Work and Leisure

Jesús Bueren

Católica-Lisbon

Work and Leisure: Why It Matters

- In chapter II we assumed that people worked a fixed amount ($L^s = \bar{L}$).
- Real life: people choose how much to work.
- Work and leisure are important because:
  - Choosing a job or career is one of the biggest decisions we make.
  - The news always talks about jobs.
  - Unemployment is stressful and risky.
  - Even with a job, working more is not always better.
  - Work lets people get what they want, but it takes time away from enjoying life.
- How much should people work?

A Simple Model of Choice

- At this stage of the course, you know that we want to undertand how people choose through the lens of a model.
- The model is going to be useful to understand the key forces at play.
- In this chapter, we use a basic choice model:
  - People have preferences over consumption and leisure.
  - Represent preferences with a utility function.
  - People pick what gives the highest utility.
  - Choices are limited by their resources (income, time).
- Household utility function:

$$U(c, \ell)$$

  where c is consumption and ℓ is leisure.

Preferences over Consumption and Leisure

- For simplicity, assume separable utility:

$$U(c) + V(\ell)$$

  - $U(c)$ is happiness from consuming good.
  - $V(\ell)$ is happiness from leisure.

- This cannot capture the fact that some consumption activities require time (e.g., going to the movies), but it is a good starting point.

Utility Function Properties

- Households like consumption:

$$U'(c) > 0$$

- Extra consumption is less valuable when you have more:

$$U''(c) < 0$$

- Households like leisure:

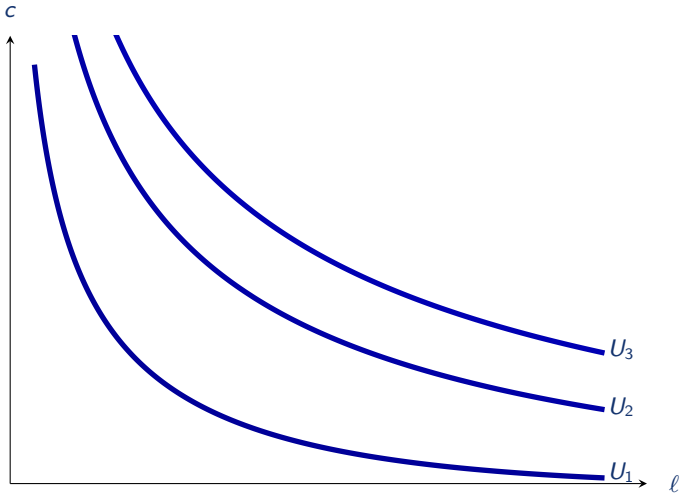
$$V'(\ell) > 0$$

- Extra leisure is less valuable the more you have:

$$V''(\ell) < 0$$

- Example: one hour surfing feels amazing; the fifth is not as exciting.

Preferences over Consumption and Leisure

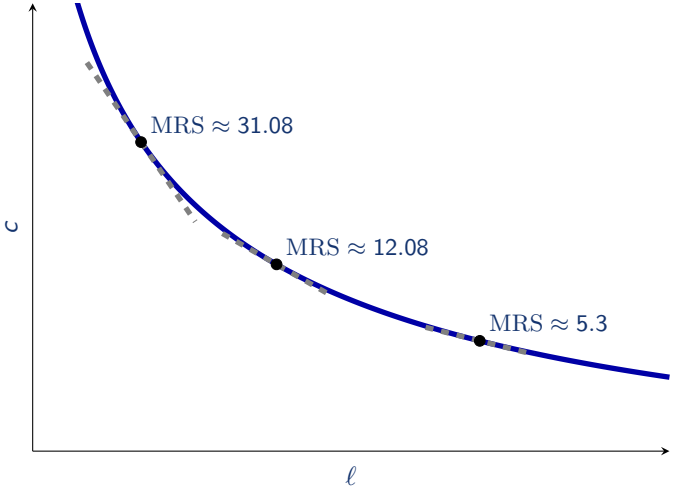


Preferences over Consumption and Leisure

- Notice that indiference curves aren't straight lines.
- That is because the slope changes as your move between different combinations of consumption and leisure.
- The slope of the indifference curve is called the The marginal rate of substitution (MRS)
- It measures how much consumption you are willing to give up for one more hour of leisure while keeping the same utility.

$$MRS = \frac{\text{MU}_\ell}{\text{MU}_c} = \frac{V'(\ell)}{U'(c)}$$

Preferences over Consumption and Leisure



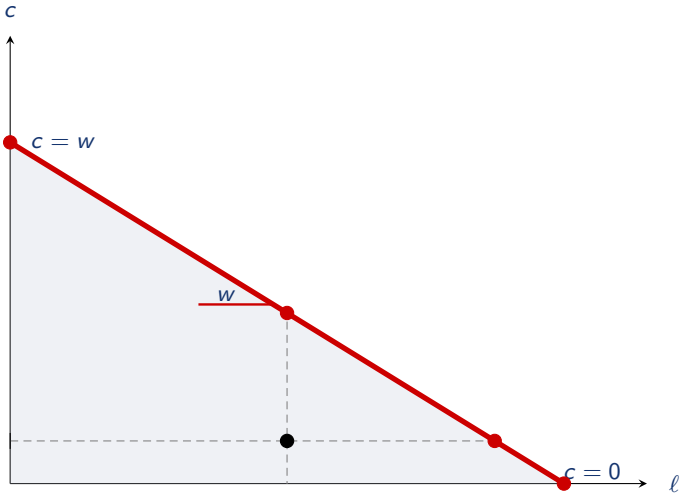
The Budget Constraint

- Total time endowment is 1: hours worked $h = 1 - \ell$.
- Consumption depends on work and wages:

$$c = w(1 - \ell)$$

- The wage establishes how much consumption you can get for each unit of leisure you give up.

Budget Constraint



Household Budget Constraint

- Households spend what they can earn:

$$c = w(1 - \ell)$$

  - Left side: consumption (spending)
  - Right side: income
    - Labor income: $w(1 - \ell)$

The Problem

- Maximize utility by choosing leisure ℓ and consumption c:

$$\max_{c,\ell} \; U(c) + V(\ell)$$

- Subject to the budget constraint:

$$c = w(1 - \ell)$$

- Question: how much leisure should a person enjoy to maximize happiness?

Solving the Problem

- Plug budget into utility:

$$U(c) + V(\ell) \longrightarrow U(\underbrace{w(1-\ell)}_{c}) + V(\ell)$$

- Take derivative with respect to leisure ℓ and set to zero:

$$\frac{d}{d\ell}\left[U(\underbrace{w(1-\ell)}_{c}) + V(\ell)\right] = 0$$

- Using chain rule:

$$-wU'(c) + V'(\ell) = 0$$

- Rearrange:

$$wU'(c) = V'(\ell) \Leftrightarrow MRS = \frac{V'(\ell)}{U'(c)} = w$$

- This equation tells us the optimal leisure (and therefore work).

What the Equation Means

- Optimal condition:

$$wU'(c) = V'(\ell)$$

- In plain words, working one extra hour:
  - Brings you extra happiness from consuming what you earn for working one more hour by $wU'(c)$
  - But lowers your happiness from an extra hour of work by $V'(\ell)$
  - At the optimum, these are equal

    the marginal gain from consumption = the marginal loss from leisure

Intuition: Few Hours vs Many Hours

- Very few hours worked (lots of leisure):
  - $U'(c)$ large (not enough income, coconuts are valuable)
  - $V'(\ell)$ low (already lots of surfing)
  - Equation says: work more, surf less $\rightarrow$ increase overall happiness
- Very many hours worked (no surfing):
  - $U'(c)$ small (income is enough, coconuts not as valuable)
  - $V'(\ell)$ large (not much surfing)
  - Equation says: work less, surf more $\rightarrow$ increase overall happiness

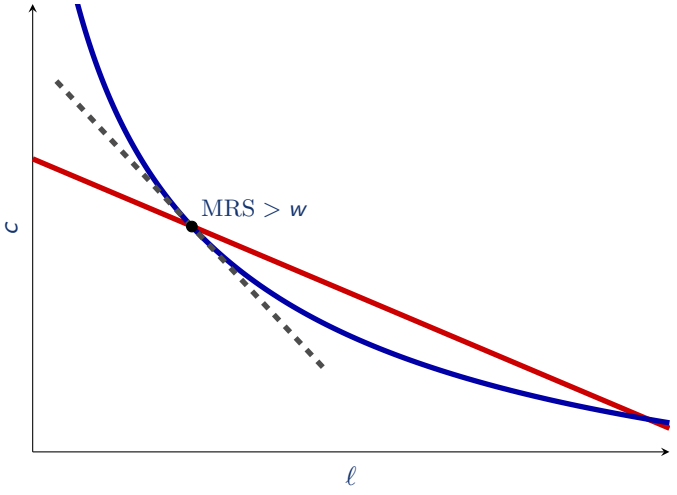
Finding the Sweet Spot

- Somewhere in the middle, optimal leisure ℓ^* satisfies:

$$wU'(c) = V'(\ell)$$

- One more hour of work would make you less happy (loss of leisure $>$ gain in consumption)
- One more hour of leisure would reduce consumption too much (gain in leisure $<$ loss in consumption)
- This is the household's best choice for work and leisure.

Solving the Problem



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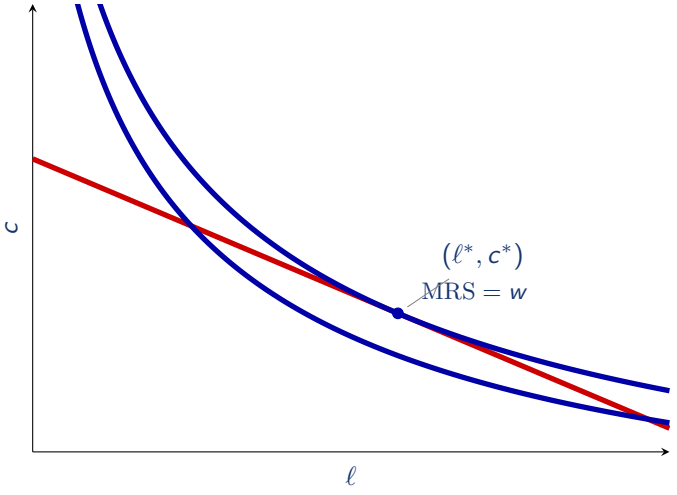
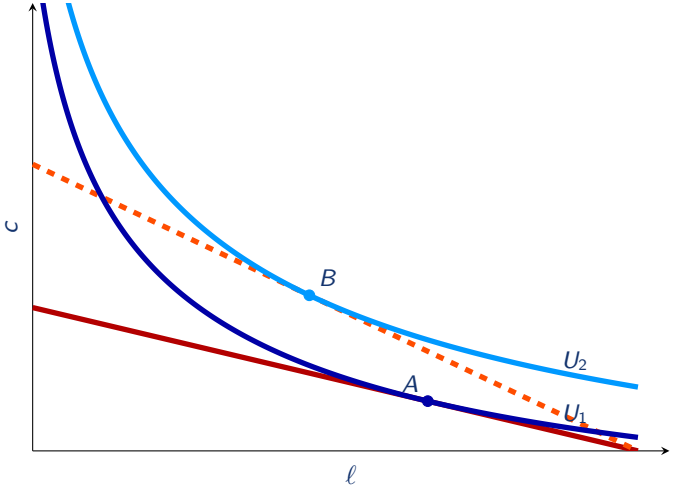


Poll

Suppose your wage was higher. How would this affect your labor supply?

- I would work more
- I would work the same amount
- I would work less

Substitution and Income Effects — Substitution Effect Dominates



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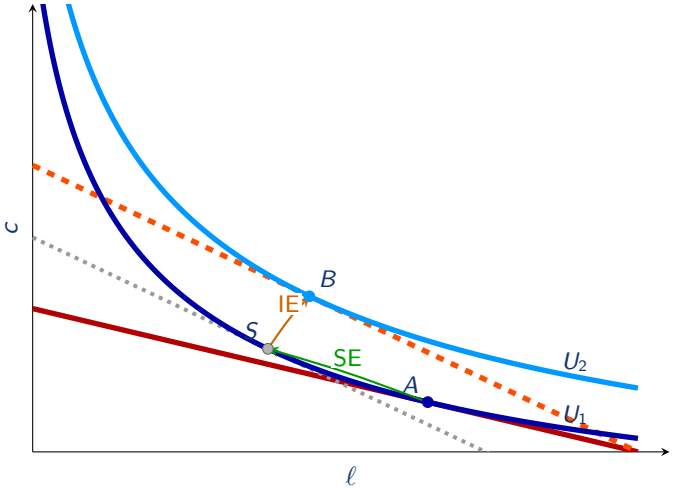

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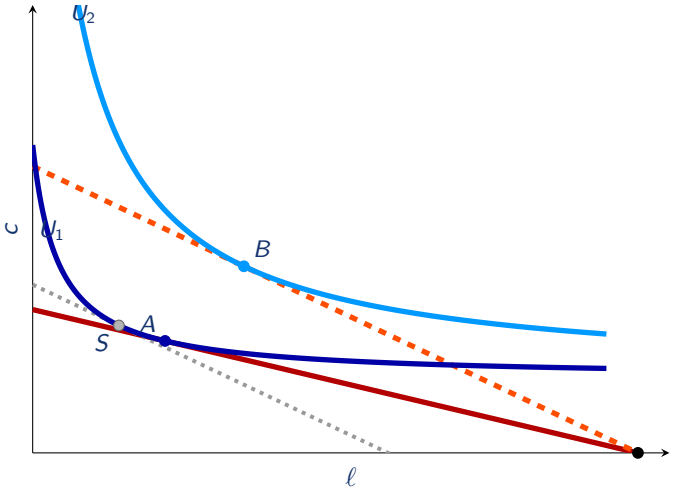


Income vs. Substitution Effects

With an increase in wages, the effect on labor supply depends on which force dominates:

- Substitution effect: leisure becomes more expensive $\Rightarrow$ work more
- Income effect: higher income increases demand for leisure $\Rightarrow$ work less

Depending on whether the income or the substitution effect dominates, you would work more or less.

Income vs. Substitution Effects: Cross-Country Evidence

- Bick et al. (2018) study labor supply responses using cross-country variation.
- There is a negative correlation between hours worked and GDP per capita, suggesting that the income effect tends to dominate.
- The relationship is not very strong, indicating that income and substitution effects partly offset each other.

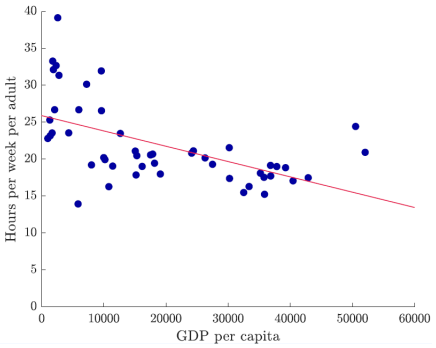


Figure: Hours Worked and GDP per Capita Across Countries

Source: Bick, Fuchs-Schündeln, and Lagakos (2018).

Comparing the US and Europe

- The figure shows the evolution of hours worked per employed person in the US and Europe.
- Until the early 1970s, the US and Western Europe looked very similar
- After that, hours diverged
- Today, Europeans work substantially less than Americans

Why did this divergence occur?

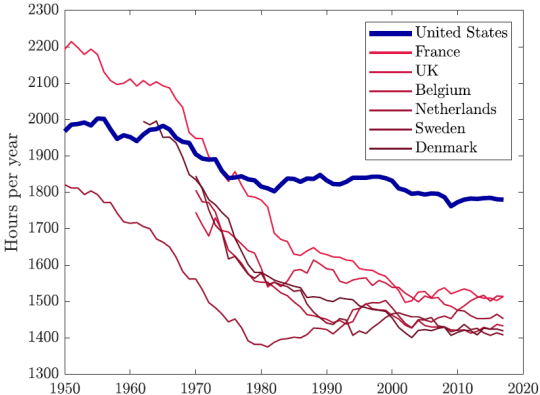


Figure: Hours Worked per Employed Person: US vs. Europe

Source: OECD

Why Do Europeans Work Less Than Americans?

Several explanations have been proposed for the divergence in hours worked between the US and Europe:

- **Taxes and social insurance (Prescott, 2004):** Higher labor taxes and more generous social security systems in Europe reduce incentives to work.
- **Labor supply elasticity:** Prescott's explanation requires a high elasticity of labor supply, which is larger than most microeconomic estimates.
- **Timing:** Policy differences emerged in the 1960s–1970s, but the divergence in hours continued to grow long after.
- **Preferences (Blanchard, 2004):** Europeans may value leisure more than Americans (Economists tend to be a little bit uncomfortable with explanations based on differences in preferences: hard to test).
- **Institutions and unions (Alesina et al., 2006):** Stronger unions in Europe may lead to shorter working hours and longer holidays.

Taxes, Transfers, and Labor Supply

- Consider the effect of taxes and transfers on an individual's labor supply decision.

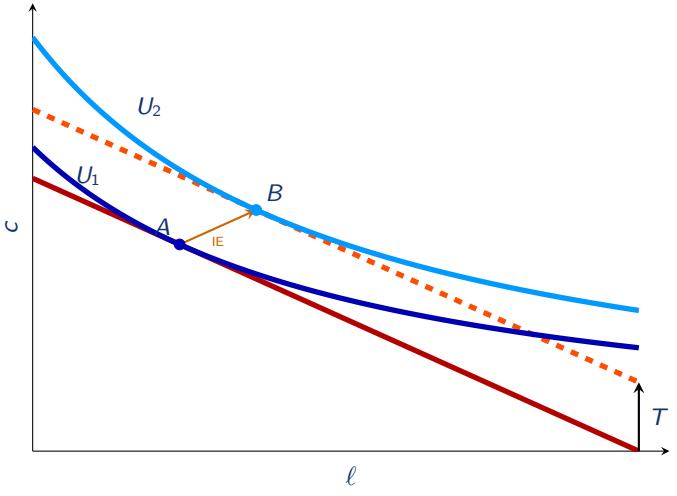
Transfers: $c = w(1 - \ell) + T$

- Do not change prices
- Make the worker richer
- Generate a pure income effect

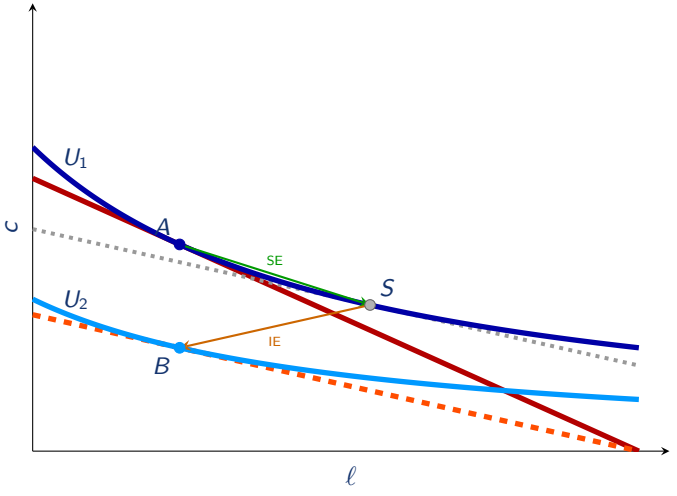
Taxes: $c = w(1 - \ell)(1 - \tau)$

- Labor income is taxed at rate τ
- The worker receives the after-tax wage $w(1 - \tau)$
- Taxes lower the slope of the budget constraint

Transfers: Lump-sum Transfer and the Income Effect



Taxes: Income and Substitution Effects



Equilibrium in the labor Market with elastic labor supply

- Now we are going to go back to the model that we covered in chapter 2, and analyze the equilibrium when labor supply is elastic.
- The key difference is that now we allow workers to adjust their labor supply in response to changes in wages.
- Production is still Cobb-Douglas, and firms are competitive.
- Capital supply is fixed and equal to $\bar{K}$

Equilibrium in the labor Market with elastic labor supply

- Labor demand is derived from the firm's profit maximization problem:

$$\max_{K,L} F(K, L) - wL - rK$$

- Firms hire labor up to the point where

$$w = F_L(K, L)$$

- This equation defines the **labor demand curve**
- The labor demand curve is downward sloping because of the diminishing marginal product of labor.
- **Example:** If $F(K, L) = K^{\alpha} L^{1-\alpha}$, then

$$w = (1 - \alpha) K^{\alpha} L^{-\alpha}$$

Equilibrium in the labor Market with elastic labor supply

On the workers' side, labor supply is derived from the household problem.

Substituting the budget constraint into the first-order condition gives:

$$\frac{v'(\ell)}{u'(w(1-\ell))} = w$$

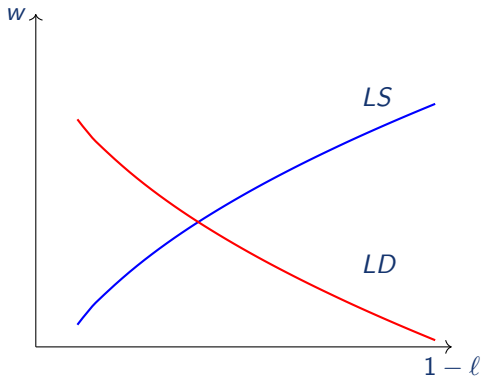
This condition implicitly defines:

- a relationship between the wage w
- and labor supplied $1 - \ell$

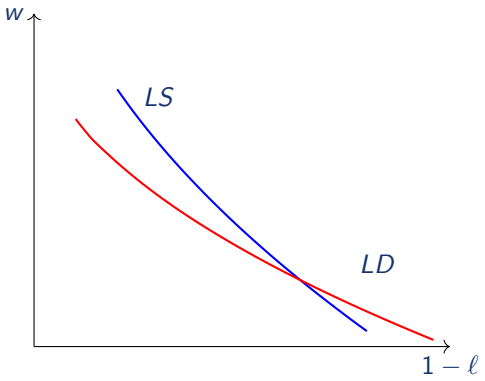
Key feature:

- The slope of labor supply is ambiguous
- Depends on the relative strength of income and substitution effects
- Labor supply can be upward or downward sloping

Equilibrium in the labor Market with elastic labor supply



Equilibrium with upward sloping labor supply



Equilibrium with downward sloping labor supply