STERN IAG

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# Workshop V: Relative Valuation

## Relative Valuation

- Refresher
  - What is relative valuation?
  - Finding comparables
  - Means of comparison
- Book multiples
- Operating multiples
- Sector specific multiples
- Advanced valuation multiples
- Examples galore w/ CIS (if time permits)

# What is Relative Valuation

- Relative value principle: what is the market *willing to pay?*
  - The science of selling to--and buying from--a "bigger idiot"
- Assets with similar attributes and similar earnings potential should sell for similar prices.
  - Apples to apples, same houses on the same block, etc.
- Easier to implement and less time consuming than intrinsic value
- Steps to relative valuation:
  - Find comparable businesses
  - Find the means of comparison

# Finding Comparables

- Comparable companies should have similar businesses in a similar industry with similar risks, size, growth, etc.
- No hard set of rules, but obviously:
  - Apples to apples, NOT apples to oranges
  - Exxon Mobile to Royal Dutch Shell, NOT Exxon Mobile to The Gap
- Premiums and discounts can be estimated for dissimilarities
  - Heavier, juicier apples trade at a 10% premium to regular apples
  - Coca-Cola trades at a 50% premium (Price to Sales) to PepsiCo
- Sometimes, there are no comparables, and premiums and discounts cannot be estimated:
  - Whole Foods trade at a 200% premium to Kroger
- Be creative, Look at private equity buy-out multiples, etc.
- Comparables can also serve as a proxy for estimates

# Means of Comparison

- **BOOK VALUE MULTIPLES**
  - P/B, P/TBV, Q
  - Assumption: similar businesses with similar returns should be trading at similar relative asset value
- **OPERATING MULTIPLES**
  - P/E, P/S, EV/S, EV/EBITDA, MC/FCFE, EV/FCFF
  - Assumption: similar businesses should have similar earnings power
- **SECTOR SPECIFIC MULTIPLES**
  - EV/Subscriber, EV/Resource in reserve, EV/Throughput of product
  - Assumption: businesses in the same industry that make similar returns on a product should trade in tandem to a common denominator
- **ADVANCED VALUATION MULTIPLES**
  - EVIC / ROICWACC, EVGCI / CROCIWACC
  - Assumption: the market premium/discount of a business, regardless of its size, should be directly proportional to its economic value added compared to similar firms in the industry



# Book Value Multiples

- **Price to Book Equity (P/B)**
  - Ratio between market value of equity and book value of equity
- Definition:

$$\text{Price to Book Ratio} = \text{PBV} = \frac{\text{Market Value of Equity}}{\text{Book value of equity}}$$

- Intuition:
  - What the market is willing to pay for a firm's assets
  - Good for when earnings power or tangible value are in the assets
  - Bad when value is not in tangible assets (i.e. service and technology)
  - Bad When book value of equity is negative (i.e. initial project/firm development)
  - Bad when accounting standards differ (i.e. U.S. PP&E vs. Chinese PP&E)

# P/B Ratio Dissected

$$P_0 = \frac{DPS_1}{k_e - g_n}$$

$$P_0 = \frac{(EPS_1)(\text{Payout Ratio})}{r - g_n}$$

$$P_0 = \frac{(BV_0)(ROE)(\text{Payout Ratio})}{r - g_n}$$

$$\frac{P_0}{BV_0} = PBV = \frac{(ROE)(\text{Payout Ratio})}{r - g_n}$$

$$\frac{P_0}{BV_0} = \frac{(ROE)(1+g)(\text{Payout Ratio})}{r - g_n}$$

$$g = (1 - \text{Payout ratio}) * ROE$$

$$\frac{P_0}{BV_0} = PBV = \frac{ROE - g_n}{r - g_n}$$

# Book Value Multiples

- **Price to Book Equity (P/TBV)**
  - Ratio between market value of equity and tangible book value (TBV)
- Definition:
  - Same as P/B, except book value does not include intangibles
  - TBV = Assets – Liabilities – Goodwill – Other intangibles
  - Proxy for liquidation value if TBV approximates replacement value
- **Tobin's Q (Q)**
  - Ratio between market value of assets in place over replacement cost of assets in place
- Definition:
  - Provides a more updated measure of value of assets than accounting book value
  - Measure has informational discrepancies and do not have precise definition
  - Rationale: firms that earn positive excess returns efficiently will have Q>1, else Q<1
  - I personally have never used this measure

# Earnings Multiples

- **Price to Earnings (P/E)**
  - Ratio between market value of equity and net income to retained earnings
- Definition:

$$PE = \frac{\text{Market Price per share}}{\text{Earnings per share}}$$

- Intuition:
  - What the market is willing to pay for a firm's earnings
  - Good to look at from a fundamental perspective (i.e. growth)
  - Bad because "earnings" is accounting measure not cash measure
  - Bad because "earnings" is often distorted by firm-specific factors (i.e. leverage, tax-rates, extraordinary items, etc.)

# P/E Ratio Dissected

$$P_0 = \frac{DPS_1}{k_e - g_n} \qquad P_0 = \frac{(EPS_1)(\text{Payout Ratio})}{r - g_n} \qquad \frac{P_0}{EPS_1} = \text{Forward PE} = \frac{\text{Payout Ratio}}{k_e - g_n} \qquad \text{Payout ratio} = 1 - \frac{\text{Expected growth rate}}{\text{Return on equity}} = 1 - \frac{g_n}{ROE_n}$$

$$\frac{P_0}{EPS_1} = \text{Forward PE} = \frac{1 - \frac{g_n}{ROE_n}}{k_e - g_n} \qquad P_0 = \frac{(EPS_0)(\text{Payout Ratio})(1+g)\left(1 - \frac{(1+g)^n}{(1+k_{e,hg})^n}\right)}{k_{e,hg} - g} + \frac{(EPS_0)(\text{Payout Ratio}_n)(1+g)^n(1+g_n)}{(k_{e,st} - g_n)(1+k_{e,hg})^n}$$

$$\frac{P_0}{EPS_0} = \frac{\text{Payout Ratio} * (1+g) * \left(1 - \frac{(1+g)^n}{(1+k_{e,hg})^n}\right)}{k_{e,hg} - g} + \frac{\text{Payout Ratio}_n * (1+g)^n * (1+g_n)}{(k_{e,st} - g_n)(1+k_{e,hg})^n}$$

$$\frac{P_0}{EPS_0} = \frac{\left(1 - \frac{g}{ROE_{hg}}\right)(1+g)\left(1 - \frac{(1+g)^n}{(1+k_{e,hg})^n}\right)}{k_{e,hg} - g} + \frac{\left(1 - \frac{g_n}{ROE_{st}}\right)(1+g)^n(1+g_n)}{(k_{e,st} - g_n)(1+k_{e,hg})^n}$$

# Earnings Multiples

- **Price to Sales (P/S)**
  - Ratio between market value of equity and the revenues of a company
- Intuition:
  - What the market is willing to pay for a firm's revenues
  - Good for negative earning firms and turn-around stories
  - Good for value proxy assuming "regression to industry norm"
  - Sucks when business margin dynamics are very different
  - Sucks when there is leverage to distort sales and operating performance
- **Enterprise Value to Sales (EV/S)**
  - Adjust comparables to account for firm value



# P/S Ratio Dissected

$$P_0 = \frac{DPS_1}{r - g_n} \qquad P_0 = \frac{(EPS_0)(\text{Payout Ratio})(1+g_n)}{r - g_n}$$

$$P_0 = \frac{(Sales_0)(\text{Net Margin})(\text{Payout Ratio})(1+g_n)}{r - g_n}$$

$$\frac{P_0}{Sales_0} = PS = \frac{(\text{Net Margin})(\text{Payout Ratio})(1+g_n)}{r - g_n}$$

$$\frac{\text{Price}}{\text{Sales}} = (\text{Net Margin})\left(\frac{(\text{Payout Ratio})(1+g)\left(1-\frac{(1+g)^n}{(1+k_{e,hg})^n}\right)}{k_{e,hg}-g} + \frac{(\text{Payout Ratio}_n)(1+g)^n(1+g_n)}{(k_{e,st}-g_n)(1+k_{e,hg})^n}\right)$$

# Earnings Multiples

- **Enterprise Value to EBITDA (EV/EBITDA)**
  - Ratio between market value of equity and net income to retained earnings
- Definition:

$$\text{EV/EBITDA} = \frac{\text{Market Value of Equity} + \text{Market Value of Debt} - \text{Cash}}{\text{EBITDA}}$$

- Intuition:
  - Measure of what the market is willing to pay for a firm's *operating* performance
  - Ignores items below "operating income" line
    - Corrects differences in leverage, tax rates, below-the-line items
  - Used frequently by buy-side analysts
  - Will not present accurate measure of comparable value if leverage, tax rates, below the line items are material in the long-term



# EV/EBITDA Dissected (via Damodaran)

$$P_0 = \frac{DPS_1}{k_e - g_n} \qquad V_0 = \frac{FCFF_1}{WACC - g}$$

$$FCFF = EBIT\,(1\text{-}t) - (Cap\ Ex - DA + \Delta\ Working\ Capital)$$

$$= (EBITDA - DA)\,(1\text{-}t) - (Cap\ Ex - DA + \Delta\ Working\ Capital)$$

$$= EBITDA\,(1\text{-}t) - DA\,(1\text{-}t) - Reinvestment$$

$$V_0 = \frac{EBITDA_1(1-t) - DA_1(1-t) - Reinvestment_1}{WACC - g}$$

$$\frac{V_0}{EBITDA} = \frac{(1-t) - \frac{DA}{EBITDA}(1-t) - \frac{Reinvestment}{EBITDA}}{WACC - g}$$

## Earnings Multiples

- **Mkt Cap to FCF to Equity (MC/FCFE)**
  - Ratio between market value of equity to cash-earnings to equity holders
- Intuition:
  - What the market is willing to pay for a firm's pure cash-flow to equity holders
  - Good for measuring the cash-earnings power of a firm
  - Sucks when there's material leverage or big tax differences
  - Sucks when reinvestment is significant
- **Enterprise Value to FCF to Firm (EV/FCFF)**
  - Ratio between firm value to cash-earnings to equity and debt holders
  - To a certain extent, fixes distortions in MC/FCFE created by leverage
  - What both equity holders and debt holders own in assets and get in cash



## Sector Specific Multiples

- Quantifying industry qualities
  - Link firm value to operating details and output
  - Provides "intuitive and qualitative" way of estimating value
  - Can be computed without going to financial statements
  - Great for firms with inaccurate or no financial statements
- Numerator is usually *enterprise value*
- Denominator is usually an *operating unit* that generate revenue
- Ex: commodity companies, manufacturing firms, subscription-based firms, internet firms

# Sector Multiple Examples

$$\text{Value per commodity unit} = \frac{\text{Market Value of Equity} + \text{Market Value of Debt}}{\text{Number of units of the commodity in reserves}}$$

$$\text{Value per unit product} = \frac{\text{Market Value of Equity} + \text{Market Value of Debt}}{\text{Number of units produced (or capacity)}}$$

$$\text{Value per Subscriber} = \frac{\text{Market Value of Equity} + \text{Market Value of Debt}}{\text{Number of Subscribers}}$$

$$\text{Value per Customer} = \frac{\text{Market Value of Equity} + \text{Market Value of Debt}}{\text{Number of Customers}}$$

$$\text{Value per Site Visitor} = \frac{\text{Market Value of Equity} + \text{Market Value of Debt}}{\text{Number of Visitors/Site}}$$

# Advanced Valuation Multiples

- **EV/IC to ROIC/WACC**
  - Ratio between the market value of capital over the book value of capital and economic return of firm
- Intuition:
  - Combines book metrics and earnings metrics nicely
  - What the market is willing to pay in excess of book for economic return
- **EV/GCI to CROCI/WACC**
  - "Cash" measure of EV/IC to ROIC/WACC
- Intuition:
  - Better measure of economic value than EV/IC to ROIC/WACC

## EV/GCI to CROCI/WACC Dissected

- GCI (Gross cash invested) = Gross tangible and intangible assets before depreciation or write-offs + investments in associates + working capital
- CROCI (Cash return on cash invested) = Post tax, pre interest cash-flow as a percentage of average GCI
- ROIC (Return on invested capital) = EBITA – cash taxes on EBITA as a percent of net tangible assets + operating working capital

- This is the ultimate measure of implied market discounts/premiums as a result of (1) the level, volatility, and duration of economic return (2) reinvestment

## Pros and Cons

- Pros
  - Simple to calculate and explain
  - Captures the intangible in a “market discount/premium”
  - Does not have as many explicit assumptions and projections
  - Very useful as a “reality check”
- Cons
  - Definition of a comparable firm is subjective
  - Does not hint at market over/under valuation
    - Tech bubble (market cap per eyeball), real estate bubble (house on the next block)
  - Prone to manipulation and oversimplification

# Examples

- See external documents