Financial planning

• Making financial decisions
  How will things change if I take this action?

• Financial decision modeling
  A framework for decision-making

• What-ifs - breakeven, sensitivities, & scenarios

Kirt C. Butler
Department of Finance
Broad College of Business
Michigan State University
February 3, 2015
MSU’s new funding paradigm

An increasing reliance on tuition revenue
Today’s session…

• Funds from the State are in short supply
  – This situation is likely to continue
  – We need to be **entrepreneurial** while still being responsible shepherds of MSU’s scarce resources

• In what assets should we **invest**?
  – Buildings, infrastructure, programs, people …

• How should we **finance** those investments?

The goal of this session is to help you support your units in making informed decisions
Today’s session…

- **Financial planning** provides a framework for evaluating the opportunities, costs & risks of investment and financing decisions

- **Valuation** is the focus of financial planning

  \[ \text{Value} = [\text{assets-in-place}] + [\text{growth options}] \]
The blunders are all there on the board, waiting to be made.

Savielly Tartakower
Decision criteria

Percentage of CFOs using a particular technique for evaluating investment projects

Net present value (NPV) 75%
Internal rate of return (IRR) 76%
Payback 57%


**Breakeven** is another useful measure is; that is, the point at which revenue = cost such that there is no net loss or gain
Decision criteria

• **Net present value (NPV)**
  = additional value created by a project net of cost ($s)

• **Internal rate of return (IRR)**
  = the project’s expected return (in %)

• **Payback** = length of time required to recoup initial cost

Shortcomings: (1) ignores cash flows after the payback period, (2) ignores the timing & riskiness of cash flows

Also…

• **Breakeven** = the point at which revenue equals cost, such that there is no net loss or gain
Decision criteria

Although these decision criteria seem complex, the simple, basic idea is to estimate what might change if we accept a proposed course of action.

In financial terms, we want to estimate changes in expected future cash flows arising from a decision.
Industry best practice: NPV

An example: Valuing an office building

**Step 1: Forecast the cash flows**

Cost of building \(= C_0 = 370,000\)

Expected sale price in Year 1 \(= C_1 = 420,000\)
Industry best practice: NPV

**Step 2: Estimate the opportunity cost of capital**

If equally risky investments in the capital markets offer a return of 5%, then

\[
\text{Cost of capital (r)} = 5\%
\]

The cost of capital also is called the **discount rate** or **hurdle rate**

\[
\text{NPV} = \frac{-\$370,000}{1.05} - \$420,000
\]

Today

One year from today
Industry best practice: NPV

**Step 3: Discount expected future cash flows**

The building is worth $400,000 today when valued at the 5% cost of capital.

\[ PV = \frac{C_1}{(1+r)} = \frac{420,000}{1.05} = 400,000 \]

Today

\[ 400,000 \]

One year from today

\[ 420,000 \]

\[ -370,000 \]
Industry best practice: NPV

Step 4: Find the project’s net present value

It costs $370,000 to buy a building that has a value of $400,000, so the net present value (NPV) of this investment is

$$NPV = 400,000 - 370,000 = 30,000$$

The building is worth $30,000 more than it costs

$400,000

- $370,000

$30,000 in added value or net present value (NPV)
Industry best practice: IRR

Alternatively

Expected return = $420,000 / $370,000 ≈ 13.5%

This is a good project because the 13.5% expected return (or IRR, or internal rate of return) exceeds the 5% required return (or cost of capital)

The 13.5% expected return is greater than the 5% required return

-$370,000

$420,000

Today

One year from today
Another useful (& simple! 😊) decision rule

Payback

= length of time required to recoup initial outlay

For the building project, we don’t get our payback until one year from today

Payback is one year

$420,000

-$370,000

Today

One year from today
Another useful (& simple! 😊) decision rule

Suppose our return arrived as $35,000 per month; that is, $420,000 = ($35,000/month)*(12 months)

We recover our investment in about 10½ months; that is, ($370,000)/($35,000/month) = 10.57 months

Payback is about 10½ months

$35,000 per month

-$370,000

Today

One year from today
Another useful (& simple! 😊) decision rule

Although the payback period is useful, we need to recognize its shortcomings

1) ignores the time value of money
   (i.e., timing and riskiness of future cash flows)
2) ignores cash flows after the payback period

<table>
<thead>
<tr>
<th>Project</th>
<th>C₀</th>
<th>C₁</th>
<th>C₂</th>
<th>C₃</th>
<th>Payback period</th>
<th>NPV @ 10%</th>
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</thead>
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<td>0</td>
<td>1</td>
<td>0</td>
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<td>5000</td>
<td>40000</td>
<td>3</td>
<td>18730</td>
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</table>
Decision modeling

To get anywhere, or even to live a long time, a man has to guess, and guess right, over and over again, without enough data for a logical answer.

Robert Heinlein, Time Enough for Love
Decision modeling

Only **incremental cash flows** are relevant

**Incremental cash flow = (Alternative – Base)**
Include anything – and everything – that changes

- First identify a **base case** as a starting point
  This usually is the ‘do nothing’ alternative, which might for example represent no changes to current programs

- Then, consider **alternatives relative to the base case**
  The incremental cash flows associated with the alternatives are estimated relative to the base case
Decision modeling

It is the theory that determines what can be observed.

Albert Einstein
Decision modeling

Only **incremental cash flows** are relevant

**Incremental cash flow = (Alternative – Base)**

- Include all side effects
  
  Introducing a new online global EMBA program would cannibalize our existing EMBA (WMBA) program

- Include any horizon value – This can be important if a project is your entry into a growth market

- Exclude sunk costs (they are not incremental) in making decisions about **future** resource allocations

- Include overhead expenses if they truly are incremental to the project
E. Lansing rental property

Base case

Your daughter is a freshman living on campus in Wilson Hall. For the next three years, she plans to rent a room in a house with two of her friends. Rent will be about $500 per month, or $500 \times 12 = $6000 per year.

Alternative

You’ve identified a rental home selling for $156,000 and licensed for three. You can buy the house, let your daughter live there with 2 of her friends for the last 3 years of school, and then sell the house in 3 years.

How can you compare this alternative to the base case

Your decision depends on what will change if you decide to buy the house.
E. Lansing rental property

Opportunities and risks

- Pro: A big benefit is you avoid $6000 in annual rent !!!
- Con: What will the house will be worth in 3 years ???

Some simplifying assumptions

- We’ll value this on an annual basis for simplicity (even though rental income and expenses occur monthly); that is, we’ll assume operating cash flows occur at year-end
- Tax considerations will be greatly simplified (e.g., state and local taxes are ignored)

My example illustrates an approach to decision-making. Don’t fret about the details – at least not just yet.

(Many details have been simplified for ease of exposition.)
E. Lansing rental property

Let’s take a 2-stage approach

1. As a starting point, let’s value the home as a stand-alone rental property, in which the base case is do nothing (this is an East Lansing landlord’s perspective)

2. Then, let’s ask how to best pay for your daughter’s housing at MSU
   Here, the base case is spend $6000/year in rent
E. Lansing rental property

Details of the opportunity

- The rental property costs $156,000 today (This is depreciated over a 27.5-year depreciable life)
- Rent for 3 tenants will be $500/month/tenant in year 1
- Rental income & expenses will grow at the 3% inflation rate (this should reflect your expectations)
- You expect the value of the property to stay the same, although you want to consider alternative scenarios
- Your personal tax rate is 28% (Note: MSU pays no tax on much of its portfolio)
- You are looking for a 6% return on this investment
Financial planning

Spreadsheet modeling

- Models are useful because they help you to understand the forces that drive a business decision
- If done properly, they allow you to construct best/worst case scenarios to assess the sensitivity of a proposed project to your assumptions and to business conditions

Helpful conventions

- Create an input section of values that drives the analysis and can be changed for further analysis
- Use formulas so that the analysis is flexible
- Include an output section to summarize your results
E. Lansing rental property

Let’s move to an Excel spreadsheet…
## E. Lansing rental property

### Macroeconomics
- Required return: 6% or hurdle rate
- Expected inflation: 3%
- Income tax rate: 28%

### Characteristics
- # of tenants: 3
- Monthly rent per tenant: 500
- Purchase price today: 156000
- Price change in 3 years: 0% [-5%, 0%, 5%, 10%]
- Depreciable life: 27.5
- Operating expense: 5000
- Realtor’s fee on sale: 3%
E. Lansing rental property

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
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<td>5673</td>
<td>5673</td>
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<tr>
<td>Depreciable basis</td>
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<td>150327</td>
<td>144655</td>
<td>138982</td>
</tr>
</tbody>
</table>

Expected market value in 3 years 156000
Tax on sale = (MV-BV)*(Tax rate)
= (156,000 – 138,983)*(0.28) -4765
Realtor's fee = 3% of sale price
= (156,000)*(0.03) -4680

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net cash flows</td>
<td>-156000</td>
<td></td>
<td></td>
<td>146555</td>
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</table>

from buying & selling the rental property
### E. Lansing rental property

<table>
<thead>
<tr>
<th>Federal income tax</th>
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</thead>
<tbody>
<tr>
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<td>18000</td>
<td>18540</td>
<td>19096</td>
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</tr>
<tr>
<td>- Operating expenses</td>
<td>-5000</td>
<td>-5150</td>
<td>-5305</td>
<td></td>
</tr>
<tr>
<td>- Depreciation</td>
<td>-5673</td>
<td>-5673</td>
<td>-5673</td>
<td></td>
</tr>
<tr>
<td>Taxable Income</td>
<td>7327</td>
<td>7717</td>
<td>8119</td>
<td></td>
</tr>
<tr>
<td>- Taxes</td>
<td>-2052</td>
<td>-2161</td>
<td>-2273</td>
<td></td>
</tr>
<tr>
<td>Net Income</td>
<td>5276</td>
<td>5556</td>
<td>5846</td>
<td></td>
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</table>
### E. Lansing rental property

- **Operating cash flows…**

<table>
<thead>
<tr>
<th>Year</th>
<th>Operating revenues</th>
<th>Operating expenses</th>
<th>Depreciation</th>
<th>Taxable Income</th>
<th>Taxes</th>
<th>Net Income</th>
<th>Total operating cash flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>18000</td>
<td>-5000</td>
<td>-5673</td>
<td>7327</td>
<td>-2052</td>
<td>5276</td>
<td>10948</td>
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<tr>
<td>1</td>
<td>18540</td>
<td>-5150</td>
<td>-5673</td>
<td>7717</td>
<td>-2161</td>
<td>5556</td>
<td>11229</td>
</tr>
<tr>
<td>2</td>
<td>19096</td>
<td>-5305</td>
<td>-5673</td>
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<td>-2273</td>
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</table>
E. Lansing rental property

<table>
<thead>
<tr>
<th>Year</th>
<th>0</th>
<th>1</th>
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<th>3</th>
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</thead>
<tbody>
<tr>
<td>Buy/sell the home</td>
<td>-156000</td>
<td></td>
<td></td>
<td>146555</td>
</tr>
<tr>
<td>Operating cash flows</td>
<td></td>
<td>10948</td>
<td>11229</td>
<td>11518</td>
</tr>
</tbody>
</table>

Incremental cash flows

<table>
<thead>
<tr>
<th>Year</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>-156000</td>
<td>10948</td>
<td>11229</td>
<td>158073</td>
<td></td>
</tr>
</tbody>
</table>

Value of home at 6% 153044 = value of cash inflows
Cost of home -156000 = initial investment

Net present value -2956 = additional value captured
Internal rate of return 5.3% = expected return

This project doesn’t quite recapture its investment
Expected return falls short of the 6% cost of capital
What if...

When I look back on all these worries
I remember the story of the old man who said
on his deathbed that he had had a lot of
trouble in his life,
most of which never happened.

Winston Churchill
What if...

**Sensitivity analysis**: How sensitive is our analysis to the expected price appreciation of the rental property?

If you have used formulas rather than numbers in your spreadsheet model, then changing your inputs will result in new outputs.

<table>
<thead>
<tr>
<th>Price change over next 3 years</th>
<th>NPV Net present value</th>
<th>IRR Expected return</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5%</td>
<td>-7475</td>
<td>4.2%</td>
</tr>
<tr>
<td>0%</td>
<td>-2956</td>
<td>5.3%</td>
</tr>
<tr>
<td>5%</td>
<td>1563</td>
<td>6.4%</td>
</tr>
<tr>
<td>10%</td>
<td>6082</td>
<td>7.5%</td>
</tr>
<tr>
<td>3.3%</td>
<td>0</td>
<td>6.0% breakeven</td>
</tr>
</tbody>
</table>
Housing for your daughter at MSU

Let’s assess the alternative of buying the rental property and renting to 2 of her friends.

Your daughter stays for free. 😊

Details of the opportunity

- Rent for your 2 tenants will be $500/month in the 1st year
  The IRS requires you report the ‘percentage business use’ of your home, and this reduces your allowable operating and depreciation expenses. In this instance, business use is 2/3 or 66.7%.

- Other assumptions are as before.
Housing for your daughter at MSU

Let’s move to an Excel spreadsheet…
Housing for your daughter at MSU

Macroeconomics
Required return 6% = cost of capital
Expected inflation 3%
Income tax rate 28%

Characteristics
# of tenants 3 but only 2 pay rent
Monthly rent per tenant 500
Purchase price today 156000
Price change in 3 years 0% [–5%, 0%, 5%, 10%]
Depreciable life 27.5
Operating expense 5000
Realtor fee on sale 3%
Business use of home 67% 2 of 3 tenants
Housing for your daughter at MSU

<table>
<thead>
<tr>
<th>Year</th>
<th>Depreciation</th>
<th>Depreciable basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3782</td>
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<tr>
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<td>3782</td>
<td>148436</td>
</tr>
<tr>
<td>3</td>
<td>3782</td>
<td>144655</td>
</tr>
</tbody>
</table>

(Note: 2/3rd business use results in 2/3rd lower depreciation)

Expected market value in 3 years 156000
Tax on sale = (MV-BV)*(Tax rate)
= (156,000 – 144,655)*(0.28) -3177
Realtor's fee = 3% of sale price
= (156,000)*(0.03) -4680

<table>
<thead>
<tr>
<th>Year</th>
<th>Net cash flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-156000</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
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<tr>
<td>3</td>
<td>148143</td>
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</table>

from buying & selling the rental property
## Housing for your daughter at MSU

### Fed income tax form...

<table>
<thead>
<tr>
<th>Year</th>
<th>Operating Revenues</th>
<th>Operating Expenses</th>
<th>Depreciation</th>
<th>Taxable Income</th>
<th>Taxes</th>
<th>Net Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12000</td>
<td>-3333</td>
<td>-3782</td>
<td>4885</td>
<td>-1368</td>
<td>3517</td>
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<tr>
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<td>12360</td>
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<td>-3782</td>
<td>5145</td>
<td>-1441</td>
<td>3704</td>
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<tr>
<td>2</td>
<td>12731</td>
<td>-3536</td>
<td>-3782</td>
<td>5413</td>
<td>-1516</td>
<td>3897</td>
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</table>

2/3rd business use reduces net income by 2/3rd

But actual operating expenses (cash flows) are higher than tax-deductible operating expenses…
Housing for your daughter at MSU

Operating cash flows…

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating revenues</td>
<td>12000</td>
<td>12360</td>
<td>12731</td>
<td></td>
</tr>
<tr>
<td>- Operating expenses</td>
<td>-5000</td>
<td>-5150</td>
<td>-5305</td>
<td></td>
</tr>
<tr>
<td>- Depreciation</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Taxable Income</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>- Taxes</td>
<td>-1368</td>
<td>-1441</td>
<td>-1516</td>
<td></td>
</tr>
</tbody>
</table>

Net Income

Total operating cash flows

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5632</td>
<td>5769</td>
<td>5911</td>
</tr>
</tbody>
</table>

In this example, actual operating expenses are not the same as tax-deductible operating expenses with a 2/3rd business use of the home.
# Housing for your daughter at MSU

<table>
<thead>
<tr>
<th></th>
<th>0</th>
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<th>2</th>
<th>3</th>
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</thead>
<tbody>
<tr>
<td>Buy/sell the home</td>
<td>-156000</td>
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<td>148143</td>
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<tr>
<td>Operating cash flows</td>
<td></td>
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<td>5769</td>
<td>5911</td>
</tr>
<tr>
<td><strong>Incremental cash flows</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-156000</td>
<td>5632</td>
<td>5769</td>
<td>154054</td>
</tr>
<tr>
<td>Value of home at 6%</td>
<td>139795</td>
<td>= value of cash inflows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of home</td>
<td>-156000</td>
<td>= initial investment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net present value</td>
<td>-16205</td>
<td>= additional value captured</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal rate of return</td>
<td>2.1%</td>
<td>= expected return</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This is the value of the ‘alternative’. However, in the ‘base case’ you were paying $6000 per year in rent !!!
Housing for your daughter at MSU

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base case: Pay rent</td>
<td>-6000</td>
<td>-6000</td>
<td>-6000</td>
<td></td>
</tr>
<tr>
<td>Alternative: Buy</td>
<td>rent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-156000</td>
<td>5632</td>
<td>5769</td>
<td>154054</td>
</tr>
</tbody>
</table>

Incremental cash flows

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Present value</td>
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<tr>
<td>Cost of home</td>
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<td>-156000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net present value</td>
<td></td>
<td>-167</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal rate of return</td>
<td>6.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This is pretty close to ‘breakeven’.
Housing for your daughter at MSU

Sensitivity analysis: Your biggest risk is the future price of rental properties in East Lansing

<table>
<thead>
<tr>
<th>Price change over next 3 years</th>
<th>NPV Net present value</th>
<th>IRR Expected return</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5%</td>
<td>-4686</td>
<td>4.8%</td>
</tr>
<tr>
<td>0%</td>
<td>-167</td>
<td>6.0%</td>
</tr>
<tr>
<td>5%</td>
<td>4352</td>
<td>7.0%</td>
</tr>
<tr>
<td>10%</td>
<td>8871</td>
<td>8.1%</td>
</tr>
<tr>
<td>-0.185%</td>
<td>0</td>
<td>6.0% breakeven</td>
</tr>
</tbody>
</table>
Housing for your daughter at MSU

Other considerations

▪ Do you really want to be a landlord?
  ▪ …and for your daughter?

▪ How do you want to structure your ownership?
  ▪ Private – at your personal tax rate
  ▪ Partnership – at your personal tax rate
  ▪ LLC – at the corporate tax rate

▪ How do you finance this investment?
  ▪ Cash? Loan through a LLC? Home equity line?

▪ Do you have better uses for your time & money?
Financial planning

This example will differ from your initiatives but it illustrates the approach of trying to estimate **WHAT WILL CHANGE?**

- Building models will help you make better, more informed decisions
- Models also will help you to understand the value drivers of your proposed investment
- Models can help you perform what-if analyses to help you structure your initiatives in the best possible way