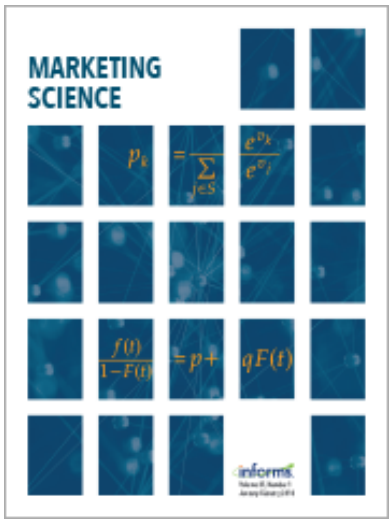

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The Misuse of Accounting-Based Approximations of Tobin's q in a World of Market-Based Assets

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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 underrecording 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 toward 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.

History: Avi Goldfarb served as the senior editor and David Godes served as associate editor for this article.

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 on 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 underrecord such assets to guard against overstating values, which leads to higher AATQ for firms focused on marketing. This biases AATQ toward giving evidence of the effectiveness of investments in market-based assets. Furthermore, whenever AATQ exceed 1, as is the case for the average firm, the metrics increase even with wasted investments.

In this paper, 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" (Lehmann 2004). To create this list, we searched academic databases (e.g., JSTOR, top-tier marketing journal websites, and search engines like Google Scholar)

Table 1. Key Marketing Studies Using AATQ Since 2004

Study	In	AATQ	Investigates
Rao et al. (2004)	JM	C&P	Branding strategy
Anderson et al. (2004)	JM	C&P	Customer satisfaction
Lee and Grewal (2004)	JM	C&P	Advertising and comms.
Gruca and Rego (2005)	JM	C&P	Customer satisfaction
Mittal et al. (2005)	MS	C&P	Customer satisfaction
Luo and Bhattacharya (2006)	JM	C&P	CSR
Srinivasan (2006)	JM	C&P	Dual distribution
Morgan and Rego (2006)	MS	C&P	Customer satisfaction
Luo and Donthu (2006)	JM	C&P	Advertising and comms.
Luo and Homburg (2007)	JM	C&P	Customer satisfaction
Sorescu and Spanjol (2008)	JM	K&Z	Innovations
Hsu and Jang (2008)	IJHM	C&P	Advertising and comms.
Fang et al. (2008)	JM	C&P	Transition to services
Nath and Mahajan (2008)	JM	C&P	CMO impact
Morgan and Rego (2009)	JM	C&P	Branding strategy
Lee and Chen (2009)	PIM	C&P	New products
Krasnikov et al. (2009)	JM	C&P	Brand identity
Wang et al. (2009)	JAMS	C&P	Advertising and comms.
Koh et al. (2009)	IJHM	C&P	Branding
Erickson and Rothberg (2009)	IMM	M/B[a]	Intellectual capital
Grewal et al. (2010)	JMR	C&P	Customer satisfaction
Torres and Tribó (2011)	JBR	M/B	Customer satisfaction
Dotzel et al. (2013)	JMR	C&P	Customer satisfaction
Park et al. (2013)	JBR	C&P	Brand identity
Kashmiri and Mahajan (2014)	IJRM	C&P	Family ownership
Sridhar et al. (2014)	JAMS	B&O	Advertising and comms.
Germann et al. (2015)	JM	C&P	CMO impact
Malshe and Agarwal (2015)	JM	C&P[b]	Customer satisfaction
Lariviere et al. (2016)	JMR	M/B	Customer satisfaction
Groening et al. (2016)	JMR	C&P	Customer and employees
McAlister et al. (2016)	JMR	C&P	Advertising and comms.
Sridhar et al. (2016)	JM	C&P	Advertising and comms.
Kang et al. (2016)	JM	C&P	CSR

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

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 et al. 1998), which means estimates of asset replacement cost are biased downward 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.

We are not the first to note problems with Tobin's q (Dybvig and Warachka 2010, Edeling and 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 2015–2016 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, November 24, 2017). Meanwhile, Mizik and Jacobson (2009a), who criticize Tobin's q, and Srinivasan and Hanssens (2009a), who largely accept 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 on 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.

$$\text{Tobin's Original q} = \frac{\textit{Market Value}}{\textit{Replacement Cost of Assets}}. \quad (1)$$

We use a marketing definition, rather than a financial accounting definition, of an asset. Using our definition, an asset is something with economic value that currently exists. Our definition includes market-based assets (Srivastava et al. 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:

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

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 that may have different properties, as we discuss later, but in this paper we focus only on the AATQ used in marketing (Table 1)

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

Where Market Value of Equity = Stock Price × Outstanding Common Stocks; Preferred Stock = 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 et al. 2004, Dotzel et al. 2013, Germann et al. 2015, Koh et al. 2009, Luo and Bhattacharya 2006, Luo and Donthu 2006, Mittal et al. 2005, Nath and Mahajan 2008, Rao et al. 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 be misleading. 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 \$2 m to create an asset worth \$3 m earns \$1 m. (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, for example, from cash to property, or come attached to an equivalent liability, for example, 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 sum of all assets, $RT + RI + UT + UI$, but given that unrecorded assets (UT and UI) are unknown, this is hard to estimate.

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, that is, $RT + RI + UT + UI$

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

Table 2. A Taxonomy of Assets

Assets recorded in external reports	Assets not recorded 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)

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

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 (Financial Accounting Standards Board) 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—that is, θ_T or θ_I increases—the denominator gets relatively bigger, and AATQ decrease.

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 and *RI*	Recorded tangible assets and recorded intangible assets
UT and *UI*	Unrecorded tangible assets and 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/difference 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

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

Tobin's q is argued to be "comparable across firms in different industries" (Anderson et al. 2004, p. 175). (See also Germann et al. 2015, Grewal et al. 2010, Lee and Grewal 2004, Mittal et al. 2005, Nath and Mahajan 2008, Park et al. 2013. Table A.1 in the 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 et al. 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 and 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 ($z = 24.06$, $p < 0.01$) suggests interindustry 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 more reliant on tangible assets will have a greater proportion of tangibles, $+\tau$, compared to intangibles, $-\tau$, $((T + \tau) + (I - \tau) + \Psi)/((T + \tau)\theta_T + (I - \tau)\theta_I)$.

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,* $dAATQ/d\tau = (T + I + \Psi)(\theta_I - \theta_T)/((I - \tau)\theta_I + (T + \tau)\theta_T)^2$ *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. (1.37) and Honeywell (1.26) had a considerably lower AATQ. Strategy dictates asset usage so we expect predictable differences depending on 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 et al. 2004, p. 129). AT, the old Compustat item number 120 ("total assets") typically used in the AATQ equals all recorded assets and $RT + RI \neq RT$, 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 *tangible assets*" (2004, p. 79, our emphasis). (See also Erickson and Rothberg 2009, Groening et al. 2016, Lee and Grewal 2004, Malshe and Agarwal 2015, Mittal et al. 2005; and Table A.2 in the appendix for quotes.) Problems are especially obvious where an article's text contradicts the formula presented (e.g., Grewal et al. 2010, p. 618; Park et al. 2013, p. 184; Anderson et al. 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 et al. 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 et al. (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 et al. 2015, Grewal et al. 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 et al. 2004, Fang et al. 2008, Hsu and Jang 2008; and Table A.3 in 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 underrecording of assets.

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

There seems to be no theoretical reason for AATQ to find equilibrium at 1, that is, $\Psi = -(UI + UT)$, 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, $p < 0.001$). 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

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

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 et al. 2004, Erickson and Rothberg 2009, Hsu and Jang 2008, Grewal et al. 2010, Groening et al. 2016, Morgan and Rego 2009, Simon and Sullivan 1993, Rust et al. 2004, Srinivasan 2006, Wang et al. 2009; and Table A.4 in 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 et al. (2016) quoting prior work say that "[Tobin's q is] generally attributed to the intangible value enjoyed by the firm," (p. 65) yet call Tobin's q "a stock-market-based performance measure" (p. 64). Sridhar et al. (2016) suggest Tobin's q can both "measure firm performance" and "changes in unmeasured intangible assets" (p. 40). 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, for example, 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, for example, impact on a firm's risk profile). It is only when the brand equity generated is greater than the investment, for example, 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 et al. do this by stating, "firm performance (i.e., Tobin's q)…" (2015, p. 3; see also Rust et al. 2004, Anderson et al. 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 et al. 2008, Nath and Mahajan 2008, Morgan and Rego 2009, Lee and Chen 2009, Krasnikov et al. 2009, Koh et al. 2009, Grewal et al. 2010, Torres and Tribó 2011, Dotzel et al. 2013, Park et al. 2013, Malshe and Agarwal 2015, Kashmiri and Mahajan 2014, Groening et al. 2016, Larivière et al. 2016, Kang et al. 2016, and Table A.5 in 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 that 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, that is, $RT + RI > 0$.

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

Accountants underrecord assets (Mizik and Nissim 2011, Sinclair and Keller 2014, Srivastava et al. 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* $dAATQ/dUI = 1/(RT + RI)$, *and unrecorded tangibles as* $dAATQ/dUT = 1/(RT + RI)$, *given* $RT + RI > 0$.

Performance type (forward-looking/historic) differs between Lemmas 4 and 5, generating confusion about

what, exactly, AATQ measure. Yet, with both Lemmas 4 and 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 $UI + UT > -\Psi$; 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. A total of 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*

$$\frac{dAATQ}{dRI} = -\frac{UI+UT+\Psi}{(RI+RT)^2} \quad \text{and} \quad \frac{dAATQ}{dRT} = -\frac{UI+UT+\Psi}{(RI+RT)^2}$$

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, that is, $(RT + \alpha_1 + RI + UT + UI + \Psi)/(RT + \alpha_1 + RI)$.

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

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 $(RT + RI + UT + UI + \Psi)/(RT + RI - \alpha_2)$, with $\alpha_2 = 0$ being no asset transfer. Any performance-neutral transfer to unrecorded assets increases AATQ. The opposite also holds. A performance-neutral transfer of an

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 $UI+UT>-\Psi$) make AATQ fall (Lemma 6)	**Performance-neutral transfers from recorded assets make AATQ rise** (Lemma 8)
	Earned decreases in recorded assets usually (when $UI+UT>-\Psi$) make AATQ rise (Lemma 6)	**Performance-neutral transfers to recorded assets make AATQ fall** (Lemma 8)

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, for example, through brand dilution. This causes AATQ to fall.

Lemma 8. *Converting recorded assets into* (*from*) *unrecorded assets increases* (*decreases*) *AATQ.* $dAATQ/d\alpha_2 = (RI+RT+UI+UT+\Psi)/(-\alpha_2+RI+RT)^2 > 0$ *as* $RI+RT+UI+UT>-\Psi$, *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, for example, 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.

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. In the following discussion, we show four problems especially relevant to investments in marketing.

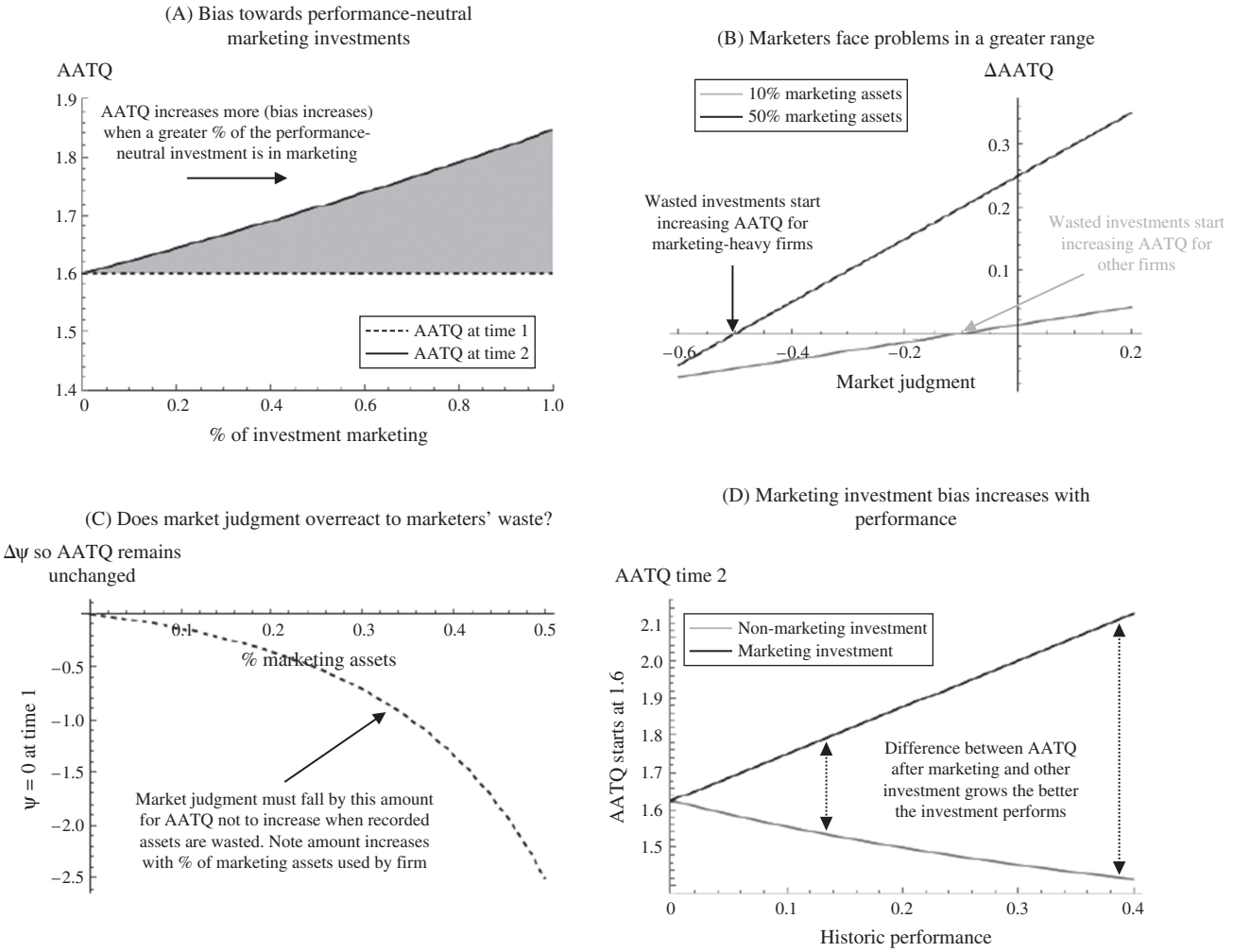
A: Strategic Choices to Invest in Marketing Raise AATQ Independent of Performance

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 1(A) 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

Figure 1. Special Concerns for Marketing Scholars Using AATQ



see marketing-focused firms have AATQ > 1, but nonmarketing-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 1(B)).

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 1(C) shows the drop in market judgment necessary to stop a firm's AATQ from rising after a wasted investment, depending on 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 1(C)). 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 Toward 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 $AATQ_{\text{Tangible}} - AATQ_{\text{Intangible}} = DIFF = -(\gamma(I+T+\gamma+\Psi))/((I\theta_I+T\theta_T)(\gamma+I\theta_I+T\theta_T))$. AATQ after the unrecorded intangible investment are larger, as $\Psi > -(I+T)$, while I, T, γ, θ_T, and θ_I are nonnegative.

Now consider what happens to this difference with increasing success, $\gamma\uparrow$, $dDIFF/d\gamma = -1/(I\theta_I + T\theta_T) + (-I(1-\theta_I)+T(1-\theta_T)+\Psi)/(\gamma+I\theta_I+T\theta_T)^2$. 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 1(D) 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 that 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 that 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 cannot 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 FT 50 journals from 2004 using an AATQ, or addressing similar questions with market value metrics free of accounting estimates, for example, 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 et al. 2008, Fornell et al. 2006, Ittner et al. 2009, Jacobson and Mizik 2009, Luo and Homburg 2008, Luo et al. 2010, Raithel et al. 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 would expect AATQs and market value metrics that do not use accounting data to increase. For a performance-neutral transfer from a recorded to an unrecorded asset, for example, 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 overreport the value of a strategy that pursues satisfaction (or other unrecorded intangibles).

Anderson et al. (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 et al. (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 captures 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 et al. (2010) consider satisfaction's distribution, Dotzel et al. (2013) *e* innovativeness 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 that if highly leveraged firms spend less on marketing (creating intangibles), they can be expected to have lower AATQ at the same level of performance.

Table 5. Use of AATQ and Related Metrics Measuring Performance in Key Marketing Papers

Study	Metric	Most relevant finding	Our response to the findings
		Customer Satisfaction	
Anderson et al. (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)." (p. 177).	Consistent with achieved satisfaction being a market-based asset.
Gruca and Rego (2005) JM	Cashflows, SR, M/B, and 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 and 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 and Rego (2006) MS	AATQ and TSR	Four (of six) satisfaction related metrics associated with AATQ, only one associated with TSR.	Association with satisfaction stronger for AATQ. Consistent with AATQ bias.
Luo and 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 et al. (2010) JMR	AATQ	"Satisfaction level positively influences shareholder value" (p. 621).	Using an AATQ is problematic given bias in the measure
Dotzel et al. (2013) JMR	AATQ (and Risk)	"customer satisfaction has a strong positive effect on firm value" (p. 271).	Using an AATQ is problematic given bias in the measure.
Malshe and 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) and C4FM	Population satisfaction no impact on C4FM, indirect effect on AATQ. AATQ in five periods, two direct and indirect effects, three direct effects. C4FM in five periods, only one (indirect) effect.	Stronger satisfaction effect measuring performance with AATQ than C4FM. Consistent with AATQ bias.
		Advertising and Marketing Communications	
Lee and 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 and Donthu (2006) JM	AATQ and 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 et al. (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 and Hanssens (2010) JM	M/B and 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 et al. (2014) JAMS	Berger and Ofek's AATQ	"advertising and R&D spending increase firm value [an AATQ], while inventory holding does not" (p. 277).	Typically advertising and R&D create unrecorded, while inventory creates recorded, assets so findings consistent with AATQ bias.

Table 5. (Continued)

Study	Metric	Most relevant finding	Our response to the findings
Sridhar et al. (2016) JM	AATQ	"…strong positive main effect for regional [and online] advertising…weaker positive main effect for national advertising…" (p. 48).	Showing connection between advertising and 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 toward active marketers.
		Other Marketing Papers	
Rao et al. (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 internally generated versus acquired brands so result consistent with bias driven by underrecording of internally generated brands.
Luo and Bhattacharya (2006) JM	AATQ and 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.
Jacobson and Mizik (2009) 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 et al. (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 and Spanjol (2008) JM	M/B and abnormal returns	M/B and 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 and Mahajan (2008) JM	AATQ (and 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 equals marketing focused firm, then bias predicts firms with CMOs will have higher AATQ which they do not find. Germann et al. (2015) later find the connection between CMO and AATQ.
Krasnikov et al. (2009) JM	AATQ and FF	"…we observed that brand-association trademarks positively affect firm cash flows, Tobin's q, ROA, and stock returns." (p. 163).	AATQ and Stock Return show similar positive results, i.e., does not show evidence of bias.
Morgan and Rego (2009) JM	AATQ (and 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 et al. (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 et al. (2015) JM	AATQ, and Jensen's Alpha (and 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 one sample "consistent with our previous findings" (p. 16).	If CMO presence equals 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.

Table 5. (Continued)

Study	Metric	Most relevant finding	Our response to the findings
Hsu et al. (2016) JAMS	C4FM	"...Rao et al. (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 et al. (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 et al. (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 toward finding impact of strategies creating unrecorded assets.

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

Larivière et al. (2016) show an indirect effect of satisfaction on 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 retest 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 note that this is a pattern consistent with bias in the AATQ.

Sridhar et al. (2016) show the positive impact of advertising on an AATQ. Sridhar et al. (2014) show advertising and research and development (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 et al. (2011) show partially significant results for the benefits of advertising and Srinivasan et al. (2009) show stronger results.

Note that our research suggests that AATQs' bias is more acute for marketing-focused firms and McAlister et al. (2016) show that an AATQ is more responsive for "differentiators," for example, 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 et al. (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 underrecording internally generated market-based assets may influence why "corporate branding strategy is associated with higher values of Tobin's q" (p. 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 et al. (2008) in considering service strategy, showing increasing returns to greater service transition. Mizik and Jacobson (2009b) found support for only two out of five 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 et al. (2009) show similar results using an AATQ and Stock Return, that is, do not show evidence of AATQ bias. Morgan and Rego (2009) show mixed results for marketing's impact on an AATQ. Groening et al. (2016) look at cross-validation of signals, but only use an AATQ to measure performance. Germann et al. (2015) and Nath and Mahajan (2008) debate CMO (Chief Marketing Officer) 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 (Corporate Social Responsibility) impact as Kang et al. (2016) do. There is a bias toward showing success as CSR strategies often create unrecorded intangible assets, for example, "stakeholder relationships" (p. 62).

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 et al. (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 on 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 and Wang 2017, Mizik and 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 the Marketing Accountability Standards Board (MASB).

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 toward finding marketing's effectiveness. Researchers should use metrics that are meaningful to nonresearchers or, at a minimum, argue in detail why the metrics should be meaningful to nonresearchers.

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

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Appendix. Sources for Claims About AATQ

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

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

Table A.1. Are Accounting-Based Approximations of Tobin's q Comparable Across Industries?

Authors	Description	Our response
Anderson et al. (2004)	"Tobin's q is also adjusted for expected market risk and is less affected by accounting conventions, which *makes it comparable across firms in different industries*." (p. 175).	Given different asset classes are differentially recorded, AATQ are not comparable across firms in different 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" (p. 162).	Some industries will have higher AATQ merely because they employ more unrecorded assets. The AATQ used in marketing are affected by accounting convention. Their supporting citation merges (Chakravarthy 1986) "Measuring Strategic Performance," *SMJ*, 7(5):437–458 and Chakravarthy (1987) "On Tailoring A Strategic Planning System To Its Context: Some Empirical Evidence," *SMJ*, 8 (6):517–534. 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" (p. 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" (p. 72).	The AATQ used in marketing are affected by accounting standards.
Grewal et al. (2010)	"Third, Tobin's q is often used to *compare firms across industries* because it is not much affected by accounting conventions (Chakravarthy 1986)." (p. 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 and Grewal (2004).
Dotzel et al. (2013)	"Tobin's q *can be used across industries* because accounting conventions do not affect it" (p. 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*" (p. 184).	Some industries will have higher AATQ merely because they employ more unrecorded assets.
Germann et al. (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)" (p. 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*" (p. 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.

tangible assets will, all else equal, have lower AATQ. Many scholars however claim that AATQ are comparable across industries. In Table A.1, 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.

Table A.2. Do Accounting-Based Approximations of Tobin's q Use Only Tangible Assets?

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" (p. 79).	This does not describe the metrics used in marketing. The AATQ in marketing use Total (recorded) assets, i.e., they include RI and $RI + RT \neq RT$.
Anderson et al. (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." (p. 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*" (p. 175). Denominator actually used is "*total assets* from the COMPUSTAT databases" (p. 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 et al. 1999)" (p. 162). Formula given: "TA = book value of *total assets*" (p. 162).	The formula described clearly states total assets are used but the text suggests it is only tangible assets.
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" (p. 550). They "use Chung and Pruitt's (1995) approximation of the NBER method of Hall et al. (1988)" (p. 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*" (p. 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*" (p. 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 (p. 162).
Grewal et al. (2010)	"Captures the relationship between the *replacement cost of a firm's tangible assets* and the market value of the firm" (p. 618). They use Chung and Pruitt giving the denominator as "*TA = book value of total assets*" (p. 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*" (p. 184). "... while the denominator captures the *replacement cost of the firm's physical assets*" (p. 184). They note, "Tobin (1969) defined the value of a company's q as the ratio of the company's market value to the *current replacement cost of its assets*" (p. 184). Use Chung and Pruitt, "q = .../*Total Assets*" (Equation (1), p. 184).	There is a contradiction. The formula given suggests total assets is used but the description says only physical assets.
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" (p. 28).	From their citations, we believe they used Chung and Pruitt's AATQ which includes recorded intangibles.
Groening et al. (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*" (p. 65).	This repeats an earlier claim about only using tangible assets. Groening and colleagues use Chung and Pruitt's AATQ, which includes recorded intangible assets.

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 it is total, not just tangible, assets that 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 Table A.2, we *italicize the key problematic claims*.

Table A.3. Will Accounting-Based Approximations of Tobin's q Tend to 1?

Authors	Description	Our response
Rao et al. (2004)	"The long-term equilibrium market value of a firm must be equal to the *replacement value of the firm*" (p. 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*" (p. 261).	The metric they use, Chung and Pruitt's AATQ, does not have this property.
Fang et al. (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*" (p. 4).	The metric they use, Chung and Pruitt's AATQ, does not have this property.

Table A.4. Do Accounting-Based Approximations of Tobin's q Measure Reliance on Intangibles?

Authors	Description	Our response
Rao et al. (2004)	"We use Tobin's q ratio *to measure the intangible assets*" (p. 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*" (p. 121).	
Hsu and Jang (2008)	"The higher Tobin's q, *the higher the value of the intangible assets of the firm*" (p. 261).	
Morgan and Rego (2009)	"*Tobin's q levels greater than* 1.0 *indicate a positive value for the firm's intangible assets*" (p. 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" (p. 162).	
Wang et al. (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*" (p. 135).	
Grewal et al. (2010)	"Tobin's q is often viewed as an *assessment of intangible firm value*" (p. 618).	
Groening et al. (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*" (p. 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*" (p. 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.

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. In Table A.3, we *italicize potentially confusing claims*.

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. In Table A.4, we *italicize what AATQ are said to measure regarding intangibles*.

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

Marketing researchers' conceptions of performance differ as such the different interpretations of AATQs in Table A.5 are not necessarily a problem. (Indeed some conceptions may be simply synonyms to the scholars, for example, firm and

Table A.5. Do Accounting-Based Approximations of Tobin's q Measure Performance?

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, p. 77).	Value of the firm.
Anderson et al. (2004)	"Tobin's q (or simply q) has gained wide acceptance as a measure of a *firm's economic performance*" (p. 175).	Economic performance.
Lee and Grewal (2004)	"We use Tobin's q, a *forward-looking measure*, (e.g., Anderson et al. 2004) to operationalize firm performance" (p. 160, Endnote 3). "We use *firm performance, market valuation of the firm, and Tobin's* q interchangeably" (p. 160, Endnote 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*" (p. 126). "There are alternative measures of *shareholder value*. *The most widely cited include Tobin's* q" (p. 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*" (p. 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" (p. 550). "To measure *long-term financial performance of a firm*, we use Tobin's q" (p. 550). "A firm that creates market value greater than the replacement costs of its assets is presumably *using its assets more effectively*" (p. 550).	Firm economic performance and incremental value.
Luo and Bhattacharya (2006)	"... *firm market value* (i.e., Tobin's q and stock return") (p. 1).	AATQ measure firm value.
Luo and Donthu (2006)	"... the *forward-looking performanc*e measures of Tobin's q and stock return" (p. 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." (p. 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" (p. 145).	AATQ is equivalent to profitability.
Sorescu and Spanjol (2008)	"We observe two related measures of *firm value*: Tobin's q and abnormal returns" (p. 119).	AATQ measure firm value.
Fang et al. (2008)	"We use Tobin's q as a proxy for our dependent variable—*firm value*" (p. 4).	AATQ measure firm value.
Nath and Mahajan (2008)	"With Tobin's q as a measure of *performance*" (p. 72).	AATQ measure performance.
Morgan and Rego (2009)	"This (Tobin's q) is a *forward-looking measur*e of firm performance" (p. 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" (p. 103).	Past performance, i.e., not future growth expectations.
Krasnikov et al. (2009)	In Table 3 (p. 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 et al. (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" (p. 624).	Value performance measure.

Table A.5. (Continued)

Authors	Description	AATQ assumed to capture
Grewal et al. (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" (p. 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*" (p. 1092).	Future growth expectations, i.e., not historic performance.
Dotzel et al. (2013)	"It (Tobin's q) captures *long-term performance* by comparing replacement and market values" (p. 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*" (p. 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*" (p. 184).	(Company) performance.
Kashmiri and Mahajan (2014)	"We used Tobin's q as our measure of *firm performance*" (p. 83).	Firm performance.
Germann et al. (2015)	"... *performance* (measured in terms of Tobin's q)" (p. 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)" (p. 12).	Performance equals 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 et al. (2010) note that as a *performance metric and a measure of firm value*, Tobin's q has several advantages over other measures of performance" (p. 28).	In quoting the prior paper the authors do not 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, p. 2).	Firm performance.
Groening et al. (2016)	"To capture the *long-term financial value of a firm*, we use Tobin's q, a stock-market-based performance measure" (p. 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" (p. 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 et al. (2016)	"... firm performance (Tobin's q)..." (p. 65). "... the market valuation of a firm (Tobin's q)..." (p. 68)	Market value and firm performance.

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.

In Table A.5, we *italicize the key descriptions of what the AATQ are said to do*.

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