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THE LEVERAGE PROBLEM IN THE VALUATION OF PRIVATELY HELD FIRMS

by

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Section I. Introduction

One of the most perplexing situations that arises in financial analysis is the valuation of a firm that lacks an observable stock market price. Firms going public, spin-offs of subsidiaries, and estate or ESOP valuations of private firms are all examples where the lack of an observable stock market price complicates the valuation process.

A technique commonly used by professional appraisers for valuing privately held firms is the use of comparables.[1] A comparable is a publicly held firm selected so that it is as similiar as possible to the private firm, eg. in size, sales, etc. Since the comparable is a publicly held firm its stock price is observable and can be used to estimate the private firm's stock price by multiplying the comparable's price-earnings (P/E) ratio by the earnings per share of the private firm. The advantage to comparables is that market determined data, reflecting expectations of the future, are incorporated into the stock price estimate.

Unfortunately, this simple technique becomes clouded when the two firms differ in their degrees of financial leverage. Moreover, this problem is typical since privately held firms often hold little or no long term debt.[2] This situation is well recognized and a commonly used technique to adjust for leverage differences has been developed (see Pratt (1981)), and use of this technique has been required on recent versions of the American Society of Appraisers Examination.

This leverage adjustment technique starts by adjusting the earnings of the levered (public) firm as if it were unlevered. The total value of the levered firm is then calulated and divided by the previously adjusted earnings to derive a "debt-free equivalent" P/E ratio, this P/E ratio is then multiplied by the earnings of the private firm to determine that firm's stock price.

It is demonstrated that this technique is equivalent to an assumption of capital structure irrelevance, ie. that the total market values of the two firms are equal. This is contrary to the purpose of the adjustment since it is purportedly undertaken to account for the difference in the capital structures. In addition, the implied earnings capitalization rate is understated which results in an overvalued stock price for the private firm. As an alternative, a technique is demonstrated to show how a comparable can be used to find a capitalization rate based on the Capital Asset Pricing Model (CAPM) using Hamada's (1972) unlevered beta adjustment. This methodology, a type of 'pure-play', retains the advantage of relying on market determined data, yet avoids the capital structure problem described above.

The paper is organized as follows. Section II presents the standard leverage adjustment technique with a numerical example which demonstrates the problem with this technique. Section III shows how the CAPM can be used with the Hamada beta adjustment to value the private firm. The final section contains a summary.

Section II. The Leverage Adjustment

To illustrate the common leverage adjustment technique, assume we are interesed in determining the stock price for an unlevered, private firm, and have as a "comparable" a levered firm with exactly the same asset structure, revenues, and operating expenses. Financial data for the two firms is presented in Table 1.[3]

Table 1

	Private	Public
Assets	$2,000,000	$2,000,000
Current Liabilities	$500,000	$500,000
Long Term Debt (12%)	0	$500,000
Equity	$1,500,000	$1,000,000
Shares Outstanding	150,000	100,000
Sales	$5,000,000	$5,000,000
Operating Expenses	$4,200,000	$4,200,000
EBIT	$800,000	$800,000
Interest	0	$60,000
Earnings before Taxes	$800,000	$740,000
Taxes (40%)	$320,000	$296,000
Net income	$480,000	$440,000
Earnings Per Share	$3.20	$4.44
Stock Price	.	$20.00
Price/Earnings	.	4.5
Market Value of Debt	0	$400,000
Market Value of the Firm	.	$2,400,000

The leverage adjustment would proceed by first finding the value of the levered, public firm (VL) by adding the total equity value to the market value of debt (D).

[1] $VL = PL(SL) + D$
$2,400,000 = 20(100,000) + 400,000$

Where PL represents the stock price of the public firm, and SL is the number of shares outstanding. Next, the "debt-free" net income (DFNI) for the levered firm is found by assuming no interest deduction.

[2] $DFNI = EBIT(1 - t)$
$480,000 = 800,000(1 - .4)$

The DFNI is then used to find a "debt-free" price-earnings ratio for the levered firm by dividing its total market value by the DFNI.

[3] P/E = VL/DFNI
     5.0 = \$2,400,000/\$480,000

Finally, the P/E ratio found in [3] above is multiplied by the earnings per share of the private firm to find its stock price.

[4] PU = (P/E)(EPS)
     \$16.00 = (5.0)(\$3.20)

The result of the leverage adjustment is a price per share for the private firm of \$16.00. This price multiplied by the shares outstanding of the firm (150,000) gives a total market value of \$2,400,000. The implied earnings capitalization rate is \$480,000/\$2,400,000 or 20%.

In the example above we showed that the leverage adjustment results in a stock price for the private firm of \$16.00. By substituting equations [1]-[3] into [4] an equivalent expression for the value of the unlevered firm is derived.

[5] PU = {[PL(SL)+D]/EBIT(1-t)}/ [EBIT(1-t)/SU]

Note that the EBIT and tax rates for the firms are equal, and [5] can be reduced to:

[6] PU = [PL(SL) + D]/SU

Multiplying through results in:

[7] PU(SU) = PL(SL) + D or   VU = VL

Thus, the adjustment implies that the value of the unlevered, private firm is equal to the value of the levered, public firm. In the example above this value was shown to be \$2,400,000. Hence, the technique assumes capital structure irrelevance, ie. no gain from leverage.[4] If this result is intended, then the adjustment for leverage is not necessary. In fact, the same result can be derived by simply dividing the market value of the public firm by the shares outstanding of the private firm as shown in [8] below.

[8] PU = VL/SU
     \$16.00 = \$2,400,000/150,000

Section III. An Alternative: The Pure-Play Technique

In this section we propose an alternative method that makes use of market data to value the shares of the private firm. The relationships derived by Hamada (1972) concerning levered and unlevered betas, in conjunction with the CAPM, are used to find a capitalization rate for earnings. The process is similiar to that used by Fuller and Kerr (1981), who found empirical support for using pure- play estimates of divisional costs of capital. The estimated capitalization rate produces a stock value that is consistent with a gain from leverage to the public firm.

As a first step, the implied capitalization rate for the levered, public firm (k_L) is derived given the earnings, market value of debt, and total value

of the firm, as shown in [9] below.

[9] VL = D + NI/k_L
$2,400,000 = $400,000 + $440,000/$k_L$

Solving [9] for k_L yields an implied capitalization rate of 22.2%. In this relationship the market value of equity is obtained by capitalizing the after-tax earnings by this implied rate.

In the second step, the CAPM is used with hypothetical values for the risk free rate, Rf, the required rate of return on the market, km, and an assumed beta, B_L, of 1.5 for the levered firm, so that the model produces a required rate of return of 22.2%. These values are presented in [10] below.

[10] k_L = Rf + B_L(km − Rf)
.222 = .102 + 1.5(.182 − .102)

Next, the Hamada adjustment for unlevering a beta is used to generate a beta value for the private firm, Bu. The adjustment is shown in [11] below.

[11] Bu = B_L/{1 + (1 − t)(D/SL)}
1.34 = 1.5/{1 + (1 − .4)($400,000/$2,000,000)}

The beta of the unlevered firm is 1.34, and this beta can be used with the market parameters, Rf and km, assumed above in [10] to derive the capitalization rate for the unlevered, private firm (ku).

[12] .2092 = .102 + 1.34(.182 − .102)

This method produces a capitalization rate for the private firm of 20.92%. This results in a market value for the private firm, VU, of: [13] VU = D + NI/k_L

$2,294,455 = 0 + $440,000/.2092

Hence, the calculated share price of the private firm is ($2,294,455)/ 150,000), or $15.30 per share. This price is consistent with recognizing a difference in value from the use of leverage.

Section IV. Summary

In this paper we have shown that the commonly used leverage adjustment procedure for use with comparables is inconsistent with its stated purpose, to recognize differences in value due to the use of leverage. As an alternative, a pure-play technique based on the CAPM and Hamada's beta adjustment, was demonstrated. This technique retains the advantage of comparables, the use of market data, yet produces a value consistent with recognizing differences in value due to leverage.

Appraisers involved with the valuation of privately held firms should be aware of the problem inherent with the commonly used leverage adjustment and that there are alternative methodologies available that produce results consistent with the intended adjustment.

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