

## **Choice of Discount Rate**

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- **The Principle**
- **Consequences**
- **Practice**
- **Application to Government**
- **Inflation**
- **Is Critical!**

## **Choice of DR: Principle**

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- **DR should reflect rate at which money can increase in productive investments = productivity of capital**
- **An empirical definition - not theory**
- **Test: what is rate at which current investments are producing, at margin?**

**Ex: You have loans: \$200 at store 18%**  
**\$5000 for tuition 9%**

**Could save at 6%**

**DR for \$100?      \$1,000?      \$10,000?**

## Consequences of Principle

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- **DR peculiar to situation of decision-making unit**
  - depends on opportunities
- **DR not a precise measure**
  - except in classroom examples, exact return difficult to obtain precisely;  $\pm 1$  or 2% quite acceptable
- **DR  $\geq$  interest rate paid**
  - repaying debt always one possible investment, so DR at least equals interest
  - actually you borrow because:  
value of money  $>$  interest
- **Since DR = minimum acceptable profitability, NPV  $>$  0 indicates a good project (may not be best)**

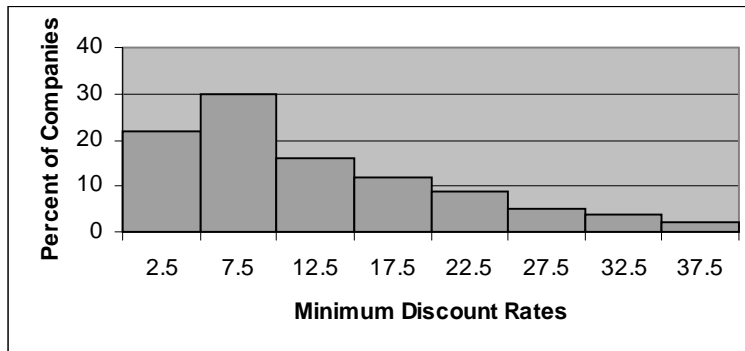
## DR Used in Practice

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- **A nice round number, generally**
  - recognition of imprecision in measurement
- **Where rate must be defended legally, as to regulatory groups - by formula**
  - not subjective
  - illusory precision
- **Research has shown that available profitability, with no inflation  $\approx$  10 to 15%/yr worldwide**
- **US Government, as of 1997, uses a several DR rates**
  - 4% -- Budget Dir. (Govt. Perform. Results Act), 1997
  - 7% -- Office of Management and Budget, 1999

## Distribution of Discount Rates for a sample of US companies

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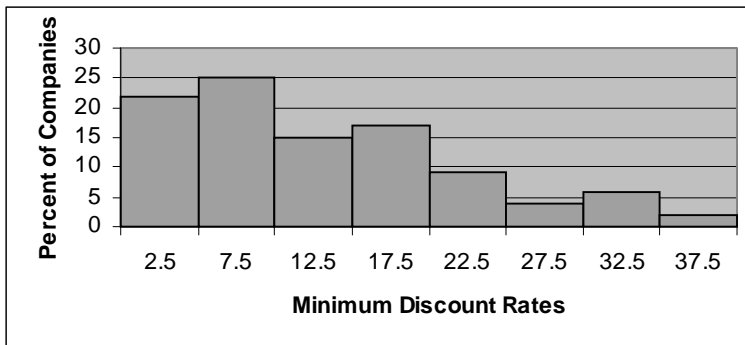
Source: Poterba and Summers, Sloan Management Review, Fall 1995

Dynamic Strategic Planning  
Massachusetts Institute of Technology

Richard de Neufville, Joel Clark, and Frank R. Field  
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## Distribution of Discount Rates for a sample of US Manufacturers

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Source: Poterba and Summers, Sloan Management Review, Fall 1995

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## **Application to Government**

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- **Where does Government Money come from?**
  - Taxes: One of Government's possible investments, or uses of money, is to reduce taxes
- **Recall, DR to be used for economic investments.**
  - Many government actions not measured in money (e.g.: defense, justice, ...)
- **DR not particularly appropriate to decide if schools should be built at all; is appropriate for choice of design**

## **Discount Rate and Inflation**

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- **Issue is Comparability**
  - the idea is to place all B, C on current basis of value
- **Two factors**
  - Productivity,  $p\%/yr.$
  - Change in purchasing power,  $i\%/yr.$   
(Inflation, Deflation)
- **Procedure depends on whether B, C stated in constant or changing purchasing power**
  - If constant:  $r = p$
  - If varying:  $r = p + i$

## Examples: Which $r$ ?

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### 1) Build Bridge, Tolls \$1/car

$r = p + i$       Tolls unlikely to adjust with inflation

### 2) Build Hospital, Fee \$500/bed/day

$r = p$       Rates do (in US) adjust with inflation, therefore you get \$ equal to current \$

### 3) Buy New Furnace, Save 2000gallons fuel per year

$r = p$       So long as fuel costs vary with inflation

## Choice of DR Critical

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- DR indicates if any investment is minimally acceptable
- Ranking of investments changes with DR which are:
  - less capital intensive
  - faster returns
  - ex. Toyota vs. Mercedes
- Choice of DR very political
  - low rates favored by
    - project enthusiasts
    - proponents of government projects