



EQUITY VALUATION IN R

Relative Valuation

Cliff Ang

Vice President, Compass Lexecon



Law of One Price

*Relative valuation is based on the **Law of One Price**, i.e., two assets that look the same must have the price*

Law of One Price (Example)

Stock	Subject Firm	A	B
Payoff If Economy Does Well	9	10	8
Payoff If Economy Does Poorly	3	4	2
Price	???	7	5



The Subject Firm's Price is \$6

Stock	Subject Firm	A	B	Average
Payoff If Economy Does Well	9	10	8	9
Payoff If Economy Does Poorly	3	4	2	3
Price	???	7	5	6



Identifying Comparables

- Some approaches
 - Firms within same industry classification
 - Competitors
- Filter by risk, growth, and profitability



EQUITY VALUATION IN R

Let's practice!



EQUITY VALUATION IN R

Valuation Multiples

Cliff Ang

Vice President, Compass Lexecon



Price-to-Earnings Ratio

- One of the most common valuation multiples used
- $\text{P/E Ratio} = \text{Market Price of Stock} / \text{Earnings Per Share (EPS)}$
 - EPS can be historical - i.e., last twelve months (LTM)
 - EPS can be forward-looking - i.e., next twelve months or next fiscal year
- P/E Ratios are not meaningful when the EPS is negative



Price-to-Book Ratio

- Another common valuation multiple
- $P/B \text{ Ratio} = \text{Market Price of Stock} / \text{Book Value Per Share}$
 - Book Value can be historical - i.e., last fiscal quarter's equity
 - Book Value can be forward-looking - i.e., estimates of future book value
- Book Values are usually positive but there are some cases when book values are negative



Implying the Price

Steps in determining the Implied Price

- A set of comparable companies are identified
- The appropriate metric or metrics are determined
- The median or average valuation multiple is selected
- The valuation multiple is applied to the subject firm's metric



Implying the Price

Relative valuation generates an **Implied Price**

- Dependent on valuation of comparable companies

Example Using P/B Ratio

What is the value of a midcap financial firm with BVPS of \$30?

```
> finl <- subset(midcap400, gics_sector == "Financials")
> finl$p_bv <- ifelse(finl$bvps < 0, NA, finl$price / finl$bvps)
> finl <- finl[complete.cases(finl), ]

> avg_p_b <- mean(finl$p_bv)
> avg_p_b
[1] 2.688627

> bvps <- 30
> implied_price <- avg_p_b * bvps
> implied_price
[1] 80.65881
```



EQUITY VALUATION IN R

Let's practice!



EQUITY VALUATION IN R

Analyzing Determinants of Multiples

Cliff Ang

Vice President, Compass Lexecon



The Average of Median May Not Always Be Applicable

- Use average or median if firms are very "comparable"
- Approaches to determine comparability:
 - Compare risk, growth, and profitability
 - Relative position historically



Regression-Based Approach

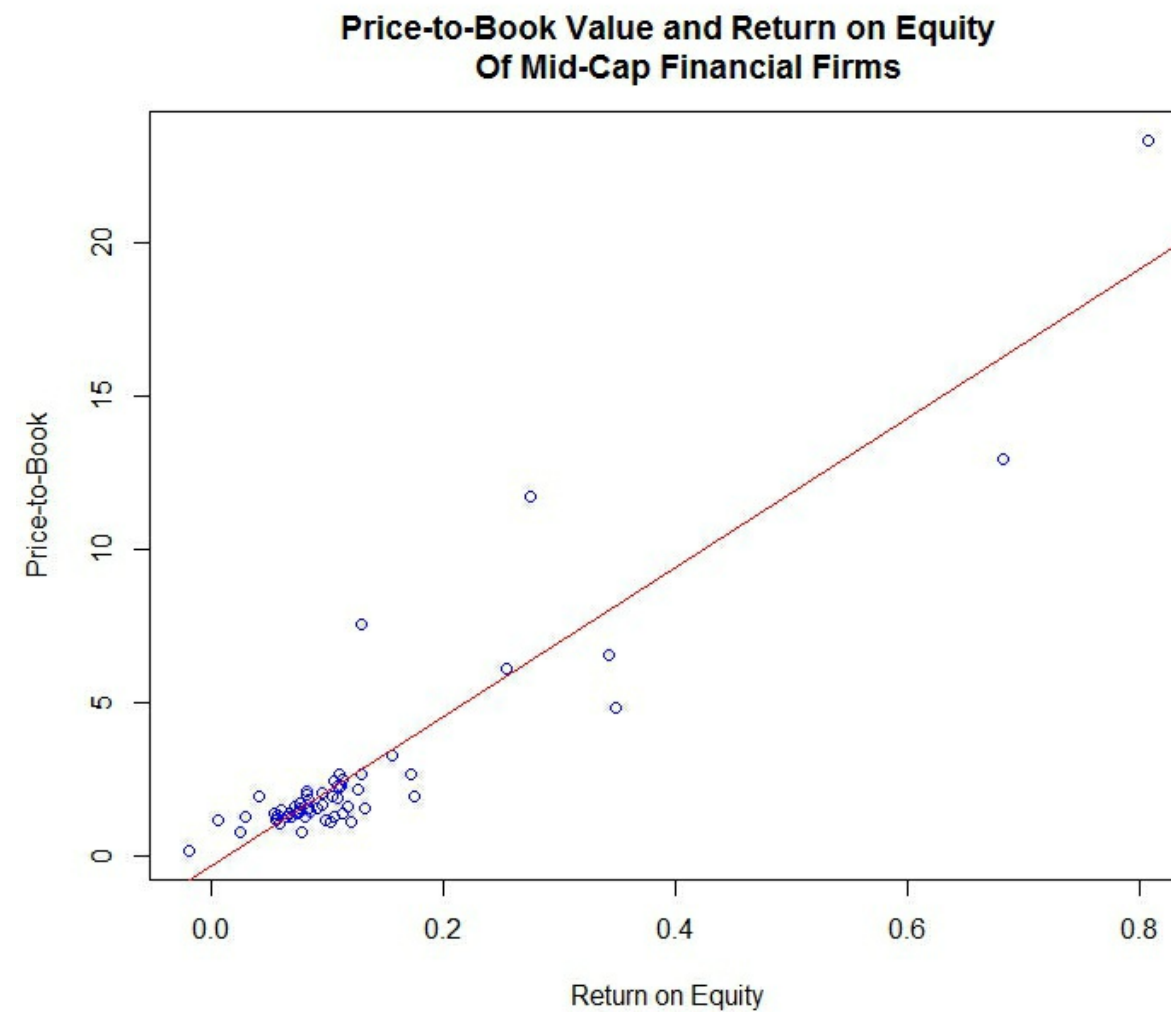
- We can also use regression analysis to help us determine what the appropriate multiple is for our subject firm
- P/B vs. ROE. P/E vs. 5-Year EPS Growth, or multiple regression
- Less subjective to arrive at the appropriate valuation multiple



Example Using P/B vs. ROE

```
> finl <- subset(midcap400, gics_sector == "Financials")
> finl$roe <- finl$ltm_eps / finl$bvps
> finl$p_bv <- ifelse(finl$bvps < 0, NA, finl$price / finl$bvps)
> finl <- finl[complete.cases(finl), ]
```

Example Using P/B vs. ROE



$$P/B = -0.365 + 24.37 * ROE$$

$$R - squared = 0.8462$$



Example Using P/B vs. ROE

```
> reg <- lm(p_bv ~ roe, data = finl)

> a <- summary(reg)$coeff[1]
> a
[1] -0.3654199

> b <- summary(reg)$coeff[2]
> b
[1] 24.37047
```



Implied Price

Assume an ROE of 10% and BVPS of \$30, what is the Implied Price?

```
> # Implied Price-to-Book
> roe <- 0.10
> implied_p_b <- a + b * roe
> implied_p_b
[1] 2.071627

> # Implied Price
> bvps <- 30
> implied_price <- implied_p_b * bvps
> implied_price
[1] 62.14881
```



EQUITY VALUATION IN R

Let's practice!