Finance I
Fall 2012

Session 8:
CAPM
(Capital Asset Pricing Model)

Agenda

1. **Recap**

2. **Capital Market Line**

3. **Capital Asset Pricing Model**

4. **Closing**

Are you not paying attention?

1.Yes
2.No

69%

31%

1.

2.

3

Usuarios que responden más rápido (en segundos)
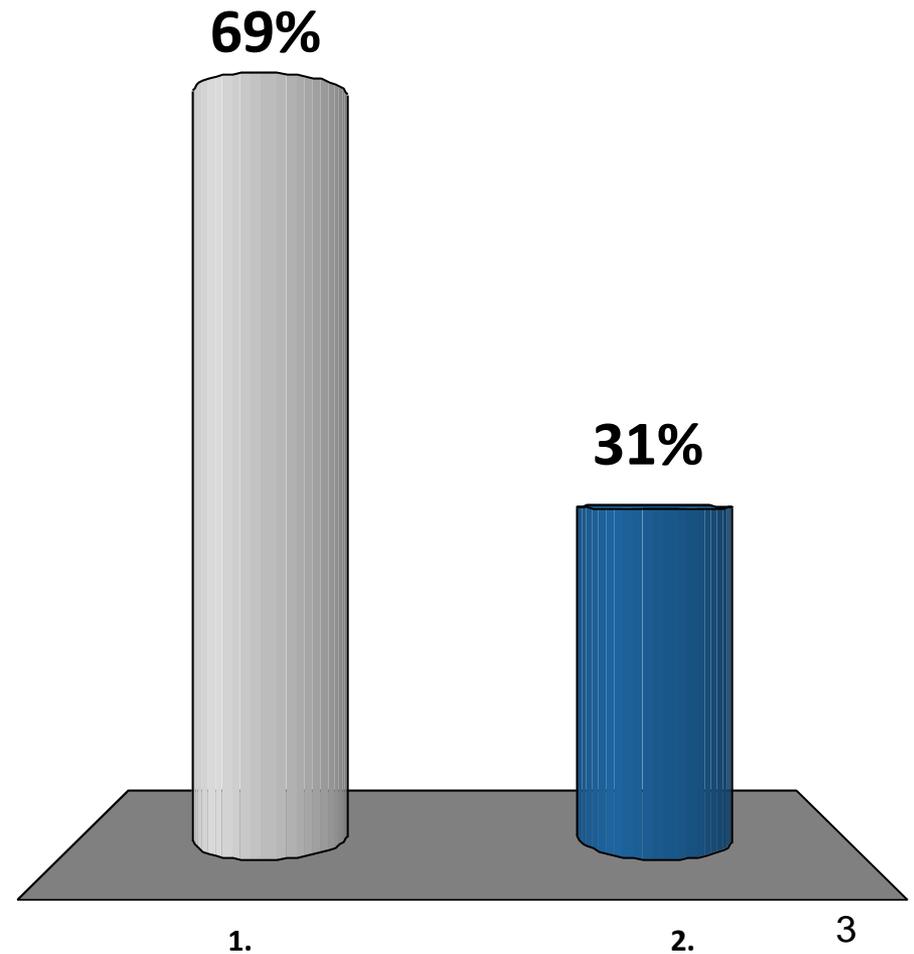
▶ **You can graph the possible combinations of assets (portfolios) in terms of risk and expected return**

- The level of risk of a portfolio is determined by:

  - Variance of each asset

  - Covariance within assets

  - Weight of each asset in the portfolio

- The expected return of a portfolio is determined by:

  - Expected return of each asset

  - Weight of each asset in the portfolio

▶ **There is an efficient "frontier" of portfolios**

- Some portfolios have the same level of risk but different expected return. The efficient frontier or "Markowitz" frontier shows the portfolios with highest expected return for any level of risk

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1. Recap

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2. Capital Market Line

▶ **What if we can invest in a risk free asset**

- Portfolio expected return?

- Portfolio variance?

▶ **The combination of the risk free asset and the efficient frontier of portfolios generates a new set of possible investments**

- Are these new investment possibilities more efficient than the Markowitz's efficient frontier?

- Yes, they are more efficient. This line is called Capital Market Line or Securities Market Line

- It represents the optimal (most efficient combinations) of a risk free asset and the market portfolio

- Every one, regardless of risk aversion should have a portfolio combining the risk free asset and the market portfolio. NO OTHER PORTFOLIO may have a higher return/risk ratio (Sharpe ratio)

2. Capital Market Line

▶ **The separation theorem:**

- All investors maximize the return to risk ratio (Sharpe ratio), regardless of risk aversion

- All investors choose a portfolio within the Security Market Line, according to their risk aversion

▶ **All portfolios are combinations of the Market Portfolio and the risk free asset**

If you're a risk averse individual, and you have a risk free asset and all the efficient portfolios available for investing, you should prefer:

1. The minimum variance portfolio
2. The risk free asset
3. A combination of any portfolio and the risk free asset
4. A combination of the market portfolio and the riske free asset
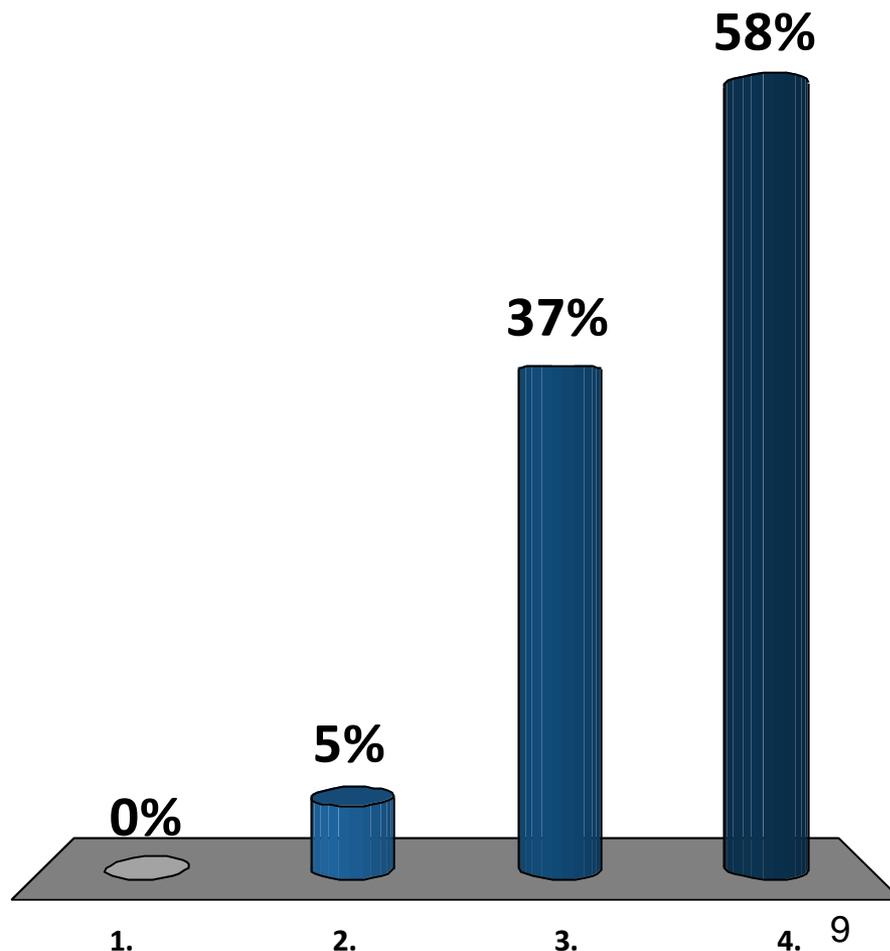
58%

37%

5%

0%

1.   2.   3.   4.

If you're a risk averse individual, and you have a risk free asset and all the efficient portfolios available for investing, you should prefer:

1. A portfolio with a Sharpe Index equal to the risk free rate
2. A portfolio with a Sharpe index equal to the minimum variance portfolio
3. A portfolio with a Sharpe index equal to the Markowitz ratio
4. A portfolio with the highest Sharpe Index ✔
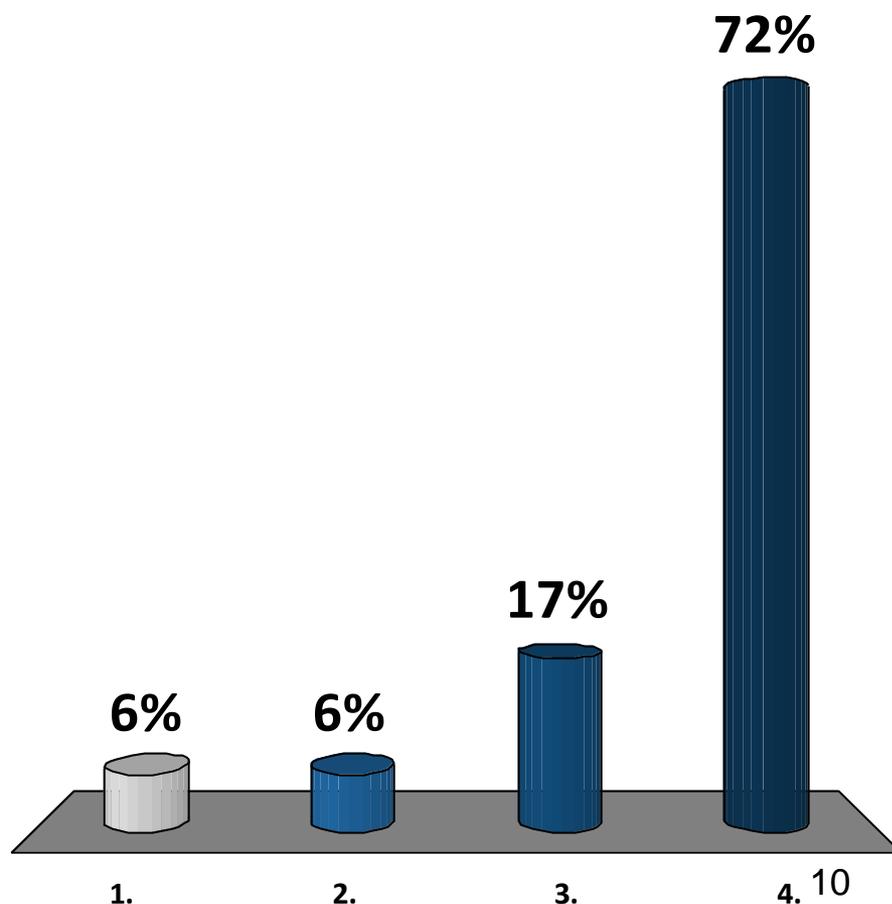
72%

17%

6%   6%

1.   2.   3.   4.

Agenda

3. CAPM

▶ **Capital Asset Pricing Model**

▶ **The required expected return of an asset is determined by its contribution to the non diversifiable risk of the market portfolio**

▶ **This contribution is represented by beta:**

$$\beta = \frac{cov\;(asset, market)}{Var(market)}$$

- If the beta of an asset is 1 (one), it holds the same level of risk as the market portfolio.

- If the beta of an asset is 0.5 (zero point five), it holds half the level of risk as the market portfolio.

3. CAPM

▶ **We can write the capital market line (or security market line) as:**

$$R_a = Rf + \beta_a * (Rm - Rf)$$

▶ **The difference between the Market portfolio return (R_m) and the risk free return (R_f) is called "Market Risk Premium"**

▶ **If an asset has the same level of risk as the market portfolio, it should have the same risk premium as the market portfolio**

- If it has twice the risk, it should have twice the risk premium

- If it has half the risk, it should have half the risk premium
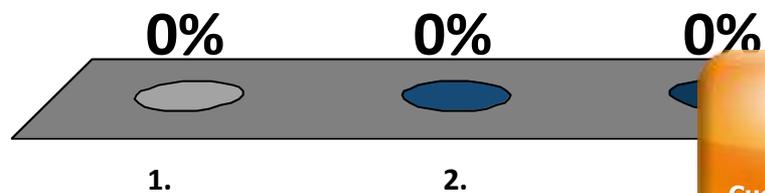
Can an asset have a negative beta?

1. Yes
2. No
✔ 3. It depends

0%   0%   0%

1.   2.

15

Cuenta regresiva
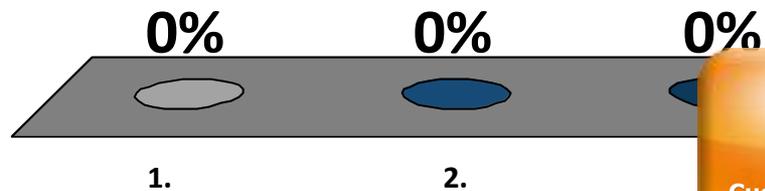
If the variance of an asset increases, its beta also increases?

1. Yes
2. No
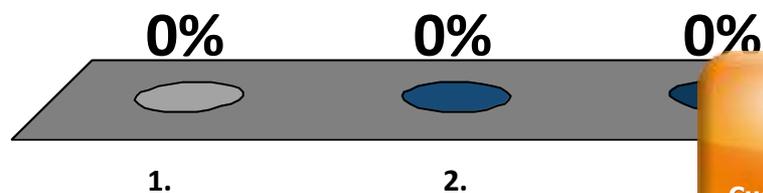3. It depends

0%   0%   0%

15

Cuenta regresiva

3. CAPM

▶ **Please keep in mind that we are talking about risk premium, not expected return…**

▶ **If an asset has twice the risk as the market portfolio, it SHOULDN'T have twice the expected return**

$$R_a = Rf + \beta_a * (Rm - Rf)$$

If the variance of an asset is equal to the markets portfolio variance, its beta is 1?

1. Yes
2. No
✔3. It depends

0%   0%   0%

1.   2.

15

Agenda

1. Recap

2. Portfolio Risk and Return

3. Closing

3. Recap

▶ **If you can lend and borrow at a risk free rate, the Capital Market Line or Security Market Line represents the optimal combination of the market portfolio and a risk free asset**

▶ **The market portfolio doesn't depend on the risk preferences of individuals, only the risk free rate and the Sharpe ratio**

▶ **All investors will choose the same risky portfolio (the market portfolio), but they will combine it with the risk free asset in a different proportion**

▶ **The cost of opportunity of any asset can be determined by the risk free rate, the market risk premium and beta, where beta is the asset's contribution of risk to the portfolio**

3. Closing

▶ **Remember to answer the online assignment before 16:00 on Wednesday**

▶ **Quiz 3 on the last 30 minutes of the class… bring a calculator, you won't be able to borrow from your classmates**

▶ **Next class will be a recap of all we've seen so far… please review the material and propose topics of discussion to help you prepare**

▶ **Midterm, Monday 9th at 14:30, room 416**

  ▶ **It should take you 80 minutes to answer**

  ▶ **You'll have 120 minutes**