

ONLINE APPENDIX

The Relation Between Equity Misvaluation and Stock Payment in Mergers is Spurious

Appendix 1 - EPS Bootstrapping Simulations

As a complementary analysis, we report simulation results connecting acquirer valuation levels, acquirer to target relative valuations, and the EPS bootstrapping effect.

A.1. Simulation procedure

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

$$MB = \frac{ROE-g}{k-g} \quad (A.1)$$

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:

$$Net\ income = ROE \times BV \quad (A.2)$$

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:

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

The acquisition price is:

$$Price = MV_T \times (1 + \pi) \quad (A.4)$$

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:

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

where $Net\ Income_A$ and $Net\ Income_T$ are respectively the net incomes of the acquirer and the target, and $\%_{Amt}$ is the goodwill amortization rate. Finally, to compute EPS, 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 revaluation in case of an acquisition accounted for under purchase accounting to compute the goodwill) and full stock payment is financed by SEO at the current market price. We choose the

simulation parameters as follows: 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%.

A.2. Results

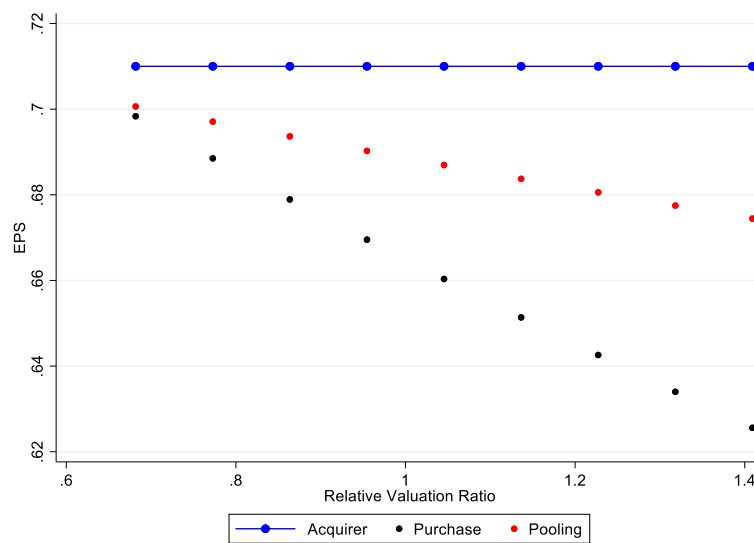
Simulation results are presented in Figure A.1. Panel A focuses on low-valuation acquirers (market-to-book equal to 1.1), while Panel B concentrates on high-valuation acquirers (market-to-book equal to 1.9). In both panels, the horizontal axis is the target to acquirer relative valuation ratio (target market-to-book ratio divided by the acquirer market-to-book ratio) and the vertical axis measures the EPS. We identify the acquirer EPS in the absence of a merger (a horizontal line, as this doesn't depend on the target valuation by construction), the EPS of the merged entity under purchase accounting, and the EPS 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).

Figure A.1 – Acquirer to Target Valuation and EPS Bootstrap

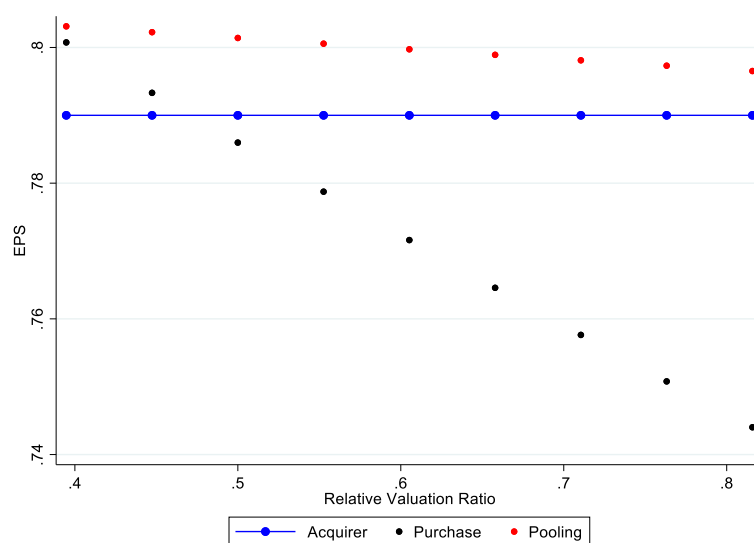
Description: Figure A.1 reports simulation results connecting acquirer valuation levels, acquirer to target valuation ratios, and earning per share (EPS). Panel A focuses on low-valuation acquirers (market-to-book equal to 1.1) and Panel B on high-valuation acquirers (market-to-book equal to 1.9). In 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. 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.

Interpretation: EPS bootstrap is present for high valuation acquirers under pooling accounting, especially in case of a high relative valuation ratio.

Panel A – Low Valuation Acquirers



Panel B – High Valuation Acquirers



Appendix 2 - Variable Definitions

Variable	Definition	Source
<i>All Stock</i>	Indicator variable = 1 for M&A deals with full stock payment, 0 otherwise	SDC
<i>Book Assets</i>	Book value of total assets (Compustat item AT): US\$ million	Compustat
<i>Book Equity</i>	Book value of equity (Compustat item CEQ): US\$ million	Compustat
<i>Capital Expenditure</i>	Capital expenditure (Compustat item CAPX): US\$ million	Compustat
<i>Current Ratio</i>	Current assets (Compustat item ACT) / Current Liabilities (Compustat item LCT)	Compustat
<i>Leverage (book)</i>	1 - (Book equity (Compustat item CEQ) / Book value of total assets (Compustat item AT))	Compustat
<i>Leverage (market)</i>	1 - (Market equity / Market value (assets))	Compustat
<i>Ln(mb)</i>	Logarithm of Market-to-book	Compustat
<i>Long-term Debt</i>	Long-Term Debt (Compustat item DLTT): US\$ million	Compustat
<i>Market Equity</i>	Price (Compustat item PRCC_F) * Shares outstanding (Compustat item CSHO): US\$ million	Compustat
<i>Market Value (assets)</i>	Market equity + Book value of total assets (Compustat item AT) - Book equity (Compustat item CEQ) - Deferred taxes (Compustat item TXDB): US\$ million	CRSP,Compustat
<i>Market-to-book</i>	Market equity / Book equity (Compustat item CEQ)	Compustat
<i>m_b_RRV</i>	Long-run value to book (RRV (2005) decomposition)	CRSP,SDC
<i>m_f_RRV</i>	Firm specific error (RRV(2005) decomposition)	CRSP,SDC
<i>m_s_RRV</i>	Time series sector error (RRV (2005) decomposition)	CRSP,SDC
<i>Net income</i>	Net income (Compustat Item NI): US\$ million	Compustat
<i>Post</i>	Indicator variable = 1 if the M&A deal announcement date is after 06/30/2001, 0 otherwise	SDC
<i>PP&E</i>	Property, plant, and equipment (Compustat item PPENT): US\$ million	Compustat
<i>Quick Ratio</i>	(Current assets (Compustat item ACT) - Inventories (Compustat item INVT)) / Current liabilities (Compustat item LCT)	Compustat
<i>Return On Assets</i>	Net income (Compustat item NI) / Book value of total assets (Compustat item AT)	Compustat
<i>Return On equity</i>	Net income (Compustat item NI) / Book equity (Compustat item CEQ)	Compustat

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

Appendix 3 - Conditional Regression Multiples

Description: Appendix 3 provides coefficient estimates from RRV valuation regressions (model 3) for Fama and French 12 industry classifications. *RRV* rows contain the results reported by RRV in their Table 4 and the *Ours* rows report corresponding coefficient estimates by replicating RRV regressions using our sample. Each model is estimated cross-sectionally at the industry level. Alpha0 is the time-series average of the constant term of each regression while Alphak is the time series average from the regression coefficient associated with the kth accounting variable. This regression uses natural logs of market and book value, natural log of the absolute value of net income, and an indicator interacted with log net income to separately estimate net income for firms with negative net income, and leverage. Fama-Macbeth standard errors are reported below average coefficient. For each set of estimates, the last row reports the time-series average R².

Interpretation: we obtain results comparable to RRV using our sample

Sample		Fama and French industry classification											
Parameters		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

Description: Appendix 4 displays average log of market-to-book and RRV valuation model components (model 3) for different sub-samples. In Columns (1) to (3), results are for all firms, with a comparison between firms that do not participate in the M&A market (Column 1) and that do so (Column 2). Columns (4) and (5) compare targets to acquirers. Columns (7) and (8) focus on all cash transactions while Columns (10) and (11) focus on all stock transactions. Columns (3), (6), (9) and (12) report a test of difference of means. The *RRV* rows contain the results reported by RRV in their Table 6 for their model 3 and the *Ours* rows report corresponding estimates obtained by using our sample. *, **, or *** indicates statistical significance at the 10%, 5%, or 1% confidence level (respectively).

Interpretation: we obtain results comparable to RRV using our sample

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 ***