

Lecture 6: Time Value of Money – Appendix B

Inflation



Presentation to Cox Business Students

FINA 3320: Financial Management

Purpose of This Appendix

- **Provide understanding of the impact of inflation on time value of money**
 - (1) Discuss inflation
 - (2) Discuss real and nominal rates of return
 - (3) Discuss real and nominal cash flows

An Example

- Suppose you invest \$100 cash today and receive \$108 cash in one year, representing a return of 8%
- **Question:** Are you better off in a year with the \$108 than you are with the \$100 right now?
- **Answer:** Well , it depends...

Depends on What?

- You will in fact receive \$108 next year, but how much purchasing power will you have?
 - You are only better off if you can buy more with the \$108 next year than you can with \$100 today
 - You may have an extra \$8, but will \$108 next year buy more or less than \$100 could buy today?
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Inflation

- Inflation: Decrease in the purchasing power of money (i.e., increase in price levels)
 - Can't buy as much with the same dollar amount...or...
 - Takes more dollars to buy the same product
- The rate of inflation is the percentage increase in price levels from one period to the next

Definition

- Nominal concepts deal with physical cash flows
 - Nominal dollars are pictures of dead presidents
 - The nominal interest rate is the return in terms of nominal dollars
 - Real concepts deal with the purchasing power of money
 - Real dollars are expressed in terms of some base time period and reflect how much can be purchased with the nominal dollars in hand
 - The real interest rate represents the percentage change in purchasing power
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Back to the Example

- Invest \$100 today and receive \$108 next year
 - Today's \$100 and next year's \$108 are nominal dollars
 - The return of 8% is the nominal rate of return
- But suppose the \$108 will buy next year what \$102 will buy today
 - We would say that next year's (real) cash flow is \$102 in today's dollars
 - The real return is therefore only 2%

Real and Nominal Rates

- Inflation is the *link* between real and nominal interest rates
 - For a given real rate of interest, the nominal rate will be higher for higher expected inflation
 - Nominal rates are said to contain an *inflation premium*
 - Intuitively, an investor expects compensation for both the loss of purchasing power and the time the money is invested
 - Fisher equation: Describes the relation between real and nominal interest rates
 - $(1 + \text{nominal}) = (1 + \text{real})(1 + \text{inflation})$
 - Approximation: $\text{Nominal} = \text{Real} + \text{Inflation}$
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Measuring Inflation

- Construct an index that describes overall price levels
 - Most common is Consumer Price Index (CPI)
 - Inflation is estimated by the percentage change in the index over some time period
- To adjust cash flows for inflation:
 - Estimate percentage change in prices since some base time period (say, since 2000)
 - Divide cash flow by $1 + \% \text{ change}$ to re-express cash flow in terms of prices in the base time period

Back to Valuation

- Everything we've done so far has been in terms of nominal dollars (or nominal cash flows) and nominal discount rates
- We can also work in terms of real dollars and real discount rates

A New Example

- You are to receive \$1,100 next year. How much is this worth today if the nominal interest rate is 10%?
 - Is the \$1,100 a nominal or real cash flow?
 - Find PV: $PV = \$1,100 / 1.10 = \$1,000$
- Can also work the problem using real cash flows and real discount rates

A New Example continued...

- Suppose inflation is expected to be 6% this year
 - What is the real value of next year's \$1,100 in terms of today's dollars?
 - What is the real discount rate?
 - $(1 + \text{nominal}) = (1 + \text{real})(1 + \text{inflation})$
 - $\text{Real} = [(1 + \text{nominal}) / (1 + \text{inflation})] - 1$
 - $\text{Real} = [(1.10) / (1.06)] - 1$
 - $\text{Real} = 3.774\%$
 - Valuation in real terms:
 - $\text{PV} = \$1,100 / (1.06) = \$1,037.74$
 - $\text{PV} = \$1,037.74 / (1 + 0.03774) = \$1,000$
 - Answers are equivalent!
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Implications for Valuation

- Two options that provide equivalent results
 - Nominal cash flows and a nominal discount rate
 - Real cash flows and a real discount rate
- Which do you use?
 - Obviously, it doesn't matter since they give you the same answers!
 - Practical advice: Use the one that's easiest to implement!!
 - This will typically be nominal terms

Thank You!



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