Venturing beyond the Rule of Thumb in the Valuation of Small Accounting Practices: an Exploration in the Italian Market

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Abstract

The study explores the prediction accuracy of a P/Sales multiple – derived from the regression of transaction values on value drivers identified consistently with prior studies – in the highly standardized and homogenous context of the transfer of Small Accounting Practices. We find that the regressed P/Sales multiple significantly outperforms other multiples – often adopted as rule of thumb valuation metrics in the industry – such as simple industry harmonic-averaged P/Sales or P/EBITDA. The median absolute error is 4.70% for the regressed multiple vs 11.30% for the best alternative metric (P/Sales harmonic mean).

Moreover, we observe that non-financial information specific to the context of Small Accounting Practices, namely the location in big cities, is value relevant and complements financial and deal characteristics information.

Keywords: value; prediction accuracy; value relevance; small accounting practices; private equity

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1. Introduction

Probably due to the difficulty of collecting data, there are not specific studies that analyse private equity transactions having as their target small accounting firms and practices (SAP), whose value is usually estimated by practitioners using the rule of thumb of applying an "industry standard" multiplier to the gross fees transferred to the buyer. This popular valuation method, widely adopted for its simplicity, has as its main drawback that it implicitly assumes that all the firms in the industry share the same risk, growth and profitability profiles (IFAC, 2010).

On the one hand the popularity of this approach and its widespread adoption for small firms may be explained considering that – given the small dimension of the operating structure taken over (if any) by the buyer – the future owner should be able to turn around the firm and realize significant efficiency gains if the firm was previously badly managed. Hence, the emphasis on the fees transferred (and the customer relationships) that represent the scarce resources and the gatekeepers allowing access to the profession to new qualified entrants.

On a different note, the persistent adoption of the rule of thumb (sales raw multiplier) seems to contradict prior studies on valuation accuracy (mainly for listed companies and analysing various sectors), which showed that a simple average sales multiple is a relatively poor metric (Liu, Nissim & Thomas, 2002; Bhojraj & Lee, 2002), while other multiples constructed with more significant accounting measures such as EBITDA (Baker & Ruback, 1999) or earnings (Liu Nissim & Thomas, 2002 and 2007) or, as an alternative approach, a "warranted" sales multiple, derived from a regression model (Bhojraj & Lee, 2002), perform significantly better.

Moreover, we may assume that, in the specific context of private equity transactions regarding SAP, non-financial information may be also relevant and useful to explain prices, as it has been found to be the case, in general, for private equity transactions (Hand, 2005; Sievers, Mokwa, and Keienburg, 2013).

Given this background, employing a unique database comprising considerations paid and other financial and non-financial information relating to transfers of SAP provided by MpO&Partners we challenge the industry-standard rule of thumb, comparing the valuation accuracy of a P/Sales multiple regressed on relevant value drivers to that of simple industry-averaged P/Sales and P/EBITDA multiples.

The main findings of our study are: i) the regressed multiple outperforms in terms of prediction

accuracy the industry harmonic-averaged P/Sales and P/EBITDA multiple; ii) the EBITDA margin turns out to be the most relevant value driver in explaining the variation of the P/Sales multiple; iii) non-financial information specific to the context of SAP, namely the location in small vs big cities, is value relevant and complements financial and deal characteristics information.

The paper contributes to different streams of research, providing evidence on a sector not yet investigated: first, the study of the accuracy of valuation models, in particular of multiples-based valuation methods, and, second, the investigation of the value relevance of financial and non-financial information.

As a practical outcome, we expect the study to enable investors and analysts to better evaluate accounting firms, facilitating transactions, in some cases allowing to preserve the going concern value of SAP, often owned and run by a single individual – a professional – or a small group of highly skilled individuals, whose knowledge otherwise would be lost.

The paper is organized as follows. Section 2 further motivates the research, illustrates the underlying theory, and develops the hypothesis to be tested, Section 3 describes the data and their origination, Section 4 explains the research design, Section 5 shows the results of the empirical analysis, and Section 6 concludes, highlighting implications and possible further research on the subject.

2. Underlying Theory and Hypotheses Development

Several studies investigated the multiple valuation approach with reference to the accuracy of different value drivers and to the definition of the set of comparable firms. Kaplan and Ruback (1995) analysed the prediction accuracy of methods based on comparable transactions and cash flow models in the context of highly leveraged transactions, and found that they perform similarly; Kim and Ritter (1999) examined the precision of comparable firm multiples for a sample of IPOs and provided evidence that forward-looking performance measures are better value drivers than historical; Liu et al. (2002) compared the efficacy of different multiples, and showed that multiples built with forward earnings explain market value better than other multiples. Bhojraj and Lee (2002) focused on the selection criteria of comparable firms, proposing a multiple derived from a regression model in order to best match the firms and to

achieve better prediction accuracy. The authors develop regressions on fundamentals and obtain a "warranted multiple" for each company; then, the sample of comparable firms is defined as the group of companies that have the closest warranted multiple to that of the target company. The advantage of this regression-based approach is that it takes into account multiple explanatory variables at the same time. Even though the warranted multiple achieved only a modest improvement over the selection using other techniques (such as filtering by industry and size), their regression models explained a significant portion of the variability of Enterprise Value to Sales (R^2 72%) and Price to Book Value (R^2 51%) multiples.

The regression model includes, as explanatory variables, accounting information chosen with a linearization of the Ohlson's Residual Income Model (RIM), considering proxies for profitability, growth and risk (Ohlson, 1995).

In fact, Ohlson's model linked a firm's value to its accounting information as well as to "other information". While most of value relevance literature focuses on accounting information, many authors included non-financial information in their Ohlson models, assuming the "other information" variable not to be zero and following the intuition that investors do not look just at the accounting figures of book value and earnings for valuation purposes. Shevlin (1996) and Amir and Lev (1996) pointed out that researchers could arrive at mistaken conclusions if important non-financial indicators are omitted. Financial statements, in fact, serve multiple functions besides valuation such as contracting, taxes, regulation and litigation (Holthausen & Watts, 2001). In addition, as indicated by Ittner and Larcker (1998) and Behn and Riley (1999), non-financial metrics may be leading indicators of accounting metrics.

In particular, non-accounting information was empirically found to be relevant in high-growth sectors or young and tech companies, and in private equity markets (Anthony & Ramesh, 1992; Amir & Lev, 1996; Wright & Robbie, 1996; Hand, 2005; Trueman, Wong, and Zhang, 2000; Armstrong, Davila, and Foster, 2006; Sievers et al., 2013). Hand (2005), for example, found that financial statement data are less value relevant in the venture capital market than is non-financial information, and that the opposite holds true in the public equity market. Given that the conclusions depend on market, sector and company characteristics, there are different results on the nature of the relation between financial and non-financial information: Amir and Lev (1996), Trueman et al. (2000), and Sievers et al. (2013) found complementarity, while Hand (2005) and Armstrong et al. (2006) found a substitution effect.

In this context, we enhance the Bhojraj and Lee (2002) model, including some non-financial information, to develop a multiple derived from a regression on both financial and non-financial variables, selected in consistent manner with a conceptual framework that reconciles a multiple with a simple discounted cash flow valuation model for a stable growth firm.

We expect the multiple derived from the regression model to be a more precise metric of the price than the simple average Price/Sales multiple – usually adopted as a rule of thumb metric for valuation of SAP (IFAC, 2010) – or Price/EBITDA multiple, also widely used in private equity transactions, both of them calculated in the asset side version (Enterprise Value to Sales or to EBITDA) if the target carries any financial debt.

Thus, we posit the following hypothesis in the context of the analysis of transaction prices for the transfer of SAP:

Hypothesis: the multiple derived from the linear regression of the P/Sales multiple on relevant value drivers outperforms, in terms of prediction accuracy, the harmonic averaged P/Sales and P/EBITDA multiples.

We select the harmonic-averaged multiples as benchmarks, consistently with the preference accorded to the harmonic mean (vs geometric, arithmetic mean or the median) by prior literature (Baker & Ruback, 1999; Beatty, Riffe, & Thompson, 1999; Liu et al., 2002; Bhojraj & Lee, 2002; Herrmann & Richter, 2003; also Dittman & Maug, 2008, though with a qualification when computing logarithmic errors – in that case the geometric mean and the median would be preferable – vs computing percentage errors).

Considering prior studies and theory and taking into account industry practice as described in practitioner-oriented literature and discussed in unstructured interviews with the executives of MpO&Partners, we include 7 explanatory variables in our regression analysis, which can be categorized: 3 as financial information regarding the firm, 2 as non-financial information regarding the firm and 2 as deal characteristics, defined as showed in Table 1.

2.1 Financial information

The financial information regarding the firm is forward-looking (elaborated by the firms' partners with the assistance of MpO&Partners) and represented by:

-S, the euro amount of the expected sales, as a proxy of dimension, which we anticipate to be associated with a higher multiple as long as a greater dimension is theoretically and empirically associated with lower risk and return (from the seminal study of Fama & French, 1992, onward);

-lnMar, Profit Margin, the log transformed-EBITDA/Sales ratio expected to be positively correlated with the P/Sales multiple. In this case, we hypothesize a log relation with the multiple considering that the higher is the profitability the higher should be also the execution risk and the probability that competition may erode the advantage of the firm achieving that higher-than-normal profitability. This is consistent with the general principle of corporate finance that in the long run the return on capital of a firm should converge towards its cost of capital (Hand 2000). A precedent in the literature is Kim and Ritter (1999), who use – as explanatory variable of the variation of the Enterprise Value to Sales multiple – the logarithm of the ratio of the profitability (EBITDA/Sales) for the target firm to the profitability of comparable firms.

-CFT, Cash Flow Timing, calculated as the sum of expected cash flows in years 1-3 after the closing, divided by the expected cash flow for year 3 (see Table 1). The higher is this index, the shorter is the payback period for the buyer, given the typical pattern of cash flow in year 1 – when the buyer has to finance investments in fixed and working capital – being lower than cash flow in year 2 and 3. Hence, we predict that the buyer will pay a higher multiple of sales for firms with a greater cash flow timing index, all else held equal. We do not explicitly include other financial variables that may be relevant in a discounted cash flow model reconciled with the P/Sales multiple, such as growth and risk[3]. Growth has not been included because casual empiricism and anecdotal evidence suggest that the buyer is willing to pay to the seller only for the recurrent business she acquired and not for potential additional business she may be able to originate after the deal. We do not add risk because it would have been arbitrary to measure it, discriminating between different SAP, and because we can assume that in this highly homogeneous setting the risk profile is basically common to all the SAP.

[3] To a certain extent, a proxy for the target firm's growth prospects may be captured by the non-financial categorical variable small town vs big city and a proxy for risk may be incorporated in the dimensional variable (sales) and in the seller's age variable (more on this in the following discussion).

2.2 Non-financial information

Previous studies suggest that value relevant non-financial information is specific for the industry (Amir & Lev, 1996; Hughes, 2000; Trueman et al., 2000; Rajgopal, Kotha, and Venkatachalam, 2000; Clarkson, Fang, Li, and Richardson, 2013; Sievers et al., 2013)[4]. Therefore, we discussed the issue in unstructured interviews with the managers of MpO&Partners and browsed specific practitioner-oriented literature (Sinkin & Putney, 2013, and 2014). As a result, we include in the regression model two explanatory variables of non-financial nature specific to the target firm:

-SA, Firm Partner's (Seller's) Age. It is the age of the owner – in case of a firm run by a lone practitioner – or the average age of the partners, in case of a partnership. We anticipate this characteristic to be relevant and negatively associated with the P/Sales multiple, because the clients of a SAP tend to view their relationship with the firm as something personal (Sinkin & Putney, 2013) with the partners they usually deal with (not as an institutional relationship with the firm). Moreover, clients belong to the same age group of the partners of the SAP. Hence, all else held equal, the risk of losing the clients is presumably higher if the seller is older, because her clients are probably on average closer to retirement and an older client may experience more difficulty to adjust to the change moving on from an established personal relationship;

-ST, Location in Small Town, a categorical variable that we expect to influence negatively the multiple paid for the firm. As Sinkin and Putney (2013) argument, if a SAP is located in a marketplace where many other accounting firms are looking to buy a SAP, the demand for the practice is greater and the value is driven upwards, while in more remote areas the supply-and-demand curve is different. Moreover, the market for the acquisitions of SAP in bigger cities presumably has greater liquidity and business opportunities for growth should be more promising in urban centres as opposed to rural areas.

[4] Amir and Lev (1996) found the value relevance of market population and penetration rate in the wireless industry. Hughes (2000) provided evidence of the relevance of air pollution measures for electric utilities. Trueman et al. (2000) confirmed the importance of unique visitors and page views and Rajgopal et al. (2000) of website traffic, for internet-based companies. Clarkson et al. (2013) found that toxic emissions and voluntary environmental disclosure are valued in the paper sector. Sievers et al. (2013) corroborated the importance of prior experience of the founding team, first reference customer, and presence of cooperation partners for venture capital-backed firms.

2.3 Deal characteristics

Within the deal characteristics category we consider two variables, after ruling out the inclusion among them of the retention period (during which a claw-back clause triggers a price adjustment if sales do not materialize) because in almost all cases this amounts to 12 months, so it would not discriminate significantly between different transactions:

-lnD, the terms of payment of the purchase price by the buyer, expressed by a log transformed duration index (calculated in months, see Table 1 for definition). We prognosticate a positive relation between our duration variable and the P/S multiple, since the transaction price in the numerator of the P/Sales is a nominal amount and the present value of a stream of payments increases as the time horizon over which they fall due shortens (and vice versa). We expect, though, the impact of longer payment terms on the P/S multiple to be gradually decreasing. From a financial point of view, pushing further away the due date of payments from months closer to the deal execution weighs more than doing the same on more distant amounts (this is also consistent with how we calculated the duration index, without considering any discount factor). Thus, while keeping the explained variable (P/S) in its original scale, we use natural log values for the terms of payment duration index;

-SD, Share Deal, categorical variable that takes on the value of 1 if the transaction is structured in the form of a transfer of shares – not originating deductible amounts for the buyer – and 0 if it is structured as an asset deal or a transfer of a fee parcel, in both cases granting the buyer a deduction from taxable income. We expect the multiples will show a negative association with share deals given their less favourable tax treatment.

3. Data

3.1 Sample Origination

Our sample counts 47 deals whose closing occurred in the five-year period from 2012 to 2016 in Italy, involving the transfer of SAP, which we refer to as firms and practices operating in the SIC 8721 sector: accounting, auditing, and bookkeeping services.

We could perform the study because we had the chance to access a unique database made of hand collected financial and non-financial data provided by MpO&Partners, a firm specialized in advising professionals (mostly accountants, but also lawyers, dentists, etc.) and facilitating M&A transactions having as typical targets regulated professional practices. Since

MpO&Partners advisory covers the entire transaction providing valuation, negotiation and contract drafting services, it has access to all information and documents relating to the transferred SAP and the deal. For the purpose of this study, owing to the sensitive nature of the data, we agreed with the firm that they would provide all the data in an anonymous form, that we would treat the data as strictly confidential and that all the economic benefits of this research would accrue to MpO&Partners. The available information includes historical and prospective financial data, non-financial information and the clauses and terms of the sale and purchase agreement: the price paid, the sales expected from the practice recurrent operations (and subject to a claw-back clause if they do not materialize during the retention period that, in almost all cases, is 12 months), the age of the firm's partner(s), the location of the head office, the EBITDA and cash flows expected from the practice's recurrent activity in the three years after the deal, the terms of payment of the purchase price, the clause of restraint of trade typically assumed by the vendor, the length of the retention period (during which sales are monitored and a price adjustments is applied in case they don't materialize), and the type of deal structure.

We consider only external sales, and exclude internal sales to buyers who were already partners of the SAP at the time of the closing, since it would result in a non-homogenous sample. As Sinkin and Putney (2013) point out and anecdotal evidence suggests, the multiple charged to a partner of the target firm is presumably lower than the multiple charged to a stranger, because the vendor does not deem fair that their partner would pay – at least not entirely – for the business they contributed to build. On ground of lack of homogeneity we also consider only firms and practices with a maximum of 1 million € sales. As claimed by Sinkin and Putney (2013), small and big accounting firms differ sensibly from each other, in particular the clients of a SAP tend to view their relationship with the firm as something personal with the partners they usually deal with (not as an institutional relationship with the firm).

The industry specific data set we have had access to is unique and valuable as long as SAP keep M&A data confidential, and according to the local Italian regulation, M&As of accounting practices in the form of the sale of a fee parcel are allowed only since year 2010. For example, Pratt's stats, provides for the same four digit SIC code (8721) only 76 deals for the same 2012-2016 period worldwide and no deals since 1996 imposing Italy as the single country of origination of the deals (data as February 20, 2017). This lack of data explains the absence of

specific literature available on the accounting industry, and encouraged us to embark on this study, which relies on a smaller sample of transactions compared to prior researches that could count on larger samples but refer to many sectors (Sievers et al., 2013; Hand, 2005). Of similar dimension compared to ours, is the classic study of Kaplan and Ruback (1995), who analysed 51 highly leveraged transactions (resulting in a transition of the target firm from public to private) in order to test the valuation accuracy of a discounted cash flow model, benchmarked against other valuation methods such as those based on comparable transactions.

3.2 Data description

Summary statistics for all collected variables referring to the investigated 47 deals, defined as illustrated in Table 1, are provided in Table 2. The average SAP in our sample has a turnover of 333 thousand euros with an (unlogged) EBITDA margin of 40%. This higher-than-average profitability, compared to other industries, is due to SAP cost structure: relevant cost items are limited to payroll, IT (hardware and software), office rental and overheads. SAP do not usually need significant equipment or inventory, neither incur relevant marketing expenses, since relationships with clients are long-term and recurring. Moreover, SAP owners are skilled professionals with knowledge of business financials, and their firms can benefit from that. Finally, the implicit owner compensation is not accounted in the margin calculation.

SAP within our sample are equally distributed between those located in small cities (with less than 50,000 residents) and big cities (24 vs 23), and their owners are on average 58 years old suggesting that SAP transfers most likely take place at a time when business is already developed and consolidated (not in the start-up phase).

The average P/Sales multiple is 1.35 and the vast majority of the transactions are transfers of fee parcel or sales of the business (83%), showing a strong preference for the most convenient tax regime for the acquirer. Transactions may have three alternative deal structures: i) sale of a fee parcel, whereby the vendor transfers to the buyer only the contracts and the relationships with the clients; ii) asset deal, if the seller transfers also the invested capital and the contracts with the employees; or iii) share deal, in case the buyer acquires the shares of a limited liability corporation. The first two deal structures (sale of a fee parcel and asset deal) have a more favorable fiscal treatment for the buyer, which can deduct the price paid from its

taxable income (all in the current year or amortizing the amount), while that is not possible if it is a share deal.

Our sample, although coming from a single source, shows a high degree of heterogeneity since all variables vary sensibly. For instance, (unlogged) EBITDA margin of SAP ranges from a minimum of 15% to a maximum of 65% (standard deviation 10%). Deals are heterogeneous too, with terms of payment of the purchase price by the buyer, expressed by the (unlogged) duration index, ranging from 8 to 38 months (standard deviation 7). Sellers' age range between 42 and 77, consistently with the variety of channels (internet advertising, conferences, direct marketing) used by MpO&Partners to reach potential clients.

Table 2 (Panel B) summarizes Spearman and Pearson correlations between the variables used in the regression model. Overall, correlation coefficients are consistent with the expectations and seem to be not too large, and therefore should not provide redundant information. Only the correlation between CFT and lnMar is quite high, since SAP with higher profitability have less costs to incur in advance and greater cash flows for a given level of revenues. However, a subsequent analysis indicates that the risk of multicollinearity is not impairing our analysis having found a Variance Inflation Factor always lower than 2.5.

4. Research Design

As discussed in Section 2, we aim to test the following

Hypothesis: the multiple derived from the linear regression of the P/Sales multiple on relevant value drivers outperforms, in terms of prediction accuracy, the harmonic averaged P/Sales and P/EBITDA multiples.

As explained in Section 2 we developed the regression model, building on the Bhojraj and Lee (2002) model, including some non-financial information and deal characteristics.

We prefer this approach to the regression of logged prices on mostly logged explanatory variables, which is frequently adopted in the value relevance strand of research (Gompers & Lerner, 2000; Hand, 2005; Sievers et al. 2013). Log models have been praised by some researchers for their flexibility in accommodating concave, convex or linear relationships between variables (Ye & Finn, 1999), because they are more robust in presence of anomalous data and outliers and because they are characterized by greater homoscedasticity of the residuals (Hand, 2000). The main drawback could be the difficulty to derive from theory a

model where value is a log function of financial and non-financial information (Hand, 2005). In fact, an alternative approach to handle the potential distortions originated by size effect and by anomalous data is to regress values scaled by some measure of size (Kim & Ritter, 1999; Bhojraj & Lee, 2002; Beatty et al. 2000).

We choose this latter approach and adopt a linear regression model, using the P/Sales multiple as explained variable and mostly non-logged independent variables because it favours an easier interpretation of the results in the specific context of SAP, where the application of a raw P/Sales multiple is considered a common benchmark by valuation practitioners. We do not need to consider asset side multiples (Enterprise Value to Sales), as long as all the firms in the sample have been transferred debt-free as it is common practice for this kind of transactions.

We identify seven explanatory variables of the variation of the P/Sales multiple (see Section 2 for a discussion), which were all available to buyers at the time of the deal, based on economic theory, empirical evidence from prior studies and industry practice (Fama & French, 1992; Hand, 2000; Kim & Ritter, 1999; Sinkin & Putney, 2013 and 2014). Explanatory variables are log transformed only if ex ante there was a specific theoretical reason for doing so. In particular, we log transform the profit margin, considering that the higher is the profitability the higher should be also the execution risk and the probability that competition may erode the advantage of the firm achieving that higher-than-normal profitability, and our duration index expecting the impact of longer payment terms on the P/S multiple to be gradually decreasing.

Our comprehensive model to regress the P/Sales multiple is the following:

$$\frac{P}{S} = \alpha + \beta_1 S + \beta_2 SA + \beta_3 ST + \beta_4 lnMar + \beta_5 lnD + \beta_6 CFT + \beta_7 SD + \varepsilon \qquad (1)$$

where the euro amount of expected sales (S), the natural logarithm of profit margin (lnMAR), and the cash flow timing (CFT) of SAP represent financial information; the age of the seller (SA), and a categorical variable which takes a value of one if the SAP is located in a small town (ST) represent non-financial information. The terms of payment of the purchase price (lnD) and a second categorical variable that takes a value of one if the deal is structured as a share deal (SD) refer to deal characteristics. Variables are defined in Table 1.

Given the absence of previous studies on the industry, we also check the relative value

relevance (i.e. explanatory power of the factors) of the explanatory variables. Thus, following Sievers et al. (2013) and Hand (2005), we decompose the overall R^2 of the comprehensive regression model in mutually exclusive parts: the portions attributable uniquely to financial information, uniquely to non-financial information, uniquely to deal characteristics, and the residual portion attributable to the combinations of the variables. This last part appears to be sufficiently modest due to the quite small correlation between covariates.

The analysis of the statistical significance of the regression coefficients (see Table 3) jointly with the consideration of the small size of our data sample, suggests to perform an exploratory study to determine a "reduced" model, and – given our main research goal (value accuracy) – we give preference to the prediction (over the fitting) aspect. For this reason, in order to apply the so-called "law of parsimony", and to select a reduced model, we run the Cp Mallows' criterion (Mallows, 1973), which compares the predictive power of models including only subsets of the variables appearing in the comprehensive model to that of the complete model, without any specific underlying distributional assumption. As additional controls, we also run the Akaike Information Criterion (AIC, see Akaike, 1998) and the Bayesian Information Criterion (BIC, see Schwarz, 1978), both based on information theory.
All these criteria converge in selecting the following reduced model comprising just three explanatory variables:

$$\frac{P}{S} = \alpha + \beta_1 \, ST + \beta_2 \, lnMar + \beta_3 \, lnD + \varepsilon \qquad (2)$$

To compare the valuation accuracy of the regressed P/Sales multiple with the accuracy of the simple harmonic averaged P/Sales and P/EBITDA multiples, we follow the widespread approach of comparing pricing errors. Pricing errors measure an estimate's proximity to the actual deal price or market value for listed companies. Assuming that the error is proportional to price (Lev & Sunder, 1979; Baker & Ruback, 1999; Beatty, et al., 1999), and consequently should be scaled by price, valuation errors can be computed in many different ways: percentage errors, absolute percentage errors and logarithmic errors are widely adopted in

prior studies[5]. Since the choice of the error measure may influence the ranking of different valuation methods (Dittman & Maug, 2008), to confirm that our results do not depend on how we compute the errors, and to enhance comparability with prior literature, we calculate dispersion metrics for the following four different measures of pricing errors.

$$\text{Percentage error for firm i} = \frac{\text{Predicted Price}_i - \text{Actual Price}_i}{\text{Actual Price}_i} \quad (3)$$

We compare this first measure (in terms of interquartile range) with Liu et al. (2002) who actually compute the error as actual price minus predicted price, all scaled by the actual price.

$$\text{Absolute Percentage error for firm i} = \left|\frac{\text{Predicted Price}_i - \text{Actual Price}_i}{\text{Actual Price}_i}\right| \quad (4)$$

We benchmark this second measure against Bhojraj and Lee (2002).

$$\text{Log error for firm i} = \log\left(\frac{\text{Predicted Price}_i}{\text{Actual Price}_i}\right) \quad (5)$$

$$\text{Absolute log error for firm i} = \left|\log\left(\frac{\text{Predicted Price}_i}{\text{Actual Price}_i}\right)\right| \quad (6)$$

Sievers et al. (2013) adopt (6) and therefore we compare the outcome with their study.

We determine the predicted price for the regressed multiple model with an out-of-sample procedure: i) we run the reduced regression model 47 times on all the data points excluding those referred to the target firm, ii) we compute the appropriate P/Sales multiple by applying all the value drivers (explanatory variables) observed for the target firm to the resulting regression equation, and iii) we multiply the appropriate P/Sales multiple by the Sales of the target firm to obtain the predicted price.

[5] Percentage error has been adopted by Alford (1992), Beatty et al. (1999), Dechow, Hutton and Sloan (1999), Cheng and McNamara (2000), Francis, Olsson and Oswald (2000), Bhojraj and Lee (2002), Liu et al. (2002), and Penman and Sougiannis (1998).
Kaplan and Ruback (1995), Kim and Ritter (1999), Gilson, Hotchkiss and Ruback (2000), E. Lie and Lie (2002), Herrmann and Richter (2003), Sievers et al. (2013) prefer to benchmark log or absolute log errors. There are also other configurations. For example, Hand (2000) uses a Symmetrized Relative Pricing Error (SRPE):

$$SRPE = \begin{cases} \left|\widehat{M}_i/M_i - 1\right| & if\ \widehat{M}_i \geq M_i \\ \left|1 - M_i/\widehat{M}_i\right| & if\ \widehat{M}_i < M_i \end{cases}$$

where $\widehat{M}_i$ is the predicted price and M_i is the actual price, for firm i.

We then make an out-of-sample estimate of the predicted price for each transaction using the harmonic mean of the P/Sales multiple of the entire sample and of the best five deals matched by size (measured by transaction prices), in both cases excluding the observed multiple of the transaction involving the target firm. Then, we replicate the procedure for the predicted values using the harmonic mean of the P/EBITDA multiple.

5. Empirical Analysis and Results

Table 3 provides regressions' results for both the complete and the reduced regression models (equations 1 and 2). The comprehensive regression model performed well reaching a 64.5% adjusted R^2, comparable to that of Sievers et al. (2013) (57%) and Hand (2005) (76%). Three out of the seven explanatory variables, namely the location, the profit margin of the SAP, and the terms of payments of the purchase price, resulted statistically significant at (at least) the 1% level, and five out of seven coefficient signs turned out as expected. All else held equal, for firms located in a small town, the multiple of sales is on average lower by 0.15 units; a 1% increase of the profit margin raises on average the multiple by 0.005 units; a 1% increase of the terms of payment accorded to the buyer (measured by the monthly duration index) increases on average the multiple by 0.002 units. The age of the seller decreases the multiple on average by 0.003 for each additional year and the expected sales' coefficient is negligible. Our cash flow timing index and deal structure categorical variable did not meet our expectations on coefficient signs, the first decreasing the multiple as SAP cash generation ability increases and the second increasing it when the least beneficial share deal structure is chosen. These four last mentioned results, however, may be attributed to noise as there is not statistical significance.

As previously described, we divide the variables into three groups: financial information (S, lnMar, CFT), non-financial information (SA, ST), and Deal characteristics (lnD, SD). Table 3 (Panel B) reports the portion of the R^2 attributable to each group. The unique contribution of financial information is the largest, followed by that of non-financial information. As we expect SAP within our sample are more likely to be already developed/consolidated (not likely to be in the start-up phase), this result is consistent with Hand (2005), which pointed out that the value relevance of financial statements increases as firms mature. However, non-financial information (namely location of the practices in small cities) remains statistically significant in

both the complete and the reduced model (adding explanatory power), suggesting a complementarity between financial and non-financial information in line with Amir and Lev (1996), Trueman et al. (2000), and Sievers et al. (2013).

We also analysed the relative importance of the explanatory variables individually, running a regression on standardized variables. As reported in Table 3, we found the logged profit margin to be the most relevant (coefficient 0.758), followed by the logged duration index of the terms of payment (0.440) and by the location of the practice (0.437). The prominence of profit margins in explaining a sales multiple is consistent with prior literature (Bhojraj and Lee, 2002) and orthodox textbook doctrine: Damodaran (2012) illustrates that firms with higher operating margins, lower reinvestment rates (for any given growth rate) and lower costs of capital will trade at higher value to sales multiples. Also Koller, Goedhart, and Wessels (2010) show that the EV-to-sales multiple is a function of ROIC and expected growth as well as EBITA margin. They also regress the EV/S multiple on the EBITA margins for non-financial companies in the S&P 500, finding an R^2 of approximately 50%.

The reduced model confirmed the adjusted R^2 at 65%, as well as the sign and significance of coefficients. Results of Mallows Cp model selection are reported in Table 4.

Once defined the parsimonious regression model, we run some standard tests and control for the regression analysis underlying assumptions. In particular, after performing a zero mean t-test on the residuals, we tested their normality by the Shapiro-Wilk normality test (Shapiro & Wilk, 1965), their homoscedasticity using the Studentized Breusch-Pagan test (Breusch & Pagan, 1979), and the no serial correlation by the Durbin-Watson test (Durbin & Watson, 1951). The tests did not expose specific criticalities.

We finally controlled both the complete and the reduced model for fixed year effects, finding no evidence of them, and challenged our expectations on the relations between the EBITDA margin, the monthly duration index and the P/S multiple, running alternative regressions using non-logged transformed variables, which achieved lower significance coefficients and overall a lower R^2.

To test the valuation accuracy of the regressed P/S multiple (derived from the reduced model), we generated out-of-sample predicted values and pricing errors for all the 47 deals under observation, and compared them with those obtained using simple average P/S and P/EBITDA. As Table 5 shows, by all the measures of the pricing error, the regressed multiple performs

better as a predictor of the actual transaction price than the harmonic mean of the P/Sales, or of the P/EBITDA (both calculated with all the observations in the sample excluding the target firm or with only the best five firms matched by size). The best simple average multiple is the P/Sales, while the average P/EBITDA gives less accurate predictions. This confirms the importance – in the context of SAP – of the gross amount of fees transferred as the primary driver of value, which underlies the widespread adoption of the P/Sales multiple as a benchmark in the industry for a raw valuation of SAP. It is also interesting to observe that by many measures of the pricing errors, restricting the calculation of the average multiple to the five firms best matched by size does not improve significantly the prediction accuracy. This result is consistent with the absence of statistical significance of the regression coefficient on size (sales) that was included in the full model and then removed from the equation in the reduced model.

Overall, we confirm our research hypothesis, i.e. that the P/S multiple derived from the regression on relevant value drivers outperforms, as a valuation metric, the harmonic averaged P/Sales and P/EBITDA multiples in the sector. The median absolute error is 4.70% for the regressed multiple, sensibly reduced from the same measure (11.30%) for the best alternative multiple (P/Sales harmonic mean).

The result is remarkable considering that the precision of the valuation model is far better than what prior researches on multiples based valuation model documented both for private firms and listed companies. For example, the best performing multiples in Liu et al. (2002) are the ratios of one (two, three) year(s) away EPS (Earnings per share) to price and the sum of discounted or nominal EPS forecasts for years +1 to +5 to price, which shows an IQ range of the valuation error (calculated as actual price minus predicted price, all scaled by the actual price) equal to 0.307 when value and value drivers are assumed to be proportional (no intercept allowed) and 0.301 when an intercept is allowed. This result can be compared with the interquartile range of our raw percentage error of 0.098 for the regressed multiple and 0.157 for the harmonic average of the P/Sales multiple.

Bhojraj and Lee (2002) found a median absolute error for the harmonic-averaged EV/S multiple of the four firms best matched on size, after controlling for the industry, of 55%, and for their warranted EV/S multiple of 35% (36% after controlling for the industry and using the four firms best matched on their warranted multiple). The correspondent measure in our analysis is the

median absolute error of 4.7% for the regressed multiple and 11.3% for the P/Sales harmonic mean.

Sievers et al. (2013) report median out-of-sample absolute log error (for their full model with financial and non-financial explanatory variables, controlling for deal characteristics) of 52% (41% in-sample). By the same measure, we achieve a median absolute log error of only 4.8% when the price is predicted with the regressed multiples, and 11.8% when the predictions are made using the harmonic average of the P/Sales of the five firms best matched by size.

Overall, the precision of the valuation models in our context is probably due to the highly homogeneous setting in which the transactions that we analysed have been originated. As Liu et al. (2002) pointed out, using large and heterogeneous data sets – as they did, analysing a large sample of listed companies belonging to various industries – could compromise the performance of multiples, since the researchers have to select comparable firms mechanically (while market participants choose carefully comparable firms considering also context-specific elements not always observable by researchers). Firms in our sample are, on the contrary, highly comparable, since they belong to the same industry, they are based in the same country, they have similar size, etc..

6. Conclusions and Future Developments

The starting point of this study was the direct observation that in the past target SAP have often been priced applying a raw multiple of the gross fees originated by the recurring clients of the SAP, without further questioning by the buyer or the seller.

This heuristic procedure could be exploited by some opportunistic players, and may originate an adverse selection phenomenon, whereby only the less performing firms would be sold because the best performing could not be priced at a fair level above the fixed multiple established as a common practice in the market.

In this context, the relevance of this study is mainly practical and specific to the highly homogeneous setting where the research has been conducted, as long as we cannot generalise the results of our analysis to a wider context. A more accurate valuation algorithm may prevent the adverse selection in the M&A market for SAP, and, in a general perspective, allows a more precise valuation of these firms, where a significant portion of the Italian professionals operate (in 2016 in Italy there were 117.916 Chartered Accountants). The benefits of a fairer valuation

process include the facilitation of the transfer of the firms, the possible solution of succession issues, and the preservation of the intangible capital incorporated in the competencies, skills, and organisation developed around one or few professionals.

Looking at future implementations of this study we may enlarge the data set, as long as MpO&Partners goes on collecting new data, which can be fed into the model, possibly testing alternative frameworks in order to achieve better accuracy. For example, we may add other non-financial information, such as the different type of the main activity carried on by the firm (audit, accounting, taxes, M&A, bankruptcy) or we could discriminate between internal (to current partners) and external sales. Another possible avenue of future development could be to consider cross-countries data, if available.

References

Akaike, H. (1998). Information theory and an extension of the maximum likelihood principle. *Selected Papers of Hirotugu Akaike* (pp. 199-213). Springer, New York

Alford, A. W. (1992). The effect of the set of comparable firms on the accuracy of the price-earnings valuation method. *Journal of Accounting Research*, 94-108.

Amir, E., & Lev, B. (1996). Value-relevance of nonfinancial information: The wireless communications industry. *Journal of Accounting and Economics*, 22(1), 3-30.

Anthony, J. H., & Ramesh, K. (1992). Association between accounting performance measures and stock prices: A test of the life cycle hypothesis. *Journal of Accounting and Economics*, 15(2), 203-227.

Armstrong, C., Davila, A., & Foster, G. (2006). Venture-backed private equity valuation and financial statement information. *Review of Accounting Studies*,11(1), 119-154.

Baker, M., & Ruback, R. (1999). Estimating industry multiples. *Harvard University*.

Beatty, R. P., Riffe, S. M., & Thompson, R. (1999). The method of comparables and tax court valuations of private firms: An empirical investigation. *Accounting Horizons*, 13(3), 177-199.

Behn, B. K., & Riley, R. A. (1999). Using nonfinancial information to predict financial performance: The case of the US airline industry. *Journal of Accounting, Auditing & Finance*, 14(1), 29-56.

Bhojraj, S., & Lee, C. (2002). Who is my peer? A valuation-based approach to the selection of comparable firms. *Journal of Accounting Research*, 40(2), 407-439.

Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation. *Econometrica: Journal of the Econometric Society*, 1287-1294.

Cheng, C. A., & McNamara, R. (2000). The valuation accuracy of the price-earnings and price-book benchmark valuation methods. *Review of Quantitative Finance and Accounting*, 15(4), 349-370.

Clarkson, P. M., Fang, X., Li, Y., & Richardson, G. (2013). The relevance of environmental disclosures: Are such disclosures incrementally informative? *Journal of Accounting and Public Policy*, 32(5), 410-431.

Damodaran, A. (2012). *Investment valuation: Tools and techniques for determining the value of any asset* (Vol. 666). John Wiley & Sons.

Dechow, P. M., Hutton, A. P., & Sloan, R. G. (1999). An empirical assessment of the residual income valuation model. *Journal of Accounting and Economics*, 26(1), 1-34.

Dittmann, I., & Maug, E. G. (2008). *Biases and error measures: How to compare valuation methods*. Working Paper, University of Mannheim, Germany.

Durbin, J., & Watson, G. S. (1951). Testing for serial correlation in least squares regression. II. *Biometrika*, 38(1/2), 159-177.

Fama E. F., French K. R. (1992). The cross-section of expected stock returns. *The Journal of Finance*, 47(2), 427-465.

Francis, J., Olsson, P., & Oswald, D. R. (2000). Comparing the accuracy and explainability of dividend, free cash flow, and abnormal earnings equity value estimates (Digest Summary). *Journal of Accounting Research*, 38(1), 45-70.

Gilson, S. C., Hotchkiss, E. S., & Ruback, R. S. (2000). Valuation of bankrupt firms. *Review of Financial Studies*, 13(1), 43-74.

Gompers, P., & Lerner, J. (2000). Money chasing deals? The impact of fund inflows on private equity valuation. *Journal of Financial Economics*, 55(2), 281-325.

Hand, J. R. (2000). Profits, losses and the non-linear pricing of Internet stocks. Available at SSRN 204875.

Hand, J. R. (2005). The value relevance of financial statements in the venture capital market. *The Accounting Review*, 80(2), 613-648.

Herrmann, V., & Richter, F. (2003). Pricing with performance-controlled multiples. *Schmalenbach Business Review*, 55(3), 194-219.

Holthausen, R. W., & Watts, R. L. (2001). The relevance of the value-relevance literature for financial accounting standard setting. *Journal of Accounting and Economics*, 31(1), 3-75.

Hughes, K. E. (2000). The value relevance of nonfinancial measures of air pollution in the electric utility industry. *The Accounting Review*, 75(2), 209-228.

International Federation of Accountants (IFAC). (2010). *Guide to practice management for small-and medium-sized practices*, New York. Retrieved from www.ifac.org/system/files/publications/files/guide-to-practice-managemen-1.pdf.

Ittner, C. D., & Larcker, D. F. (1998). Are nonfinancial measures leading indicators of financial performance? An analysis of customer satisfaction. *Journal of Accounting Research*, 36, 1-35.

Kaplan, S. N., & Ruback, R. S. (1995). The valuation of cash flow forecasts: An empirical analysis. *The Journal of Finance*, 50(4), 1059-1093.

Kim, M., & Ritter, J. R. (1999). Valuing ipos. *Journal of Financial Economics*, 53(3), 409-437.

Koller, T., Goedhart, M., & Wessels, D. (2010). *Valuation: measuring and managing the value of companies* (Vol. 499). John Wiley and sons.

Lev, B., & Sunder, S. (1979). Methodological issues in the use of financial ratios. *Journal of Accounting and Economics*, 1(3), 187-210.

Lie, E., & Lie, H. J. (2002). Multiples used to estimate corporate value. *Financial Analysts Journal*, 58(2), 44-54.

Liu, J., Nissim, D., & Thomas, J. (2002). Equity valuation using multiples. *Journal of Accounting Research*, 40(1), 135-172.

Liu, J., Nissim, D., & Thomas, J. (2007). Is cash flow king in valuations?. *Financial Analysts Journal*, 63(2), 56-68.

Mallows, C. L. (1973). Some comments on Cp. *Technometrics*, 15(4), 661-675.

Ohlson, J. A. (1995). Earnings, book values, and dividends in equity valuation. *Contemporary Accounting Research*, 11(2), 661-687.

Penman, S. H., & Sougiannis, T. (1998). A comparison of dividend, cash flow, and earnings approaches to equity valuation. *Contemporary Accounting Research*, 15(3), 343-383.

Rajgopal, S., Kotha, S., & Venkatachalam, M. (2000). *The relevance of web traffic for internet stock prices*. Graduate School of Business, Stanford University.

Schwarz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics*, 6(2), 461-464.

Shapiro, S. S., & Wilk, M. B. (1965). An analysis of variance test for normality (complete samples). *Biometrika*, 52(3/4), 591-611.

Shevlin, T. (1996). The value-relevance of nonfinancial information: A discussion. *Journal of Accounting and Economics*, 22(1), 31-42.

Sievers, S., Mokwa, C. F., & Keienburg, G. (2013). The relevance of financial versus non-financial information for the valuation of venture capital-backed firms. *European Accounting Review*, 22(3), 467-511.

Sinkin, J., & Putney, T. (2013). Methods and Results Differ for External Transactions and Internal Transfers. *Journal of Accountancy*, Vol. 216, No. 5.

Sinkin, J., & Putney, T. (2014). Pricing Issues for Small Firm Sales: What Partners Need to Know to Maximize Proceeds When Selling Their Practice. *Journal of Accountancy*, Vol. 218, No. 4, 24.

Trueman, B., Wong, M. F., & Zhang, X. J. (2000). The eyeballs have it: Searching for the value in Internet stocks. *Journal of Accounting Research*, 137-162.

Wright, M., & Robbie, K. (1996). Venture capitalists, unquoted equity investment appraisal and the role of accounting information. *Accounting and Business Research*, 26(2), 153-168.

Ye, J., & Finn, M. (1999). *Nonlinear and Nonparametric Accounting-based Equity Valuation Models*. Working Paper, Baruch College, University of New York.

Table 1 – Definition of regression variables and sign prediction

	Label	Unit of measurement	Definition	Sign prediction
Explained variable				
P/Sales	P/S	Dimensionless number	Transaction price (Euros) scaled by Sales (Euros)	
Explanatory variables				
Financial information regarding the firm				
Sales (as a proxy of size)	S	Euros	Sales expected in the first three years after the deal (a claw-back clause triggers a price adjustment if the expected sales do not materialize during the retention period, typically 12 months)	+
Profit Margin	ln *Mar*	Dimensionless number	Natural logarithm of the ratio expected (in the three years after the deal) EBITDA (Earnings Before Interest Taxes Depreciation and Amortization) to Sales	+
Cash Flow Timing	CFT	Dimensionless number	Sum of Expected Cash Flow for Years 1-3 after the deal scaled by Cash Flow Expected for Year 3	+
Non-financial information regarding the firm				
Firm Partners' (Seller's) Age	SA	Years	Age of the partner in case of lone practitioner and average age of the partners in case of a partnership	-
Location in Small Town	ST	Categorical variable 0/1	It takes on the value 1 if the firm's head office is located in a small town (with less than 50,000 residents), 0 otherwise	-
Deal characteristics				
Terms of Payment	ln *D*	Duration Index (months)	$\frac{\sum P_t \times t}{\sum P_t}$ where P_t is the Euro amount of the portion of the purchase price paid at month *t* (upfront payment is considered made at *t* = 1)	+
Share Deal	SD	Categorical variable 0/1	Takes on the value 1 if the transaction is a transfer of shares (not deductible for the buyer), 0 if the transaction is a transfer of fee parcel or sale of the business (payment deductible for the buyer)	-

Notes: This table reports the definitions of the explained variable and the definitions and sign prediction for all explanatory variables included in our regression models. The explanatory variables are grouped by type of information (financial, non-financial, and relating to deal's characteristics). Sign predictions refer to the relationship between the Sales multiple and each explanatory variable.

Table 2 – Regression variables: summary statistics and correlations

PANEL A: Summary statistics

	N	Min	Max	Q1	Median	Q3	Mean	SD
Explained variable:								
P/Sales multiple (P/S)	47	0.814	1.512	1.273	1.398	1.495	1.349	0.172
Explanatory variables:								
Sales (S)	47	45,860	841,951	195,867	322,710	416,548	333,649	190,564
Profit Margin (lnMar)	47	-1.880	-0.430	-0.997	-0.895	-0.770	-0.901	0.263
Cash Flow Timing (CFT)	47	0.505	3.000	2.065	2.351	2.643	2.322	0.462
Firm Partners' Age (SA)	47	42.5	77.0	51.0	56.0	64.5	57.6	8.7
Location in Small Town (ST)	47	0.00	1.00	0.00	1.00	1.00	0.51	0.50
Terms of Payment (lnD)	47	2.089	3.646	2.760	3.072	3.223	2.979	0.377
Share Deal (SD)	47	0.00	1.00	0.00	0.00	0.00	0.17	0.38

PANEL B: Spearman/Pearson correlation

	PS	S	lnMar	CFT	SA	ST	lnD	SD
P/Sales multiple (P/S)		0.10	0.35	0.19	-0.49	-0.36	0.28	0.05
Sales (S)	0.13		-0.14	0.25	0.02	-0.09	0.24	0.30
Profit Margin (lnMar)	0.56	-0.12		0.55	-0.30	0.17	-0.33	0.24
Cash Flow Timing (CFT)	0.37	0.18	0.65		-0.29	0.00	-0.27	0.34
Firm Partners' Age (SA)	-0.47	-0.04	-0.36	-0.33		-0.17	-0.32	-0.10
Location in Small Town (ST)	-0.32	-0.09	0.05	-0.07	-0.16		0.00	0.10
Terms of Payment (lnD)	0.18	0.18	-0.39	-0.33	-0.32	0.12		-0.13
Share Deal (SD)	0.11	0.26	0.20	0.32	-0.12	0.10	-0.16	

Notes: This table shows summary statistics and correlations of the variables included in our regression models. Variables are defined in Table 1. Panel A shows summary statistics of explained and explanatory variables referring to 47 transfers of Small Accounting Practices (SAP), occurred between 2012 and 2016. N indicates the number of observations, Min and Max the minimum and maximum value observed for each variable, Q1 and Q3 the first and third quartiles, SD the standard deviation. Profit margin and terms of payment are (natural) log-transformed, ST and SD are categorical variables. Panel B shows the correlation between the variables; Spearman correlation estimates are reported in the upper triangle, Pearson correlation coefficients in the lower one.

Table 3 – P/S multiple regressions results

PANEL A: complete model regression	Sign prediction	Coefficient	Std. Error	*Coefficient for standardized variables*	t-value	Pr(>|t|)	
Intercept	#	1.488	0.305		4.877	0.000	***
Financial information							
Sales (S)	+	0.000	0.000	*0.100*	1.001	0.323	
Profit Margin (lnMar)	+	0.496	0.087	*0.758*	5.698	0.000	***
Cash Flow Timing (CFT)	+	-0.034	0.049	*-0.092*	-0.699	0.489	
Non-financial information							
Firm Partners' Age (SA)	-	-0.003	0.002	*-0.150*	-1.283	0.207	
Location in Small Town (ST)	-	-0.149	0.031	*-0.437*	-4.780	0.000	***
Deal characteristics							
Terms of Payment (lnD)	+	0.201	0.055	*0.440*	3.660	0.001	**
Share Deal (SD)	-	0.026	0.044	*0.057*	0.585	0.562	
Adjusted R-squared: 64.5%							
Multiple R-squared: 69.9%							

PANEL B: R-squared decomposition	
Complete model R-squared	69.9%
	Method
	LAST
Unique to financial	*29.8%*
Unique to non-financial	*18.1%*
Unique to deal characteristics	*10.3%*
Attributable to combinations	*11.7%*

Table 3 – Continued

PANEL C: reduced model regression	Sign prediction	Coefficient	Std. Error	*Coefficient for standardized variables*	t-value	Pr(>|t|)	
Intercept	#	1.156	0.120		9.663	0.000	***
Profit Margin (lnMar)	+	0.516	0.062	*0.788*	8.288	0.000	***
Location in Small Town (ST)	-	-0.144	0.030	*0.423*	-4.792	0.000	***
Terms of Payment (lnD)	+	0.246	0.044	*0.538*	5.619	0.000	***
Adjusted R-squared: 65.1%							
Multiple R-squared: 67.4%							

Notes: This table reports the results of the regression analysis of P/Sales multiples based on 47 observations of transfers of Small Accounting Practices (SAP). Sign prediction represents our expectations on the coefficient sign for each explanatory variable and coefficients for standardized variables are calculated after standardizing both explained and explanatory variables. The asterisks following Pr(>|t|) indicate that the coefficient differs from zero at the 5% (*), 1% (**) or 0.1% (***) level. Panel A reports the regression's results for a complete model that considers all the explanatory variables, Panel C reports the regression's results of a reduced regression model that considers only the variables defined after a selection based on Mallow's Cp. Results of Mallow's Cp model selection analysis are shown in Table 4. Panel B reports results of a decomposition of the overall R^2 of the complete regression model in the portions attributable uniquely to financial information, uniquely to non-financial information, uniquely to deal characteristics, and the residual portion attributable to the combinations of the variables. All variables are defined in Table 1.

Table 4 – Model reduction/variables selection

N. of variables	Regression Model	Variable out		Mallows' Cp	R^2	Adj. R^2
7	S / lnMar / CFT / SA / ST / lnd / SD			8.00	69.9%	64.5%
6	S / lnMar / CFT / SA / ST / lnd	SD	OUT	6.34	69.6%	65.1%
5	S / lnMar /SA / ST / lnd	CFT	OUT	4.72	69.3%	65.6%
4	lnMar / SA / ST / lnd	S	OUT	3.79	68.5%	65.5%
3	lnMar / ST / lnd	SA	OUT	3.30	67.4%	65.1%
2	lnMar / lnd	ST	OUT	23.89	49.9%	47.6%
1	lnMar	lnD	OUT	46.10	31.2%	29.7%

Notes: This table reports the results of Mallows' Cp model selection, applied in order to select a subset of variables from those included in the comprehensive model (see Table 3).
We also run the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC), which confirmed Mallows' Cp outcome (results available upon request).

Table 5 – Predictive power/errors analysis

	Percentage Errors							Log Errors						
	Min	Q1	Median	Mean	Q3	Max	SD	Min	Q1	Median	Mean	Q3	Max	SD
all.regPS	-31,20%	-5,30%	0,80%	-0,80%	4,50%	14,40%	9,00%	-15,50%	-4,60%	-0,80%	0,40%	5,10%	27,20%	8,50%
	(0.40%)	(1.60%)	(4.70%)	(6.40%)	(9.50%)	(31.20%)	(6.30%)	(0.40%)	(1.60%)	(4.80%)	(6.30%)	(9.30%)	(27.20%)	(5.80%)
all.avPS	-64,80%	-3,90%	5,50%	0,00%	11,80%	12,80%	16,30%	-13,60%	-12,60%	-5,70%	-1,10%	3,90%	49,90%	14,50%
	(0.10%)	(5.50%)	(11.30%)	(11.70%)	(12.10%)	(64.80%)	(11.20%)	(0.10%)	(5.60%)	(12.00%)	(11.30%)	(12.90%)	(49.90%)	(9.00%)
best.avPS	-64,20%	-6,60%	4,60%	0,00%	11,50%	22,40%	16,80%	-25,30%	-12,30%	-4,70%	-1,30%	6,40%	49,60%	15,40%
	(0.50%)	(4.80%)	(11.30%)	(12.40%)	(15.00%)	(64.20%)	(11.20%)	(0.50%)	(4.90%)	(11.80%)	(12.20%)	(14.50%)	(49.60%)	(9.30%)
all.PEBITDA	-47,75%	-14,53%	-0,38%	0,09%	12,85%	49,20%	21,20%	-64,91%	-15,71%	-0,38%	-2,20%	12,09%	40,01%	22,04%
	(0.38%)	(6.47%)	(14.19%)	(16.77%)	(26.52%)	(49.20%)	(12.74%)	(0.38%)	(6.60%)	(13.88%)	(17.19%)	(24.66%)	(64.91%)	(13.74%)
best.PEBITDA	-41,04%	-11,98%	-0,36%	0,59%	12,19%	44,69%	22,14%	-52,83%	-12,76%	-0,36%	-1,91%	11,50%	36,94%	23,04%
	(0.36%)	(6.38%)	(12.24%)	(17.29%)	(29.04%)	(44.69%)	(13.61%)	(0.36%)	(6.34%)	(11.93%)	(17.72%)	(28.54%)	(52.83%)	(14.61%)

Notes: This table shows a summary of the distributions of pricing errors resulting from the application of five different approaches in order to determine out-of-sample predicted prices:

- all.regPS: Price/Sales multiple calculated using the reduced regression model (see Table 3). The set of comparables is defined as all the deals in our sample excluding the one being valued;
- all.avPS: Price/Sales multiple calculated as the harmonic mean of the Price/Sales multiples of all the deals in our sample excluding the one being valued;
- best.avPS: Price/Sales multiple calculated as the harmonic mean of the Price/Sales multiples of the five closest deal by size.
- all.avPEBITDA: Price/EBITDA multiple calculated as the harmonic mean of the Price/EBITDA multiples of all the deals in our sample excluding the one being valued;
- best.avPEBITDA: Price/EBITDA multiple calculated as the harmonic mean of the Price/EBITDA multiples of the five closest deal by size.

Pricing errors for firm *i* are calculated as follows: $\text{Percentage error}_i = \frac{\text{Predicted Price}_i - \text{Actual Price}_i}{\text{Actual Price}_i}$; $\text{Absolute Percentage error}_i = \left|\frac{\text{Predicted Price}_i - \text{Actual Price}_i}{\text{Actual Price}_i}\right|$; $\text{Log error}_i = \log\left(\frac{\text{Predicted Price}_i}{\text{Actual Price}_i}\right)$; $\text{Absolute log } error_i = \left|\log\left(\frac{\text{Predicted Price}_i}{\text{Actual Price}_i}\right)\right|$. Absolute errors (both percentage and log) are shown in parentheses for each approach. Metrics include maximum and minimum error (Min, Max), first and third quartile (Q1, Q3), median, mean, standard deviation (SD).

Appendix A: MpO&Partners

MpO&Partners is a Tax & Law firm, based in Milan, where Chartered Accountants, Auditors and Lawyers jointly operate. Its core business consists in advising professionals (accountants, lawyers, dentists, etc.) willing to execute mergers and acquisitions, providing valuation, identification of potential counterpart, tax and financial structuring of the transaction, and contract drafting services.

MpO&Partners also provides management control systems and digital solutions specifically designed for professionals, encouraging them to move towards digitization and internationalization. Furthermore, it holds conferences and seminars, engages in publishing and research activities in collaboration with universities and other institutions, and is in touch with Italian professional bodies.