8TH EDITION

INTERMEDIATE MICROECONOMICS

HAL R. VARIAN

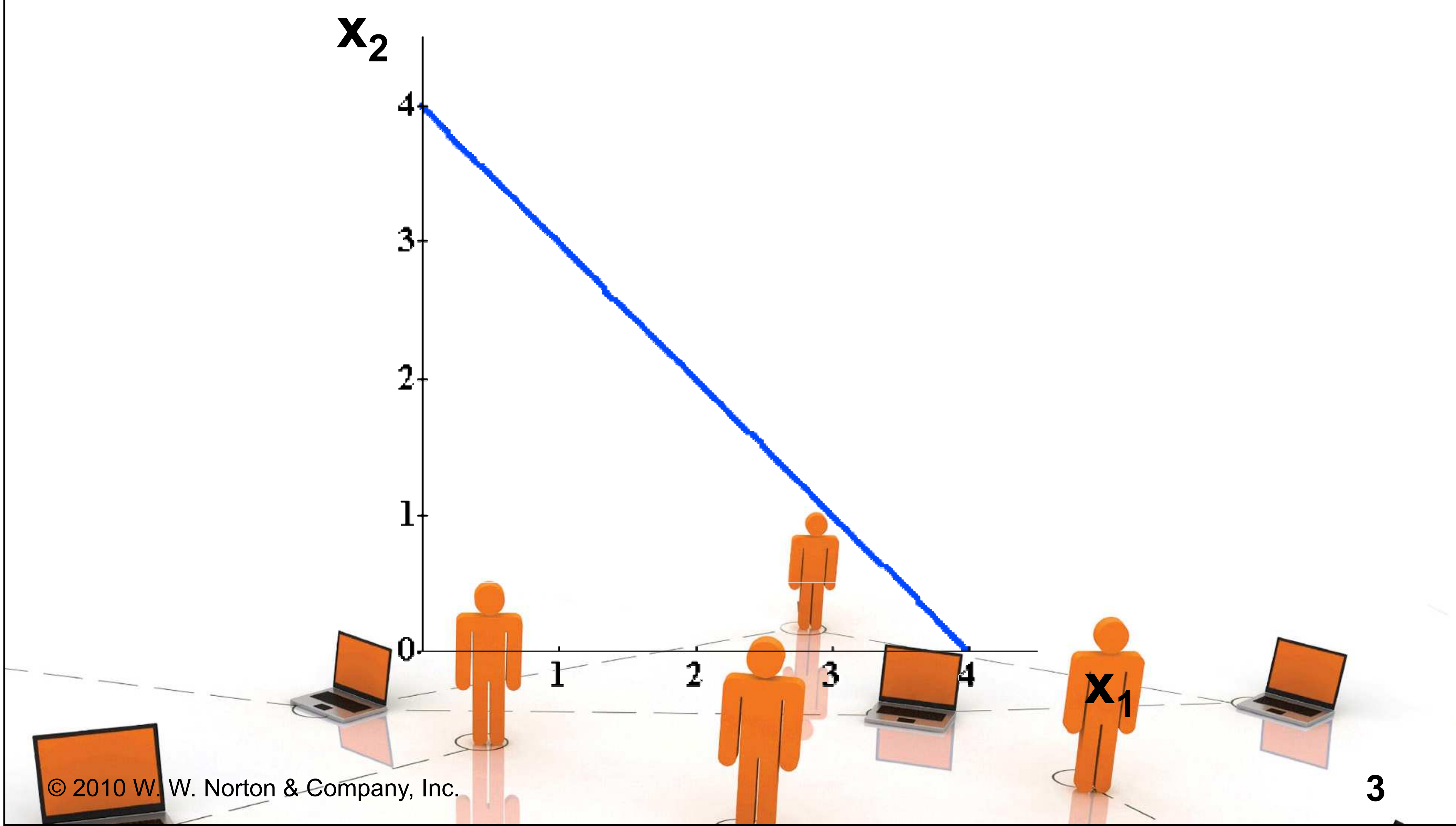
5

Choice

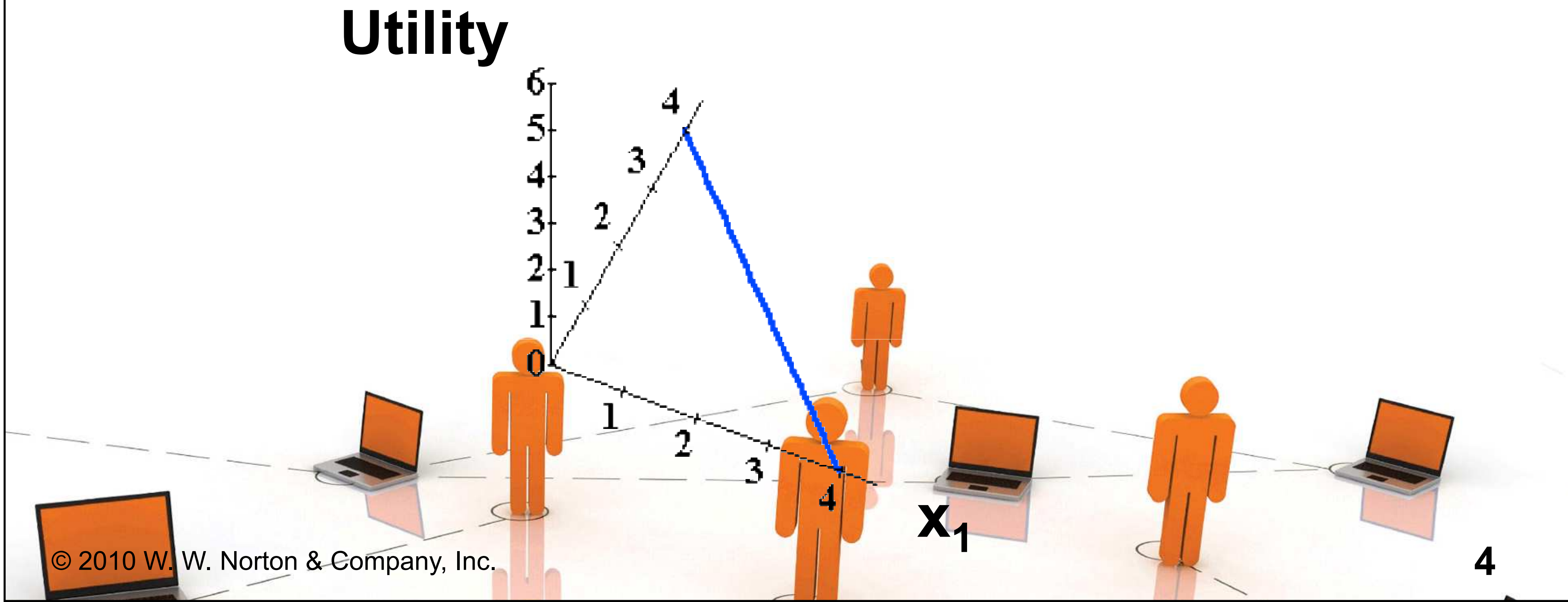
Economic Rationality

- **The principal behavioral postulate is that a decisionmaker chooses its most preferred alternative from those available to it.**
- **The available choices constitute the choice set.**
- **How is the most preferred bundle in the choice set located?**

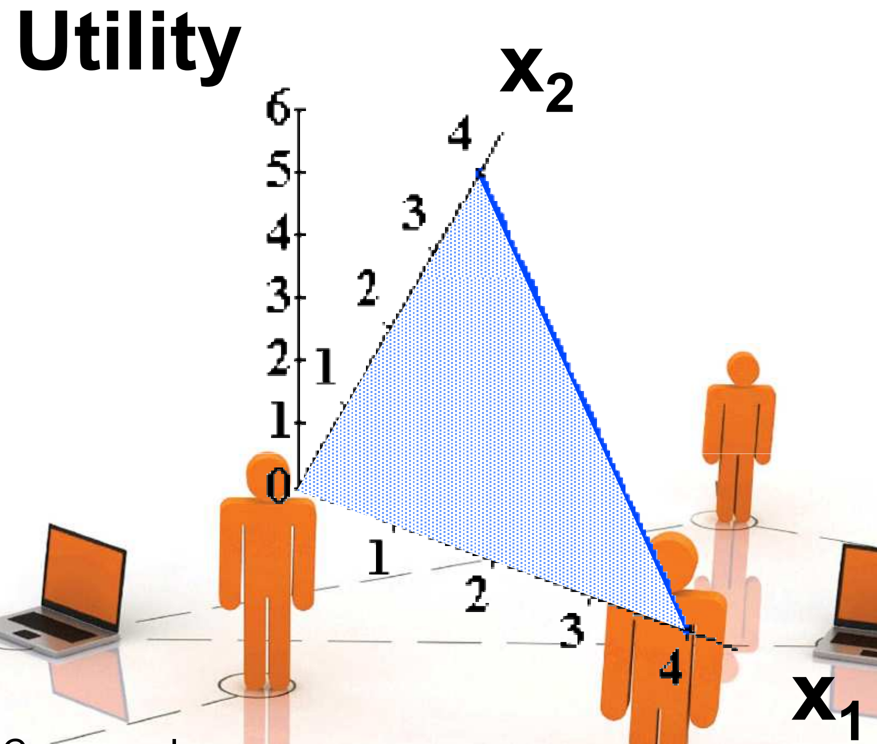
Rational Constrained Choice



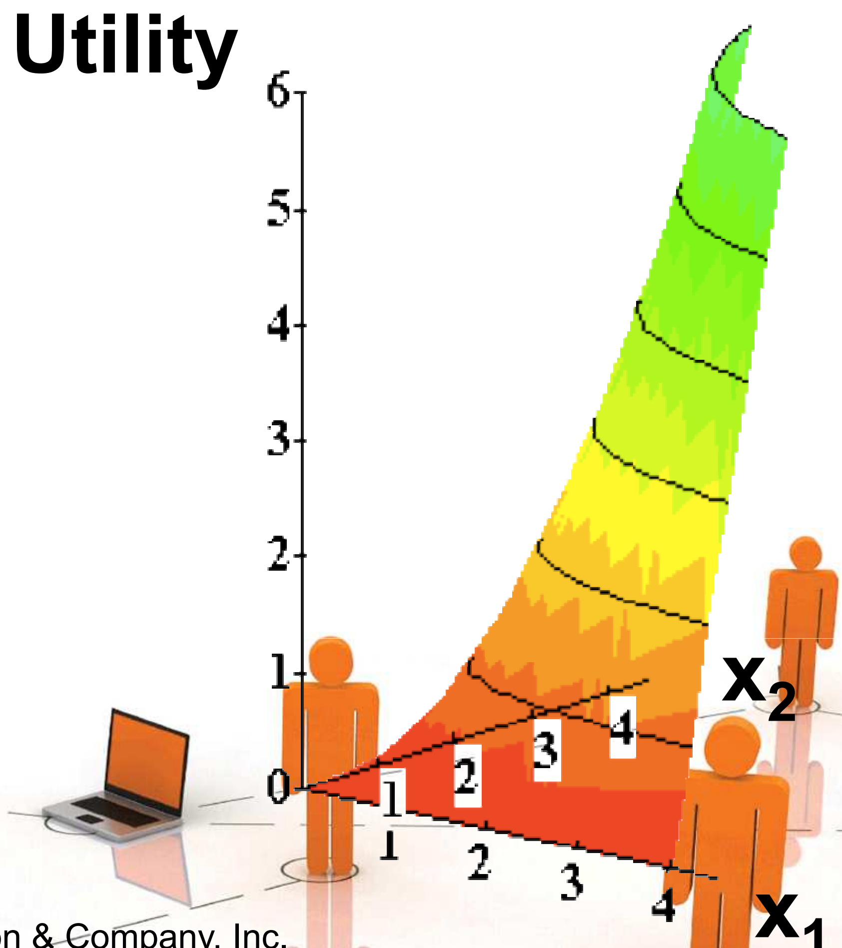
Rational Constrained Choice



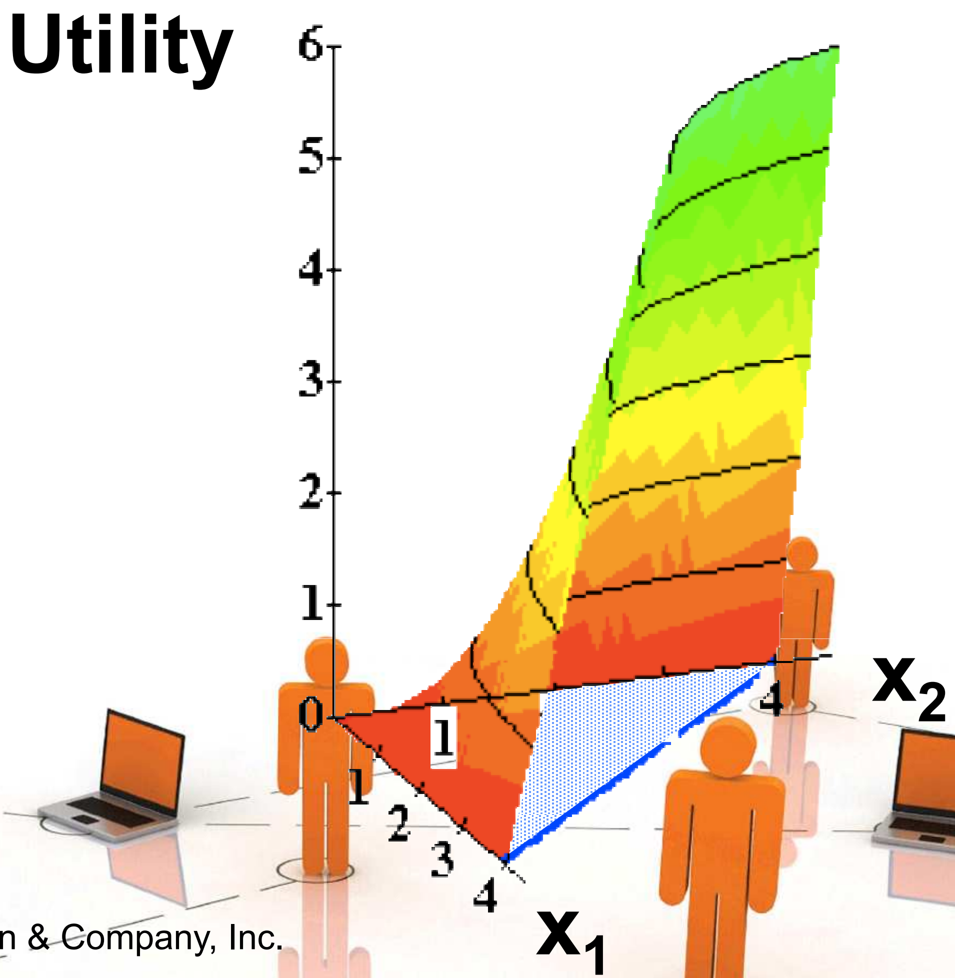
Rational Constrained Choice



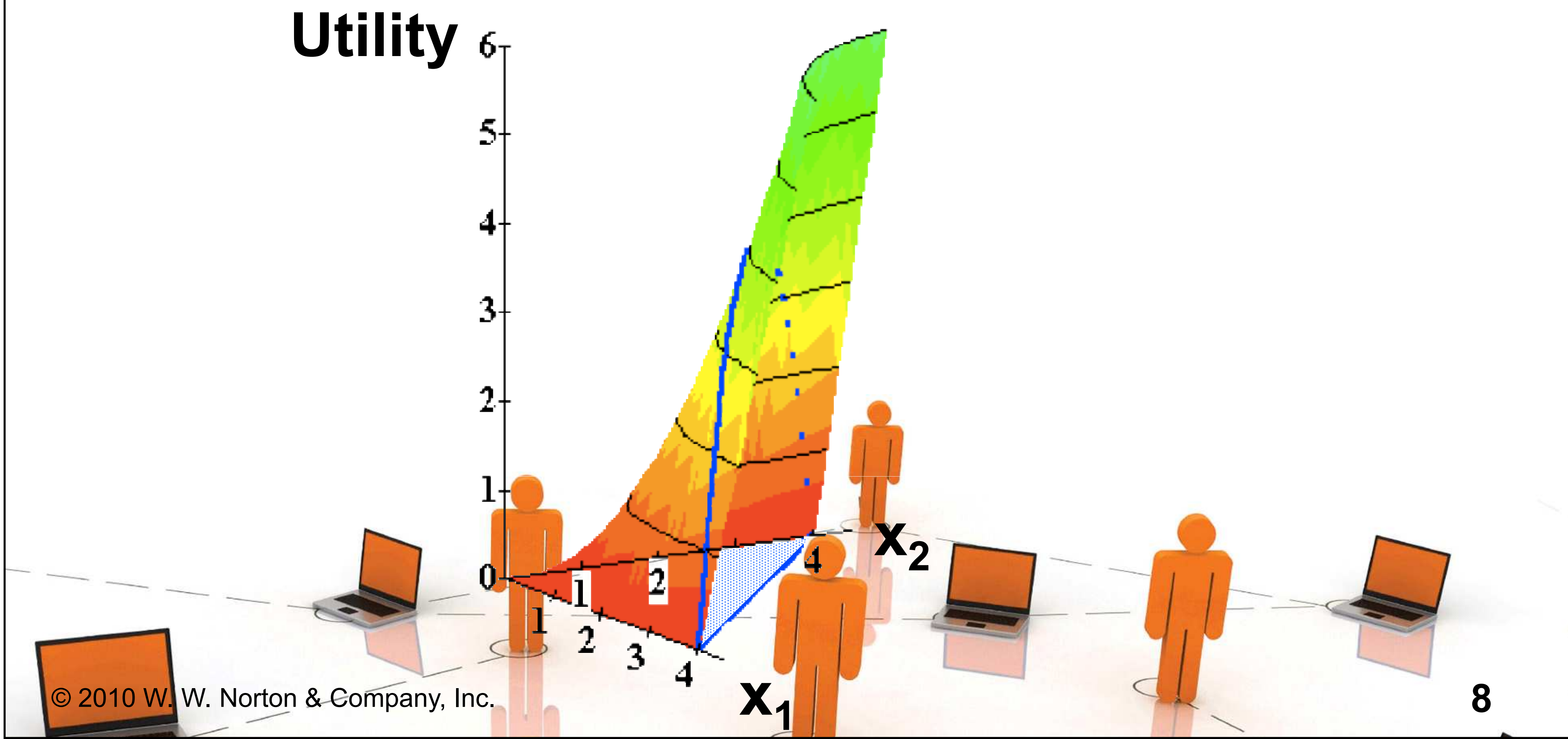
Rational Constrained Choice



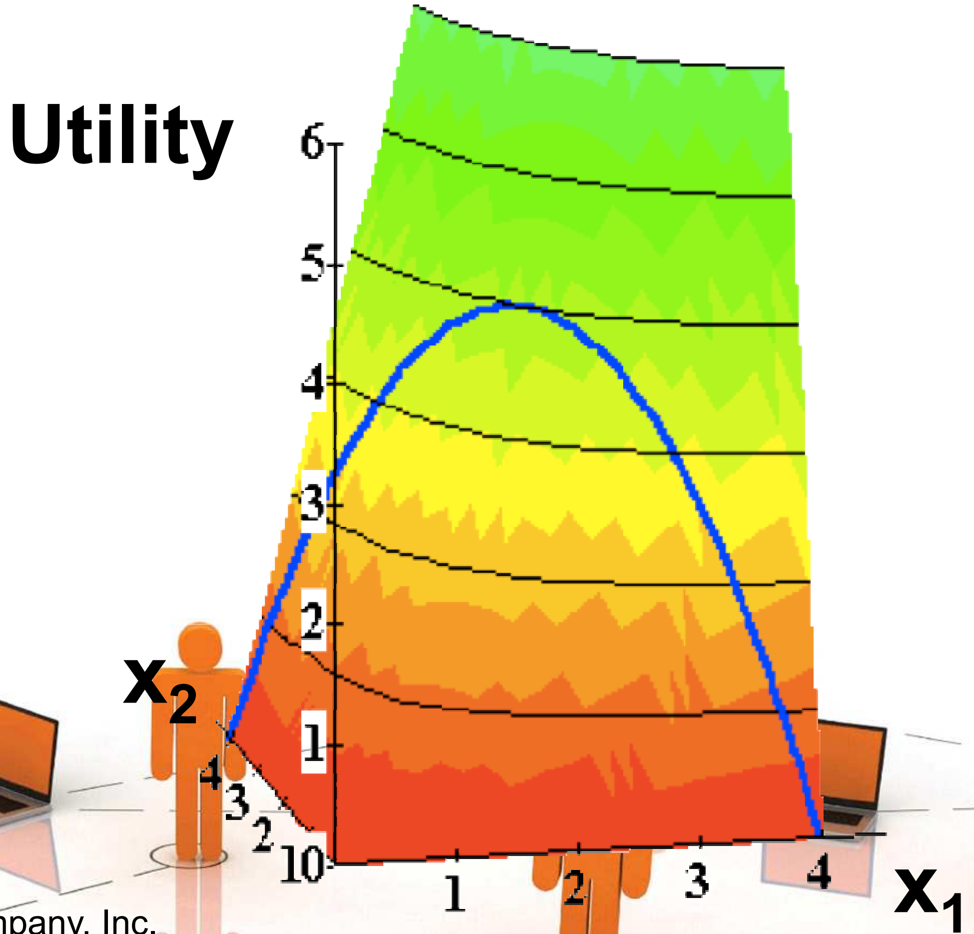
Rational Constrained Choice



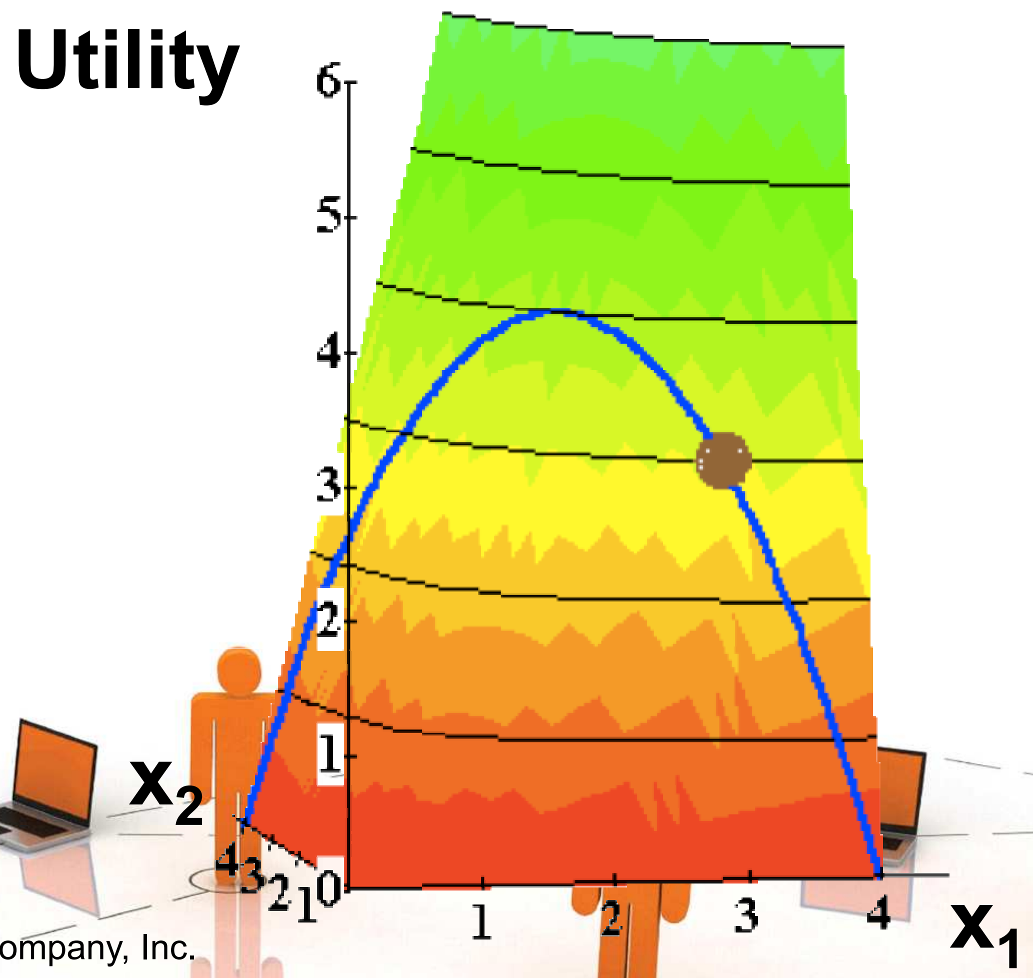
Rational Constrained Choice



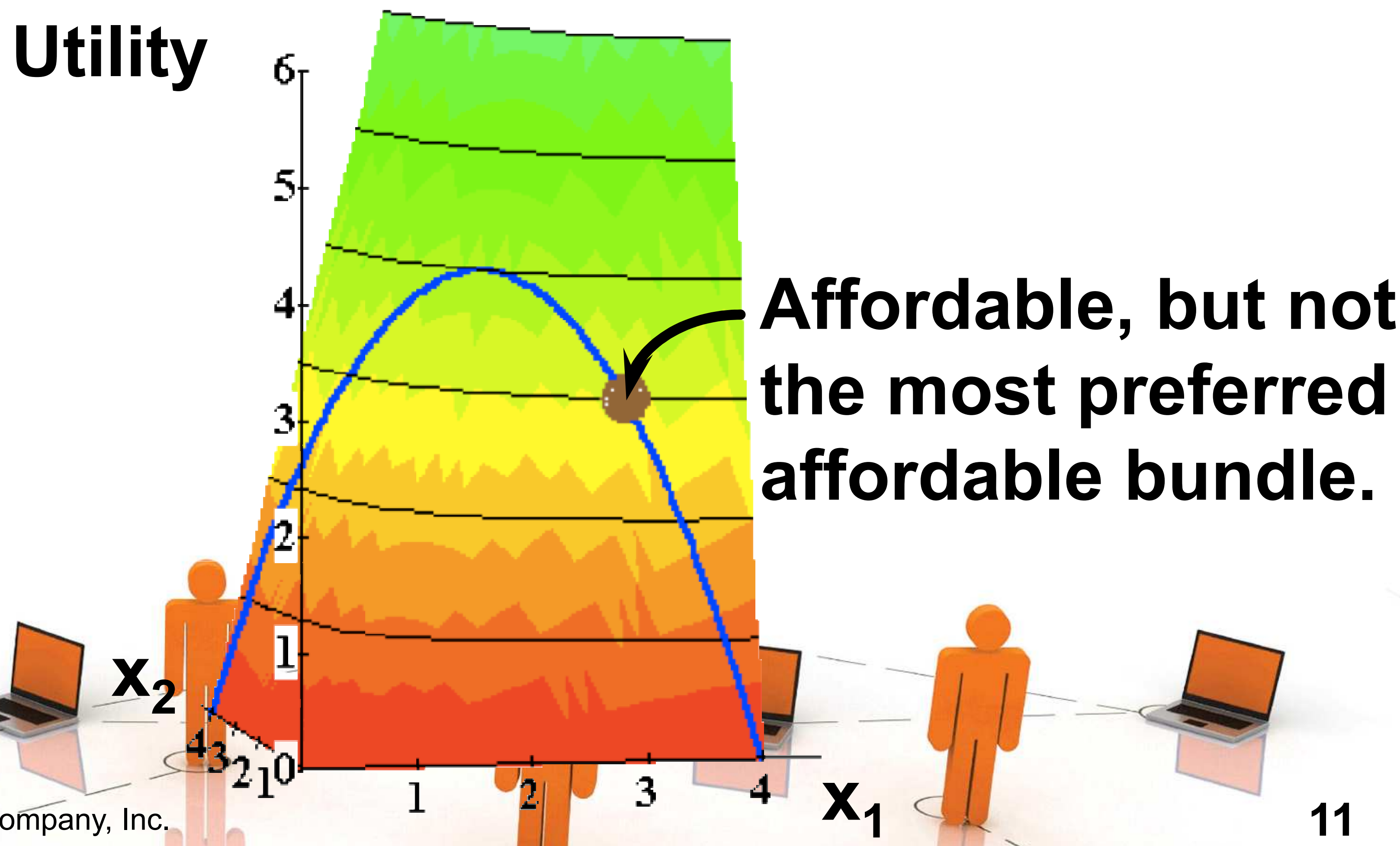
Rational Constrained Choice



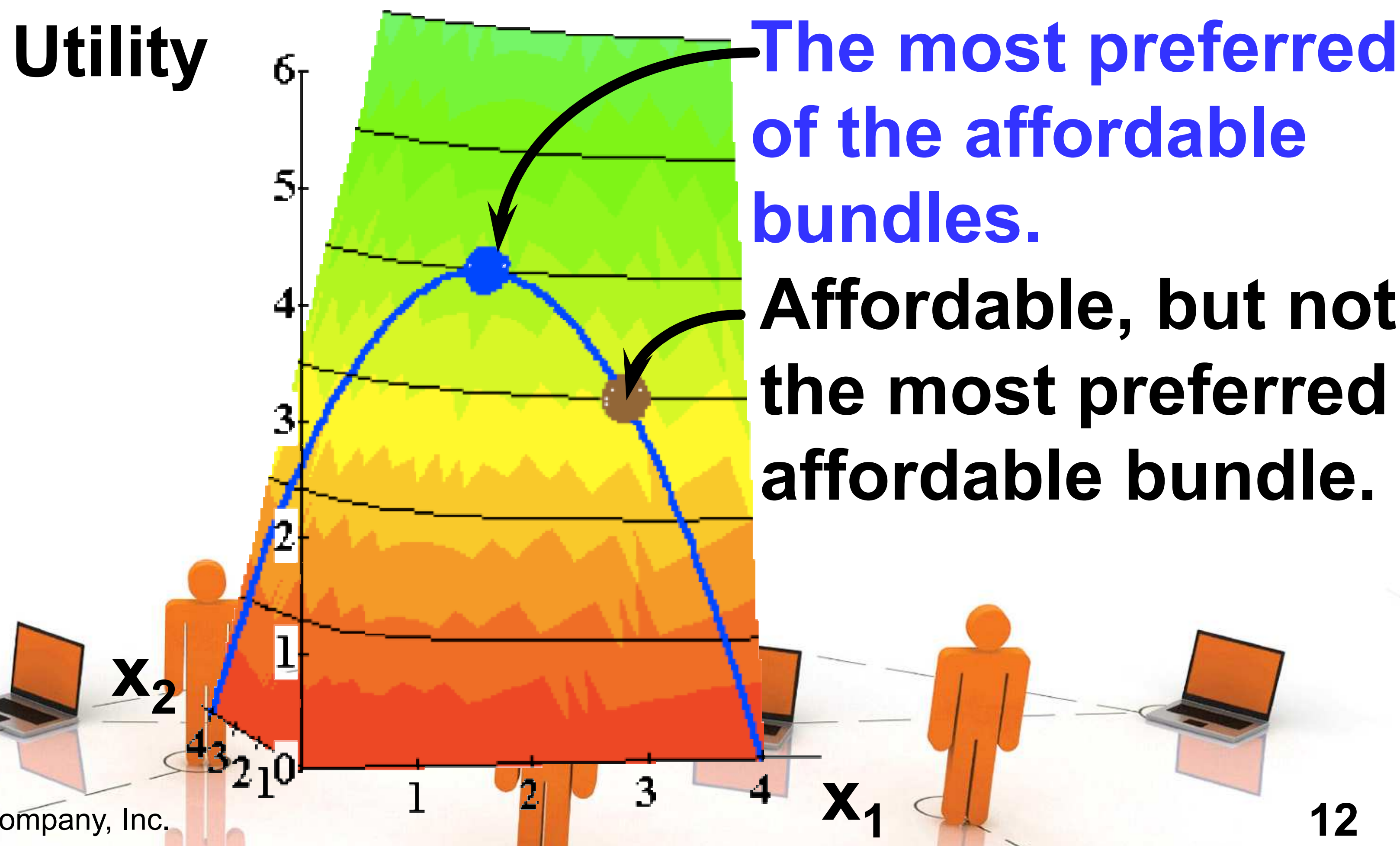
Rational Constrained Choice



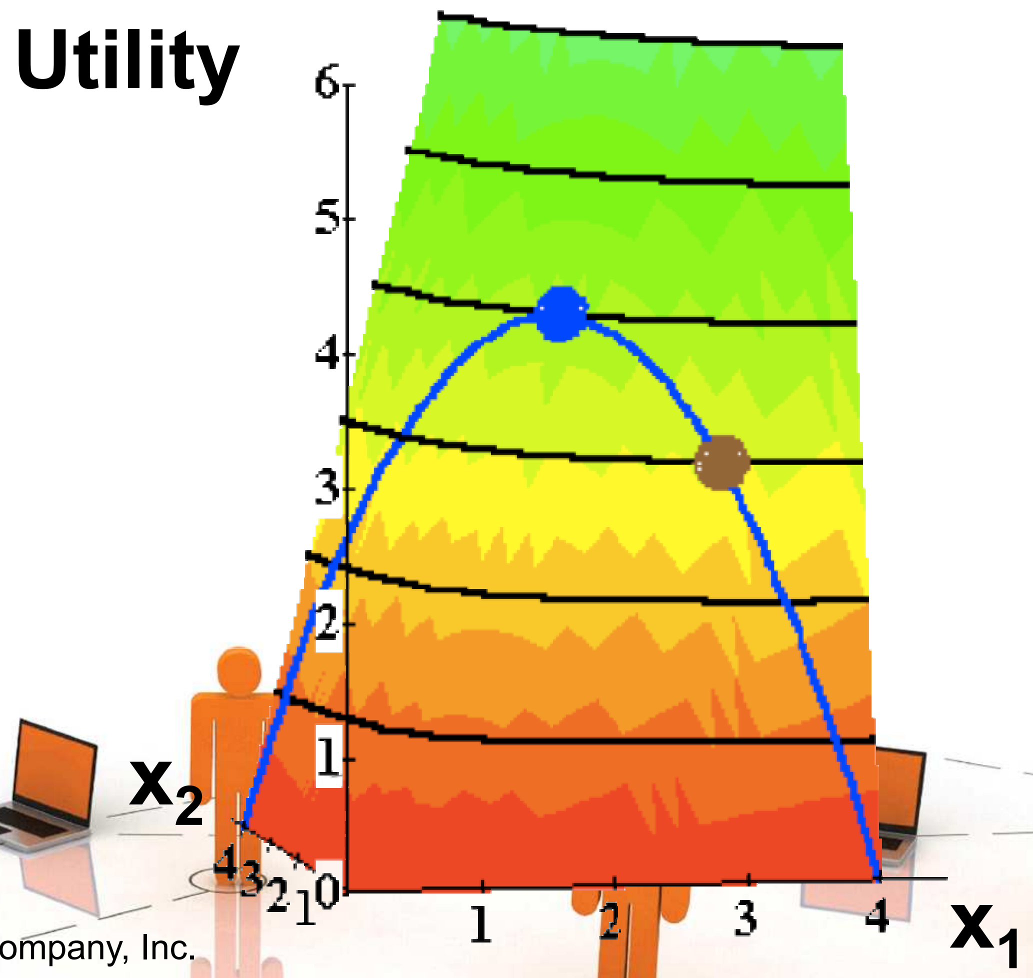
Rational Constrained Choice



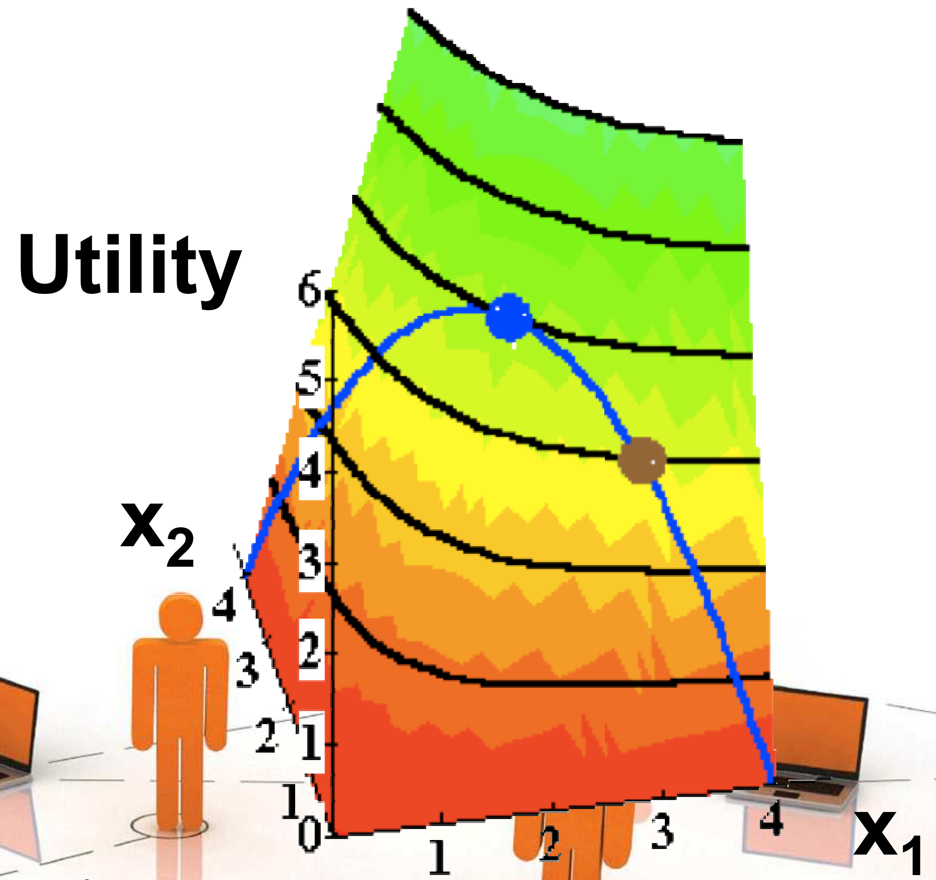
Rational Constrained Choice



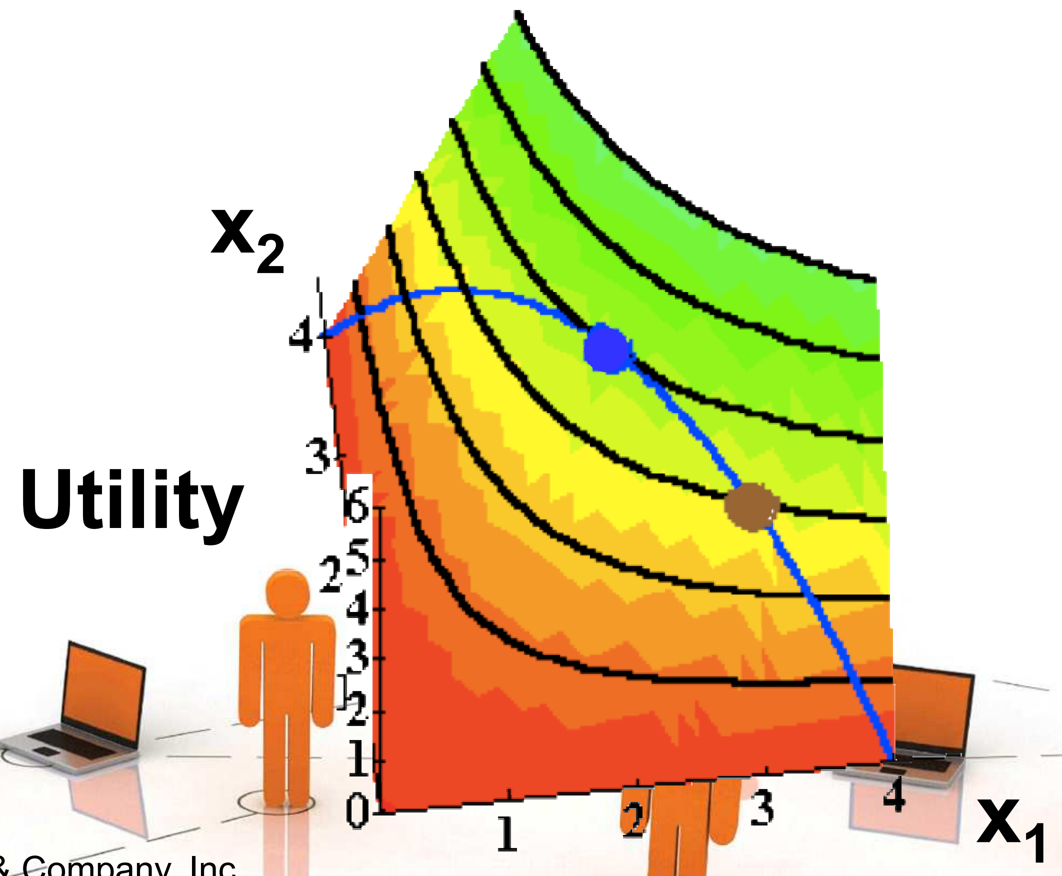
Rational Constrained Choice



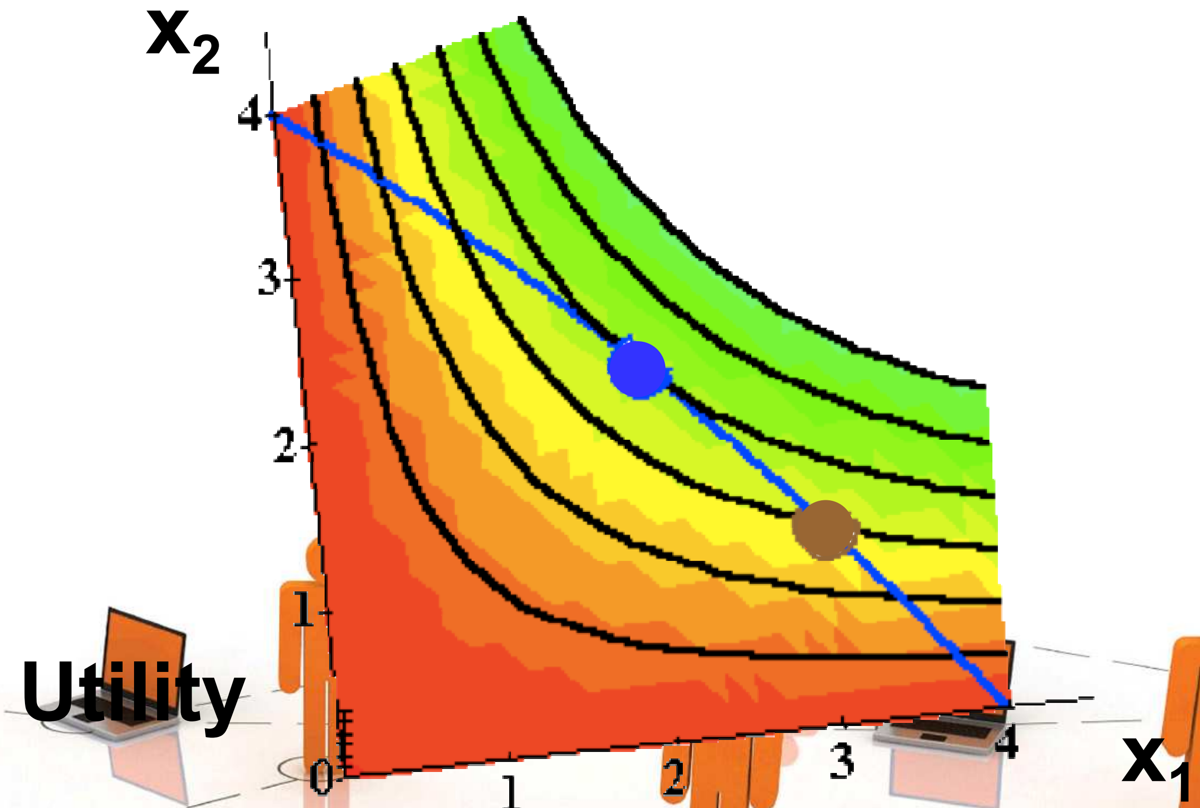
Rational Constrained Choice



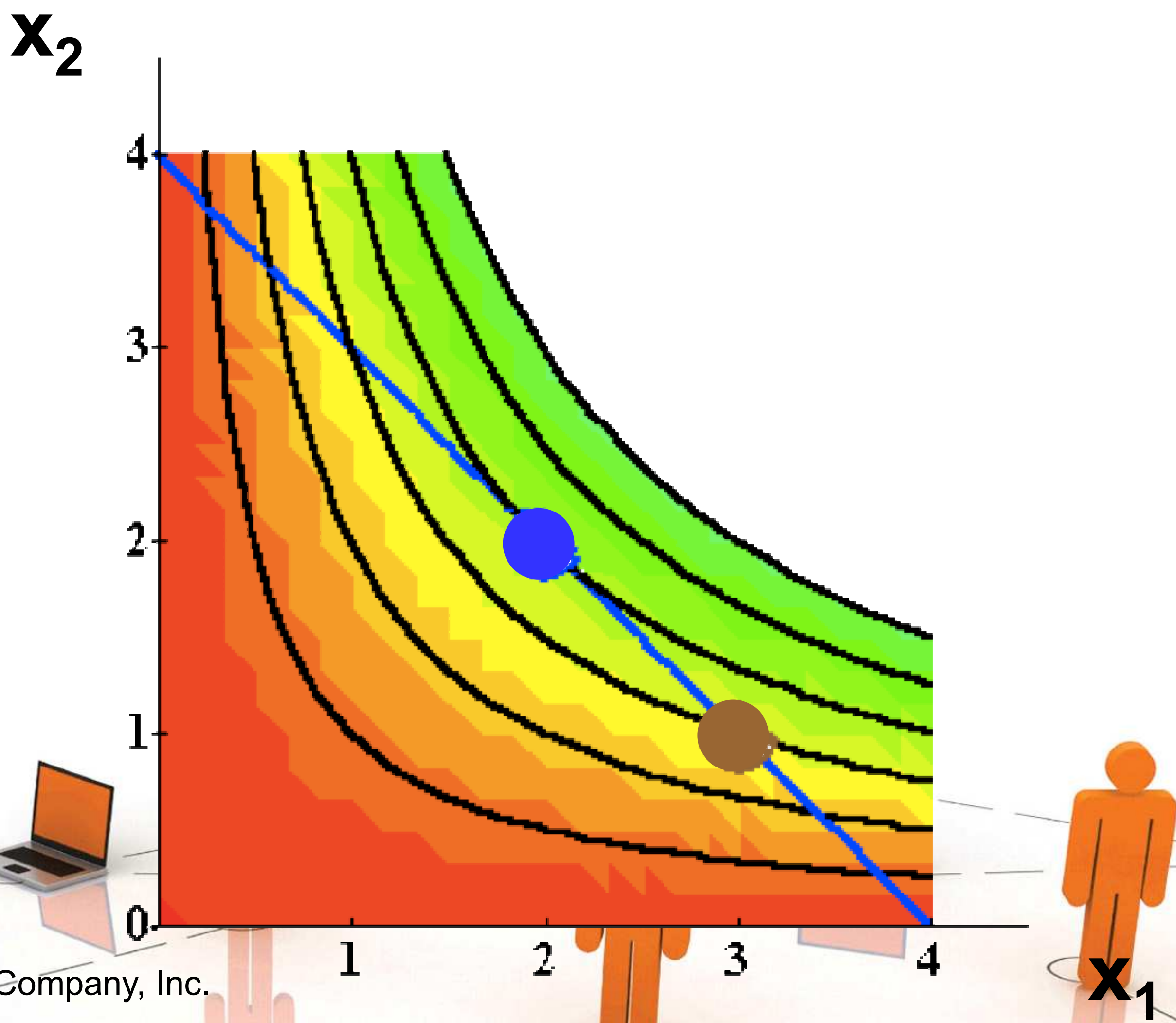
Rational Constrained Choice



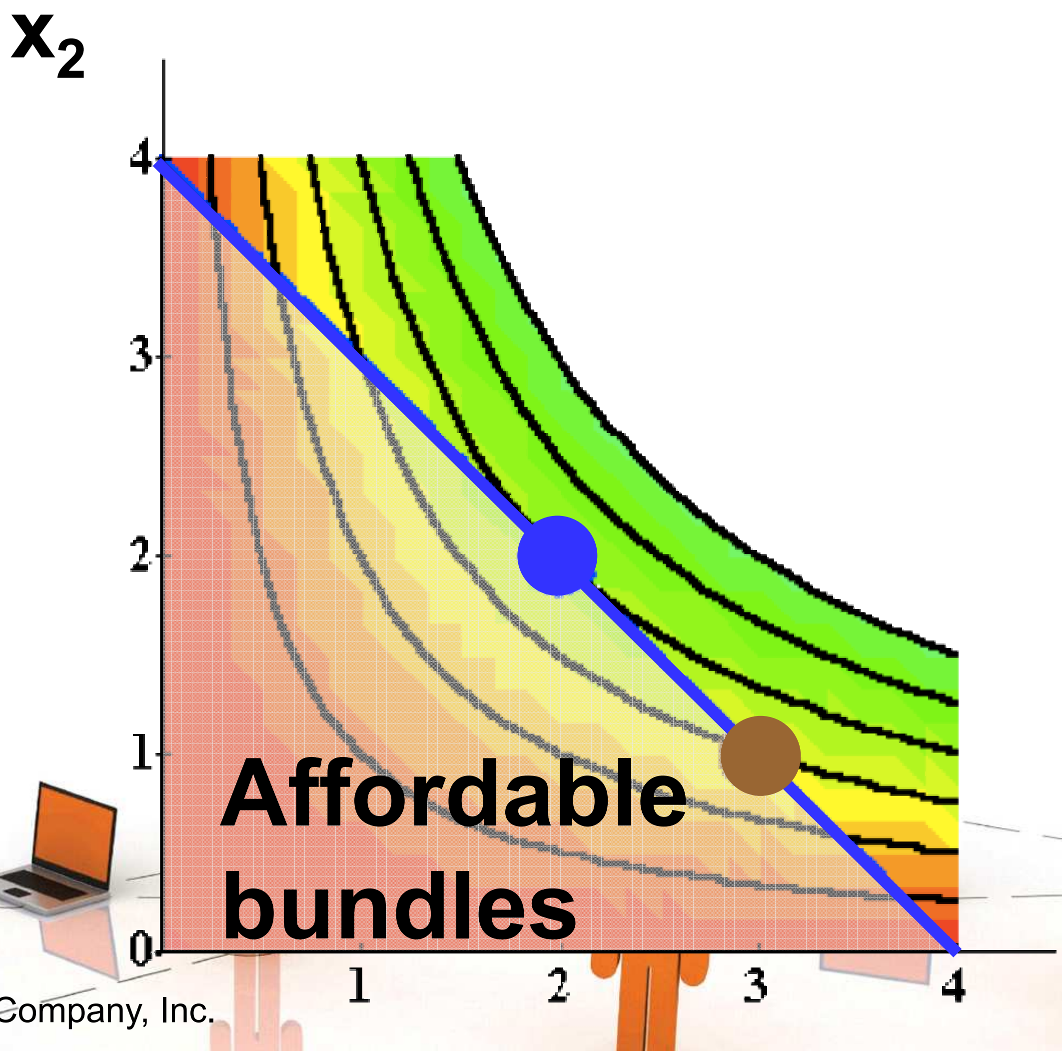
Rational Constrained Choice



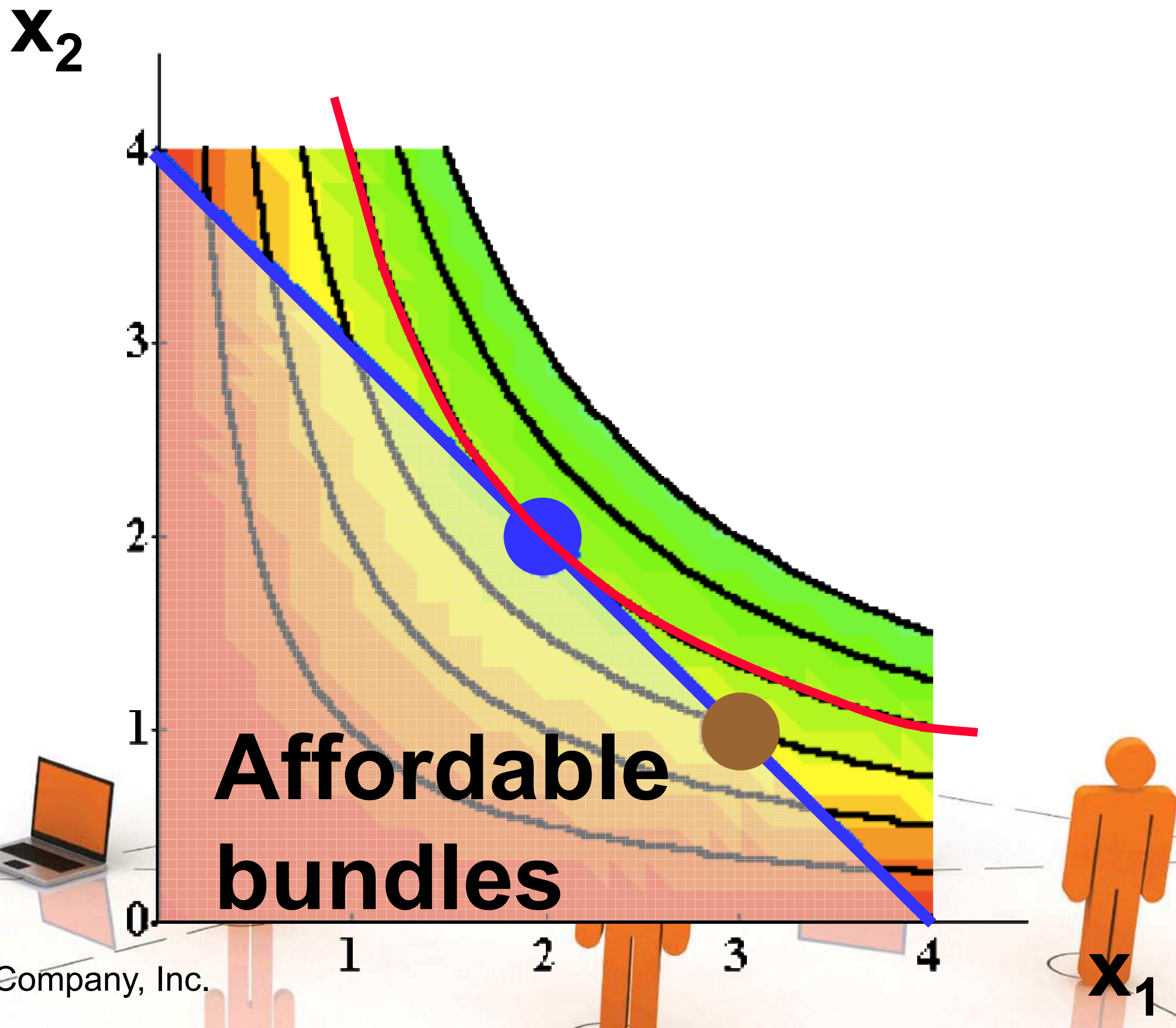
Rational Constrained Choice



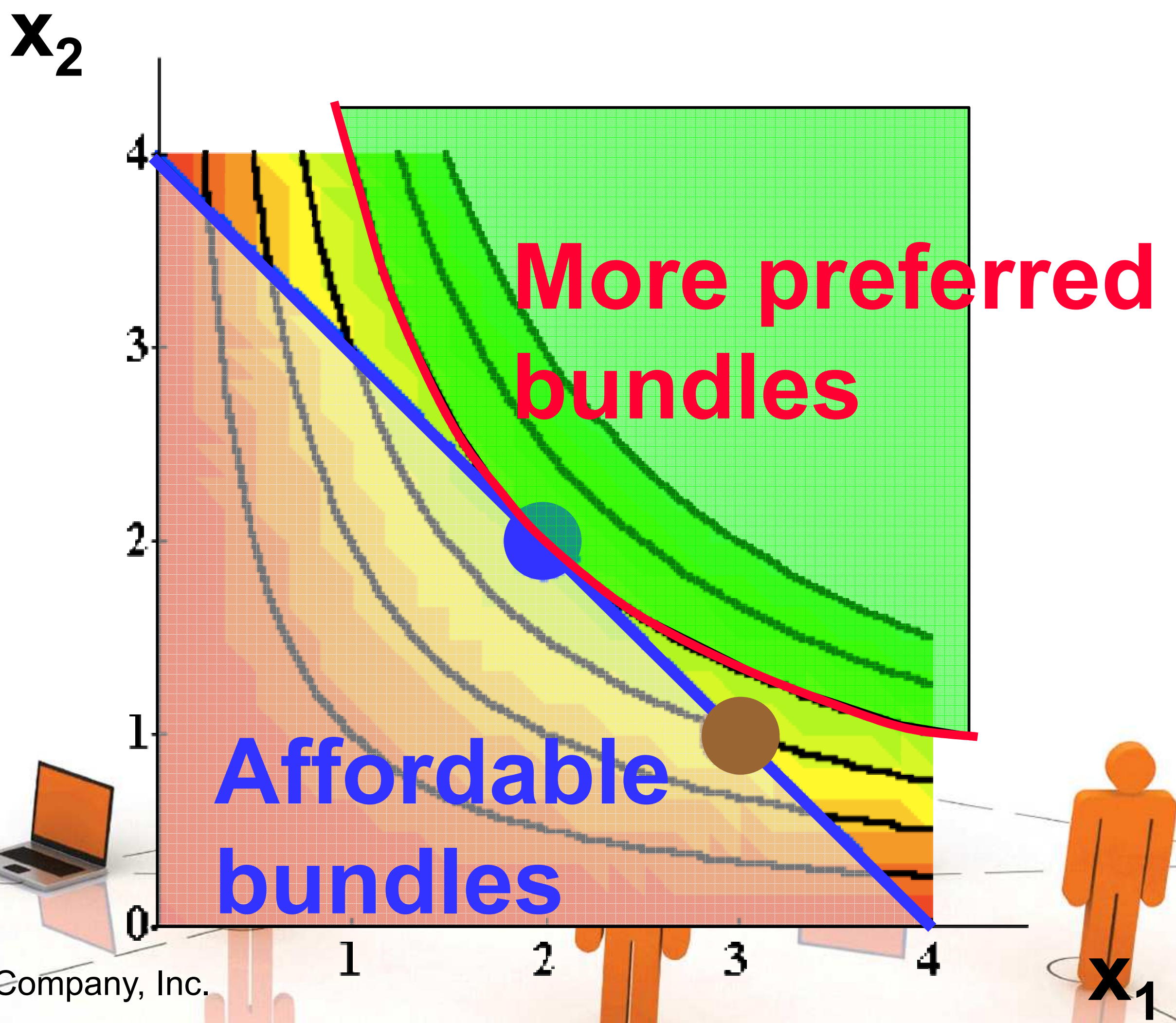
Rational Constrained Choice



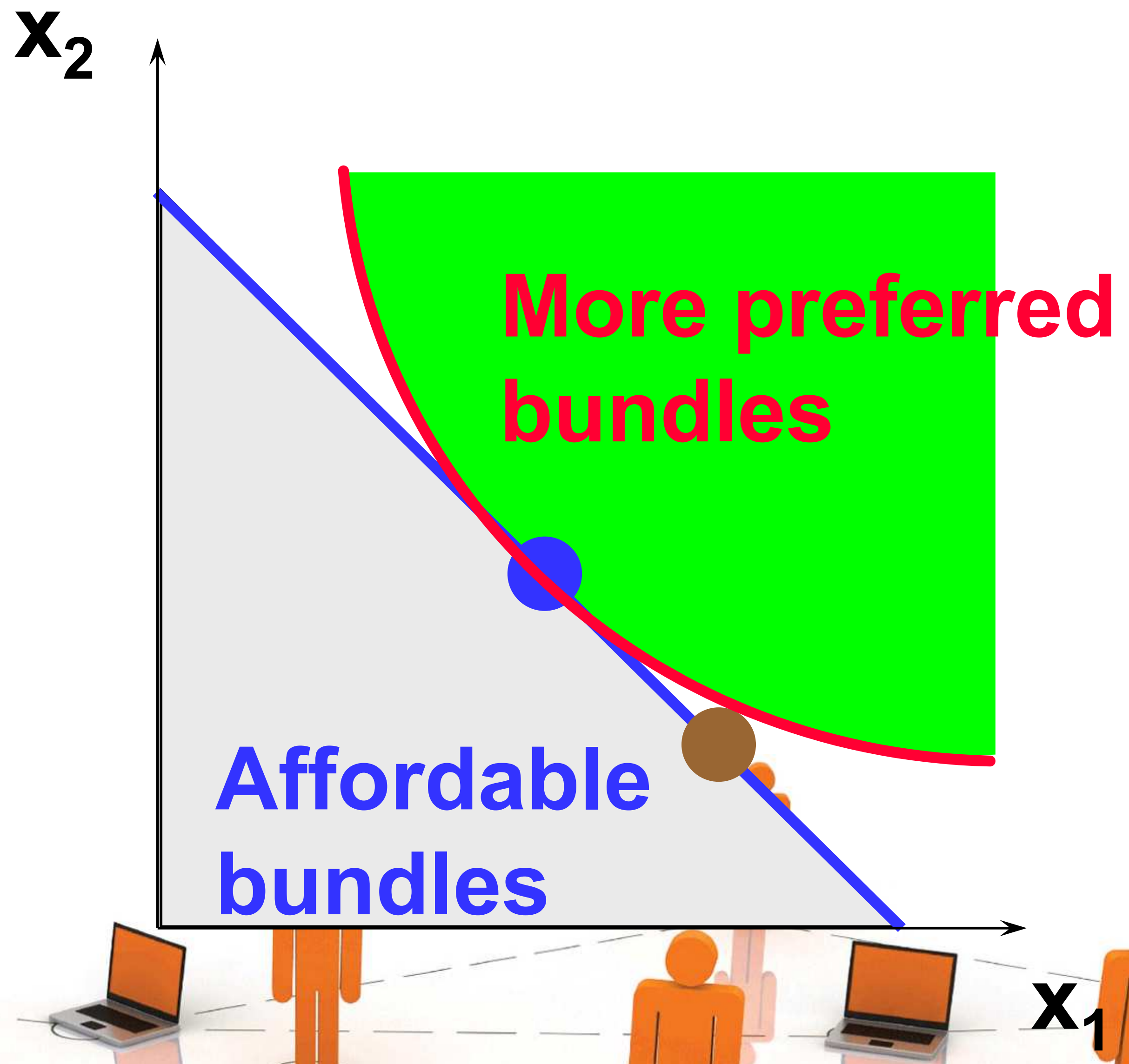
Rational Constrained Choice



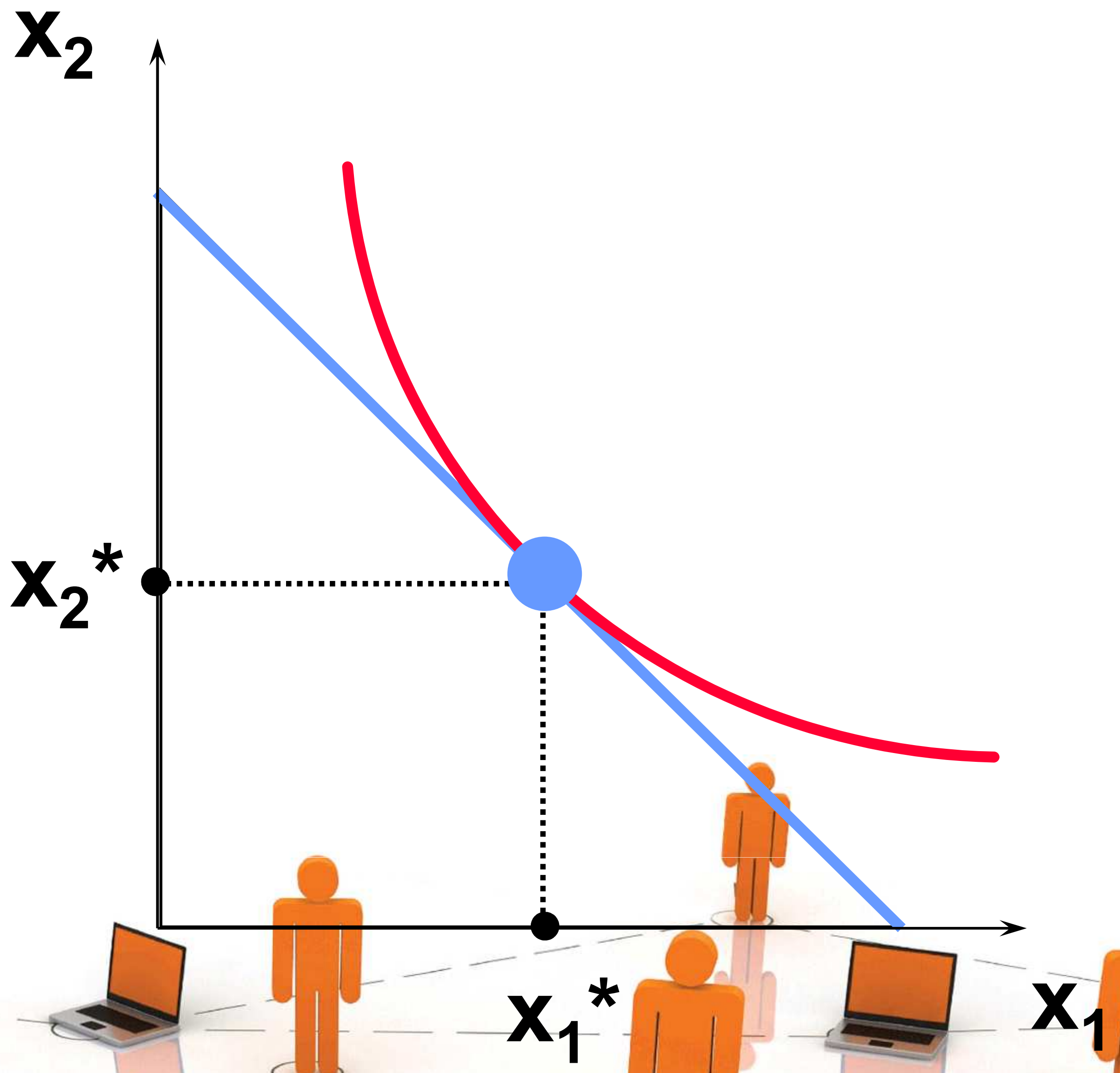
Rational Constrained Choice



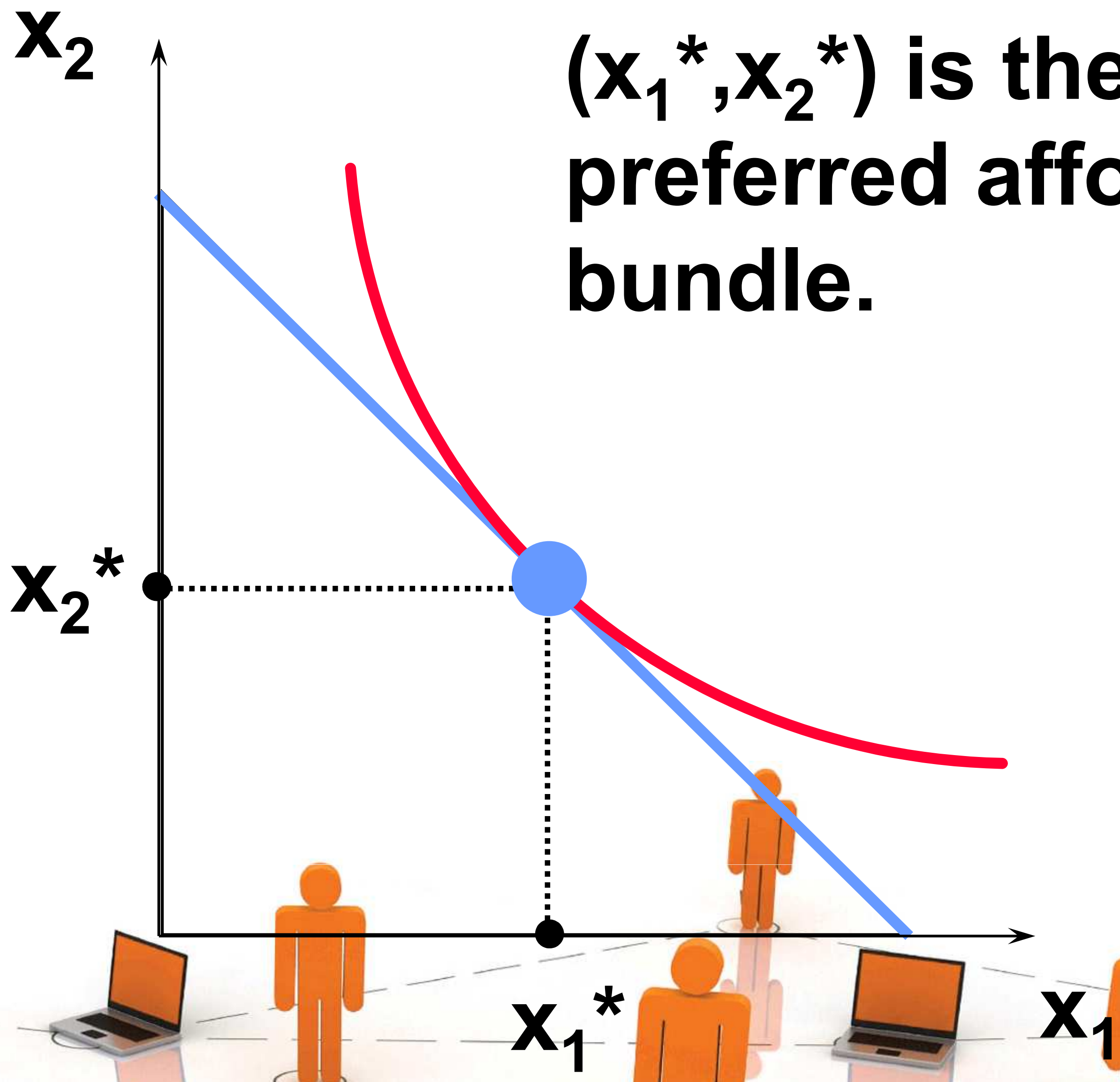
Rational Constrained Choice



Rational Constrained Choice



Rational Constrained Choice



(x_1^*,x_2^*) is the most preferred affordable bundle.

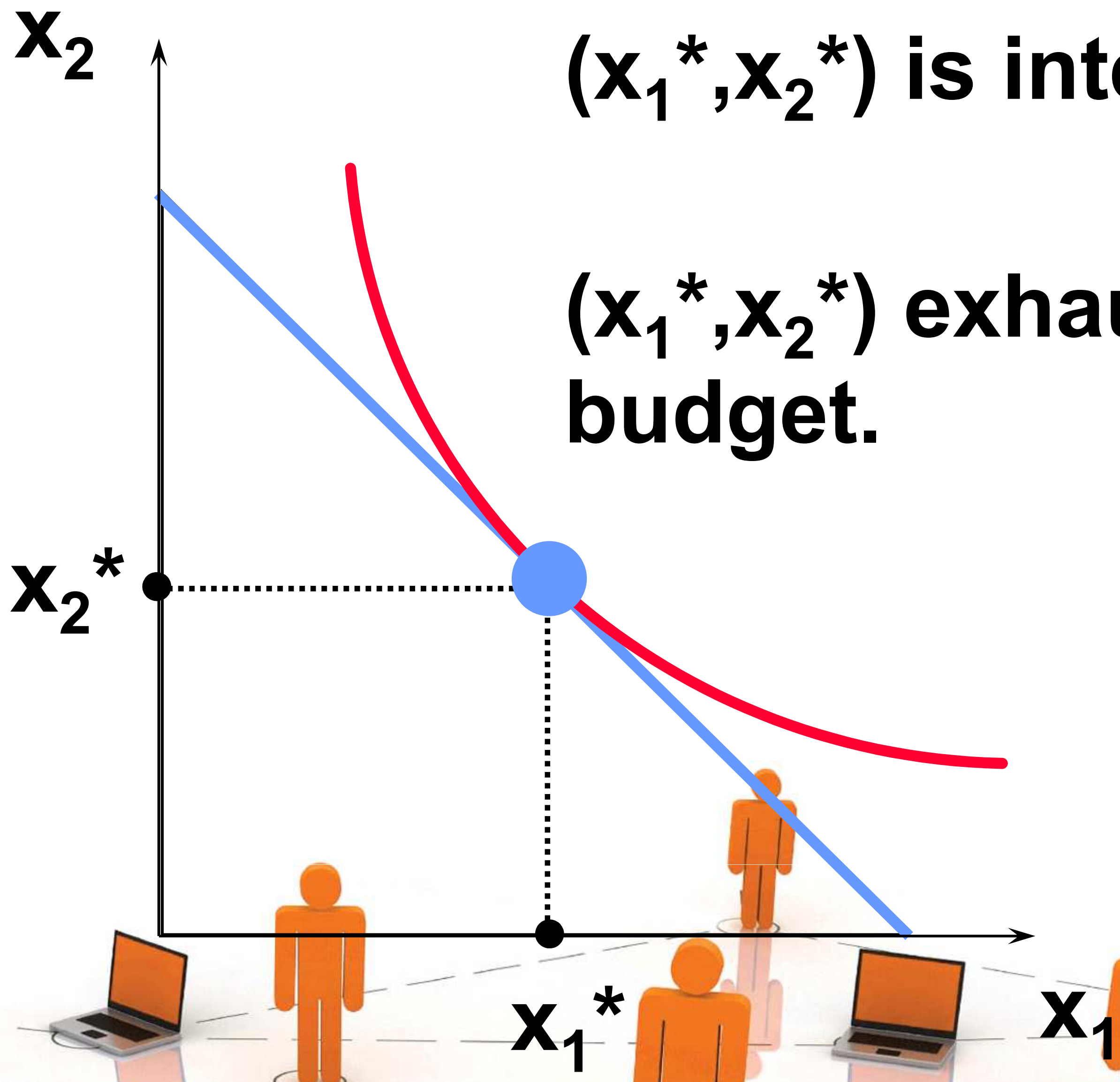
Rational Constrained Choice

- **The most preferred affordable bundle is called the consumer's ORDINARY DEMAND at the given prices and budget.**
- **Ordinary demands will be denoted by $x_1^*(p_1,p_2,m)$ and $x_2^*(p_1,p_2,m)$.**

Rational Constrained Choice

- When $x_1^* > 0$ and $x_2^* > 0$ the demanded bundle is INTERIOR.
- If buying (x_1^*, x_2^*) costs \$m then the budget is exhausted.

Rational Constrained Choice

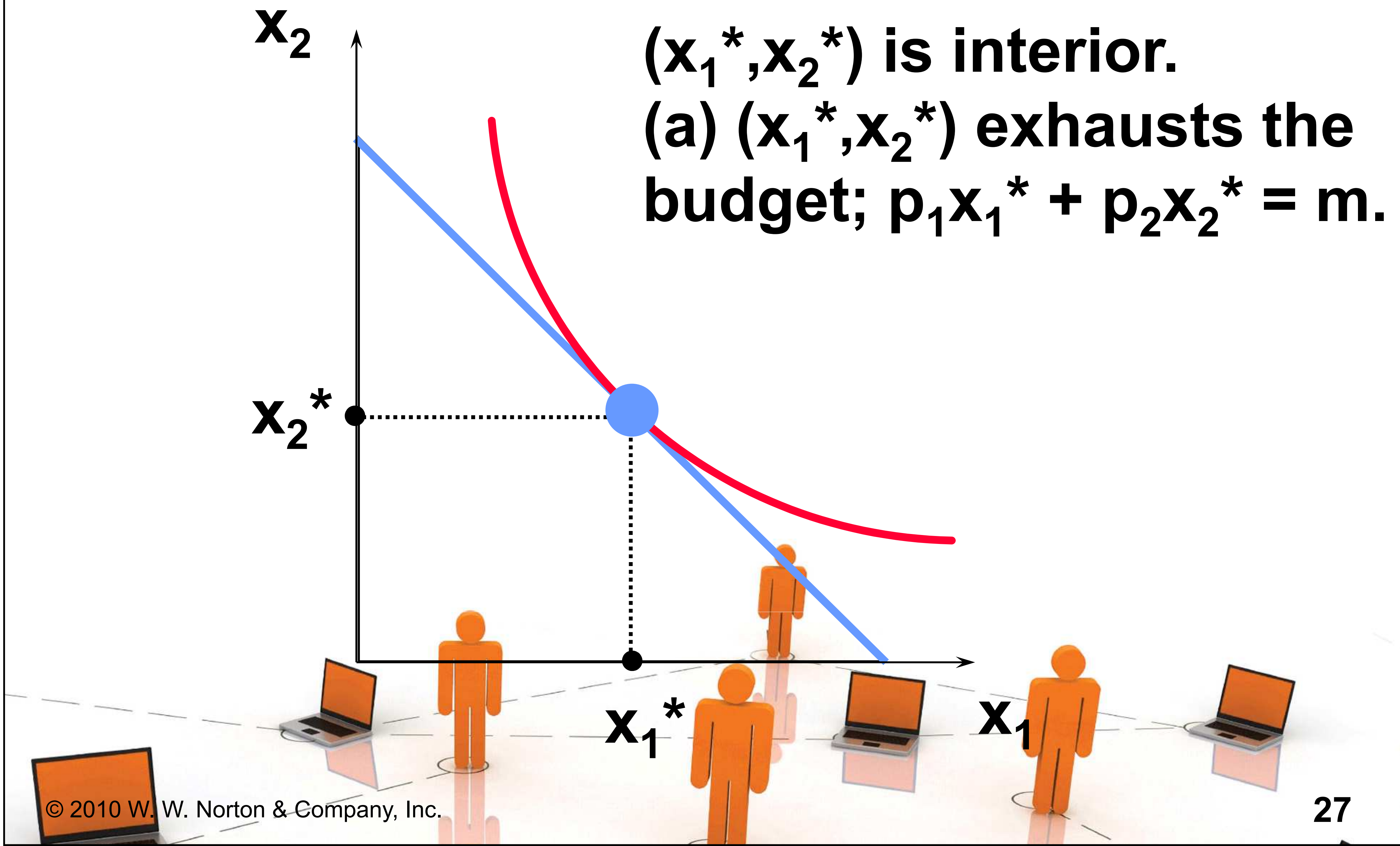


(x_1^*, x_2^*) is interior.

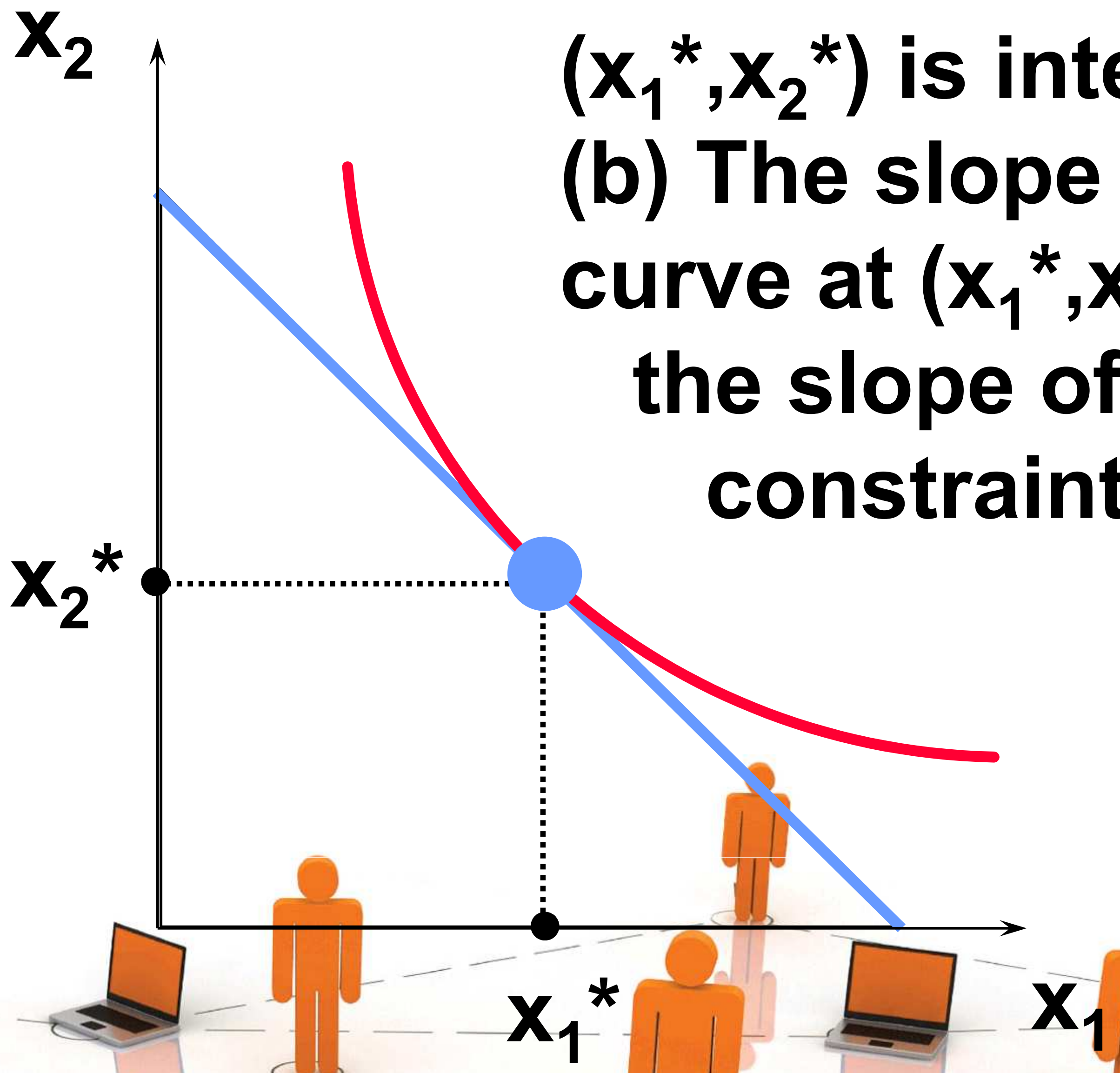
(x_1^*, x_2^*) exhausts the budget.

Rational Constrained Choice

(x_1^*, x_2^*) is interior.
(a) (x_1^*, x_2^*) exhausts the budget; $p_1x_1^* + p_2x_2^* = m$.



Rational Constrained Choice



(x_1^*,x_2^*) is interior .
(b) The slope of the indiff. curve at (x_1^*,x_2^*) equals the slope of the budget constraint.

Rational Constrained Choice

- (x_1^*, x_2^*) satisfies two conditions:
- (a) the budget is exhausted;

$$p_1x_1^* + p_2x_2^* = m$$

- (b) the slope of the budget constraint, $-p_1/p_2$, and the slope of the indifference curve containing (x_1^*, x_2^*) are equal at (x_1^*, x_2^*).

Computing Ordinary Demands

- **How can this information be used to locate (x_1*,x_2*) for given p_1, p_2 and m?**

Computing Ordinary Demands - a Cobb-Douglas Example.

- Suppose that the consumer has Cobb-Douglas preferences.

$$U(x_1, x_2) = x_1^a x_2^b$$

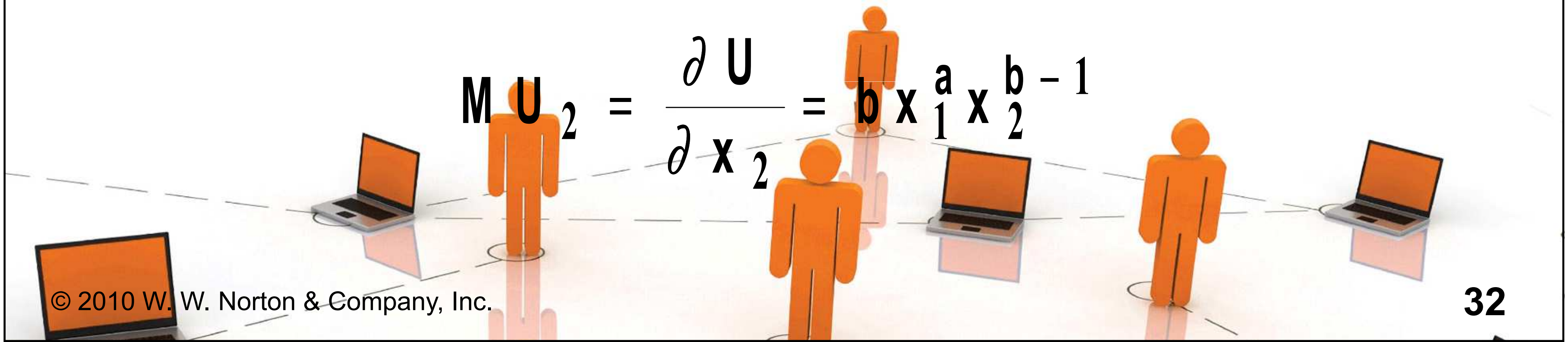
Computing Ordinary Demands - a Cobb-Douglas Example.

- Suppose that the consumer has Cobb-Douglas preferences.

$$U(x_1, x_2) = x_1^a x_2^b$$

- Then
$$MU_1 = \frac{\partial U}{\partial x_1} = a x_1^{a-1} x_2^b$$

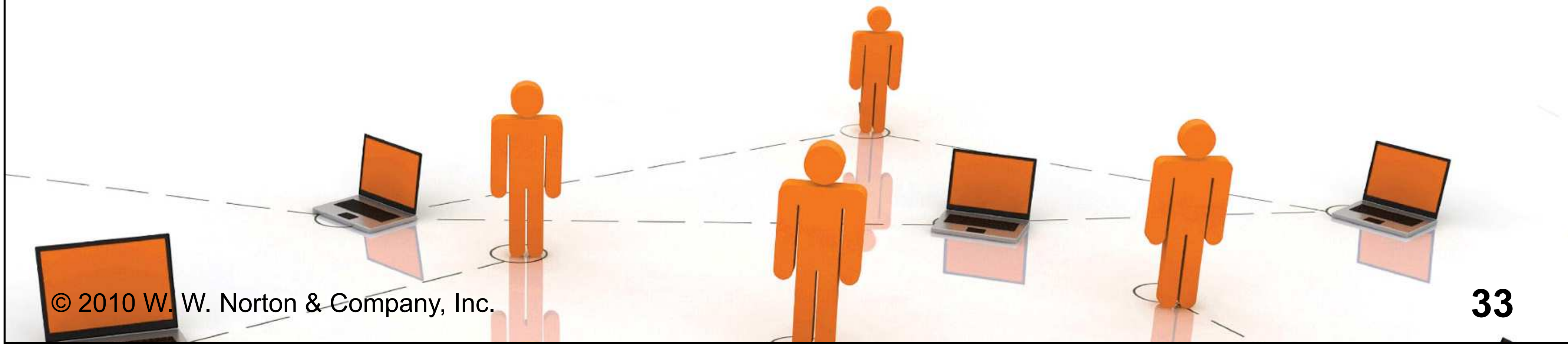
$$MU_2 = \frac{\partial U}{\partial x_2} = b x_1^a x_2^{b-1}$$



Computing Ordinary Demands - a Cobb-Douglas Example.

- **So the MRS is**

$$MRS = \frac{dx_2}{dx_1} = -\frac{\partial U/\partial x_1}{\partial U/\partial x_2} = -\frac{a x_1^{a-1} x_2^{b}}{b x_1^{a} x_2^{b-1}} = -\frac{a x_2}{b x_1}.$$



Computing Ordinary Demands - a Cobb-Douglas Example.

- So the MRS is

$$MRS = \frac{dx_2}{dx_1} = -\frac{\partial U/\partial x_1}{\partial U/\partial x_2} = -\frac{ax_1^{a-1}x_2^b}{bx_1^a x_2^{b-1}} = -\frac{ax_2}{bx_1}.$$

- At (x_1^*, x_2^*), MRS = $-p_1/p_2$ so

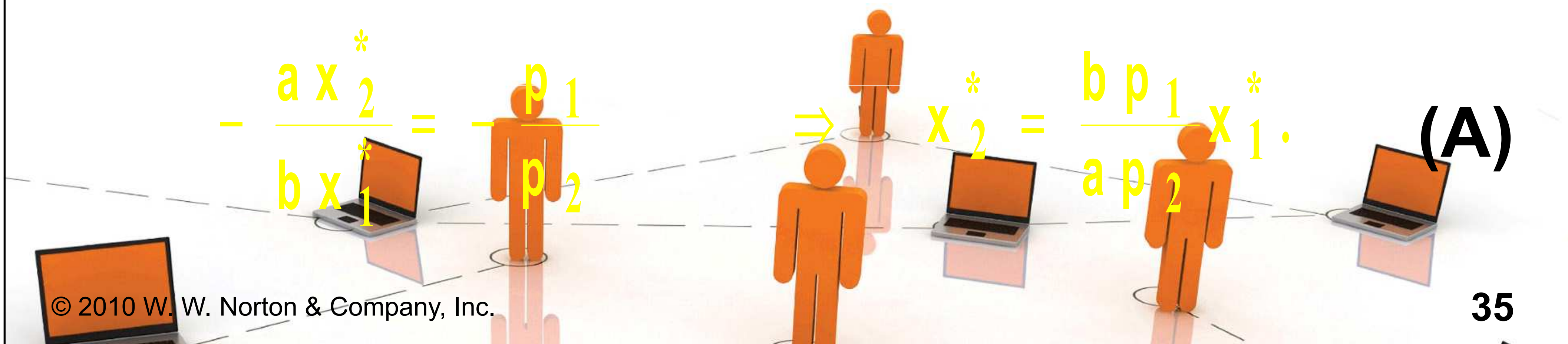
Computing Ordinary Demands - a Cobb-Douglas Example.

- So the MRS is

$$MRS = \frac{dx_2}{dx_1} = -\frac{\partial U/\partial x_1}{\partial U/\partial x_2} = -\frac{ax_1^{a-1}x_2^b}{bx_1^a x_2^{b-1}} = -\frac{ax_2}{bx_1}.$$

- At (x_1^*, x_2^*), MRS = $-p_1/p_2$ so

$$-\frac{ax_2^*}{bx_1^*} = -\frac{p_1}{p_2} \qquad \Rightarrow x_2^* = \frac{bp_1}{ap_2}x_1^*. \qquad \textbf{(A)}$$



Computing Ordinary Demands - a Cobb-Douglas Example.

- (x_1^*, x_2^*) also exhausts the budget so

$$p_1x_1^* + p_2x_2^* = m. \qquad \textbf{(B)}$$

Computing Ordinary Demands - a Cobb-Douglas Example.

- So now we know that

$$x_2^* = \frac{bp_1}{ap_2}x_1^* \qquad \textbf{(A)}$$

$$p_1x_1^* + p_2x_2^* = m. \qquad \textbf{(B)}$$

Computing Ordinary Demands - a Cobb-Douglas Example.

- **So now we know that**

$$x_2^* = \frac{bp_1}{ap_2}x_1^* \qquad \textbf{(A)}$$

Substitute

$$p_1x_1^* + p_2x_2^* = m. \qquad \textbf{(B)}$$

Computing Ordinary Demands - a Cobb-Douglas Example.

- **So now we know that**

$$x_2^* = \frac{bp_1}{ap_2}x_1^* \qquad \textbf{(A)}$$

Substitute

$$p_1x_1^* + p_2x_2^* = m. \qquad \textbf{(B)}$$

and get

$$p_1x_1^* + p_2\frac{bp_1}{ap_2}x_1^* = m.$$

This simplifies to ….

Computing Ordinary Demands - a Cobb-Douglas Example.

$$x_1^* = \frac{am}{(a+b)p_1}.$$

Computing Ordinary Demands - a Cobb-Douglas Example.

$$x_1^* = \frac{am}{(a+b)p_1}.$$

Substituting for x_1^* in

$$p_1 x_1^* + p_2 x_2^* = m$$

then gives

$$x_2^* = \frac{bm}{(a+b)p_2}.$$

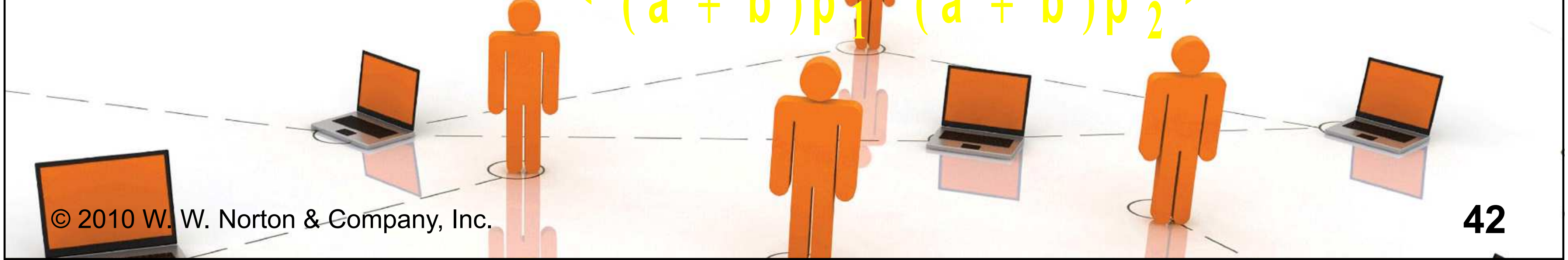
Computing Ordinary Demands - a Cobb-Douglas Example.

So we have discovered that the most preferred affordable bundle for a consumer with Cobb-Douglas preferences

$$U(x_1, x_2) = x_1^a x_2^b$$

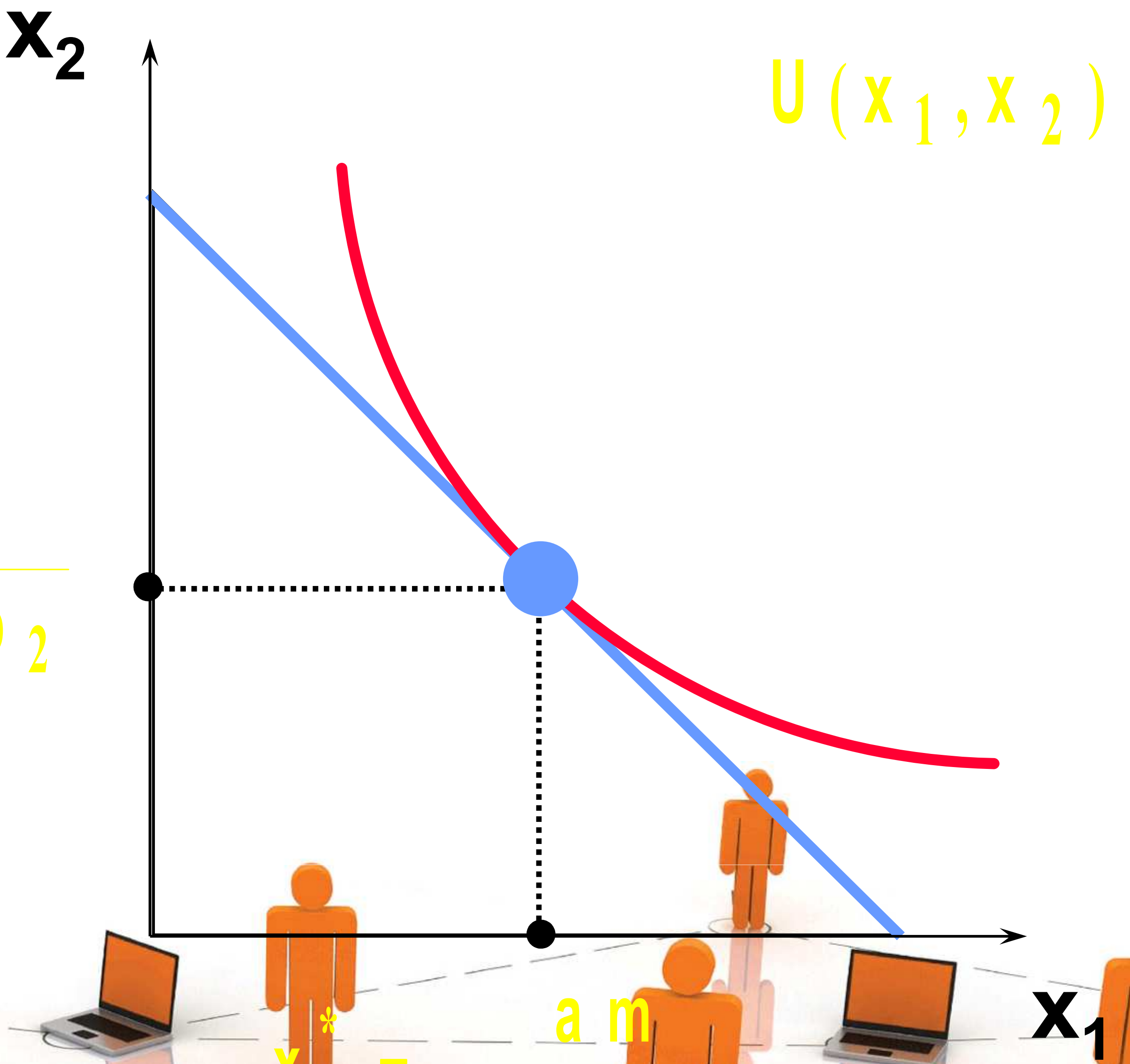
is

$$(x_1^*, x_2^*) = \left(\frac{am}{(a+b)p_1}, \frac{bm}{(a+b)p_2} \right).$$



Computing Ordinary Demands - a Cobb-Douglas Example.

$$U(x_1, x_2) = x_1^a x_2^b$$



$$x_2^* = \frac{bm}{(a+b)p_2}$$

$$x_1^* = \frac{am}{(a+b)p_1}$$

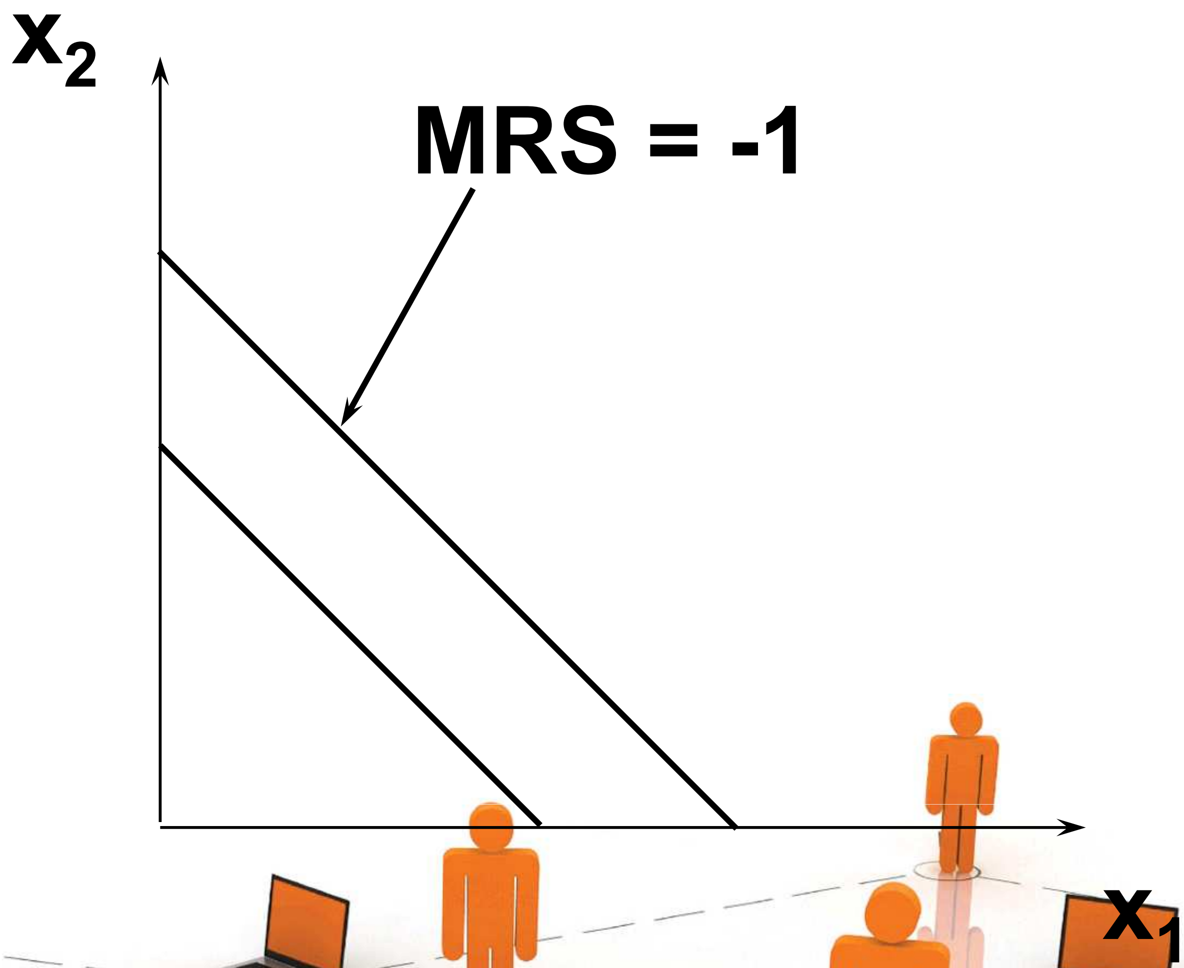
Rational Constrained Choice

- When $x_1^* > 0$ and $x_2^* > 0$ and (x_1^*,x_2^*) exhausts the budget, and indifference curves have no 'kinks', the ordinary demands are obtained by solving:
- (a) $p_1x_1^* + p_2x_2^* = y$
- (b) the slopes of the budget constraint, $-p_1/p_2$, and of the indifference curve containing (x_1^*,x_2^*) are equal at (x_1^*,x_2^*).

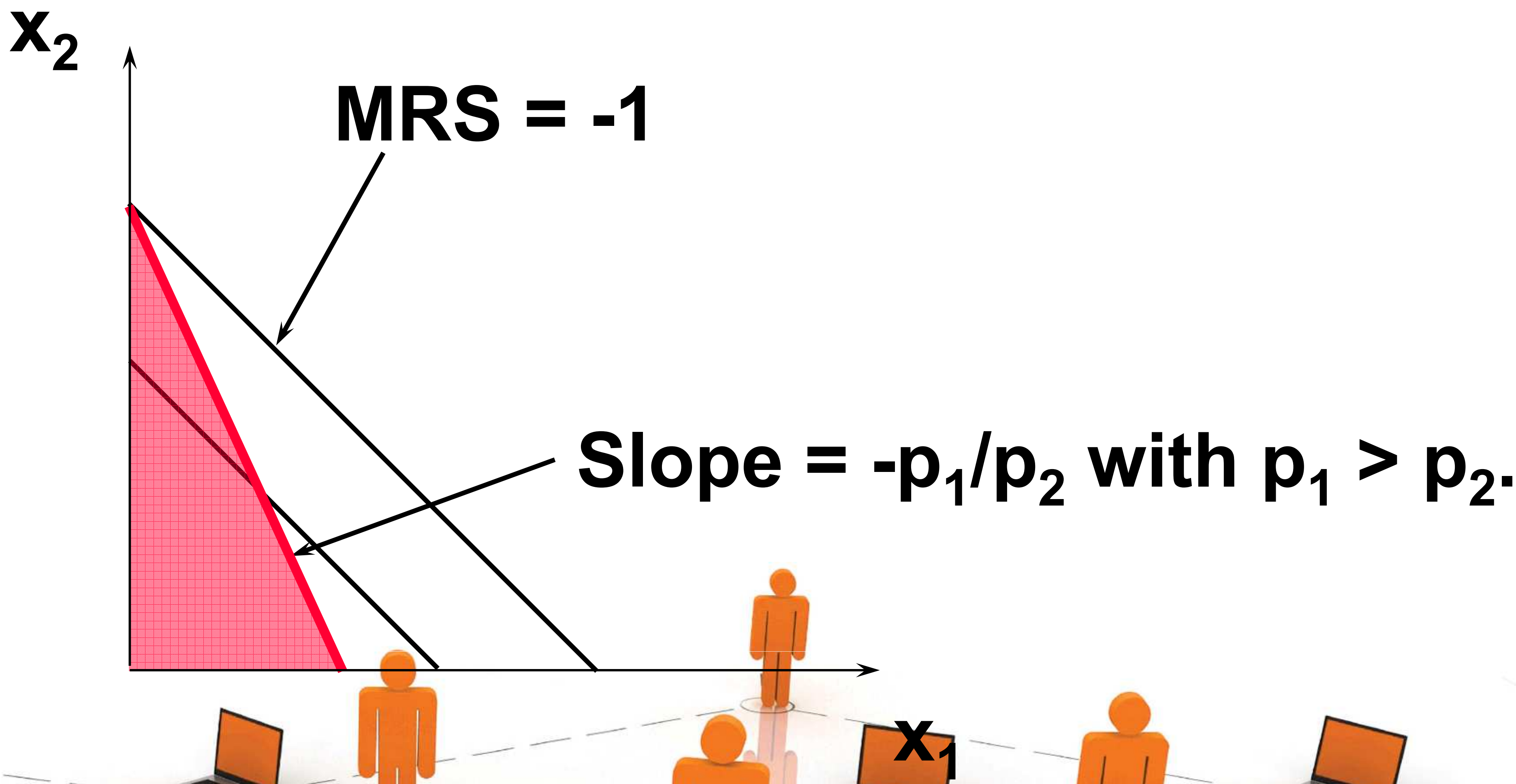
Rational Constrained Choice

- But what if $x_1^* = 0$?
- Or if $x_2^* = 0$?
- If either $x_1^* = 0$ or $x_2^* = 0$ then the ordinary demand (x_1^*, x_2^*) is at a corner solution to the problem of maximizing utility subject to a budget constraint.

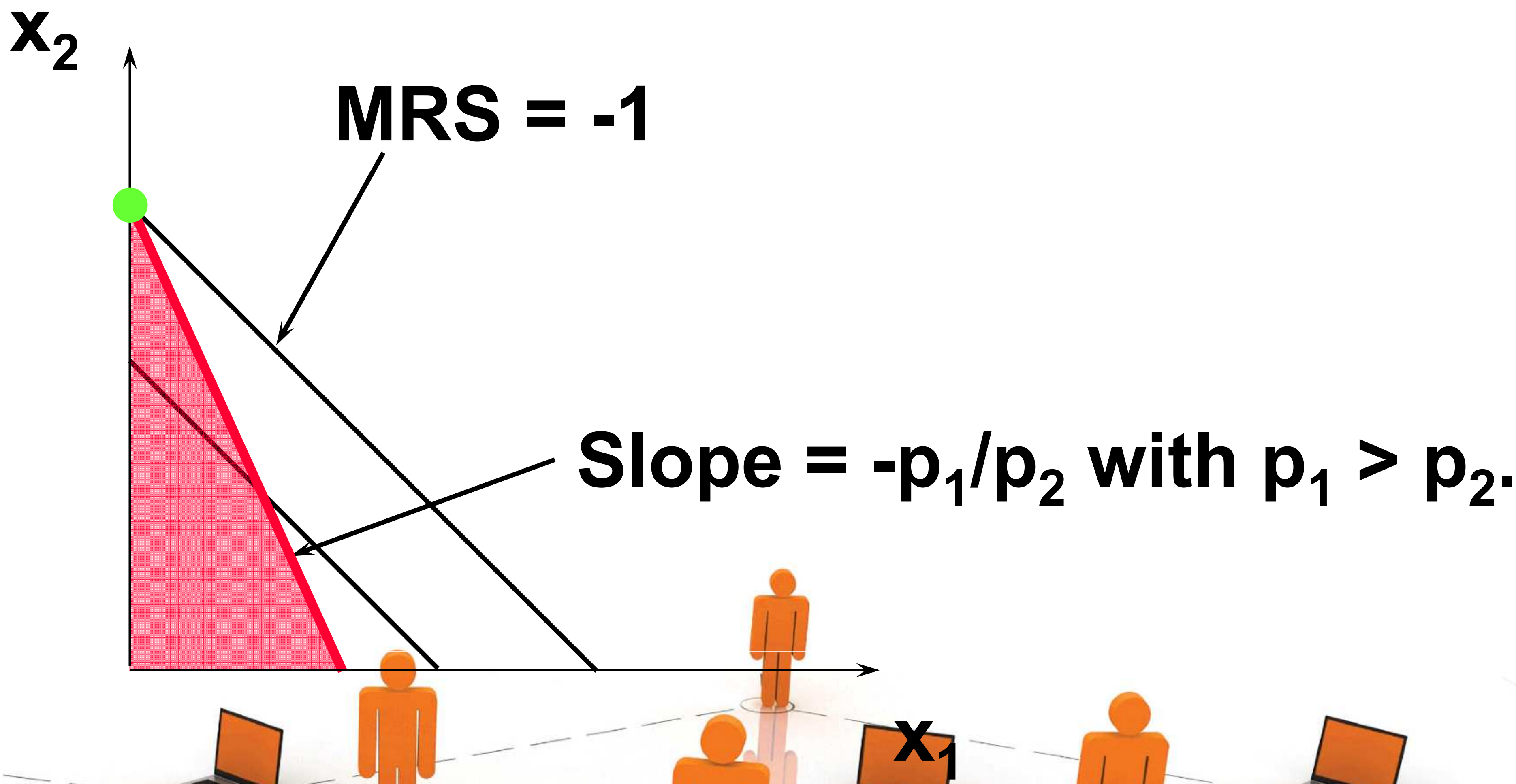
Examples of Corner Solutions -- the Perfect Substitutes Case



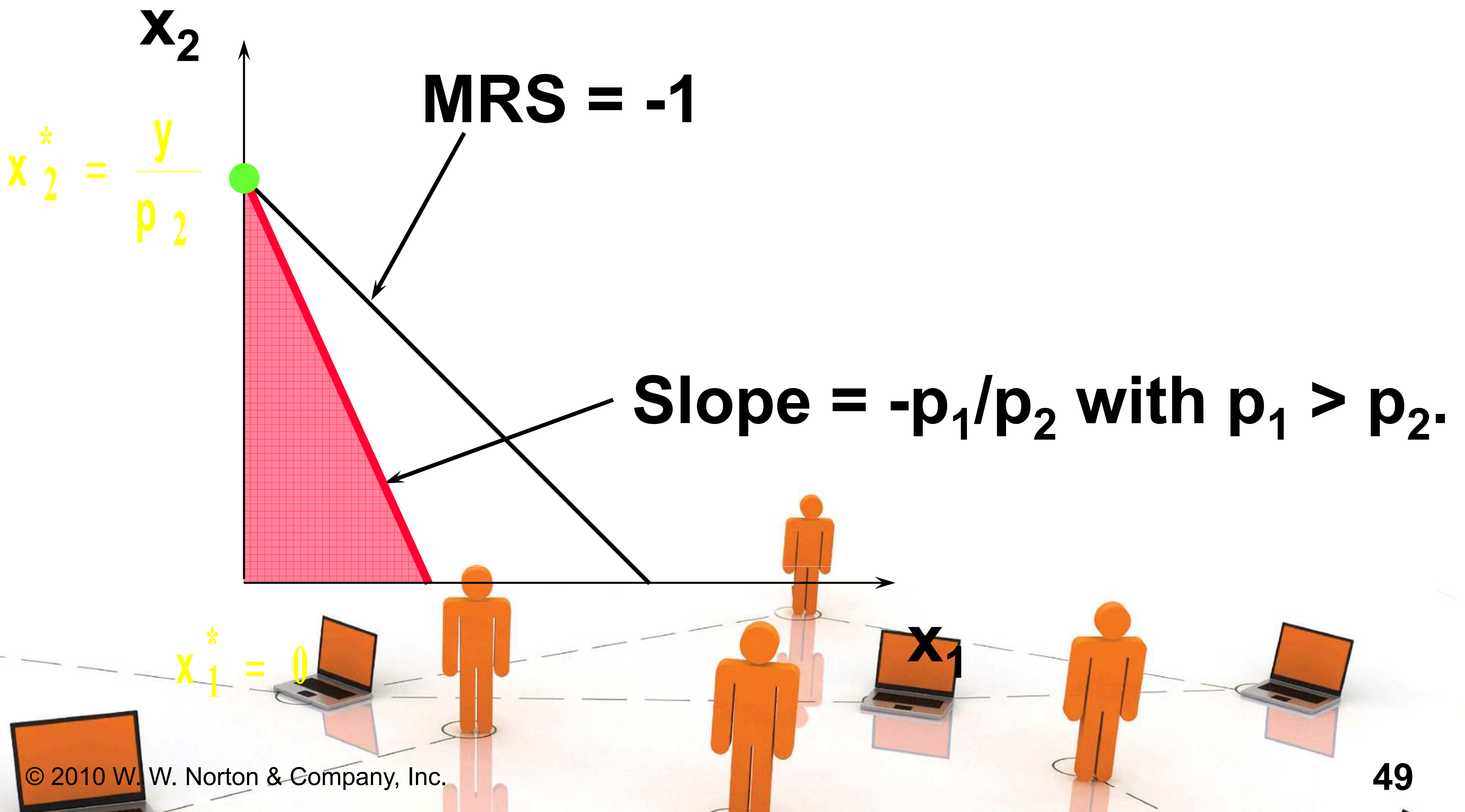
Examples of Corner Solutions -- the Perfect Substitutes Case



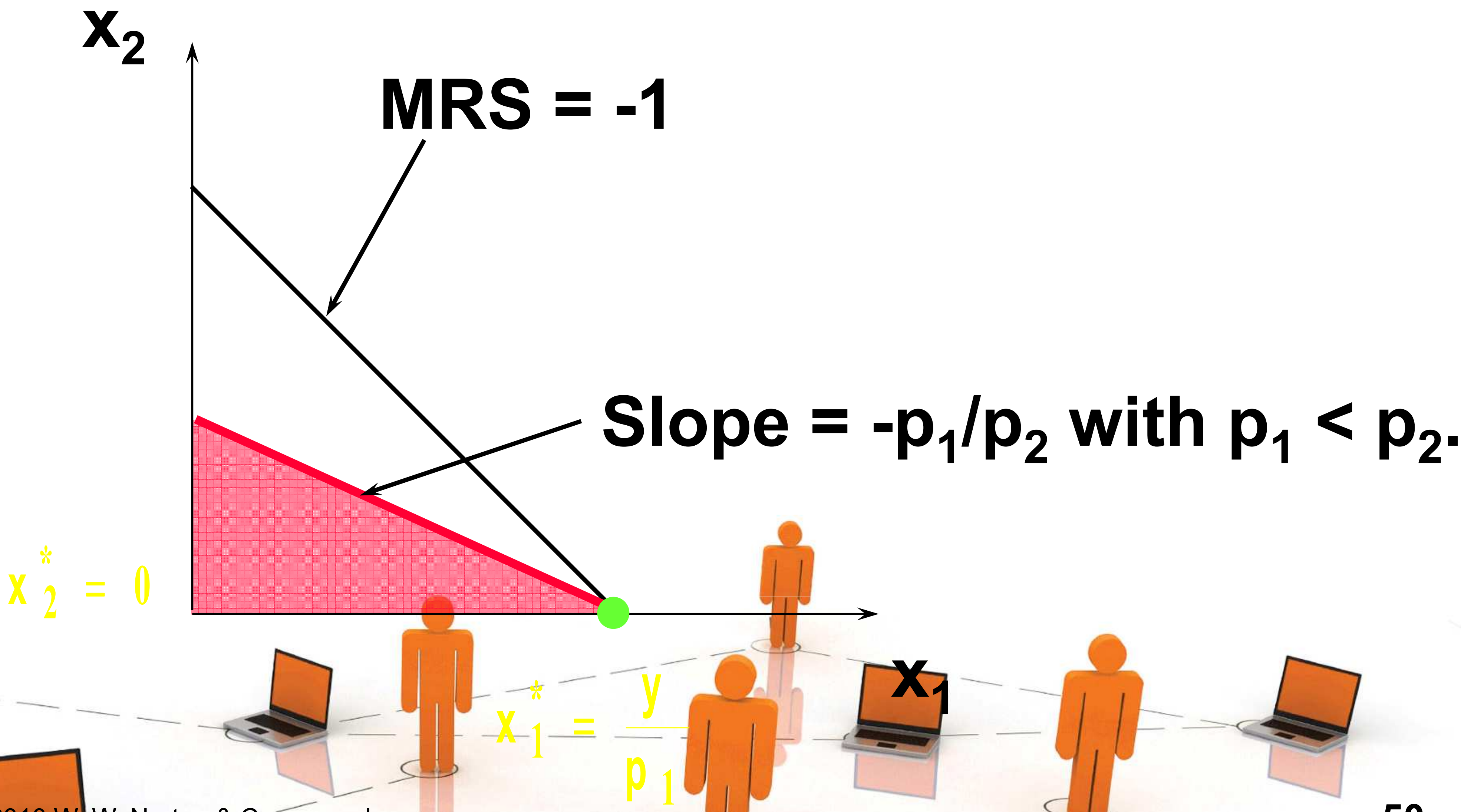
Examples of Corner Solutions -- the Perfect Substitutes Case



Examples of Corner Solutions -- the Perfect Substitutes Case



Examples of Corner Solutions -- the Perfect Substitutes Case



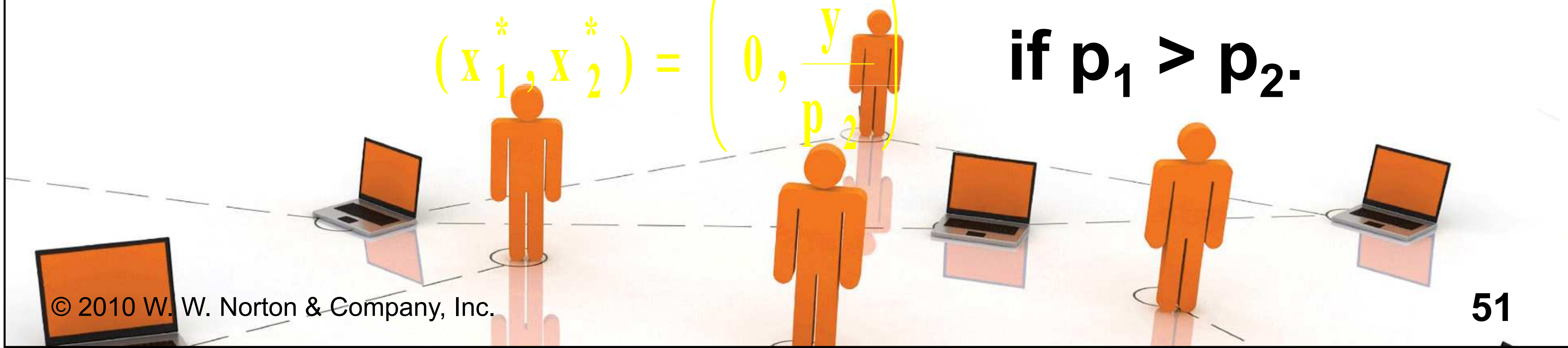
Examples of Corner Solutions -- the Perfect Substitutes Case

So when $U(x_1,x_2) = x_1 + x_2$, the most preferred affordable bundle is (x_1^*,x_2^*) where

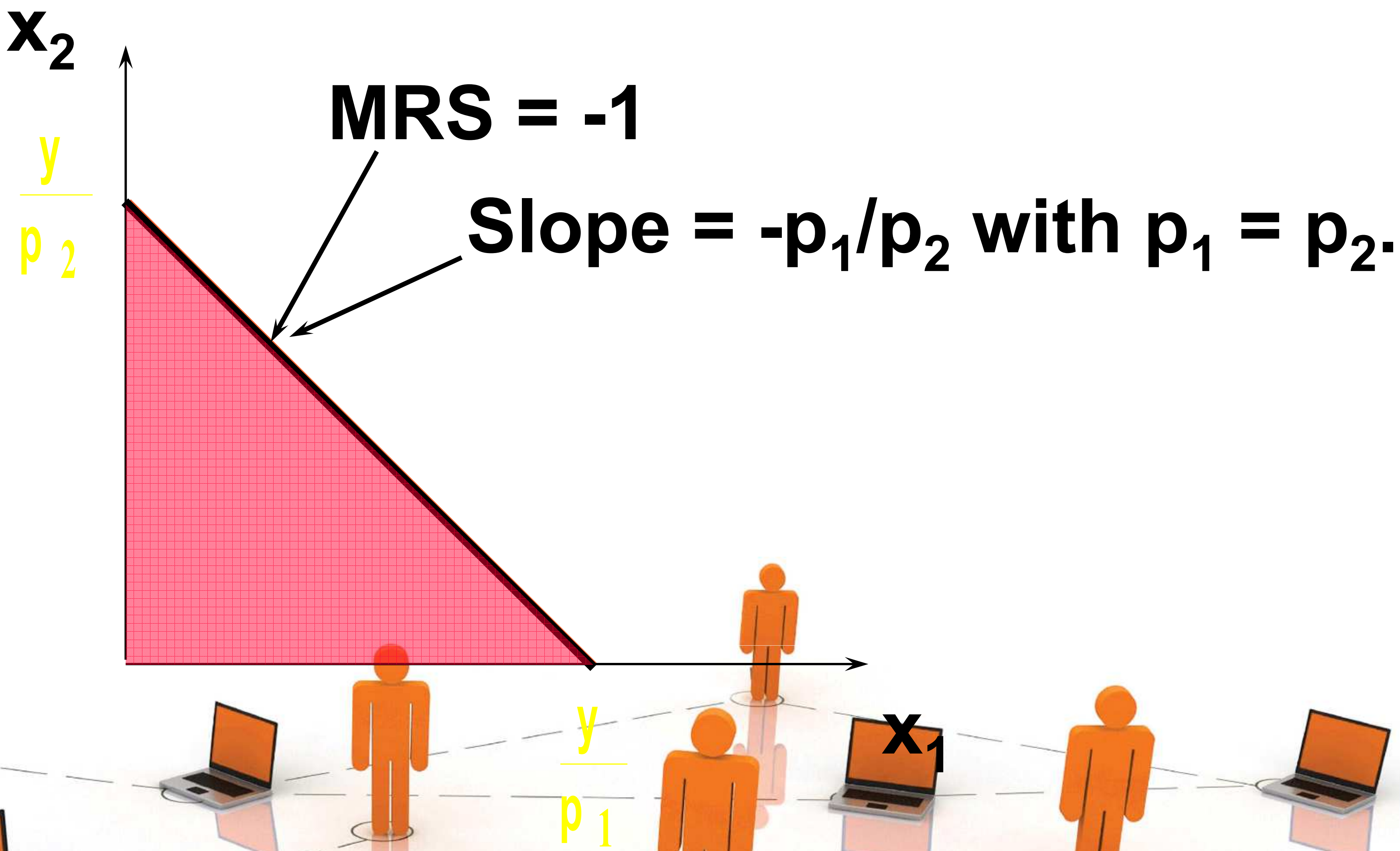
$$(x_1^*, x_2^*) = \left(\frac{y}{p_1}, 0\right) \qquad \text{if } p_1 < p_2$$

and

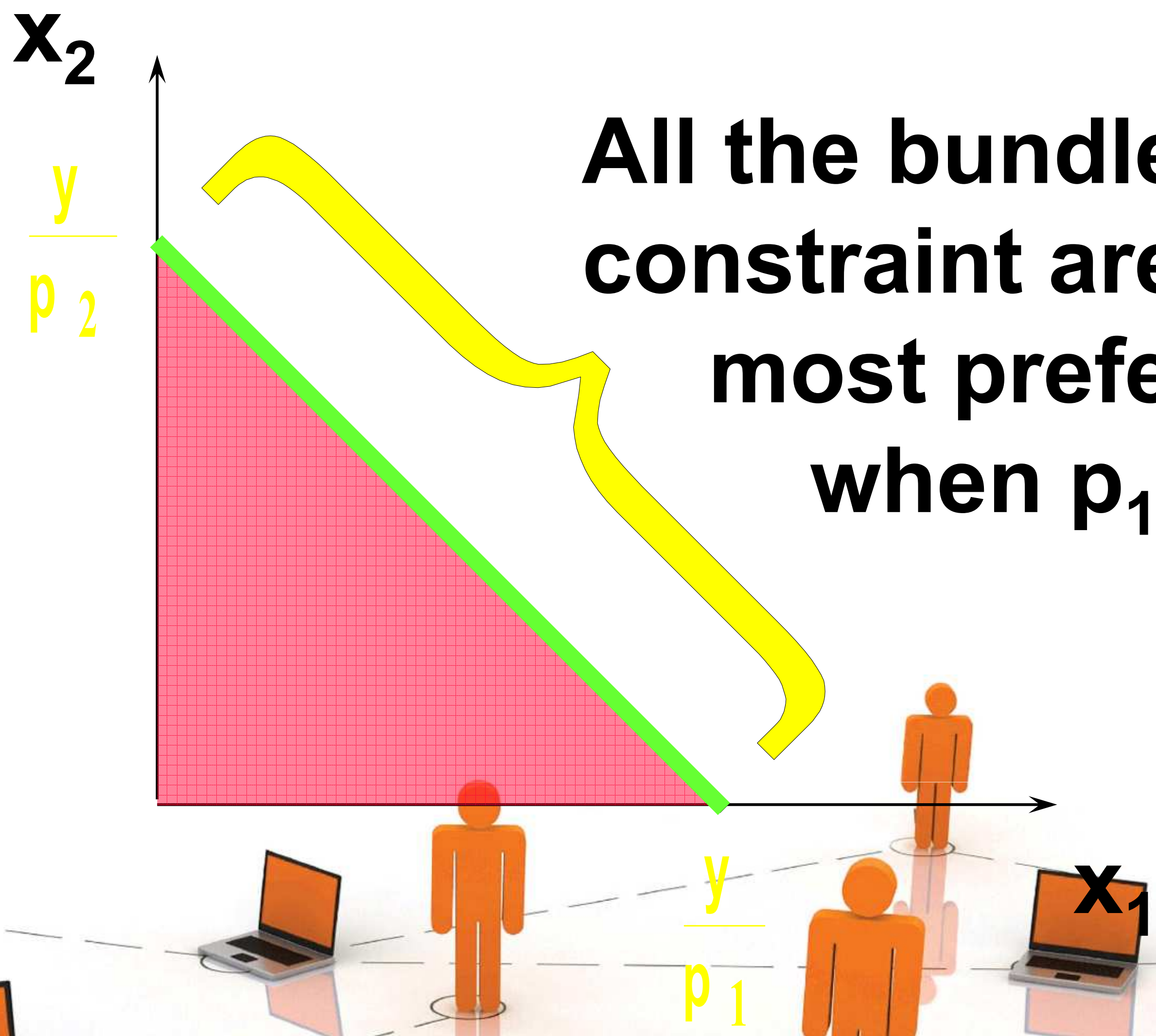
$$(x_1^*, x_2^*) = \left(0, \frac{y}{p_2}\right) \qquad \text{if } p_1 > p_2.$$



Examples of Corner Solutions -- the Perfect Substitutes Case

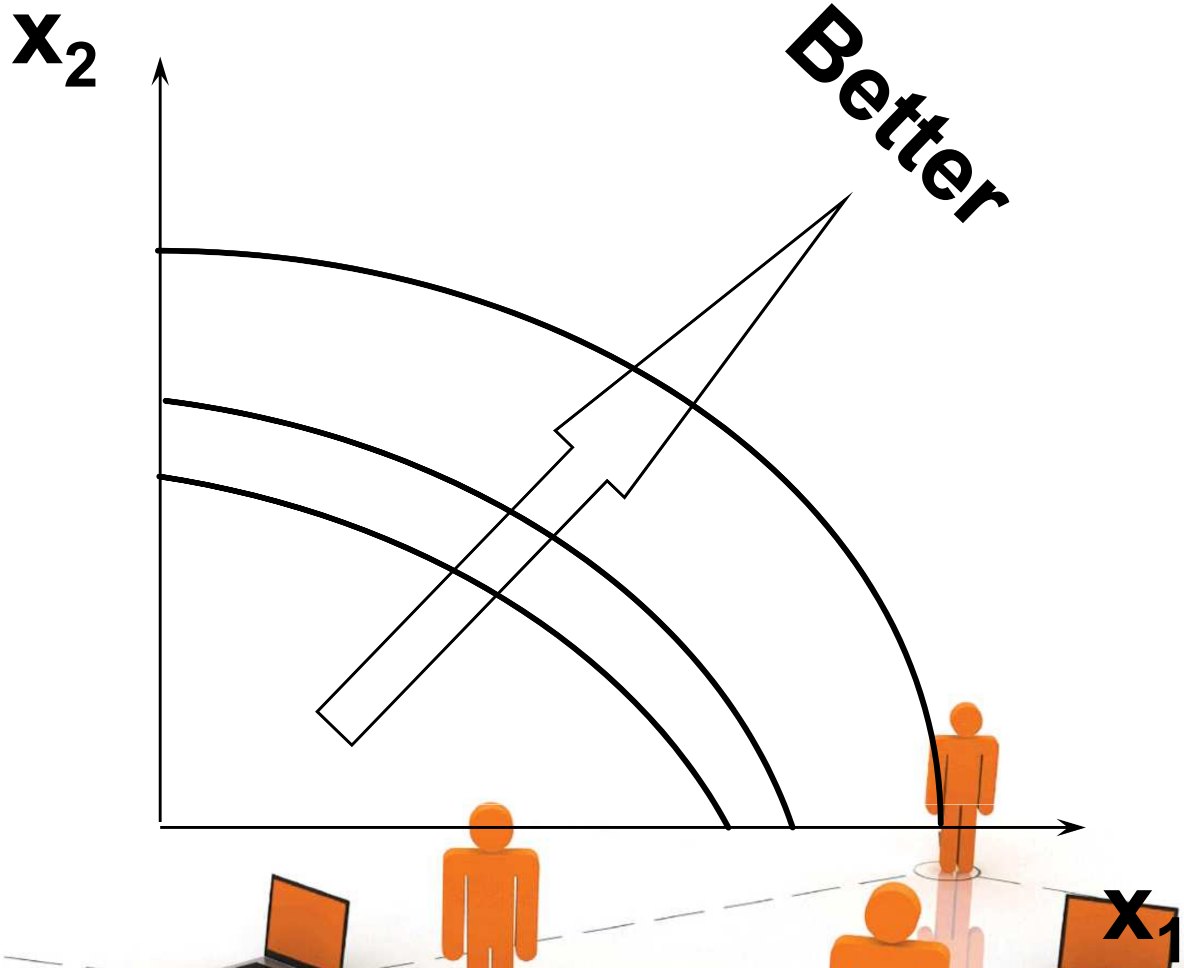


Examples of Corner Solutions -- the Perfect Substitutes Case

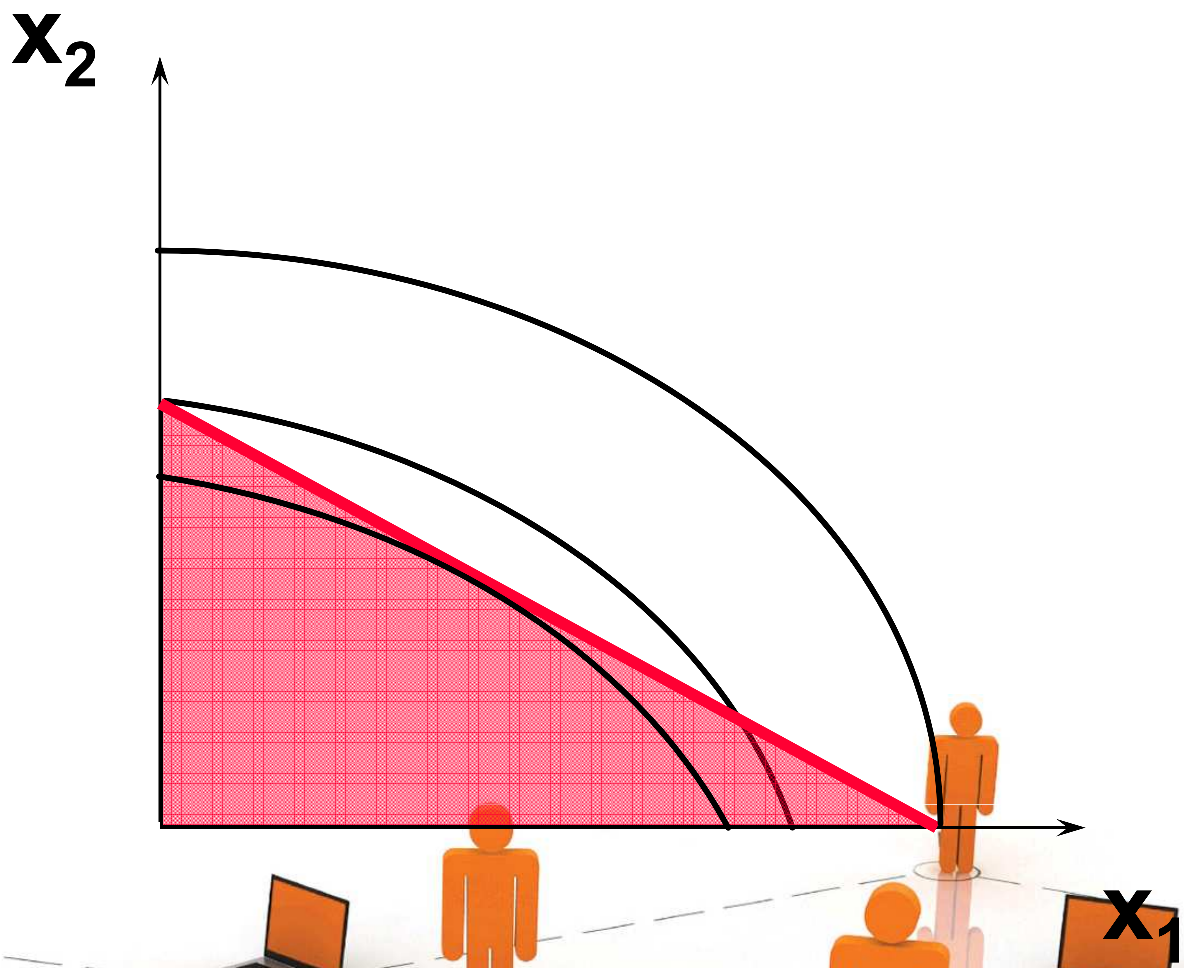


All the bundles in the constraint are equally the most preferred affordable when $p_1 = p_2$.

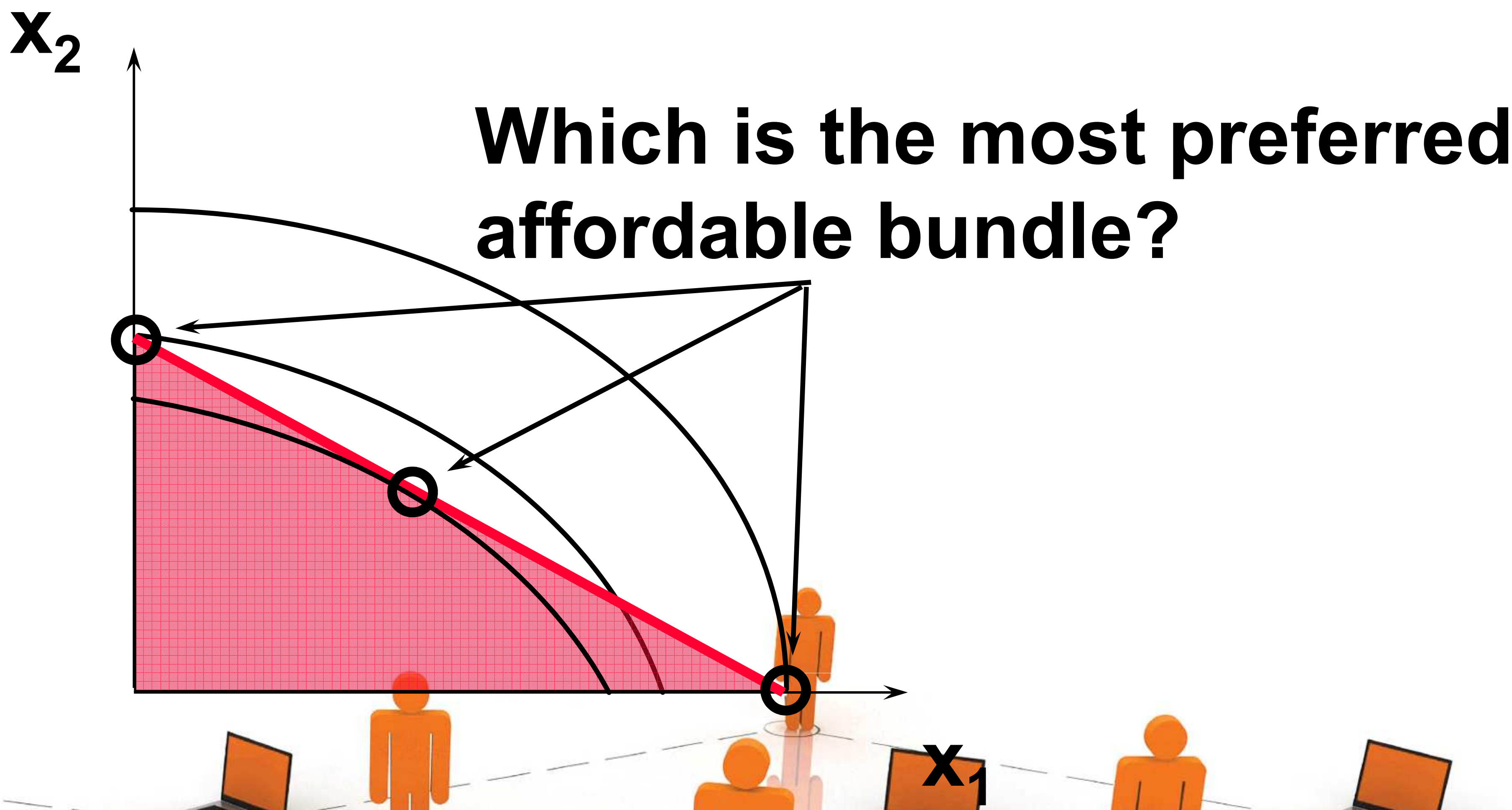
Examples of Corner Solutions -- the Non-Convex Preferences Case



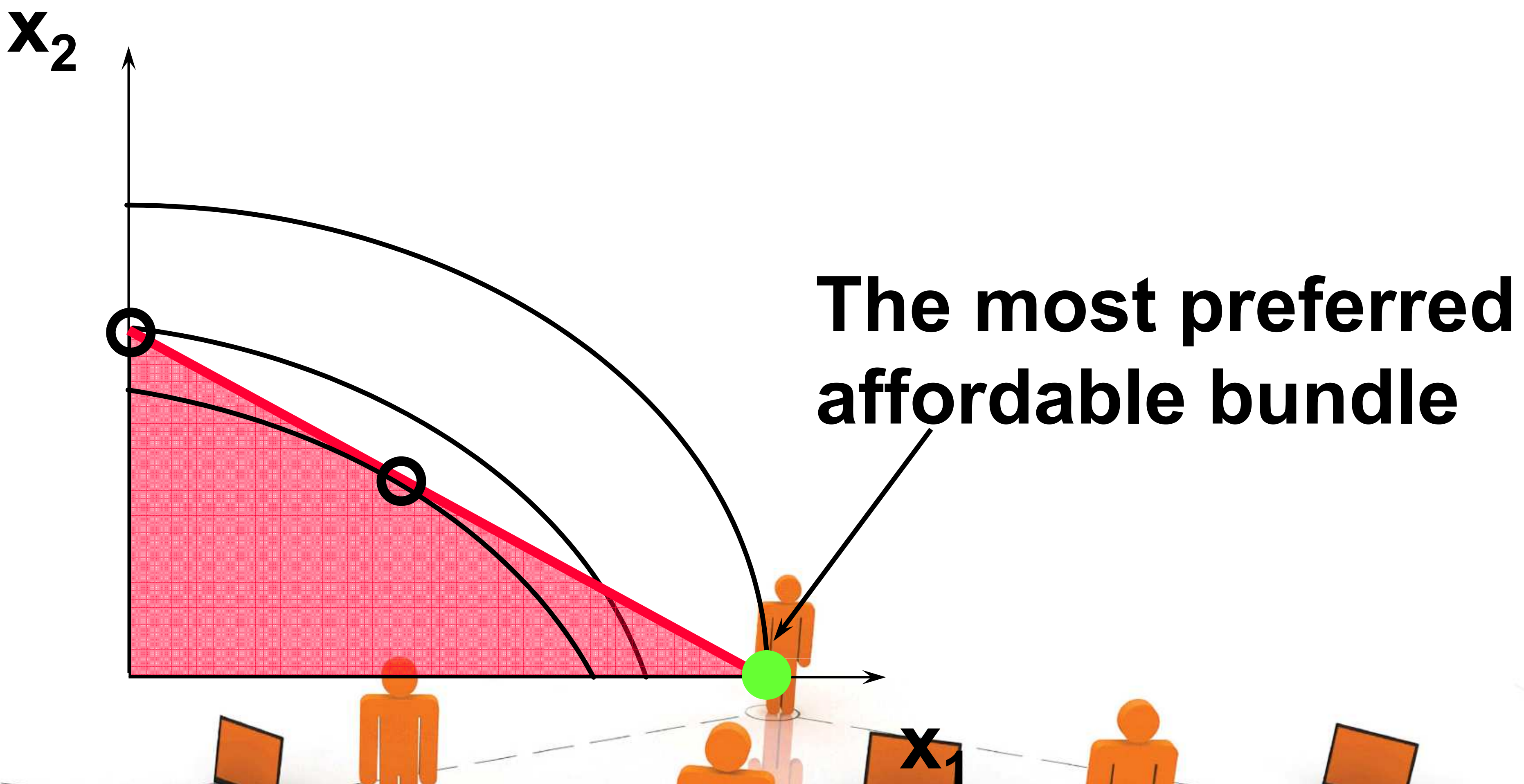
Examples of Corner Solutions -- the Non-Convex Preferences Case



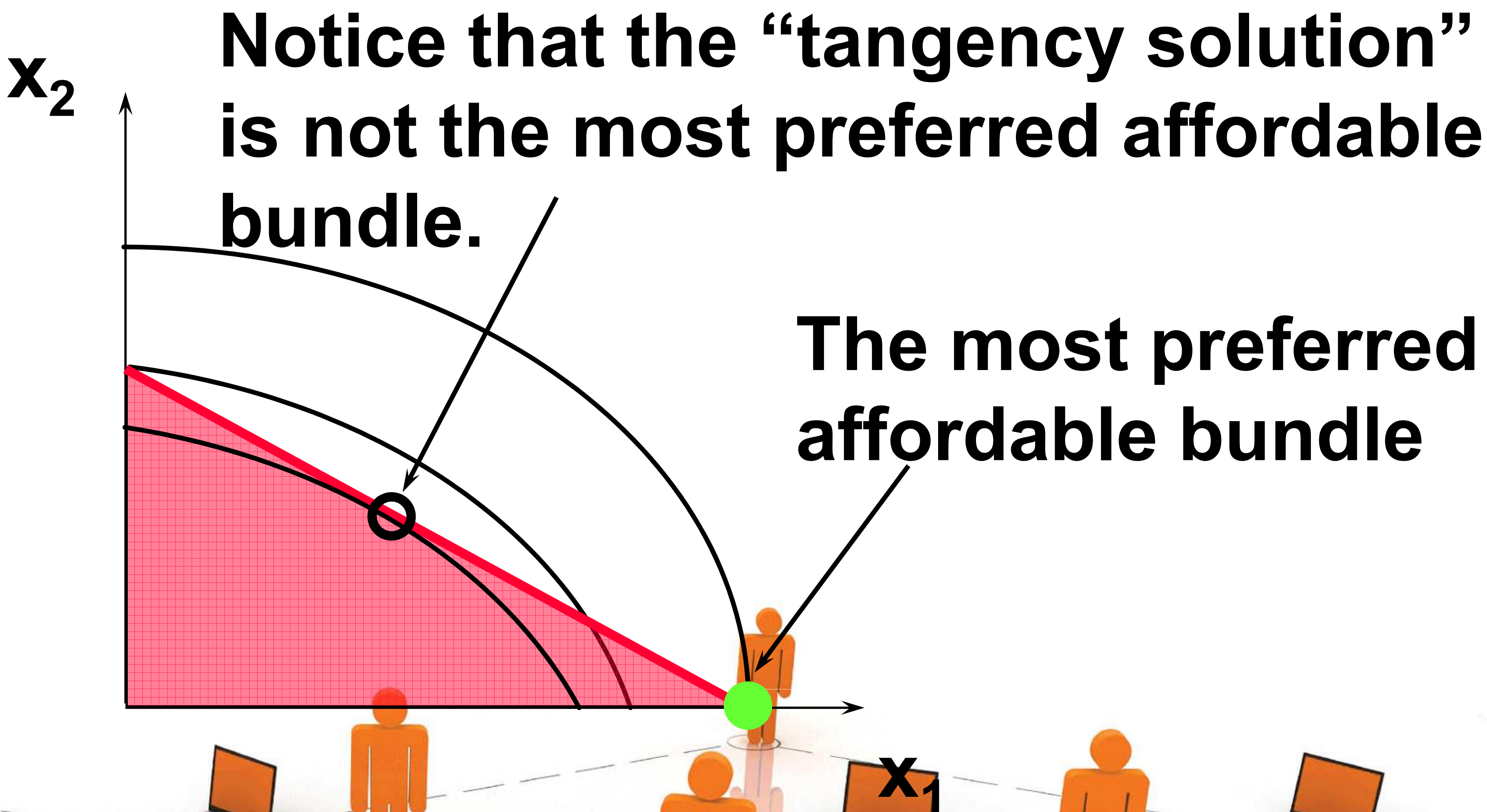
Examples of Corner Solutions -- the Non-Convex Preferences Case



Examples of Corner Solutions -- the Non-Convex Preferences Case

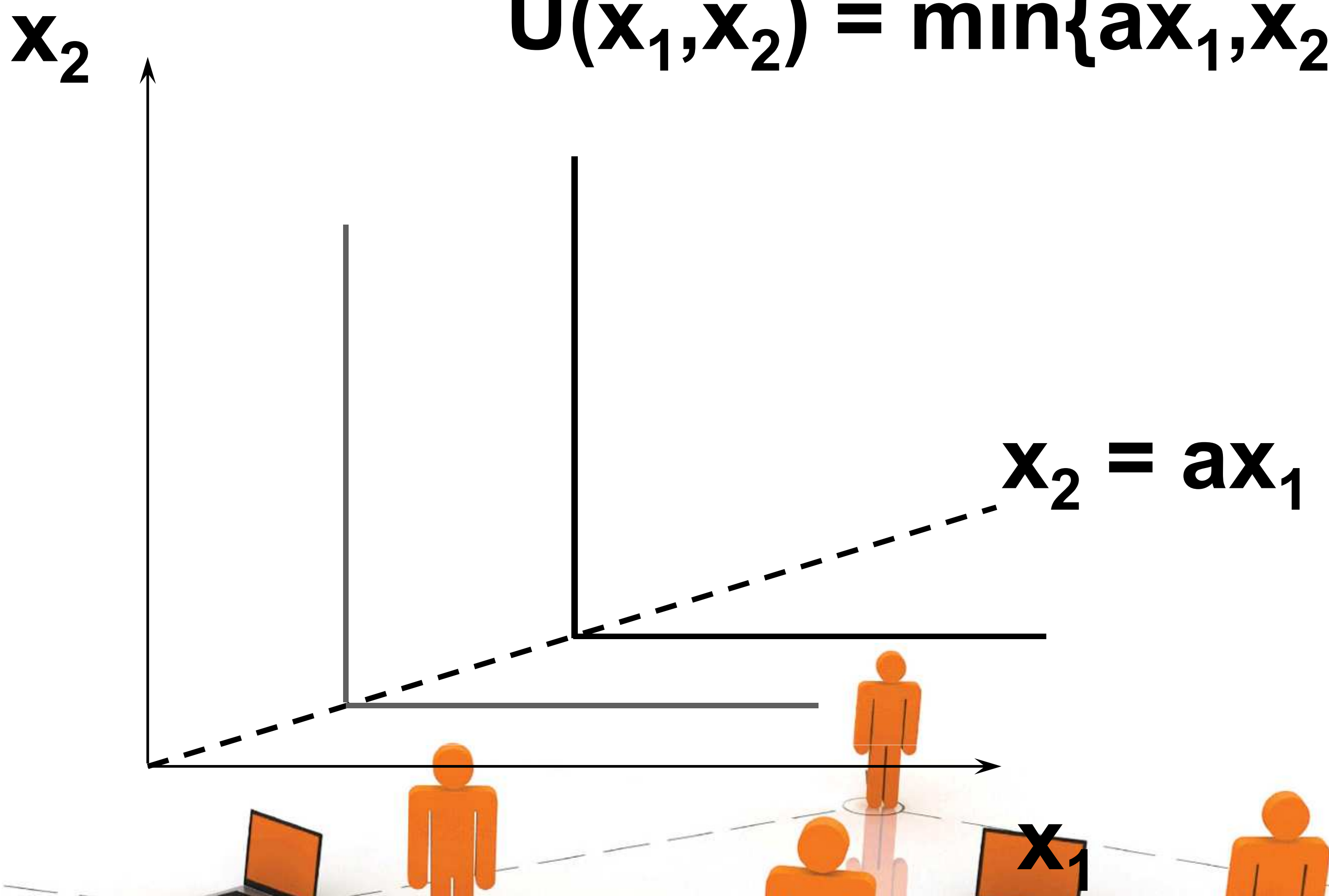


Examples of Corner Solutions -- the Non-Convex Preferences Case

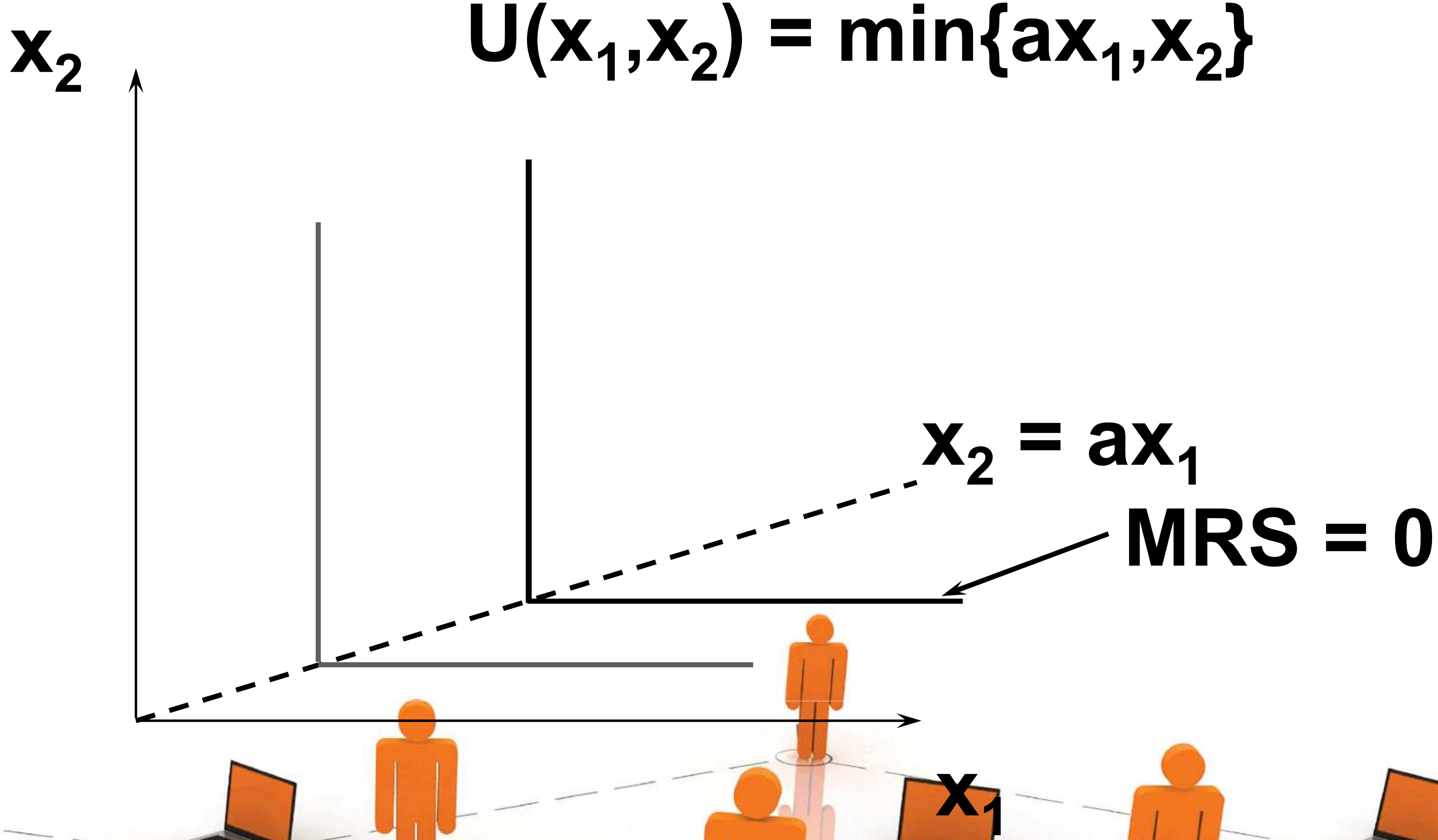


Examples of ‘Kinky’ Solutions -- the Perfect Complements Case

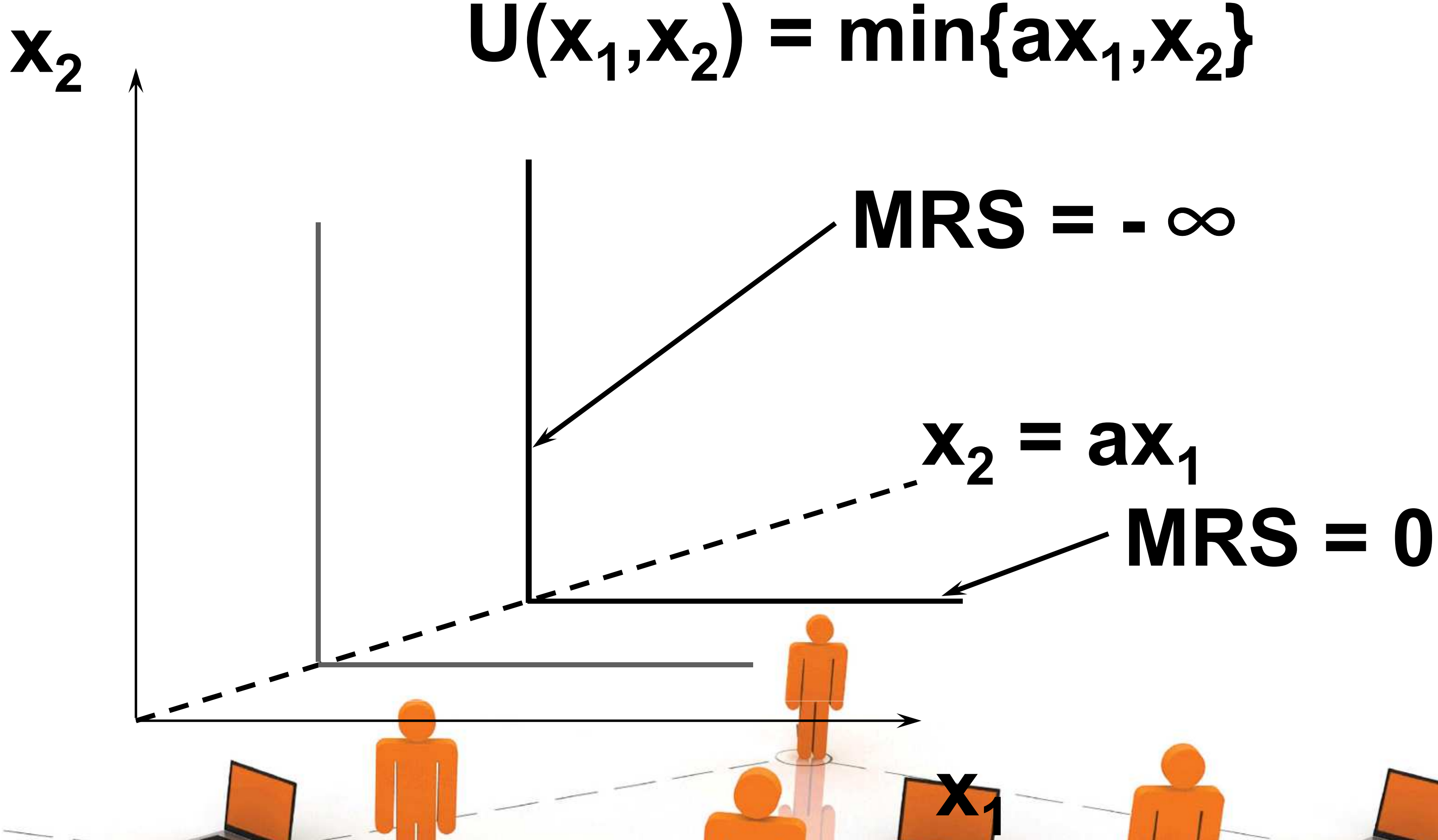
$$U(x_1,x_2) = \min\{ax_1,x_2\}$$



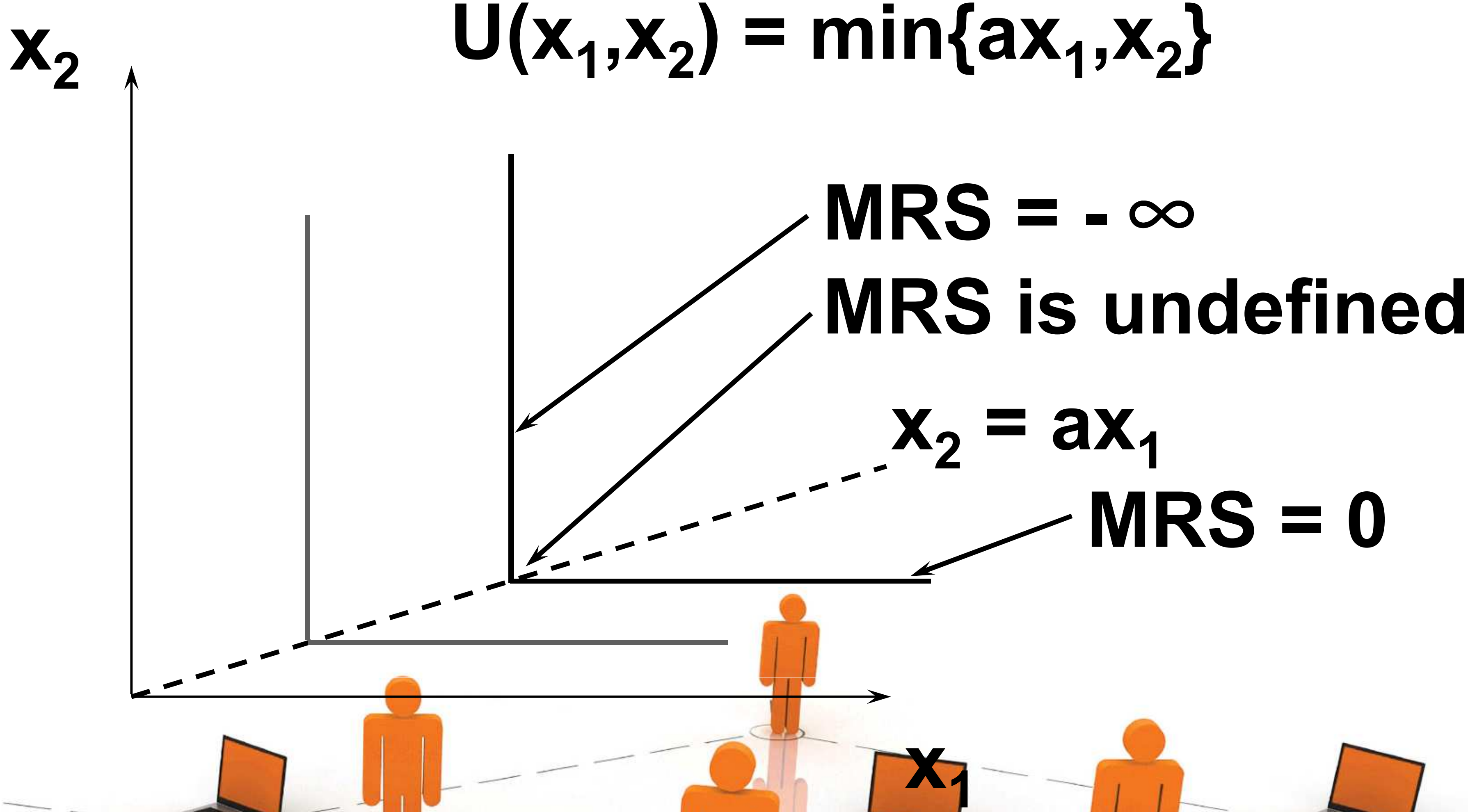
Examples of 'Kinky' Solutions -- the Perfect Complements Case



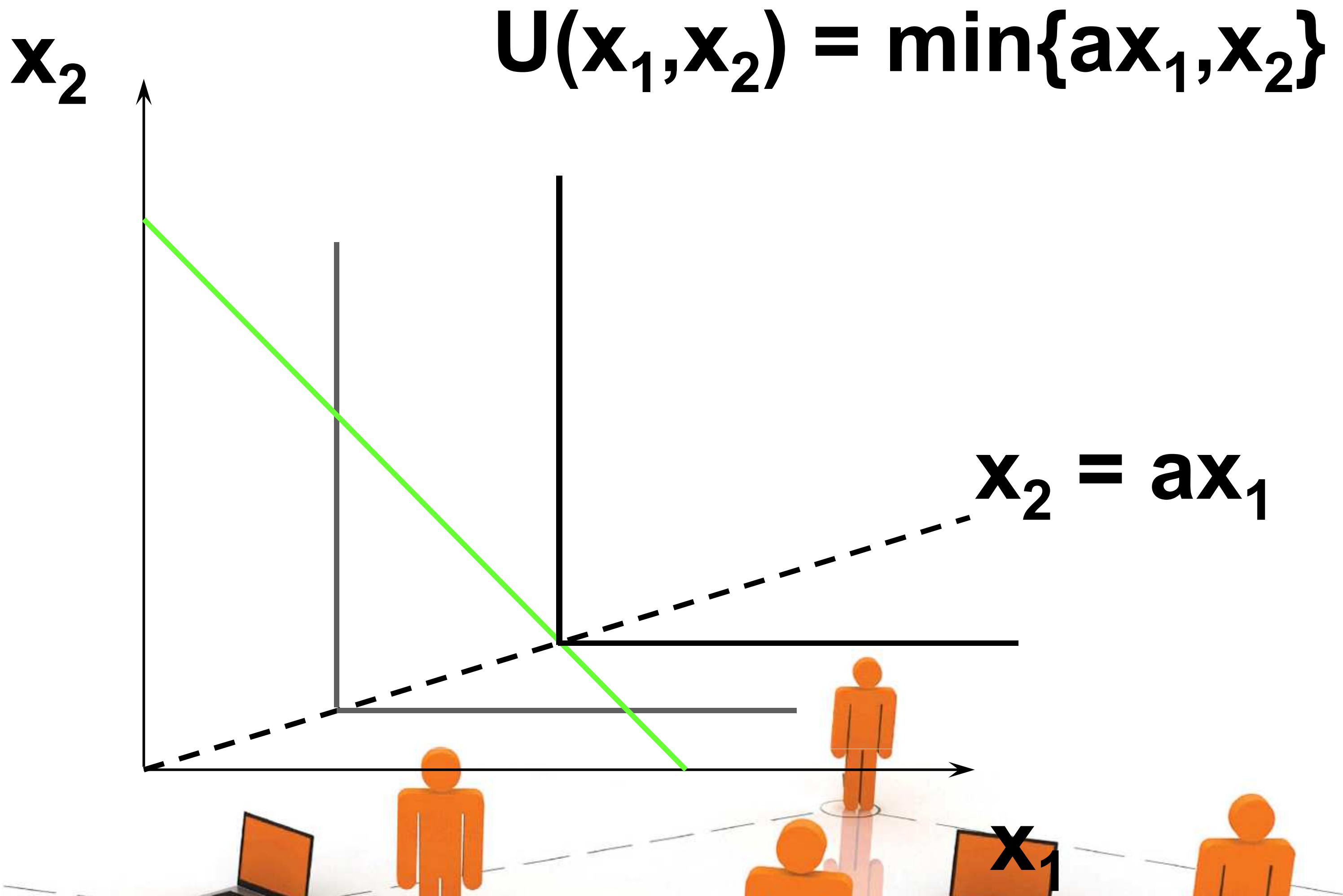
Examples of ‘Kinky’ Solutions -- the Perfect Complements Case



Examples of 'Kinky' Solutions -- the Perfect Complements Case

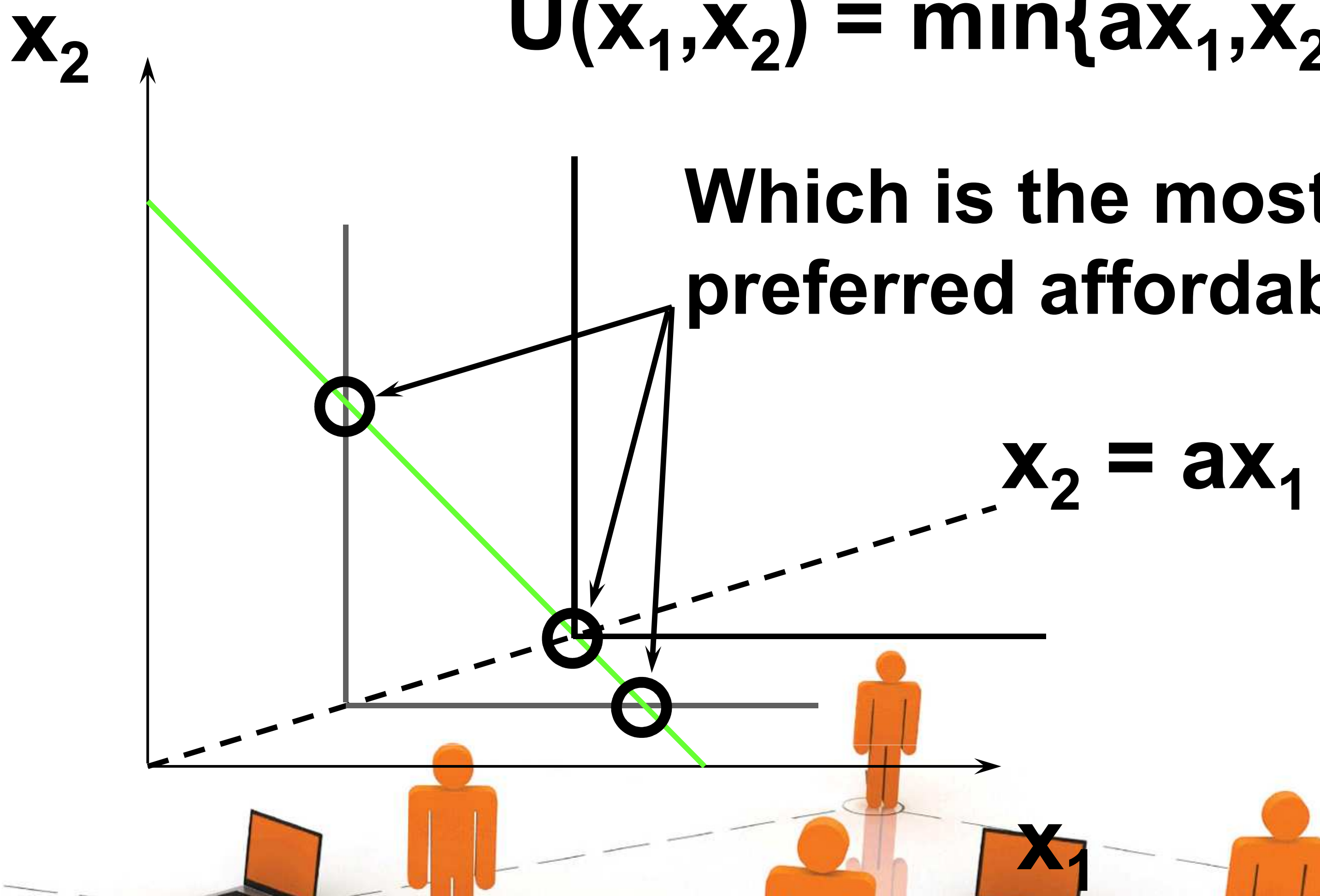


Examples of 'Kinky' Solutions -- the Perfect Complements Case



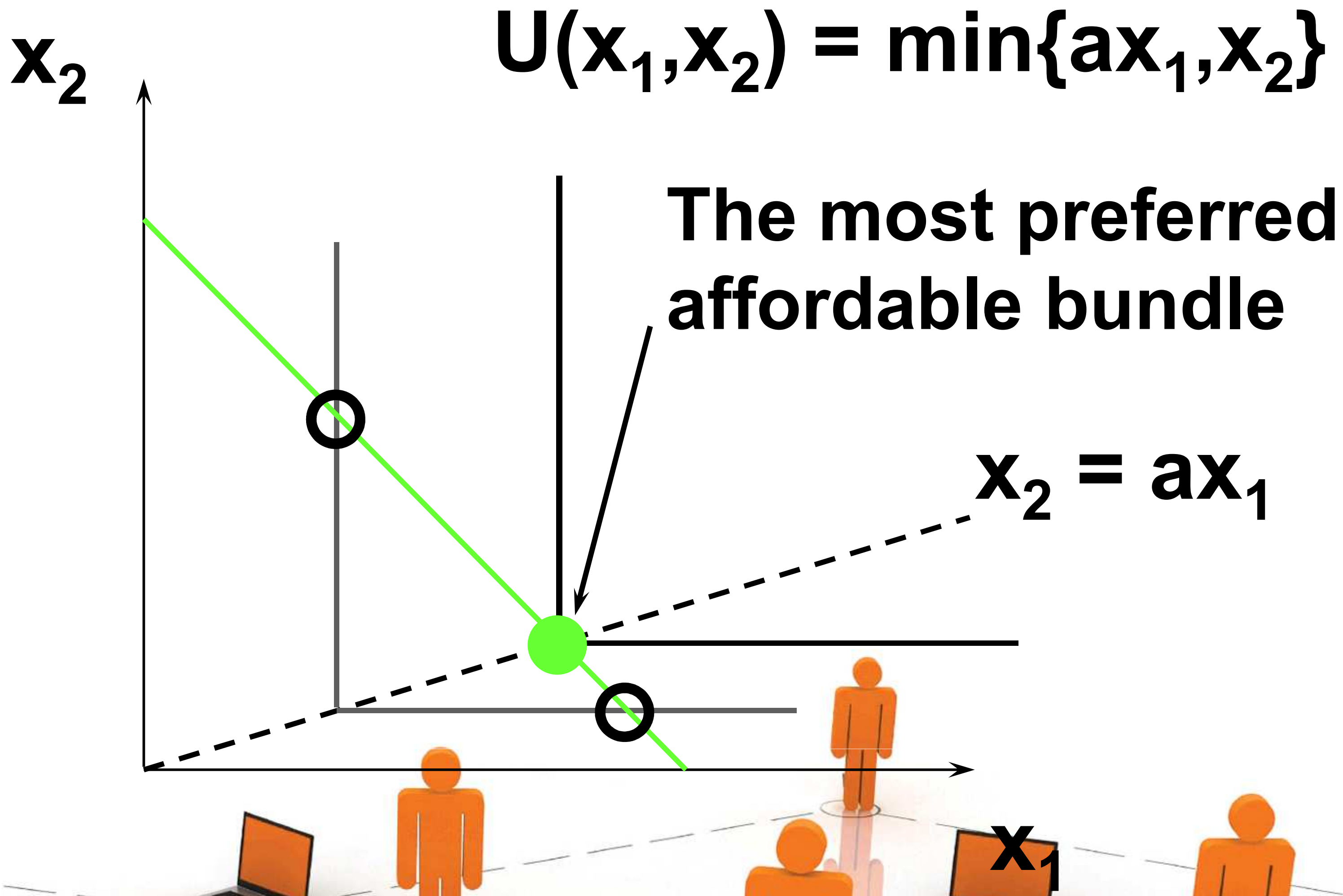
Examples of ‘Kinky’ Solutions -- the Perfect Complements Case

$$U(x_1,x_2) = \min\{ax_1,x_2\}$$

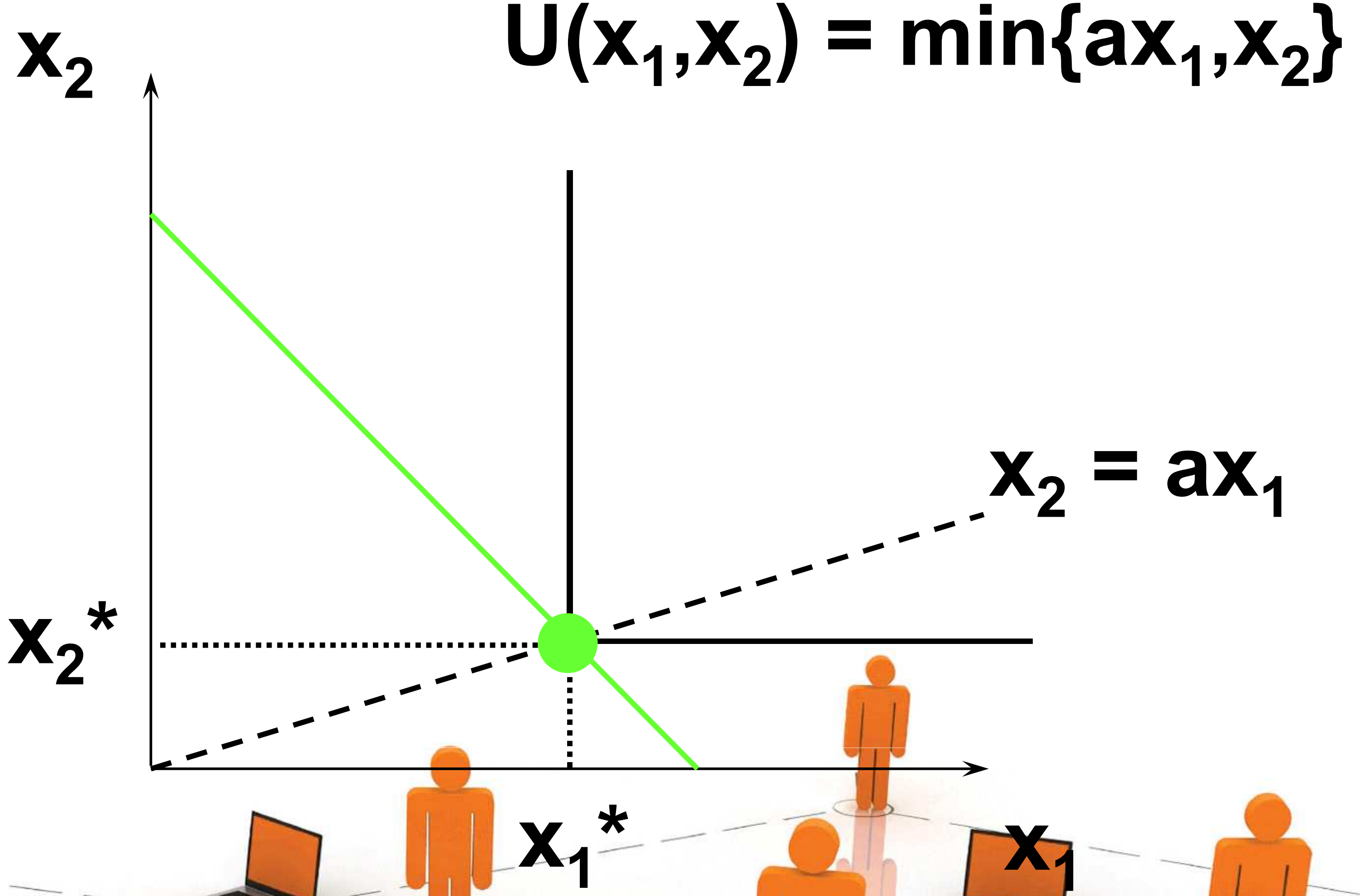


Which is the most preferred affordable bundle?

Examples of 'Kinky' Solutions -- the Perfect Complements Case

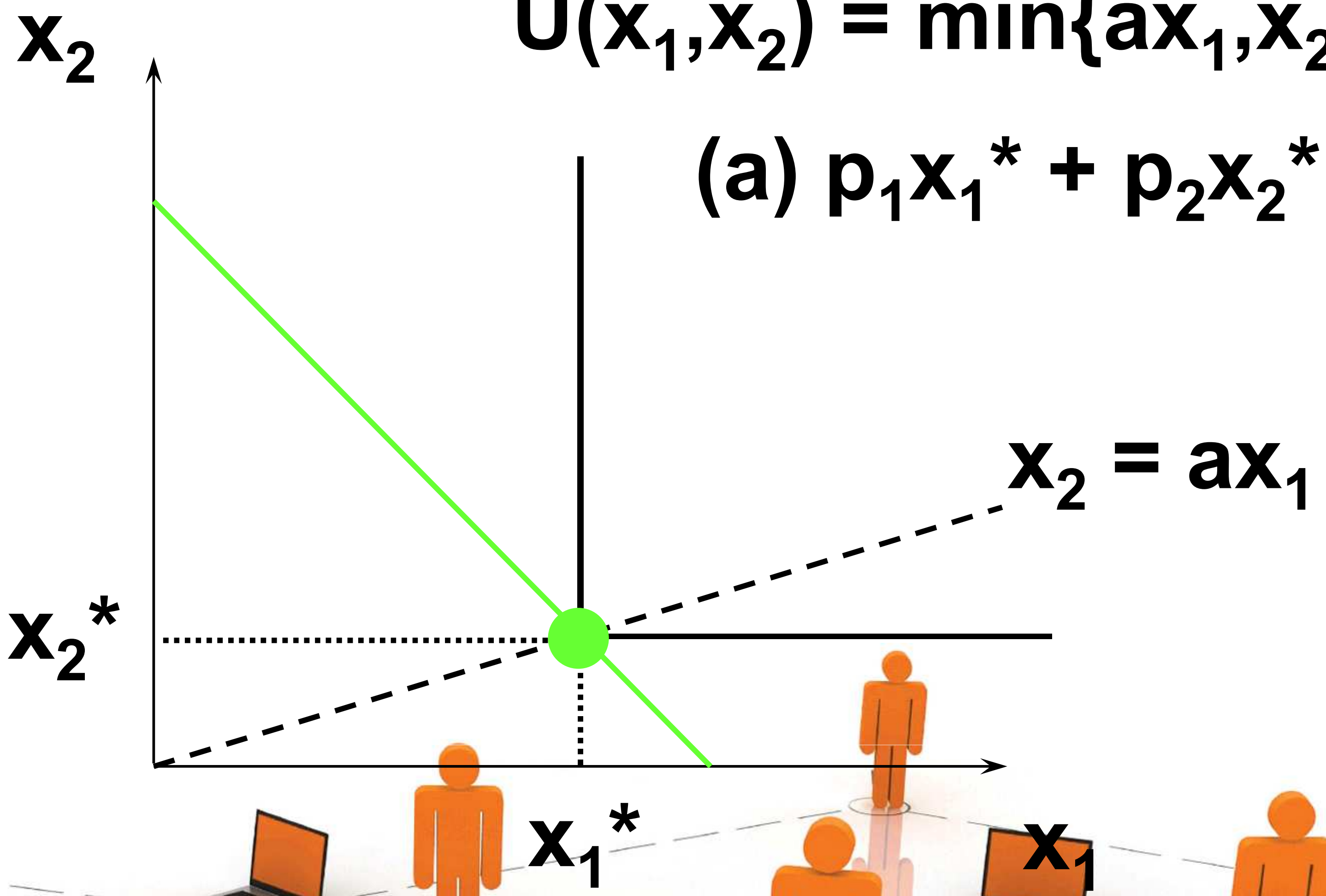


Examples of 'Kinky' Solutions -- the Perfect Complements Case



Examples of 'Kinky' Solutions -- the Perfect Complements Case

$U(x_1,x_2) = \min\{ax_1,x_2\}$

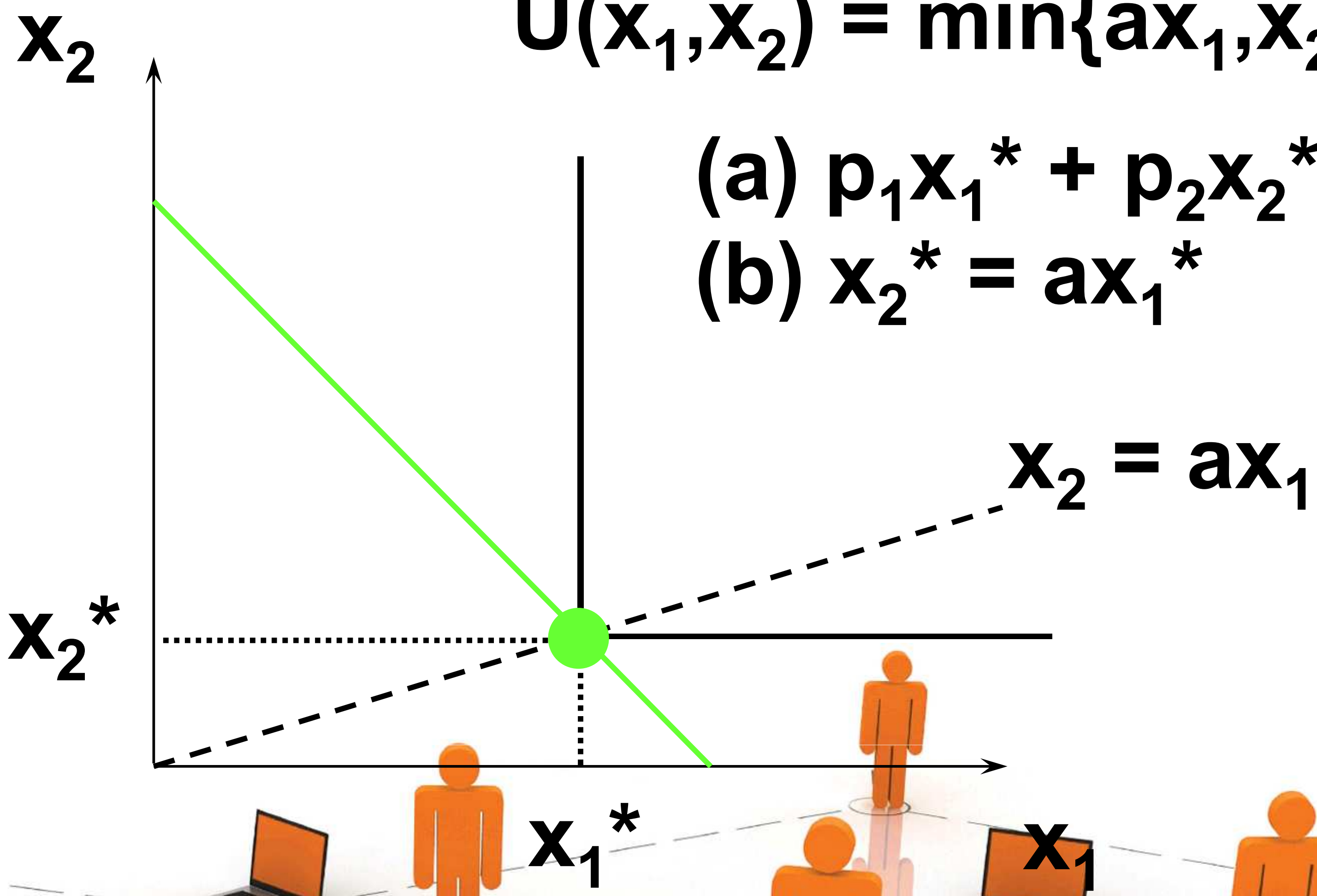


Examples of ‘Kinky’ Solutions -- the Perfect Complements Case

$$U(x_1,x_2) = \min\{ax_1,x_2\}$$

(a) $p_1x_1^* + p_2x_2^* = m$

(b) $x_2^* = ax_1^*$



Examples of 'Kinky' Solutions -- the Perfect Complements Case

(a) $p_1x_1^* + p_2x_2^* = m$; (b) $x_2^* = ax_1^*$.

Examples of 'Kinky' Solutions -- the Perfect Complements Case

(a) $p_1x_1^* + p_2x_2^* = m$; (b) $x_2^* = ax_1^*$.

Substitution from (b) for x_2^* in (a) gives $p_1x_1^* + p_2ax_1^* = m$

Examples of ‘Kinky’ Solutions -- the Perfect Complements Case

(a) $p_1x_1^* + p_2x_2^* = m$; (b) $x_2^* = ax_1^*$.

Substitution from (b) for x_2^* in (a) gives $p_1x_1^* + p_2ax_1^* = m$ which gives

$$x_1^* = \frac{m}{p_1 + ap_2}$$

Examples of ‘Kinky’ Solutions -- the Perfect Complements Case

(a) $p_1x_1^* + p_2x_2^* = m$; (b) $x_2^* = ax_1^*$.

Substitution from (b) for x_2^* in (a) gives $p_1x_1^* + p_2ax_1^* = m$ which gives $x_1^* = \dfrac{m}{p_1 + ap_2}$; $x_2^* = \dfrac{am}{p_1 + ap_2}$.

Examples of ‘Kinky’ Solutions -- the Perfect Complements Case

(a) $p_1x_1^* + p_2x_2^* = m$; (b) $x_2^* = ax_1^*$.

Substitution from (b) for x_2^* in (a) gives $p_1x_1^* + p_2ax_1^* = m$ which gives

$$x_1^* = \frac{m}{p_1 + ap_2}; \quad x_2^* = \frac{am}{p_2 + ap_2}.$$

A bundle of 1 commodity 1 unit and *a* commodity 2 units costs $p_1 + ap_2$; $m/(p_1 + ap_2)$ such bundles are affordable.

Examples of ‘Kinky’ Solutions -- the Perfect Complements Case

$U(x_1,x_2) = \min\{ax_1,x_2\}$