Unit 07
Shelter – Section 1

Definitions and Background
- What is shelter?
  - House, mortgage, property tax, etc.
- What is housing?
  - In addition to shelter, utilities, household operations, housekeeping supplies, furnishings and equipment are included in housing.
- How important is housing in household budget?
  - Average household expenditure on housing in 2011: $16,803 which is 33.8% of household total expenditure.
  - Average household expenditure on shelter in 2011: $9,825 which is 19.8% of total household expenditure.
- For more information see Bureau of Labor Statistics Website at http://www.bls.gov/cex/home.htm#tables

Where to Live?
- There are many factors that can affect a consumer’s preference as to where to live.
  - Proximity to work
  - School
  - Commercial services
  - Open space
  - Cost of housing

Or ...

Cost of Living Index
- The Cost of Living Index measures relative price levels for consumer goods and services in participating areas for a mid-management standard of living.
- The nationwide average equals 100, and each index is read as a percent of the national average. The index does not measure inflation, but compares prices at a single point in time. Excludes taxes.
- Metropolitan areas as defined by the Office of Management and Budget.
- Data are published by ACCRA http://www.coli.org/

Examples of Cost of Living Index
- For the fourth quarter of 2010
  - Salt Lake City: 100.6
    - Meaning that Salt Lake City Metropolitan area’s cost of living is about 100.6% of national average.
  - New York Manhattan: 216.7
    - Meaning that New York Manhattan’s cost of living is a little more than twice that of national average.
  - Louisville, Kentucky: 87.7
    - Meaning that Louisville’s cost of living is about 87.7% of national average.
- For more cities see Table 728 of the Statistical Abstract of United States at http://www.census.gov/compendia/statab/2012/tables/12s0728.pdf
What Determines the Price of Shelter?
- Amenities of the house – size, etc.
- Location premium
  - Good schools
  - Nice neighborhoods
  - Low crime rate
  - Proximity to work
- Housing price is ultimately determined by demand and supply.
  - The higher the demand, and the lower the supply, the higher the price. New York Manhattan prices are so high because a lot of people want to live there.
- Demand and supply are partly determined by amenities and location.

What Are the Costs of Owning a Home?
- The cost of renting is just rent.
- The cost of home ownership is much more complicated. The cost includes
  - One time costs:
    - Closing cost, down payment, selling cost
  - Periodic costs:
    - Opportunity cost: lost investment returns on closing costs and down payment
    - Mortgage principal and interest payment
    - Property taxes
    - Hazard insurance
    - Operating and maintenance costs
    - Factors reducing homeownership costs
      - Tax deductions
      - Appreciation

One-Time Costs of Home Ownership
- Closing costs: include such expenditures as loan origination fees, survey fees, lawyer fees, and advance tax and insurance payments. They are generally in the neighborhood of 3-4% of the loan amount. It can be much less if you choose a no-cost loan, but then the interest rate will be higher.
- Down payment: 20% of the housing price is usually a good idea as that will allow you to not have to pay private mortgage insurance, which often can cost $100 a month. Zero down may be available, but one pays a much higher interest rate.
- Selling costs: Fees you will have to pay to a real estate agent. Usually it is 6% of the selling price, although you might be able to negotiate a lower fee.

Periodical Costs – Opportunity Cost
- Opportunity cost is the lost investment returns on closing costs and down payment.
- Example:
  - If you buy a house of $200,000, with $5,000 of closing costs and 20% down, then your upfront one-time cost is $5,000 + 40,000 = $45,000.
  - If interest rate is 6% per year, then opportunity cost per year is $45,000 * 6% = $2,700.

Periodical Costs - Mortgage Payment
- Notations
  - Monthly payment = M
  - Loan amount = L
  - Principal payment = P
  - Interest payment = I
  - Mortgage term = n (months)
  - Annual interest rate = r
- Mortgage payment is just an installment payment situation we studied in Unit 04. It is a present value factor sum (PVFS) application. Typically the EOM formula is used for mortgage computation.
An example
- House price = $200,000
- Down payment (20%) = $40,000
- Mortgage Loan L = $160,000
- r = 9%, n = 30 years = 360 months,
  rm = 9%/12 = 0.75% = 0.0075
- What is the monthly payment?
- What are the interest portion, the principal portion, and the remaining balance after each payment?

Monthly Payment
- Monthly payment (M)

\[
M = \frac{PVFS(rm = 0.75\%, n = 360, EOM)}{1 - \frac{1}{(1 + 0.75\%)^{360}}} \times 0.75% = 160,000 \times 0.0075 = 1,200.00
\]

Interest, Principal, and Balance
- Interest payment (I), principal payment (P), and monthly balance (L) vary each month
  - Month 1
    - I1 = 160,000 * 0.75% = 1,200.00
    - P1 = 1,287.40 - 1,200 = 87.40
    - L1 = 160,000 - 87.40 = 159,912.60
  - Month 2
    - I2 = 159,912.60 * 0.75% = 1,199.34
    - P2 = 1,287.40 - 1,199.34 = 88.06
    - L2 = 159,912.60 - 88.06 = 159,824.54
  - Month 3 ...

After Paying 18 Years of a 30-Year

Periodical Costs – Property Taxes, Insurance, and Operating and Maintenance Costs
- Property taxes: Property taxes are paid to the local government. Usually monthly payments are paid to the mortgage company so the mortgage company can hold the money in an escrow account to pay property tax.
- Hazard insurance: Homeowners insurance often is also paid as monthly payment to the mortgage company in an escrow account.
- Operating and maintenance costs: heating, cooling, electricity, repairs, etc.
Factors Reducing Homeownership Costs - Tax Deductions

- What expenses are tax-deductible?
  - The interest paid on a mortgage loan
  - Property taxes
- To claim tax benefits one must use itemized deduction instead of standard deduction.
  - Two tax concepts we need to know
    - Standard deduction vs. itemized deduction
    - Marginal tax rate

Standard Deduction vs. Itemized Deduction

- Every American taxpayer must choose to either itemize or take a standard deduction when filing tax return.
- Itemizing will allow the homeowner to deduct several expenses from his adjusted gross income before calculating the income tax owed. The most significant itemized deductions are mortgage interest, property tax, state income taxes, and charitable contributions.
- If a taxpayer chooses not to itemize, s/he receives a standard deduction. In 2012, the standard deduction for a single person was $5,950. The standard deduction for a married couple filing jointly was $11,900.

### 2012 Federal Marginal Tax Rate

<table>
<thead>
<tr>
<th></th>
<th>Single</th>
<th>Married - Joint</th>
<th>Head of Household</th>
<th>Married - Separate</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>0 - 8,700</td>
<td>0 - 17,400</td>
<td>0 - 12,400</td>
<td>0 - 8,700</td>
</tr>
<tr>
<td>15%</td>
<td>8,700 - 35,350</td>
<td>27,400 - 70,700</td>
<td>12,400 - 47,350</td>
<td>8,700 - 35,350</td>
</tr>
<tr>
<td>25%</td>
<td>35,350 - 85,650</td>
<td>70,700 - 142,700</td>
<td>47,350 - 122,300</td>
<td>35,350 - 71,350</td>
</tr>
<tr>
<td>28%</td>
<td>85,650 - 178,690</td>
<td>142,700 - 217,450</td>
<td>122,300 - 198,650</td>
<td>71,350 - 108,725</td>
</tr>
<tr>
<td>33%</td>
<td>178,690 - 388,350</td>
<td>217,450 - 388,350</td>
<td>198,650 - 388,350</td>
<td>108,725 - 194,175</td>
</tr>
<tr>
<td>35%</td>
<td>388,350 and up</td>
<td>388,350 and up</td>
<td>388,350 and up</td>
<td>194,175 and up</td>
</tr>
</tbody>
</table>

Annual Value of Homeownership Tax Deduction

- Homeowner tax benefit = marginal tax rate * (annual interest paid on mortgage loan + annual property taxes - standard deduction)
- However, in many cases the tax benefit is larger than the above formula shows. The above formula provides a conservative estimate of homeownership tax benefit.

### Example of Computing Tax Benefit

- Example:
  - First year mortgage interest payment = 14,356
  - Property tax = 2,700
  - Federal marginal tax rate = 25%
  - State marginal tax rate = 10%
  - Standard deduction for both federal and state taxes = 5,700
  - Total marginal tax rate = federal marginal tax rate + state marginal tax rate = 25% + 10% = 35%
- Answer:
  - Total tax saving = 35% * (14,356 + 2,700 - 5,700) = 3,974.60

Appreciation

- Appreciation is an investment return to the homeowner when a house increases in value over time.
- Housing prices can rise, fall, or remain constant over time.
Annual Rate of Appreciation

- Below is an example of how to compute the rate of appreciation
- An example
  - Initial house price = $200,000
  - Selling price after 5 years = $230,000
  - Annual appreciation rate = \((230000/200000)^{1/5} - 1\) = 2.8347%
- General formula for home appreciation =
  \[(\text{selling price}/\text{purchasing price})^{1/n} - 1\]
  where n=number of years one has the house.

How Good of an Investment Is a Home?

- One needs to be very careful about what statistics are used. The news media often quotes statistics on home appreciation rates that are mostly comparisons of prices of houses that were sold this year compared to last year. These statistics are like comparing apples to oranges because the houses sold are quite different from one year to another. For an example of such statistics see [http://extras.sltrib.com/homeprices/](http://extras.sltrib.com/homeprices/)

The Better Way – Housing Price Index (HPI)

- The HPI is published by the Office of Federal Housing Enterprise Oversight (OFHEO). The HPI is a broad measure of the movement of single-family house prices. It serves as a timely, accurate indicator of house price trends at various geographic levels.
- The HPI includes house price figures for the nine Census Bureau divisions, 50 states and the District of Columbia, and many Metropolitan Statistical Areas (MSAs) and Divisions.
- A weighted average index figure for the United States as a whole is also included.

Historical HPI for the U.S.

- The base is set to be 1991 at 100. For 2012 Q1, the index was 182.20. This means, housing prices in the U.S. in 2012 Q1 is about 1.822 times the prices in 1991. The interpretation of HPI is the same as the interpretation of Consumer Price Index (CPI).

What is the Annual Housing Appreciation Rate in the U.S. from 1991 to 2012?

- From the Table on the previous page we know
  - 1991 HPI = 100, 2012 HPI=182.20
- Denote
  - \(a=\text{annual appreciation rate}\)
  - \(n=\text{number of years, in this case 21 years}\)
- Answer:
  - \(a=(182.20/100)^{1/n}-1=(182.20/100)^{1/21}-1=2.898\%

Housing Price Index for Utah

- In this table 1991 was used as the base year.
What is the Annual Housing Appreciation Rate in Utah from 1991 to 2012?

- From the Table on the previous page we know
  - 1991 HPI = 100, 2012 HPI = 248
- Denote
  - \( a \) = annual appreciation rate
  - \( n \) = number of years, in this case 21 years
- Answer:
  - \( a = \left( \frac{248}{100} \right)^{\frac{1}{21}} - 1 = 4.42\% \)