REVIEW: MEASURING RETURNS

WHAT WILL YOU LEARN?

- Measuring returns
  - Holding-period return
  - Cumulative return
  - Continuously compounded return
  - Annualized returns
  - Internal rate of return
  - Time vs. dollar-weighted returns

HOLDING PERIOD RETURN

CUMULATIVE RETURN

GEOMETRIC AVERAGE VS. ARITHMETIC AVERAGE

ANNUALIZED RETURNS

DOLLAR VS. TIME-WEIGHTED RETURNS

SUMMARY

- The performance of an investment is measured by its return.
  - Holding-period return
  - Cumulative return
  - Continuously compounded return
  - Annualized returns
  - Internal rate of return
  - Time vs. dollar-weighted returns

COMPUTING EXCESS RETURNS OVER A BENCHMARK

WHAT WILL YOU LEARN?

- How do you measure excess returns?

EXCESS RETURN

- For a single holding period, the excess return is commonly defined as difference between the benchmark return and the portfolio return.
- What about over multiple periods?

EXAMPLE

	Portfolio return %	Benchmark return %	Difference %
Month 1	19.2	-2.0	21.2
Month 2	-2.6	9.7	-12.3
Month 3	-15.6	-3.1	-12.5
Geometric average			
Arithmetic average			
Cumulative return			

EXAMPLE

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Month 1	19.2	-2.0	21.2
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Geometric average	-0.67	1.37	-2.04
Arithmetic average	0.33	1.53	-1.20
Cumulative return	-2.01	4.17	-6.18

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EXAMPLE

SUMMARY

- The difference between two geometric mean returns is not itself a geometric mean excess return.

GEOMETRIC MEAN EXCESS RETURN

WHAT WILL YOU LEARN?

- How do you calculate the geometric excess return?

GEOMETRIC EXCESS RETURN

EXAMPLE

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GEOMETRIC MEAN EXCESS RETURN

ARITHMETIC EXCESS RETURN

- When we want to use expected values of future returns by calculating statistics of *past* returns, the arithmetic mean return is the better choice.

SUMMARY

- The arithmetic excess return can be misleading when evaluating performance.
- The geometric excess return is the excess return based on the ending values of wealth invested relative to what it would have earned if the benchmark had been chosen.
- When summarizing statistical properties of returns, such as expected return, arithmetic mean return or arithmetic excess return is more appropriate.