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Which multiples matter in M&A? An overview

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Abstract
This paper provides an overview of valuation multiples in mergers and acquisitions advisory. I review the literature and legal controversies and the theoretical basis for their role. I then standardize all the advisor multiples available in SDC Platinum along four dimensions and report rich descriptive statistics on each dimension over time and across industries. I highlight eight findings that are notable in light of current knowledge and debates. This paper answers the call from Gow et al. (Journal of Accounting Research 54(2):477–523, 2016) for thorough descriptive research, to provide a foundation and prompts for future hypothesis development. It includes an explicit guide for using this data, an overview of the key institutional details, and a discussion of tractable and open research questions.

Keywords Valuation · Accounting · M&A

JEL Classification G30 · G32 · M41 · G34

1 Introduction

Directors and shareholders considering an exchange of control must judge how they value their claims on the corporation, relative to the offered consideration. But when changes in control are anticipated, the target's pre-deal market price may provide a distorted or otherwise insufficient measure of its value (Bond et al. 2010), so that the offer cannot be evaluated solely in terms of the premium. This can provide a rational basis for the use of fundamental valuation in the governance of mergers and acquisitions (M&A). This is reflected in case law in the United States, where it is considered "effectively mandatory" (Davidoff 2006) for target directors to consider expert valuations before accepting a takeover offer.

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The theoretically coherent textbook approaches to valuation are discounted free cash flow (DCF) (Modigliani and Miller 1958) and residual income valuation (Ohlson 1995). However, these depend on forecasts and discount-rate assumptions, which are subjective and can be manipulated. DeAngelo (1990) proposes that this can explain demand for M&A valuation advisory based on crude multiples of accounting numbers.

To date, empirical research on M&A valuation advisory has focused on such questions as the motivations of advisor and client, information and bias in the level of valuations, the determinants of the choice of advisor, litigation risk, and the choice of comparable peer firms (comps) (Kisgen et al. 2009; Cain and Denis 2013; Liu 2020; Imperatore et al. 2021; Eaton et al. 2001). However, there is little understanding of the choice of valuation *method* in this setting. It is known that accounting multiples are the primary valuation approach in M&A (DeAngelo 1990). Bartell and Janssen (2017) find that they are present in 100% of merger-filing fairness opinions. But there are many different possible multiples, varying along several dimensions, and there is substantial unexplained heterogeneity in which ones advisors use.

This paper provides an overview of accounting multiples in M&A valuation. It surveys the literature, frames the theoretical basis for their role, provides institutional background on their use, and discusses motivations for studying this setting. It then categorizes all valuation multiples on four dimensions: (1) **financial valuation numerator**: enterprise value versus equity value, (2) **value driver denominator**: for example, net income, EBITDA, book equity, etc., (3) **denominator measurement period**: past, current, or future, and (4) **set of comps type**: comparable transactions versus comparable trading firms. Finally, it standardizes all of the advisor valuation multiples in U.S. public deals in SDC Platinum through 2020 and provides rich descriptive statistics on each dimension over time and across industries.

Figure 1 illustrates the categorization scheme. Figures 2, 3, 4 and 5 plot trends

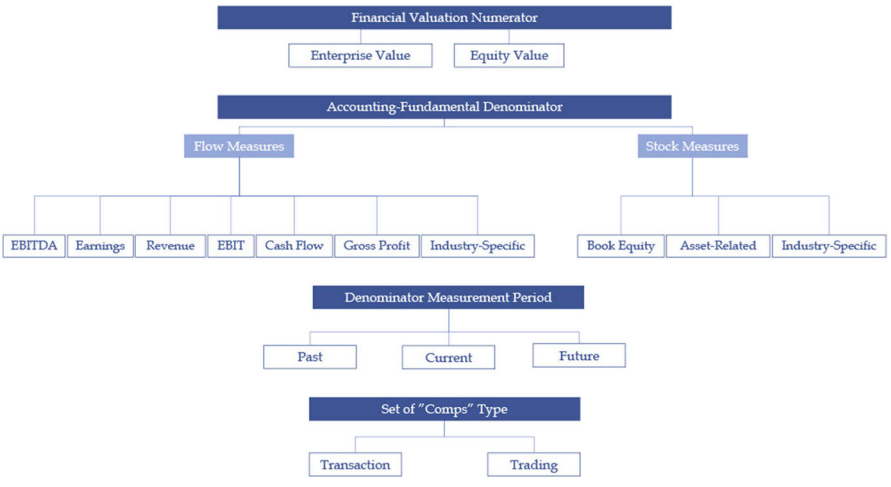

Fig. 1 Standardization scheme. Figure 1 illustrates the dimensions used to categorize the valuation ratios

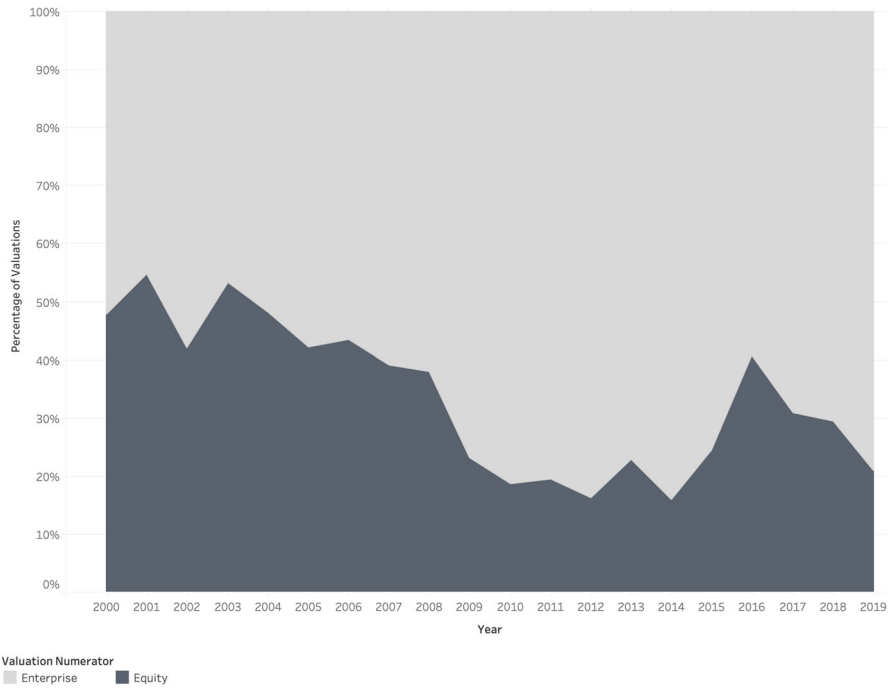

Fig. 2 Valuation numerator over time. Figure 2 plots the proportion of enterprise value valuation multiples versus direct equity value valuation multiples, from 2000 through 2019

in each dimension over time, from 2000 to 2020. Table 1 reports the distribution of the synthetic multiples standardized along those dimensions. And Tables 2, 3, 4, and 5 report summary statistics on each dimension individually and across industries. A thorough discussion of each dimension is provided in the sections below. This section highlights eight findings of greatest interest in light of current research and debates.

First, there is meaningful heterogeneity in the multiples used. Even after standardizing, the most common multiple, *enterprise value to current EBITDA—trading comps*, accounts for only 7.48% of the sample (Table 1). There are more than 25 different standardized multiples that each comprise more than 1% of the sample. While many aspects of M&A disclosures are perceived as boilerplate designed to limit litigation (Kisgen et al. 2009), there is substantial—and currently little-understood—variation *within* multiples, that is, advisors' choice of which multiples to use for which deals.

Second, accrual-basis income-statement and balance-sheet measures dominate as the value drivers used in this setting. The five most common value-driver denominators are, in order, *EBITDA* (32%), *net income* (25%), *revenue* (22%), *book equity* (9%), and *EBIT* (6%), collectively comprising 95% of the total sample. All cash-flow metrics combined comprise only 1.8% of the sample. And industry-specific measures (e.g., *daily production, proved reserves*, etc.) comprise only 1.5% of the total sample. That is, income statement and balance sheet measures dominate. This is notable in light of

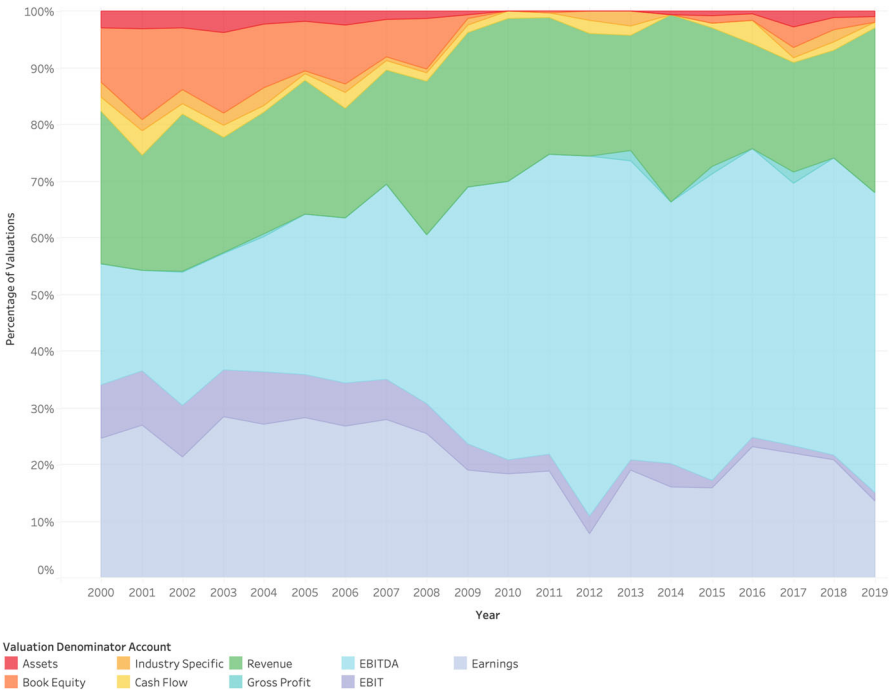

Fig. 3 Value-driver denominators over time. Figure 3 plots the relative frequency of value-driver denominators used in the valuation multiples, from 2000 through 2019

claims and concerns about the declining value-relevance of accrual accounting (Lev and Gu 2016).

Third, flow measures dominate stock measures as value drivers. *Book equity* and *total assets*, respectively, are used in only 9% and 2% of valuation multiples, and these are overwhelmingly concentrated in the financial services, insurance, and real-estate industries. (A possible explanation is that, for those industries, the assets recognized on the balance sheet more closely track the economic assets of the firm.) Excluding those industries, *book equity* and *total assets*, respectively, are used in only 2.0% and 0.3% of multiples. That is, M&A advisors treat price-to-book as an irrelevant valuation metric for operating companies. This is notable in light of its common use in accounting and finance research. The revealed preference from financial-statement users in this setting may also inform the debate over income-statement versus balance-sheet emphases in standards (Dichev and Penman 2007).

Fourth, M&A advisors infrequently use forward multiples (25%) and instead modally use trailing multiples. This is notable, given that theory and empirical research indicate that forward measures are more relevant for valuation (Dechow and Dichev 2002; Plenborg and Pimentel 2016), and they are prescribed by industry textbooks for the same reason (Koller et al. 2020) (i.e., this is common knowledge). This is not easy to rationalize: analyst forecasts are available for the large majority of these firms, and there is no legal proscription, in either statutory or case law, on the use

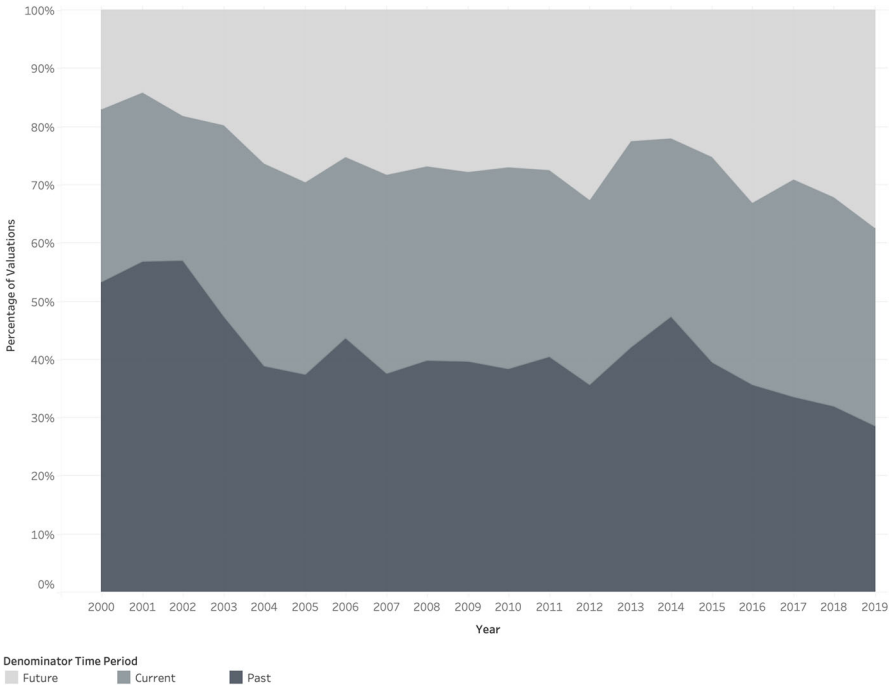

Fig. 4 Denominator measurement period over time. Figure 4 plots the proportion of multiples that use historical versus current-period versus future-period measures of the denominator, from 2000 through 2019

of third-party forecasts or internally generated forecasts in this setting—indeed these same disclosures (and judicial appraisals) typically also include DCFs. Therefore this is a puzzle.

Fifth, M&A advisors use enterprise-value multiples more frequently than direct equity value multiples, and this has increased significantly over the past two decades. There is a mechanical link between the valuation numerator (enterprise value versus equity) and the value-driver denominator.[1] The same period has seen a dramatic rise in the use of *EBITDA* as the preferred value driver, at the expense of both *EBIT* and *net income*. This suggests that the increasing use of EV multiples could be downstream from an increasing preference for *EBITDA* as the value driver.

Sixth, advisors typically draw the comps for their multiples from trading firms (66%), rather than other transactions (34%), and this difference has increased over time. Comparable trading multiples provide a benchmark for the value of the target as a standalone, while comparable transaction multiples provide a benchmark for the value of the target in the takeover market. Given these different interpretations, it is striking that there is not convergence in practice. U.S. case law does not provide guidance on which approach advisors *should* use (Bebchuk and Kahan 1989). But, given that the mean (median) 30-day market premium paid to targets in the sample

[1] It is consistent to use income statement levels below (versus above) *EBIT* with equity value (versus enterprise value), since they are after (versus before) the cost of debt financing.

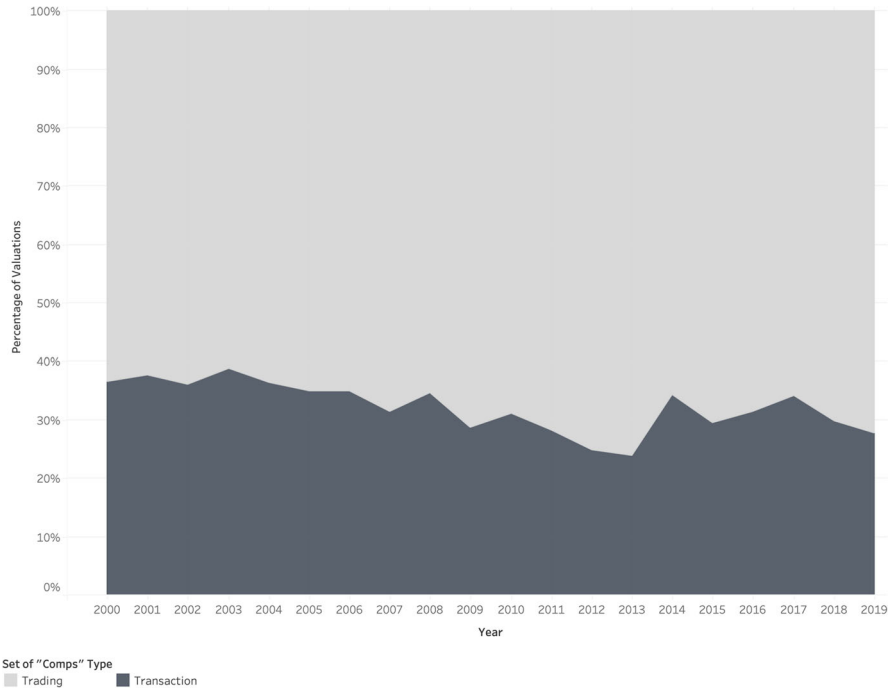

Fig. 5 Set of comps type over time

is 38% (30%), using trading rather than transaction comps would set a significantly lower bar. Therefore this seems germane to the growing literature studying bias in the choice of comps (Eaton et al. 2001; Imperatore et al. 2021).

Seventh, tabulating by industry, the *finance, insurance, and real estate (FIRE)* division stands out, with the largest significant differences from the mean on almost all dimensions. While the accounting literature has long recognized the different properties of earnings in these sectors (Kahle and Walkling 1996), this shows implications for valuation practice. But otherwise there remains significant heterogeneity within industries and not much convergence within them, again highlighting the discretion and unexplained variance.

Eighth, advisors usually also include DCFs as additional valuation benchmarks, and the presence of the DCF has some, though limited, covariance with the choice of accounting multiple. For example, advisors are less likely to use earnings multiples and more likely to instead use revenue multiples in those deals in which they elect not to include a DCF valuation. A possible explanation is that advisors deem both earnings multiples and DCF valuation unsuitable for firms that are unlikely to be profitable over short horizons. However, advisors are no more likely to use forward multiples when a DCF valuation is also present. This is surprising, given that DCF valuation inherently requires the use of forecasts of several additional periods. This underscores the puzzle noted above.

Table 1 Frequency distribution of standardized multiples

	freq	pct	cumpct
Enterprise Value to Current EBITDA, Trading Comps	974	7.48	7.48
Enterprise Value to Past EBITDA, Transaction Comps	899	6.91	14.39
Equity Value to Current Earnings, Trading Comps	837	6.43	20.82
Enterprise Value to Future EBITDA, Trading Comps	833	6.40	27.21
Equity Value to Future Earnings, Trading Comps	797	6.12	33.34
Enterprise Value to Past EBITDA, Trading Comps	769	5.91	39.24
Enterprise Value to Past Revenue, Transaction Comps	682	5.24	44.48
Enterprise Value to Current Revenue, Trading Comps	581	4.46	48.94
Enterprise Value to Past Revenue, Trading Comps	577	4.43	53.38
Equity Value to Past Earnings, Trading Comps	533	4.09	57.47
Enterprise Value to Future Revenue, Trading Comps	528	4.06	61.53
Equity Value to Past Earnings, Transaction Comps	424	3.26	64.78
Equity Value to Current Book Equity, Trading Comps	266	2.04	66.83
Equity Value to Current Book Equity, Transaction Comps	243	1.87	68.69
Enterprise Value to Past EBIT, Trading Comps	224	1.72	70.41
Enterprise Value to Past EBIT, Transaction Comps	223	1.71	72.13
Equity Value to Past Book Equity, Transaction Comps	214	1.64	73.77
Equity Value to Past Book Equity, Trading Comps	208	1.60	75.37
Enterprise Value to Current EBITDA, Transaction Comps	202	1.55	76.92
Equity Value to Future Earnings, Transaction Comps	174	1.34	78.25
Enterprise Value to Future EBITDA, Transaction Comps	166	1.28	79.53
Enterprise Value to Future Revenue, Transaction Comps	145	1.11	80.64
Equity Value to Current Earnings, Transaction Comps	139	1.07	81.71
Enterprise Value to Current EBIT, Trading Comps	137	1.05	82.76
Enterprise Value to Future EBIT, Trading Comps	133	1.02	83.79
Other	...	...	100.00
Total	13019	100.00	

This paper makes four contributions. First, accounting multiples are ubiquitous in valuation practice in general, but, as the papers in this setting themselves typically note, the published literature on their use is surprisingly thin (Erhard and Sloan 2020). Valuation textbooks cover the variety of possible valuation multiples and describe their theoretical basis and interpretation (Damodaran 2012; Koller et al. 2020) but provide less understanding of the variation in the choice *among* multiples. To my knowledge, this paper provides the broadest overview of the distribution of multiples in use among expert financial intermediaries in recent decades.

Second, this large sample of accounting multiples provides an unusually direct insight into how fundamental accounting performance measures are translated into valuations, a central focus of accounting research. Research usually infers the value-relevance of financial-statement metrics from their ability to predict market value in

Table 2 Valuation numerator by industry

Industry	Mfg	Services	FIRE	Retail	TransComm	Mining	Wholesale	Construction	Ag	Pub Admin	**Total**
Enterprise Value	3081	2551	492	521	539	340	143	44	33	7	7751
	(74.42)	(73.92)	(15.82)	(73.48)	(77.00)	(59.54)	(67.14)	(56.41)	(82.50)	(100.00)	(59.54)
Equity Value	1059	900	2618	188	161	231	70	34	7	0	5268
	(25.58)	(26.08)	(84.18)	(26.52)	(23.00)	(40.46)	(32.86)	(43.59)	(17.50)	(0.00)	(40.46)
Total	4140	3451	3110	709	700	571	213	78	40	7	13019
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

In the tables below, I report summary statistics for the full sample and by the highest-level industry taxonomy in the SIC, the "division," delimited by the following codes:
0100-0999—*Agriculture, Forestry, and Fishing* (shortened to "Ag")
1000-1499—*Mining*
1500-1799—*Construction*
2000-3999—*Manufacturing* ("Mfg")
4000-4999—*Transportation, Communications, Electric, Gas, and Sanitary service* ("TransComm")
5000-5199—*Wholesale Trade* ("Wholesale")
5200-5999—*Retail Trade* ("Retail")
6000-6799—*Finance, Insurance, and Real Estate* ("FIRE")
7000-8999—*Services*
9100-9729—*Public Administration* ("Pub Admin")
The divisions are sorted, left to right, by the number of observations to highlight significant variation

Table 3 Value-driver denominator by industry

Industry	Mfg	Services	FIRE	Retail	TransComm	Mining	Wholesale	Construction	Ag	Pub Admin	**Total**
EBITDA	1450	1298	278	299	407	287	100	27	14	7	4167
	(35.02)	(37.61)	(8.94)	(42.17)	(58.14)	(50.26)	(46.95)	(34.62)	(35.00)	(100.00)	(32.01)
Net Income	856	680	1267	136	115	85	41	16	7	0	3203
	(20.68)	(19.70)	(40.74)	(19.18)	(16.43)	(14.89)	(19.25)	(20.51)	(17.50)	(0.00)	(24.60)
Revenue	1348	1119	144	159	78	17	28	16	12	0	2921
	(32.56)	(32.43)	(4.63)	(22.43)	(11.14)	(2.98)	(13.15)	(20.51)	(30.00)	(0.00)	(22.44)
Book Equity	83	45	995	29	21	2	13	10	1	0	1199
	(2.00)	(1.30)	(31.99)	(4.09)	(3.00)	(0.35)	(6.10)	(12.82)	(2.50)	(0.00)	(9.21)
EBIT	345	261	41	78	44	26	25	8	6	0	834
	(8.33)	(7.56)	(1.32)	(11.00)	(6.29)	(4.55)	(11.74)	(10.26)	(15.00)	(0.00)	(6.41)
Assets	12	6	212	4	3	8	5	0	0	0	250
	(0.29)	(0.17)	(6.82)	(0.56)	(0.43)	(1.40)	(2.35)	(0.00)	(0.00)	(0.00)	(1.92)
Cash-flow metrics	19	33	9	4	32	132	0	1	0	0	230
	(0.46)	(0.96)	(0.29)	(0.56)	(4.57)	(23.12)	(0.00)	(1.28)	(0.00)	(0.00)	(1.77)
Industry Specific	10	3	164	0	0	14	0	0	0	0	191
	(0.24)	(0.09)	(5.27)	(0.00)	(0.00)	(2.45)	(0.00)	(0.00)	(0.00)	(0.00)	(1.47)
Gross Profit	17	6	0	0	0	0	1	0	0	0	24
	(0.41)	(0.17)	(0.00)	(0.00)	(0.00)	(0.00)	(0.47)	(0.00)	(0.00)	(0.00)	(0.18)
Total	4140	3451	3110	709	700	571	213	78	40	7	13019
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Table 4 Denominator measurement period by industry

Industry	Mfg	Services	FIRE	Retail	TransComm	Mining	Wholesale	Construction	Ag	Pub Admin	**Total**
Past Period	1701	1330	1365	402	218	147	111	43	18	3	5338
	(41.79)	(39.01)	(46.76)	(58.43)	(32.11)	(26.25)	(52.61)	(56.58)	(48.65)	(42.86)	(42.18)
Current Period	1191	1086	1128	173	247	202	65	20	12	3	4127
	(29.26)	(31.86)	(38.64)	(25.15)	(36.38)	(36.07)	(30.81)	(26.32)	(32.43)	(42.86)	(32.61)
Future Period	1178	993	426	113	214	211	35	13	7	1	3191
	(28.94)	(29.13)	(14.59)	(16.42)	(31.52)	(37.68)	(16.59)	(17.11)	(18.92)	(14.29)	(25.21)
Total	4070	3409	2919	688	679	560	211	76	37	7	12656
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Table 5 Set of comps type by industry

Industry	Mfg	Services	FIRE	Retail	TransComm	Mining	Wholesale	Construction	Ag	Pub Admin	**Total**
Trading Comps	2846	2358	1734	486	474	428	157	53	29	4	8569
	(68.74)	(68.33)	(55.76)	(68.55)	(67.71)	(74.96)	(73.71)	(67.95)	(72.50)	(57.14)	(65.82)
Transaction Comps	1294	1093	1376	223	226	143	56	25	11	3	4450
	(31.26)	(31.67)	(44.24)	(31.45)	(32.29)	(25.04)	(26.29)	(32.05)	(27.50)	(42.86)	(34.18)
Total	4140	3451	3110	709	700	571	213	78	40	7	13019
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

large-sample regressions (Dechow and Dichev 2002). This paper opens a black box and directly documents intermediaries' preferred metrics for specific industries and settings. The revealed preference of these users is also germane to broader questions on, for example, value-relevance and standards.

Third, this paper contributes to the literature on M&A valuation advisory (Cain and Denis 2013). In particular, it complements the growing literature on the choice of peers in this setting (Imperatore et al. 2021; Eaton et al. 2001; Guo et al. 2023). These papers typically abstract from the choice of multiple. But the valuation is ultimately jointly determined by the choice of comps and the method. Therefore understanding the variation in multiples employed in this setting should help researchers interpret and enrich their findings.

Fourth, and most importantly, this paper answers the call from Gow et al. (2016) for thorough, institutionally grounded, descriptive research to lay a foundation for hypothesis development. This paper aims to provide a simple and yet sufficient guide for researchers to enter this area. I provide a transparent guide for standardizing and cleaning the valuation data from SDC Platinum. I explain the key facts around the institutions, law, and valuation practice as well as their implications for researchers (i.e., what questions can and cannot be credibly addressed empirically). I cover the literature and controversies to frame theory. I discuss motivations for studying this setting in light of that. And I offer several potential research questions, suggested by notable and intriguing features of the data.

This setting is, in my view, an unusually ripe and natural topic of interest for accounting researchers: it is about how financial intermediaries link accounting fundamentals to valuation estimates to inform governance in a high-profile decision setting (public company takeovers). The literature is surprisingly thin on this seemingly basic and fundamental question: *which* links are used and why? Researchers may have been, to date, discouraged from entering this area by the complexity of the institutions and law, by defining a motivation, or by ignorance of this data and how and use it. This paper removes those barriers and enables accounting researchers to wade into this blue ocean.

The remainder of this paper proceeds as follows. Section 2 provides background, covering key institutional details and motivations for empirical research, the literature, and topics of debate. Section 3 describes how I access, clean, and standardize this data. Section 4 covers the empirical findings. Section 5 concludes by discussing open research questions.

2 Background

2.1 Legal and institutional background

Mergers are complex, and targets and acquirers have relied on financial intermediaries such as investment banks to provide advisory since the early 20th century. This

practice became more formalized and ubiquitous as a result of Smith vs. Van Gorkom (Del. 1985), in which the directors of TransUnion were held negligent for accepting a takeover offer without sufficient analysis to determine the adequacy of its terms. Since then, third-party valuation advisory, summarized in a "fairness opinion," has been considered "virtually mandatory" for target boards (Davidoff 2006). The valuations that advisors provide to directors at their meeting to vote on the deal are considered material and are disclosed in merger proxies prior to target shareholders' vote on the deal.[2]

2.2 Controversy

Despite its ubiquity, the relevance of this process is ambiguous and debated. *Smith v. Van Gorkom* generated immediate and enduring controversy in the legal literature, in its implication that directors must and could rely upon valuations as indicators that shareholders were receiving fair value, *in lieu* of other assurances, such as the sale process or market premium (Fischel 1985). Bebchuk and Kahan (1989) noted that valuation is subjective, given the limited guidance from the courts on what precisely advisors were supposed to value (the target's standalone value, value to its acquirer, or outside options?), degrees of freedom in the choice of method, unverifiable assumptions, and widely different valuations produced from the application of different standard methods. Davidoff (2006) argued that "market-based prices are the truest indicator of value" and questioned the relevance of fundamental valuations when they are available, an argument that echoes the recent trend in the related setting of judicial appraisal (e.g., the *Aruba Networks* case and subsequent appeals).

2.3 Theory

As above, the fairness opinion process is controversial. But there are threads in accounting and finance research that, contra the legal literature above, can rationalize it. I review them here, to offer a theoretical frame for future research.

First, a long thread of research in finance (e.g., Boone and Mulherin (2007) and cites therein) questions whether the sale process for targets is competitive. Sellers may fear proprietary costs from prospective buyers (Verrecchia 2001), and buyers fear a winner's curse. Target management may have private interests in different prospective acquirers and motives to please their acquirer's management (Chen et al. 2016). The debate over golden parachutes highlights the intractability of fully aligning executives' incentives with those of their shareholders in takeovers (Bebchuk et al. 2014).

Other threads of research suggest when and why the target's pre-deal market price (or equivalently the transaction market premium) may not provide a sufficient basis for evaluating takeover offers. There could be fundamental mispricing (Shleifer and

[2] Acquirers may voluntarily get a fairness opinion. But there is no legal precedent requiring them to get one or to disclose it if they do. U.S. acquirers usually must only have a shareholder vote (and thus file any proxy) if they are public and issuing more than 20% of their outstanding shares to finance the deal.

Summers 1990), or managers could manipulate the information environment (Perry and Williams 1994) or time the market (Harford et al. 2018). Or takeover rumors and expectations could be impounded in the target's stock price, requiring unraveling to evaluate the offer (Bond et al. 2010). Finally, the pre-deal stock price will not fully impound the value of the target to prospective alternative acquirers or expected transaction synergies, which directors may consider relevant in evaluating the offer.

Those threads can rationalize the use of fundamental valuation in M&A but do not explain the use of accounting multiples versus theoretically coherent approaches, such as discounted-free-cash-flow. A seminal work in this vein is by DeAngelo (1990). She advances a model in which information asymmetry renders market signals uninformative about the target's value, which generates a demand for fundamental valuation. But, she notes, DCF valuations are "sensitive to the cash flow and discount rate assumptions of insider-managers [and therefore] not a very credible means of convincing outside stockholders that those values are fair." Therefore, in DeAngelo's framework, accounting multiple heuristics are used, as they are transparent and anchored on jointly recognized common signals.

2.4 Other literature

This paper relates most closely to two separate literatures on (i) M&A valuation advisory and fairness opinions and (ii) the use of accounting multiples for valuation.

The literature on M&A valuation advisory, summarized and disclosed in fairness opinions, has to date focused on such questions as the informativeness and bias of the level of the valuations (Cain and Denis 2013), their relation to litigation risk and deal premia (Kisgen et al. 2009), and the motivations of advisor and client or the determinants of the demand for valuation advisory (Liu 2020). More recently, there has been a growth of literature on the choice of peers (comps) in these valuations. Eaton et al. (2001) estimate that target advisors choose comparable peers with higher valuation multiples than their potential peers (i.e., an upward bias), which they view as evidence of target advisors' incentives and efforts to negotiate for a higher deal price. A concurrent working paper by Imperatore et al. (2021) links the fairness-opinion disclosures to the appraisal setting and shows, in a difference-in-differences analysis, that advisors select peers (comps) with differentially lower multiples in response to an increase in appraisal risk (i.e., a downward bias)—that is, to make the negotiated deal price appear more attractive by comparison. However, to my knowledge, there is no published empirical research on the *choice of multiple* in this setting.

There are several threads of research in accounting multiples. Some highlight the institutional use and role of these multiples in various settings, such as IPOs and tax (Beatty and Verrecchia 1989; Kim and Ritter 1999). Other early papers develop the theoretical foundation for relating the multiples used in practice to fundamental value (Penman 1992).

Another thread of empirical research seeks to identify the best multiples with large-sample tests using one of two approaches: (1) assuming market efficiency and comparing how different multiples perform in explaining market valuations (Dechow

et al. 1999; Liu et al. 2002) or (2) assuming market inefficiency and evaluating multiples by their ability to forecast abnormal returns (Gray and Vogel 2012).

Plenborg and Pimentel (2016) provide a broad overview (see additional cites therein). However, as these papers themselves often note, this literature is surprisingly thin, relative to the ubiquitous use of multiples among practitioners and the fundamental nature of the question. Researchers have surprisingly limited understanding of seemingly basic questions about the *variation* in multiples—*which* multiples are used, when and why?

2.5 Motivation

Why is the accounting literature on this setting and data currently so thin? It comprises rich variation in accounting-based valuations used in a salient governance decision. Given that, it might be expected to be, if anything, unusually crowded with accounting researchers.

There are two major barriers that researchers face to motivating research in this setting. The first is that the prevailing attitude toward fairness opinions in the academic literature and the public discourse is (perhaps deservedly) negative. The second is the institutional complexity, which makes it difficult for researchers to frame the fairness opinion's role, particularly relative to the outcome variables that empirical researchers instinctively reach for (e.g., premiums). The combination of these can impede academics' ability to define and communicate a motivation for studying this setting. I explain these issues below.

The key institutional fact for understanding this is that the fairness opinion per se is solicited and presented to the board of directors during the governance phase of the merger, once a negotiated offer is on the table. Since it is only involved in the *acceptance* phase of the contracting, rather than the negotiation of the *offer*, it should not be understood as driving deal pricing. Fairness opinions only become publicly observable, via the merger-proxy distribution, after directors approve the deal. And practitioners attest that it is uncommon for directors to vote down a deal on the basis of the opinion per se, at that late stage. Further, the investment bank advisors have a financial motive to facilitate deal completion and degrees of freedom in valuation methodology. Researchers in this area should expect to be asked: Why care if you cannot show economic effects and this is a rubber stamp?

Because this paper seeks to promote research, I lay out some motivations for studying these this setting, notwithstanding these institutional facts, below.

First, the process can have a substantive governance role in a broader sense, even though directors rarely vote down deals on the basis of the fairness opinion per se. Because they are effectively mandatory for U.S. buyout targets, all prior negotiations happen in the shadow of the eventual board book and proxy valuation disclosures. Therefore its governance role is *ex ante*, affecting the deals managers bring to the board. From the outset of every potential deal, managers know that they will eventually have to show how the deal terms compare to several conventional valuation benchmarks, which will be disclosed and scrutinized. The broader impact of this is not limited to

cases in which directors vote deals down, just as the effect of the audit process is not limited to adverse opinions.

Second, valuation advisory is a continuous process in M&A, which are complex and multi-stage. Given its ubiquitous (and expensive) role throughout this process, it should be uncontroversial that valuation, broadly defined, has an important role. Most of this process (e.g., investment bank analysts' initial pitchbooks or the valuation benchmarks that managers and advisors reference in informal conversations and negotiations) is not directly observable. However, the fairness opinion valuations are systematically observable and tethered (though not necessarily identical) to the valuations used in other phases of the deal. Therefore researchers can treat this setting as a publicly observable clean slice of the messy and otherwise unobservable M&A valuation process. This is the implicit conceit in the published empirical papers in the finance literature (Eaton et al. 2001).

There are two main reasons to believe that these disclosures are informative about M&A valuation more broadly. First, systematic differences between the valuations presented to the board and shareholders versus those used in earlier phases of the deal would be highly scrutinized in discovery in litigation (e.g., the criticism of Goldman Sachs in the *Southern Peru* appraisal case). Second, even assuming that advisors seek only to facilitate deal completion, they anticipate scrutiny and opposition from other sophisticated parties in appraisal (Imperatore et al. 2021). That is, their catering bias motivates them to show a methodology consistent with perceived best practices among M&A practitioners.

Therefore this setting presents an opportunity for researchers to develop more general inferences about M&A valuation practice, as long as they are stated with appropriate restraint.

3 Sample and variable construction

3.1 Data

I download all advisor multiples in SDC Platinum, for deals announced from Jan. 1, 2000 (when SDC's coverage begins), to 2020, comprising 13,019 multiples from 2,300 unique deals.

3.2 Categorizing multiples

Valuation multiples as a whole are the predominant approach to valuation in M&A, but they vary along several dimensions. First, all valuation ratios must have a financial valuation as the numerator—either the equity value or the total enterprise value. Second, all valuation ratios must have a value-driver denominator. Just five categories of accounting fundamentals (in order, EBITDA, net income, revenue, book equity,

and EBIT) account for over 95% of the total, and I bucket the remaining ones parsimoniously. Third, the denominator must be measured as of some period. To maintain tractability, I bucket the measurement period into just three categories, relative to the deal announcement date: *Past*, *Current*, and *Future*. And, finally, the multiple is determined by the multiples of relevant comps, which fall into two broad categories, either comparable trading (i.e, standalone) firms or comparable transactions. In summary, valuation multiples can be categorized on these dimensions:

1. **Valuation numerator**: equity valuation versus enterprise valuation
2. **Value-driver denominator**: EBITDA, net income, revenue, book equity, EBIT, cash flow measures, total assets, industry-specific, gross profit.
3. **Denominator measurement period**: past, current, or future.
4. **Comparison type**: comparable transaction versus comparable trading multiples

These dimensions are not fully independent. For example, there is a link between the valuation numerator and the value-driver denominator. It is consistent to estimate *enterprise value* (versus *equity value*) as a multiple of income statement levels at or above (versus below) EBIT, since they are before (versus after) the cost of debt financing. However, neither are they fully co-determined. For example, the dataset includes some cases in which *revenue* is used as the value driver in equity-value multiples. Similarly, it is more common to use forecasts with flow measures, like *earnings*, and less common to use forecasts of stock measures like *book equity*. In the interest of balancing comprehensiveness and brevity, I analyze each dimension separately while acknowledging that they are not fully independent.

Appendix A describes how I clean the SDC data to standardize it on these dimensions.

4 Empirics

I first create synthetic standardized multiples, based on this scheme, and report their frequency distribution. Then the subsections that follow describe each individual dimension in detail and report trends over time and by industry, using the year of the announcement of the deal and the highest-level taxon in the SIC, the division, respectively.

4.1 Synthetic multiples

Table 1 reports the frequency distribution of the standardized multiples in the sample. The most striking finding is that the multiples, even after standardization, are not highly concentrated, overall or on any one dimension. Consider the following:

EV to current EBITDA, trading comps is the modal multiple but only 7.48% of the sample, and followed closely by *enterprise value to current EBITDA, transaction comps* at 6.91% and *equity value to current earnings, trading comps* at 6.43%. There

are 25 synthetic multiples that each account for more than 1% of the sample. It requires the 22 most common multiples to reach a cumulative frequency of 80%. The top three most common synthetic multiples alone vary on all four dimensions. That is, there is a surprisingly high level of heterogeneity, across each dimension, and in their combinations. This is significant for two reasons.

First, while many aspects of merger disclosures are seen as boilerplate (Bebchuk and Kahan 1989) designed to rubber stamp deals and limit litigation, advisors evidently have significant scope and exercise discretion in the choice of valuation method. There are real choices being made. Understanding these choices presents a ripe opportunity for research.

Second, there is a growing thread of academic research analyzing advisors' choice of peers (comps) in this setting (Imperatore et al. 2021; Eaton et al. 2001). For the purposes of their research questions, these papers abstract from the particular accounting multiple. But the multiple is the essential complement to the choice of peers—which jointly determine the implied valuation—and this varies significantly between deals. There is no one multiple or small set that encompasses the large majority.

4.2 Valuation numerator: enterprise versus equity

Figure 2 plots the trend in the valuation numerator dimension over the sample period, while Table 2 presents summary statistics by industry. Advisors prefer *enterprise value* multiples (60% of the sample), and this has generally increased over time.

One common prior is that advisors' use of *enterprise value* multiples is determined by the target's debt. But, notably, the valuations in this setting are intended to inform directors and shareholders on the fairness of the merger consideration offered to equity holders (Davidoff 2006), while debtholders are protected by their contracts. *Enterprise value* valuations are only an intermediate step *en route* to valuing the equity, before subtracting the estimated value of senior claims. The company's capital structure per se would not constrain advisors from using direct *equity value* multiples, since the value-driver denominator itself can be after the amount or cost of debt (e.g., *book equity* or *net income*).

Another candidate hypothesis for explaining the valuation numerator is that advisors use *enterprise value* valuation multiples if the acquirer will optimize the capital structure of the target to increase its value (Stulz 2000). In that case, estimating the value of the target to the acquirer first requires estimating the unlevered firm value.

While this idea has a strong theoretical pedigree (Jensen and Meckling 1976), it is not clear that it explains advisors' choices in this setting in practice: advisors usually do not explicitly state that they are attempting to value the target inclusive of transaction synergies (Davidoff 2006). While the advisor's intent in each valuation (that is, whether the valuation aims to be standalone or synergy-inclusive) is not directly observable, we can observe an empirical proxy. If advisors are attempting to estimate the value of the target to an acquirer, rather than its standalone value, then, if consistent, they would use transaction comps rather than trading comps. Appendix B reports a two-way tabulation showing that there is no significant difference by this factor: advisors

use *enterprise value* in 59% of multiples with trading comps and 60% of multiples with transaction comps.

Examining variation by industry, the *finance, insurance, and real estate* division stands out: for these firms, advisors use enterprise (versus equity) multiples only 16% (versus 84%) of the time, while the numbers are 73% (versus 27%) for the remainder. Damodaran (2012) notes that, for financial institutions with depositors, defining and estimating net debt is problematic. However, beyond this known factor, there is again substantial unexplained heterogeneity in practice within industries and over time.

4.3 Value-driver denominator

Figure 3 shows trends in the major categories of value-driver denominators over time, while Table 3 reports summary statistics for the full sample and by industry.

In the full sample, the most common value-driver denominators are, in order, *EBITDA* (32.0%), *earnings* (24.6%), *revenue* (22.4%), *book equity* (9.2%), *EBIT* (6.4%), *total assets* (1.9%), and various cash-flow metrics (1.8%). The continued dominance of income statement and balance sheet measures as value drivers stands out: they occupy the top six places, comprising 97% of the sample, while cash-flow based metrics and all miscellaneous bespoke industry-specific metrics together comprise only 3%. This is surprising in light of questions and concerns within the accounting literature about the relevance of accrual accounting measures (Nallareddy et al. 2020; Lev and Gu 2016).

Examining trends over time (Fig. 3), the most salient feature is the increase in *EBITDA* multiples, apparently at the expense of *earnings* multiples. Given the correspondence between the value-driver denominator and the valuation numerator, this could partially be accounted for by the trend toward the use of *enterprise value* multiples.[3] However, that trend would not, by itself, explain the increase in *EBITDA* at the expense of *EBIT*, since the latter is also matched to *enterprise value* multiples. This trend could relate to the general trend toward non-GAAP measures and emphasis on levels of profitability further up the income statement (Black et al. 2018).

Finally, aggregating across categories, it is notable that flow measures dominate stock measures throughout, and this disparity has increased over time. *Book equity* visibly trends downward in the figure. *Total assets* is not easily visible in the plot, but it accounts for 3.1% of multiples in 2000-2004 versus 1.7% of multiples in 2015-2019. This trend mirrors accounting research in other settings on the increasing size and importance of unrecognized intangibles, which has caused book measures of net assets to be more severely understated and less value-relevant over time. However, it also raises questions about the motivation for efforts to fix book value, given that financial-statement users almost exclusively use flow measures for valuation for nonfinancial corporations. That is, rather than a call to remedy the balance sheet, it could be seen

[3] Income-statement levels at or above EBIT are naturally matched to enterprise value valuations (since measures above EBIT capture value realized exclusive of claims incurred and owed to financial creditors), whereas net income (after all expenses, including interest) is consistently matched to equity valuations.

as an argument to abandon balance-sheet principles that make earnings more transient and thus less suitable for capitalization (Dichev and Penman 2007).

Examining variation by industry (Table 3), the finance, insurance, and real estate division once again stands out. In those industries, advisors use *book equity* as the value driver in 32.0% of valuations and *total assets* in 6.8%, whereas, for the remainder of the sample, the percentages are 2.06% and 0.38%, respectively. One candidate explanation is that, for companies in those industries, the net assets recorded on their books more closely approximate their total economic assets. M&A advisors appear to perceive balance-sheet summary measures as relevant valuation benchmarks for companies in these industries and irrelevant for others.[4]

"Industry specific," in this scheme, includes all value drivers that do not fall into the other categories, such as *deposits*, *proved reserves*, *funds from operations*,[5] *net cash*, *daily production*, and *subscribers*. While this category may seem interesting, there are only 191 such observations in the entire sample, and 164 of these (86%) are in the finance, insurance, and real estate industries. The majority of this category is comprised of *funds from operations* and *deposits*. There are very few cases of value drivers that are not expressed in monetary units: only three valuations use *daily production*, and only one uses *subscribers*. That is, advisors still overwhelmingly use financial-statement line items and closely related metrics as the value drivers.

4.4 Denominator measurement period

Figure 4 plots trends in denominator measurement period (*past, current,* or *future)* over time, while Table 4 reports summary statistics for the full sample and by industry sector.

By industry (Table 4), the finance, insurance, and real estate division once against stands out: advisors use forward multiples in only 15% of multiples for targets in those industries versus 25% of the remainder. This can be explained by the more common use of stock measures in these industries.

In the full sample, advisors use past-period multiples in the plurality, 42%, versus current-period multiples in 33%, and forward multiples in only 25%. Figure 4 shows only a modest trend toward the use of forward measures over this period. This is notable, given that valuation theory, empirical research, and practitioner texts all converge in recommending forward multiples as more relevant for valuation (Koller et al. 2020; Plenborg and Pimentel 2016).

This is not easy to rationalize: it cannot be explained simply as a direct response to litigation risk in M&A. These measures are not being directly contracted on, only advanced as informative benchmarks for directors and shareholders to consider. There

[4] Another notable difference is that the finance, insurance, and real estate industries have a higher frequency of industry specific value drivers, and 50% of those are stock measures—most commonly *deposits*. Additionally, in the those industries, *among* flow measures, advisors are significantly more likely to use *earnings* as the value driver, rather than *EBIT* and *EBITDA* (which also corresponds to the lower prevalence of *enterprise value* multiples in those industries).

[5] The conventional definition of FFO, a common metric in real estate, is net income plus depreciation plus gains (losses). Since this measure is still accrual-based, it is not included in the cash-flow measures category.

is nothing in statutory or case law that proscribes reliance on forecasts in this setting.[6] The advisors usually also include DCFs, which require several more forecast periods, in these same disclosures. And DCFs are often referenced and relied upon by Delaware judges in appraisal cases.

One interpretation is that this reflects advisors' defensive posture in this setting. But this only begs the question of *why* trailing multiples, rather than the known best practice, would be the right choice. Multiples of reported numbers are not truly less discretionary or certain, since the valuation is determined both by the value driver and the multiple applied, the latter of which is discretionary and implicitly embeds growth assumptions.

Overall therefore this finding evades simple explanation.

4.5 Set of comps type: transactions versus trading firms

Figure 5 plots trends in the set of comps type, while Table 5 reports summary statistics for the full sample and by industry sector. Notably, advisors primarily use comparable trading firms (66% of the full sample), and this has trended slightly upward over the sample period.

A key component of valuation multiples is the set of comparable firms (comps) that are used to determine the multiple applied to the value driver to estimate the value. This overview considers only the choice of whether to draw the comps from transactions (that is, the deal prices paid to comparable targets in other acquisitions) or trading firms. By definition, comparable transaction multiples would provide an estimate of the value, relative to fundamentals, of similar firms in the takeover market—that is, to prospective outside buyers. Comparable trading multiples would provide an estimate of the value of the target as a standalone. This naturally raises the question of why comparable trading multiples would be relevant for public targets, which can observe their pre-deal stock price as a measure of their standalone value (Davidoff 2006). In light of this, it may seem surprising that comparable trading multiples are the strong and increasing majority in this setting.

As discussed in Section 2, case law does not provide definitive guidance on whether advisors should provide measures of the value of the target as a standalone or should include synergies, value to prospective alternative buyers, or both. Indeed, this ambiguity is one of the major criticisms of the process (Bebchuk and Kahan 1989). This paper is agnostic on this question. However, the findings are relevant for two reasons.

First, comparable transaction multiples versus comparable trading multiples have distinct meanings—the former provides a benchmark for the value of the target in the market for corporate control, and the latter provides a benchmark for its standalone fundamental value. So it is striking that there is not convergence in practice. That is, while the literature has documented that all merger proxy and fairness opinion disclosures include comparable multiples, one-third of these multiples are estimating a different construct than the other two thirds. This starkly illustrates the criticism

[6] Interview with Gil Matthews, October 2022

from the legal literature that the objective of the valuation is ambiguous and undefined (Bebchuk and Kahan 1989; Davidoff 2006).

Second, the choice of whether to draw the multiple from comparable transactions versus trading firms would seem to have large effects on the implied valuation, in quantitative terms. The median (mean) one-month premium for targets in the sample is 30% (37%). This suggests that the multiples from comparable transactions would be roughly similarly higher as well. Therefore this distinction would seem to have direct and practical relevance for the literature on peer choice and the valuation level (Imperatore et al. 2021; Eaton et al. 2001)

4.6 Multiples and DCFs

It is established that advisors use multiples in essentially all of these disclosures, with DCFs being the second most frequent method (Bartell and Janssen 2017). DCFs are pervasive (used by default) but not universal (guaranteed). There is a subset of targets where advisors' judgment leads them *not* to use a DCF. A natural question is how the two relate.

To inform upon this, I merge indicators for whether a fairness opinion DCF is also present in the same deal in SDC Platinum into my main sample, totaling 84%. In Panels A-D of Table 6, I present two-way tabulations of each dimension of the multiple by this indicator.

The distribution of valuation numerator is not significantly different in the two samples; however, the distribution of the value-driver denominator is (chi-squared tests untabulated). The most notable difference is that, in deals in which the advisor elects *not* to include a DCF, that advisor is also less likely to use earnings multiples (21.8% versus 25.2%), less likely to use EBITDA multiples (25.9% versus 33.34%), and more likely to use *revenue* multiples (30.41% versus 20.69%).

An intuitive explanation is that advisors see both DCF valuations and earnings multiples as infeasible for unprofitable firms. However, note the following tension: the entire point of DCF, in principle, is to translate the full sequence of future payoffs into present value terms, while multiples implicitly embed steady growth assumptions. Therefore one could argue that, in principle, DCF valuation is *most* relatively valuable in such scenarios, for transiently unprofitable firms. Yet practitioners treat DCFs as infeasible in the same cases in which they treat earnings-multiples heuristics as such. Therefore this again highlights the anchoring role of the accounting system in these institutional valuations.

Finally, it is striking that advisors are not significantly more likely to use forward measures when a DCF is also present (Panel C). This again underscores the puzzle.

Table 6 Accounting Multiple Dimensions by Indicator for an Accompanying DCF

Panel A: Valuation Numerator in Multiple by DCF Indicator			
	I(DCF)=0	I(DCF)=1	Total
Enterprise Value	1404	6347	7751
	(60.13)	(59.41)	(59.54)
Equity Value	931	4337	5268
	(39.87)	(40.59)	(40.46)
Total	2335	10684	13019
	(100.00)	(100.00)	(100.00)
Panel B: Value-Driver Denominator in Multiple by DCF Indicator			
	I(DCF)=0	I(DCF)=1	Total
Revenue	710	2211	2921
	(30.41)	(20.69)	(22.44)
Gross Profit	6	18	24
	(0.26)	(0.17)	(0.18)
EBITDA	605	3562	4167
	(25.91)	(33.34)	(32.01)
EBIT	154	680	834
	(6.60)	(6.36)	(6.41)
Earnings	510	2693	3203
	(21.84)	(25.21)	(24.60)
Cash Flow	57	173	230
	(2.44)	(1.62)	(1.77)
Book Equity	206	993	1199
	(8.82)	(9.29)	(9.21)
Assets	45	205	250
	(1.93)	(1.92)	(1.92)
Industry-Specific	42	149	191
	(1.80)	(1.39)	(1.47)
Total	2335	10684	13019
	(100.00)	(100.00)	(100.00)
Panel C: Value-Driver Measurement Period by DCF Indicator			
	I(DCF)=0	I(DCF)=1	Total
Past	1011	4327	5338
	(44.73)	(41.62)	(42.18)
Current	674	3453	4127
	(29.82)	(33.21)	(32.61)
Future	575	2616	3191
	(25.44)	(25.16)	(25.21)
Total	2260	10396	12656
	(100.00)	(100.00)	(100.00)

Table 6 continued

Panel D: Set of Comps Type by DCF Indicator			
	I(DCF)=0	I(DCF)=1	Total
Trading Comps	1570	6999	8569
	(67.24)	(65.51)	(65.82)
Transaction Comps	765	3685	4450
	(32.76)	(34.49)	(34.18)
Total	2335	10684	13019
	(100.00)	(100.00)	(100.00)

5 Conclusion and future research opportunities

Given the richness and novelty of this data, the statistics reported here, while descriptive, are informative on a number of topics of interest and debate. However, more importantly, this paper aims to provide a foundation for future research. Below I share five ideas suggested by the regularities, puzzles, and gaps in this first pass.

First, the valuation numerator—the choice of which entity to estimate the value of initially—is arguably the most basic component of the multiple and yet, surprisingly, appears the least understood. What determines this choice? What are the trade-offs and the impacts on the quality of the ultimate equity valuation? Given the mechanical link between them, does the choice of value-driver denominator precede the valuation numerator or vice versa? And what explains the increasing use of enterprise value multiples in Fig. 2?

Second, advisors' heavy reliance on trailing multiples (versus more value-relevant forward multiples) is a puzzle that warrants solving. The simplest candidate explanations—forecast availability or legal constraints—do not suffice. Given that this is definitionally the choice of whether to anchor the valuation directly on financial statement quantities, it seems especially fundamental for interpreting the role of accounting in M&A.

Third, the visible trends in advisors' choice of value-driver (Fig. 3) suggests a possible link to the non-GAAP phenomenon. That literature mostly focuses on notions of core owners' earnings (Rouen et al. 2019), excluding, for example, nonrecurring items. EBITDA is therefore conceptually distinct and often classified separately in the academic non-GAAP literature (Laurion 2020). But the sharp rise of EBITDA in M&A valuation is suggestive. Our understanding of each setting (i.e., the choice of income statement level in M&A versus "street" earnings measures) could be enriched by linking the two.

Third, another opportunity is to link the choice of multiple to the choice of comps. The implied valuation is ultimately determined jointly by both. Linking the two could revise inferences or reconcile dissonant results of Eaton et al. (2001) and Imperatore et al. (2021).

Fourth, the choice of method could be linked to the earlier literature studying the motives of M&A advisors and clients and *level* of their valuations (Cain and Denis 2013). How do advisors' conflicts of interest, client relationships, and involvement in other parts of the deal (versus greater independence) relate to their valuation method and why?

A natural question is how the choice of method relates to *deal pricing*. I caution that causal direction would be difficult to establish, given that, on one hand, the advisors are often involved in earlier stages of the deal and thus may affect price negotiation, but, on the other, the final valuations they present to directors at that late stage in the deal process are often alleged to rationalize the deal price. It is not obvious that any multiple should generally yield a higher or lower valuation than another, since the multiple applied to any value driver should be determined by the same multiples of peers. This does not rule out the possibility of some relationship but suggests it must be more subtle and conditional.

These disclosures are rich and varied on a topic of principal concern: the link between fundamentals and value. The setting, M&A governance, is salient. Researchers have a surprisingly limited understanding of some seemingly basic aspects of valuation practice. It is ripe fruit for research. This paper aims to serve as a platform to place it within reach.

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Appendix A: Cleaning and Coding the SDC multiples

SDC provides the accounting multiples in two separate data fields, divided by whether the set of comps for the multiple was drawn from comparable trading firms or comparable transactions. I tag the source of each multiple, to preserve this information and append all the multiples from both fields, together. I first inspected the SDC-provided valuation multiples to identify regularities. I then coded each valuation multiple on the other dimensions by identifying key substrings.

For example, common identifying strings indicating an enterprise value valuation include "enterprise," "EV," and "firm value," while common strings indicating an equity value valuation include "equity," "price," "PE," and "market capitalization," etc. I code the measurement period by extracting key substrings like "last" or "LTM" (last 12 months), "CY" or "Y0" for the current period, or "next," "NTM" or "Y1" for the subsequent period—or, when a calendar year is indicated, comparing that year to the acquisition announcement year. I used a similar process of iterative identification of key differentiating substrings and inspection to code the value-driver denominators. This generally required very little researcher discretion, given that, as noted above, advisors overwhelmingly use common, standard income-statement and balance-sheet measures. I made one discretionary choice worth noting: in my original coding, there were 10 cases in which the value-driver denominator indicated by SDC appeared to be "EBT" (earnings before taxes). Nine of those were direct *equity* rather than *enterprise* valuations. Because there were so few cases, for parsimony, I included these cases of *EBT* with *net income* (rather than report the distribution of 10 observations across 10 industry divisions), a relative increase of 0.28%.

Additionally, SDC's data fields include a few financial ratios that I do not consider valuation ratios. For example, ROA might be included in the "opinion of the financial advisor" section of the merger proxy as a part of the advisor's overall analysis. I drop those observations. I can fully classify all 13,019 valuation ratios on the *valuation numerator*, *value-driver denominator*, and *comparison type* dimensions. However, there are 364 observations for which I cannot identify the denominator measurement period.

Finally, while the categories above define the main standardization scheme, I also code other indicator variables related to the denominator that transcend those categories, for various discussion points in the analysis. For example, I flag accounting metrics that are explicitly indicated as "adjusted" (whether adjusted earnings or adjusted EBITDA). And I re-bucket the denominator types into a binary categorization, *stock versus flow* measures. Flow measures are items that are determined over a period of time, such as income statement and cash flow items, including EBITDA, earnings, revenue, and certain industry-specific metrics (e.g., *Daily Production*). Stock measures are items that are measured at a point in time, such as balance sheet items, and include book equity, total assets, and certain industry-specific metrics (e.g., *proven reserves*).

Appendix B: Additional tables

Table 7 Accounting Value Driver x Measurement Period

	EBITDA	Net Income	Revenue	Book Equity	EBIT	Assets	Cash-flow metrics	Industry specific	Gross Profit	**Total**
Past Period	1776	1037	1383	443	471	109	46	62	11	5338
	(43.03)	(33.15)	(47.77)	(43.90)	(56.68)	(45.23)	(20.09)	(35.84)	(47.83)	(42.18)
Current Period	1274	1055	783	533	188	123	90	75	6	4127
	(30.87)	(33.73)	(27.05)	(52.82)	(22.62)	(51.04)	(39.30)	(43.35)	(26.09)	(32.61)
Future Period	1077	1036	729	33	172	9	93	36	6	3191
	(26.10)	(33.12)	(25.18)	(3.27)	(20.70)	(3.73)	(40.61)	(20.81)	(26.09)	(25.21)
Total	4127	3128	2895	1009	831	241	229	173	23	12656
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Table 8 Valuation Numerator x Set of "Comps" Type

	Enterprise Value	Equity Value	**Total**
Trading Comps	5066	3503	8569
	(65.36)	(66.50)	(65.82)
Transaction Comps	2685	1765	4450
	(34.64)	(33.50)	(34.18)
Total	7751	5268	13019
	(100.00)	(100.00)	(100.00)

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