

The Preference Relationship, Indifference Curve & Utility

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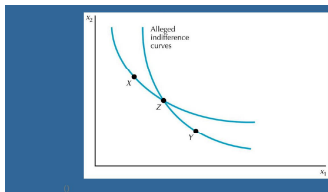
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- What does this relationship ensure? What happens when this assumption is violated?

Transitivity Violations



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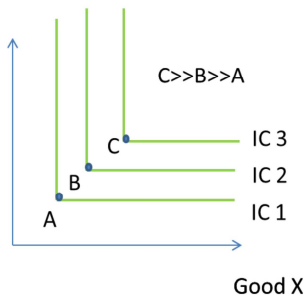
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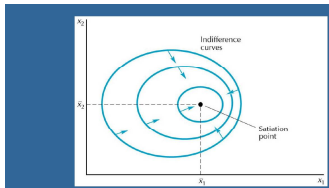
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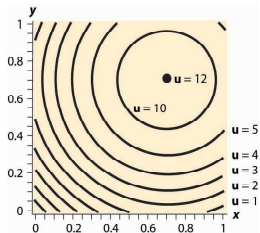
Monotonicity Assumption



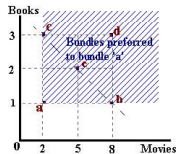
Non-Satiation Violations



The Visual Example of Local-Satiation



Characteristics of Indifference Curve



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- What happens to the slope of the indifference curve if this condition is obeyed? What are we assuming about the preferred set?

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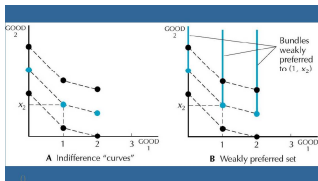
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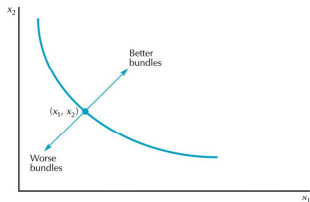
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- Does It Obey the Rules of Monotonicity? Does it Obey Convexity? What Is the Consequence?
- Perfect Complements. What Does the Formula Look Like?
- Does It Obey The Rules of Monotonicity? Does It Obey Convexity? What Is the Consequence?
- Bads-What Does the Formula Look Like?-What Does The Graph Look Like?
- Does It Obey the Rules of Monotonicity? Does it Obey Convexity? What Is the Consequence?
- Neutrals-What Does the Formula Look Like? What Does the Graph Look Like?
- Does It Obey the Rules of Monotonicity? Does it Obey Convexity? What Is the Consequence?
- Satiated Preferences.- How Do We Represent It?
- Discrete Goods.-How Do We Represent It

Discrete Good Argument

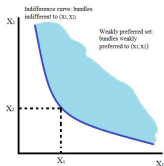


Ranking Bundles



Characteristics of Indifference Curve

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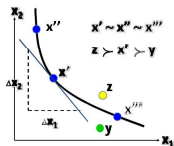


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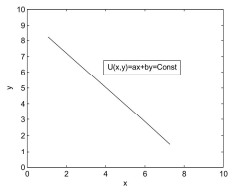
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MRS Formula and Graphic Representation

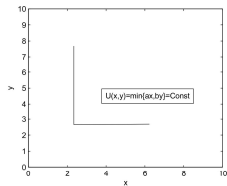
$$MRS(x') = \lim_{\Delta x_1 \rightarrow 0} \left(\frac{\Delta x_2}{\Delta x_1} \right) = \frac{dx_2}{dx_1}$$



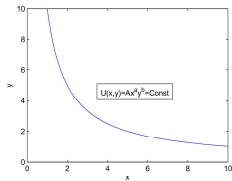
Indifference Curve for Perfect Substitutes



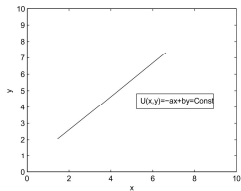
Indifference Curve for Perfect Complements



Indifference Curve/General Cobb Douglas



Indifference Curve with Bads



What Does MRS Represent?

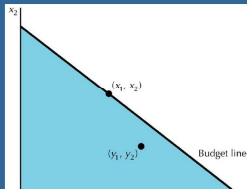
Trade and MRS

Suppose that a consumer consuming (x_1, x_2) given an opportunity to trade at a rate E . He will prefer staying put only if E is equal to $|MRS|$

Illustration with a picture.

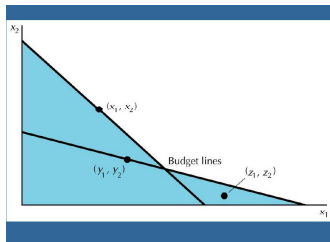
Revealed Preference With One Set of Price

$$(x_1, x_2) \succ (y_1, y_2).$$

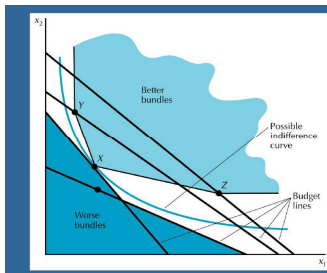


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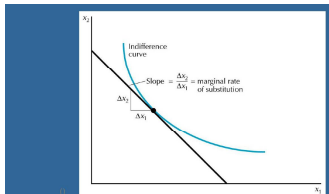
Revealed Preference With Two Set of Prices



Revealed Preference Curves



Convex and Concavity Relationship



Optimization-MRS and Tangency

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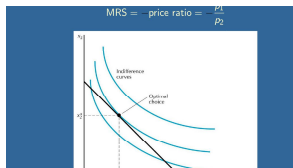
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- Why Is This Important?

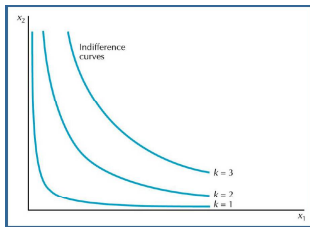
Representation of the Basic Optimal Choice



Ordinal Utility-What Would Cardinality Look Like?

Bundle	U_1	U_2	U_3
A	3	17	-1
B	2	10	-2
C	1	.002	-3

Utility Curves With Different Values



Different Utility Functions-Formulas and Meaning.

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- How Does These Indifference Curves Look? Why?

Cobb Douglas Utility Curves With Different Parameterizations

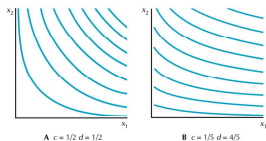
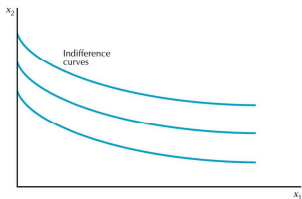


FIGURE 4.5 Cobb-Douglas indifference curves

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Indifference Curves=Quasi Linear Preferences



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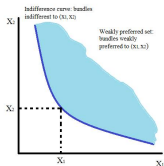
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Importance and Definition of Monotonicity

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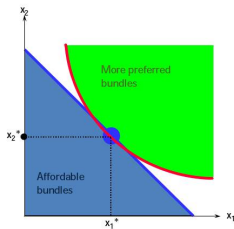
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Budget Set and Preferred Set-Starting Point of Optimization



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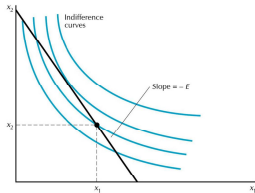
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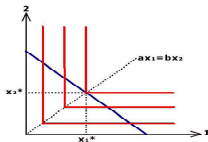
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MRS with Optimization

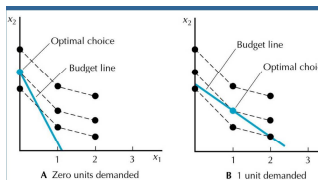


Optimization with Complements

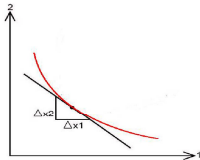
Perfect Complements: $u(x_1, x_2) = \min\{ax_1, bx_2\}$



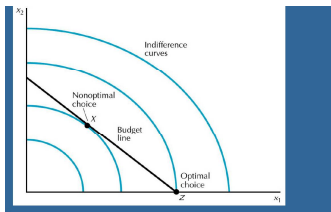
Optimization with Discrete Goods



MRS as a Subjective Trade Rate



Concavity with Optimization



Smoothness and Optimal Points

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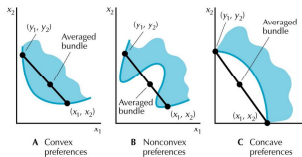
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- How Is This Assumption Violated?

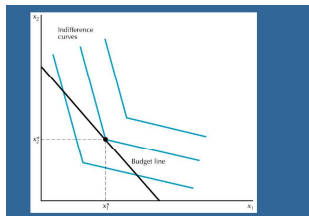
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- On an **typical** indifference curve between which values does the MRS move?
- MRS will **move** between $[-\infty, 0]$
- Which values does the $\frac{-p_1}{p_2}$ take
- If they are both goods the values of this will **be** between:
- $[-\infty, 0]$
- How will the MRS be moving from its extreme values:
- If it is a smooth curve, it will be continuously changing.
- Values of MRS will continuously follow one another.
- In that case at least in one (x_{1*}, x_{2*})
- $MRS = \frac{-p_1}{p_2}$
- How Is This Assumption Violated?
- Non-Smooth Curves- or Lines With Constant Slope.

Convex and Concavity Relationship

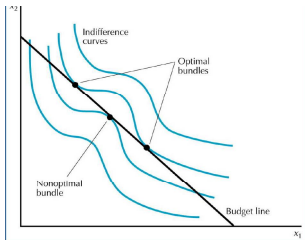


The Consequences of Smoothness

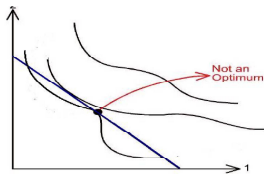


"Is This Curve Smooth?"

Non-Convex Preferences: Where Does It Leave Us?

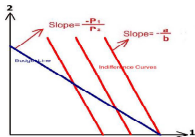


Conditions for Optimality



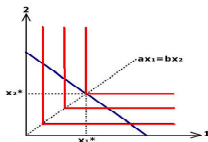
How Do You Solve The Problem of Optimization for Substitutes

Perfect Substitutes: $u(x_1, x_2) = ax_1 + bx_2$

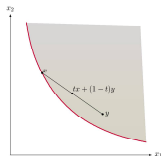


How Do You Solve the Problem of Optimization for Complements

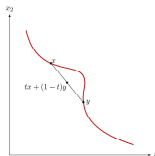
Perfect Complements: $u(x_1, x_2) = \min\{ax_1, bx_2\}$



Convexity vs. Non-Convexity

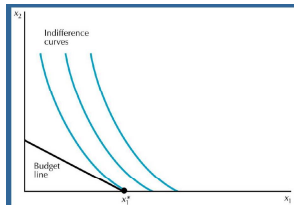


Convex Preference



Non-convex Preference

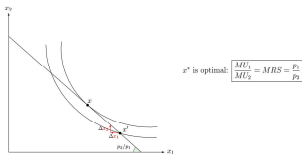
Optimum Point in the Exteriority



Interior Solution

Maximize $u(x_1, x_2)$ subject to $p_1x_1 + p_2x_2 = m$

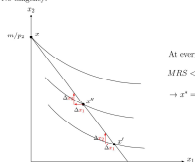
I. **Tangent solution:** Smooth and convex preference



Exterior Solution

B. Boundary optimum

1. No tangency:



At every bundle on the budget line,

$$MRS < \frac{p_1}{p_2} \text{ or } \Delta x_1 \cdot MU_1 < \Delta x_2 \cdot MU_2$$

$$\rightarrow x^* = (0, m/p_2)$$

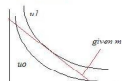
Duality Theory

Expenditure Minimization



given u^0 , e^1 is the minimized budget/expenditure

Utility Maximization



given m , u^1 is the maximized utility

Expenditure Optimization vs Utility Maximization

- In one case $\Rightarrow$ the lowest expenditure with the indifference curve given.

Expenditure Optimization vs Utility Maximization

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- Is Every Constraint Binding? If it is not what do we assume about the values of λ_j ?

Expenditure Optimization vs Utility Maximization

- What we assume about $\lambda_j \geq 0$

Expenditure Optimization vs Utility Maximization

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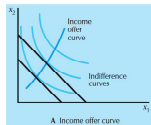
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- If $\lambda_i > 0$ for good 1, then $X_2 = \frac{m}{p_2}$
- If $\lambda_i > 0$ for good 2, then $X_1 = \frac{m}{p_1}$

Income Offer-How Do We Construct It?



1 of 1

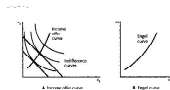
Price Offer Curve-How Do We Construct It?



1 of 1

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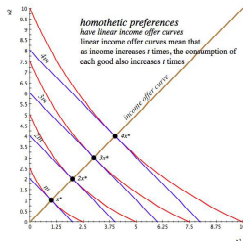
Income Offer & Engel Curve=How Do We Differentiate It?



Engel Curve= How Does the Quasilinear Preferences Look Like?



Income Offer Curve-How Do We Construct Them?



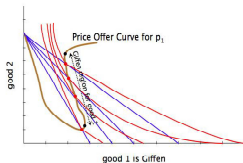
Price Offer For An Ordinary Good

If $\frac{\Delta x_1}{\Delta p_1} < 0$ then good 1 is an **ordinary** good.



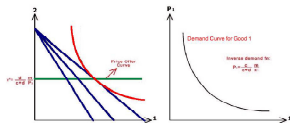
Price Offer For A Giffen Good

If $\frac{\Delta x_1}{\Delta p_1} > 0$ then good 1 is a **Giffen** good.



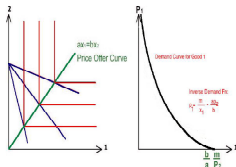
Price Offer For A Cobb-Douglas Good Tuple

Remember: $x_1 = \frac{c}{c+d} \frac{m}{p_1}$ and $x_2 = \frac{d}{c+d} \frac{m}{p_2}$



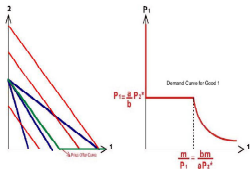
Price Offer For Complements-Mathematical

$$u = \min\{ax_1, bx_2\}$$



Price Offer For Substitutes=Mathematical

$$u = ax_1 + bx_2$$



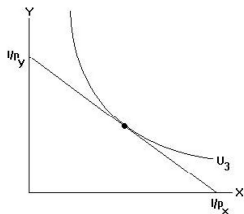
Income Offer Curve-How Do We Construct Them?

Example: Cobb-Douglas: $u = x_1^c x_2^d$

$$\begin{aligned} x_1(p_1, p_2, m) &= \frac{c}{c+d} \frac{m}{p_1} \\ \frac{\partial x_1}{\partial p_2} &= 0 \end{aligned} \quad (2)$$

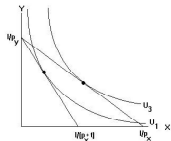
Good 1 is neither a gross complement nor a gross substitute for good 2.

Original Situation-Without Any Tax



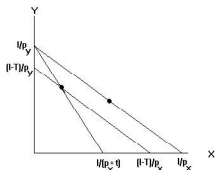
A graph showing the general utility maximization solution.

Initial Effect=Tax on Good X



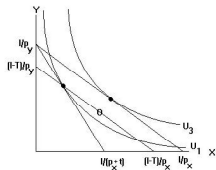
A graph showing the effect on a consumer's budget line and optimal choice when a tax is added to good x.

Two Different Kinds of Tax Compared-Graphical



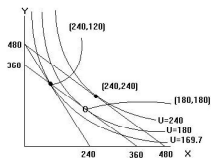
A graph showing the impact on the consumer's budget line of a tax on x and impact of a lump sum tax.

Two Different Kinds of Tax Compared-In Terms Of Utility



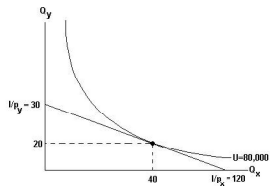
A diagram showing that a consumer can achieve greater utility under a lump-sum tax than under a revenue-equivalent tax on good x .

Two Different Kinds of Tax Compared-Numeric Example



A graph showing the numerical results of an example demonstrating that a consumer can achieve greater utility under a lump sum tax than under a revenue

Utility Maximization-Numeric Example



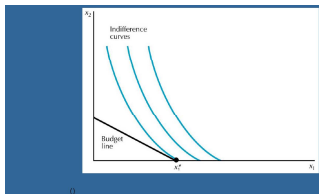
A graph showing the solution to the preceding utility maximization example.

How Do You Identify Cobb Douglas Utility Functions?

Year	p_1	p_2	m	x_1	x_2	s_1	s_2	Utility
1	1	1	100	25	75	.25	.75	57.0
2	1	2	100	24	30	.24	.76	33.9
3	2	1	100	13	74	.26	.74	47.9
4	1	2	200	48	76	.24	.76	67.8
5	2	1	200	25	150	.25	.75	95.8
6	1	4	400	100	75	.25	.75	80.6
7	4	1	400	24	304	.24	.76	161.1

The income shares (s_1, s_2) are more or less constant $\implies$ Cobb-Douglas utility function $u(x_1, x_2) = x_1^{1/4} x_2^{3/4}$ seems to fit these data well.

What Creates A Corner Solution?



Which Tax Scheme Would You Prefer and Why?

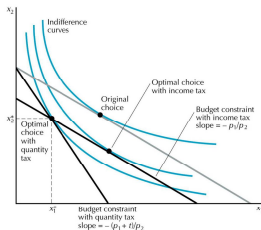
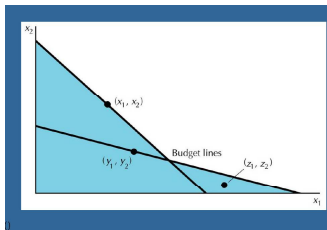


FIGURE 5.9 Income tax versus a quantity tax

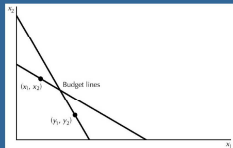
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Difference Between Directly and Indirectly Preferred

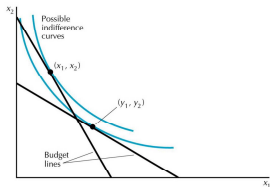


Inconsistent Choices to S.A.R.P.

and $q_1y_1 + q_2y_2 > q_1x_1 + q_2x_2$.



Consistent Choices to S.A.R.P.



Checking for W.A.R.P.

Observation	p_1	p_2	x_1	x_2
1	1	2	1	2
2	2	1	2	1
3	1	1	2	2

The table below shows cost of each bundle at each set of prices. The choices (e.g. bundle 1, prices 1) are directly revealed preferred to baskets in the same row with * (e.g. bundle 2, prices 1).

	Bundles		
	1	2	3
Prices 1	5	4*	6
2	4*	5	6
3	3*	3*	4

Checking for S.A.R.P.

		Bundles		
		1	2	3
Prices	1	20	10*	22 ^(*)
	2	21	20	15*
	3	12	15	10