofek (1995) each suggest an AATQ. Chung and Pruitt introduce an easier approximation that became popular, as it captured 96.6% of the variance of Lindenberg and Ross' version (Chung and Pruitt, 1994). (Note the comparison to an earlier AATQ, not Tobin's original q). Market-to-book measures have also been used as AATQ (Kaplan and Zingales, 1997). There are other q variants which may have different properties, as we later discuss, but in this paper we focus only on the AATQ used in marketing (Table 1).

$$3)\ \text{Chung and Pruitt's } q \text{ Approximation} = \frac{\text{Market Value of Equity + Preferred Stocks + Debt}}{\text{Total Assets}}$$

Where Market Value of Equity = Stock Price * Outstanding Common Stocks; Preferred Stocks = Liquidation Value of Outstanding Preferred Stock; Debt = Short-term Liabilities – Short-term Assets + Long-term Debt. A variant uses Debt equal to (Current Liabilities - Current Assets) + Inventories + Long-term Debt.

Scholars often suggest that Tobin's q is a financial or capital market metric (Gruca and Rego, 2005; Anderson, Fornell, and Mazvancheryl, 2004; Dotzel, Shankar, and Berry, 2013; Germann, Ebbes, and Grewal, 2015; Koh, Lee, and Boo, 2009; Luo and Bhattacharya, 2006; Luo and Donthu, 2006; Mittal et al., 2005; Nath and Mahajan, 2008; Rao, Agarwal, and Dahlhoff, 2004). Assuming market efficiency, financial metrics have the advantage of being forward looking, unlike measures based on historical accounting data. In addition, in efficient markets, financial measures adjust for risk by discounting future cash flows at a risk-appropriate rate. However, we believe that calling marketing's AATQ "financial metrics" may mislead. We prefer the term "hybrid financial/accounting metrics," as accounting data clearly impact AATQ.

Resolving the Confusion Around Accounting-Based Approximations of Tobin's q

Next, we aim to resolve confusion around Tobin's q. Consider that there are two broad types of assets. The first is tangible (physical) assets. Tangible asset increases are either earned through performance (e.g., a successful development project), or arise through strategic choice (e.g., borrowing to purchase an asset). By earned increase we mean the asset arising is valued above the level of the investment. Spending $2m to create an asset worth $3m earns $1m. (Similarly an earned decrease occurs when the assets are devalued). Strategic choice describes when net assets are neither created nor destroyed. Assets are either moved around, e.g., from cash to property, or come attached to an equivalent liability, e.g., a property acquired with a 100% mortgage.

The second type, intangible assets, includes market-based assets (e.g., brand equity). Intangible assets may be earned but they can also arise from (performance-neutral) strategic choices (e.g., investments in brand building that neither create nor destroy value). In this respect, intangible assets resemble tangible assets. Either asset type may be recorded or unrecorded in a firm's external reports (see Table 2). Tangible assets (T) equal RT+UT and intangible assets (I) equal RI+UI, but unrecorded assets (UT and UI) are unknown. The replacement cost of assets equals the summation of all assets, RT+RI+UT+UI, but given that unrecorded assets (UT and UI) are unknown, this is hard to estimate.

Table 2. A Taxonomy of Assets

	Assets Recorded in External Reports	*Assets Unrecorded in External Reports*
Tangible (T)	**Recorded Tangible (RT):** Examples: Property (Compustat code: PPEGT/PPENT); cash is a recorded tangible for our purposes (CHE)	**Unrecorded Tangible (UT)**: Examples: Fully depreciated machine with a positive market value (not recorded so no Compustat code)
Intangible (I)	**Recorded Intangible (RI)**: Examples: Goodwill; acquired brands (GDWL); some R&D types (XRD)	**Unrecorded Intangible (UI)**: Examples: Most market-based assets (e.g., customer relationships); other types of R&D (not recorded so no Compustat code)

Because numerous AATQ variants are used, we consider a generic AATQ for a debt-free company (the effect of borrowing will be seen later). This form of AATQ compares the market value of a firm to the value of its *recorded* assets. The denominator, accounting estimate of assets, equals recorded tangible plus recorded intangible assets (RT+RI). This is a biased estimate of the replacement cost of all assets, i.e., RT+RI+UT+UI.

4) Generic AATQ $= \frac{Replacement\ Cost\ of\ Firm's\ Assets+\Psi}{Recorded\ Accounting\ Estimate\ of\ Firm's\ Assets} \equiv \frac{RT+RI+UT+UI+\Psi}{RT+RI} \equiv \frac{T+I+\Psi}{T\theta_T+I\theta_I}$

Let θ_T be the proportion of tangible assets recorded in the external reports, i.e., $\frac{RT}{RT+UT}$. Let θ_I be the proportion of intangible assets recorded in the external reports, i.e., $\frac{RI}{RI+UI}$. Note that market value must be positive, so market judgment cannot be more negative than the total value of firm assets, T+I+Ψ>0, so Ψ> – (T+I). (See Table 3 for our notation.)

Table 3. Summary of Notation Used in Theoretical Models

Term	Meaning
Ψ	Market judgment parameter
T	Total of firm tangible assets
I	Total of firm intangible assets, (T+I = all firm assets)
RT & RI	Recorded tangible assets & recorded intangible assets
UT & UI	Unrecorded tangible assets & unrecorded intangible assets
θ_T	Proportion of tangible assets that are recorded, RT/(RT+UT)
θ_I	Proportion of intangible assets that are recorded, RI/(RI+UI)
τ	Change in level of assets
α	An investment (and any associated borrowing) made by the firm
β	Funds returned from an investment
γ	Earned increase in an asset

Are Accounting-Based Approximations of Tobin's q Comparable Across Industries?

Accounting rules determine which type of tangible and intangible assets are captured in the external reports (Fischer, 2016). In other words, the accountants and other policy makers involved in FASB and similar bodies, when setting accounting standards, implicitly specify the proportions of each type of asset recorded, θ_T and θ_I. When an accounting rule change allows for a greater proportion of assets to be recognized—i.e., θ_T or θ_I increases—the denominator gets relatively bigger, and AATQ decrease.

Lemma 1. *Where tangible and intangible assets exist, AATQ are lower when a greater percentage of assets are recorded,* $\frac{dAATQ}{d\theta_I} = -\frac{I(T+I+\Psi)}{(I\,\theta_I + T\,\theta_T)^2} < 0$ *and* $\frac{dAATQ}{d\theta_T} = -\frac{T(T+I+\Psi)}{(I\,\theta_I + T\,\theta_T)^2} < 0.$

Tobin's q is argued to be "comparable across firms in different industries" (Anderson, Fornell, and Mazvancheryl, 2004, p. 175). (See also Germann, Ebbes, and Grewal, 2015; Grewal, Chandrashekaran, and Citrin, 2010; Lee and Grewal, 2004; Mittal et al., 2005; Nath and Mahajan, 2008; Park et al., 2013. An appendix supplies quotations showing claims made and notes our response to the claims.) The problem is that industries require different mixes of tangible and intangible assets (e.g., plant versus brand), and accounting conventions determine which types of assets are recorded. This means the most explicit justification for cross-industry comparability that we saw—"Tobin's q can be used across industries because accounting conventions do not affect it" (Dotzel, Shankar, and Berry, 2013, p. 265)—is simply not true of the AATQ that these scholars use. Given that accounting conventions set θ_I and θ_T, Lemma 1 means that AATQ are impacted by these conventions.

To illustrate this point, we looked at the Standard & Poor's 500 (S&P 500) Index at the beginning of 2014, which gave us 373 companies after excluding firms for which a full 10 years of prior data was not available (e.g., due to launches, mergers, acquisitions, bankruptcies, and financial firms not disclosing all necessary information). We ran a variance decomposition model to assess the impact of industry on Chung and Pruitt's AATQ. The significant effect of NAICS code ($z = 24.06$, $p < .01$) suggests inter-industry differences. AATQ are impacted by industry effects.

Indeed, if accountants do their jobs properly – i.e. faithfully follow accounting conventions – they will more reliably record tangible assets than intangible assets (Sinclair, 2016) (i.e., $\theta_T > \theta_I$). This means we should expect that firms in industries that are more reliant on intangible assets should have higher AATQ, all else being equal. Let τ be a difference in the level of

tangible assets, so an industry with a greater reliance on tangible assets will have a greater proportion of tangibles, +τ, compared to intangibles, -τ, $\frac{(T+\tau)+(I-\tau)+\Psi}{(T+\tau)\theta_T+(I-\tau)\theta_I}$.

Lemma 2. *If $\theta_T>\theta_I$, then industries more reliant on tangible assets (where τ is greater) will, all else equal, have lower AATQ than those more reliant on intangibles, $\frac{dAATQ}{d\tau} = \frac{(T+I+\Psi)(\theta_I-\theta_T)}{((I-\tau)\theta_I+(T+\tau)\theta_T)^2}$ is negative given $\Psi > -(T + I)$ and a squared denominator.*

We see this higher AATQ for industries more reliant on intangibles in our S&P 500 data. In the first year of our data, 2004, Google's AATQ was 15.53 and Starbucks scored 7.31. Firms less reliant on market-based assets such as Jacobs Engineering Group Inc.'s (1.37) and Honeywell (1.26) had considerable lower AATQ. Strategy dictates asset usage so we expect predictable differences depending upon firm strategy. (We will address the implications for marketing later).

Do Accounting-Based Approximations of Tobin's q Use Only Tangible Assets?

Tobin's original theory seems to imply that q's denominator comprises all of the firm's assets—"the ratio of the market value of the firm to the replacement cost of the firm's assets" (Rao, Agarwal, and Dahlhoff, 2004, p. 129). AT, the old Compustat item number 120 ("total assets") typically used in the AATQ equals all recorded assets and RT+RI≠RT, since RI> 0. However, confusion remains as to whether the denominator should constitute all assets, or just tangible assets. Rust et al. assert that "Tobin's q is the ratio of the market value of the firm to the replacement cost of its <u>tangible assets</u>" (2004, p. 79, our underlining). (See also Erickson and Rothberg, 2009; Groening, Mittal, and Zhang, 2016; Lee and Grewal, 2004; Malshe and Agarwal, 2015; Mittal et al., 2005; and the appendix for quotes.) Problems are especially obvious where an article's text contradicts the formula presented (e.g., Grewal, Chandrashekaran, and

Citrin 2010, p. 618; Park et al., 2013, p. 184; Anderson, Fornell, and Mazvancheryl, 2004, pp. 175, 177, and 183). Some marketers may believe that accountants never record intangible assets, RI=0, but this is incorrect. Goodwill is a well-known recorded intangible (Goldfarb, Lu, and Moorthy, 2009; Lev, 2001; Lusch and Harvey, 1994). In our S&P data, we found 24% of total assets recorded were intangibles, and 91.2% of our year/firm combinations reported intangibles.

Formulas using only tangible assets as their denominator have been outlined in economics (Hirsch and Seaks, 1993; Montgomery and Wernerfelt, 1988; Wernerfelt and Montgomery, 1988). Yet these formulas are not used in any of the marketing papers in Table 1. In fact, such approaches (which effectively downplay the importance of intangible assets) implicitly contradict the market-based assets approach of Srivastava, Shervani, and Fahey (1998), which 19 of the 33 papers in the table reference. The mere existence of these formulas in economics has bred confusion, as marketers cite properties derived from formulas in economics that they do not use in their research. (For example, Germann, Ebbes, and Grewal 2015; Grewal, Chandrashekaran, and Citrin 2010; Malshe and Agarwal 2015).

Will Accounting-Based Approximations of Tobin's q Tend to 1?

Tobin (1969) suggests that q should oscillate around 1, as market value approximates asset replacement value in the long run; marketers echo this sentiment (See Rao, Agarwal, and Dahlhoff, 2004; Fang, Palmatier, and Steenkamp, 2008; Hsu and Jang, 2008; and the appendix for details.) The prevailing logic is that if asset replacement cost is consistently higher than market value, the firm should be sold for parts, while consistently high market values should vanish in competitive markets.

Unfortunately, AATQ are consistently above 1, because assets tend to be systematically undervalued in external reports for the following reasons: (1) certain classes of assets are typically unrecorded; (2) accountants aim never to overstate, so recorded assets are conservatively valued; and (3) accounting rules typically prevent increasing asset values but encourage reducing asset values. Barring accounting errors, the proportion of each type of assets recorded, θ_T and θ_I, are less than 1. Indeed, given some asset values are recorded, $RI + RT > 0$, AATQ will only fall below 1 when the market judgment is sufficiently negative to compensate for the under-recording of assets.

Lemma 3. *Given* $\frac{RT+RI}{RT+RI} = 1$*, the generic AATQ equals 1 only when* $\frac{UT+UI+\Psi}{RT+RI} = 0$*, meaning that market judgment,* Ψ*, must equal -(*$UT + UI$*).*

There seems no theoretical reason for AATQ to find equilibrium at 1, i.e., Ψ=-(UI+UT), but are AATQ typically above 1? We calculated Chung and Pruitt's AATQ for our sample of 373 S&P 500 firms each year. The average value never falls below 1 (mean 1.81, median 1.44), even during the 2008 crash, which drastically reduced market values. The average AATQ value in the marketing research papers for which it was available was 1.6, also above 1 (t-test, $p < .001$.) That AATQ are consistently above 1 suggests they do not capture what Tobin originally proposed.

Accounting-Based Approximations of Tobin's q and Reliance on Intangibles

A theoretical measure of reliance on intangible assets is the replacement cost of all assets divided by the replacement cost of tangible assets. In our notation, this would be

5) $Reliance\ on\ Intangibles = \frac{T+I}{T} = \frac{T+I+\Psi-\Psi}{T}\ \frac{Market\ Value\ of\ Firm-\Psi}{Replacement\ Costs\ of\ Tangibles}$

Ideally we need the market's judgment, Ψ, which is unobserved to measure reliance on intangibles. As this ideal measure is unavailable, AATQ have been used (See Rao, Agarwal, and Dahlhoff, 2004; Erickson and Rothberg, 2009; Hsu and Jang, 2008; Grewal, Chandrashekaran, and Citrin, 2010; Groening, Mittal, and Zhang, 2016; Morgan and Rego, 2009; Simon and Sullivan, 1993; Rust et al., 2004; Srinivasan, 2006; Wang, Zhang, and Ouyang, 2009; and the appendix for quotes.) This is far from perfect (the numerator includes market judgment and the denominator includes recorded intangibles but not unrecorded tangibles) but, all else equal, increasing a firm's reliance on intangible assets increases AATQ.

A significant problem arises, however, when reliance on intangibles and performance are treated as synonymous. For example, Groening, Mittal, and Zhang (2016) say that "[Tobin's q is] generally attributed to the intangible value enjoyed by the firm," yet call Tobin's q "a stock-market-based performance measure" (p. 13). Sridhar, Germann, Kang, and Grewal (2016) suggest Tobin's q both "measures firm performance" and "changes in unmeasured intangible assets" (p. 2). Given intangible value and performance are different concepts, it is unclear how any metric can properly measure both.

Performance differs from intangible value because intangible assets are not, by their mere existence, evidence of value creation. Successful firms can earn intangible assets as they can earn tangible assets. Alternatively, managers can simply purchase tangibles or intangibles. There are many examples in marketing of purchasing intangibles; when P&G bought Gillette they bought valuable intangibles, e.g., the Gillette brand. Investments in brand-building advertising essentially are an attempt to purchase an intangible asset. If the brand equity created equals the amount spent, this investment is performance neutral (technically, after compensating for all

relevant factors, e.g., impact on a firm's risk profile). It is only when the brand equity generated is greater than the investment, e.g., the advertising's cost, that this is positive performance. Similarly, when less brand equity is created than the investment this is negative performance. In this way, an investment's impact has (1) a bought element, which we call strategic choice (i.e., the amount invested), and (2) an earned element (i.e., value created above/below the investment).

Even unsuccessful (value-destroying) investments in intangibles will typically create some assets (albeit less than the amount invested). This means that the mere presence of intangible assets is not evidence of value creation. Given that marketing investments typically purchase intangibles, equating intangible assets' existence with evidence of value creation means any empirical test of whether marketing investments create value is redundant. By this logic, marketing typically creates intangibles and intangibles equal value, so if one equates intangibles with value creation one has already assumed that marketing typically creates value.

Do Accounting-Based Approximations of Tobin's q Measure Performance?

Many scholars claim that AATQ measure performance. For instance, Germann, Ebbes, and Grewal do this by stating, "firm performance (i.e., Tobin's q)…" (2015, p. 3; see also Rust et al., 2004; Anderson, Fornell, and Mazvancheryl, 2004; Lee and Grewal, 2004; Gruca and Rego, 2005; Mittal et al., 2005; Luo and Bhattacharya, 2006; Luo and Donthu, 2006; Luo and Homburg, 2007; Sorescu and Spanjol, 2008; Fang, Palmatier, and Steenkamp, 2008; Nath and Mahajan, 2008; Morgan and Rego, 2009; Lee and Chen, 2009; Krasnikov, Mishra, and Orozco, 2009; Koh, Lee, and Boo, 2009; Grewal, Chandrashekaran, and Citrin, 2010; Torres and Tribó, 2011; Dotzel, Shankar, and Berry, 2013; Park et al., 2013; Malshe and Agarwal, 2015; Kashmiri and Mahajan, 2014; Groening, Mittal, and Zhang, 2016; Larivière et al., 2016; Kang, Germann,

& Grewal, 2016 and the appendix for quotes). We suggest that many scholars do not clearly conceptualize what they mean by performance, or at least compare this to other scholar's conceptions. Across papers AATQ are said to be doing a wide range of things that are plausibly, but imprecisely, related to performance and which contradict, without explicitly noting this, other scholars' conceptions.

Even before seeing our detailed arguments, it should be clear that no measure can perfectly capture "future growth expectations," as Torres and Tribó (2011, p. 1092) claim, while also being able to "account for the firm's past performance," as Lee and Chen (2009, p. 103) assert. There is some logic behind the claim that AATQ measure historic performance and some logic behind the claim that they measure future growth expectations, but ultimately, we will show that AATQ are inappropriate for measuring either type of performance.

Why Scholars Think AATQ Measure Performance

Equating AATQ with Tobin's theoretical q may explain assertions that AATQ are solely forward-looking performance metrics. Unfortunately, marketers do not use the theoretical q, and the AATQ used are impacted by factors unconnected to forward-looking performance. That said, AATQ do rise with increases in market judgment for firms with recorded assets, i.e., RT+RI>0.

Lemma 4. *AATQ rise with market judgment as* $\frac{dAATQ}{d\Psi} = \frac{1}{RT+RI}$ *, and* $RT + RI > 0$.

Accountants under-record assets (Mizik and Nissim, 2011; Sinclair and Keller, 2014; Srivastava, Shervani, and Fahey, 1998), and the justification for AATQ as historic performance measures is that earned asset increases often go unrecorded. Any earned increase in an

unrecorded intangible asset, such as customer relationships, increases AATQ. (Note a similar logic applies to unrecorded tangibles but the impact is less common). All earned increases will be recognized by efficient financial markets, which means that whenever they are not recorded in the accounts, such increases cause AATQ to rise (for firms with any recorded assets).

Lemma 5. *AATQ rise with an earned increase in unrecorded intangible assets as* $\frac{dAATQ}{dUI} = \frac{1}{RT+RI}$ *, and unrecorded tangibles as* $\frac{dAATQ}{dUT} = \frac{1}{RT+RI}$*, given* $RT + RI > 0$.

Performance type (forward looking/historic) differs between Lemma 4 and Lemma 5, generating confusion about what, exactly, AATQ measure. Yet with both Lemma 4 and Lemma 5 good performance corresponds with an increase in AATQ. If AATQ only responded to historic and future growth expectations the metrics might be merely somewhat confusing. Unfortunately, performance and AATQ do not always move in the same direction. The fact that, as we will show, AATQ can increase as a result of performance negative actions can mislead us into thinking performance problems are actually evidence of performance success.

How AATQ Fail to Effectively Measure Historic Performance

Consider a firm earning an increase in recorded assets; for instance, the firm makes a profit on a transaction and receives this in the form of increased cash. Clearly positive performance has occurred and the arguments for AATQ are predicated on AATQ increasing with positive performance. If AATQ are a valid measure of historic performance one would expect an earned increase in recorded assets to increase AATQ. We will show that AATQ fall whenever $\mathrm{UI} + \mathrm{UT} > -\Psi$; the market judgment is not so negative that it outweighs all unrecorded assets.

Is the condition that $UI + UT > -\Psi$ a rarity? Hardly—the condition holds whenever the AATQ is above 1 (i.e., in normal circumstances). In every year that we analyzed (2004 to 2013), the average firm would see a decrease in AATQ for positive historic performance that created recorded assets. 72.5% of all firm year combinations have AATQ above 1, a substantial majority of firms in any year would see an earned increase in recorded assets leading to a fall in AATQ.

Lemma 6. *AATQ fall (rise) with an earned increase (decrease) in recorded assets, intangible or tangible, as* $\frac{dAATQ}{dRI} = -\frac{UI+UT+\Psi}{(RI+RT)^2}$ *and* $\frac{dAATQ}{dRT} = -\frac{UI+UT+\Psi}{(RI+RT)^2}$ *if* $UI + UT > -\Psi$.

As internally generated intangible assets are rarely recorded (Sinclair, 2016), the impact of an earned increase in recorded intangible assets is largely moot. It is hard to think of good examples where a firm would be permitted to increase recorded intangible assets through superior performance so we can largely ignore this.

What is not trivial is the way AATQ respond to an increase in earned recorded tangible assets. This is an everyday event for firms. For-profit firms eventually aim to generate cash, and any increase in cash arising from superior performance is an earned increase in recorded tangible assets. If AATQ adequately measure historic performance, they should rise with superior performance. However, earned increases in recorded assets often lead to a decrease in AATQ.

To visualize the problem, consider failure's impact. A firm makes a completely wasted investment: the cash is flushed down the toilet. This decision reduces recorded assets and Lemma 6 tells us that, all else equal, the average firm will see an increase in AATQ.

AATQ Change with Performance-Neutral Strategic Choices

Performance is an outcome (e.g., generating a profit), while strategic choices are decisions made in the hope of gaining an outcome (e.g., making an investment). A performance-neutral outcome is when an investment of $X creates an asset of exactly $X (after adjusting for any impact on risk, tax liabilities, etc.) A performance-neutral asset transfer from cash to brand is analogous to transfers between bank accounts: assets move around but their total (replacement cost) does not change. Performance-neutral choices should not predictably move a performance measure as, by definition, they do not impact performance. Yet AATQ can change with a performance-neutral choice of off-balance-sheet financing, dividend payments, depreciation policies, debt issuances, or equity structure, among other things.

Consider a firm that borrows cash; this increases recorded assets, which features on both the numerator and denominator. (For example, Chung and Pruitt's AATQ will see an increase in Debt (numerator) and an equivalent increase in Total Assets (denominator)). Even if this loan is performance neutral, meaning it has no impact on market judgment, AATQ will typically fall. A similar logic applies when purchasing recorded intangibles (e.g., borrowing to buy an established brand and recording the acquired intangible (Fischer, 2016)). Let α_1 be an investment/ borrowing that increases both the numerator and denominator of the AATQ, i.e., $\frac{\mathrm{RT}+\alpha_1+\mathrm{RI}+\mathrm{UT}+UI+\Psi}{RT+\alpha_1+\mathrm{RI}}$.

Lemma 7. *Performance neutral increases in recorded assets, e.g., investments financed by borrowing, lower AATQ where AATQ>1 as* $\frac{dAATQ}{d\alpha_1} = -\frac{UI+UT+\Psi}{(RI+RT+\alpha_1)^2}$.

The archetypical marketing strategy choice is to increase unrecorded assets at the expense of recorded assets (e.g., to invest cash in an unrecorded brand asset). This strategy, all else being

equal, has a positive impact on AATQ. To see this impact, let α_2 be any investment that reduces a recorded asset, such as cash, and creates an unrecorded intangible asset of equal value; by definition, this is performance neutral. The generic AATQ after the asset transfer is $\frac{\mathrm{RT}+\mathrm{RI}+\mathrm{UT}+UI+\Psi}{RT+\mathrm{RI}-\alpha_2}$, with α_2 =0 being no asset transfer. Any performance-neutral transfer to unrecorded assets increases AATQ. The opposite also holds. A performance-neutral transfer of an unrecorded asset into a recorded asset means that AATQ fall. For example, consider a performance neutral event when a brand that was built internally – so its value is unrecorded – is licensed. This will generate cash but, being performance neutral, it reduces the brand's value by the equivalent of the cash generated, e.g., through brand dilution. This causes AATQ to fall.

Lemma 8. *Converting recorded assets into (from) unrecorded assets increases (decreases) AATQ.* $\frac{dAATQ}{d\alpha_2} = \frac{RI+RT+UI+UT+\Psi}{(-\alpha_2+RI+RT)^2}$ *>0 as RI+RT+UI+UT>-Ψ, given the firm has positive value.*

One might ask, "How can a firm decide to turn a recorded asset like cash into an unrecorded asset?" Arguably, the most common way to do so is to invest in marketing. For example, the explicit purpose of brand-building advertising is to spend cash creating an unrecorded market-based asset, brand equity. A similar outcome arises from customer acquisition spending, e.g., banks giving tablets to students. These trade a recorded asset, cash, to create an unrecorded market-based asset, a customer relationship. The problem we note—that AATQ predictably rise with strategic choices—is not an obscure exception; Lemma 8 covers the heart of marketing strategy. Using AATQ risks giving false positives for marketing investments. Table 4 summarizes why AATQ are messy measures of strategic choice, future performance, and historic performance. Changes inconsistent with a performance metric are in bold.

Table 4. What Changes Accounting-Based Approximations of Tobin's q?

Future Performance	Historic Performance	Strategic Choice
Earned increases in market judgment make AATQ rise (Lemma 4)	Earned increases in unrecorded assets make AATQ rise (Lemma 5)	**Performance-neutral increases in recorded assets make AATQ fall (Lemma 7)**
Earned decreases in market judgment make AATQ fall (Lemma 4)	Earned decreases in unrecorded assets make AATQ fall (Lemma 5)	**Performance-neutral decreases in recorded assets make AATQ rise (Lemma 7)**
	Earned increases in recorded assets usually (when UI+UT>-Ψ) make AATQ fall (Lemma 6)	**Performance-neutral transfers from recorded assets make AATQ rise (Lemma 8)**
	Earned decreases in recorded assets usually (when UI+UT>-Ψ) make AATQ rise (Lemma 6)	**Performance-neutral transfers to recorded assets make AATQ fall (Lemma 8)**

In summary, we argue that AATQ give false positives because of biases introduced by their use of accounting data, and so have problems measuring performance in marketing.

Why Are AATQ Especially Problematic in Marketing?

Mittal et al. (2005) observe that "[i]n extreme cases, not accounting for the replacement value of an intangible asset may result in 'overestimation' of a firm's true q" (p. 550). We suggest that extreme cases are not only when problems arise. AATQ give problems in most cases and, as outlined below, the problems are especially acute in marketing research. The topics that marketers study (Table 1) often examine the effectiveness of investments in market-based assets, such as brand building, advertising, and customer satisfaction. Such investments transfer assets from a recorded tangible to an unrecorded intangible asset. These theoretically increase AATQ, even when the transfer is performance neutral and can increase AATQ even for wasted investments. That investments in marketing often aim to create unrecorded intangible assets and

these can increase AATQ independently of performance makes AATQ poor measures of performance. Below, we show four problems especially relevant to investments in marketing.

A: Strategic Choices to Invest in Marketing Raise AATQ Independent of Performance

Lemma 8 tells us that transferring funds from a recorded to an unrecorded asset will increase AATQ independent of performance. Merely spending cash on advertising instead of machinery increases AATQ. Figure 1A shows how the impact of a performance-neutral investment on AATQ grows with the percentage of the investment that is in marketing (i.e., unrecorded) assets. To create this figure, we assume; that the firm has an average AATQ (e.g., 1.6), that the firm makes marketing investments that create unrecorded assets while any alternative investments create recorded assets, and the investment is 10% of the replacement cost of the firm's assets.

B: Problems Are More Likely to Occur When Considering Marketing-Focused Firms

As marketing-focused firms focus on less reliably recorded intangible assets, such firms will have relatively high AATQ compared to other firms at the same level of market judgment (Lemma 2). This means that there is a range of market judgment that would see marketing-focused firms have AATQ>1, but non-marketing-focused firms have AATQ<1. AATQ have the wrong sign for a performance measure when AATQ>1 (Lemma 6), meaning that in the specified range, AATQ rise with wasted investments only for marketing-focused firms (see Figure 1B).

C: Market Judgment Would Have To Overreact to Compensate for Marketers' Wasted Spending

Investment failures not only waste funds, but may convey information about the firm's future prospects. One might conjecture that a decrease in market judgment could offset any

increase in AATQ from wasted investments; this may be true but it does not address the bias in AATQ. Figure 1C shows the drop in market judgment necessary to stop a firm's AATQ from rising after a wasted investment, depending upon the percentage of assets that are marketing assets. Consider a firm making a recorded negative tangible investment versus a similarly negative unrecorded intangible investment. The investment is α_3, which is less than all recorded assets, $\alpha_3 < T\theta_T + I\theta_I$. The benefit is β, and $\alpha_3 > \beta > 0$, given that the investment is performance negative. AATQ after a recorded tangible and unrecorded intangible asset investment are, respectively, $\frac{\Psi+I(1-\theta_I)+T(1-\theta_T)+T\theta_T+I\theta_I-\alpha_3+\beta}{T\theta_T+I\theta_I-\alpha_3+\beta}$ and $\frac{\Psi+I(1-\theta_I)+T(1-\theta_T)+T\theta_T+I\theta_I-\alpha_3+\beta}{T\theta_T+I\theta_I-\alpha_3}$. AATQ after the intangible investment are higher by $\frac{-\beta(T+I-\alpha_3+\beta+\Psi)}{(\alpha_3-(I\theta_I+T\theta_T))(-\alpha_3+\beta+I\theta_i+T\theta_T)}$, which is greater than 0.

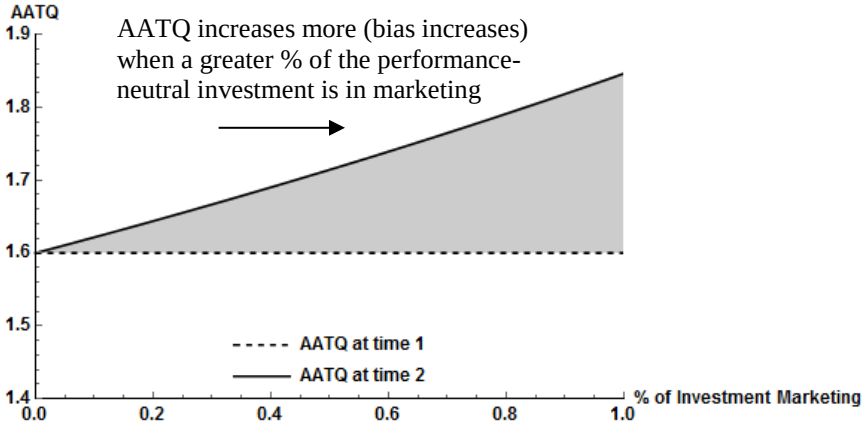
For AATQ not to increase in response to a failed investment, one must presume that the market will "overreact" and punish marketing-focused firms more (see Figure 1C). This overreaction would mean that marketing-focused firms would become predictably "undervalued" (relative to their assets) after a failed investment. This is hard to reconcile with the efficient market assumption underpinning the core argument for using Tobin's q.

D: Bias Towards Marketing-Focused Firms Increases with More Effective Investments

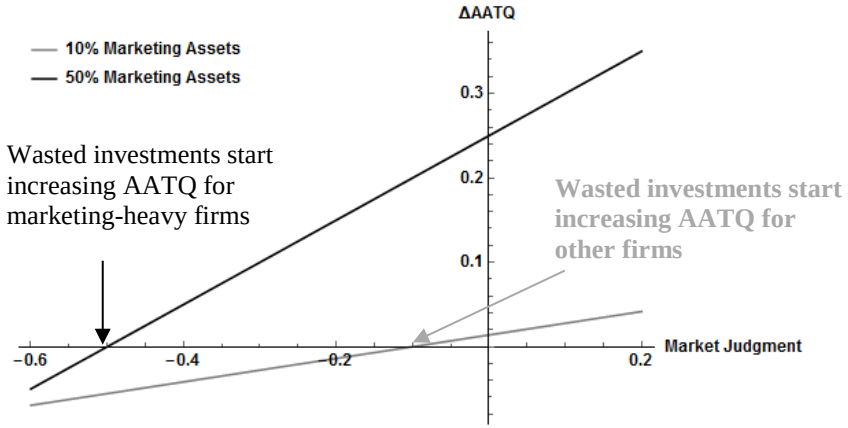
Bias in AATQ is especially significant when investments are effective. Let $\gamma > 0$ equal a given firm's earned increase in either a recorded tangible or an unrecorded intangible asset. Starting at the same AATQ, the difference in AATQ at period 2 after these two earned increases is $AATQ_{Tangible} - AATQ_{Intangible} = DIFF = -\frac{\gamma(I+T+\gamma+\Psi)}{(I\theta_I+T\theta_T)(\gamma+I\theta_I+T\theta_T)}$. AATQ after the unrecorded intangible investment are larger, as $\Psi > -(I+T)$, while I, T, γ, θ_T, and θ_I are non-negative.

Figure 1. Special Concerns for Marketing Scholars Using AATQ

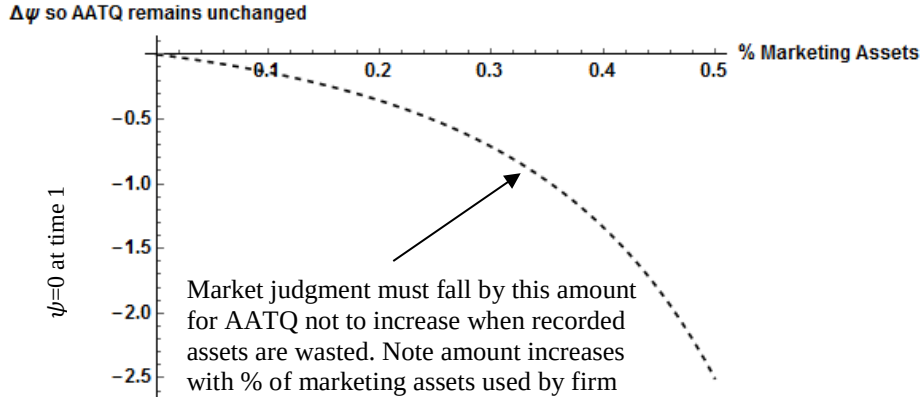
A) Bias Towards Performance-Neutral Marketing Investments



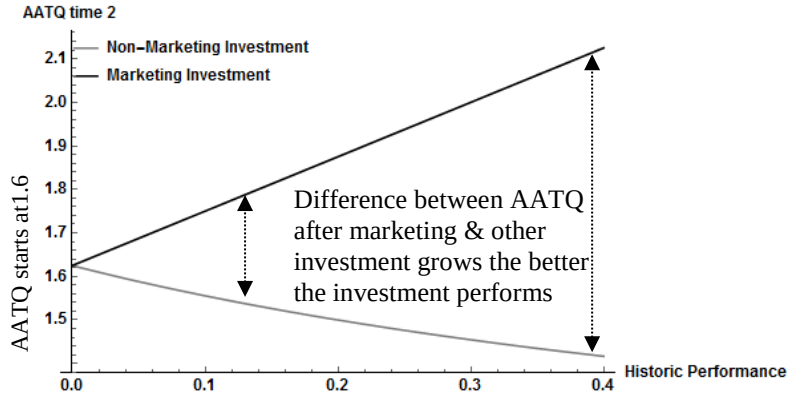
B) Marketers Face Problems in a Greater Range



C) Does Market Judgment Overreact to Marketers' Waste?



D) Marketing Investment Bias Increases with Performance



Now consider what happens to this difference with increasing success, $\gamma\uparrow$, $\frac{dDIFF}{d\gamma} = \frac{-1}{I\theta_I+T\theta_T} + \frac{-I(1-\theta_I)+T(1-\theta_T)+\Psi}{(\gamma+I\theta_I+T\theta_T)^2}$. The change in this difference from increasing effectiveness is negative, given the conditions immediately above, and $\theta_T < 1, \theta_I < 1$. Therefore, the difference between the tangible and intangible investment's impact on AATQ increases with the success of the investment. Figure 1D illustrates, starting at an average AATQ, how the difference in AATQ between a marketing (asset unrecorded) and other investment (asset recorded) increases when the earned asset increase is greater. When comparing two equally successful investments, the more successful the investments are, the greater the bias in favor of the marketing-focused company.

AATQ Related Empirical Findings In Marketing Scholarship

Could bias have impacted marketing scholarship? Note we are not arguing that any specific result is invalid but that using an AATQ often allows for a plausible alternative hypothesis—the results are artifacts of the metric used. Given marketers typically use only a single dependent variable it is hard to spot bias. Furthermore, results from studies using alternative metrics predicted to be weaker would, presumably, have remained unpublished. This means we can't use a formal test to examine if bias impacts prior findings yet we can review if this is plausible. To see if it is plausible that bias has impacted marketing scholarship we sought insights related to AATQ bias by examining marketing papers in the FT50 journals from 2004 using an AATQ, or addressing similar questions with market value metrics free of accounting estimates, e.g., stock return. (Note the insights we examined were not necessarily those central to the original study). We excluded papers that examined mispricing/stock market inefficiency (Aksoy, Cooil, Groening, Keiningham, & Yalçın, 2008; Fornell, Mithas, Morgeson, & Krishnan, 2006; Ittner,

Larcker, & Taylor, 2009; Jacobson & Mizik, 2009; Luo & Homburg, 2008; Luo, Homburg, & Wieseke, 2010; Raithel, Sarstedt, Scharf, & Schwaiger, 2012).

We make no conclusive claim, merely noting findings (Table 5) of published papers in the customer satisfaction, advertising/communications, and the wider marketing literature are broadly consistent with our theory. AATQ typically record stronger effects than alternative metrics.

Customer Satisfaction

Theoretically, the connection between *achieved* customer satisfaction and market-based assets seems strong. Market-based assets are valuable so firms with higher satisfaction should, all else equal, have higher value. AATQ, and other market value related metrics, should increase for firms earning an increase in an unrecorded customer satisfaction asset. Pursuing satisfaction however may, or may not, represent a good investment. If the strategy is successful we'd expect AATQs and market value metrics that don't use accounting data to increase. For a performance neutral transfer from a recorded to an unrecorded asset, e.g., cash to customer satisfaction, AATQ will increase (Lemma 7) with no change in other metrics. Failed satisfaction investments make other metrics fall but will often increase AATQ (Lemma 8). Overall AATQs have a bias to over-report the value of a strategy that pursues satisfaction (or other unrecorded intangibles).

Anderson, Fornell, and Mazvancheryl, (2004), Gruca and Rego (2005), and Luo and Homburg (2007) showed – consistent with it being a market-based asset – that achieved customer satisfaction is associated with higher AATQ. Mittal, Anderson, Sayrak, and Tadikamalla, (2005) find that customer satisfaction is significantly associated with an AATQ

across all models but the relationship with Annualized Stock Return is much weaker, going away when controlling for firm efficiency. They assert that AATQ captures the long-term impact, and Annualized Stock Return the short-term impact. An alternative hypothesis is that the results are due to the AATQ's bias. Consistent with our theory a marketing strategy's link to performance is stronger when performance is measured by an AATQ.

Morgan and Rego, (2006) examined the relationship between performance and six satisfaction metrics derived from ACSI data. Four significantly predicted the AATQ but only one predicted Total Shareholder Return, also consistent with AATQ's positive bias. More recent papers often examine complex questions, making bias' impact harder to predict. For example, Grewal, Chandrashekaran, and Citrin, (2010) consider satisfaction's distribution, Dotzel, Shankar, and Berry, (2013) e- versus p-innovativeness, and Malshe and Agarwal, (2015) leverage's impact. The latter scholars' use of an AATQ adds noise connected to their hypothesis given if highly leveraged firms spend less on marketing (creating intangibles) they can be expected to have lower AATQ at the same level of performance.

Larivière et al., (2016) show an indirect effect of satisfaction upon the AATQ in their main model. Five alternative time periods show a direct effect on the AATQ in three periods, and a direct and indirect effect in the other two. Noting problems with their AATQ they re-test with Carhart's four-factor model and show a much weaker relationship: no direct or indirect relationship in the main model, and only a single indirect, never direct, relationship, in one of five alternative models. Their results are consistent with the bias we outline. We would reiterate a vital point that they make: "our findings indicate that the relationship between satisfaction and [Shareholder Value] is sensitive to the metric used to assess performance" (p. 107).

Advertising and Communications

Lee and Grewal (2004) measured performance with only an AATQ. Luo and Donthu, (2006) used stock return and an AATQ. The AATQ strongly supports their hypothesis, but the stock return model finds less significant support. They showed the robustness of the AATQ results using a simpler model (p. 85) unfortunately not retesting the stock return model. They suggested that "[t]hese less significant results in the stock return model (compared to Tobin's q) are not totally unexpected; a recent study by Mittal and colleagues (2005) also finds that their marketing variables strongly influence Tobin's q but do not affect stock return significantly" (p. 84). We would note that this is a pattern consistent with bias in the AATQ.

Sridhar, Germann, Kang, and Grewal, (2016) show the positive impact of advertising on an AATQ. Sridhar, Narayanan, and Srinivasan, (2014) show advertising and R&D, which create unrecorded assets, increase an AATQ, unlike recorded inventory investments. These results are consistent with the bias we outline, (especially Lemma 7). Joshi and Hanssens (2010), breaking with our predictions, do not see stronger results using market to book than matched returns. Not all related research employs AATQ. Using a return model, Carhart's four-factor, Osinga, Leeflang, Srinivasan, and Wieringa, (2011) show partially significant results for the benefits of advertising and Srinivasan, Pauwels, Silva-Risso, and Hanssens, (2009) stronger results.

Note that our research suggests that AATQs' bias is more acute for marketing-focused firms and McAlister, Srinivasan, Jindal, and Cannella, (2016) show that an AATQ is more responsive for "differentiators", e.g., advertising focused firms. Our model provides an alternative explanation, namely this could be an artifact of bias in their performance metric. AATQs respond more positively when marketing focused firms, differentiators, invest more heavily in marketing.

Other Major Marketing Papers

Rao, Agarwal, and Dahlhoff, (2004) show effects for advertising and R&D consistent with our theory. Furthermore, it seems likely that corporate branding will manifest after greater internal brand generation and house of brands after greater reliance on acquisitions. If so then AATQ bias driven by under-recording internally generated market-based assets may influence why "corporate branding strategy is associated with higher values of Tobin's q" (page 126).

Luo and Bhattacharya, (2006) generally find stronger results using an AATQ than Stock Return. Srinivasan (2006) uses an AATQ as a performance measure as do Fang, Palmatier, and Steenkamp (2008) in considering service strategy, showing increasing returns to greater service transition. Mizik and Jacobson (2009b) found support for only 2 out of 5 branding components not using an AATQ. Sorescu and Spanjol, (2008) even utilize the insight that AATQ give stronger results in their theory. They suggest that their AATQ can be used to tease out differences between normal (AATQ) and abnormal profits.

Contrary to our expectations Krasnikov, Mishra, and Orozco, (2009) show similar results using an AATQ and Stock Return, i.e., do not show evidence of AATQ bias. Morgan and Rego, (2009) show mixed results for marketing's impact on an AATQ. Groening, Mittal, and Zhang (2016) look at cross-validation of signals but only use an AATQ to measure performance. Germann, Ebbes, and Grewal, (2015) and Nath and Mahajan, (2008) debate CMO impact but each shows model-free evidence that firms with CMOs, presumably marketing heavy firms, have higher AATQ. Finally, we would advise against using an AATQ to test CSR's impact as Kang, Germann, & Grewal, (2016) do. There is a bias towards showing success as CSR strategies often create unrecorded intangible assets, e.g., "stakeholder relationships" (p. 62. & p.63).

Table 5. Use of AATQ And Related Metrics Measuring Performance In Key Marketing Papers

Customer Satisfaction

Study	Metric	Most Relevant Finding	Our Response To The Findings
Anderson, Fornell, & Mazvancheryl (2004) JM	AATQ	"...association between customer satisfaction and shareholder value (as measured by Tobin's q) is positive and significant in both specifications (albeit marginally in M2)."	Consistent with achieved satisfaction being a market-based asset
Gruca & Rego (2005) JM	Cashflows, SR, M/B & AATQ	"customer satisfaction has a positive, significant impact on the future value of the firm, regardless of the measure of firm value we use" (p. 127)	
Mittal et al. (2005) MS	AATQ & SR	All 4 AATQ models show association with satisfaction but "Only in M1 does satisfaction have a statistically significant main effect on stock returns…. in Models 2 and 3, no main or interactive effects of satisfaction …emerge." (p. 552)	AATQ's stronger results consistent with AATQ bias
Morgan & Rego (2006) MS	AATQ & TSR	Four (of six) satisfaction related metrics associated with AATQ, only 1 associated with TSR	Association with satisfaction stronger for AATQ. Consistent with AATQ bias
Luo & Homburg (2007) JM	AATQ	"...customer satisfaction has a significant impact on Tobin's q ... consistent with extant studies" (p. 145)	AATQ result consistent with achieved satisfaction being a market-based asset
Grewal, Chandrashekran, & Citrin (2010) JMR	AATQ	"Satisfaction level positively influences shareholder value" (p. 621)	Using an AATQ is problematic given bias in the measure
Dotzel, Shankar, & Berry (2013) JMR	AATQ (& Risk)	"customer satisfaction has a strong positive effect on firm value" (p.271)	Using an AATQ is problematic given bias in the measure
Malshe & Agarwal (2015) JM	Tobin's q (C&P's?)	"We find that customer satisfaction has a positive impact on Tobin's q.." (p. 32)	Using an AATQ is problematic given bias in the measure
Larivière et al. (2016) JMR	AATQ (M/B) & C4FM	Population satisfaction no impact on C4FM, indirect effect on AATQ. AATQ in 5 periods 2 direct & indirect effects, 3 direct effects. C4FM in 5 periods only 1 (indirect) effect	Stronger satisfaction effect measuring performance with AATQ than C4FM. Consistent with AATQ bias

Advertising and Marketing Communications

Study	Metric	Most Relevant Finding	Our Response To The Findings
Lee & Grewal 2004 JM	AATQ	"Speedier communication channel adoption .. seems to yield significant results" (p. 167)	A greater focus on marketing associated with higher AATQ

Luo & Donthu (2006) JM	AATQ & SR	"…in contrast to the strong support of the hypotheses in the Tobin's q model, the support in the stock return model is less significant" (p. 84) "less significant results in the stock return model (compared to Tobin's q) are not totally unexpected" (p. 84).	Our paper suggests a reason why an AATQ is expected to give more significant results than stock return. This result is consistent with AATQ bias
Wang, Zhang, & Ouyang (2009) JAMS	AATQ	" advertising can create persistent brand intangible value" (p. 136)	Using an AATQ is problematic given bias in the measure
Srinivasan et al. (2009) JM	C4FM	"Advertising has positive and significant effects on stock returns..." (p. 36)	No AATQ used so we have no prediction
Joshi & Hanssens (2010) JM	M/B & MFR	"results from using either stock return metric were comparable" (p. 26)	Contrary to our expectations does not show stronger effects for Market to Book
Osinga et al. (2011) JM	Adapted C4FM	"find partial support for the effect on returns" [of direct-to-consumer advertising] (p. 121)	No AATQ used so we have no prediction
Sridhar, Narayanan, & Srinivasan (2014) JAMS	Berger & Ofek's AATQ	"advertising and R&D spending increase firm value [an AATQ], while inventory holding does not" (p. 277)	Typically advertising & R&D create unrecorded, while inventory creates recorded, assets so findings consistent with AATQ bias
Sridhar et al. (2016) JM	AATQ	"..strong positive main effect for regional [and online] advertising …weaker positive main effect for national advertising ..." (p. 8)	Showing connection between advertising & AATQ problematic given AATQ bias
McAlister et al. (2016) JMR	AATQ	"Advertising increases sales for both differentiators and cost leaders but increases firm value [AATQ] only for differentiators." (p. 216)	Differentiators (those with material advertising) have higher AATQ. Consistent with AATQ bias towards active marketers

Other Marketing Papers

Study	**Metric**	**Most Relevant Finding**	**Our Response To The Findings**
Rao, Agarwal, & Dahlhoff (2004) JM	AATQ	"..advertising, and R&D expenditures are all positive and significant.." (p. 136). "The coefficient of corporate branding is statistically significant" (p. 136).	Corporate branding likely correlates with internal generated vs. acquired brands so result consistent with bias driven by under-recording of internally generated brands
Luo & Bhattacharya (2006) JM	AATQ & SR	"interaction term of CSR x innovativeness capability affects only Tobin's q" (p. 12) CSR x innovativeness interaction fails for stock return (p. 13), r^2 higher for all AATQ models	AATQ's shows stronger support for marketing related questions than stock return. Result consistent with bias
Srinivasan (2006) JM	AATQ	Results differ by segment, "counterintuitive" results for advertising stock (p. 131)	Variables used that are connected to AATQ bias: e.g., franchising (off-balance sheet) assets
Mizik & Jacobson (2008) JMR	Abnormal SR	"[2 of 5] brand asset components… have positive … statistically significant effects on stock return." (p. 25)	Would more components have been significant using an AATQ?

Fang, Palmatier, & Steenkamp (2008) JM	AATQ	"..effects of service transition strategies on firm value are not constant but rather increase at a progressive rate.." (p.9)	"further research should replicate our results using other valuation measures" (p.13). We would echo this advice given AATQ bias
Sorescu & Spanjol (2008) JM	M/B & Abnormal Returns	M/B & abnormal returns significant for breakthrough but only M/B for incremental innovation. Only M/B associated with advertising. (Table 5, p. 126)	Stronger results using M/B. Consistent with bias
Nath & Mahajan (2008) JM	AATQ (& Sales Growth)	Model-free "CMO presence shared a significant, positive correlation with the Tobin's q measure…" (p. 78). "no main effect for CMO presence/absence on firm performance" (p. 74)	If CMO presence=marketing focused firm then bias predicts firms with CMOs will have higher AATQ which they do not find. Germann, Ebbes, and Grewal (2015) later find the connection between CMO and AATQ
Kransnikov, Mishra, & Orozco (2009) JM	AATQ & FF	"..we observed that brand-association trademarks positively affect firm cash flows, Tobin's q, ROA, and stock returns." (p. 163)	AATQ & Stock Return show similar positive results, i.e., does not show evidence of bias
Morgan & Rego (2009) JM	AATQ (& CF)	".. marketing spending appears to be an investment rather than an expense" (p. 70)	Using an AATQ is problematic given bias in the measure
Bharadwaj, Tuli, & Bonfrer (2011) JM	C4FM	"...unanticipated changes in brand quality are positively associated with stock returns.." (p. 88)	No AATQ used so we have no prediction
Germann, Ebbes, & Grewal (2015) JM	AATQ,& Jensen's Alpha (& Sales Growth)	Model-free "...Tobin's q of CMO firms is always above the line depicting Tobin's q of non-CMO firms." (p. 12)."CMO effect is fairly robust in terms of sign and statistical significance across various model identifying assumptions" (p. 13) Jensen's Alpha used for 1 sample "consistent with our previous findings" (p. 16)	If CMO presence=marketing focused firm then bias predicts firms with CMOs have higher AATQ. Germann and colleagues find this -- contrary to Nath and Mahajn 2008. Replicating part of their analysis with Alpha helps allay some bias concerns
Hsu, Fournier, & Srinivasan (2016) JAMS	C4FM	"... Rao et al.'s (2004) finding of superior returns for the BH [Branded House] strategy versus [House of Brands] is driven by the sub-branding variant rather than the pure BH itself." (p. 273)	Authors use C4FM as more appropriate (p. 263) but suggest AATQ could be used in further research (p. 278)
Groening, Mittal, & Zhang (2016) JMR	AATQ	"..customer-related achievements have a significantly positive effect and customer-related lapses have a significantly negative effect on firm valuation measured by Tobin's q" (p. 73)	The robustness checks they showed did not test an alternative performance metric
Kang, Germann & Grewal (2016) JM	AATQ	"firms benefit financially from CSR because it leads to positive financial performance" (p. 60) "..performance (Tobin's q)" (p.65)	AATQ problematic given bias towards finding impact of strategies creating unrecorded assets

MS=Marketing Science, JM=Journal of Marketing, JMR=Journal of Marketing Research, JAMS=Journal of the Academy of Marketing Science, AATQ = Chung and Pruitt's (C&P) unless stated, TSR=Total Shareholder Returns, SR= Stock Return, C4FM=Carhart's Four-Factor Model, M/B=Market to Book Ratio, MFR=Matched Firm Returns, CF=Cash Flows, FF = Fama & French Model

In general the empirical findings are consistent with our analytical assessment of bias in AATQ: AATQ give more positive results for marketing related questions than other metrics. Of course, we do not formally demonstrate that any papers using AATQ have reached incorrect conclusions. Many involve complex interactions, advanced models, and dynamic outcomes making bias' impact hard to predict. Indeed, as research questions become more complex it will only become harder to be confident that any bias is corrected by econometric choices. Given the problems with the metrics we recommend that going forward marketers avoid using AATQ as performance metrics. Furthermore, we support the suggestion that scholars should use multiple measures (Katsikeas et al., 2016) to allow for any bias to be more easier seen. Finally, we would also like to see detailed theoretical explanations for scholars' choice of dependent variables.

Discussion

Anderson, Fornell, and Mazvancheryl (2004) note that Tobin's q is "well-grounded in economic theory" (p. 172). Unfortunately, the AATQ used in marketing research are different from Tobin's original q, and have no such theoretical grounding. AATQ seem to be on the rise in marketing research, which is worrying, given the false positives that AATQ can yield.

AATQ's use in finance research and the implications for marketing. While scholars in other disciplines have disputed the value of Tobin's q (Klock and Megna, 2000; McFarland, 1988; Shepherd, 1986), Mittal et al. (2005, p. 550) simply assert its widespread acceptance. Sridhar et al. (2016) do give two supportive citations from finance for Tobin's q's value, but draw one from a moderately ranked journal (Parcharidis and Varsakelis, 2010), and another uses (a slightly different version of) Tobin's q merely as "further evidence" (Giroud and Mueller, 2011) in a battery of measures. While the links to justifications of Tobin's q in finance are limited, we

would say this is of modest importance. A metric's suitability depends upon the question being addressed (Ambler and Roberts, 2008) so referring to use in another discipline may mean little. The way marketing investments are treated by financial accounting make AATQ especially problematic for *marketing-related questions*. For research in finance, the bias that we show may be mere noise if it does not relate directly to the hypothesis. Acceptability in finance would not mean AATQ are useful in marketing; metric choice must be justified for the question at hand.

Accounting and Marketing. The undervaluing of market-based assets is not a mistake by a few erroneous accountants, but a design feature of financial accounting. Given this we support calls for more work at the interface of marketing and accounting (Bendle & Wang, 2017; Mizik & Nissim, 2011). If marketers develop a greater understanding of accounting, this should help in creating and using better performance metrics and avoiding the sort of pitfalls we outline in this paper. It may also allow marketers to positively influence the choices of financial accountants, such as through the work of MASB, the Marketing Accountability Standards Board.

Is Tobin's q a good way to build credibility with managers? Managers do not seem to see the value of AATQ (Bendle et al., 2015; Mintz and Currim, 2013). Marketing accountability research aims to examine marketing's value; yet much of the research focuses on how marketing impacts AATQ, metrics that managers do not consider important. Attempts to build marketing's credibility cannot be based on metrics that managers do not use and are biased towards finding marketing's effectiveness. Researchers should use metrics that are meaningful to non-researchers or, at a minimum, argue in detail why the metrics should be meaningful to non-researchers.

In conclusion, we hope marketing scholars reconsider using AATQ as performance metrics given that AATQ are biased towards false positives when firms make marketing investments.

References

Aksoy, L., Cooil, B., Groening, C., Keiningham, T. L., & Yalçın, A. (2008). The Long-Term Stock Market Valuation of Customer Satisfaction. *Journal of Marketing*, *72*(4), 105–122. https://doi.org/10.1509/jmkg.72.4.105

Ambler, T., & Roberts, J. H. (2008). Assessing marketing performance: don't settle for a silver metric. *Journal of Marketing Management*, *24*(7), 733–750.

Anderson, E. W., Fornell, C., & Mazvancheryl, S. K. (2004). Customer satisfaction and shareholder value. *Journal of Marketing*, *68*(4), 172–185.

Bendle, N. T., Farris, P. W., Pfeifer, P. E., & Reibstein, D. J. (2015). *Marketing Metrics: The Manager's Guide to Measuring Marketing Performance* (3rd ed.). Upper Saddle River, NJ: Pearson FT press.

Bendle, N. T., & Wang, X. (Shane). (2017). Marketing Accounts. *International Journal of Research in Marketing*, *43*(3), 604–621.

Berger, P. G., & Ofek, E. (1995). Diversification's effect on firm value. *Journal of Financial Economics*, *37*(1), 39–65.

Bharadwaj, S. G., Tuli, K. R., & Bonfrer, A. (2011). The Impact of Brand Quality on Shareholder Wealth. *Journal of Marketing*, *75*(5), 88–104. https://doi.org/10.1509/jmkg.75.5.88

Chung, K. H., & Pruitt, S. W. (1994). A Simple Approximation of Tobin's q. *Financial Management*, *23*(3), 70–74.

Dotzel, T., Shankar, V., & Berry, L. L. (2013). Service Innovativeness and Firm Value. *Journal of Marketing Research*, *50*(2), 259–276.

Dybvig, P. H., & Warachka, M. (2015). *Tobin's Q Does Not Measure Performance: Theory, Empirics, and Alternative Measures* (No. SSRN March 5, 2015).

Edeling, A., & Fischer, M. (2016). Marketing's Impact on Firm Value: Generalizations from a Meta-Analysis. *Journal of Marketing Research*, *53*(4), 515–534.

Erickson, G. S., & Rothberg, H. N. (2009). Intellectual capital in business-to-business markets. *Industrial Marketing Management*, *38*(2), 159–165.

Fang, E., Palmatier, R. W., & Steenkamp, J. B. E. (2008). Effect of service transition strategies on firm value. *Journal of Marketing*, *72*(5), 1–14.

Fischer, M. (2016). Brand valuation in accordance with GAAP and legal requirements. In D. W.

Stewart, C. T. Gugel, & MASB (Eds.), *Accountable marketing: linking marketing actions to financial performance* (pp. 182–200). New York, N.Y.: Routledge.

Fornell, C., Mithas, S., Morgeson, F. V., & Krishnan, M. S. (2006). Customer Satisfaction and Stock Prices: High Returns, Low Risk. *Journal of Marketing*, *70*(1), 3–14. https://doi.org/10.1509/jmkg.2006.70.1.3

Germann, F., Ebbes, P., & Grewal, R. (2015). The Chief Marketing Officer Matters! *Journal of Marketing*, *79*(3), 1–22.

Giroud, X., & Mueller, H. M. (2011). Corporate governance, product market competition, and equity prices. *The Journal of Finance*, *66*(2), 563–600.

Goldfarb, A., Lu, Q., & Moorthy, S. (2009). Measuring Brand Value in an Equilibrium Framework. *Marketing Science*, *28*(1), 69–86.

Grewal, R., Chandrashekaran, M., & Citrin, A. V. (2010). Customer satisfaction heterogeneity and shareholder value. *Journal of Marketing Research*, *47*(4), 612–626.

Groening, C., Mittal, V., & Zhang, Y. (2016). Cross-Validation of Customer and Employee Signals and Firm Valuation. *Journal of Marketing Research*, *53*(1), 61–76.

Gruca, T. S., & Rego, L. L. (2005). Customer satisfaction, cash flow, and shareholder value. *Journal of Marketing*, *69*(3), 1–18.

Hirsch, B. T., & Seaks, T. G. (1993). Functional form in regression models of Tobin's q. *The Review of Economics and Statistics*, *75*(2), 381–385.

Hsu, L., Fournier, S., & Srinivasan, S. (2016). Brand architecture strategy and firm value: how leveraging, separating, and distancing the corporate brand affects risk and returns. *Journal of the Academy of Marketing Science*, *44*(2), 261–280. https://doi.org/10.1007/s11747-014-0422-5

Hsu, L. T. J., & Jang, S. S. (2008). Advertising expenditure, intangible value and risk: A study of restaurant companies. *International Journal of Hospitality Management*, *27*(2), 259–267.

Ittner, C. D., Larcker, D., & Taylor, D. (2009). Commentary —The Stock Market's Pricing of Customer Satisfaction. *Marketing Science*, *28*(5), 826–835. https://doi.org/10.1287/mksc.1090.0526

Jacobson, R., & Mizik, N. (2009). The Financial Markets and Customer Satisfaction: Reexamining Possible Financial Market Mispricing of Customer Satisfaction. *Marketing Science*, *28*(5), 810–819. https://doi.org/10.1287/mksc.1090.0495

Joshi, A., & Hanssens, D. M. (2010). The direct and indirect effects of advertising spending on firm value. *Journal of Marketing*, *74*(1), 20–33.

Kang, C., Germann, F., & Grewal, R. (2016). Washing Away Your Sins? Corporate Social Responsibility, Corporate Social Irresponsibility, and Firm Performance. *Journal of Marketing*, *80*(2), 59–79. https://doi.org/10.1509/jm.15.0324

Kaplan, S. N., & Zingales, L. (1997). Do investment-cash flow sensitivities provide useful measures of financing constraints? *The Quarterly Journal of Economics*, *112*(1), 169–215.

Kashmiri, S., & Mahajan, V. (2014). Beating the recession blues: Exploring the link between family ownership, strategic marketing behavior and firm performance during recessions. *International Journal of Research in Marketing*, *31*(1), 78–93.

Katsikeas, C. S., Morgan, N. A., Leonidou, L. C., & Hult, G. T. M. (2016). Assessing Performance Outcomes in Marketing. *Journal of Marketing*, *80*(2), 1–20.

Klock, M., & Megna, P. (2000). Measuring and valuing intangible capital in the wireless communications industry. *The Quarterly Review of Economics and Finance*, *40*(4), 519–532.

Koh, Y., Lee, S., & Boo, S. (2009). Impact of brand recognition and brand reputation on firm performance: US-based multinational restaurant companies' perspective. *International Journal of Hospitality Management*, *28*(4), 620–630.

Krasnikov, A., Mishra, S., & Orozco, D. (2009). Evaluating the financial impact of branding using trademarks: a framework and empirical evidence. *Journal of Marketing*, *73*(6), 154–166.

Larivière, B., Keiningham, T. L., Aksoy, L., Yalçin, A., Morgeson, F. V., & Mithas, S. (2016). Modeling Heterogeneity in The Satisfaction, Loyalty Intention and Shareholder Value Linkage: A Cross-Industry Analysis at the Customer and Firm Level. *Journal of Marketing Research*, *53*(1), 91–109. https://doi.org/10.1509/jmr.12.0143

Lee, R. P., & Chen, Q. (2009). The Immediate Impact of New Product Introductions on Stock Price: The Role of Firm Resources and Size. *Journal of Product Innovation Management*, *26*(1), 97–107.

Lee, R. P., & Grewal, R. (2004). Strategic responses to new technologies and their impact on firm performance. *Journal of Marketing*, *68*(4), 157–171.

Lev, B. (2001). *Intangibles: Management, measurement, and reporting*. Washington, D.C: Brookings Institution.

Lindenberg, E. B., & Ross, S. A. (1981). Tobin's q Ratio and Industrial Organization. *The Journal of Business*, *54*(1), 1–32.

Luo, X., & Bhattacharya, C. B. (2006). Corporate social responsibility, customer satisfaction, and market value. *Journal of Marketing*, *70*(4), 1–18.

Luo, X., & Donthu, N. (2006). Marketing's credibility: A longitudinal investigation of marketing communication productivity and shareholder value. *Journal of Marketing*, *70*(4), 70–91.

Luo, X., & Homburg, C. (2007). Neglected outcomes of customer satisfaction. *Journal of Marketing*, *71*(2), 133–149.

Luo, X., & Homburg, C. (2008). Satisfaction, Complaint, and the Stock Value Gap. *Journal of Marketing*, *72*(4), 29–43. https://doi.org/10.1509/jmkg.72.4.29

Luo, X., Homburg, C., & Wieseke, J. (2010). Customer Satisfaction, Analyst Stock Recommendations, and Firm Value. *Journal of Marketing Research*, *47*(6), 1041–1058. https://doi.org/10.1509/jmkr.47.6.1041

Lusch, R. F., & Harvey, M. G. (1994). The case for an off-balance-sheet controller. *Sloan Management Review*, *35*(2), 101–105.

Malshe, A., & Agarwal, M. K. (2015). From Finance to Marketing: The Impact of Financial Leverage on Customer Satisfaction. *Journal of Marketing*, *79*(5), 21–38.

McAlister, L., Srinivasan, R., Jindal, N., & Cannella, A. A. (2016). Advertising Effectiveness: The Moderating Effect Of Firm Strategy. *Journal of Marketing Research*, *53*(2), 207–224.

McFarland, H. (1988). Evaluating q as an Alternative to the Rate of Return in Measuring Profitability. *The Review of Economics and Statistics*, *70*(4), 416–622.

Mintz, O., & Currim, I. S. (2013). What drives managerial use of marketing and financial metrics and does metric use affect performance of marketing-mix activities? *Journal of Marketing*, *77*(2), 17–40.

Mittal, V., Anderson, E. W., Sayrak, A., & Tadikamalla, P. (2005). Dual emphasis and the long-term financial impact of customer satisfaction. *Marketing Science*, *24*(4), 544–555.

Mizik, N., & Jacobson, R. (2009a). Financial markets research in marketing. *Journal of Marketing Research*, *46*(3), 320–324.

Mizik, N., & Jacobson, R. (2009b). Valuing branded businesses. *Journal of Marketing*, *73*(6), 137–153. https://doi.org/10.1509/jmkg.73.6.137

Mizik, N., & Nissim, D. (2011). *Accounting for marketing activities: Implications for marketing research and practice* (Vol. 11–103). Cambridge, MA: Marketing Science Institue Working Paper.

Montgomery, C. A., & Wernerfelt, B. (1988). Diversification, Ricardian rents, and Tobin's q. *The RAND Journal of Economics*, *19*(4), 623–632.

Morgan, N. A., & Rego, L. L. (2006). The Value of Different Customer Satisfaction and Loyalty

Metrics in Predicting Business Performance. *Marketing Science*, *25*(5), 426–439. https://doi.org/10.1287/mksc.1050.0180

Morgan, N. A., & Rego, L. L. (2009). Brand portfolio strategy and firm performance. *Journal of Marketing*, *73*(1), 59–74.

Nath, P., & Mahajan, V. (2008). Chief Marketing Officers: A Study of Their Presence in Firms'Top Management Teams. *Journal of Marketing*, *72*(5), 65–81.

Osinga, E. C., Leeflang, P. S. ., Srinivasan, S., & Wieringa., J. E. (2011). Why do firms invest in consumer advertising with limited sales response? A shareholder perspective. *Journal of Marketing*, *75*(1), 109–124. https://doi.org/10.1509/jmkg.75.1.109

Parcharidis, E. G., & Varsakelis, N. C. (2010). R&D and Tobin's q in an emerging financial market: the case of the Athens stock exchange. *Managerial and Decision Economics*, *31*(5), 353–361.

Park, C. W., Eisingerich, A. B., Pol, G., & Park, J. W. . (2013). The role of brand logos in firm performance. *Journal of Business Research*, *66*(2), 180–187.

Raithel, S., Sarstedt, M., Scharf, S., & Schwaiger, M. (2012). On the value relevance of customer satisfaction. Multiple drivers and multiple markets. *Journal of the Academy of Marketing Science*, *40*(4), 509–525. https://doi.org/10.1007/s11747-011-0247-4

Rao, V. R., Agarwal, M. K., & Dahlhoff, D. (2004). How is manifest branding strategy related to the intangible value of a corporation? *Journal of Marketing*, *68*(4), 126–141.

Rust, R. T., Ambler, T., Carpenter, G. S., Kumar, V., & Srivastava, R. K. (2004). Measuring marketing productivity: Current knowledge and future directions. *Journal of Marketing*, *68*(4), 76–89.

Shepherd, W. G. (1986). Tobin's q and the Structure-Performance Relationship: Comment. *The American Economic Review*, *76*(5), 1205–1210.

Simon, C. J., & Sullivan, M. W. (1993). The measurement and determinants of brand equity: A financial approach. *Marketing Science*, *12*(1), 28–52.

Sinclair, R. N. (2016). Reporting on brands. In D. W. Stewart, C. T. Gugel, & MASB (Eds.), *Accountable marketing: Linking marketing actions to financial performance* (pp. 168–181). New York, N.Y.: Routledge.

Sinclair, R. N., & Keller, K. L. (2014). A case for brands as assets: Acquired and internally developed. *Journal of Brand Management*, *21*(4), 286–302.

Sorescu, A. B., & Spanjol, J. (2008). Innovation's effect on firm value and risk: Insights from consumer packaged goods. *Journal of Marketing*, *72*(2), 114–132.

Sridhar, S., Germann, F., Kang, C., & Grewal, R. (2016). Relating Online, Regional, and National Advertising to Firm Value. *Journal of Marketing*, *80*(4), 39–55.

Sridhar, S., Narayanan, S., & Srinivasan, R. (2014). Dynamic relationships among R&D, advertising, inventory and firm performance. *Journal of the Academy of Marketing Science*, *42*(3), 277–290.

Srinivasan, R. (2006). Dual distribution and intangible firm value: Franchising in restaurant chains. *Journal of Marketing*, *70*(3), 120–135.

Srinivasan, S., & Hanssens, D. M. (2009a). Marketing and firm value: Metrics, methods, findings, and future directions. *Journal of Marketing Research*, *46*(3), 293–312.

Srinivasan, S., & Hanssens, D. M. (2009b). Marketing and Firm Value: Perspectives and Conclusions. *Journal of Marketing Research*, *46*(3), 327–329.

Srinivasan, S., Pauwels, K., Silva-Risso, J., & Hanssens, D. M. (2009). Product innovations, advertising, and stock returns. *Journal of Marketing*, *73*(1), 24–43. https://doi.org/10.1509/jmkg.73.1.24

Srivastava, R. K., Shervani, T. A., & Fahey, L. (1998). Market-based assets and shareholder value: A framework for analysis. *Journal of Marketing*, *62*(1), 2–18.

Tobin, J. (1969). A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking*, *1*(1), 15–29.

Torres, A., & Tribó, J. A. (2011). Customer satisfaction and brand equity. *Journal of Business Research*, *64*(10), 1089–1096.

Wang, F., Zhang, X. P. S., & Ouyang, M. (2009). Does advertising create sustained firm value? The capitalization of brand intangible. *Journal of the Academy of Marketing Science*, *37*(2), 130–143.

Wernerfelt, B., & Montgomery, C. A. (1988). Tobin's q and the Importance of Focus in Firm Performance. *The American Economic Review*, *78*(1), 246–250.

APPENDIX: SOURCES FOR CLAIMS ABOUT AATQ

Are Accounting-Based Approximations of Tobin's q Comparable Across Industries?

In the main text Lemma 1 shows that the proportion of a specific asset class recorded in the financial accounts change AATQ. Specifically when a greater proportion of an asset class is recorded AATQ will be lower, all else equal. If a greater proportion of tangible assets, compared to intangible assets, are recorded then it follows that industries with a greater reliance on tangible assets will, all else equal, have lower AATQ. Many scholars however claim that AATQ are comparable across industries. In the table below we *italicize problematic claims* relevant to cross-industry comparability.

A connected question is whether the proportion of assets of a specific class that are recorded is set by accounting conventions. Accounting conventions allow for most tangible assets, even those internally generated, to be recorded but generally do not allow for internally generated intangibles to be recorded. Accounting conventions, therefore, impact asset recording which directly impacts AATQ. Many scholars erroneously make claims contrary to this. In the table below we **bold problematic claims** relevant to AATQ and accounting conventions.

Authors	**Description**	**Our Response**
Anderson, Fornell, and Mazvancheryl (2004)	"Tobin's q is also adjusted for expected market risk and is less affected by accounting conventions, which *makes it*	Given different asset classes are differentially recorded AATQ are not comparable across firms in different

	comparable across firms in different industries" (page 175).	industries unless they use identical asset profiles. AATQ are affected by accounting conventions. AATQ may be *less* affected by accounting conventions than ROI, the comparison made by the authors, but this is not empirically or theoretically demonstrated.
Lee and Grewal (2004)	"*Tobin's q can be used to compare across industries* because it is not affected by accounting convention" (page 162).	Some industries will have higher AATQ merely because they employ more unrecorded assets. The AATQ used in marketing are affected by accounting convention. The supporting citation merges Chakravarthy (1986) "Measuring Strategic Performance", *SMJ*, 7 (5), 437-458) & Chakravarthy (1987) "On Tailoring A Strategic Planning System To Its Context: Some Empirical Evidence", *SMJ*, 8 (6), 517-34. We found no specific mention of Tobin's q in either paper, (the authors may have seen Market to Book as equivalent to Tobin's q). Note Chakravarthy wrote before the AATQ used, Chung and Pruitt's, was introduced (1994).
Mittal et al. (2005)	"As such, *Tobin's q is directly comparable across industries*, whereas accounting measures may not be so easily compared" (page 550).	Some industries will have higher AATQ merely because they employ more unrecorded assets.
Nath and Mahajan (2008)	"Researchers prefer Tobin's q because it is forward looking and is not affected by accounting standards that may differ across industries" (page 72).	The AATQ used in marketing are affected by accounting standards.
Grewal, Chandrashekaran, and Citrin (2010)	"Third, Tobin's q is often used to *compare firms across industries* because it is not much affected by accounting conventions (Chakravarthy 1986)." (page 618).	Some industries will have higher AATQ merely because they employ more unrecorded assets. "not much" is not empirically or theoretically addressed.

		There is the same error in the Chakravarthy citation as Lee & Grewal (2004).
Dotzel, Shankar, and Berry (2013)	"Tobin's q *can be used across industries* because accounting conventions do not affect it" (page 265).	Some industries will have higher AATQ merely because they employ more unrecorded assets. The AATQ used in marketing are affected by accounting conventions.
Park et al. (2013)	"… *comparable across corporate brands in different industries*" (page 184).	Some industries will have higher AATQ merely because they employ more unrecorded assets.
Germann, Ebbes, and Grewal (2015)	"Capital market-based measures….. are organizational goal agnostic, *permitting performance comparison across firms that pursue different performance goals*…are less affected by accounting conventions because they include the potential effect of accounting practice inconsistencies across industries when evaluating expected future revenue streams (e.g., Amit and Wernerfelt 1990)" (page 12).	Note AATQ are not purely capital market-based measures. This claim is inadequately supported, and does not apply if firms use different asset classes to pursue their goals. The supporting Amit and Wernerfelt reference is to a different version of Tobin's q. The AATQ used follows Nath and Mahajan (2008) i.e., uses Chung and Pruitt's AATQ, which is impacted by accounting conventions. "Less affected" is not empirically or theoretically demonstrated.
Sridhar et al. (2016)	"Tobin's q is not affected by accounting conventions but instead *adjusts for industry-specific performance idiosyncrasies*" (page 44).	The AATQ used in marketing are affected by accounting conventions. The claim that AATQ adjust for industry-specific performance idiosyncrasies relies on the AATQ being a capital market–based measure but AATQ mix capital market and accounting measures.

Do Accounting-Based Approximations of Tobin's q Use Only Tangible Assets?

Marketing scholars sometimes claim that AATQ only use tangible assets. This is incorrect as intangible assets are reported in total assets and total, not just tangible, assets are used in the AATQ employed by marketers in all the papers that we reviewed. (Financial accounting does exclude many intangibles but it does not exclude all). In the table below we *italicize the key problematic claims*.

Article	**Description**	**Our Response**
Rust et al. (2004)	"Tobin's q is the ratio of the market value of the firm to the *replacement cost of its tangible assets*, which include property, equipment, inventory, cash, and investments in stock and bonds" (page 79).	This does not describe the metrics used in marketing. The AATQ in marketing use Total (recorded) assets, i.e., they include RI and RI+RT≠RT.
Anderson, Fornell, and Mazvancheryl (2004)	"… the denominator of q *excludes intangible assets* from its calculations. The intangible assets contribute to the value of a firm, but estimates of replacement costs for such assets are not a part of the denominator." (page 175). "Mk is the replacement cost of the firm's assets (e.g., plant, equipment) and is equal to the value of the firm that is attributable to *its tangible assets*" (page 175). Denominator actually used is "*total assets* from the COMPUSTAT databases" (page 183).	The authors contradict themselves between the text and formula. They say they exclude intangibles but they describe, and use, Chung and Pruitt's formula which includes recorded intangibles, e.g., goodwill.
Lee and Grewal (2004)	"Tobin's q reflects a firm's long-term profitability because it captures the relationship between the replacement cost of a firm's *tangible assets* and the market value of the firm (Bharadwaj,	The formula described clearly states total assets are used but the text suggests it is only tangible assets.

	Bharadwaj, and Konsynski 1999)" (page 162). Formula given: "TA = book value of *total assets*" (page 162).	
Mittal et al. (2005)	"… the denominator of q *excludes intangible assets from its calculations*. … but estimates of replacement costs for these assets are obviously not a part of the denominator" (page 550). They "use Chung and Pruitt's (1995) approximation of the NBER method of Hall et al. (1988)" (page 550)	There is a contradiction between the text description and the formula used. Chung and Pruitt's AATQ includes recorded intangible assets as it uses Total Assets.
Erickson and Rothberg (2009)	"As the measure of the difference between a firm's value and the *replacement cost of its physical assets*" (page 159). "Tobin's q is market capitalization of a firm less *the replacement cost of its assets*. Since replacement cost is often hard to get, a common variation on the measure is to use *book value of the assets*" (page 162)	Their approach is hard to follow, e.g., note the use of subtraction on page 162. They use book value, which includes recorded intangibles, and so there is a contradiction between the text on page 159 and the formula used (page 162).
Grewal, Chandrashekaran, and Citrin (2010)	"Captures the relationship between the *replacement cost of a firm's tangible assets* and the market value of the firm" (page 618). They use Chung & Pruitt giving the denominator as "*TA = book value of total assets*" (page 618).	The description of the formula in the text ("tangible assets") is different from the formula given ("total assets").
Park et al. (2013)	".. the company's market value to the *current replacement cost of its physical assets*" (page 184). "…while the denominator captures the *replacement cost of the firm's physical assets*" (page 184). They note: "Tobin (1969) defined the value of a company's q as the ratio of the company's market value to the	There is a contradiction. The formula given suggests total assets is used but the description says only physical assets.

	current replacement cost of its assets" (page 184). Use Chung and Pruitt, "q= …/*Total Assets*" (Equation 1, page 184).	
Malshe and Agarwal (2015)	"…Tobin's q reflects a firm's stock of tangible and intangible assets by capturing the relationship between *the replacement cost of a firm's tangible assets* and the market value of the firm" (page 28).	From their citations we believe they used Chung and Pruitt's AATQ which includes recorded intangibles.
Groening, Mittal, and Zhang (2016)	"As Anderson, Fornell, and Mazvancheryl (2004) explain, Tobin's q uses a market-based view of investor expectations of the firm's future potential by measuring the ratio of market value of a firm's securities to the *replacement costs of its tangible assets*" (page 13).	This repeats an earlier claim about only using tangible assets. The Groening and colleagues paper, however, uses Chung and Pruitt's AATQ which includes recorded intangible assets.

Will Accounting-Based Approximations of Tobin's q Tend to 1?

The theory behind Tobin's q when the idea was initially proposed suggested that efficient markets might tend to approach a Tobin's q of 1. This idea persists in the marketing literature. The theory, however, does not relate to the AATQ used in marketing. Barring accounting errors, the proportion of assets recorded is less than 1. This means AATQ will usually be above 1 even in an equilibrium where market value equals the replacement cost of assets.

It would be helpful going forward to note that the properties of the AATQ metrics used in marketing differ from the properties of Tobin's original theoretical q. We *italicize potentially confusing claims.*

Authors	**Description**	**Our Response**
Rao, Agarwal, and Dahlhoff (2004)	"The long-term equilibrium market value of a firm must be equal to the *replacement value of the firm"* (page 130).	The metric they use, Chung and Pruitt's AATQ, does not have this property.
Hsu and Jang (2008)	"Using Tobin's q to measure intangible value is based on the assumption that the *long run equilibrium market value of a firm must be equal to the replacement value of its assets*" (page 261).	The metric they use, Chung and Pruitt's AATQ, does not have this property.
Fang, Palmatier, and Steenkamp (2008)	"Tobin's q is the ratio of the market value of the firm to the replacement cost of its assets. *The long-term equilibrium market value of a firm should equal the replacement costs of its assets*" (page 4).	The metric they use, Chung and Pruitt's AATQ, does not have this property.

Do Accounting-Based Approximations of Tobin's q Measure Reliance on Intangibles?

Given intangibles are more likely to be omitted from financial statements than tangible assets AATQ can indicate reliance on intangibles, although with measurement error. Below we *italicize what AATQ are said to measure regarding intangibles*.

Authors	**Description**	**Our Response**
Rao, Agarwal, and Dahlhoff (2004)	"We use Tobin's q ratio *to measure the intangible assets*" (page 129).	AATQ can measure reliance on intangibles (with significant measurement error). Reliance on intangibles is quite different from performance. We would urge this distinction to be made clear by marketing scholars.
Srinivasan (2006)	"The firm's intangible value *as measured by its Tobin 's q*" (page 121).	
Hsu and Jang (2008)	"The higher Tobin's q, *the higher the value of the intangible assets of the firm*" (page 261).	
Morgan and Rego (2009)	"*Tobin's q levels greater than 1.0 indicate a positive value for the firm's intangible assets*" (page 64).	
Erickson and Rothberg (2009)	"We use *this measure (Tobin's q) for the level of intellectual capital/ intangibles* in the firms in our sample" (page 162).	
Wang, Zhang, and Ouyang (2009)	"We use Tobin's q, the ratio of the market value of a firm to the replacement cost of its assets, *to estimate firm intangible value*" (page 135).	
Grewal, Chandrashekaran, and Citrin (2010)	"Tobin's q is often viewed as an *assessment of intangible firm value*" (page 618).	
Groening, Mittal, and Zhang (2016)	"Tobin's q is particularly adept at capturing the "unmeasured source of value, and [is] *generally attributed to the intangible value enjoyed by the firm*" (page 13).	
Sridhar et al. (2016)	"We use Tobin's q to measure firm performance because *it captures variation in a firm's market value, as well as the effect of changes in unmeasured intangible assets that might result from the firm's advertising*" (page 40)	The authors suggest that the AATQ both captures 1) variations in market value, and 2) unmeasured intangibles. An effective metric cannot adequately capture two different constructs.

Do Accounting-Based Approximations of Tobin's q Measure Performance?

Marketing researchers' conceptions of performance differ as such the different interpretations of AATQs below is not necessarily a problem. (Indeed some conceptions may be simply synonyms to the scholars, e.g., firm and market value). What is a problem is that the same measures are used in marketing to capture quite different conceptions of performance without significant discussion. If a metric is used to capture a different construct than it captured in prior research we would suggest the reasons for the different usage should be fully explained.

Below we *italicize the key descriptions of what the AATQ are said to do*.

Authors	**Description**	**AATQ Assumed to Capture**
Rust et al. (2004)	Example of "Tobin's q" given under heading of "*Value of the Firm*" (Figure 1, page 77).	Value of the firm.
Anderson, Fornell, and Mazvancheryl (2004)	"Tobin's q (or simply q) has gained wide acceptance as a measure of a *firm's economic performance*" (page 175).	Economic performance.
Lee and Grewal (2004)	"We use Tobin's q, a *forward-looking measure*, (e.g., Anderson, Fornell, and Mazvanchery 2004) to operationalize firm performance" (page 160, footnote 3). "We use *firm performance, market valuation of the firm, and Tobin's q* interchangeably" (page 160, footnote 3).	In this conception the AATQ is a forward looking measure of performance, as well as measure of market value. This logic seems to suggest that "market value" is both an input to the AATQ and interchangeable with the AATQ.
Gruca and Rego (2005)	"We tested this conjecture using Tobin's q, price-to-book ratio, and stock price as alternative *measures of firm value*" (page 126). "There are alternative measures of *shareholder value. The most widely cited include Tobin's q*" (page 116).	AATQ here measure firm value and shareholder value.

Mittal et al. (2005)	"Tobin's q has gained wide acceptance as a measure of a *firm's economic performance*" (page 550). "Thus, a firm that does not create incremental value will have a Tobin's q of 1 while *firms creating incremental value will have a Tobin's q>1*" (page 550). "To measure *long-term financial performance of a firm*, we use Tobin's q" (page 550). "A firm that creates market value greater than the replacement costs of its assets is presumably *using its assets more effectively*" (page 550).	Firm economic performance and incremental value.
Luo and Bhattacharya (2006)	"...*firm market value* (i.e., Tobin's q and stock return") (page 1).	AATQ measure firm value.
Luo and Donthu (2006)	"…the *forward-looking performance* measures of Tobin's q and stock return" (page 72).	A forward looking measure, i.e., not historic performance.
Srinivasan (2006)	"Although Tobin's q is a reliable *measure of firm value*, it represents the stock market's evaluation of the level, speed, and risk of the firm's future cash flow." (page 132)	AATQ measure firm value.
Luo and Homburg (2007)	"…we explored *profitability implications*. The results show that advertising and promotion efficiency has a significant impact on Tobin's q" (page 145).	AATQ is equivalent to profitability.
Sorescu and Spanjol (2008)	"We observe two related measures of *firm value*: Tobin's q and abnormal returns" (page 119).	AATQ measure firm value.
Fang, Palmatier, and Steenkamp (2008)	"We use Tobin's q as a proxy for our dependent variable—*firm value*" (page 4).	AATQ measure firm value.
Nath and Mahajan (2008)	"With Tobin's q as a measure of *performance*" (page 72).	AATQ measure performance.
Morgan and Rego (2009)	"This (Tobin's q) is a *forward-looking measure* of firm performance" (page 64).	Forward looking performance, i.e., not historic performance.

Lee and Chen (2009)	"To account for the *firm's past performance*, Tobin's q, based on Chung and Pruitt's (1994) method, was included" (page 103).	Past performance, i.e., not future growth expectations.
Krasnikov, Mishra, and Orozco (2009)	In Table 3 (page 162) Tobin's q is part of "*Firm Performance and Shareholder Value.*"	Firm Performance and Shareholder Value. Are these constructs distinct? If not why separate them and if so how does a single metric capture both?
Koh, Lee, and Boo (2009)	"In examining firm performances, the study employed two frequently used performance measures: Tobin's q, *a value performance measure,* and return on assets (ROA), an accounting performance measure" (page 624).	Value performance measure.
Grewal, Chandrashekaran, and Citrin (2010)	"As a *performance metric and a measure of shareholder value*, Tobin's q has several advantages over other measures of performance, such as market-to-book value and return on investment" (page 618).	These scholars make a distinction between performance metrics and measures of shareholder value. How the scholars see the difference and how a single AATQ captures both conceptions should be more clearly stated.
Torres and Tribó (2011)	"The second dependent variable is shareholder value, measured through Tobin's q (i.e., market-to-book ratio value of equity), which captures *future growth expectations*" (page 1092).	Future growth expectations, i.e., not historic performance
Dotzel, Shankar, and Berry (2013)	"It (Tobin's q) captures *long-term performance* by comparing replacement and market values" (page 265).	Long-term performance.
Park et al. (2013)	"Tobin's q has received wide acceptance in the current marketing literature as an *appropriate measure of performance*" (page 184). "When a firm's market value exceeds the replacement costs of the firm's assets, the firm creates shareholder value; thus, the higher Tobin's q, *the better the company's performance*" (page 184).	(Company) performance.

Kashmiri and Mahajan (2014)	"We used Tobin's q as our measure of *firm performance*" (page 83).	Firm performance.
Germann, Ebbes, and Grewal (2015)	"…*performance* (measured in terms of Tobin's q)" (page 1). "It provides a measure of the *premium (or discount) that the market is willing to pay above (below) the replacement costs of a firm's assets,* thus capturing any above-normal returns expected from a firm's collection of assets (Amit and Wernerfelt 1990)" (page 12).	Performance = above normal returns to a firm's assets. The Amit and Wernerfelt 1990 citation does not relate directly to the AATQ used – the AATQ used was introduced in 1994.
Malshe and Agarwal (2015)	"Grewal, Chandrashekaran, and Citrin (2010) note that as a *performance metric and a measure of firm value,* Tobin's q has several advantages over other measures of performance" (page 28).	In quoting the prior paper the authors don't clarify how firm value is being contrasted with performance, note the use of "and", or how two constructs are captured by the single measure.
Larivière et al. (2016)	"Tobin's Q is the first *firm performance outcome* we use in assessing the link between customer satisfaction, repurchase intention and SHV" (Web Appendix A, page 2).	Firm performance
Groening, Mittal, and Zhang (2016)	"To capture the long-*term financial value of a firm,* we use Tobin's q, a stock-market-based performance measure" (page 64).	Long-term financial value of a firm.
Sridhar et al. (2016)	"We use Tobin's q to measure *firm performance* because it captures variation in a firm's market value, as well as the effect of changes in unmeasured intangible assets that might result from the firm's advertising" (page 40)	Performance seems to be a composite of market value and change in intangibles. It is not clear how the AATQ captures the two different ideas effectively and how they combine to create performance.
Kang, Germann, & Grewal (2016)	"..firm performance (Tobin's q).." (page 65) "..the market valuation of a firm (Tobin's q).."(page 68)	Market value and firm performance