The misvaluation / M&A-stock-payment fallacy[♦]

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Abstract: The academic finance community generally believes that cash-flow neutral accounting rules are not value relevant. We argue in this paper that accounting regulations allowing pooling accounting in the U.S. (which affected post-merger accounting treatment, but had no direct cash flow implications) erroneously led the academic finance community to argue that equity misvaluation was a fundamental driver of full stock payment in M&A transactions (Shleifer and Vishny 2003; Rhodes-Kropf, Robinson, and Vishwanathan, 2005), a widespread belief frequently taught in business schools. We document that when these regulations were abolished the relation between equity misvaluation and full stock payment in M&A deals disappeared.

Keywords: missvaluation, stock payment, mergers and acquisitions, pooling of interests

JEL codes: M41, G34

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1. Introduction

The notion that acquirers would like to use highly valued, or overvalued, shares as the method of payment in a merger or acquisition has a distinguished history in the academic finance literature and has become a widely-accepted result by both practitioners and academics alike. Shleifer and Vishny (2003) (hereafter: SV), introduce a behavioral theory of equity misvaluation and its use as an acquisition currency, while Rhodes-Kropf and Vishwanathan (2004) (hereafter: RV) show that we can ex-post observe misvalued acquirers paying in stock in acquisitions even in a model in which all parties are rational and have unbiased expectations (but bidders and targets have, potentially correlated, valuation errors).[1]

Rhodes-Kropf, Robinson, and Vishwanathan (2005) (hereafter: RRV) report empirical evidence supporting the RV misvaluation-based model.[2] RRV has had a considerable impact on the finance (and mergers and acquisitions, M&A) literature. Part of this impact is due to the introduction by RRV of a procedure to isolate the so-called misvaluation component of firm value, which has been widely applied in the finance literature since the publication of that paper. But the results in RRV relating misvaluation and the method of payment in M&A deals itself are now treated in the M&A literature as stylized facts, and widely taught to business students around the world.

In this paper we show that this well-known and widely-cited result is simply not robust. In particular, this connection between acquirer valuation and the use of stock as a method of payment does not hold in samples from after the end of RRV's sample period (i.e., after June 2001), in samples of data from countries other than the United States (U.S.), or even in specific subsamples from RRV's sample period.[3]

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[1] In the RV model, markets price securities correctly on average, but because there is a systematic component to the deviation from fundamental values (in addition to an idiosyncratic component), when one party mistakenly overstates their private value, they will make stock-financed offers that the target will be more likely to accept because of this correlated misvaluation component. We thank David Robinson for helping us to understand the intricacies of the SV and RV models, and the subtle differences between them.

[2] Dong, Hirshleifer, Richardson, and Teoh (2006) and Ang and Cheng (2006) offer substantially similar empirical evidence, without necessarily relying on fundamentals of the RV or SV models to motivate their tests.

[3] We are not alone in questioning the logic behind the RRV results. Recent contributions in the empirical M&A literature challenge the SV (behavioral) and RV (rational) theories of equity misvaluation and stock payment in M&A deals. In particular, Eckbo, et al. (2018) strongly reject the notion of bidder opportunism that lies behind the desire to use overvalued stock in an M&A deal. The authors argue that the more the target knows about the bidder,

The fragility of the RRV result makes us question the origin of this correlation between misvaluation and full stock payment reported by RRV. We start our investigation by replicating the results in RRV as closely as possible to be in position to investigate potential sources of misleading causal interpretation. As in RRV, we focus on full stock payment (100% stock-swaps), as this allows us to draw clean inferences about the relation between misvaluation and the choice of method of payment.[4] If the acquirer chooses to pay in stock because it considers its stock to be overvalued, the transaction is more profitable the more acquirer stock that is used as compensation for target shareholders. Therefore, under the misvaluation-based method of payment hypothesis, *full* stock payment should be observed in M&A deals.[5]

We are able to closely replicate the vast majority of RRV's descriptive statistics using data gathered for a sample period that closely matches theirs (1978 – 2001), and we then turn to the commonly-used RRV regression-based valuation decompositions. In those decompositions, we obtain similar R-squared and regression coefficients as RRV for most industry-level and firm-level analyses. Most importantly, in our replication of RRV over their sample period, our results confirm the presence of a correlation between broad (i.e., market-to-book) and firm-specific proxies for overvaluation and the propensity of a firm to participate in the M&A market, the propensity to participate as an acquirer, and, crucially in the present case, the propensity of an acquirer to use full stock payment. In all cases, the coefficients in our replication regressions are of the same sign and similar magnitude as reported in RRV, and the vast majority have the same level of statistical significance.

Next, we focus on M&A deals after June 2001. Using the same sample-selection criteria as in RRV, but for a sample period from July 2001 - 2017, we find that the proportion of M&A transactions

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the lower should be its propensity to accept overvalued stock as compensation in an M&A deal. Their test of this simple and intuitive prediction generates results incompatible with the misvaluation-based explanation of the use of stock as a method of payment. The authors also report results of an instrumental variable-based approach, again rejecting the misvaluation-based argument.

[4] See RRV Table 9, Panel C and p.590.

[5] Empirical evidence based on mixed payment usage (or the percent of stock in the method of payment, a continuous variable) are ambiguous and difficult to interpret because, under the misvaluation-based method of payment hypothesis, the use of a combination of stock and cash (or any other medium) implies the presence of some costs to the use of stock as a method of payment which are difficult to theoretically reconcile with the misvaluation hypothesis.

fully paid in stock drops sharply during the post-2001 period compared to the earlier sample period that RRV used (21.5% vs. 36.7%), a fact already reported in de Bodt, et al. (2018). The key insight that emerges from our analyses using data from the more recent sample period (July 2001 – 2017) is that, while we come to the same conclusion about the effect of overvaluation on a firm's participation in the M&A market and participation in the role of an acquirer, multivariate analyses of the probability of full stock payment reveal fundamentally different results than those reported in RRV. Specifically, in the more recent sample period, high market-to-book firms are actually *less* likely to use full stock payment to buy their target (conditional on making an offer to begin with) and the RRV misvaluation components either lose significance or flip sign explaining the method of payment.[6]

The contradictory results obtained for the determinants of full stock payment in acquisitions between the two sample periods (1980 – June 2001 vs. July 2001 – 2017) is striking. To assess the generalizability of these conflicting results, we turn to international evidence. We study the same sub-periods and report results for European countries (Austria, Belgium, Finland, France, Germany, Ireland, Italy, Norway, Portugal, Spain, Sweden, Switzerland, and the UK, as in Faccio and Masulis, 2005), for the UK alone, and for Australia. We find no evidence of statistically significant relations between acquirer firm-specific RRV misvaluation proxies (or broad market-to-book ratios) and use of full stock payment during the earlier period. Such relations are generally also insignificant during the July 2001 to December 2017 sample period, and the only significant coefficients we find during this latter period support a *negative* relation between the market-to-book ratio or the firm-specific misvaluation proxy (from RRV) and the use of full stock payment (i.e., the opposite of RRV's original findings). Once again, our results fail to support the misvaluation hypothesis.

The fact that the original RRV result does not appear to hold using post-2001 U.S. data or in international markets leads us to question what the U.S. after 2001 and those international markets have in common. One possibility is accounting regulation, as there was a dramatic change in such regulation

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[6] The negative relation between the probability of full stock payment and the market-to-book ratio that we report for the post-2001 period is consistent with the market-to-book ratio being a proxy for future growth opportunities (Martin, 1996; Faccio and Masulis, 2005), as acquirers anticipating a period of high growth could be more reluctant to share the benefits of such growth with a target firm.

in the U.S. in the middle of 2001. Furthermore, this change made the U.S. regulations for accounting for M&A deals much more similar to international rules than they previously had been. Before June 30th 2001, the "pooling of interests" method of accounting for stock-swap M&A transactions was allowed in the U.S. by the Accounting Principles Board under APB 16. APB 16 was released in 1970 and allowed two alternative methods of accounting for business combinations. Under the first, known as the "purchase" method, acquirers would account for an M&A deal by recording the difference between the acquisition price and the fair value of the target's net assets (assets minus liabilities) as goodwill on their balance sheet. Such goodwill would then be amortized by the acquiring corporation, reducing future earnings.[7] Under the second method, known as "pooling of interests" (hereafter: "pooling") qualifying acquirers could simply fuse the accounting statements of the acquiring and acquired firms.[8] The pooling method of accounting for acquisitions was disallowed by the Financial Accounting Standards Board (FASB) under FAS 141 effective at the end of June 2001.

The most important of the conditions to qualify for pooling accounting was paragraph 47-b in APB 16: *all of* the consideration paid to target shareholders had to be acquirer common stock (with rights identical to those of the majority of the acquirer's outstanding voting common stock) and the acquirer had to purchase at least 90% of the target's voting stock. This created artificial regulatory incentives promoting the use of stock as the exclusive method of payment in M&A deals (i.e., full stock swaps) between 1970 and the middle of 2001. It is important to note that these artificial regulatory incentives promoting the use of stock in M&A deals were in effect during practically the entire RRV sample period (1978 – 2001[9]) but were withdrawn very shortly after the end of that period. Furthermore, pooling accounting was either not an option for firms in the international markets described above

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[7] This amortization of goodwill was not tax-deductible, as the goodwill was classified by the taxation authorities in the U.S. as a self-created intangible. See https://www.law.cornell.edu/uscode/text/26/197.

[8] In APB 16 the FASB justified this method of acquisition accounting as a "fusion of equity interests," specifically rejecting the notion that the "acquisition price" (and hence goodwill) could be accurately measured in deals in which the target's shares were exchanged for 100% acquirer stock, i.e., full stock-swap M&A deals.

[9] Dong, Hirshleifer, Richardson, and Teoh (2006) and Ang and Cheng (2006) use data from basically this same sample period.

(Europe and Australia), or not frequently used in practice in those markets because the preconditions required for qualification were too restrictive.

Therefore, evidence from U.S. data from after the middle of 2001, and from countries other than the U.S. (for any sample period), allows us to observe the role of RRV misvaluation components isolated from any regulation-induced incentives to use a full stock swap to qualify for pooling accounting. We argue that these incentives cloud our ability to draw a causal connection between equity misvaluation and the method of payment using samples of M&A deals from a period during which pooling was allowed (i.e., the RRV sample period, which we also call the pooling period). As explained in Section 2 of this paper, despite the absence of direct cash-flow implications from these accounting choices, there are indeed compelling reasons (e.g., EPS bootstrapping and incentives driven by CEO compensation contracts) to believe that these artificial regulatory incentives specifically stimulated the use of stock as a method of payment by acquiring firms with highly or overvalued equity (either firm-specific, or more generally when equity markets appear broadly overvalued). The fact that qualification for pooling accounting required 100% stock payment suggests that the positive correlation between full stock payment and valuation ratios observed during the pooling period was conceivably driven by the willingness of acquirers to structure their acquisitions in such way that they qualified under the pre-2001 regulations allowing pooling accounting.

We develop three additional analyses to investigate whether our interpretation is plausible. In the first, using data from the pooling period, we discriminate between the following subsets of deals: paying fully or partially in cash (those deals had to be accounted for using purchase accounting), paying fully in stock *and* using pooling accounting, or paying fully in stock and using purchase accounting. Our results show that the firm-specific RRV misvaluation component is significant only in explaining the choice of full-stock payment *combined with pooling accounting*, but does not explain the choice of full-stock payment coupled with purchase accounting (which represents a little under half of the distribution of full-stock payment deals in the sample from the pooling period). This result again suggests that full stock payment was chosen by highly valued acquirers in order to qualify for pooling accounting prior to the accounting rule change in 2001.

In the second additional analysis, we revisit the probability with which a firm participates in the M&A market. Our results show that the M&A market participation decision is positively correlated with overvaluation during the pooling and the post-pooling periods, consistent with the evidence in RRV. But if full stock payment was (at least partially) motivated by qualifying for pooling accounting during the pooling period and if this incentive was stronger for highly valued acquirers, we should observe that the relation between M&A market participation and valuation weakens during the post-pooling period.[10] We explicitly test this prediction and find that, indeed, the probability with which a firm enters the M&A market is significantly more positively correlated with that firm's market-to-book ratio and RRV firm-specific misvaluation component in the pooling period compared to the post-pooling period. In other words, the relation between firm overvaluation and participation in the M&A market (i.e., Table 9, Panel A in RRV) is significantly weakened following the substantial change in accounting regulations in the middle of 2001.

In the third investigation, we add to the RRV specification the *target's* misvaluation components (measured in an identical fashion to the acquirer's). Target shareholders have to agree to accept full stock payment for the transaction to qualify for pooling, and a full stock swap between acquirer and target is predicated on an exchange ratio (for the conversion of target stock to acquirer shares) that depends on both the acquirer and the target valuation levels. If these valuations are correlated, the absence of the target valuation ratios from the regression specification acts as an omitted endogenous variable, potentially leading to inconsistent estimates of coefficients of interest (the acquirer misvaluation ratios). For the sub-sample of transactions for which we are able to compute the target RRV misvaluation components, our baseline results are confirmed. Interestingly, the coefficients on the target valuation ratios parallel the coefficients on the acquirer measures of valuation in sign and statistical significance. This makes sense because it would have been surprising if acquirers, absent the strong incentives provided by the availability of pooling accounting, displayed a preference for allowing highly (or over) valued target shares to be converted (at a premium) into stock in their own company.

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[10] We thank François Degeorge for this suggestion.

The principal conclusion from our analyses is that the widely-accepted positive relation between equity overvaluation and the use of full stock-swaps as the method of payment in M&A deals is extremely fragile and appears to us to be an artifact of an accounting regulatory regime in the U.S. (allowing the use of pooling accounting) which no longer exists. The most impactful conclusions in this paper are that the RRV results disappear when we focus on M&A deals in the post-pooling period (i.e., July 2001 onwards) or M&A deals from countries in which pooling was never a viable alternative: Outside of the specific regulatory regime in the U.S. that allowed pooling from 1970 to the middle of 2001, we do not generally observe *any* (positive or negative) statistically significant relation between acquirer equity misvaluation and full stock payment in M&A deals. This identification of pooling accounting regulations as a confounding factor polluting the RRV results is the key contribution of our work. It represents a prominent illustration of the real effects of changes in accounting regulations even in the absence of direct cash-flow implications. The widespread claim that acquirers were in position to fool targets by paying for M&A deals with overvalued stocks, regularly put forward to support behavioral theories, appears to be based on misleading causal inference.

This paper proceeds as follows. Section 2 introduces our arguments about the relation between pooling and overvaluation. Section 3 describes our data sources and provides descriptive statistics. Section 4 contains our main empirical results, updating the RRV tests for the post-pooling period and introducing new international evidence, and in Section 5 we report additional results. Section 6 concludes.

2. Purchase versus pooling of interests in M&A accounting

The central theme of this paper is that the disappearance of the relation between acquirer overvaluation and full stock payment after June 2001 can be explained by highly-valued acquirers choosing stock as their sole method of payment in M&A deals in order to qualify for pooling accounting up to June 2001. This claim may appear surprising, at least to financial economists, because opting for pooling of interests or purchase to account for an M&A transaction does *not* have direct cash-flow implications. In this

section, we discuss the attributes and consequences of this M&A accounting choice and rationalize why we expect that pooling accounting was the more popular option for highly-valued acquirers.

2.1. The consequences of purchase accounting

If an acquirer qualified for pooling accounting pre-2001, the post-acquisition accounting impact of an M&A deal on the acquirer was relatively modest: the accounting statements of the acquirer and target were simply "fused" together going forward (as if the two firms had never existed separately). Under the alternative to pooling, called purchase accounting (which the acquirer had to use if they did not qualify for pooling), the impact on the acquirer was considerably more substantial. Two effects potentially adversely affected the post-acquisition accounting statements of the acquirer: (i) As a result of a merger, the target's assets had to be written up to their "fair value." In most settings, such a revaluation would result in an increase in the value of the target's total assets. These additional assets would bloat the acquirer's balance sheet, potentially adversely affecting asset-based ratios such as return on assets (ROA); and (ii) As a result of a merger, the difference between the price paid to acquire the target and the "fair value" of the target's assets had to be accounted for as goodwill, and, under accounting regulations in effect prior to July 2001, that goodwill had to be amortized on a regular schedule.[11] Such amortization of goodwill would depress the earnings of the newly merged firm (and, notably, have no offsetting positive tax consequences, since such amortization did not qualify as a tax deduction), and weaken ratios such as EPS or P/E (which led to the term "dilutive" to describe some acquisitions).

These costs associated with the purchase method gave acquirers a strong incentive to qualify for the pooling method of accounting. An interesting example of this motivation is AT&T's acquisition of NCR in 1991. Lys and Vincent (1995) report that AT&T agreed to pay as much as US$500 million over what would otherwise have been required by NCR's shareholders, simply to convince the target's shareholders to accept a full stock-swap so that the acquirer (AT&T) could qualify for pooling accounting treatment. Furthermore, this choice boosted AT&T's EPS by 17% ceteris paribus but had

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[11] This amortization, originally mandated by APB 17 in 1970, was described as "arbitrary" by the FASB in 2001, and replaced in FAS 142 by an annual test for impairment.

absolutely no effect on the fundamental future cash flows from the acquisition. In other words, AT&T appears to have paid a substantial amount of their shareholder's wealth in order to benefit from a cosmetic accounting treatment (pooling) that boosted EPS but had no tangible consequences for the cash flows accruing to their shareholders. Another case reported in Aboody, et al. (2000) demonstrates the potential magnitude of the impact from purchase accounting: the Walt Disney-Capital Cities/ABC merger in 1995 resulted in a US$16 billion asset write-up, adversely affecting Disney's post-1995 net income by more than US$400 million per year (see Aboody et al., 2000, footnote 2).

2.2. The correlation between acquirer and target valuations

Given that most of the costs associated with the purchase accounting were related to the valuation of the *target*, the believability of our thesis in this paper depends, therefore, on the credibility of the idea that highly valued *acquirers* had stronger incentives (than fairly- or under-valued acquirers) to qualify for pooling.

One possible explanation for the relation between acquirer overvaluation and the desire to use the pooling method of accounting prior to July 2001 is that the acquirer's valuation ratio proxied for the general level of valuation in the stock market. In other words, acquirer overvaluation in the RRV results proxies for generally high valuations of firms in the U.S. (note that most of the pooling transactions in our sample occurred in the mid-to-late 1990s: see Table 1). When market valuation ratios are generally high, the price paid to acquire a target would be high, exacerbating almost all of the accounting impacts from purchase accounting described above.[12] On the other hand, the acquirer could avoid these costs by paying for the target completely with acquirer stock and accounting for the transaction using pooling accounting. Therefore, the effect of correlated valuations implies a positive correlation between valuation ratios and full stock payment in M&A deals during the pooling period (1970 – June 2001), because when valuations were generally high, qualifying for pooling enabled the acquirer to avoid the creation of egregious amounts of goodwill and the associated earnings-reducing amortization. Note that the original RRV regressions concerning the method of payment (which we replicate) do *not* contain

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[12] Also see, for example, Fu, Lin, and Officer (2013), Table 5.

target-firm valuation ratios, thus it is entirely plausible that the acquirer-firm valuation metrics in those empirical models simply proxy for generally high valuation multiples.[13]

2.3. Earnings per share (EPS) bootstrapping

Another possible explanation for the relation between acquirer overvaluation and the use of pooling is EPS bootstrapping. If an overvalued acquiring firm uses a stock-swap to buy a target firm that has a lower valuation multiple, the acquiring firm is essentially exchanging higher-priced shares for lower-priced shares. As a result of the acquisition, the number of shares outstanding in the acquiring firm will increase but by less than the total number of shares outstanding in the target because of the discrepancy in valuation multiples, assuming that the acquirer does not pay too high of a premium. When EPS is computed for the combined firm, therefore, the numerator (total earnings) will be the sum of the earnings of the acquirer and target (assuming no synergies), but the denominator (total shares outstanding) is less than the sum of the shares outstanding of the acquirer and target. The result, therefore, is a higher reported EPS ("bootstrapping"). Furthermore, this effect occurs if the price-to-earnings ratio of the acquirer (PER_A) is higher than the price-to-earnings ratio of the target (PER_T).

To see this, let A denote the acquirer, T the target, E_i earnings for firm $i \in \{A, T\}$, NS_i the number of shares for firm $i \in \{A, T\}$, and P_i the price of the shares in firm $i \in \{A, T\}$. In the case of full stock payment, after the merger the earnings and number of shares of the merged entity are respectively:

$$E_{A+T} = E_A + E_T \tag{1}$$

$$NS_{A+T} = NS_A + NS_T \times \frac{P_T}{P_A} = NS_A \times \left(1 + \frac{(NS_T \times P_T)}{(NS_A \times P_A)}\right), \tag{2}$$

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[13] In Table 8 we report the results of regressions that are otherwise identical to those reported by RRV but that *include* target-firm valuation measures.

where (1) assumes that there are no real synergies in the merger, and (2) assumes that the exchange ratio is equal to the ratio of stock prices of the two merging firms. For EPS bootstrapping to take place, it must be that $EPS_{A+T} > EPS_A$. Substituting Eq. (1) and (2), we obtain:

$$\frac{E_A + E_T}{NS_A \times \left(1 + \frac{(NS_T \times P_T)}{(NS_A \times P_A)}\right)} > \frac{E_A}{(NS_A \times P_A)} \tag{3}$$

After simplification, we obtain:

$$\frac{(NS_A \times P_A)}{E_A} > \frac{(NS_T \times P_T)}{E_T} \text{ or } PER_A > PER_T \tag{4}$$

The relation with pooling comes about because the bootstrapping effect assumes that the earnings of the combined firm is the sum of the earnings of the acquirer and the target (Eq. 1). Absent real synergies generated by the merger, this implies that no accounting goodwill has been recorded and, therefore, that there is no need for goodwill amortization associated with the acquisition. On the other hand, if the acquisition had been accounted for under the purchase method in effect between 1970 and June 2001, goodwill would likely have been recorded on the acquirer's balance sheet and said goodwill would need to be amortized in future years, reducing accounting earnings and dampening the "bootstrapping" effect.

As a complementary analysis, Figure 1 reports simulations results connecting acquirer valuation levels, acquirer to target relative valuations, and the EPS bootstrapping effect. The simulation procedure and parameters are described in Appendix 1. Panel A focuses on low-valuation acquirers (market-to-book equal to 1.1), while Panel B concentrates on high-valuation acquirers (market-to-book equal to 1.9). In both panels, the horizontal axis is the target to acquirer relative valuation ratio (target market-to-book ratio divided by the acquirer market-to-book ratio) and the vertical axis measures the EPS ratio. We identify the acquirer EPS ratio in the absence of merger (a horizontal line, as this doesn't depend on

the target valuation by construction), the EPS ratio of the merged entity under purchase accounting, and the EPS ratio of the merged entity under pooling accounting. Payment consideration is full stock in all cases. Clear conclusions emerge here also: (i) for low valuation bidders, no EPS bootstrapping is possible, regardless of whether the transaction is accounted for using purchase or pooling; (ii) for high valuation bidders, EPS bootstrapping is possible and potentially economically significant; and (iii) with no real synergies, the merged firm's EPS is always higher under pooling compared to purchase accounting (because of goodwill amortization in the latter).

Simply put, for high-valuation acquirers (especially those with higher valuation ratios than their target's), EPS bootstrapping worked best in M&A deals prior to July 2001 if the acquirer could qualify for pooling accounting (as AT&T did in their acquisition of NCR). Therefore, most highly valued (and possibly overvalued) acquirers had the incentive prior to July 2001 to structure their M&A deals as stock swaps in order to qualify for pooling and enjoy the greatest EPS bootstrapping benefits. In fact, there were CEOs of highly-valued acquiring firms in the mid-to-late 1990s who publicly stated that qualifying for pooling was a precondition for them to even consider an acquisition. For example, Barry Diller stated in 1997 that "We will not do any deals without pooling of interests accounting."[14]

Note finally that we do not claim that EPS bootstrapping is the reason *why* acquirers do deals. In the late 1990s, for example, it may have been that acquirers first decided to buy a target, then chose a method of payment such that the acquiring firm could qualify for pooling (and therefore get the maximum benefit from the EPS bootstrapping effect). This possibility does not, however, affect the main conclusion from this EPS bootstrapping argument: the availability of the pooling method of accounting drove a positive correlation between high acquirer valuation and full stock-swaps in M&A deals prior to 2001, because the choice of a full stock-swap allowed the acquirer to enjoy the maximum EPS-accretive benefits from their high valuation ratio.

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[14] See Reda (1999). The firm that Mr. Diller ran at that time, USA Networks, had a P/E multiple well in excess of 400 at the close of the 1997 fiscal year.

2.4. Managers' preferences induced by executive compensation

Purchase accounting has no direct cash-flow implications, if for no other reason than the amortization of goodwill does not produce a tax credit. We may, therefore, wonder why firms care about this issue. This is discussed at length in Aboody, et al. (2000). The authors study a sample of 687 full-stock payment acquisitions of public companies occurring between 1991 and 1997, hand-collecting compensation and share ownership data from acquiring firms' proxy statements. They report several important results: (i) in acquisitions with large write-ups of target assets, CEOs with earnings-based compensation are more likely to choose the pooling method of accounting. In the authors' own words, "… this finding reflects the notion that earnings-based bonus plans are often based on mechanical formulas that are not modified to compensate managers for the earnings penalty associated with the purchase method." (Aboody, et al., 2000, p. 263); (ii) managers' preference for pooling decreases with the costs associated with the conditions that must be met to quality for pooling, in particular restrictions on stock repurchase activity and/or divestiture of the target company's assets (when these requirements are potentially binding for the acquirer); (iii) the likelihood of observing an acquirer choosing pooling increases with the size of the gap between the acquisition price and the target firm's book value of equity, a result supporting the desire to avoid large goodwill charges and the subsequent amortization (which was mandatory before mid-2001).

de Bodt, et al. (2018) also report results supporting the importance of CEO compensation in explaining the choice of accounting method in M&A transactions. Studying a sample of 1,146 acquisitions over the period 1990 to 2014 and using CEO compensation data collected from Execucomp, the authors find that the probability of full-stock payment as a function of the percentage of acquiring-firm CEO variable compensation decreases significantly in the post-pooling period (relative to the pre-pooling period). This is consistent with acquiring-firm CEOs' preferring full-stock payment for their targets during the pooling period because of compensation-related CEO incentives. Moreover, the authors show that this result holds in particular for high ROA and high market-to-book acquirers, an additional result which supports the notion that CEO incentives were in particularly important in the choice of accounting method for well-performing and highly-valued acquirers. Another recent

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contribution mentioning the importance of CEO incentives is Li, et al. (2018). The authors use the abolishment of pooling of interests (as of July 1, 2001) as an exogenous shock to the probability with which firms use full-stock payment in acquisitions, in order to identify the causal effect of shareholder voting on deal quality. Their identification strategy rests on the clear preference of CEOs for pooling of interests during the U.S. accounting regime when pooling was an available accounting choice.

2.5. M&A accounting in international markets

Some of the important control tests in this paper involve studying whether we can observe a relation between equity misvaluation and the choice of stock as a method of payment in acquisitions in other countries around the world. To that end, it behooves us to establish that pooling was not a viable acquisition accounting choice in those countries, otherwise those tests could not serve as a robustness test for our results based on U.S. data (with and without the availability of pooling).

Li and Meeks (2016) study the accounting treatment of business combinations for the U.K., the U.S., and countries under the auspices of the International Accounting Standards Board or Committee (I.A.S.B. / I.A.S.C.[15]) from 1943 to 2005 (see Li and Meeks, 2016, Table 1). For each year, the authors report whether pooling of interests was viable in the given country (or under the given accounting standard) and whether it was compulsory or optional. The authors also report the criteria the acquirer had to meet to be eligible for pooling. Over the years, the global picture reflects a narrowing of options available to acquirers, with a convergence towards mandatory recognition of purchased goodwill associated with a formal process of impairment schemes in place of mandatory amortization.

Amel-Zadeh, et al. (2016) complement this historical analysis of accounting practices for M&A by describing whether for the U.K., the U.S. and the so-called international territories (those countries which adopt rules formulated by the I.A.S.B. or I.A.S.C.) pooling was a commonly-available accounting option in the 1975 to 2006 period (see Amel-Zadeh, et al., 2016, Table 1). For the U.K., pooling of interests is classified as optional from 1975 to 1993, becomes an uncommon option between 1994 and 1999, and purchase accounting becomes mandatory in the U.K. from 2005 (purchase accounting is

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[15] The I.A.S.B. succeeded the I.A.S.C. in April 2001.

optional from 1975 to 2004 but the status of pooling between 2000 and 2004 is not reported). Concerning the international territories, pooling is optional up to 1992 and becomes uncommon from 1993 to 1999. Purchase accounting is mandatory from 2005 and the status of pooling is again unreported between 2000 to 2004.

Figures collected in the Securities Data Corporation (SDC) database are consistent with these claims. Over the period from the 1992 (when pooling became an uncommon accounting choice in the international territories) to end of June 2001 (the end of pooling in the U.S.)[16], SDC reports 3,177 M&A transactions accounted for under pooling in the U.S., 10 in the U.K., 32 across Austria, Belgium, Finland, France, Germany, Ireland, Italy, Norway, Portugal, Spain, Sweden and Switzerland (the set of European countries that we study in Section 4) and none in Australia. According to these statistics, pooling of interests was clearly an infrequent accounting choice outside of the U.S. (especially after the early 1990s).

3. Data and descriptive statistics

RRV collect a sample of 4,325 bids for 4,025 target firms over the period 1978 to 2001 from the Securities Data Corporation (SDC) database of mergers and acquisitions. RRV use the following sample selection criteria: (1) Acquirer and target are both public firms (according to SDC); (2) Necessary information about the acquirer and target are available in both the Center for Research in Securities Prices (CRSP) and Compustat databases (see Appendix 2); and (3) Both firms are required to have non-zero total assets, book-to-market below 100, and market value of equity greater than US$10 million, and both successful and unsuccessful bids are included in RRV's sample.

Applying these criteria (some 15 years later) to the same data sources over the same period, we obtain 4,080 announced M&A bids over the period 1978 to 2001 between listed acquirers and targets. The difference between RRV's sample and ours (using exactly the same sampling criteria and data sources) is due to changes in the SDC database itself through time[17] and the lack of an available CRSP

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[16] Another reason to report numbers from 1992 onwards is because of data quality concerns about SDC's data on the choice of accounting method in M&A transactions during the 1980s, as explained in Section 3.
[17] The SDC database is known to change over time due to back-filling of data (Bollaert and Delanghe, 2015).

permanent number for the listed target firm. Table 1, Panel A documents the number of M&A deals and average deal size per year in the RRV sample and our sample. The well-known M&A waves are present in both cases. Despite our best efforts, however, there are some differences between the RRV sample and our replication sample. In particular, the average transaction size in our sample is smaller (US$550 million versus US$839 million in the RRV sample) and 1,307 have a method of payment that is completely in acquirer stock in our replication sample versus 1,218 in the RRV sample (and our sample consequently has fewer all-cash bids).

Insert Table 1 about here

In Table 1, Panel B we report the percentage of full-stock deals by year of announcement in our sample, and the proportion of these full-stock deals accounted for using the pooling and purchase methods. According to SDC data there were no pooling transactions in any year up to 1988, except for 1981 (the year in which all of the 71 transactions in our sample are recorded as accounted for under pooling). This seems quite dubious given that pooling had been allowed by the (precursor to the) FASB since 1970. This questions whether SDC data presents an accurate record of the accounting method choice during that time period (and whether the accounting method reported for those transactions in 1981 is simply a data error). We decide, therefore, to undertake a significant data validation effort. As our data source to obtain quarterly financial reports (10-Q's filed with the securities and Exchange Commission (SEC)) is the SEC Edgar database, we are limited to the 1993 to 2001 period. For each transaction, we collect the target's 10-Q for the three quarters following the announcement date. We then search for the presence of words "pooling of interests" in those filings. This leads us to reclassify 43 transactions in our sample as accounted for under pooling while reported by SDC as accounted for under purchase accounting. This reclassified data is reflected in the percentages reported in Panel B of Table 1 between 1993 and 2001.

In another setting in which data validation is clearly required, three transactions are announced in 2002 and recorded in SDC as being accounted for under pooling (7.7% of the subsample of the 100% stock deals in that year), despite the fact that pooling accounting had been abolished by that point in U.S. capital market history. These transactions are the acquisitions of Kerman State Bank by Westamerica Bancorp (announced on 02/26/2002), Massachusetts Fincorp Inc by Abington Bancorp (announced on 04/10/2002), and Franklin Financial Corp by Fifth Third Bancorp (announced on 07/23/2002). In the first case, the corresponding SEC filings mention that the transaction will be accounted for under purchase accounting. In the second case, the SEC filings report that the payment is 60% stock and 40% cash consideration, which is incompatible with accounting for the transaction under pooling even when pooling was an allowable accounting choice (i.e., before June 2001). And in the third case, we found no mention of pooling of interests in the SEC filings associated with the transaction. These three cases appear therefore to be data errors in the SDC database, and we correct these data (but leave the erroneous percentage in Panel B of Table 1 for the 2002 year).

Figure 2 focuses on the year 2001 and displays the percentage of full-stock deals per half year during the year in which pooling accounting was abolished in the U.S. The sharp drop in the frequency of announced full-stock deals from the first half of the year to the second half of the year is clearly apparent. This corresponds to the enactment of FAS 141, abolishing the use of pooling to account for M&A transactions.

Insert Figure 2 about here

We next use the matching procedure described in RRV to merge data from SDC, CRSP, and Compustat, applying the following rules (which are exactly the same as those described by RRV): (1) To calculate the market-to-book ratio, we match fiscal year-end data from Compustat with CRSP market values measured three months afterward; (2) We associate CRSP and Compustat data with an announced bid from SDC if the bid announcement occurs at least one month after the date on which the CRSP

market value is observed; and (3) If an M&A bid announcement occurs between the fiscal year-end and one month after the date on which the CRSP market value is observed, we match the M&A transaction with data from the prior fiscal year.

Using this matching procedure, we collect financial data on acquirers to compute size, performance, and leverage ratios. Table 2 reports descriptive statistics on these acquirer characteristics, with a comparison between the RRV sample and our replication sample. Variable definitions are provided in Appendix 2: we follow RRV in computing the market-to-book ratio, and specifically use book equity as the denominator (as do RRV).[18] Our replication sample includes smaller acquirers (US$16,254 million average market value of assets versus US$18,487 million average in the RRV sample, with a similar conclusion using book value of assets, market value of equity, property, plant, and equipment (PP&E), long-term debt, capital expenditure, and net income). Our acquirers display also lower operating performance (return on assets of 2.8% versus 5.2% in the RRV sample and return on equity of 7.8% versus 15.2% in the RRV sample) but, importantly, a similar market-to-book ratio (3.55 versus 3.43 in the RRV sample). Finally, we observe that acquirers in our sample (vs. RRV's sample) are more levered, with an average book leverage ratio of 0.65 versus 0.59 and an average market leverage ratio of 0.50 versus 0.44, but display similar quick and current ratios.

In Table 2 we also provide a comparison of acquirer characteristics between the pooling and post-pooling periods (see columns (4) and (5)), using our RRV replication sample for the pooling period. For the post-pooling period, we collect a sample of acquisition bids in the July 2001 to 2017 window using the RRV sample selection criteria described above. This results in a sample of 2,080 acquisition bids announced between July 2001 and 2017.[19] In the remainder of this paper we will refer to this sample as the post-pooling sample. Note that this sample overlaps with the RRV sample for only six months, between July 2001 and December 2001.

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[18] This will be important when comparing our results to other references. For example, Faccio and Masulis (2005) and Martin (1996) both use total assets as the denominator and (a proxy for) the market value of asset as the numerator in their measure of Tobin's Q.

[19] 100 of the 236 deals announced in 2001 occur in the six months after the abolishment of pooling at the end of June of that year. Therefore, the post-pooling sample size described here starting in July 2001 (2,080) is different than the deal count reported in Table 1 for the post-pooling period (1,980) because Table 1 reports annual observations and starts the post-pooling period with 2002.

Insert Table 2 about here

It appears that during the post-pooling period, acquirers in the sample described above are significantly larger, with an average market value of assets of US$46,846 million versus US$16,253 million during the pooling period. We reach a similar conclusion using the other size measures. Acquirers in the post-pooling sample also display weaker operating performance (with a return of assets of 1.8% versus 2.8% during the pooling period and return on equity of 5.8% versus 7.8%) and lower valuation ratios (with a market-to-book of 3.3 versus 3.5 during the pooling period). The financial structure of acquirers during the pooling and post-pooling periods appears more similar, except for the quick ratio which increases by more than 10% (from around 2 during the pooling period to 2.2 during the post-pooling period).

As (economically[20]) significant differences exist between the original RRV sample and our replication sample, we will start our investigation by reproducing the RRV multivariate analyses using our replication sample to check whether these differences in sample composition prevent us from reaching the same conclusions as in RRV. We reproduce the market-to-book decomposition from RRV (see Section 4 of their paper), and present descriptive statistics for the decomposition (using RRV's Model III) in Appendix 3. We also replicate Table 6 from RRV (decomposition of the market-to-book ratio at the firm level) in Appendix 4. These descriptive statistics are based on our RRV replication sample plus a control sample of non-merger firms, collected using the same criteria as in RRV. Specifically, as in RRV, a firm-year from Compustat is labeled as an "M&A" observation if the firm was involved in an M&A deal as either the acquirer or target (according to SDC data) in the specific year; all other firm-year observations from Compustat are then categorized as "non M&A."

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[20] Note that since we do not have the original RRV sample at our disposal, we are not in position to test the statistical significance of differences highlighted in Table 2.

As in RRV, in our replication sample (from the pooling period), merger firms display higher market-to-book than non-merger firms and acquirers display higher market-to-book than target firms. These results (which are entirely from the pooling period) are almost completely consistent with the results from Model III in Table 6 in RRV.

4. Firm valuation, merger participation, firm role, and full stock payment

4.1. Replication of the Rhodes-Kropf, Robinson, and Viswanathan (2005) results

In Table 3, we use our replication sample to reproduce the firm-level merger participation (Table 9, Panel A in RRV), role (Table 9, Panel B in RRV), and method of payment choice (Table 9, Panel C in RRV) multivariate analyses. Specifically, in Panel A we use the joint sample of merger and non-merger firm-years (described above) to examine whether the decision to be involved in a deal is a function of the valuation components as decomposed by RRV. The dependent variable in this regression is an indicator variable equal to one if a firm is involved in a merger either as acquirer or target, and zero otherwise. In Panels B and C, we focus on the sample of merging firms only, and examine whether valuation affects the decision to be an acquirer rather than a target (Panel B: the dependent variable is an indicator equal to one if the firm involved is an acquirer, and zero otherwise (i.e., if it is a target)) and the choice of method of payment (Panel C: the dependent variable is an indicator equal to one if the method of payment in the deal is a 100% stock swap, and zero otherwise). In Panel C the valuation metrics (i.e., the independent variables) are for the *acquirer*, as they are in RRV's Table 9. All these panels replicate RRV's original specifications (Table 9 in RRV), and we also present their coefficient estimates to ease comparability.

We present results for the baseline specification, using a probit model and that includes only the (log) market-to-book ratio as the sole independent variable, and the Model III specification from RRV (which includes their most developed definition of the firm-specific error, the time-series sector error, and the long-run value-to-book as independent variables). Estimates are presented in our Table 3 for

pooled models with year fixed-effects (as in Table 9 of RRV). Our results confirm those in RRV for the sample drawn from the pooling period. Specifically, in Panel A of Table 3 firms are more likely to participate in the M&A market when their market-to-book ratio is high, and firm-specific valuation errors have a positive and statistically significant effect on the propensity to participate to the M&A market.

Insert Table 3 about here

In Panel B we find (as do RRV) that firms are much more likely to be an acquirer rather than a target when they have a high market-to-book ratio or high firm-specific valuation error, conditional on participating in the M&A market to begin with. Crucially in the present case, in Panel C we confirm that in our RRV replication sample highly-valued firms (whether using the book-to-market or the firm-specific valuation error identified in the RRV model) are significantly more likely to pay for an acquisition completely in stock than with cash or a mixed method of payment. We note that our coefficient estimates and significance levels are of about the same magnitude as those in RRV (if not a little higher).

We conclude from these validity checks that, despite some differences in size and composition, our replication sample provides an adequate empirical basis to replicate RRV's results during the 1978 to 2001 period.[21,22]

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[21] One possibility, which we explore in Internet Appendix Table 1, is that acquirers chose the pooling method of accounting in the period before June, 2001, to mask "bad" deals on average. We examine post-merger accounting returns (ROA) in regressions similar to those in Table 7 in Harford, Humphery-Jenner, and Powell (2012). We find that for transactions in the period where pooling was allowed in the U.S., those accounted for using the pooling method of accounting exhibit abnormally high post-deal ROA while those accounted for with the purchase method do not. This is (at least) prima facie evidence that the acquirer's choice of accounting method (and, hence, method of payment) was not influenced by fundamental deal quality. Admittedly, however, we cannot observe the counterfactual: how acquirers during that period would have performed (in terms of post-deal ROA) had their deals been accounted for using purchase rather than pooling.

[22] In Section 3, we highlight potential data errors in the SDC database related to identification of transactions accounted for under pooling and discuss our hand-collected data validation from 1993 onwards. We check whether our results are affected by pre-1993 classification issues by re-estimating Table 3 specifications on the validated sample starting with the 1993 sample year. We obtain similar results (see Internet Appendix 2).

4.2. Post-pooling period evidence

Does the relation between overvaluation and full-stock payment persist in the post-pooling period or was it a transitory anomaly? There are good reasons to believe that the dynamics of the method-of-payment choice changed dramatically right after the RRV sample period ends: pooling accounting (qualification for which was a major motivation to use stock as the method of payment) was abolished by the FASB in June 2001. Section 2 above describes in detail some plausible explanations for why the overvaluation versus stock-payment relation may be very different in the absence of the availability of pooling accounting.

In Table 4, we use our post-pooling sample (all acquisitions are announced from July 2001 to December 2017) to reexamine the results from RRV in light of this dramatic change in regulation right after the end of the sample period in the original RRV paper. The structure of the panels in Table 4 is similar to that in Table 3 above (and also Table 9 in RRV): Panel A examines participation in the M&A market, Panel B looks at whether that participation is in the role of an acquirer or target, and Panel C presents results for regressions explaining the method of payment choice. As in Table 3, we present results for the baseline specification which includes only the (log) market-to-book ratio as the sole independent variable and the Model III specification from RRV (which includes the firm-specific error, the time-series sector error, and the long-run value-to-book as independent variables).

In Panels A and B of Table 4, we report the results from multivariate analyses of the decision to participate to the M&A market (Panel A) and the decision to participate as an acquirer (Panel B). The results concerning the market-to-book and the firm-specific RRV misvaluation component in Panels A and B are qualitatively similar to those reported in RRV, the sign of our coefficients are the same and the statistical significance levels are close to those in the original RRV analysis.[23] Given these results, we reach the same conclusion as RRV using multivariate analyses about the effect of broad and firm-

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[23] There is one exception to this. In our analysis of whether a firm participates in the M&A market (Panel A), the market-to-book coefficient is positive and significant even when we include year fixed-effects (Panel A – Column 2) while statistical significance disappears in RRV's Table 9 with the inclusion of year fixed-effects.

specific misvaluation components on the probability of a firm becoming involved in acquisitions and as an acquirer: after the abolishment of pooling (as it was before 2001), higher market-to-book and higher firm-specific misvaluation increases the probability with which a firm engages in an M&A deal as an acquirer. Simply put, highly- (or over-) valued firms are more likely than other firms to attempt to buy another firm, as discussed in the original RRV paper.

Insert Table 4 about here

Where we diverge from RRV, however, is in the effect of valuation on the choice of method of payment. Panel C in Table 4 contains the results of regressions where the dependent variable is indicator equal to one if the method of payment in an announced M&A deal is a 100% stock swap of the acquirer's shares for the target's, and zero otherwise (cash and mixed method of payment). As in Panel C in Table 3, the independent variables (measures of valuation) are for the acquirer. As can be seen in the table, in the post-pooling period the acquirer's raw (log) market-to-book ratio does *not* positively predict full-stock payment in M&A deals as it did in RRV's analysis based solely in the pooling period. In fact, the coefficient on this variable is significantly *negative*, implying that highly-valued acquirers are *less* likely to use their own equity as the method of payment in an M&A deal. This result is consistent with the market-to-book ratio being a proxy for future growth opportunities (as argued in Martin, 1996 and Faccio and Masulis, 2005), as acquirers anticipating a period of high growth should be more reluctant to share benefits of this growth with the target shareholders.

When we turn our attention to the components of the RRV decomposition in columns (3) and (4), we again find no support for the contention that highly- (or over-) valued acquirers are more likely to offer their target a full stock swap. Contrary to the strongly positive coefficient on the firm-specific error component of valuation (m_f_RRV) that RRV report for the pooling period, in our analysis of M&A deals focused solely on the post-pooling period the coefficient on the firm-specific error component of valuation is statistically insignificant. Reflecting the fact that the negative coefficient on

the market-to-book ratio in columns (1) and (2) must be driven by one of these components of valuation, the third RRV misvaluation components (*m_b_RRV*) has a significantly *negative* coefficient in Panel C of Table 4 (as opposed to the large and significantly positive coefficients reported in the original pooling-period results reported by RRV).

What this implies is that the link between acquirer equity overvaluation and the use of full stock payment is broken by the change in regulation that prohibited the use of pooling accounting in acquisitions. This link, which is very strong in the RRV paper and has become widely accepted in the academic finance profession, appears to be a transitory anomaly: it simply doesn't exist in analyses using data solely from the post-pooling period.

4.3. International evidence

Another empirical strategy to investigate whether pooling is the factor driving the apparent relation between the RRV misvaluation components and the decision to pay fully in stock is to replicate the RRV regressions but for a sample drawn from countries that either did not allow pooling at all or did so with such restrictive conditions that, in practice, accounting under pooling was not used. We first select the same sample of European countries as in Faccio and Masulis (2005): Austria, Belgium, Finland, France, Germany, Ireland, Italy, Norway, Portugal, Spain, Sweden, Switzerland, and the UK. We next focus on Australia. Our data sources are the SDC database for M&A transactions and Worldscope for accounting and financial information. Amel-Zadeh, et al. (2016) report that pooling accounting was not commonly used in these countries, a fact confirmed by data collected from SDC (see the discussion in Section 2.5.).

Testing whether misvaluation was driving the probability of full-stock payment in other countries outside the U.S. only makes sense if stock market valuation levels undergo significant variations through time in these countries as they did in the U.S. Figure 3 displays the evolution of the equally-weighted average market-to-book ratio from 1980 to 2016 for the U.S., the U.K., our set of European Union (E.U.) countries and Australia. For each country, we collect market values and book

values of equity for all firms in the Worldscope database. Figure 3 confirms that time-series fluctuations of valuation levels in these foreign countries are comparable to those observed in the U.S. Moreover, the correlations between these curves are striking (and confirmed by simple pairwise correlation coefficients that are around 0.6 or above in all cases, except between Australia and the U.S. for which the correlation coefficient is 0.21).

Insert Figure 3 about here

We report coefficients from regressions like those in RRV explaining the probability of full-stock payment for the period from 1990 (due to data availability) to the end of June 2001 (despite the fact that the regulatory change in question in this paper did not affect firms from those countries, as it was a change in accounting policy in the U.S.) and also from July 2001 to the end of 2017. The coefficients from these regressions are reported in Table 5, and Table 5 is organized the same way as Panel C in Tables 3 or 4. Columns 1 to 4 contain results for the E.U. countries, columns 5 to 8 for the U.K. alone, and columns 9 to 12 for Australia. Panel A in Table 5 is for the pooling period while Panel B is for the post-pooling period (again, despite the fact that the break point between these two accounting regimes in the middle of 2001 would not have been meaningful for these non-U.S. firms).

The results are again unambiguous. Concerning the pooling period (Panel A), neither the (log) the market-to-book ratio nor the firm-specific RRV misvaluation component are statistically significant for any of these groups of countries.[24] During the post-pooling period (Panel B), the (log) market-to-book ratio is *negatively* and significantly correlated with the probability of full-stock payment for E.U. countries and the U.K. Its coefficient is also negative in the Australian sample, but is not statistically

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[24] We obtain similar results when we restrict the sample period for the analysis to start in 1992. We do this robustness test for several reasons. First, there may be concerns about the quality of SDC data for transactions prior to that (see our discussion above about SDC data-quality issues). Second, the evidence discussed above (from Amel-Zadeh, et al., 2016) suggests that the use of pooling was only uncommon in these non-U.S. countries after 1992 (its use was optional prior to that). In an additional robustness test, we repeat these analyses excluding foreign firms cross-listed in the U.S., as they may be affected by the change in regulations in the U.S.: again, our results are unaffected.

significant in those columns (9 – 10). We obtain similar results concerning the firm-specific RRV misvaluation component: a negative but not statistically significant coefficient for the E.U. countries and the U.K. and a negative and statistically significant coefficient in the Australian sample.[25] The international evidence confirms that, in absence of the opportunity to account for M&A transactions under pooling, the link between misvaluation proxies and the choice of full-stock payment disappears, even during the period overlapping the intensive use of pooling in the U.S.

Insert Table 5 about here

4.4. Robustness checks

As additional robustness checks, we investigate whether our results are affected by the internet bubble or the 2008 financial crisis (results reported in the Internet Appendix 3 and 4). To check the robustness of our results to the inclusion of the internet bubble in our sample period, we replicate Table 3, Panel C for the pooling period (1978 to end of June 2001) and Table 4, Panel C for the post-pooling period (July 2001 to 2015) excluding high tech firms from our sample. High tech firms are identified using the Kile and Phillips (2009) SIC-code based classification. As in Panel C of Tables 3 and 4, the coefficient on the RRV firm-specific misvaluation component is positive and highly significant during the pooling period but loses its significance in the post-pooling period (either with or without the inclusion of year fixed-effects). We note also that for the sample excluding high tech firms the coefficient on the (log) the market-to-book ratio is negative and significant during the post-pooling period, confirming the results in Table 4, Panel C.

Our second robustness check focuses on the 2008 financial crisis. We replicate our analyses using the post-pooling but pre-financial crisis period (July 2001 to 2007) and the post-pooling and post-

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[25] As with Table 3, we check whether these results are affected by any pooling-classification issues in the SDC database (see Section 3) by replicating Table 5 on a sample starting in 1993 (i.e., removing observations from the 1980s when SDC's classification of the accounting method is potentially problematic). We obtain similar results (see Internet Appendix 2).

financial crisis period (2009 to 2017).[26] The coefficient on the RRV firm-specific misvaluation component is not statistically significance in either post-pooling subperiod excluding the financial crisis, while the coefficient on the (log) market-to-book ratio is negative and statistically significant in both periods. These results again fail to support the misvaluation hypothesis for the choice of stock as the sole method of payment.

5. Additional evidence

In an effort to more clearly identify the incentives to opt for full-stock payment during the pooling period, we discriminate in that period between transactions (i) paid fully or partially in cash, (ii) paid fully in stock and recorded under pooling accounting, and (iii) paid fully in stock and recorded under purchase accounting. Table 6 reports results obtained using probit regressions for the choice between (i) and (ii) (i.e., cash vs. stock-pooling) in columns (1) to (4) and for the choice between (i) and (iii) (i.e., cash vs. stock-purchase) in columns (5) to (8). A striking result emerges: while the RRV firm-specific misvaluation component is significant in explaining the choice of stock as the method of payment when pooling accounting is used, it is not significant when purchase accounting is used by the acquirer. In other words, our results show that the RRV firm-specific misvaluation component is only able to significantly explain the choice of full-stock payment and pooling accounting *as a package*, but is *not* able to explain the choice between cash and full-stock payment coupled in the absence of pooling. We also observe that the (log) market-to-book ratio is itself not a significant predictor of opting for full-stock payment and recording the transaction under purchase accounting when year fixed-effects are included in the regression (column (6)). These results again suggest strongly that the observed link between acquirer equity overvaluation and the use of full-stock payment is conditional on the availability of pooling as an accounting choice in acquisitions.

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[26] We exclude the 2008 year from this analysis because that year was the nadir of the financial crisis.

Insert Table 6 about here

As a second additional investigation, we test the following prediction about the probability to participate to the M&A market: if full-stock payment was (at least partially) motivated by the desire to qualify for pooling accounting during the pooling period, and if this incentive was stronger for highly-valued acquirers, we should observe that the relation between M&A market participation and high-valuation (see Table 4, Panel A) weakens during the post-pooling period. In Table 7 we report a direct test of this prediction. Table 7 replicates Table 3, Panel A but with a sample combining the pooling (from 1978 to end of June 2001) and post-pooling (from July 2001 to 2017) periods (i.e., combining the samples from Tables 3 and 4). This allows us to include in the specification interactions between an indicator variable called *Post* that identifies transactions taking place during the post-pooling period, the (log) market-to-book ratio (columns (1) and (2)) and the RRV misvaluation components (columns (3) and (4)).[27]

As predicted, the coefficient of the interaction term between *Post* and the firm-specific RRV misvaluation component is negative and highly statistically significant, with and without year fixed-effects. The interaction term between *Post* and the (log) market-to-book ratio is negative and significant in the absence of year fixed-effects (column (1)) but loses significance once year fixed-effects are included in the specification (column (2)). These results support the notion that participation in the M&A market by highly-valued firms during the pooling period was driven (at least partly) by the desire to qualify for pooling, as claimed by numerous CEOs at that time (see the Barry Diller quotes in Section 2, as an example). The results also reveal that the abolishment of pooling in 2001 has had a profound impact on the M&A market, substantially modifying the composition of the population of acquirers.

Insert Table 7 about here

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[27] Because the interpretation of coefficients of interaction terms in non-linear models raises difficulties (Greene, 2010), we check whether we obtain similar results using a linear probability model, and this is the case.

Finally, we explore whether the omission of target valuation ratios from the RRV analysis acts as an endogenous missing variable, potentially leading to inconsistent estimates. As noted in the introduction, target shareholders have to accept full-stock payment from the acquirer for the transaction to qualify for pooling. The full-stock payment is based on an exchange ratio between acquirer and target shares that depends on both the acquirer and the target valuation levels. If these valuations are correlated, as we suspect they may be (see the discussion in Section 2.2.), the absence of the target valuation ratios from the regression specification may act as an endogenous omitted variable. Table 8 reports the results that we obtain for the sub-sample of 2,170 transactions for which we are able compute the RRV misvaluation components for the *target* (listed targets for which the CRSP and Compustat databases report the required data). Our baseline results are confirmed: the coefficient on the acquirer (log) market-to-book ratio switches sign between the pooling and the post-pooling periods, becoming negative in the later (column (2)) and the coefficient on the firm-specific RRV misvaluation component loses statistical significance during the post-pooling period (column (4)). We note also that the target valuation ratios have similar coefficients to the acquirer ones, in both sign and statistical significance. This makes sense, in particular the negative coefficient on the target (log) the market-to-book ratio for the post-pooling period (column (2)), as it would have been surprising had acquirers, in the absence of pooling, displayed a preference for stock swaps with highly-valued targets.[28]

Insert Table 8 about here

Taken together, our results suggest that the RRV conclusions about the method of payment in M&A deals are driven by the availability of pooling as an accounting choice. Highly-valued acquirers desired to use pooling accounting for their M&A deals, and because pooling accounting was only

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[28] We replicate these tests using (bidder – target) valuation ratio differences in place of target and acquirer valuation ratios. We obtain comparable results (see Internet Appendix 5).

acceptable to the FASB if the deal was a full stock-swap, this prompted highly-valued acquirers to use their own equity as the sole method of payment. This link was misinterpreted in the literature to be a link between (over)valuation and the method of payment in mergers and acquisitions, a link that was severed when the FASB disallowed pooling in June 2001. Incentives generated by accounting regulation (even cash-flow neutral rules) act as an omitted variable, leading to a spurious causal interpretation of the RRV regression results.

6. Conclusions

The method of payment in M&A transactions has been closely examined in the finance literature. In this paper we challenge the notion, introduced in the Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2004) theories of the use of stock as an acquisition currency, that acquirer equity misvaluation is a key driver of the choice of the method of payment. Our thesis is that during the period in which pooling accounting was allowed by the FASB in the U.S. (1970 – June 2001) these accounting regulations provided an artificial incentive for acquirers to use complete stock swaps to buy their targets, especially during periods of high general valuations or for individually overvalued acquirers. As we demonstrate using data from the post-pooling period and other countries, however, once those regulatory incentives are taken away (as they were starting in July 2001) the link between acquirer valuation and the choice to conduct a full stock-swap in an M&A deal is broken.

Additional tests confirm that qualifying for pooling appears to have been the motivation for highly valued acquirers to choose full stock payment. In particular, the Rhodes-Kropf, Robinson and Viswanathan (2005) results hold only when full stock payment is packaged with pooling but disappear if the acquirer accounts for the transaction (ex-post) using purchase accounting, and the link between overvaluation and the probability that a firm participates in the M&A market weakens during the post-pooling period. Our results reveal that changes in accounting regulations can have a dramatic impact on behavior in financial markets, most importantly even in the absence of direct cash-flow implications. One implication of our study is that the academic finance community should likely pay more attention

to accounting regulation as a source of potential omitted variable biases before (over)interpreting correlations as causal relations.

References

Aboody, David, Kasznik, Ron, Williams, Michael, 2000. Purchase versus Pooling in Stock-for-Stock Acquisitions: Why Do Firms Care? Journal of Accounting and Economics 29, pp. 261-286

Amel-Zadeh, Amir, Meeks, Geoffrey, Meeks, Jacqueline. 2016. Historical perspectives on accounting for M&A. Accounting and Business Research 46, pp. 501-524

Ang, James, S., Cheng, Yingmei, 2006, Direct evidence on the market-driven acquisition theory, Journal of Financial Research 29, pp.199-216

Bollaert, Helen, Delanghe, Marieke, 2015. Securities Data Company and Zephyr, data sources for M&A research, Journal of Corporate Finance 33, pp. 85-100

de Bodt, Eric, Cousin, Jean-Gabriel, Roll, Richard, 2018. The full stock payment marginalization in M&A transactions. Management Science 64(2)

Dong, Ming, Hirshleifer, David, A., Richardson, Scott, Teoh, Siew, 2006. Does Investor Misvaluation Drive the Takeover Market?. Journal of Finance 61, pp.725-762

Eckbo, B. Espen, Makaew, Tanakorn, Thorburn, Karin S., 2018. Are stock-financed takeovers opportunistic? Journal of Financial Economics 128, pp.443-465

Faccio, M., Masulis, R., 2005. The choice of payment method in European mergers and acquisitions. Journal of Finance 60, pp.1345-1388

Fu, Fangjian, Lin, Leming, Officer, Micah S., 2013. Acquisitions driven by stock overvaluation: Are they good deals? Journal of Financial Economics 109, pp.24-39

Greene, W., 2010, Testing hypotheses about interaction terms in nonlinear models, Economic Letters, 107, P. 291-296

Harford, Jarrad, Humphery-Jenner, Mark, Powell, Ronan, 2012. The sources of value destruction in acquisitions by entrenched managers. Journal of Financial Economics 106, pp.247-261

Li, Kai, Liu, Tingting, Wu, Julie, 2018, Vote Avoidance and Shareholder Voting in Mergers and Acquisitions, Review of Financial Studies, forthcoming

Li, Kevin, Meeks, Geoff, 2016, Seventy years of accounting standards for M&A, Available at SSRN: https://ssrn.com/abstract=2732242

Lys, T.Z., Vincent, L., 1995. An analysis of value destruction in AT&T's acquisition of NCR, Journal of Financial Economics 39, pp. 353-378

Martin, Kenneth J., 1996. The method of payment in corporate acquisitions, investment opportunities, and management ownership. Journal of Finance 51, 1227-1246

Rhodes-Kropf, Matthew, Viswanathan, S., 2004. Market valuation and merger waves. Journal of Finance 59, pp.2685-2718

Rhodes-Kropf, Matthew, Robinson, David, Viswanathan, S., 2005. Valuation waves and merger activity: the empirical evidence. Journal of Financial Economics 77, pp.561-603

Shleifer, Andrei, Vishny, Robert W., 2003. Stock market driven acquisitions. Journal of Financial Economics 70, pp.295-311

Figure 1 – Acquirer to Target Valuation and EPS Bootstrap

Figure 1 reports simulation results connecting acquirer valuation levels, acquirer to target valuation ratios, and earning per share (EPS). Panel A focuses on low-valuation acquirers (market-to-book equal to 1.1) and Panel B on high-valuation acquirers (market-to-book equal to 1.9). In both panels, the horizontal axis is the target to acquirer relative valuation ratio (target market-to-book ratio divided by the acquirer market-to-book ratio) and the vertical axis is the EPS ratio. We identify acquirer EPS in the absence of merger (a horizontal line as it doesn't depend on the target valuation by construction), EPS for the merged entity under purchase accounting, and EPS for the merged entity under pooling accounting. Payment is full stock in all cases. The simulation procedure is described in detail in Appendix 1.

Panel A – Low Valuation Acquirers
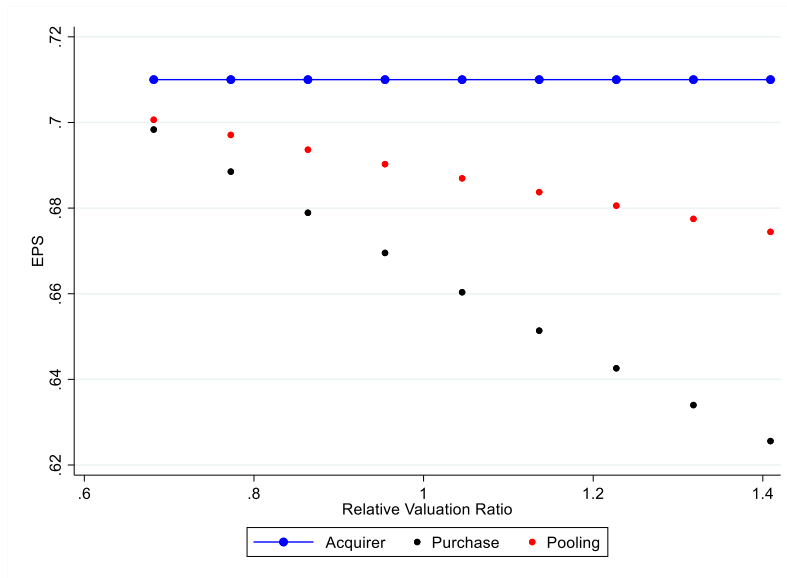
Panel B – High Valuation Acquirers
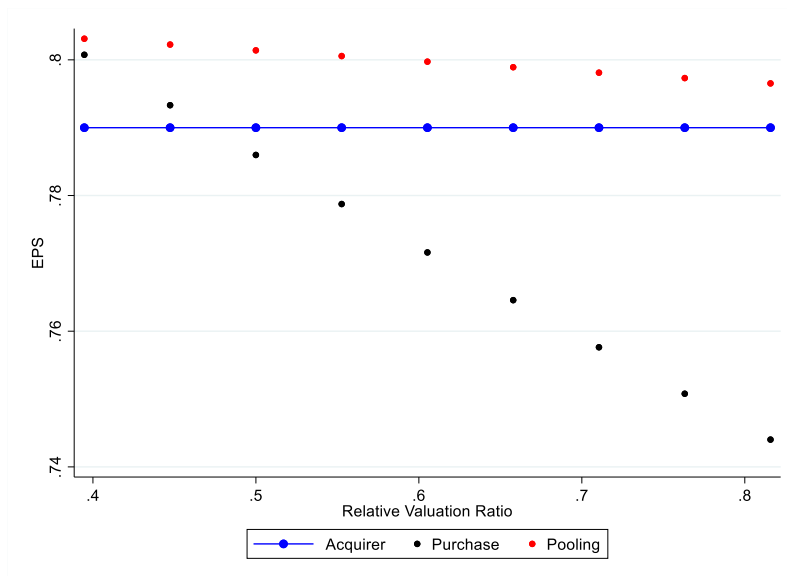
Figure 2 – Full stock deals percentage in 2001

Figure 2 compares the percentage of full-stock M&A deals between the first and second half year of 2001, the year in which pooling accounting was abolished in the U.S. Pooling was abolished on June 30, 2001.

% all stock deals during 2001
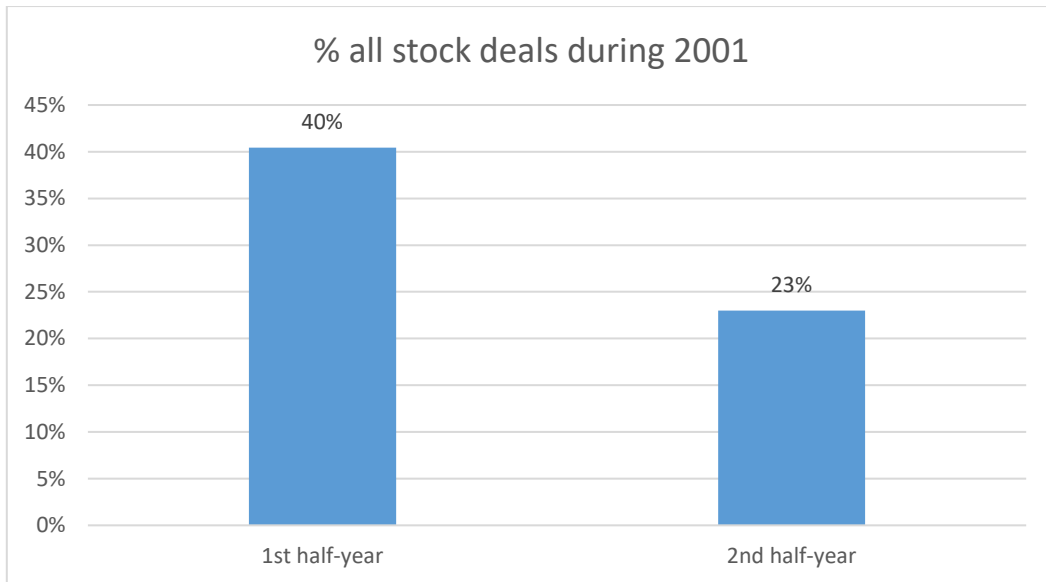
Figure 3 – Market-to-Book Ratios: International Evidence

Figure 3 displays the evolution of the equality-weighted average market-to-book ratios from 1980 to 2016 for the four geographical areas under scrutiny in Section 4. The E.U. set is composed of Austria, Belgium, Finland, France, Germany, Ireland, Italy, Norway, Portugal, Spain, Sweden, Switzerland, and the UK (as in Faccio and Masulis, 2005). For each of the countries, the sample of firms is composed of all firms for which the Worldscope database reports the market value and book of equity.
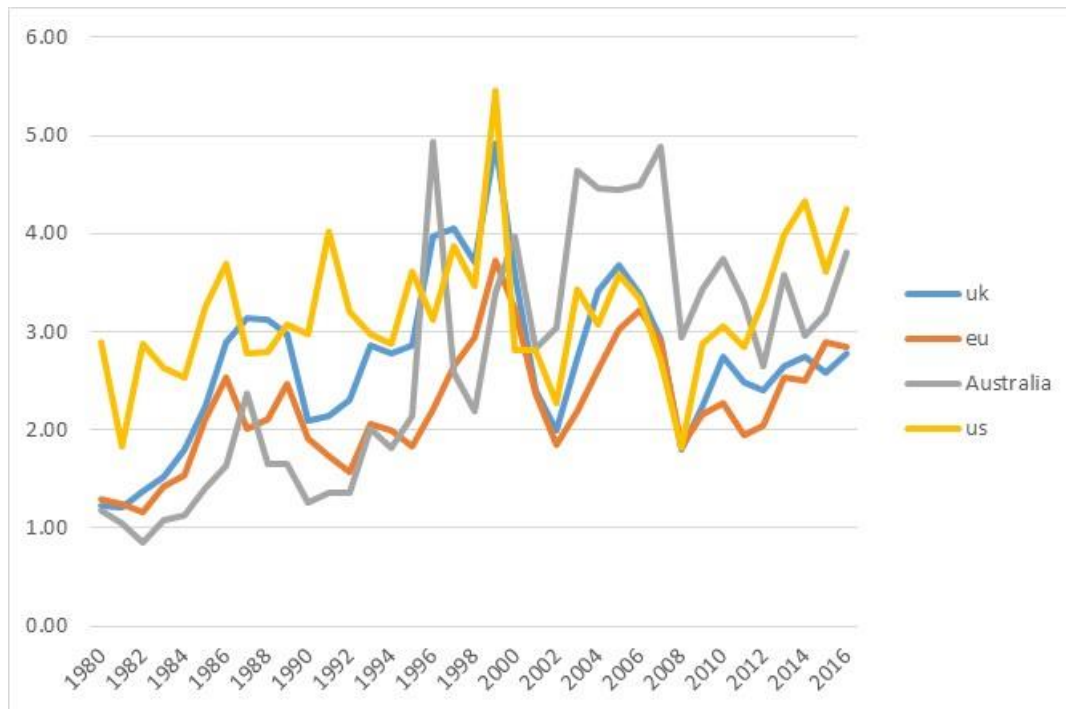
Table 1 – M&A Sample Descriptive Statistics

Table 1 presents descriptive statistics for the RRV (Rhodes-Kropf, et al., 2005) sample and our replication M&A sample ("Ours"). Panel A presents a comparison of yearly M&A frequencies and average deal size between the RRV sample and our replication M&A sample. M&A transactions are collected from the SDC database and are required to have the necessary information available in the CRSP and Compustat databases. Sample selection criteria are reported in Section 3. *Deal Size* is the average nominal deal value in US$ million as reported in the SDC database. *All Stock* and *All Cash* refer to transactions paid fully in acquirer stock or cash. Panel B presents, for our sample, the proportion of full-stock deals by year, and the proportion of these full-stock deals that use pooling or purchase accounting.

Panel A

Year	Acquisition Bids		All Stock		All Cash		Deal Size	
	RRV	Ours	RRV	Ours	RRV	Ours	RRV	Ours
	(1)	(2)	(5)	(6)	(7)	(8)	(9)	(10)
1978	11	8	4	3	7	4	435	207
1979	11	8	1	1	4	7	88	276
1980	18	5	0	0	3	0	310	761
1981	61	71	1	1	4	4	857	745
1982	63	70	0	1	0	0	271	197
1983	95	71	2	0	9	2	308	241
1984	104	122	7	4	34	6	252	283
1985	113	135	17	24	55	48	406	276
1986	144	145	14	26	81	60	300	272
1987	164	150	25	25	95	59	274	305
1988	141	160	20	19	70	61	175	278
1989	141	168	28	42	66	58	363	281
1990	101	121	19	24	49	33	274	276
1991	108	128	31	37	32	22	234	184
1992	99	129	24	53	43	20	228	124
1993	170	160	51	62	69	41	460	197
1994	255	256	96	108	98	58	260	237
1995	315	264	100	103	124	62	569	313
1996	367	301	141	110	116	63	717	430
1997	413	340	157	168	116	48	713	600
1998	426	351	154	153	127	67	1,840	838
1999	451	368	160	149	160	82	1,421	1,333
2000	395	313	124	116	137	74	1,666	915
2001	159	236	42	78	43	54	994	845
2002	-	164	-	40	-	48	-	637
2003	-	162	-	44	-	42	-	778
2004	-	148	-	42	-	35	-	2,113
2005	-	155	-	31	-	45	-	1,694
2006	-	162	-	25	-	68	-	1,962
2007	-	152	-	20	-	64	-	997
2008	-	117	-	20	-	55	-	1,938
2009	-	94	-	20	-	26	-	2,131
2010	-	100	-	13	-	46	-	1,111
2011	-	70	-	13	-	29	-	1,632
2012	-	88	-	19	-	38	-	856
2013	-	84	-	12	-	32	-	952
2014	-	122	-	23	-	41	-	3,067
2015	-	126	-	20	-	42		4,413
2016	-	120	-	19	-	50		3,443
2017	-	116	-	34	-	34	-	2,695
1978-2001	4,325	4,080	1,218	1,307	1,542	933	839	550
2002-2017	-	1,980	-	395	-	695	-	1,873

Panel B

Year	% All stock (1)	% All Stock Pooling (2)	% All Stock Purchase (3)
1978	42.9%	0.0%	100.0%
1979	12.5%	0.0%	100.0%
1980	0.0%	-	-
1981	1.5%	100.0%	0.0%
1982	1.4%	0.0%	100.0%
1983	0.0%	-	-
1984	3.6%	0.0%	100.0%
1985	20.5%	0.0%	100.0%
1986	20.5%	0.0%	100.0%
1987	18.1%	0.0%	100.0%
1988	14.5%	0.0%	100.0%
1989	27.9%	12.2%	87.8%
1990	23.5%	16.7%	83.3%
1991	33.0%	33.3%	66.7%
1992	49.1%	41.5%	58.5%
1993	43.4%	51.6%	48.4%
1994	49.8%	58.9%	41.1%
1995	44.2%	58.8%	41.2%
1996	43.2%	66.7%	33.3%
1997	54.8%	79.3%	20.7%
1998	48.9%	86.3%	13.7%
1999	46.1%	63.5%	36.5%
2000	42.5%	41.4%	58.6%
2001	35.2%	15.8%	84.2%
2002	26.4%	7.7%	92.3%
2003	30.5%	0.0%	100.0%
2004	30.4%	0.0%	100.0%
2005	21.7%	0.0%	100.0%
2006	16.6%	0.0%	100.0%
2007	13.9%	0.0%	100.0%
2008	18.5%	0.0%	100.0%
2009	23.3%	0.0%	100.0%
2010	14.0%	0.0%	100.0%
2011	19.4%	0.0%	100.0%
2012	22.4%	0.0%	100.0%
2013	14.5%	0.0%	100.0%
2014	19.7%	0.0%	100.0%
2015	16.3%	0.0%	100.0%
2016	16.1%	0.0%	100.0%
2017	30.4%	0.0%	100.0%
1978-2001	36.7%	53.2%	46.8%
2002-2017	21.5%	0.8%	99.2%

Table 2 - Characteristics of Acquirers: Descriptive Statistics

Table 2 reports a set of descriptive statistics for acquirer characteristics, with a comparison between the RRV (Rhodes-Kropf, et al., 2005) sample and the sample we use to replicate the RRV results ("Ours"). This table also contains a test of difference of means for characteristics in our sample between the pooling period (1978 to end of June 2001) and the post-pooling period (July 2001 to 2017). Size, performance and leverage indicators are computed using data collected from the Compustat database, and all variables are defined in Appendix 2. Reported statistics are yearly averages. *t(diff)* is the t-statistic for a difference of means test between the pooling and the post-pooling periods, with a correction for unequal variance across groups. Ratios are winsorized at 1% in each tail to control for outliers. *,**, or *** indicates statistical significance at the 10%, 5%, or 1% confidence level (respectively).

Variable	Pooling Period		Post-Pooling Period		
	RRV	Ours	Ours	t(diff)	
	(1)	(2)	(3)	H_0: (3) − (2) = 0	
Sample size	4,325	4,080	1,980		
Size					
Market value (assets)	18,486.55	16,253.55	46,846.95	8.37	***
Book assets	11,516.44	10,187.36	33,664.34	7.03	***
Market equity	9,733.78	8,151.01	20,732.03	9.91	***
Book equity	2,518.64	1,896.67	6,694.25	11.72	***
PP&E	1,869.88	1,349.86	3,224.79	7.15	***
Long-term debt	1,596.73	1,200.72	4,889.75	9.19	***
Capital expenditure	466.12	408.00	620.48	3.98	***
Net income	401.63	328.59	1,132.35	10.37	***
Performance					
Return on assets	0.0520	0.0285	0.0177	-2.82	***
Return on equity	0.1520	0.0784	0.0567	-1.70	*
Market-to-book	3.43	3.55	3.33	-1.86	*
Leverage					
Leverage (book)	0.59	0.65	0.63	-2.18	**
Leverage (market)	0.44	0.50	0.47	-2.98	***
Quick ratio	2.00	1.99	2.23	3.14	***
Current ratio	2.52	2.50	2.61	1.36	

Table 3 - Rhodes-Kropf et al. (2005) Replication

Table 3 replicates RRV's (Rhodes-Kropf, et al., 2005) main empirical results. Panel A focuses on the probability that a firm participates in the M&A market, Panel B on the probability of the firm being an acquirer conditional on participation, and Panel C on the probability that the M&A deal involves full-stock payment for the target. The RRV columns contain the results reported by RRV in their Table 9 and the Ours columns report results that we obtain using our replication sample. *Baseline* and *Model 3* present results using the log of the market to book (*ln(mb)*) and RRV model 3 market-to-book decomposition (see Equation 15 and Appendix 2 in RRV for definitions of *m_f_RRV*, *m_s_RRV* and *m_b_RRV*). The odd columns do not include year fixed-effects while the even columns do. All regressions are probit models where the dependent variables are indicator variables that equal one if the firm participates in the M&A market in that year (Panel A), if the firm participates as an acquirer (Panel B), and if the method of payment in the acquisition is completely acquirer equity (Panel C); and zero otherwise. The M&A sample is introduced in Table 1, and all variables are defined in Appendix 2. *T-statistics* are reported in parentheses below corresponding coefficients. *,**, or *** indicates statistical significance at the 10%, 5%, or 1% confidence level (respectively).

Panel A - M&A Market Participation

Valuation	RRV				Ours			
Component	Baseline		Model 3		Baseline		Model 3	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
ln(mb)	0.0880***	-0.0340			0.0610***	0.0131**		
	(15.95)	(-1.19)			(10.36)	(2.10)		
m_f_RRV			0.2090***	0.2060***			0.1556***	0.1577***
			(24.13)	(4.02)			(15.49)	(15.85)
m_s_RRV			0.7220***	-0.2330**			0.6583***	0.3320***
			(28.38)	(-1.90)			(29.28)	(11.16)
m_b_RRV			-0.0830***	-0.1250***			-0.1254***	-0.1359***
			(-10.59)	(-3.28)			(-14.63)	(-15.86)
year FE	no	yes	no	yes	no	yes	no	yes

Panel B - Acquirer Status

Valuation	RRV				Ours			
Component	Baseline		Model 3		Baseline		Model 3	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
ln(mb)	0.0970***	-			0.1677***	0.1918***		
	(6.86)	-			(9.72)	(10.44)		
m_f_RRV			0.3790***	-			0.4622***	0.4663***
			(18.00)	-			(15.51)	(15.70)
m_s_RRV			0.4910***	-			0.3867***	0.7397***
			(8.39)	-			(7.11)	(10.46)
m_b_RRV			-0.0229***	-			-0.1398***	-0.1215***
			(-11.27)	-			(-5.65)	(-4.85)
year FE	no	yes	no	yes	no	yes	no	yes

Panel C - Full Stock Payment

Valuation	RRV				Ours			
Component	Baseline		Model 3		Baseline		Model 3	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
ln(mb)	0.2320***	0.1790***			0.2172***	0.0993***		
	(14.35)	(10.11)			(7.88)	(3.36)		
m_f_RRV			0.1460***	0.1160***			0.2003***	0.2103***
			(6.33)	(5.02)			(4.63)	(4.82)
m_s_RRV			0.6430***	0.3730***			0.7976***	0.0060
			(10.53)	(5.70)			(9.70)	(0.05)
m_b_RRV			0.2360***	0.2190***			0.0505	0.0056
			(10.87)	(9.92)			(1.22)	(0.13)
year FE	no	yes	no	yes	no	yes	no	yes

Table 4 - Post-Pooling Period Results

Table 4 displays results obtained estimating the same models as in Table 3 but using our sample from the post-pooling period (July 2001 to 2017). Panel A focuses on the probability of a firm participating in the M&A market, Panel B on the probability of the firm being an acquirer conditional on participation, and Panel C on the probability that the M&A deal involves full stock payment for the target. *Baseline* and *Model 3* present results using the log of the market to book (*ln(mb)*) and RRV model 3 market-to-book decomposition (see Equation 15 and Appendix 2 in RRV for definitions of *m_f_RRV*, *m_s_RRV* and *m_b_RRV*). The odd columns do not include year fixed-effects while the even columns do. The M&A sample is introduced in Table 1, and all variables are defined in Appendix 2. *T-statistics* are reported in parentheses below corresponding coefficients. *,**, or *** indicates statistical significance at the 10%, 5%, or 1% confidence level (respectively).

Panel A - M&A Market Participation

Valuation	Post-Pooling			
Component	Baseline		Model 3	
	(1)	(2)	(3)	(4)
ln(mb)	0.0507***	0.0452***		
	(6.24)	(5.30)		
m_f_RRV			0.1346***	0.1362***
			(11.38)	(11.40)
m_s_RRV			0.1301***	0.0522
			(3.55)	(1.10)
m_b_RRV			-0.0513***	-0.0567***
			(-4.10)	(-4.46)
year FE	no	yes	no	yes

Panel B - Acquirer Status

Valuation	Post-Pooling			
Component	Baseline		Model 3	
	(1)	(2)	(3)	(4)
ln(mb)	0.1571***	0.1602***		
	(5.86)	(5.84)		
m_f_RRV			0.2756***	0.2774***
			(7.26)	(7.28)
m_s_RRV			0.1277	0.0486
			(1.30)	(0.39)
m_b_RRV			0.0355	0.0434
			(0.93)	(1.12)
year FE	no	yes	no	yes

Panel C - Full Stock Payment

Valuation		Post-Pooling		
Component	Baseline		Model 3	
	(1)	(2)	(3)	(4)
ln(mb)	-0.1685***	-0.1760***		
	(-3.60)	(-3.66)		
m_f_RRV			0.0690	0.0640
			(1.10)	(1.00)
m_s_RRV			-0.0236	-0.0285
			(-0.14)	(-0.15)
m_b_RRV			-0.4350***	-0.4499***
			(-6.88)	(-6.94)
year FE	no	yes	no	yes

Table 5 – International Evidence

Table 5 displays results obtained estimating the same probit models as in Table 3, Panel C (the probability that the M&A deal involves full-stock payment for the target) but using a sample of international deals from the 1990-2017 period. Panel A reports results for the pooling period (1990 to June 2001) and Panel B for the post-pooling period (July 2001 to 2017). The table displays results for deals in subsamples of international countries: all EU countries (columns (1) to (4)), the UK only (columns (5) to (8)), and Australia (columns (9) to (12)). *Baseline* and *Model 3* present results using the log of the market to book (*ln(mb)*) and RRV model 3 market-to-book decomposition (see Equation 15 and Appendix 2 in RRV for definitions of *m_f_RRV*, *m_s_RRV* and *m_b_RRV*). The odd columns do not include year fixed-effects while the even columns do. All variables are defined in Appendix 2. *T-statistics* are reported in parentheses below corresponding coefficients. *,**, or *** indicates statistical significance at the 10%, 5%, or 1% confidence level (respectively).

Panel A - Pooling Period

Valuation Component	European Union				UK only				Australia			
	Baseline		Model 3		Baseline		Model 3		Baseline		Model 3	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln(mb)	0.0079	-0.0077			0.0049	-0.0078			-0.0005	0.0415		
	(0.21)	(-0.19)			(0.09)	(-0.13)			(-0.01)	(0.42)		
m_f_RRV			-0.0058	-0.0197			-0.0185	-0.0195			0.0847	0.1204
			(-0.11)	(-0.35)			(-0.20)	(-0.21)			(0.71)	(0.98)
m_s_RRV			0.3120***	0.3276***			0.1618	0.1246			0.1248	0.3044
			(3.38)	(3.24)			(0.97)	(0.75)			(0.30)	(0.68)
m_b_RRV			0.0075	-0.0053			0.0098	-0.0095			-0.2181	-0.1841
			(0.15)	(-0.10)			(0.13)	(-0.13)			(-1.02)	(-0.83)
year FE	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
N	1,558	1,558	1,558	1,558	554	554	554	554	123	120	123	120

Valuation	European Union				UK only				Australia			
Component	Baseline		Model 3		Baseline		Model 3		Baseline		Model 3	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln(mb)	-0.0757**	-0.0992**			-0.1086*	-0.1269*			-0.1016	-0.0896		
	(-1.99)	(-2.48)			(-1.74)	(-1.93)			(-1.58)	(-1.35)		
m_f_RRV			-0.0672	-0.0771			-0.0695	-0.0961			-0.1762**	-0.1604**
			(-1.23)	(-1.39)			(-0.83)	(-1.11)			(-2.29)	(-2.08)
m_s_RRV			0.1956**	0.1770*			0.1965	0.2724			0.0882	0.1850
			(2.18)	(1.77)			(1.40)	(1.63)			(0.62)	(1.17)
m_b_RRV			-0.1011**	-0.1244**			-0.1348	-0.1275			-0.0104	-0.0095
			(-2.06)	(-2.45)			(-1.62)	(-1.41)			(-0.12)	(-0.10)
year FE	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
N	1,836	1,836	1,836	1,836	562	562	562	562	510	510	510	510

Table 6 – Cash and Mixed payment versus All-Stock Pooling / Purchase

Table 6 displays results obtained estimating probit regressions for the choice of payment using our sample from the pooling period (before July 2001). Columns (1) to (4) (under the heading Stock-Pooling) report estimates obtained using the sub-sample of transactions that were either fully- or partially- paid for in cash or fully paid for with acquirer stock *and* accounted for using pooling. Columns (5) to (8) (under the heading Stock-Purchase) report estimates obtained using the sub-sample of transactions that were either fully- or partially- paid for in cash or fully paid for with acquirer stock *and* accounted for using the purchase method. In both cases, the dependent variable is an indicator variable taking value one in case of full-stock payment, and zero otherwise. *Baseline* and *Model 3* present results using the log of the market to book (*ln(mb)*) and RRV model 3 market-to-book decomposition (see Equation 15 and Appendix 2 in RRV for definitions of *m_f_RRV*, *m_s_RRV* and *m_b_RRV*). The odd columns do not include year fixed-effects while the even columns do. The M&A sample is introduced in Table 1, and all variables are defined in Appendix 2. *T-statistics* are reported in parentheses below corresponding coefficients. *,**, or *** indicates statistical significance at the 10%, 5%, or 1% confidence level (respectively).

Valuation Component	Stock-Pooling				Stock-Purchase			
	Pooling period				Pooling period			
	Baseline		Model 3		Baseline		Model 3	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(mb)	0.2839***	0.1270***			0.1226***	0.0555		
	(8.80)	(3.57)			(3.91)	(1.63)		
m_f_RRV			0.3112***	0.3346***			0.0623	0.0608
			(6.15)	(6.23)			(1.28)	(1.25)
m_s_RRV			1.0486***	-0.1007			0.4642***	0.0447
			(10.88)	(-0.72)			(5.20)	(0.35)
m_b_RRV			0.0269	-0.0543			0.0620	0.0523
			(0.55)	(-1.02)			(1.27)	(1.05)
year FE	no	yes	no	yes	no	yes	no	yes

Table 7 – Pooling Abolishment and the Probability of Participating in the M&A Market

Table 7 reports estimates of the probability of a firm participating in the M&A market, as in Panel A of Table 3, using a combined sample covering the whole 1978 to 2017 period. The *Post* indicator variable takes value one during the post-pooling period (July 2001 to 2017), and zero otherwise. *Baseline* and *Model 3* present results using the log of the market to book (*ln(mb)*) and RRV model 3 market-to-book decomposition (see Equation 15 and Appendix 2 in RRV for definitions of *m_f_RRV*, *m_s_RRV* and *m_b_RRV*). The odd columns do not include year fixed-effects while the even columns do. The M&A sample is introduced in Table 1, and all variables are defined in Appendix 2. All regressions are probit models where the dependent variables are indicator variables that equals one if the firm participates in the M&A market in that year. *T-statistics* are reported in parentheses below corresponding coefficients. *,**, or *** indicates statistical significance at the 10%, 5%, or 1% confidence level (respectively).

Valuation	All period			
Component	Baseline		Model 3	
	(1)	(2)	(3)	(4)
ln(mb)	0.1290***	0.0728***		
	(20.67)	(10.52)		
Post x lm_b	-0.0848***	0.0121		
	(-9.13)	(1.03)		
m_f_RRV			0.3053***	0.3000***
			(26.19)	(26.27)
m_s_RRV			0.7161***	0.5452***
			(25.60)	(15.66)
m_b_RRV			-0.1376***	-0.1637***
			(-14.85)	(-17.05)
Post x m_f_RRV			-0.1163***	-0.1003***
			(-6.79)	(-5.78)
Post x m_s_RRV			-0.5439***	-0.4675***
			(-11.03)	(-7.05)
Post x m_b_RRV			0.0325**	0.1206***
			(2.42)	(6.89)
year FE	no	yes	no	yes

Table 8 – Probability of Full-Stock Payment controlling for Target Valuation

Table 8 reports estimates of the probability that an M&A deal involves full stock payment, as in Panel C of Tables 3 and 4. We complement RRV's (Rhodes-Kropft, et al. 2005) specification by including valuation ratios for the *target* firm. In columns (1) and (2), the log of the market to book (*ln(mb)*) is the included valuation ratio. In columns (3) and (4), RRV's model 3 market-to-book decomposition (see Equation 15 and Appendix 2 in RRV for definitions of *m_f_RRV*, *m_s_RRV* and *m_b_RRV*) is used. Columns (1) and (3) report results for the pooling period (from 1978 to June 2001) and columns (2) and (4) for the post-pooling period (from July 2001 to 2017). All regressions are probit models where the dependent variable is equal to one if the method of payment in the acquisition is completely acquirer equity and zero otherwise. Our M&A sample is described in Table 1, and all variables are defined in Appendix 2. *T-statistics* are reported in parentheses below corresponding coefficients. *,**, or *** indicates statistical significance at the 10%, 5%, or 1% confidence level (respectively).

	Pooling	Post-Pooling	Pooling	Post-Pooling
	(1)	(2)	(3)	(4)
Bidder characteristics				
bidder ln(mb)	0.1939***	-0.1549**		
	(4.15)	(-2.32)		
bidder m_f_RRV			0.2732***	0.1105
			(4.37)	(1.39)
bidder m_s_RR			-0.0628	-0.4025
			(-0.37)	(-1.61)
bidder m_b_RRV			0.1611**	-0.4705***
			(2.45)	(-5.10)
Target characteristics				
Target ln(mb)	0.1117***	-0.1560***		
	(2.67)	(-2.70)		
Target m_f_RRV			0.1872***	-0.0894
			(3.29)	(-1.18)
Target m_s_RR			0.5028***	0.1925
			(2.87)	(0.81)
Target m_b_RRV			0.0294	-0.1761**
			(0.50)	(-2.05)
Year FE	yes	yes	yes	yes

Appendix 1 - EPS Bootstrapping Simulation Procedure

We start by assuming that the market-to-book ratio (MB) is driven by a constant growth model:

$$MB = \frac{ROE - g}{k - g} \tag{A.1}$$

where ROE is the return on equity, k is the required rate of return, and g is the constant growth rate. Net income is given by:

$$Net\ income = ROE \times BV \tag{A.2}$$

where BV is the book value of equity. Using Eq. (A.1) and Eq. (A.2) and the definition of the market-to-book ratio ($MB = {MV}/{BV}$, where MV is the market value of equity), we obtain:

$$Net\ income = MV \times (k - g) + g \times BV \tag{A.3}$$

The acquisition price is:

$$Price = MV_T \times (1 + \pi) \tag{A.4}$$

where π is the acquisition premium. Acquisition goodwill is, by definition, the difference between the acquisition price ($Price$) and the book value of target (BV_T). In case of pooling, the net income of the merged entity is the sum of the acquirer and target net incomes. If the transaction is accounted for under purchase accounting, the net income for the merged entity is given by:

$$Net\ income_P = Net\ income_A + Net\ income_T - (Goodwill \times \%_{Amt}) \tag{A.5}$$

where $Income_A$ and $Income_T$ are respectively the net incomes of the acquirer and the target, and $\%_{Amt}$ is the goodwill amortization rate. Finally, to compute EPS ratios, we assume that the ratio of the target to the acquirer number of shares is proportional to their relative size (as given by their respective book values).

For simplicity (but without loss of generality), we assume that target book values are fair values (there is no asset reevaluation in case of acquisition accounted for under purchase to compute the goodwill) and full stock payment is financed by SEO at the current market price. We choose the simulation parameters as follow: goodwill amortization rate ($\%_{Amt}$) equal to 5%, acquisition premium (π) equal to 40%, book value of acquirer (BV_A) equal to 1,000, book value of target (BV_T) equal to 1,000 times the target to acquirer relative size, itself equal to 0.1. The required rate of return (k) is 7%, the acquirer growth rate (g_A) is 6% and the target growth rate (g_T) 2%.

Appendix 2 - Variable Definitions

Variable	Definition	Source
All Stock	Indicator variable = 1 in for M&A deals with full stock payment, 0 otherwise	SDC
Book Assets	Book value of total assets (Compustat item AT): US$ million	Compustat
Book Equity	Book value of equity (Compustat item CEQ): US$ million	Compustat
Capital Expenditure	Capital expenditure (Compustat item CAPX: US$ million	Compustat
Current Ratio	Current assets (Compustat item ACT) / Current Liabilities (Compustat item LCT)	Compustat
Leverage (book)	1- (Book equity (Compustat item CEQ) / Book value of total assets (Compustat item AT))	Compustat
Leverage (market)	1- (Market equity / Market value (assets))	Compustat
Ln(mb)	Logarithm of Market-to-book	Compustat
Long-term Debt	Long-Term Debt (Compustat item DLTT): US$ million	Compustat
Market Equity	Price (Compustat item PRCC_F) * Shares outstanding (Compustat item CSHO): US$ million	Compustat
Market Value (assets)	Market equity + Book value of total assets (Compustat item AT) - Book equity (Compustat item CEQ) - Deferred taxes (Compustat item TXDB): US$ million	CRSP,Compustat
Market-to-book	Market equity / Book equity (Compustat item CEQ)	Compustat
m_b_RRV	Long-run value to book (RRV (2006) decomposition)	CRSP,SDC
m_f_RRV	Firm specific error (RRV(2006) decomposition)	CRSP,SDC
m_s_RRV	Time series sector error (RRV (2006) decomposition	CRSP,SDC
Net income	Net income (Compustat Item NI): US$ million	Compustat
Post	Indicator variable = 1 if the M&A deal announcement date is after 06/30/2001, 0 otherwise	SDC
PP&E	Property, plant, and equipment (Compustat item PPENT): US$ million	Compustat
Quick Ratio	Current assets (Compustat item ACT) - Inventories (Compustat item INVT) / Current liabilities (Compustat item LCT)	Compustat
Return On Assets	Net income (Compustat item NI) / Book value of total assets (Compustat item AT)	Compustat
Return On equity	Net income (Compustat item NI) / Book equity (Compustat item CEQ)	Compustat

Legend: SDC: Thomson SDC M&A database; CRSP: Center for Reseach in Security Prices database ; Compustat: Fundamental Annual database

Appendix 3 - Conditional Regression Multiples

Sample	Parameters	Fama and French industry classification
		1	2	3	4	5	6	7	8	9	10	11	12
RRV	Alpha0	2.39	2.56	2.20	2.35	2.38	2.55	2.91	2.15	2.44	2.68	2.21	2.60
		0.04	0.11	0.05	0.06	0.11	0.05	0.10	0.13	0.05	0.04	0.04	0.05
	Alpha1	0.64	0.56	0.64	0.66	0.64	0.59	0.60	0.85	0.62	0.61	0.58	0.60
		0.01	0.02	0.01	0.02	0.05	0.02	0.03	0.03	0.01	0.02	0.01	0.01
	Alpha2	0.27	0.30	0.27	0.23	0.31	0.29	0.26	0.12	0.28	0.26	0.30	0.25
		0.01	0.02	0.01	0.02	0.04	0.01	0.04	0.03	0.01	0.01	0.01	0.01
	Alpha3	0.08	0.05	0.10	0.00	0.13	-0.03	0.27	0.17	0.01	-0.09	-0.16	0.00
		0.03	0.06	0.03	0.04	0.06	0.04	0.05	0.04	0.04	0.05	0.05	0.04
	Alpha4	-2.59	-2.36	-2.09	-2.13	-2.43	-2.55	-2.27	-2.52	-2.11	-2.42	-1.06	-2.15
		0.05	0.09	0.07	0.15	0.19	0.11	0.18	0.23	0.06	0.10	0.05	0.09
	R-square	0.84	0.80	0.86	0.88	0.90	0.83	0.87	0.94	0.86	0.85	0.82	0.80
Ours	Alpha0	2.03	1.97	2.05	2.10	2.30	2.46	2.85	1.75	2.39	2.70	2.02	2.39
		0.05	0.08	0.04	0.08	0.08	0.05	0.07	0.07	0.03	0.06	0.06	0.04
	Alpha1	0.64	0.63	0.64	0.65	0.59	0.57	0.56	0.87	0.59	0.54	0.62	0.61
		0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.01	0.02	0.02	0.01
	Alpha2	0.35	0.33	0.30	0.29	0.36	0.35	0.32	0.11	0.33	0.37	0.33	0.31
		0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	Alpha3	-0.08	-0.04	-0.05	-0.08	-0.08	-0.13	0.02	0.03	-0.13	-0.17	-0.16	-0.10
		0.01	0.02	0.01	0.01	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.01
	Alpha4	-1.81	-1.49	-1.63	-1.38	-1.66	-2.07	-1.79	-1.90	-1.83	-1.93	-1.00	-1.73
		0.05	0.05	0.06	0.07	0.10	0.13	0.10	0.11	0.05	0.10	0.04	0.05
	R-square	0.90	0.91	0.89	0.90	0.92	0.85	0.89	0.97	0.88	0.86	0.89	0.84

Appendix 4 - Decomposing Market-to-book at the Firm Level in the Pooling Period

Sample	Valuation Component	All			M&A			All Cash			All Stock		
		Non M&As	M&As	t(diff)	Target	Acquirer	t(diff)	Target	Acquirer	t(diff)	Target	Acquirer	t(diff)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RRV	ln(mb)	0.59	0.76	-15.81 ***	0.69	0.83	-6.95 ***	0.61	0.79	-5.13 ***	0.87	1.12	-6.97 ***
	m_f_RRV	-0.01	0.18	-25.21 ***	0.03	0.32	-20.21 ***	-0.08	0.29	-15.01 ***	0.05	0.44	-16.09 ***
	m_s_RRV	0.03	0.10	-24.20 ***	0.07	0.12	-8.73 ***	0.06	0.14	-8.40 ***	0.12	0.17	-5.21 ***
	m_b_RRV	0.57	0.48	10.69 ***	0.58	0.39	12.52 ***	0.62	0.37	9.97 ***	0.71	0.51	6.94 ***
Ours	ln(mb)	0.64	0.79	-13.41 ***	0.68	0.87	-8.74 ***	0.53	0.78	-6.43 ***	0.82	1.00	-5.30 ***
	m_f_RRV	-0.01	0.14	-20.28 ***	-0.01	0.24	-16.51 ***	-0.10	0.18	-10.45 ***	0.03	0.29	-12.21 ***
	m_s_RRV	0.01	0.08	-20.01 ***	0.07	0.09	-2.64 ***	0.06	0.09	-2.80 ***	0.09	0.11	-1.67 *
	m_b_RRV	0.64	0.57	8.68 ***	0.61	0.55	4.48 ***	0.57	0.51	2.16 **	0.70	0.60	4.62 ***