Intermediate Microeconomics

Chapter 5
The Household as Supplier

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Labor, leisure and income

- Until now, income was fixed – but it actually depends on the labor provided by the household
- Labor (l) is a *bad*, the corresponding good is *leisure* (n)
- The budget constraint is now determined by the *time endowment* (T) of the individual
- Individual considers the choice of leisure/work versus consumption of all other goods (c), given the ongoing *real* wage rate (w)
- Real wage = price of consumption is \$1

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Budget constraint

- Time endowment:

$$T = n + l$$

- Budget constraint:

$$c = w \times l = w \times (T - n)$$

or:

$$c + w \times n = w \times T$$

- *Value of time endowment* ($w \times T$) = the amount of money the individual would have if he worked every available hour

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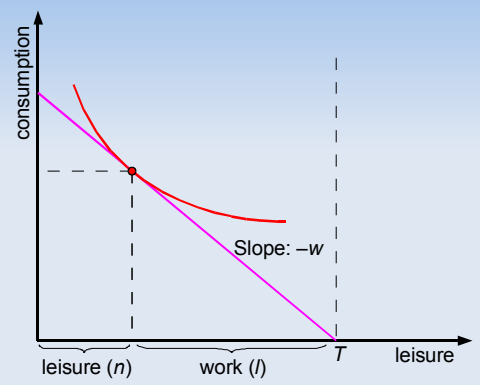
Budget constraint



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Comparative statics

- When wage rate falls, two effects:
  - substitution effect = leisure is ”less expensive”, so consume more leisure and work less
  - income effect = income is (literally) lower, so need to work more to be able to afford consumption ⇒ work more (less leisure)
- If leisure is a normal good, income and substitution effect work in *opposite* directions (compare to chapter 3!) – you ”sell” labor
- Which effect dominates? Theory does not provide a definite answer

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Labor supply

- *Labor supply curve* = schedule showing the relationship between the quantity of labor supplied and the wage rate, *ceteris paribus*
- If substitution effect always dominates income effect, then labor supply slopes upward
- If income effect always dominates substitution effect, then labor supply slopes downward
- More realistic case: labor supply curve bends back (substitution effect dominates at low wage rates and income effect dominates at high wage rates)

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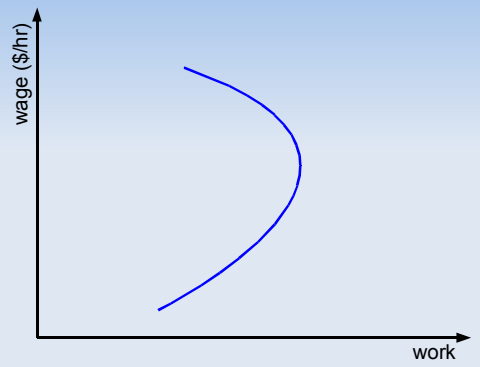
Bending labor supply



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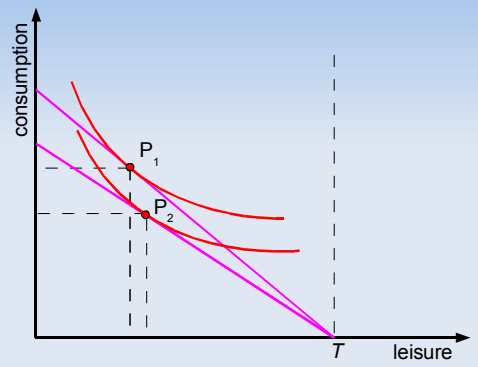
Labor supply



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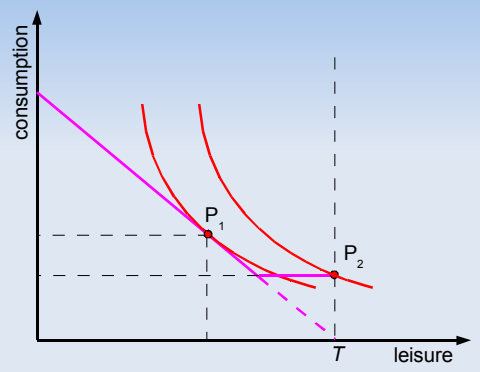
Labor supply decision with AFDC



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Producer surplus

- *Producer surplus* = amount of income an individual receives in excess of what he would require to supply a given number of units of a factor
- Geometrically, it is the area above the supply curve and below the wage rate

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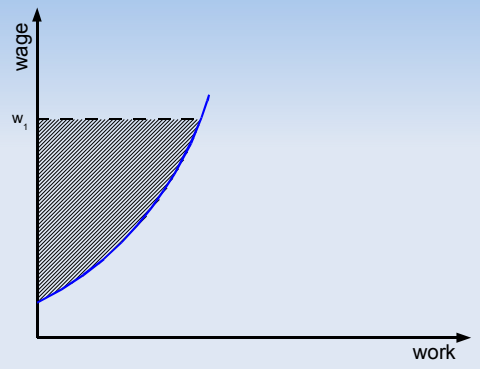
Producer surplus



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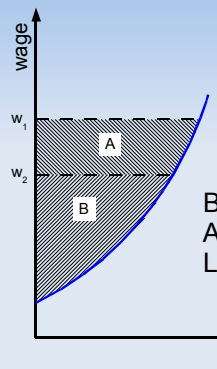
Producer surplus after wage falls



Before wage drop: A + B
After wage drop: B
Loss: A

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Capital

- Firms use two main factors of production: labor and capital
- *Real capital* = physical aids to production (e.g., buildings)
- *Financial capital* = money lent to firms to purchase or rent real capital
- Where does financial capital come from? Why do people save?

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A two-period model

- Until now, we assumed people only care about the present
- Now suppose people care about consumption today (c_0) versus tomorrow (c_1)
- *Life-cycle model* = a model where people's decisions at a point in time are made taking into account the economic circumstances over that person's entire lifetime
- Thus, we assume people only live for two periods

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Endowment

- *Endowment point* = feasible consumption bundle if the individual makes no trades with the market (or does not save/borrow)
- *Present value of endowment* = maximum level of current consumption that can be obtained, given the endowment
- Hence, the ”income” of the consumer is the present value of her endowment

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Present value

- *Present value* = maximum amount of money you would be willing to pay today for the right to receive a given amount at a specified date in the future
- The opposite of ”compounding interest” (interest rate is *i*):
  - if you deposit $\$x$ today, in n years you'll get $x \cdot (1+i)^n$
  - if n years from today you get $\$y$, how much should you have deposited today?

$$x = \frac{y}{(1+i)^n}$$

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More on present value

- *Discount rate* = interest rate used in the calculation of present value
- Payments further into the future have lower value today (because of discounting)
- What if you have annual payments of $\$M_0$, $\$M_1$, $\$M_2$, ..., $\$M_n$ instead of one payment after n years?

$$x = M_0 + \frac{M_1}{(1+i)} + \frac{M_2}{(1+i)^2} + \ldots + \frac{M_n}{(1+i)^n}$$

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Intertemporal budget constraint

- Suppose individual has income I_0 today and I_1 tomorrow $\Rightarrow$ present value of endowment is

$$PV = I_0 + \frac{I_1}{(1+i)}$$

- *Borrower* = individual for whom $c_0 > I_0 \Rightarrow$ loan = $c_0 - I_0$
- *Saver* = individual for whom $c_0 < I_0 \Rightarrow$ savings = $I_0 - c_0$

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Intertemporal budget constraint

- Net savings are $S = I_0 - c_0$
  - if S > 0, then individual is saver (lender)
  - if S < 0, then individual is borrower
- "Today's budget constraint": $c_0 + S = I_0$
- "Tomorrow's BC": $c_1 = I_1 + S \cdot (1 + i)$
- Combine them to get intertemporal budget constraint:

$$c_0 + \frac{c_1}{(1+i)} = I_0 + \frac{I_1}{(1+i)}$$

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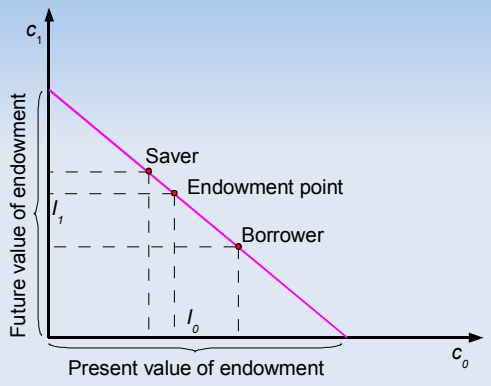
Intertemporal budget constraint



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Indifference maps

- Indifference curves show preference for present consumption versus future consumption
- *Marginal rate of time preference* = marginal rate of substitution between present and future consumption (slope of indifference curve)
- ”Impatient” people have steep indifference curves (– slope > 1) around the 45 degree line
- Optimal consumption choice: tangency point of indifference curves and budget line

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Comparative statics

- The ”price” of future consumption is the inverse of the interest rate ⇒ an increase in the interest rate is equivalent to a fall in price
  - substitution effect: shift consumption more to the future (save more)
  - income effect:
    - borrower: need to repay more in the future, so it is as if income fell ⇒ consume less of *both* goods
    - saver: will get back more in the future, so it is as if income increased ⇒ consume more of *both* goods

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The effect of a higher interest rate on savings

- Borrower:
  - substitution effect: increase savings
  - income effect: increase savings
- Saver:
  - substitution effect: increase savings
  - income effect: decrease savings

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