WHY NOT VALUE EQUITY CFs DIRECTLY?

WHAT HAVE WE DONE SO FAR?

- Discount the firm's projected Free Cash Flows at their Weighted Average Cost of Capital to get the *aggregate* value of the firm's securities—Debt, Equity, and any other financial assets.

- D*ivide this total value* among the various security holders by valuing each of the firm's securities according to their contractual rights.

- Equity is at the bottom

DIRECT VALUATION OF EQUITY

Discount firm's equity cash flows at the *equity RADR*.

- Project the *future expected equity cash flows* using a pro forma model.

- Note: *Equity cash flow ≠ dividend stream*! (More on this later)

- Discount the future expected equity cash flows and the terminal value of equity *at cost of equity*.

What are equity cash flows?

The equity cash flow is the firm's FCF minus all of the cash needed to service debt:

Definition of Equity Cash Flows
Free Cash Flow
- Net repayment of Debt principal
- After-tax interest payments on Debt

Equivalent definition of equity CF

Definition of Equity Cash Flows
Profit After Taxes
+ Depreciation
- Changes in Net Working Capital
- Changes in Fixed Assets at Cost
- Net repayments of Debt principal

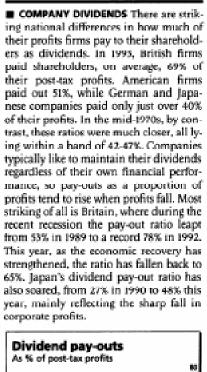**Note:** If the firm repays $100 of bonds but issues $200 of new debt, then the "net repayment of debt" is -$100.
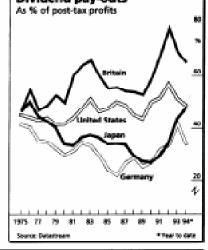
EQUITY CF AND DIVIDENDS

- The equity cash flows are not just the expected dividend stream of the firm.

- Equity CFs include *all* of the cash available for equity holders.

- This means that our valuation of equity is *independent of the dividend stream.*

- Miller and Modigliani: Under certain conditions, the payment of dividends merely reduces by an equal amount the value of the remaining equity claim, which means that shareholders neither gain nor lose from the payment of dividends. (*Journal of Business*, 1961)

- Our definition of equity cash flows follows this article by valuing the equity of the firm independent of its dividend payout policy (as long as changes in dividend policy do not affect the firm's investment and other financial policies).

MM "dividend irrelevance": Firm's dividend policy does not affect the value of the firm or the value of its securities **if**:

- Taxation of dividends and capital gains is the same. If the taxation on capital gains is lower than the taxation on dividends, shareholders ought to prefer lower dividends and greater capital gains.

- MYSTERY: In the United States, the effective taxation on capital gains is in fact lower than the tax imposed on dividends; nevertheless, American companies pay impressive amounts of dividends. (Other countries *impute* corporate taxes: Canada, Germany, Australia …)

- Firm's investment policy does not depend on the firm's dividend policy. This is implicit in all of our pro formas.

- Application to warrant valuation

- Either

  ◊ Dividend payout policy does not affect the firm's debt financing mix,

  ◊ If dividends affect the firm's financing then the debt has no effect on firm valuation. (Meaning T = 0.)

- Dividends have no informational effects.

■ COMPANY DIVIDENDS There are striking national differences in how much of their profits firms pay to their shareholders as dividends. In 1993, British firms paid shareholders, on average, 69% of their post-tax profits. American firms paid out 51%, while German and Japanese companies paid only just over 40% of their profits. In the mid-1970s, by contrast, these ratios were much closer, all lying within a band of 42-47%. Companies typically like to maintain their dividends regardless of their own financial performance, so pay-outs as a proportion of profits tend to rise when profits fall. Most striking of all is Britain, where during the recent recession the pay-out ratio leapt from 55% in 1989 to a record 78% in 1992. This year, as the economic recovery has strengthened, the ratio has fallen back to 65%. Japan's dividend pay-out ratio has also soared, from 27% in 1990 to 48% this year, mainly reflecting the sharp fall in corporate profits.

Dividend pay-outs
As % of post-tax profits

Britain

United States

Japan

Germany

1975 77 79 81 83 85 87 89 91 93 94*

Source: Datastream   *Year to date

Many firms strive to have stable *dividends*; this means that the *dividend payout ratio* is likely to be unstable. Although financial theory suggests that dividend stability is not in itself a relevant corporate goal, some firms do regard dividend stability as important. (John Lintner, "Distribution of Incomes of Corporations Among Dividends, Retained Earnings and Taxes," *American Economic Review*, May 1956).

SOME EXAMPLES OF EQUITY CASH FLOWS

SCENARIO I: Debt is a plug

If Debt is a plug, then the equity cash flow equals the dividend paid out by the firm.

WHY?

$$\Delta Liabilities \; = \; \Delta Assets$$

A little simple substitution gives the following equation:

$$\Delta Current\ Assets \; + \; \Delta Fixed\ Assets \; - \; \Delta Depreciation$$
$$= \; \Delta Current\ Liabilities \; + \; \Delta Debt \; +$$
$$\Delta Stock \; + \; \Delta(Accumulated\ Retained\ Earnings)$$

Under the current scenario the firm issues no new stock, so that ΔStock = 0.

Since $\Delta(Accumulated\ R/E) = PAT - Div$, we can write the last equation as:

$$- \Delta NWC - \Delta(FA\ at\ Cost) + Depreciation$$
$$+ \Delta Debt + PAT - Div = 0$$

Taken together, the Equity Cash Flow equation thus becomes:

$$Equity\ Cash\ Flow = PAT + Depreciation -$$
$$\Delta NWC - \Delta NWC - \Delta(FA\ at\ Cost) = Div$$

- Intuition Dividends are the equity holders' cash flows only if:
    - ◊ No share repurchases
    - ◊ Firm does not accumulate cash or marketable securities

SCENARIO II: Equity is the plug

Equity Cash Flow equals the firm's Free Cash Flow minus the after-tax interest payments.

ASSUMPTIONS: Incremental financing is done with the following financing pattern:

- Debt is kept at a constant level: $\Delta \text{Debt} = 0$. This means that whenever debt matures it is refinanced with new debt of identical value.

- All incremental financing comes from issuing new stock and all incremental excess cash is used to either buy back shares or pay dividends: I.e., Equity is the Balance Sheet *plug*!

- Firm's balances of Cash and Marketable Securities do not change over time. (Remember that Cash = Negative Debt).

$$Equity\ Cash\ Flow\ =\ FCF\ -\ \Delta Debt$$
$$-\ (1-t_c)*interest\ =\ FCF\ -\ (1-t_c)*interest$$

For this case the Miller-Modigliani dividend theorem means that a change in the dividend is exactly counterbalanced by a change in the Stock issued or repurchased:

- Small dividends: Firm will repurchase stock, which will be perceived by its shareholders as *positive Equity cash flows.*
- Large dividends: Firm will issue new stock (or repurchase little stock), which will be perceived by its shareholders as *negative Equity cash flows.*

In both cases, *the sum of the dividends plus Stock issued (or repurchased) will be constant and equal to the Equity Cash Flow.*

(This was the original Miller and Modigliani case. They showed that unless differential taxation of dividends and capital gains were an issue, shareholders would be indifferent to the split-up of the Equity Cash Flow.)

SCENARIO III: No new Stock issued

Some of the firm's cash is used to pay down Debt and the remainder is used to pay dividends or is retained as Cash and Marketable securities. For this case the Equity Cash Flow is defined by:

$$Equity\ Cash\ Flow\ =\ Dividend\ +\ \Delta Cash\ -\ \Delta Debt$$

A change in the dividend is exactly counterbalanced by a change in the firm's Cash balances or a change in the firm's net issuance of debt.

Valuing the equity cash flow streams, two examples

EXAMPLE I: Firm sets a *target Debt/Equity ratio* of 30% in terms of book value:

Initial Sales	2,500					
Annual Sales growth	6%					
Current Assets to Sales	25%					
Current Liabilities to Sales	8%					
Net Fixed Assets to Sales	70%					
COGS to Sales	55%					
Interest rate	7%					
Dividend payout ratio	85%					
Depreciation rate	10%					
Corporate tax rate	40%					
r(U)	20%					
year	**0**	**1**	**2**	**3**	**4**	**5**
Profit and Loss						
Sales	2,500	2,650	2,809	2,978	3,156	3,346
Costs of Goods Sold		(1,458)	(1,545)	(1,638)	(1,736)	(1,840)
Interest		(37)	(39)	(42)	(44)	(47)
Depreciation		(239)	(278)	(322)	(372)	(428)
Profit before taxes		916	946	976	1,004	1,030
Taxes		(366)	(378)	(390)	(401)	(412)
Profit after taxes		549	568	585	602	618
Dividend		(467)	(483)	(498)	(512)	(525)
Retained earnings		82	85	88	90	93
Assets						
Current Assets	625	663	702	744	789	836
Fixed Assets						
At cost	2,050	2,394	2,784	3,225	3,722	4,283
Accumulated Depreciation	(300)	(539)	(818)	(1,140)	(1,513)	(1,941)
Net Fixed Assets	1,750	1,855	1,966	2,084	2,209	2,342
Total Assets	**2,375**	**2,518**	**2,669**	**2,829**	**2,998**	**3,178**
Liabilities and Equity						
Current Liabilities	200	212	225	238	252	268
Debt	502	532	564	598	634	672
Equity						
Stock	1,541	1,559	1,580	1,605	1,635	1,669
Accumulated Retained Earnings	132	214	300	387	478	570
Total Liabilities and Equity	**2,375**	**2,518**	**2,669**	**2,829**	**2,998**	**3,178**
Target Debt/Equity ratio	30%	30%	30%	30%	30%	30%

Free Cash Flow and the Equity Cash Flow

year	0	1	2	3	4	5
Free Cash Flow						
Profit after Taxes		549	568	585	602	618
+ Interest after taxes		22	24	25	27	28
+ Depreciation		239	278	322	372	428
- Change in Net Working Capital		(26)	(27)	(29)	(30)	(32)
- Change in Fixed Assets at Cost		(344)	(390)	(440)	(497)	(561)
FCF		441	453	464	473	482
Equity Cash Flow						
Free Cash Flow		441	453	464	473	482
- Interest after taxes		(22)	(24)	(25)	(27)	(28)
+ Change in Debt		30	32	34	36	38
Equity Cash Flow		449	461	473	483	491

THE COST OF EQUITY

- Assume that the correct risk-adjusted discount rate for levered equity cash flows is given by the Chapter 8 formula when T=0:

$$r_e(L) \;=\; r(U) \;+\; \left[r(U) \;-\; r_f*(1-t_c) \right]\frac{D}{E}$$

- Assume that book value of *both Debt and Equity* equals market value.

- Assume that r(U) = 20%.

- Assume that the terminal value of equity is determined by:

$$\text{Terminal Equity Value} \;=$$
$$\frac{\left(\text{Year 5 Equity CF}\right)*\left(1 \;+\; \text{long-run Equity CF growth}\right)}{\text{year 5 } r_e(L) \;-\; \text{long-run Equity CF growth}}$$

- Assume that the long-run Equity Cash Flow growth rate is the average of the annual growth rates in the model.

Valuing the equity directly			1	2	3	4	5
year			1	2	3	4	5
Equity Cash Flow			449	461	473	483	491
long-run growth rate	2.28%						
RADR for equity			24.74%	24.74%	24.74%	24.74%	24.74%
Terminal Value of Equity							2,237
Equity Cash Flow + Terminal Value			449	461	473	483	2,729
Discounted at Equity RADR			402	331	272	223	1,009
Equity Value	2,237						

The cost of equity is constant, since the Debt/Equity ratio is constant. (Miles & Ezzel?)

CHECK …COMPARE RESULTS TO SEQUENTIAL VALUATION

year	0	1	2	3	4	5	
Free Cash Flow		441	453	464	473	482	
growth rate	2.21%						
implied terminal value	2,824	=Year 5 FCF*(1+average FCF growth)/(r(U)-FCF growth)					
PV of FCFs at r(U) = Value of Firm	1,373						
PV of Terminal Value	1,135						
Total value of firm	2,747						
Equity = Firm value - Year 0 Debt	2,245						

WHY ARE THE RESULTS DIFFERENT?

- Have used cost of capital formulas from constant-growth, infinitely-lived models to do valuation in pro forma.

- Pro forma assumptions differ from those of the theoretical models.

Cash as a plug

Same example, with some minor parameter changes and one major change in assumptions:

- Assume that both Stock and Debt are fixed, and that any cash generated by the firm goes into a Cash and Marketable Securities account.

- This means that the *net Debt* of the firm is Balance Sheet Debt *minus* the Cash and Marketable Securities account. In economic terms we are saying that since the Cash could be used to repay Debt, the effective Debt of the firm is less than what appears on the Balance Sheet.

This model results in the following set of pro forma financial statements:

Initial Sales	2,500					
Annual Sales growth	6%					
Current Assets to Sales	25%					
Current Liabilities to Sales	8%					
Net Fixed Assets to Sales	70%					
COGS to Sales	55%					
Interest rate on debt	8%					
Interest rate on cash	7%					
Dividend payout ratio	75%					
Depreciation rate	10%					
Corporate tax rate	40%					
r(U)	20%					
year	0	1	2	3	4	5
Profit and Loss						
Sales	2,500	2,650	2,809	2,978	3,156	3,346
Costs of Goods Sold		(1,458)	(1,545)	(1,638)	(1,736)	(1,840)
Interest on debt		(56)	(56)	(56)	(56)	(56)
Interest on cash		11	12	12	11	11
Depreciation		(239)	(278)	(322)	(372)	(428)
Profit before taxes		908	941	973	1,003	1,032
Taxes		(363)	(376)	(389)	(401)	(413)
Profit after taxes		545	565	584	602	619
Dividend		(409)	(424)	(438)	(451)	(464)
Retained earnings		136	141	146	150	155
Assets						
Cash and Marketable Securities	157	163	166	165	160	150
Current Assets	625	663	702	744	789	836
Fixed Assets						
At cost	2,050	2,394	2,784	3,225	3,722	4,283
Accumulated Depreciation	(300)	(539)	(818)	(1,140)	(1,513)	(1,941)
Net Fixed Assets	1,750	1,855	1,966	2,084	2,209	2,342
Total Assets	**2,532**	**2,680**	**2,834**	**2,994**	**3,158**	**3,328**
Liabilities and Equity						
Current Liabilities	200	212	225	238	252	268
Debt	700	700	700	700	700	700
Equity						
Stock	1,500	1,500	1,500	1,500	1,500	1,500
Accumulated Retained Earnings	132	268	409	555	706	861
Total Liabilities and Equity	**2,532**	**2,680**	**2,834**	**2,994**	**3,158**	**3,328**

Even if we are willing to make the assumption that Balance Sheet numbers reflect market values, calculating the cost of equity involves using the effective Debt/Equity ratio:

$$effective\ Debt\ /\ Equity\ ratio\ =\ \frac{Debt\ -\ Cash}{Stock\ +\ Accumulated\ Retained\ Earnings}$$

We use this effective Debt/Equity ratio in the same formula for $r_e(L)$ used in the previous example. The cash flows and equity valuation are given below:

year	0	1	2	3	4	5
Free Cash Flow						
Profit after Taxes		545	565	584	602	619
+ Interest after taxes		34	34	34	34	34
+ Depreciation		239	278	322	372	428
- Change in Net Working Capital		(26)	(27)	(29)	(30)	(32)
- Change in Fixed Assets at Cost		(344)	(390)	(440)	(497)	(561)
FCF		448	460	471	480	488
Equity Cash Flow						
Free Cash Flow		448	460	471	480	488
- Interest after taxes		(34)	(34)	(34)	(34)	(34)
+ Change in Debt		0	0	0	0	0
Equity Cash Flow		415	426	437	447	454
Valuing the equity directly						
year		1	2	3	4	5
Equity Cash Flow		415	426	437	447	454
average growth rate	2.31%					
Effective Debt/Equity ratio		30.38%	27.99%	26.03%	24.48%	23.30%
RADR for equity		24.62%	24.25%	23.96%	23.72%	23.54%
Terminal Value of Equity						2,190
Equity Cash Flow + Terminal Value		415	426	437	447	2,644
Discounted at Equity RADR		371	308	256	212	1,021
Equity Value	2,168					

Why not use a direct valuation?

- Hard to predict equity cash flows: more senior claim holders have *contingent* rights to cash flows.

- In many valuations the discount rate with which to discount the equity holders' cash flows cannot be determined until the value of the firm is estimated.

   Nevertheless, we can often estimate *r(U)* without specific knowledge of the value of the firm.

- If the firm has convertible securities, we cannot figure the relative value of the equity and the convertible securities without knowing the *total value to be shared* by the convertible holders and the stock holders:

A Comparison of Sequential Valuation of Equity to Direct Valuation of Equity

Sequential Valuation of Equity	Direct Valuation of Equity
Project Sales.	Same
Pro Forma and FCFs	Pro forma, FCFs, and equity cash flows (i.e., estimate the financing of the firm)
WACC and firm valuation	Valuation of equity CFs at cost of equity.
Check DCF valuation by using *whole firm multiples* for comparables. Leverage of comparables is not important.	Check the direct equity valuation by using *equity multiples for comparables* (these comparables should have similar leverage).
Value debt, etc. to arrive at equity residual.	No comparable step