The Residual Income Method of Business Valuation

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I. Introduction

Although quite well known in academic circles and among CFA candidates and charterholders,[1] little has been written about the Residual Income Method (RIM) of business valuation in the business appraisal literature.[2] Certainly, the RIM has not gained widespread application in the business valuation community, despite its many advantages. The RIM is a method of valuation within the income approach. The primary features distinguishing the RIM from the more familiar discounted cash flow (DCF) method are (1) that it is based on accrual accounting net income rather than net cash flows, and (2) that it relies upon accounting book value as the anchor of value. It is often claimed, under the banner of "cash is king," that cash flow is a better measure of value than accounting net income due to management's ability to manipulate the latter. However, the RIM in fact yields exactly the same value, as does the DCF method when applied with the same valuation assumptions. This article illustrates the basic features of the RIM, and compares the results of applying it to those yielded by the DCF method.

II. The Residual Income Method

The RIM employs concepts similar to economic value added (EVA) analysis,[3] in that it measures value added in terms of earnings in excess of the required rate of return on capital employed. Starting with the value of its existing capital, a firm adds value only to the extent that its returns exceed its cost of capital. Thus, under the RIM, the value of equity (V_e) is calculated using the following general formula:

$$V_e = BV_0 + \Sigma\, [RI_t/(1+k_e)^t] \qquad (1)$$

Where:

BV_0 = Beginning book value of equity;
k_e = Cost of equity capital; and
RI_t = Residual Income at time t, defined as:

$$NI_t - (k_e{}^* \, BV_{t-1}) \qquad (2)$$

Where:

NI_t = Accrual accounting net income at time t; and
BV_{t-1} = Book value of equity at time t-1.

As with the DCF method, the RIM may be applied either to capitalize a single period's return (both where it is assumed that future period returns will be stable, and where such returns are expected to grow at a stable rate in perpetuity), or to discount projected returns over multiple discrete periods followed by a capitalized terminal value. It can also be used either to value equity directly, or to value equity indirectly by first valuing the entire enterprise on a "debt free" basis and then subtracting the market value of debt.

A. Direct Equity Valuation Using Single-Period Capitalization

For a single-period capitalization, formula (1) above reduces to beginning book value plus either a perpetuity or a growing perpetuity, depending on whether future residual income is expected to be stable or to grow at a stable rate.

1. Future Returns Expected to be Stable

In the simplest case where future residual income is expected to be stable, the formula becomes:

$$V_e = BV_0 + RI_1/k_e \qquad (3)$$

Where:

RI_1 = Residual income at the end of period one, defined as:

$$NI_1 - (k_e{}^* \, BV_0) \qquad (4)$$

Where:

NI_1 = Accrual accounting net income at the end of period one; and
BV_0= Beginning book value.

To illustrate the application of the RIM in this situation, assume that ABC Company has the following simplified balance sheet, where year 0 represents the valuation date, and year 1 represents the projected balance sheet one year hence:

Year	0	1	Growth Rate
Current Assets	30	30	0%
Fixed Assets	80	80	0%
Total Assets	110	110	0%
Current Liabilities	20	20	0%
Long-term Debt	40	40	0%
Equity	50	50	0%
Liabilities + Equity	110	110	0%

Since no growth is anticipated, the balance sheet is in a steady state. Under this scenario, there will be no change in working capital requirements, and capital expenditures will be necessary only to replace existing fixed assets, i.e., at a level equal to depreciation.

Now, assume further that ABC Company is expected to have the following simplified income statement for year 1, assuming a cost of debt of 5% and an effective tax rate of 40%.

Year	1
Earnings before interest and taxes (EBIT)	20.00
Interest	(2.00)
Earnings before taxes (EBT)	18.00
Taxes	(7.20)
NI	10.80

Assuming a cost of equity capital of 15%, we are now ready to value the equity of ABC Company under the RIM by applying formula (3) above:

$$V_e = BV_0 + RI_1/k_e = 50 + [10.80 - (0.15 * 50)]/0.15 = \mathbf{72}.$$

Comparing the results of the RIM with the single-period capitalization of cash flows method, we use the traditional definition of net cash flow to equity (NCF_e):[4]

$$NCF_e = NI + \text{Depreciation} - \text{Capital Expenditures} - \text{Increase in working capital} + \text{Increase in long-term debt} \qquad (5)$$

In this steady state scenario, as stated above, capital expenditures are equal to depreciation, and these factors cancel out. Further, no increase in working capital or long-term debt is needed. Therefore, in this simple example, NCF_e = NI. Using the no-growth single-period capitalization method to calculate the value of equity, we arrive at the same value as we did under the RIM:

$$V_e = NCF_e / k_e = 10.80/0.15 = \mathbf{72}.$$

It should be further noted that, under the no-growth assumptions of this example, all net income is paid out in dividends (there being no need to retain earnings as there is no growth to fund). Using the accounting convention of the "clean surplus relationship:"

$$BV_1 = BV_0 + NI_1 - Div_1 \qquad (6)$$

Solving for Div_1,

$$Div_1 = BV_0 + NI_1 - BV_1. \qquad (7)$$

As $BV_1 = BV_0$ in our example, it follows that $Div_1 = NI_1$. Accordingly, we can also value ABC Company using the dividend discount model (DDM) and get the same result. The DDM formula is as follows:

$$V_e = Div_1 / k_e \qquad (8)$$

Setting dividends equal to net income, we arrive at the same value:

$$V_e = Div_1 / k_e = 10.80/0.15 = \mathbf{72}.$$

2. Future Returns Expected to Grow

Now assume the same facts as above, except that future returns are expected to grow at a rate of 4% in perpetuity. We now modify formula (3) above as follows:

$$V_e = BV_0 + RI_1/(k_e - g) \qquad (9)$$

With a 4% growth rate, the above balance sheet is changed to look like this:

Year	0	1	Growth Rate
Current Assets	30	31.2	4%
Fixed Assets	80	83.2	4%
Total Assets	110	114.4	4%
Current Liabilities	20	20.8	4%
Long-term Debt	40	41.6	4%
Equity	50	52	4%
Liabilities + Equity	110	114.4	4%

Note that the capital structure has remained constant with the 4% growth funded by a combination of retained earnings and increased long-term debt.

Assuming the same year 1 income and other parameters, the year 1 income statement is again as follows (the difference being that it is now expected to grow at 4% in the future):

Year	1
Earnings before interest and taxes (EBIT)	20.00
Interest	(2.00)
Earnings before taxes (EBT)	18.00
Taxes	(7.20)
NI	10.80

Under these assumptions, the RIM yields the following value for the equity of ABC Company:

$$V_e = BV_0 + RI_1/(k_e - g) = 50 + [10.80 - (0.15 * 50)]/(0.15 - 0.04) = \mathbf{80}.$$

For comparison, let us now compute the equity value by capitalizing net cash flows to equity. From the above balance sheet, we can determine that in year 1, capital expenditures have exceeded depreciation by 3.2, working capital has grown by 0.4, while long-term debt has grown by 1.6. Under these circumstances, using formula (5) above:

$$NCF_e = 10.80 - 3.2 - 0.4 + 1.6 = 8.8.$$

Using the Gordon Growth Model for a growing perpetuity, we again arrive at the same value as we did under the RIM:

$$V_e = NCF_e / (k_e - g) = 8.80/(0.15 - 0.04) = \mathbf{80}.$$

The same result is obtained using the Dividend Discount Model (DDM). Using formula (7) above, dividends in year 1 are computed, using the clean surplus relationship, as follows:

$$Div_1 = BV_0 + NI_1 - BV_1 = 50 + 10.80 - 52 = 8.80.$$

We therefore calculate the DDM value of equity as follows:

$$V_e = Div_1 / (k_e - g) = 8.80/(0.15 - 0.04) = \mathbf{80}.$$

It is thus apparent that equity can be valued directly using the RIM, the capitalization of cash flows method, or the dividend discount model, all with the same results under the same assumptions.

B. Indirect Equity Valuation Using Single-Period Capitalization

As noted above, the RIM can also be used to value equity indirectly, by first determining the enterprise value of the firm, and then deducting the market value of debt. This can be done using single-period capitalization, both where future returns are expected to be stable, and where they are expected to grow at a constant rate.

As with the DCF method, the RIM requires different metrics to value the total enterprise on a "debt free" basis, but the basic formula is the same. The anchor of value is the book value of operating assets rather than the book value of equity, and residual income is measured by operating income rather than net income. Instead of the cost of equity, the weighted average cost of capital (WACC) is used. Thus, the basic formula becomes:

$$V_f = OA_0 + \Sigma\,[RI_t/(1+WACC)^t] \qquad (10)$$

Where:
V_f = Value of firm;
OA_0 = Book value of beginning operating assets;
WACC = Weighted average cost of capital; and
RI_t = Residual Income at time t, defined as:

$$OI_t - WACC * OA_{t-1} \qquad (11)$$

Where:
OI_t = Operating income at time t; and
OA_{t-1} = Book value of operating assets at time t-1.

Operating assets (OA) are defined to be distinct from financial assets. For purposes of RIM valuation, OA = Total assets – Current liabilities. Operating income (OI) is defined to eliminate the after-tax effect of interest expense (thus "debt free"). Therefore, OI = EBIT * (1-t), where EBIT is earnings before interest and taxes, and t is the effective tax rate. Equivalently, OI = NI + I * (1-t), where I is interest expense.

1. Future Returns Expected to be Stable

With these definitions in mind, where future residual income is expected to be stable, the formula becomes:

$$V_f = OA_0 + RI_1/WACC \qquad (12)$$

Where:
RI_1 = Residual income at the end of period one, defined as:

$$OI_1 - (WACC * OA_0) \qquad (13)$$

Where:
OI_1 = Operating income at the end of period one; and
OA_0= Book value of beginning operating assets.

The enterprise value (V_f) is then reduced by the value of debt to calculate the value of equity.

To illustrate the use of the RIM to calculate the enterprise value of the firm where future returns are expected to be stable, consider the same balance for ABC Company as was used above, with the addition of an entry for operating assets (OA):

Year	0	1	Growth Rate
Current Assets	30	30	0%
Fixed Assets	80	80	0%
Total Assets	110	110	0%
Current Liabilities	20	20	0%
Long-term Debt	40	40	0%
Equity	50	50	0%
Liabilities + Equity	110	110	0%
Operating Assets	90	90	0%

Under this steady state scenario, as before, there will be no change in working capital requirements, and capital expenditures will be necessary only to replace existing fixed assets, i.e., at a level equal to depreciation.

Assume further the same year 1 income statement, expanded to show the computation of operating income (OI):

EBIT	20
OI	12
I * (1-t)	1.2
NI	10.8
Div	8.8

Assuming the same cost of debt (5%) and the same cost of equity (15%) as above, the WACC that equates the indirect and direct values is approximately 10.743%. The RIM value is calculated as follows:

$$V_f = OA_0 + RI_1/WACC = 90 + [12 - (0.10743 * 90)]/0.10743 = 112 \text{ (rounded)}.$$

Debt of 40 is then subtracted to get an equity value of **72**.

Comparing the indirect calculation of equity value using the RIM with the single-period capitalization of cash flows method, we use the traditional definition of net cash flow to invested capital (NCF_f):

$$NCF_f = NI + \text{Depreciation} - \text{Capital Expenditures} - \text{Increase in working capital} + I * (1-t) \qquad (14)$$

In this steady state scenario, as stated above, capital expenditures are equal to depreciation, and these factors cancel out. Further, no increase in working capital is needed. Therefore, in this simple example, $NCF_f = NI + I * (1-t) = 10.80 + 1.2 = 12$. Using the no-growth single-period capitalization method to calculate the value of equity indirectly, we arrive at the same value as we did under the RIM:

$$V_f = NCF_f / WACC = 12/0.10743 = 112 \text{ (rounded)}.$$

Subtracting debt of 40, produces the same equity value as reached using the RIM, i.e., **72**.

2. Future Returns Expected to Grow

Now assume the same facts as above, except that, as under the direct procedure, future returns are expected to grow at a rate of 4% in perpetuity. We now modify formula (12) above as follows:

$$V_f = OA_0 + RI_1/(WACC - g) \qquad (15)$$

With a 4% growth rate, the above balance sheet is modified as follows:

Year	0	1	Growth Rate
Current Assets	30	31.2	4%
Fixed Assets	80	83.2	4%
Total Assets	110	114.4	4%
Current Liabilities	20	20.8	4%
Long-term Debt	40	41.6	4%
Equity	50	52	4%
Liabilities + Equity	110	114.4	4%
Operating Assets	90	93.6	4%

Note that the capital structure has again remained constant with the 4% growth funded by a combination of retained earnings and increased long-term debt.

Assuming the same year 1 income and other parameters, the year 1 income statement is again as follows (the difference being that it is now expected to grow at 4% in the future):

EBIT	20
OI	12
I * (1-t)	1.2
NI	10.8
Div	8.8

The WACC that equates the direct and indirect equity values is approximately 10.908%. Under these assumptions, the RIM yields the following enterprise value for ABC Company:

$$V_f = OA_0 + RI_1/(WACC - g) = 90 + [12 - (0.10908 * 90)]/0.06908 = 122 \text{ (rounded)}.$$

Subtracting debt of 40, the equity value is **82**.

The parallel calculation using free cash flow to the firm yields the same result. As before, in year 1 capital expenditure exceeded depreciation by 3.2, while working capital grew by 0.4. After-tax interest expense was 1.2. Using formula (14) above:

$$NCF_f = 10.80 - 3.2 - 0.4 + 1.2 = 8.40.$$

Using the Gordon Growth Model for a growing perpetuity, we again arrive at the same value as we did under the RIM:

$$V_f = NCF_f / (WACC - g) = 8.40/(0.06908) = 122 \text{ (rounded)}.$$

Subtracting debt of 40 again results in an equity value of 82.

It can be seen from the above that the same equity values are obtained under both the RIM and the DCF methods, when capitalizing single periods under assumptions of either stable or constantly growing returns. This is true whether equity is valued directly or indirectly.

C. Multiple-Period DCF Compared to Residual Income Method

The above-described equivalence between the DCF method and the RIM also obtains for valuations using multiple discrete periods followed by a terminal capitalized value. A detailed illustration is contained in Exhibit A, representing a hypothetical start-up business. Note that once again the same equity values are obtained under the same assumptions, regardless whether equity is valued directly or indirectly.

III. Advantages of the Residual Income Method

While the same valuation results are obtained, the RIM has a number of advantages over valuation using cash flows. First, it requires the analyst to focus on the true drivers of value, which are the amount of capital invested, and the return on that investment. As with

EVA, the RIM defines increases in value as returns in excess of the required rate. Note in Exhibit A that, despite high earnings growth rates, the RIM shows negative residual income in the early years of the start-up enterprise, while the cash flow methods show positive cash flows. The company is actually destroying value until it starts to stabilize in year 5. It is impossible to tell from cash flow analysis alone whether a company is earning positive economic returns on its investment.

Second, the RIM takes advantage of accrual accounting, which matches value added with value surrendered, and recognizes value that may be added before cash flows are received. Unlike cash flow analysis, the RIM treats investments as assets rather than as lost value, and anchors value on the equity already recognized in the balance sheet.

Third, the RIM places far less weight on the terminal value, i.e., the distant earnings that are the most difficult to project. In Exhibit A, for example, under the DCF method (direct equity procedure), the terminal value accounts for 2,239 out of the total value of 3,392. In contrast, under the RIM, the terminal value accounts for only 746, with the bulk of value coming from the book value of equity, for which no projections are required.

IV. Conclusion

The RIM is worthy of consideration either as a primary valuation method, or as a check on valuations performed using the single-period capitalization or multiple-period DCF methods. It is widely recognized in the academic literature, and is taught to countless students in business schools, as well as to CFA candidates, both in the U.S. and abroad. It yields the same values under the same assumptions as the DCF method, but directs the analyst's attention to the true sources of value, i.e., existing investment and return on that investment exceeding the cost of capital.

Endnotes

1. See, e.g., Lundholm, R. and Sloan, R., *Equity Valuation and Analysis with eVal* (McGraw-Hill 2004), Ch. 10; Penman, S., *Financial Statement Analysis and Security Valuation* (McGraw-Hill, 2d ed. 2004), Ch. 5; Palepu, K., Healy, P., and Bernard, V., *Business Analysis and Valuation* (South-Western 2000), Ch. 11; Feltham, J. and Ohlson, J., "Valuation and Clean Surplus Accounting for Operating and Financing Activities," *Contemporary Accounting Research* 11 (1995): pp. 689-731; Stowe, J., Robinson, T., Pinto, J., and McLeavey, D., *Analysis of Equity Investments: Valuation* (AIMR 2002), Ch. 5.
2. The only such article the author has been able to locate is Gore, R., Cooper, J. and Allen, M., "Accounting-Based Valuation: The Residual Income Model," *Valuation Strategies*, November/December 2001, pp. 20-33.
3. See Stewart, G.B., *The Quest for Value* (HarperBusiness 1991).
4. See, e.g., Pratt, S., *Valuing a Business* (McGraw-Hill 4th ed. 2000), p. 158.
5. Since the WACC requires the market value of equity to determine the relative weights of debt and equity, and the market value of equity is what we are attempting to calculate, we encounter a circularity problem if we want to reach the same value of equity indirectly that was reached under the direct procedure. The solution is to use the value of equity calculated under the direct procedure for purposes of determining the weight of equity under the indirect procedure. Other capital structure assumptions may of course be used, and the valuation results will be consistent with those assumptions, but not necessarily the same as the direct equity value. This is true for both the RIM and DCF methods to exactly the same extent.
6. Pratt, p. 158.
7. While it is true that book values may be distorted due to either "creative accounting" by management or the particular requirements of GAAP accounting (e.g., the carrying of fixed assets at original cost less depreciation, or the immediate expensing of R&D and advertising), the RIM corrects automatically for such distortions. If book value is too high, residual income will be correspondingly lower, and vice versa. See Penman, pp. 161-162; Lundholm & Sloan, pp. 186-187; Palepu, Healy & Bernard, pp. 12-18 to 12-20.

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EXHIBIT A

Reconciliation of DCF Method with Residual Earnings Method

End of Period	0	1	2	3	4	5	6	7	Terminal 8
Income Statement									
Revenue		2466.5	2760.0	3726.0	4657.5	5356.1	5891.7	6186.3	6495.6
Cost of Goods Sold	65%	(1603.2)	(1794.0)	(2421.9)	(3027.3)	(3481.4)	(3829.6)	(4021.1)	(4222.1)
Depreciation	30%	(720.0)	(737.1)	(788.7)	(818.3)	(836.7)	(849.3)	(891.7)	(936.3)
EBIT		143.3	228.9	515.4	811.8	1037.9	1212.8	1273.5	1337.1
Interest		(19.5)	(11.3)	(11.4)	(11.6)	(12.1)	(12.6)	(13.2)	(13.9)
EBT		123.8	217.6	504.0	800.2	1025.8	1200.2	1260.2	1323.2
Income Tax		(49.5)	(87.0)	(201.6)	(320.1)	(410.3)	(480.1)	(504.1)	(529.3)
Net Income		74.3	130.6	302.4	480.1	615.5	720.1	756.1	793.9
Balance Sheet									
Cash	1,200	826.1	778.0	601.6	549.1	590.7	694.2	728.9	765.4
Accounts Receivable		246.6	276.0	372.6	465.7	535.6	589.2	618.6	649.6
Inventory	390	144.3	161.5	218.0	272.5	313.3	344.7	361.9	380.0
PP&E	2,000	2400.0	2457.1	2629.1	2727.7	2789.1	2830.9	2972.5	3121.1
Total Assets	3,590	3617.0	3672.5	3821.2	4015.1	4228.7	4459.0	4681.9	4916.0
Accounts Payable		173.1	193.8	261.6	327.0	376.0	413.6	434.3	456.0
Long-Term Debt	390	225.3	227.6	232.9	241.3	252.0	264.7	277.9	291.8
Retained Earnings		18.6	51.2	126.8	246.8	400.7	580.7	769.8	968.2
Book Value of Equity	3,200	3218.6	3251.2	3326.8	3446.8	3600.7	3780.7	3969.8	4168.2
Liabilities + Equity		3617.0	3672.5	3821.2	4015.1	4228.7	4459.0	4681.9	4916.0
Cash Flow Statement									
Net Income		74.3	130.6	302.4	480.1	615.5	720.1	756.1	793.9
+ Depreciation		720.0	737.1	788.7	818.3	836.7	849.3	891.7	936.3
- Δ Non-Cash Current Assets		(0.9)	(46.5)	(153.1)	(147.6)	(110.7)	(84.9)	(46.7)	(49.0)
+ ΔCurrent Liabilities		173.1	20.6	67.8	65.4	49.0	37.6	20.7	21.7
Cash from Operations		966.5	841.8	1005.8	1216.2	1390.5	1522.1	1621.9	1703.0
- Capex		(1120.0)	(794.3)	(960.7)	(916.9)	(898.1)	(891.1)	(1033.3)	(1084.9)
-Dividends Paid		(55.7)	(97.9)	(226.8)	(360.1)	(461.6)	(540.1)	(567.1)	(595.5)
+ ΔLTD		(164.7)	2.3	5.3	8.4	10.8	12.6	13.2	13.9
ΔCash		(373.9)	(48.1)	(176.4)	(52.4)	41.6	103.5	34.7	36.4
DCF Method (Direct Equity Procedure)									
NCF_e = NI + Dep - Capex - ΔWC + ΔLTD		56	98	227	360	462	540	567	595
DCF		48	74	149	206	230	233	213	
Sum of DCF	1,154								
Terminal Value	2,239								
Equity Value	**3,392**								
Residual Income Method (Direct Equity Procedure)									
Residual Income = $NI_{(t)}$ - $Ke*Equity_{(t-1)}$		(406)	(352)	(185)	(19)	98	180	189	198
Discounted Residual Income		(353)	(266)	(122)	(11)	49	78	71	
BV_0 + Sum of RI	2,646								
Terminal Value	746								
Equity Value	**3,392**								
DCF Valuation (Debt Free Procedure)									
NCF_f = NI + I*(1-t) - Capex + Dep - ΔWC		232	102	228	359	458	535	562	590
DCF		203	78	153	209	234	239	219	
Sum of DCF	1,335								
Terminal Value	2,447								
Enterprise Value	3,782								
Less: LTD	(390)								
Equity Value	**3,392**								
Residual Income Valuation (Debt Free Procedure)									
Residual Income = $OI_{(t)}$ - $WACC*OA_{(t-1)}$		(431)	(359)	(192)	(25)	92	173	182	191
Discounted RI		(377)	(274)	(128)	(15)	47	77	71	
OA_0 + Sum of RI	2,991								
Terminal Value	791								
Enterprise Value	3,782								
Less: LTD	(390)								
Equity Value	**3,392**								

Model Assumptions:

Cost of Debt (Kd)	5%
Cost of Equity (Ke)	15%
Weight of Debt (Wd)	5%
Weight of Equity (We)	95%
WACC	14%
Tax Rate (t)	40%
Long-term Growth Rate (g)	5%
Dividend Payout	75%