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RESEARCH ARTICLE

Introducing LIVA to measure long-term firm performance

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ABSTRACT

Research summary: This article introduces a new measure of long-term firm performance: long-term investor value appropriation (LIVA). This measure helps to address a disconnect between the common theoretical assumption that managers optimize firm value, and the widespread empirical practice of measuring performance using short-term ratios such as return on assets (ROA). LIVA can lead to markedly different strategic insights compared to commonly used measures such as ROA and cumulative abnormal returns. For instance, the widely cited finding of a U-shaped relation between acquisition experience and performance turns out to be largely driven by short-term stock price movements and vanishes when using 10-year LIVA.

Managerial summary: Managers have a large number of performance measures at their disposal, such as return on assets, total shareholder returns, and earnings before interest and taxes. However, these short-term measures do not capture well whether a firm creates long-term shareholder value, which is one of the primary objectives for most firms. Addressing that gap, this article introduces a new measure called long-term investor value appropriation (LIVA). LIVA can be constructed using publicly available stock market data and it can help managers to better analyze historical long-term performance.

KEYWORDS

long-term performance, performance measurement, return on invested capital, value appropriation, value destruction

1 | INTRODUCTION

Core theories in the strategy field, such as the resource-based view, the positioning school, transaction cost economics, and value-based strategy, posit that firms and their managers seek to maximize appropriation of long-term value (Barney, 1986; Brandenburger & Stuart, 1996; Porter, 1980; Williamson, 1979). Likewise, formal models in strategy usually assume some form of maximization of profit or long-term value appropriation (e.g., Gans & Ryall, 2017; Jacobides, Winter, & Kassberger, 2012; Levinthal & Wu, 2010).

This core theoretical assumption contrasts with how performance is usually measured in empirical studies: an analysis of recent papers in *Strategic Management Journal* (*SMJ*) shows that a significant majority of studies use short-term ratios such as return on assets (ROA), instead of the long-term value appropriation in terms of absolute size (i.e., in dollars or other monetary amounts) that managers are supposed to maximize, even though previous literature has shown that optimizing such short-term accounting ratios in general does not correspond to long-term value maximization. For instance, firms that create economic value for their investors can actually have an accounting return on capital (ROC) below the cost of capital and vice versa (Fisher & McGowan, 1983). Likewise, firms that invest in initiatives that have a positive net present value (NPV) might decrease their ROC (Levinthal & Wu, 2010).

To address this apparent disconnect between the theoretical performance goal of firms and the empirical measurement of it, we develop an empirical performance metric that measures whether firms created value for their investors over long time periods: long-term investor value appropriation (LIVA). We investigate its properties and derive how it relates to common performance measures in the literature, such as total shareholder return (TSR), economic profit (EP), and ROC.

In order to develop a measure that is consistent with the theoretical notion of value maximization, we define LIVA in terms of the backward-looking NPV of returns over time. We show that the definition of LIVA based on NPV is equivalent to the discounted sum of excess stock market returns times market capitalization, and moreover that in the long run LIVA becomes approximately equal to the sum of discounted EP as calculated from accounting statements. These two measures converge because short-term differences between stock returns and accounting profits tend to cancel out in the long run when properly discounted. Essentially, the use of different measures shifts profits forward or backward over time, but in the long run this does not affect the total.

We perform three increasingly involved analyses to show how LIVA can bring new strategic insights. First, to get a straightforward feel for LIVA relative to other performance metrics, we compare rankings of the best and worst performing companies using LIVA and other common performance measures. We find that top performers in terms of LIVA correspond to often-lauded companies, such as Apple, Amazon, and Alphabet. These companies end up much lower in lists that are based on ratios such as excess return and ROA. The reason is that these latter lists are dominated by relatively small companies, because only a small base allows a stellar performance in terms of ratio measures relative to size. Additionally, we show that when traditional measures such as excess return are hard to define meaningfully, for instance, in the case of bankruptcy, LIVA can provide a useful measure to assess economic effects.

Second, we show how LIVA can be used for in-depth case studies, applying it to Circuit City and Best Buy. A key advantage of LIVA over other measures is that due to its additivity it can be decomposed into specific sources of value creation and destruction, which can be a powerful tool in analyzing individual firms. For instance, the LIVA decomposition indicates that despite Circuit City's bankruptcy, it destroyed relatively little investor value due to its successful spin-off of Car-Max.

Third, we show how LIVA can be used in a large-*N* empirical setup. Specifically, we conduct a replication study of the widely cited finding by Haleblian and Finkelstein (1999) of a U-shaped relation between acquisition experience and performance. The presumed theoretical mechanism for this finding is that as deal experience increases, at first this reduces acquisition performance due to "inappropriate generalization" (p. 35), but eventually it enhances performance as firms gain sufficient deal experience. With our data set, we can replicate the U-shaped relation when using short-term cumulative abnormal returns (CAR), consistent with the original analysis of Haleblian and Finkelstein (1999). Yet we find that this result is mainly driven by short-term stock price movements that vanish in the long term: When using 10-year LIVA, we find a negative relation between acquisition experience and performance, instead of a U-shaped relation.

The above analyses suggest four settings in which LIVA is likely to make a difference in management research vis-à-vis often used ratios such as ROA and TSR; they are:

1. *When economic magnitude matters*: Since LIVA is an absolute-size measure, results obtained with LIVA are driven by firms with significant economic impact; this contrasts to results driven by firms that have the highest ROA and TSR, since these firms are typically small companies with relatively little economic impact.
2. *When major corporate events are captured*: When events such as Mergers & Acquisitions (M&A), spin-offs, and bankruptcy are the focus of a study, LIVA is uniquely suited to capture the performance impact of such events.
3. *When performance is affected over a long time period*: In this case, measures such as ROA and CAR may have difficulty picking up long-term performance consequences of strategic actions.
4. *When aggregating or decomposing performance is of central interest*: LIVA is well suited for aggregating performance, for instance, at the industry level or for decomposing performance into the individual sources of a company's performance.

We discuss these four settings more extensively toward the end of the paper and outline potential research domains that can benefit from using LIVA. These include not only case studies and event studies—of which we provide explicit examples in the paper—but also cross-industry, policy, innovation, and corporate decline studies.

To aid researchers in employing LIVA, we have made available several resources:

- Appendix S1, available online, with methodological details.
- The global LIVA database, published on Wharton Research Data Services (WRDS).
- A supporting website with further materials, including teaching slides, available at www.liva-measure.com.

2 | LITERATURE REVIEW

Explaining organizational performance is at the heart of the strategy literature. Though there are many ways to measure performance, financial performance for investors plays a central role. The main theories of the strategy field, including the resource-based view (Barney, 1991), the positioning school (Porter, 1980), transaction cost economics (Williamson, 1979), and more recently value-based strategy (Gans & Ryall, 2017), all assume some form of profit maximizing behavior of firms and seek to explain differences in the profit appropriated across firms, and ultimately their investors. Though some scholars have argued for measuring performance of other stakeholders (Coff, 1999; Lieberman, Garcia-Castro, & Balasubramanian, 2016), measuring financial performance (for investors) has remained important in the empirical literature. For instance, out of all 215 empirical papers published in *SMJ* in 2016 or 2017 using quantitative methods, 108 used some measure of financial performance, approximately half of them as a dependent variable. These numbers are consistent with an earlier review of accounting metrics in the strategy literature by Richard, Devinney, Yip, & Johnson (2009, Table 1).

We also looked more specifically which performance measures were used in *SMJ*. The majority of studies use ratio measures based on accounting returns, with ROA leading the pack (61 out of 108 studies). By contrast, only six studies used an absolute-size measure (i.e., in dollar or other monetary amounts) based on accounting returns. The key reasons for the ubiquity of ratios based on accounting returns are presumably that they are easy to obtain, easy to use, and have been widely used in the past. At the same time, these accounting ratios are not without long-standing and well-known critiques.

First, accounting returns can diverge strongly from the underlying economic returns (Fisher & McGowan, 1983). Second, as, for instance, Levinthal and Wu (2010) argue, firms ought to optimize value in terms of absolute size and not returns in terms of ratios.[1] Lastly, the use of ratios in regressions can lead to biases and unstable results primarily due to confounding correlations in the numerator (e.g., profits) and the denominator (e.g., assets) (Wiseman 2009).

A few empirical studies in our *SMJ* sample use measures other than accounting ratios. Four studies use EBITDA (earnings before interest, taxes, depreciation and amortization), an absolute-size measure of operating profits; some of these studies cite similar reasons for using absolute-size measures instead of ratios as argued in this paper. Twenty studies use stock-market-based measures, such as TSR and CAR. TSR is the buy-and-hold return of an investment: the percentage return from dividend yield and share price appreciation, with dividends reinvested. CAR is a market-adjusted TSR-based measure, indicating how well a stock has done relative to the overall market. CAR is typically used in event studies, for instance, to judge the performance of mergers, acquisitions, or alliances around an announcement date. An advantage of using TSR or CAR is that they immediately relate to economic returns that are realizable by investors, and thus is not prone to the Fisher and McGowan critique.

While the strategy literature is mainly concerned with measuring past performance, there exists a significant literature on investment appraisal—the evaluation of future investment opportunities. The gold standard is appraisal based on NPV (Brealey, Myers, & Allen, 2006;

[1]For instance, a firm that has a cost of capital of 10% and a ROC of 20% will appropriate additional value for its investors if it invests in a project earning 15% returns, despite the fact that the investment will decrease the ROC for the firm. Thus, a firm with a lower ROC might in fact appropriate more value than a firm with a higher ROC, because the latter might artificially forego positive NPV opportunities that would lower its ROC. Indeed, theoretical papers almost never use accounting ratios such as ROA: of the six theoretical models in *SMJ* in 2016 that use a performance measure, five use absolute-size profit and one TSR as a dependent variable.

Koller, Goedhart, & Wessels, 2010). The basic idea is that an investment should be made if and only if it is expected to return more than the cost of capital, reflected by a positive NPV, and that a higher NPV is better than a lower NPV. The NPV is defined as the sum of expected cash flow (CF) from an investment, discounted by a cost of capital r:

$$\mathrm{NPV} = \sum_t \frac{\mathrm{CF}_t}{(1+r)^t}.$$

Thus, NPV measured over a long time period captures the extent to which strategic investments have been (financially) successful (see also Jacobides et al., 2012).

3 | LIVA AND ITS PROPERTIES

The literature review highlights an interesting disconnect between the theoretical and empirical strategy literature regarding performance measurement: while theoretical models assume that firms maximize absolute profits and ultimately long-term NPV, empirical papers usually assess performance using short-term ratios such as ROA, which might not properly reflect underlying economic performance, even over long time periods. In this section, we address this gap by developing an empirical measure of long-term firm performance based on a backward-looking measure of NPV, using data that are publicly available for listed companies. We call this measure “long-term investor value appropriation”, i.e., LIVA.

3.1 | Defining LIVA

To define LIVA based on NPV, we want to estimate the *ex post* discounted value of all cash flows to and from investors between two time points $t = 0$ and $t = T$. This value is equivalent to assuming that at time 0 investors invest V_0, the value of the firm at that time; in subsequent periods t, investors receive the free cash flow (FCF) generated by the firm FCF_t; and at time T, investors sell the firm for its market value V_T.[2] (The FCF is the cash that is available to all investors [debt and equity holders], which is equal to the cash flow from operations net of capital expenditures.) Taking the sum of the present value of these cash flows at time $t = T$ yields, with r denoting the cost of capital:

$$\mathrm{LIVA} = V_T - V_0(1+r)^T + \sum_{t=1}^{T} \frac{\mathrm{FCF}_t}{(1+r)^{t-T}}. \quad (1)$$

In Appendix S2, available online, we show that when taking the starting and ending value V_t equal to the enterprise value of the firm (i.e., the market value of equity plus the book value of debt), the above equation is equal to:

$$\mathrm{LIVA} = \sum_{t=1}^{T} \frac{\mathrm{ER}_t\,\mathrm{MC}_{t-1}}{(1+r)^{t-T}}. \quad (2)$$

[2]Throughout the article, we use the convention that state variables at a certain point in time (such as market capitalization) are measured at the end of a period, and that flow variables (such as FCF) start in Period 1. Thus, $t = 0$ reflects the moment before any flows have started.

In this equation, ER_t is the excess return (the TSR above the cost of equity) over period t, and MC_{t-1} is the market capitalization (the market value of all shares) at the beginning of period t. In words, LIVA is equal to the sum of the discounted absolute excess returns to shareholders over a given period.

The excess return (ER_t) per period can be operationalized in several ways. All methods are based on TSR, also called buy-and-hold returns, which are equal to the dividend yield plus stock price appreciation with dividends reinvested. The simplest way to calculate excess return is to take the difference between the company TSR and the value-weighted market returns. More involved methods would use the capital asset pricing model (CAPM), based on which the excess returns are the residuals of a regression without intercept of TSR on the market return. Additionally, other factors than just the market return could be included; common methods in the finance literature include a three-factor (Fama & French, 1993) or four-factor model (Carhart, 1997).

We prefer to use the simplest method (TSR minus market average), because it has a clear interpretation, and is least prone to errors and dependencies on methodological choices (CAPM and multifactor models require choosing rolling time windows over which to perform the regressions, the choice of which will affect the results). Moreover, Fama and French (1997) show that in practical applications, the factor loadings (i.e., the betas) usually have such high error margins that differences across companies and industries are not statistically significant. Indeed, we did not find material differences in outcomes across the various methods for calculating excess return, and thus for most analyses use the simplest one (details are available from the authors).

3.2 | Numerical example

Table 1 shows a numerical example of a LIVA calculation. The hypothetical firm has its initial public offering (IPO) of 1 million shares of $10 each in Year 0, acquires another firm by issuing 1 million shares at a price of $100 each in Year 10, and is acquired at a share price of $80 in Year 20. For simplicity, we assume that the shares do not pay dividends, and that the cost of capital throughout the entire period is constant at 8% per year. Thus, there are three cash flows over the entire 20-year period: investors pay $10 M in Year 0, pay another $100 M in Year 10, and receive $160 M in Year 20. In present values (as of Year 20), these are −$47M, −$216M, and +$160M, respectively. Adding these cash flows leads to a total LIVA of −$103M using the discounted cash flow formula from Equation (1).

Alternatively, one can calculate LIVA with Equation (2) using shareholder returns. In the first decade, the annualized excess return[3] is 16.6%, and in the second −9.5%. Using these figures leads to a LIVA of $169M for the first decade and −$272M for the second. The sum of these two is again −$103M, the same as the figure from the discounted cash flow method.

This example also illustrates how LIVA can behave quite differently from other market-based metrics. As seen in Table 1, total LIVA over the entire 20-year period is negative, even

[3]This uses the continuous compounding equation for calculating excess return: $ER = (1 + TSR)/(1 + r) - 1$. The LIVA for each decade can then be calculated using the total, non-annualized excess returns. For instance, for the first period, the total excess return is $(1 + 16.6\%)^{10} - 1 = 363\%$, which multiplied by the initial discounted market cap of $47M leads to a LIVA of $169M in the first decade. Alternatively, one could employ Equation (**2**) to the discounted market cap and excess returns in each individual year, leading to exactly the same results.

TABLE 1 LIVA example

	Year 0 (IPO)	Year 10 (pre-M&A)	Year 10 (post-M&A)	Year 20 (acquired)	Total
Share price	$10	$100	$100	$80	
Shares outstanding	1M	1M	2M	2M	
Market capitalization	$10M	$100M	$200M	$160M	
Discounted market cap	$47M	$216M	$432M	$160M	
Discounted cash flow	−$47M		−$216M	$160M	−$103M
TSR (annualized)	25.9%		−2.2%		11.0%
Cost of capital (annualized)	8.0%		8.0%		8.0%
Excess return (annualized)	16.6%		−9.5%		2.7%
LIVA	$169M		−$272M		−$103M

Note: Numerical example of LIVA and shareholder return calculations for a firm that has its IPO for 1 million nondividend paying shares of $10 each in Year 0, acquires another firm by issuing 1 million shares at a price of $100 each in Year 10, and is acquired at a share price of $80 in Year 20. See the text for further details.
Abbreviations: IPO, initial public offering; LIVA, long-term investor value appropriation; TSR, total shareholder return.

though both the TSR (of 11% per year) and the increase in market capitalization (of 15% per year) are well above the cost of capital (of 8% per year). The reason that excess return can be positive while LIVA is negative is that the negative return in the second decade is on a much larger base than the positive one in the first, due to the acquisition. Hence, despite the fact that a single investor holding a constant set of shares over the entire time period would have made a better return than the market, the company destroyed value for its investor base as a whole, leading to a negative LIVA.

This example is not a mere theoretical possibility. For instance, in the merger between America Online (AOL) and Time Warner, both companies had positive excess returns (a TSR above the cost of equity of 5% per year for Time Warner from 1995 until 2000 when they were acquired, and of 11% per year for AOL over the 20-year period from 1995 to 2014). However, an analysis of LIVA shows that AOL destroyed more than $150 billion of value, and still more than $100 billion after taking into account the value created for Time Warner shareholders. The reason for this result is similar to the above example: unlike excess return, the LIVA calculation takes into account that AOL's positive returns were on a much smaller base than its collapse after the merger.

3.3 | Interpreting LIVA

The interpretation of LIVA is very similar to the interpretation of NPV. For instance, over the 20-year period 1999–2018, Apple generated a LIVA of $1,002 billion. This means that Apple investors earned $1,002 billion more than if they had invested their money in a market-wide index over the same period. More precisely, if an investor had bought the outstanding shares of Apple in 1999 at the market price, borrowing the money at a cost equal to the average market return, sold all Apple shares again at the end of 2018 at the market price, and using that money as well as any intermediate cash returns (dividends and share buy backs) to repay her “debt,” then she would have had $1,002 billion left in her bank account.

One property to keep in mind when interpreting LIVA is that its average across all firms is zero. Though at first maybe surprising, this property follows immediately from the definition in Equation (2): because excess return is a comparison to the market average, the (value-weighted) average excess return must be zero (hence the name *excess* return), and hence its discounted sum over time (i.e., LIVA) must be zero on average as well. Note that this property does not hinge on any assumptions about efficient markets, but rather results from the fact that returns are compared to the cost of capital, and that the average cost of capital is by definition equal to the average market return. Because the average deviation from an average is always zero, the average return above the cost of capital is always zero, and thus the average LIVA is zero.

3.4 | LIVA and accounting returns

Though we have defined LIVA in terms of shareholder returns, it is insightful to relate it back to accounting returns. Intuitively, the two must be related, because ultimately the shareholder cash distributions (dividends and share buy backs) must be paid from the operating profits of the firm. In Appendix S1, we derive the relation between LIVA and a commonly used accounting-based operationalization of EP:

$$\text{LIVA} = [\text{EV}_T - \text{BV}_T] - [\text{EV}_0 - \text{BV}_0](1+r)^T + \sum_{t=1}^{T} \frac{\text{EP}_t}{(1+r)^{t-T}}. \tag{3}$$

In this equation, EV_t is the market value and BV_t the book value of the firm's operating assets. The EP is operationalized as the net operating profit after tax (NOPAT)[4] minus a capital charge for the book value of the firm's assets (Hawawini, Subramanian, & Verdin, 2003)[5]:

$$\text{EP}_t = \text{NOPAT}_t - r\,\text{BV}_{t-1} = (\text{ROC}_t - r)\text{BV}_{t-1}. \tag{4}$$

The final part of this equation relates after tax ROC to EP. Substituting for EP in Equation (3) yields:

$$\text{LIVA} = [\text{EV}_T - \text{BV}_T] - [\text{EV}_0 - \text{BV}_0](1+r)^T + \sum_{t=1}^{T} \frac{(\text{ROC}_t - r)\text{BV}_{t-1}}{(1+r)^{t-T}}. \tag{5}$$

The summation in Equation (5) is thus the accounting analogue of Equation (2). The sum in Equation (5) is over *accounting* returns above the cost of capital times *accounting* value of assets, while in Equation (2) it is over *market* returns above the cost of equity times *market* value of equity.

Finally, it is interesting to evaluate Equations (1)–(3) and (5) over a firm's entire lifetime. This leads to particularly simple equations, because before the inception of the firm and after

[4]NOPAT = EBIT (earnings before interest and taxes) minus income tax.

[5]Note that Hawawini et al. use the term capital employed instead of book value (BV); both reflect the balance sheet valuation of the net operating assets (i.e., operating assets minus operating liabilities, equal to balance sheet debt plus equity).

its liquidation (e.g., through a take-over or bankruptcy), the firm's book and market values are zero:

$$\mathrm{LIVA} = \sum_{t=1}^{T} \frac{\mathrm{FCF}_t}{(1+r)^{t-T}} = \sum_{t=1}^{T} \frac{\mathrm{ER}_t\,\mathrm{MC}_{t-1}}{(1+r)^{t-T}} = \sum_{t=1}^{T} \frac{\mathrm{EP}_t}{(1+r)^{t-T}} = \sum_{t=1}^{T} \frac{(\mathrm{ROC}_t - r)\mathrm{BV}_{t-1}}{(1+r)^{t-T}}. \tag{6}$$

In other words, the LIVA over the entire lifetime of a firm is equal to the sum of discounted cash flow, equal to the sum of discounted (absolute) excess returns, equal to the sum of discounted economic profit, and equal to the sum over excess accounting returns times book value.

This equation sheds some further light on the relations between cash, market returns, and accounting returns: when properly measured and discounted, the only difference between these measures is that they shift value backwards or forwards over time, without affecting the total. Moreover, this equation shows the origin of the two leading terms on the right hand side of Equations (3) and (5): the differences between book and market value at time $t = 0$ and $t = T$ adjust for the fact that not all value as priced in the market (which is partly based on future expectations) might have been attributed in the accounting statements.

4 | APPLICATIONS OF LIVA

In this section, we compare LIVA to common accounting and shareholder return measures. The purpose of this section is to show where and how LIVA can potentially lead to new strategic insights. Most of the analyses in this section are based on a global LIVA database that we created for all US-listed firms over the period 1999 to 2018, using monthly data from the Compustat database, for a total of over 45,000 company listings. Methodological details can be found in Appendix S1. The global LIVA database is available for download in WRDS.

4.1 | Analysis of individual firms

4.1.1 | Identifying top performing firms

Case studies provide an important method of inquiry for management research (Eisenhardt, 1989; Siggelkow, 2007). One way of selecting case studies is based on long-term performance, in order to find examples of particularly effective (or ineffective) strategic management. To assess the impact of different performance measures on finding top performing firms, we look for the top 10 firms in our database using several performance measures.

Table 2 shows the results for all companies in our database for which data were available for at least 5 years in the 20-year period 1999–2018 and had at least $100 million of initial market capitalization. Excess return is annualized, and ROA is a weighted annual average over the period of data availability.

Although both the LIVA and excess return lists are based on share price data, they are notably different. Among the names on the LIVA list in Panel (a) are many of "the usual suspects": firms that have been in the news because of their successes, such as Apple, Amazon, and Alphabet (the corporate parent of Google). By contrast, the excess return top 10 list in Panel (b) consists of companies that were certainly quite successful, but were only able to reach these very high returns because they started out so small. The number one company on this list, Pharmasset, had a market capitalization of $187M in 2007 and was acquired in 2011 by Gilead for $11.2B, leading to its annualized return of 100% above the market average. The average initial market capitalization of the firms in the excess return list was $332M. (Note that we have excluded companies below $100M market capitalization; the inclusion of such smaller companies would certainly lead to even higher potential figures of excess returns.) Thus, the top positions on the shareholder return lists not only reflect a strong performance but also a small starting point.

Moreover, LIVA takes size changes better into account than shareholder returns. For instance, Exxon Mobil is number seven on the LIVA list, despite having a shareholder return of only 0.2% above the market average, because it had a significantly larger capital base when it realized positive returns than when it realized negative returns. This is the reverse effect of the example in Table 1.

Similar to the list using excess market return, the top performers on the ROA list in Panel (c) are typically relatively small companies. An extremely high ROA often does not reflect very high profits, but rather very low balance sheet assets. For instance, the top performing company in terms of ROA is BP Prudhoe Bay Royalty Trust, a company that distributes profits from oil and gas royalty rights, which have not been capitalized on the balance sheet to their economic value. Thus, the high performance in terms of ROA appears to be as much a reflection of particular accounting conventions as of good underlying economic performance.

These examples show some of the potential advantages of using LIVA when assessing long-term firm performance: it measures the absolute size of economic performance without favoring initially small companies (unlike relative shareholder return measures), it values both profits and growth (unlike accounting based return measures), and it does not hinge on accounting definitions.

4.1.2 | Identifying value destruction

A second use of LIVA is in identifying value destruction. Panel (a) of Table 3 lists the 20 companies with the most negative LIVA over the period 1999–2018. Many of the companies that destroyed value are in the telecom sector.[6] Striking is the difference between the LIVA measures and excess returns.

Moreover, LIVA provides a more meaningful measure than shareholder returns can give in case of bankruptcy: in that case TSR and excess return are always −100% (assuming that there was no residual value to claim for shareholders), while LIVA provides the magnitude of the actual value destroyed. Therefore, it can serve as a meaningful measure of corporate decline.

Interestingly, only one company of the top 20 value destroyers went bankrupt. This picture is corroborated by the analysis in Panel (b) of Table 3, which shows an aggregation of all U.S. companies in the CRSP database between 1995 and 2014 with negative LIVA by end of listing type. Only 6% of value destruction was by companies that went bankrupt. In fact, 42% of

[6]The value destruction in the telecom sector has been particularly bad in the 20-year period of this analysis, for instance due to the overly aggressive bidding for 3G licenses by many firms, resulting in too high investments that could not be subsequently recuperated.

TABLE 2 Top 10 global companies 1999–2018 by LIVA, excess returns, and ROA

(a) LIVA ($B)	
Apple	1,002
Amazon.com	637
Tencent Holdings	375
Alphabet	315
Samsung Electronics	277
UnitedHealth Group	255
Exxon Mobil	239
Visa Inc.	215
Genentech	212
Nestle	207
(b) Excess return (annualized)	
Pharmasset	100%
Seaboard Associates	60%
Hermes Microvision	58%
Hana Bank	58%
Loxo Oncology	57%
Fevertree Drinks	54%
Ceska Pojistovna	53%
Plus500	52%
Public Finance BHD	52%
Cementos del Valle	52%
(c) ROA	
BP Prudhoe Bay Royalty Trust	1,400%
Permian Basin Royalty Trust	857%
Sabine Royalty Trust	773%
North European Oil Royalty Trust	443%
San Juan Basin Royalty Trust	257%
Rightmove	193%
Santa Fe Energy Trust	122%
Livechat Software	115%
Plus500	107%
West Indian Tobacco	101%

Note: Top 10 lists based on a database of global firms in Compustat with at least $100M initial market capitalization, and at least 5 years of data available.
Abbreviations: LIVA, long-term investor value appropriation; ROA, return on assets.

value was destroyed by companies that are still active, and another 33% by companies that had been acquired. These results suggest that LIVA might be a useful addition to bankruptcy and dissolution measures used regularly in industry life-cycle and population ecology studies: If we

TABLE 3 Analysis of companies with negative LIVA, 1999-2018

(a) Bottom 20 performers **Company**	**LIVA ($B)**	**Excess return**
General Electric	−619	−9%
Lucent Technologies	−502	−31%
American International Group	−408	−18%
Time Warner (formerly AOL)	−401	−4%
MCI (formerly Worldcom)	−399	*Bankrupt*
Pfizer	−369	−2%
Vodafone Group	−343	−4%
AT&T (acquired in 2005)	−285	−19%
Citigroup	−271	−11%
Telewest Communications	−269	−47%
Glaxosmithkline	−244	−4%
Orange	−241	−7%
BT Group	−217	−7%
Lloyds Banking Group	−216	−14%
AT&T (formerly SBC)	−214	−4%
Aegon	−211	−14%
Dell Technologies	−211	−11%
Deutsche Telekom	−211	−4%
Mitsubishi UFJ Financial Group	−209	−7%
Wachovia	−205	−19%
(b) Analysis by end of listing type **Type**	**LIVA ($B)**	**Of total**
Bankrupt	−1,075	6%
Acquired	−5,804	33%
Active	−7,385	42%
Other[a]	−3,444	19%

[a]The "Other" category includes, for instance, a company that is taken private, delisting from a secondary exchange (i.e., the listing continues at another stock exchange), and delisting for which the reason has not been recorded in the CRSP database.

consider value destruction a form of "failure," then most of the failure is actually experienced by firms that do not exit.

4.2 | Case study: Circuit City versus Best Buy

In this section, we want to illustrate how LIVA can be insightful for strategic analysis of a case study. We have selected Circuit City as a focal company, because it went bankrupt and thus shows how LIVA allows to provide a measure of performance over the entire lifetime of a company—unlike, for instance, excess return, which would just have been −100%. Moreover, Circuit City had a clear competitor, Best Buy, allowing for an interesting comparison. This case study also showcases another attractive feature of LIVA. Because it is an additive measure, different time periods and different parts of operations can be selected that jointly add up to LIVA. This allows a decomposition of total LIVA into different sources and time periods. Methodological details can be found in Appendix S1.

The total LIVA of Circuit City amounts to negative $3.4 billion over the period from its listing on the American Stock Exchange in 1968 as Wards, until its bankruptcy and delisting by the end of 2008.[7] The LIVA of Best Buy amounts to positive 14.7 billion dollars over the period from its IPO on the NASDAQ in 1985, until the end of our data in 2014.

Given that Circuit City went bankrupt, it might not be too surprising that its investors fared worse than the general market, leading to a negative LIVA. But, as mentioned earlier, bankruptcies can signify widely differing ranges of performance, depending on how much cash the company used from and redistributed to investors along the way. As a matter of fact, of the negative $3.4 billion, already $2.8 billion occurred before 1980, during the company's history as Wards. During this era, the company consisted mostly of smaller television and audio stores, operated under various store formats and brands (Wells & Danskin, 2012b). The decomposition in Table 4 shows that during the Wards era from 1969 to 1980, the company did return significant cash to shareholders, but failed to grow its enterprise value at the rate of the market, leading to a negative LIVA.

The following period, from 1980 to 1995, became the era of the superstore, which Circuit City pioneered and rolled out successfully. Circuit City's superstore model had started with the 40,000 square foot Wards Loading Dock store opened in Richmond in 1974. In 1981 it started to expand this successful store formula, rebranding the stores to Circuit City soon after. In 1984 the company itself was renamed and listed on the New York stock exchange. The model with a wide selection of inventory kept in a store warehouse, a high-service commissioned sales force, and in-house offering of credit and repairs proved very successful, with Circuit City growing to 419 superstores in the mid-1990s (Wells & Danskin, 2012b).

The LIVA decomposition in Table 4 corroborates this picture. The contribution of operating profits to LIVA over this period was $26 billion, clearly the highest of the three periods in Circuit City's history. Still, the company operated cash negative over the period, mainly due to the high capital expenditures and investments in working capital, such as inventory, required for the company's aggressive expansion strategy, totaling $32.3 billion in present value.

For much of the superstore era, Best Buy created relatively little value for its investors, as illustrated by the mere $3.8 billion LIVA contribution of its operating profits. That started to change in the early 1990s, when Best Buy modified its store format into a deep-discount retail model, with low service by hourly paid sales staff, and inventory stacked in the store display area instead of a separate warehouse (Wells & Danskin, 2012a). Within a few years, this strategic change transformed Best Buy from a subscale follower into a market leader, overtaking Circuit City in revenue by 1995, and thus marking the beginning of the deep-discount era. Moreover, Best Buy was able to overtake its competitor at a cumulative investment (capital expenditure and working capital) of $9.6 billion in present value, less than a third of Circuit City's over the same period.

[7]Both the LIVA of Circuit City and Best Buy are discounted to the year 2015, in order to make them directly comparable. Moreover, to calculate excess return we use a beta of 1.48, which is the average beta of Circuit City and Best Buy. The betas for the individual companies based on all monthly returns are respectively 1.54 and 1.42. These values are not statistically different from each other, and therefore we decide to average them given the similar operating and risk profiles of both companies.

TABLE 4 LIVA decomposition for Circuit City and Best Buy

(a) Circuit City	1969–1980	1980–1995	1995–2010	2010–2015	
	Wards	**Superstore**	**Deep discount**		**Total**
NOPAT	6.3	26.0	15.0		47.3
Capital expenditure	−2.6	−19.5	−10.1		−32.3
Change in working capital	−2.2	−12.8	−5.7		−20.7
Acquisitions	0.0	−1.0	−0.7		−1.7
Other items	2.8	4.4	5.6		12.8
Total cash items	4.2	−2.9	4.1		5.5
Change in relative enterprise value[a]	−7.1	20.8	−22.6		−8.9
LIVA	−2.8	17.9	−18.5		−3.4

(b) Best Buy	1969–1980	1980–1995	1995–2010	2010–2015	
		Superstore	**Deep discount**	**Decline**	**Total**
NOPAT		3.8	43.6	22.1	69.5
Capital expenditure		−3.7	−26.1	−2.9	−32.7
Change in working capital		−5.9	−0.7	−7.1	−13.7
Acquisitions		0.0	−14.6	−0.4	−15.0
Other items		0.1	0.4	2.2	2.7
Total cash items		−5.7	2.6	13.9	10.7
Change in relative enterprise value[a]		9.7	29.2	−34.9	4.0
LIVA		4.0	31.7	−21.0	14.7

Note: Total LIVA is calculated using the definition in Equation (2), and then decomposed over time and into various cash items using the derivations provided in the text. All figures in 2015 present value billion U.S. dollars.
Abbreviations: LIVA, long-term investor value appropriation; NOPAT, net operating profit after tax.
[a]Change in relative enterprise value for each period reflects the change in enterprise value (market value of equity plus book value of debt) compared to the market return. See Equation (1) as well as the details in Appendix S1.

Over the following decade, Circuit City tried to catch up again through a series of expensive restructurings and store refurbishments. By the mid-2000s, Circuit City had laid off its commissioned sales force, and changed its store layout to a bright warehouse style, essentially becoming a copycat of the now entrenched discounter Best Buy. But it was too late, and Circuit City's competitive position continued to deteriorate. In the face of yet another failed turn-around attempt, the dawning financial crisis, and a drop of almost 50% in holiday sales, the company was forced into liquidation in January 2009 (Wells & Danskin, 2012a).

Table 4 illustrates the dramatic reversal of fortune in the deep-discount era from 1995 to 2010. While Circuit City's present value of operating profits dropped to $15 billion, Best Buy's increased to $43.6 billion, allowing the latter company to make higher investments in organic growth and acquisitions to further improve its competitive position. In the subsequent period 2010–2015, Best Buy was able to capitalize on those investments, generating cash worth close to

$14 billion. At the end of that period, Best Buy's cumulative LIVA stood at $14.7 billion, indicating a significant value creation for its investors.

Interestingly, Circuit City's total LIVA netted to negative $0.6 billion over the superstore and deep-discount eras, from 1980 until its liquidation—quite a small amount compared to the sizes of the cash flows and valuations involved. The LIVA decomposition indicates that this is largely thanks to significant cash redistributions in the period 1995 to 2010 (which were, in fact, larger than Best Buy's). A significant redistribution was the Car-Max spin-off in 2002, which instantly contributed about $5 billion to Circuit City's LIVA, in a way saving the day for its investors. Note that this transaction happened in terms of a stock dividend and was not included in Circuit City's operating results, and thus would not have shown up in an analysis of classic performance measures such as ROA or capital (in fact, ROC fell from 9% in 2001 to 3% in 2002). Because in our LIVA calculation we track actual returns to investors, it is included in our decomposition in Table 4, on Line 5 ("Other items").

Finally, the LIVA decomposition points to the main culprit of Circuit City's demise: the very expensive but largely ineffective expansion and retaliation strategy in the late 1980s and early 1990s. This expansion cost the company well over $30 billion worth of LIVA, thus proving a very costly strategic mistake for its investors.

4.3 | The relation between acquisition experience and performance

While in the previous sections we conducted analyses at the level of individual firms, in this section we employ LIVA in a more traditional large-scale empirical setting. In particular, we replicate the widely cited analysis of the relation between acquisition experience and performance in Haleblian and Finkelstein (1999), abbreviated H&F below. H&F report a U-shaped relation, supporting their argument that when companies have more deal experience, at first this reduces acquisition performance due to "inappropriate generalization," but eventually it increases performance after firms have accumulated sufficient deal experience to make appropriate generalizations. We compare the result of the analysis with the original CAR variable[8] to the results when using 10-year LIVA and analyze the main differences. Methodological details can be found in Appendix S1.

4.3.1 | Results

Models 1 and 2 in Table 5 show the replications of the original H&F Models 1 and 2 in their Table 2 (p. 47). The main results regarding the relationship between acquisition experience and performance are very similar. In Model 1, testing a linear relationship between acquisition experience and performance, we find a 95% confidence interval for the regression coefficient of [−8.0, −0.4], compared to [−4.8, −0.4] in H&F.[9] These confidence intervals overlap and are both consistent with a negative relationship. In Model 2, testing a quadratic relationship between acquisition experience and performance, we find an interval for the first-order term of [−20.5,

[8]Following current research practices, we calculate CAR over a 21-day window of the announcement returns instead of a one-day window as used in H&F. When we use one-day CAR as DV we find the same U-shape, but with a lower level of economic and statistical significance, because some of the M&A information tends to be incorporated in the share price before or after the announcement date, in particular due to information leakage before the official announcement.
[9]We calculate the 95% confidence intervals in H&F based on their reported coefficients and *SE*.

TABLE 5 Replication of Haleblian and Finkelstein (1999)

	21-Day CAR		10-Year LIVA	
	(1)	(2)	(3)	(4)
Acquirer-to-target relatedness	3.02	3.59	7.84	7.78
	(41.24)	(41.15)	(5.18)	(5.29)
Relative acquisition size	−20.49	−41.07	−4.60	−2.46
	(73.80)	(74.59)	(4.75)	(5.38)
Stock consideration	−2.21	−2.15	−0.04	−0.05
	(0.48)	(0.48)	(0.04)	(0.04)
Debt-to-equity	−11.09	−11.45	−3.50	−3.46
	(13.67)	(13.60)	(1.69)	(1.71)
Free cash flow	2.92	3.02	0.13	0.12
	(0.88)	(0.88)	(0.08)	(0.08)
Attitude	−20.38	−24.25	7.51	7.92
	(81.21)	(80.43)	(4.58)	(4.30)
Acquiring firm performance	−125.03	−92.26	−9.84	−13.25
	(238.44)	(238.19)	(16.44)	(17.22)
Acquisition experience	−4.21	−13.75	−4.18	−3.19
	(1.91)	(3.44)	(0.95)	(2.14)
[Acquisition experience]^2		0.19		−0.02
		(0.05)		(0.03)

Note: Ordinary least squares (OLS) regression coefficients (firm-level cluster-robust standard errors in parentheses), replicating models 1 and 2 in Haleblian and Finkelstein (1999:47). All regressions include year fixed effects. The 21-day CAR coefficients have been multiplied by 10,000, as in the original regression. 10-year LIVA coefficients are in billion U.S. dollars.
Abbreviations: CAR, cumulative abnormal returns; LIVA, long-term investor value appropriation.

−7.0] (H&F: [−15.0, −3.1]) and for the second-order term [0.09, 0.29] (H&F: [0.06, 0.88]). Again, the pairs of confidence intervals of H&F and our replication overlap, and are both consistent with a U-relation between acquisition experience and performance.

Models 3 and 4 use 10-year LIVA as dependent variable (DV), regressed on the same variables as in Models 1 and 2, respectively. The results are markedly different, especially for the quadratic model. Model 3 indicates an association of [−6.0, −2.3] billion dollars LIVA with each additional deal as experience. This coefficient is different from 0 with $p = 10^{-5}$, a statistically much stronger result than in Model 1 with CAR as DV ($p = 0.03$). In Model 4, the first-order term is [−7.4, 1.0] and the second-order term [−0.08, 0.04], which does not provide conclusive evidence for any U or inverse-U relation.

Figure 1 further clarifies the difference between the results from both analyses. The charts show average and 95% confidence intervals[10] of the CAR (Panel (a)), 10-year LIVA (Panel (b)), and 10-year annualized excess returns (Panel (c)) by group of deal experience. Panels (a) and (b) confirm the finding in the regression analysis: the analysis with CAR as a DV is consistent with a U-shaped relationship, while LIVA is consistent with a negative relationship between

[10]Calculated by regressing the respective DV onto fixed effects groups of acquisition experience (without controls and regression constant), using firm-level cluster-robust *SE*.

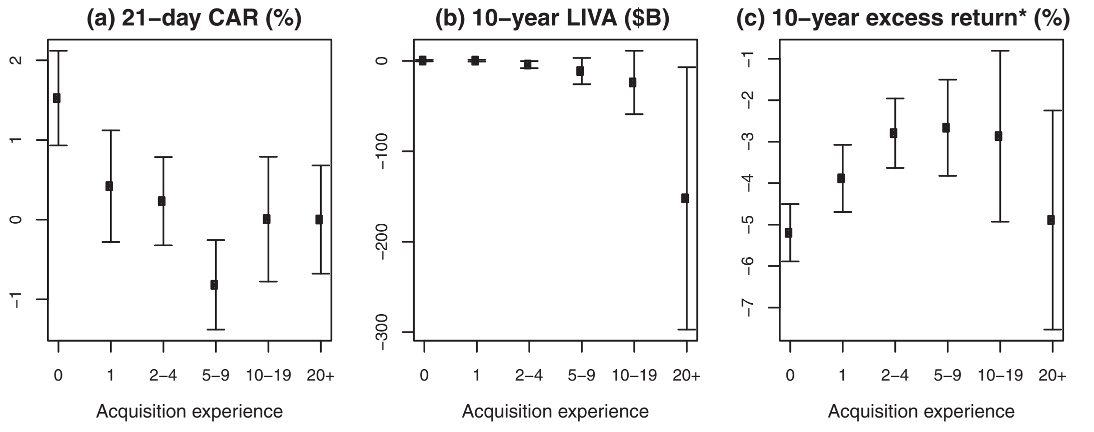

FIGURE 1 Mean (dots) and 95% confidence intervals (bars) of acquirer performance by acquisition experience. *Excess return is annualized

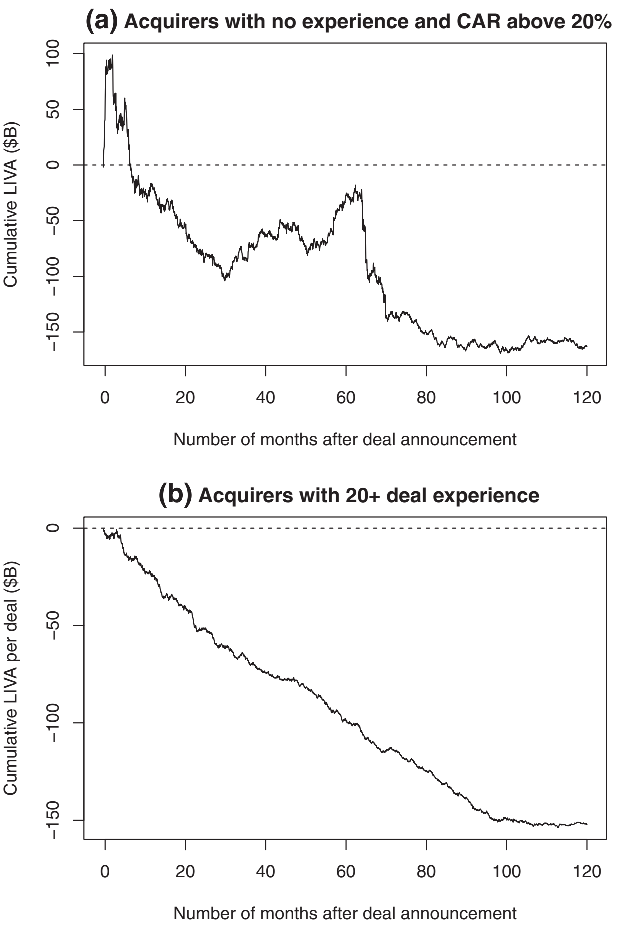

FIGURE 2 LIVA evolution over 10-year period after deal announcement. CAR, cumulative abnormal return; LIVA, long-term investor value appropriation

acquisition experience and performance. Panel (c) is added to compare 10-year LIVA with excess return over the same time period; interestingly, the 10-year excess return measure is consistent with an inverted U-shaped relation between acquisition experience and performance, which is the exact opposite of the results with the 21-day CAR measure in the original study.

Particularly striking is the difference for the group with zero deal experience. Using CAR the 95% interval is [0.9%, 2.1%], consistent with the presumed U-shape. However, using LIVA it is [−$0.5B, $1.2B], a negligible effect both statistically and when comparing the effect size to acquirers with more experience. In part, this is because acquirers with zero acquisition experience are much smaller, and thus economically much less relevant; this group has average assets of $1B, compared to $217B for the 20+ experience group.

Figure 2 points toward another important effect as well. Panel (a) of this figure shows the evolution of cumulative LIVA for a stock portfolio of all acquirers with zero experience and CAR above 20%, from 14 days before to 10 years after the announcement. Consistent with the large CAR, at first the value of this portfolio rapidly rises. However, already a year after the announcement, the portfolio LIVA turns negative and becomes even more negative over time. In fact, almost two thirds of these no-experience companies with the highest CAR have a negative total return after 10 years. This also explains the strongly negative 10-year excess returns in Panel (c) of Figure 1 for acquirers with zero experience. As with the positive 21-day CAR, the negative 10-year excess return is mainly driven by very small companies—which have little economic significance and thus have little weight in the LIVA analysis. Apparently, investors have difficulty initially assessing the future success of small companies doing their first deal, suggesting that the positive CAR for this group is largely driven by overly optimistic investors, rather than by long-term value creation.

A similarly overly optimistic initial investor perception seems to drive the difference between CAR and LIVA for the acquirers with 20+ experience. Panel (b) of Figure 2 shows the average cumulative LIVA per deal for this group. While investors initially respond neutrally to acquirers in this group, LIVA starts to become negative already a few months post-acquisition and becomes steadily more negative over the largest part of a 10-year period for these companies.

4.3.2 | Discussion

As with any observational study, a key question is to what extent the associations are causal: can the average 10-year LIVA of acquirers be attributed to the acquisitions, or are there omitted variables driving both the deal making and the long-term returns? One should point out that, importantly, the same concern should be raised when using CAR, even though it is a short-term interval around the deal announcement. For instance, for the group of acquirers in panel (a) of Figure 2—acquirers without experience and high announcement returns—the high CAR might be driven by the actual deal prospects, but it could be equally well driven by the signal that an acquisition gives, for instance, about these acquirers' future growth prospects. But no matter what was driving investors' exuberant prospects, the results indicate that they were unwarranted: the initially positive returns were rapidly reversed and never recovered.

Similarly, large acquirers with significant experience initially met neutral average investor expectations, but over the longer run, these firms potentially destroyed large amounts of shareholder value, as illustrated by Figure 1 and Panel (b) in Figure 2. Again, both the initial investor expectations and the long-term financial results might not be solely due to the acquisitions, but it is clear from the LIVA analysis that avid acquirers have not fared well over the past decades. Moreover, analysts have linked the performance of the worst-faring acquirers in our sample directly to their overly aggressive M&A strategy, with General Electric as one of the most egregious examples (Crooks, 2018).

These findings have consequences for the long-standing debate on the drivers of M&A performance. The learning arguments set forth in Haleblian and Finkelstein (1999) have been widely cited and have significantly influenced subsequent papers both within the M&A literature (e.g., Laamanen & Keil, 2008; Zollo & Singh, 2004) as well as in other domains, such as the dynamic capabilities literature (Zollo & Winter, 2002). However, the above findings using LIVA are more consistent with theories of CEO hubris (Hayward & Hambrick, 1997; Malmendier & Tate, 2008) than with the mechanisms proposed by H&F using short-term measures of firm performance. Thus, using LIVA can shed new light on important theoretical and empirical debates in the strategy literature.

More generally, the analysis shows that inferences from event studies using short-term abnormal returns might not always translate to long-term performance. Given the extensive use of event studies in the management literature, it appears fruitful to analyze the long-term outcomes for other findings that were derived from short-term return measures such as CAR, which has become increasingly prevalent in the management literature.

5 | DISCUSSION

5.1 | Settings in which LIVA makes a difference

Based on the above analyses, in this section we discuss when LIVA is likely to make a difference vis-à-vis commonly used measures of performance such as ROA and CAR. We also discuss how LIVA relates to other potential measures that could be used to alleviate potential issues with ROA and CAR.

5.1.1 | When economic magnitude matters

The most obvious difference between LIVA and often-used ratios is that LIVA measures the absolute size of performance, in dollar or other monetary terms. This is important when economic magnitude matters, as the top 10 lists in Table 1 make clear: ratio measures tend to be dominated by (at least initially) small firms.

This also matters in regressions with performance as a dependent variable. The results of such regressions will be largely driven by small firms' performance, for two reasons: first, because there are many more small firms than large firms; and second, because the variance of ratio measures will be much larger for small firms than for large firms. By contrast, the results of regressions that use absolute-size measures such as LIVA reflect economic magnitude, and can be driven by both small- and large firm performance, depending on which in aggregate have the largest size and variance.

To better capture the economic magnitude in regressions, an alternative to using LIVA is using a ratio measure in a weighted least squares (WLS) regression. Size-based weights (e.g., assets or market capitalization) in WLS will have a similar effect as using an absolute-size DV such as LIVA.

Another alternative to using LIVA, while still reflecting economic magnitude, would be to use an accounting-based absolute-size measure such as EP, as defined in Equation (4). An advantage of using EP can be that it is not influenced by stock market sentiments, which could significantly affect LIVA, especially over shorter time periods or when the stock markets are distorted at the beginning or the ending of the measurement period (note that any stock market distortions in the middle of the measurement period will automatically cancel out and not affect LIVA). A disadvantage of EP is that much more care needs to be taken to include the right accounting items, which can be particularly tricky when incorporating intangible assets.

As a final alternative, a stock-based measure such as CAR can also be made into an absolute-size measure by multiplying by market capitalization, as some studies already do (e.g., Cuypers, Cuypers, & Martin, 2017). In the short run, this is almost equivalent to using a short-term version of LIVA. However, when measuring performance in the long run, it is better to use the actual formula to calculate LIVA rather than merely multiplying excess returns with market capitalization, as the latter method will not properly capture capitalization changes that may occur over the years.

5.1.2 | When capturing major corporate events

As shown earlier in several examples, major corporate events such as M&A, spin-offs, and bankruptcy are often ill-reflected in ratio measures. The clearest example is after a bankruptcy, in which case the TSR is −100% (assuming there are no valid claims for ordinary shareholders), while LIVA will capture the actual economic impact—which can differ significantly across bankruptcies, even of similar size. Also in more subtle cases, there can be major deviations between ratio measures and LIVA, as highlighted earlier by the example of the merger between AOL and Time Warner.

In principle, such corporate events could be taken into account using other absolute-size measures such as EP. However, in practice, great care needs to be taken to correctly account for all flows of money to and from investors, for instance, when there are exchanges of shares across multiple legal entities. By contrast, it is relatively straight-forward using stock market data to take such flows into account with LIVA.

5.1.3 | When performance is affected over a long time period

LIVA is particularly suited for settings in which it takes a longer time period before strategic actions are reflected into performance, as was the case for the replication analysis of the H&F study. For medium-long time periods (of up to around 3 years), this can also be achieved using other measures such as ROA and TSR. Over much longer periods, though, aggregation of these measures becomes troublesome. For instance, it is unclear how ROA should be aggregated over 20 years: a straight average, an asset-weighted average, or a discounted average could all have very different outcomes, while it is unclear which would be the right one—if any.

The use of TSR (or excess return) is potentially troublesome too over time periods longer than a few years. TSR is bounded below by −100%, while it is not bounded above. When using TSR over the full period, this could lead to strong outliers above, while transforming it using a compounded annual growth rate (CAGR[11]) or a $\log(1 + x)$ function can lead to downward biases. By contrast, LIVA aggregates well over time periods up to several decades.[12]

[11]See Appendix S1 for the calculation of a CAGR.

[12]Over the very long term—more than a few decades—LIVA will suffer from aggregation issues too. The reason is that LIVA uses the stock market return for discounting, implicitly assuming that investors always could have invested all

5.1.4 | When aggregating or decomposing performance

Because LIVA is an additive measure, it is simple to aggregate it over multiple companies or time periods. For instance, to calculate an industry LIVA over a decade, one can just add up LIVA for all constituent firm-years. Similarly, one can decompose LIVA into different time periods or into its constituent sources, as shown, for example, in Table 4 for Circuit City and Best Buy.

Such aggregation and decomposition is much less straight-forward for ratio measures, because they are not additive. For instance, to calculate the TSR for an industry one has to devise some method to aggregate them over firms (e.g., arithmetic average or market capitalization weighted average) and over time (e.g., arithmetic average or geometric average; the latter is used when calculating a CAGR, but the former is also defensible). By contrast, LIVA can simply be added and choices of aggregation need not be made.

Other additive measures, such as EP, share this benefit with LIVA and can equally well be used when performance needs to be aggregated or decomposed. However, a benefit of the LIVA decomposition specifically is that it allows for a reconciliation of the accounting statements with stock market data, which sometimes can surface strategically important transactions that otherwise would have gone unnoticed (such as the Car-Max spinoff by Circuit City).

5.2 | Future research applications of LIVA

Based on the above discussion, we suggest below several potential uses of LIVA in future studies.

5.2.1 | Case studies

LIVA is particularly well suited for use in both individual as well as small-*N* case studies, because in these studies one is often interested in studying longer episodes for which LIVA is well suited to assess performance. Moreover, the LIVA decomposition approach can provide more direct links between strategic actions and organizational performance, as we illustrated with our case study of Circuit City and Best Buy. Finally, a small sample allows the researcher to make a careful assessment of when overly low or high LIVA might reflect market imperfections rather than underlying performance.

In addition to using LIVA to assess individual companies' performance, it can also be used to find interesting candidates for case study based on their long-term performance. For instance, Table 2 shows the top-performing companies on US stock markets. Such lists can also be made for other geographies and/or specific industries in order to find long-term value creating (or destroying) firms that merit further study.

An advantage of using LIVA for case studies as compared to large empirical studies is that particular care can be taken to the period of measurement. As Equation (1) shows, LIVA can be misleading if (stock market) valuations are distorted at either the beginning or the end of the

their money in the general stock market. This assumption eventually cannot hold true, because companies pay out some of their returns in terms of dividends and/or share buy-backs, which means that very large investors would not be able to keep all their money invested in the stock market. Due to this mechanism, when comparing LIVAs over extremely long time periods, results from many decades ago will overwhelm results from more recent eras. The useful time limit for using LIVA is probably around 30–40 years, which in practice should be more than sufficient for any analysis of a company's strategic actions.

measurement period. Hence, when using LIVA in individual case studies, one can and should make sure that the measurement periods are chosen such that the start and end are not right at a short-term boom or bust.

5.2.2 | Event studies

The replication of Haleblian and Finkelstein (1999) shows that LIVA can add new insights in event studies beyond the often-used short-term cumulative abnormal return (CAR). The two measures answer different questions: while CAR measures the impact of an event on investor expectations for the average firm, LIVA measures the long-term performance impact in terms of economic significance. Given that the latter will often be of interest, LIVA is a useful addition to the event study toolkit. We employed it to study M&A, an area in which it also could be used to study the effect of other variables. A particularly interesting application could be a replication of deal performance relative to when they happen in an acquisition wave (Carow, Heron, & Saxton, 2004), as these waves are driven by investor sentiment and thus could exhibit deviations by the short-term investor expectations of CAR vis-à-vis long-term actual performance of LIVA. Additionally, LIVA might also be used to study other diversification decisions, or, for instance, the performance of CEOs.

5.2.3 | Cross-industry studies

The independence from accounting standards is a benefit of LIVA that can be particularly salient when comparing different industries, as different industries often employ different accounting conventions. Especially financial services are often excluded from studies because of their different way of accounting for revenues, costs, and capital. Because LIVA is stock-price based, it does not face any of these issues, and thus can be useful in cross-industry studies.

5.2.4 | Policy studies

The property that LIVA measures the magnitude of economic impact, rather than the impact of the average firm, can be helpful when assessing the impact of changes in economic policy, such as patent law. For instance, it would be interesting to use a staggered difference-in-difference analysis with LIVA as DV to better understand the effects of changing intellectual property right laws by country (Balachandran & Hernandez, 2016) on long-term firm performance, particularly in knowledge intensive industries.

5.2.5 | Innovation studies

Another area where economic magnitude is likely to be important is in innovation, because often many innovations fail, but a few can be "big hits." For those big hits the absolute magnitude of their impact is much more relevant than their impact relative to the size of the firm that generated them. For instance, one might employ LIVA to find and understand the drivers of the most successful biotech companies, which often have a few products or even a single one, thus allowing to attribute economic value to specific innovations and their characteristics. Often such companies are eventually acquired, allowing an exact calculation of LIVA (i.e., discounted acquisition price minus initial investments).

5.2.6 | Corporate decline studies

As the examples in Table 3 show, LIVA also offers a useful measure of corporate decline, contrasting with, for instance, shareholder return, which will always be −100% for a bankrupt firm. Moreover, our analysis suggests that only a small minority of value tends to be destroyed through bankruptcy, suggesting that it is interesting to study corporate decline not only for firms that cease to exist—as population ecologists usually do—but also for firms that destroy value during their existence.

6 | CONCLUSION

For many central questions in strategy, research is concerned with long-term performance consequences and the economic significance of these consequences. For these situations, we hope that strategy researchers and practitioners will find LIVA a useful addition to their toolkit of performance measures.

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Additional supporting information may be found online in the Supporting Information section at the end of this article.

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