Chapter Nine

Buying and Selling

Buying and Selling

Trade involves exchange -- when something is bought something else must be sold.

What will be bought? What will be sold?

Who will be a buyer? Who will be a seller?

Buying and Selling

- And how are incomes generated?
- How does the value of income depend upon commodity prices?
- How can we put all this together to explain better how price changes affect demands?

Endowments

- The list of resource units with which a consumer starts is his **endowment**.
- A consumer's endowment will be denoted by the vector ω (omega).

Endowments

E.g. $\boldsymbol{\omega = (\omega_1, \omega_2) = (10,2)}$ **states that the consumer is endowed with 10 units of good 1 and 2 units of good 2.**

Endowments

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states that the consumer is endowed with 10 units of good 1 and 2 units of good 2.

What is the endowment's value?

For which consumption bundles may it be exchanged?

Endowments

p_1=2 and p_2=3 so the value of the endowment $(\omega_1, \omega_2) = (10,2)$ is

$$p_1\omega_1 + p_2\omega_2 = 2 \times 10 + 3 \times 2 = 26$$

Q: For which consumption bundles may the endowment be exchanged?

A: For any bundle costing no more than the endowment's value.

Budget Constraints Revisited

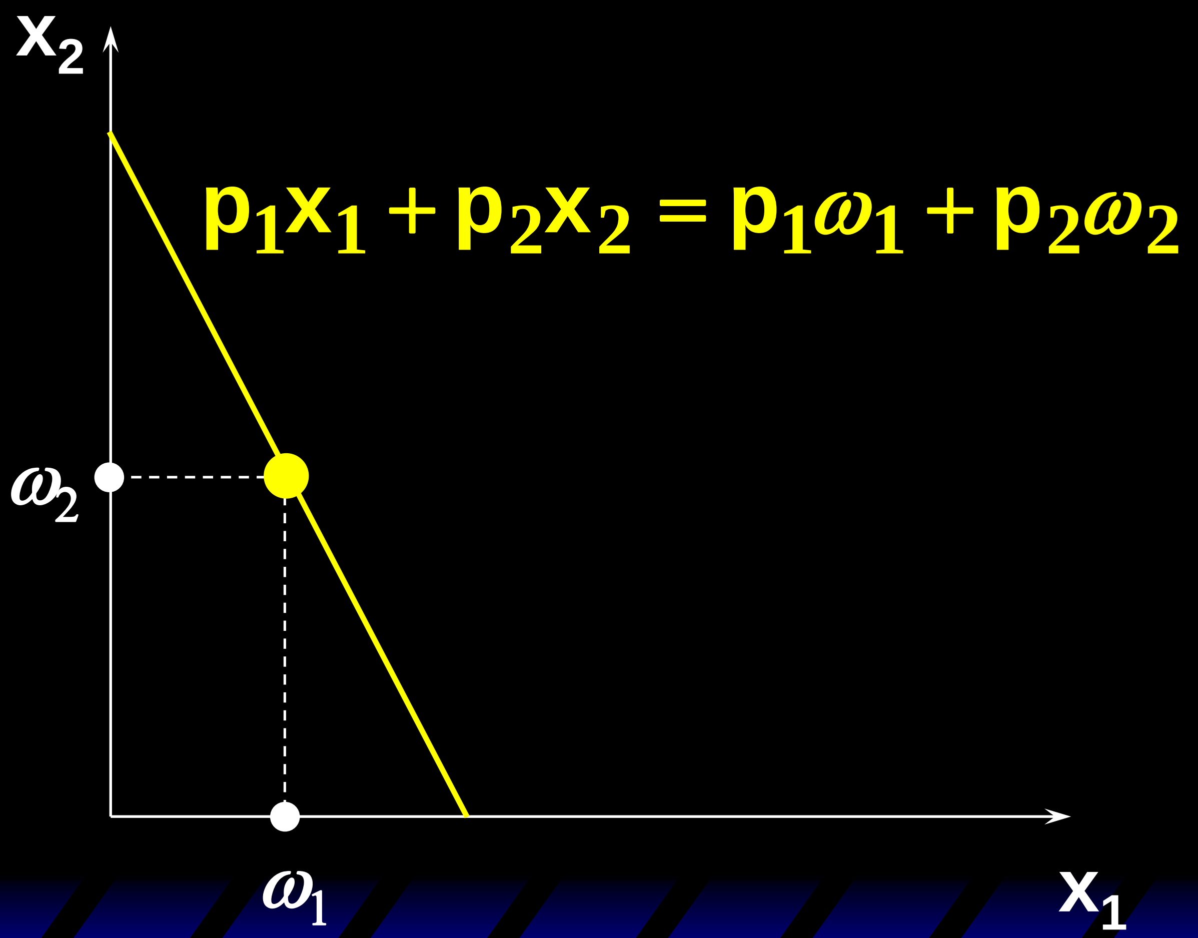
So, given p_1 and p_2, the budget constraint for a consumer with an endowment (ω_1, ω_2) is

$$p_1 x_1 + p_2 x_2 = p_1 \omega_1 + p_2 \omega_2.$$

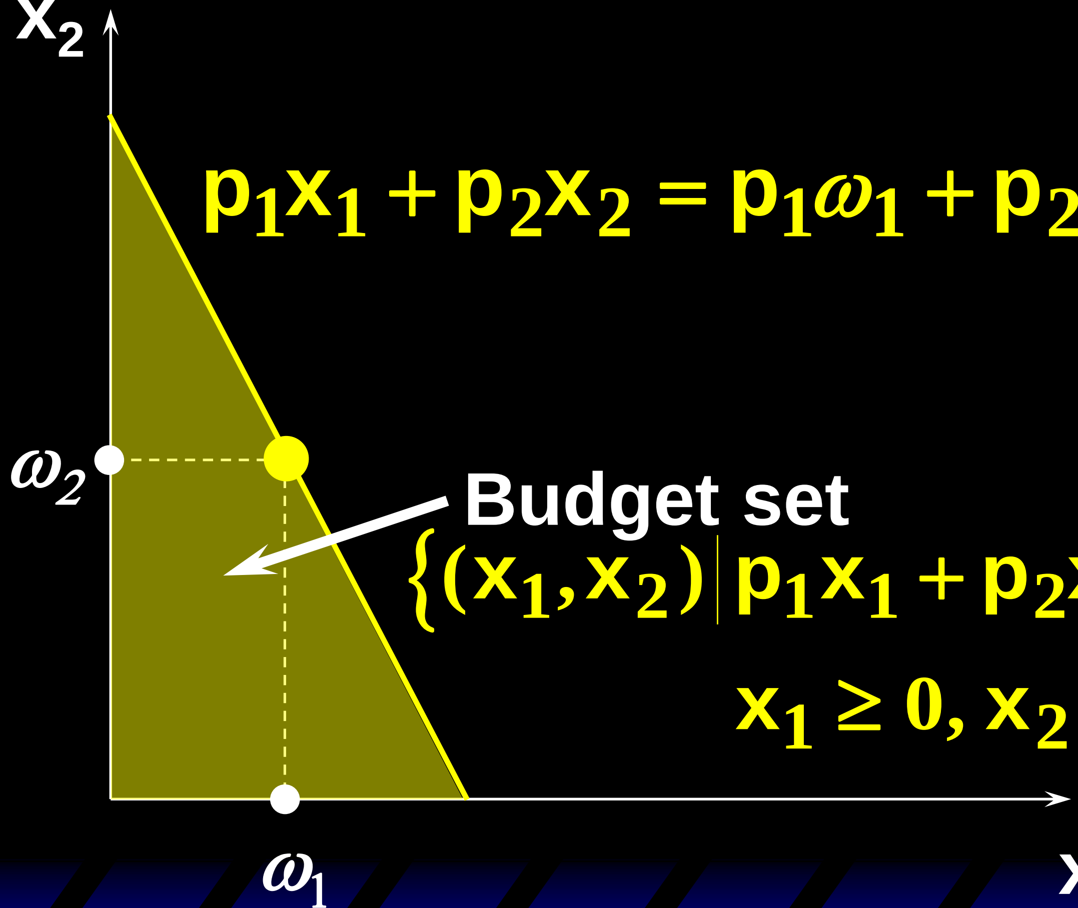
The budget set is

$$\{(x_1, x_2) \mid p_1 x_1 + p_2 x_2 \le p_1 \omega_1 + p_2 \omega_2,$$
$$x_1 \ge 0, x_2 \ge 0\}.$$

Budget Constraints Revisited



Budget Constraints Revisited

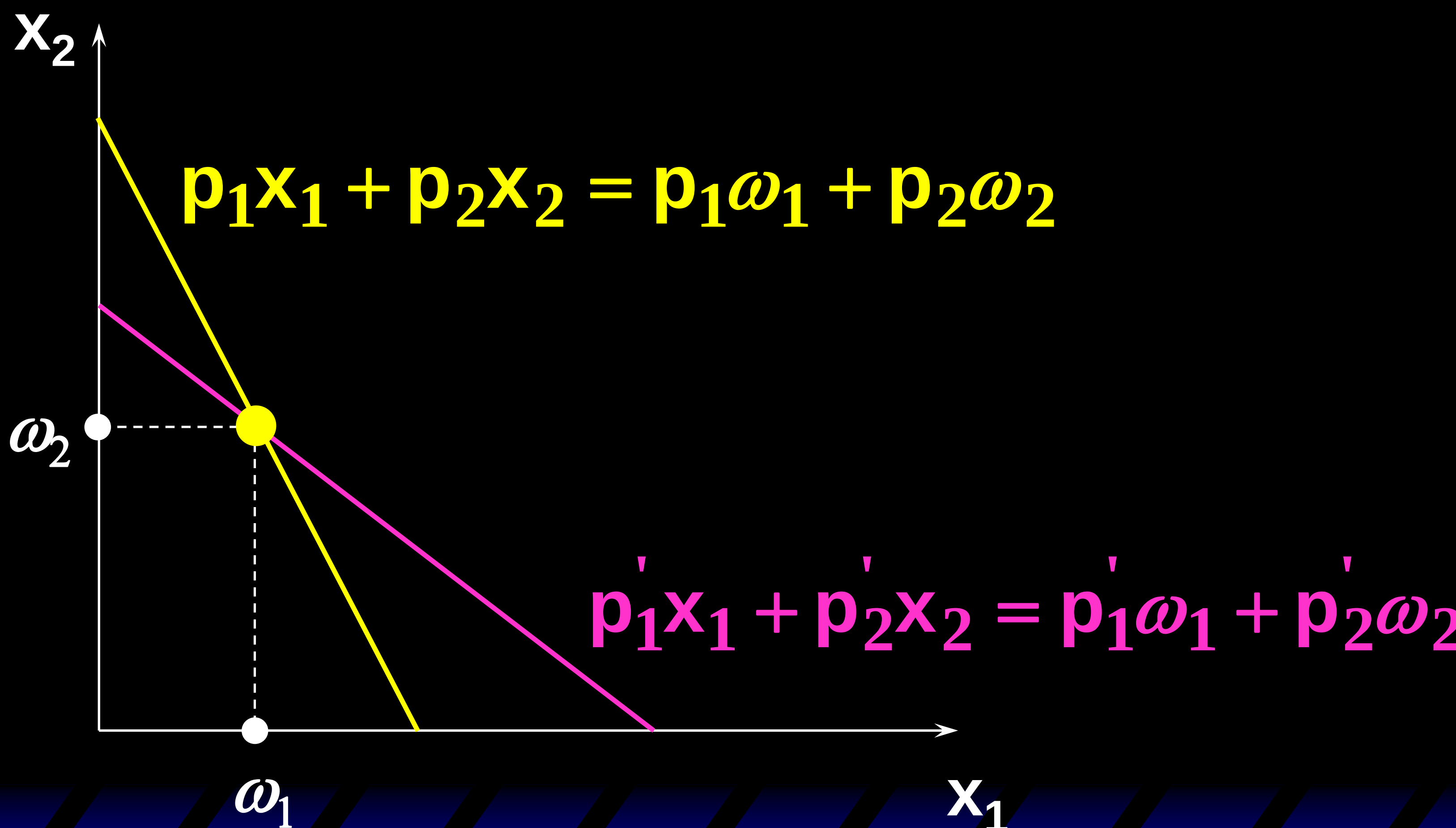


$$p_1x_1 + p_2x_2 = p_1\omega_1 + p_2\omega_2$$

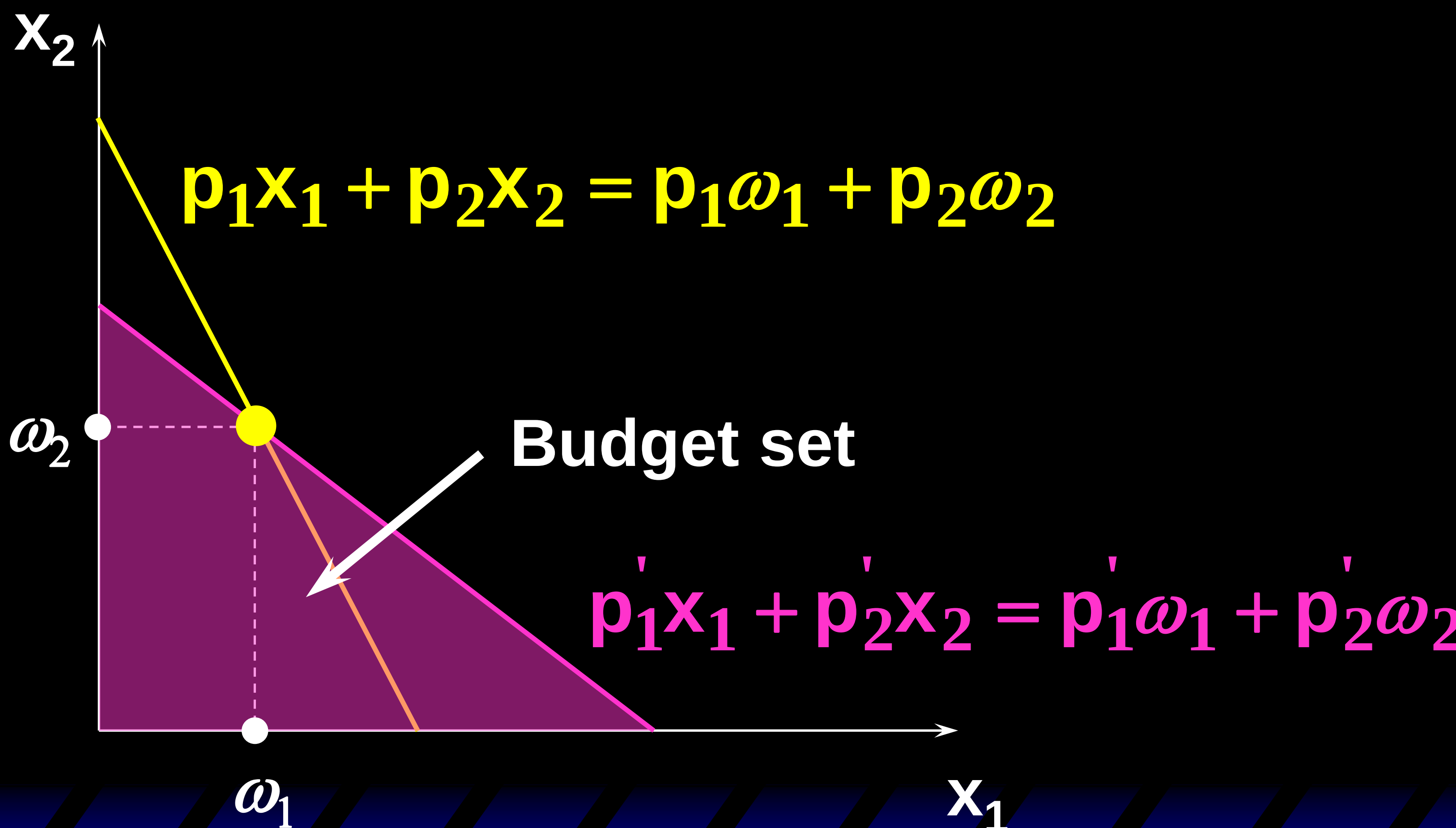
Budget set

$$\left\{(x_1, x_2) \,\middle|\, p_1x_1 + p_2x_2 \le p_1\omega_1 + p_2\omega_2, \; x_1 \ge 0,\, x_2 \ge 0\right\}$$

Budget Constraints Revisited

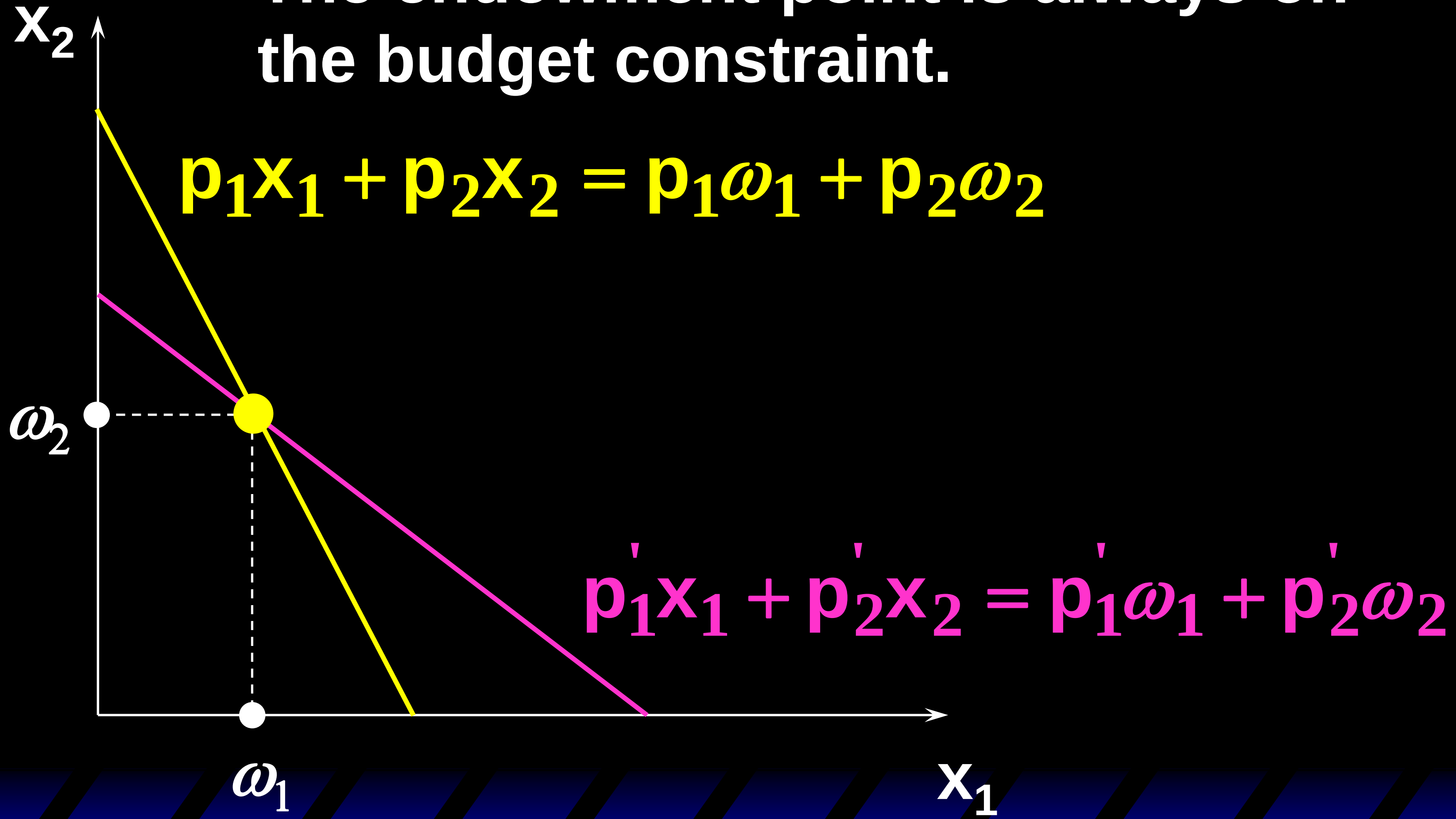


Budget Constraints Revisited



Budget Constraints Revisited

The endowment point is always on the budget constraint.



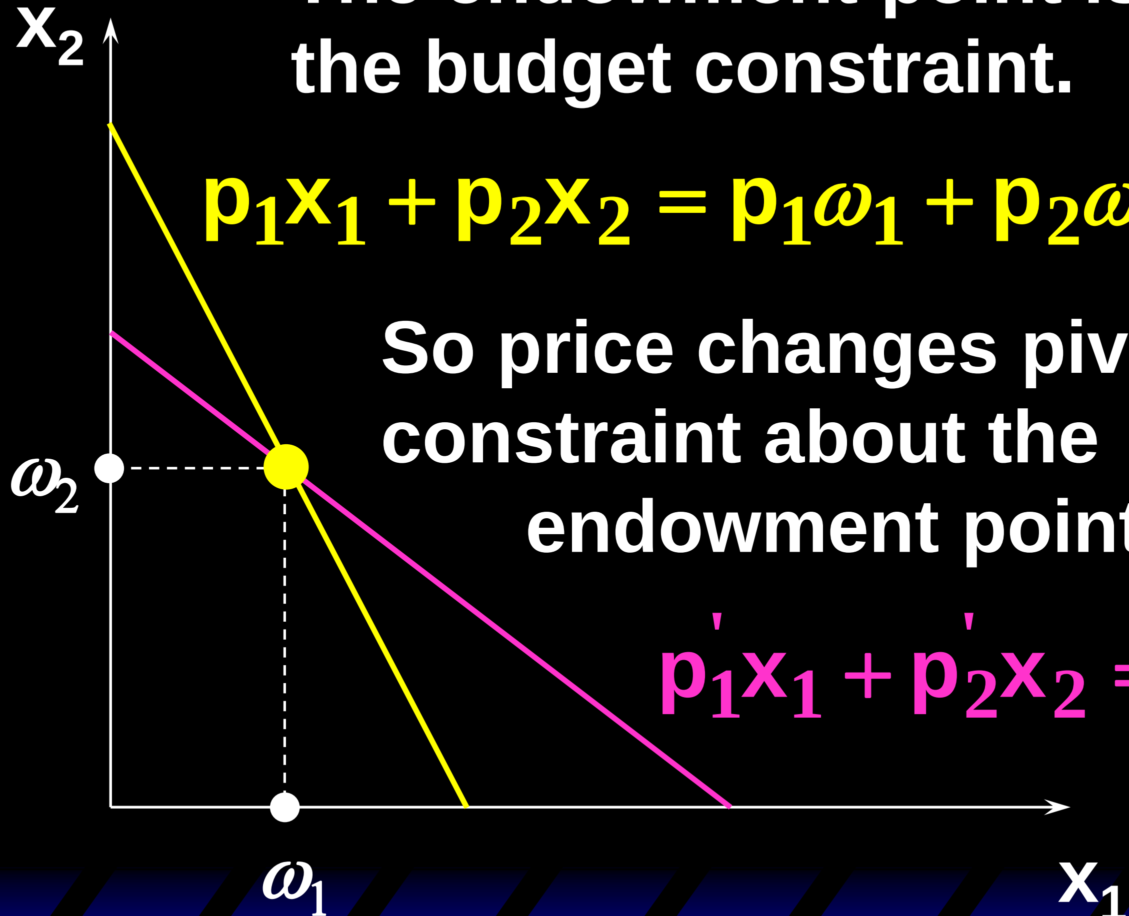
Budget Constraints Revisited

The endowment point is always on the budget constraint.

$$p_1x_1 + p_2x_2 = p_1\omega_1 + p_2\omega_2$$

So price changes pivot the constraint about the endowment point.

$$p_1'x_1 + p_2'x_2 = p_1'\omega_1 + p_2'\omega_2$$



Budget Constraints Revisited

The constraint

$$p_1x_1 + p_2x_2 = p_1\omega_1 + p_2\omega_2$$

is

$$p_1(x_1 - \omega_1) + p_2(x_2 - \omega_2) = 0.$$

That is, the sum of the values of a consumer's net demands is zero.

Net Demands

Suppose $(\omega_1, \omega_2) = (10,2)$ and $p_1=2$, $p_2=3$. Then the constraint is

$$p_1x_1 + p_2x_2 = p_1\omega_1 + p_2\omega_2 = 26.$$

If the consumer demands $(x_1^*, x_2^*) = (7,4)$, then 3 good 1 units exchange for 2 good 2 units. Net demands are

$x_1^* - \omega_1 = 7-10 = -3$ and

$x_2^* - \omega_2 = 4 - 2 = +2.$

Net Demands

$p_1=2$, $p_2=3$, $x_1^*-\omega_1 = -3$ and $x_2^*-\omega_2 = +2$ so

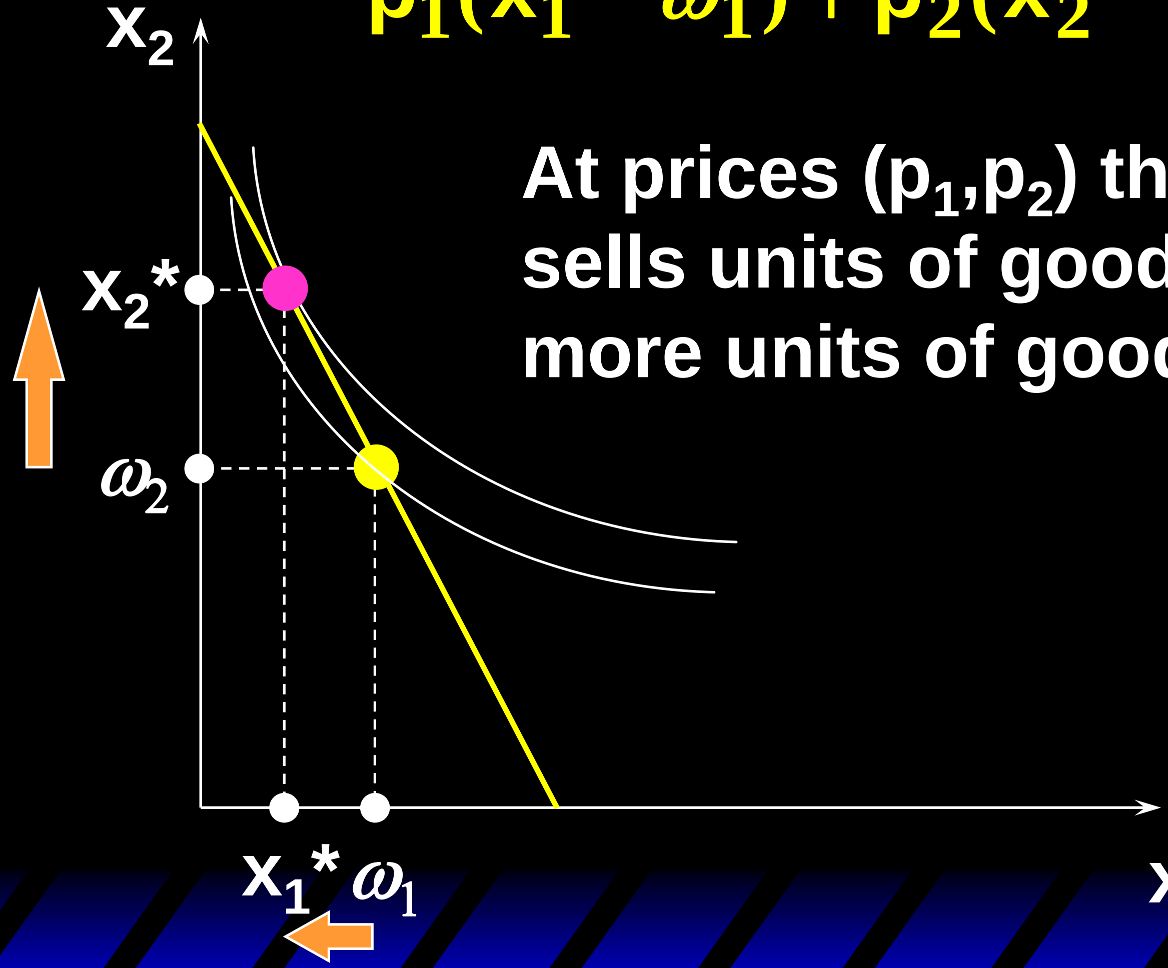
$$p_1(x_1-\omega_1)+p_2(x_2-\omega_2) =$$

$$2\times(-3) \quad + \quad 3\times 2 \quad = 0.$$

The purchase of 2 extra good 2 units at $3 each is funded by giving up 3 good 1 units at $2 each.

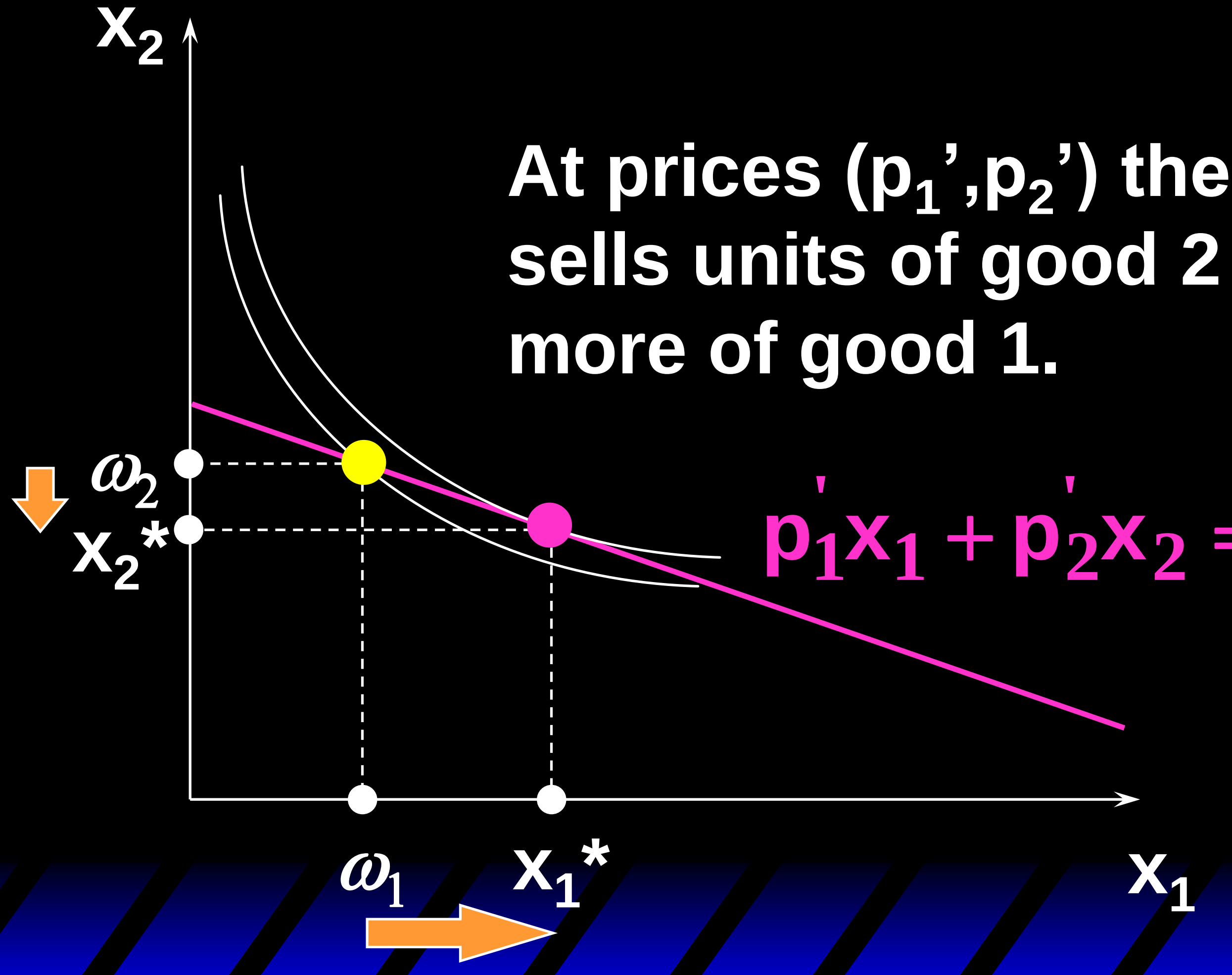
Net Demands

$$p_1(x_1 - \omega_1) + p_2(x_2 - \omega_2) = 0$$



At prices (p_1,p_2) the consumer sells units of good 1 to acquire more units of good 2.

Net Demands



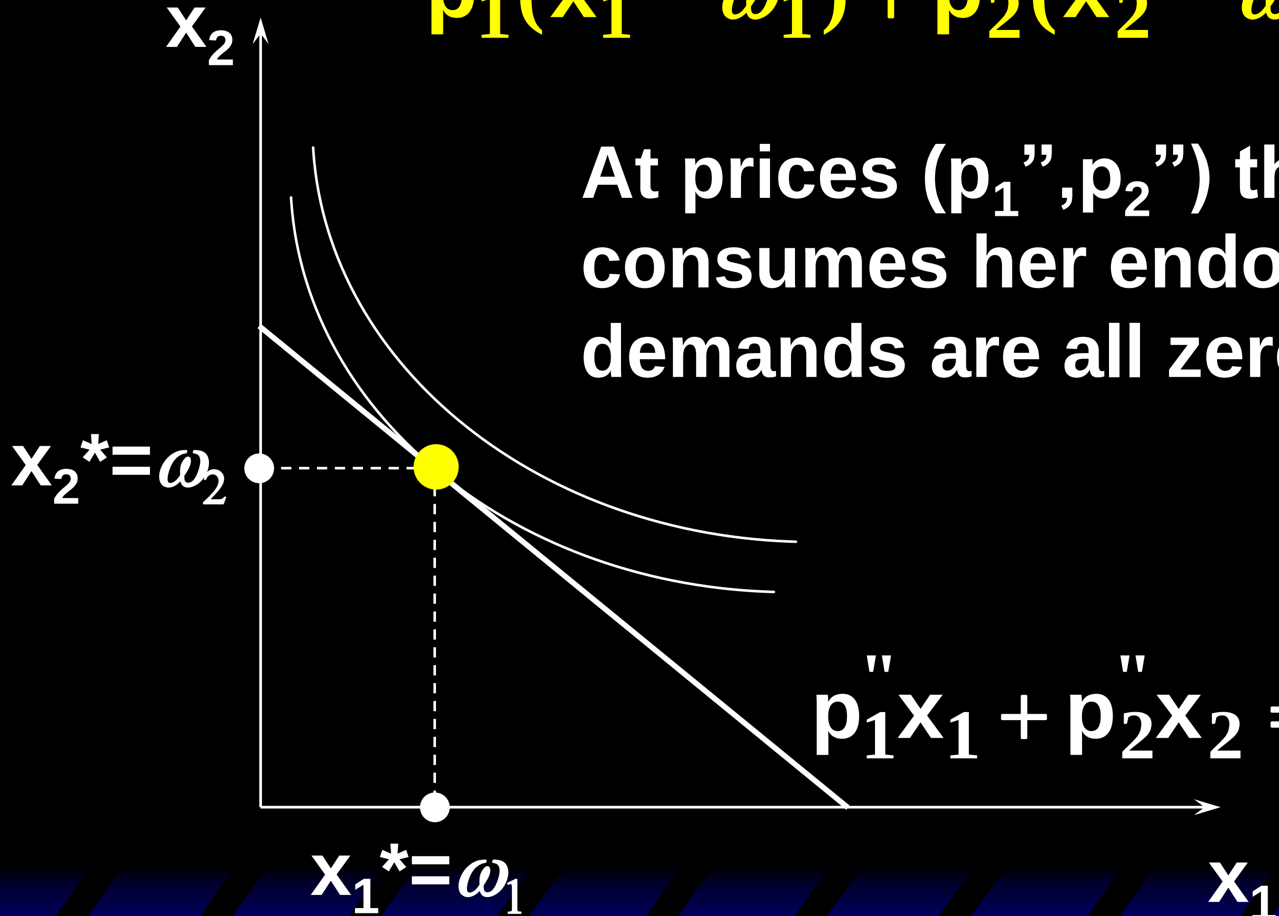
At prices (p_1', p_2') the consumer sells units of good 2 to acquire more of good 1.

$$p_1' x_1 + p_2' x_2 = p_1' \omega_1 + p_2' \omega_2$$

Net Demands

$$p_1(x_1 - \omega_1) + p_2(x_2 - \omega_2) = 0$$

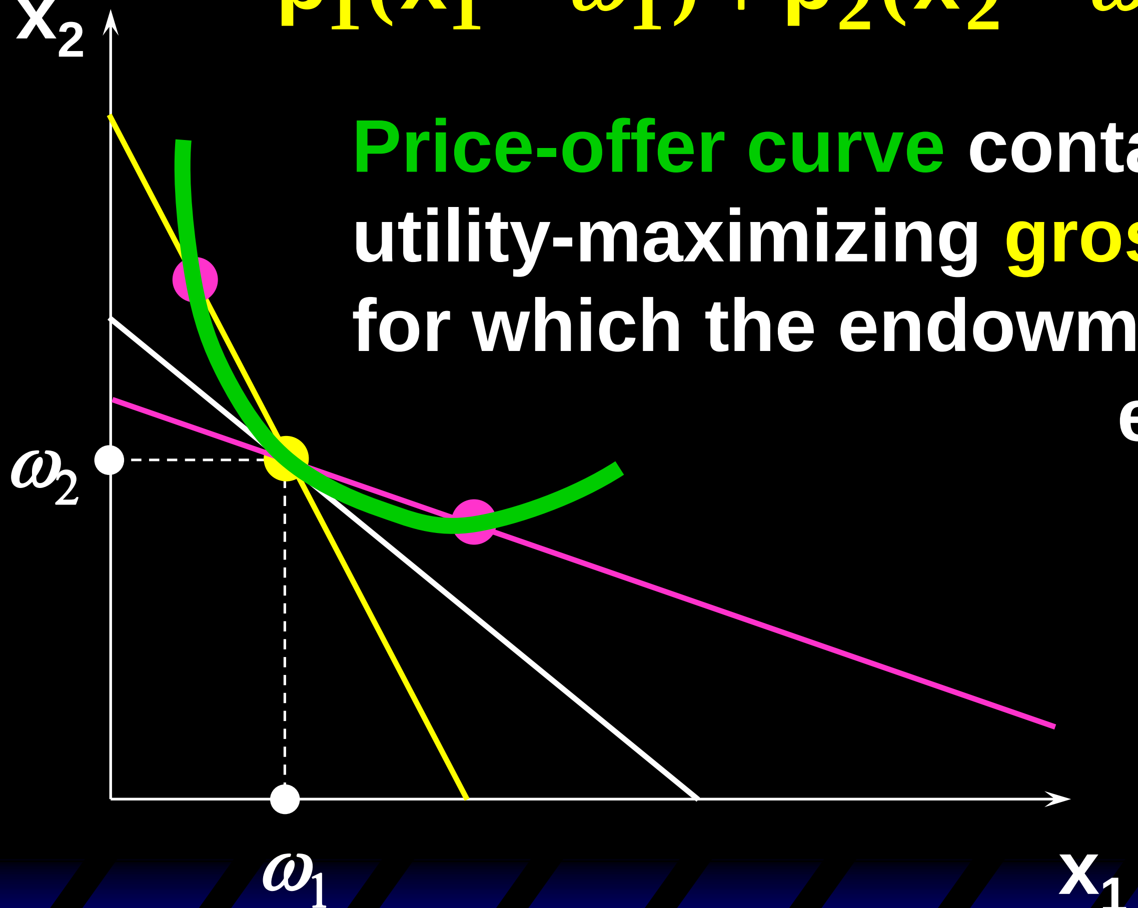
At prices (p_1",p_2") the consumer consumes her endowment; net demands are all zero.



$$p_1'' x_1 + p_2'' x_2 = p_1'' \omega_1 + p_2'' \omega_2$$

Net Demands

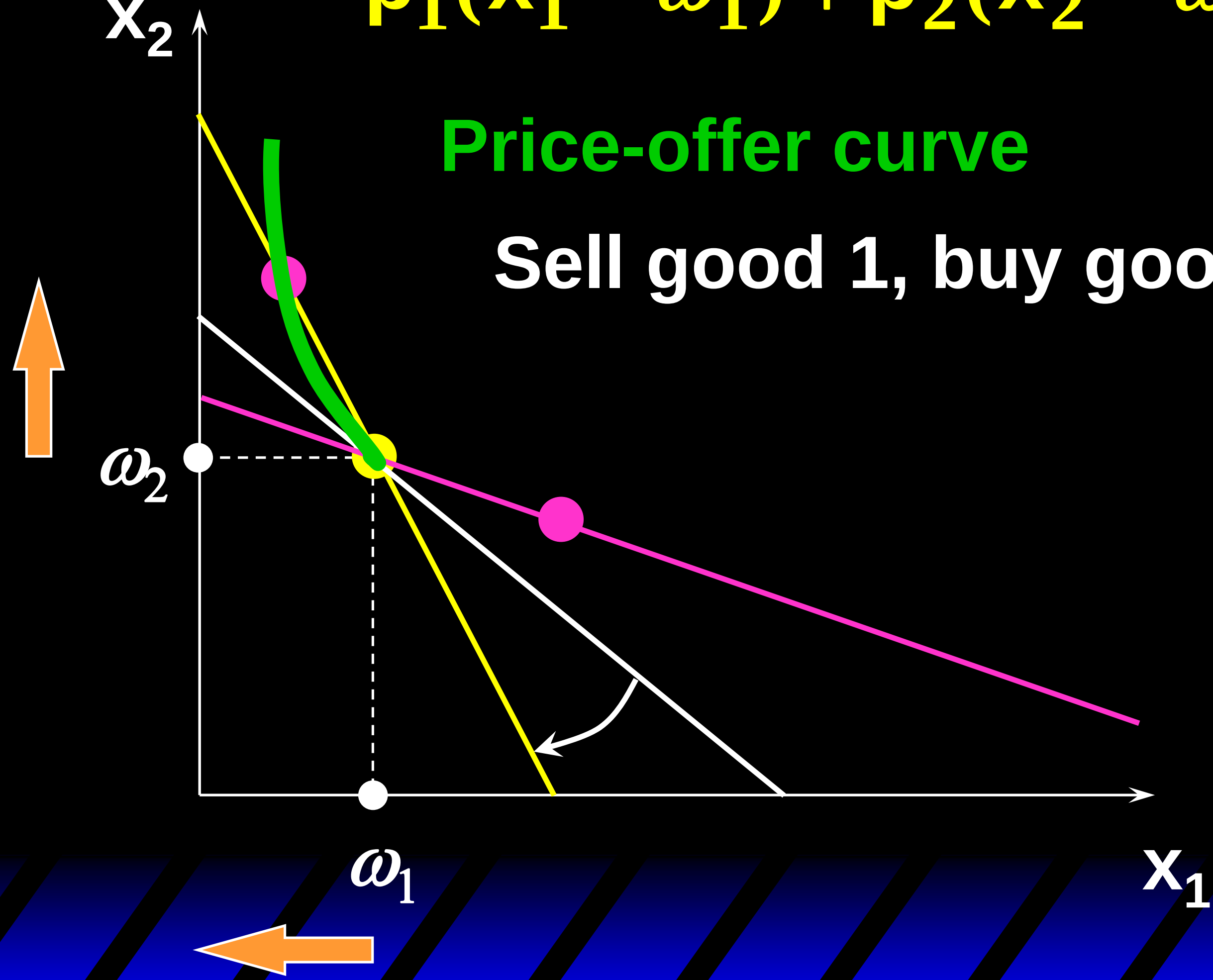
$$p_1(x_1 - \omega_1) + p_2(x_2 - \omega_2) = 0$$



Price-offer curve contains all the utility-maximizing gross demands for which the endowment can be exchanged.

Net Demands

$$p_1(x_1 - \omega_1) + p_2(x_2 - \omega_2) = 0$$



Net Demands

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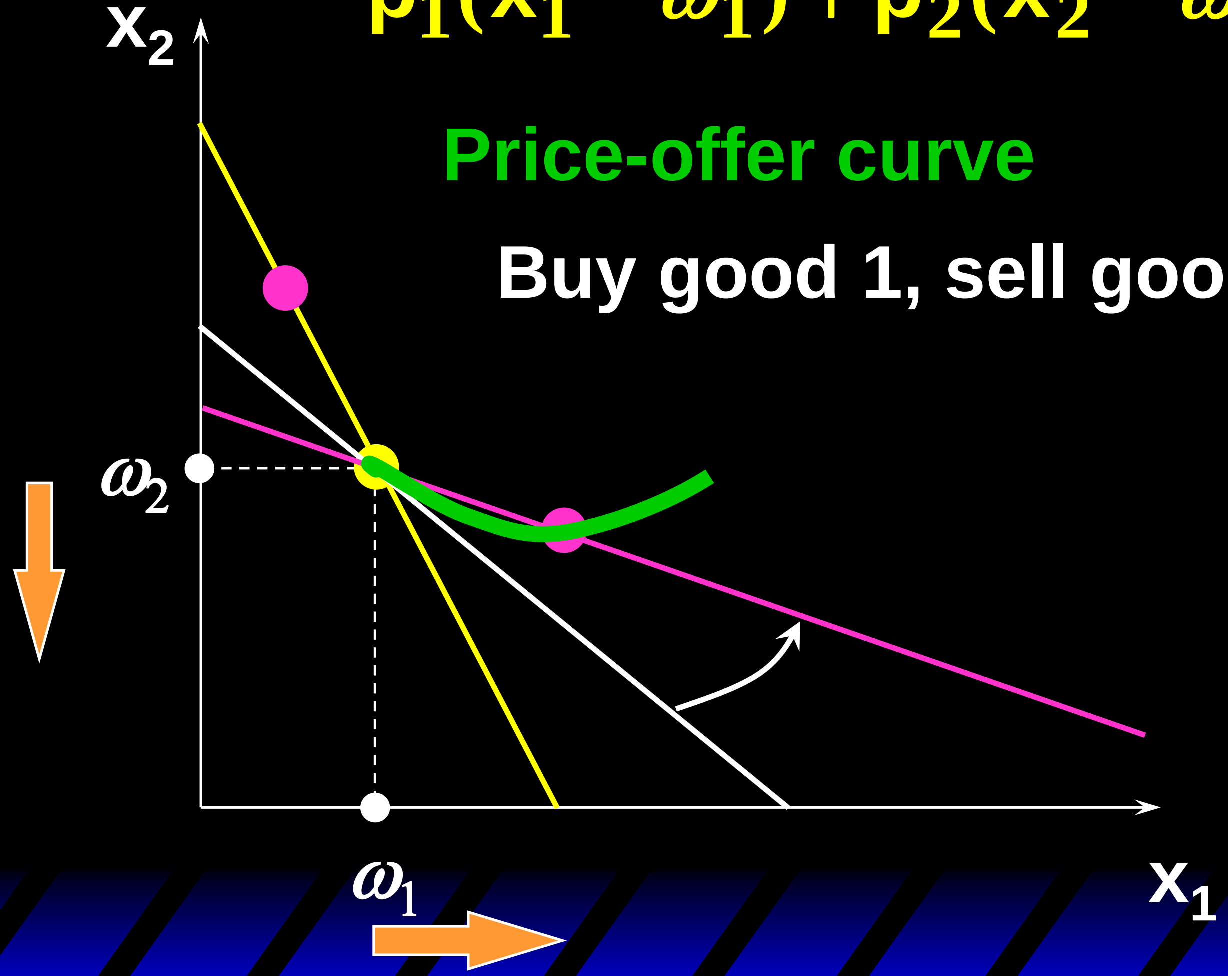


Labor Supply

A worker is endowed with \$m of nonlabor income and $\overline{R}$ hours of time which can be used for labor or leisure. $\omega = (\overline{R}, m)$.

Consumption good's price is p_c.

w is the wage rate.

Labor Supply

The worker's budget constraint is

$$p_c C = w(\overline{R} - R) + m$$

where C, R denote gross demands for the consumption good and for leisure. That is

$$\underbrace{p_c C + wR}_{\text{expenditure}} = \underbrace{w\overline{R} + m}_{\text{endowment value}}$$

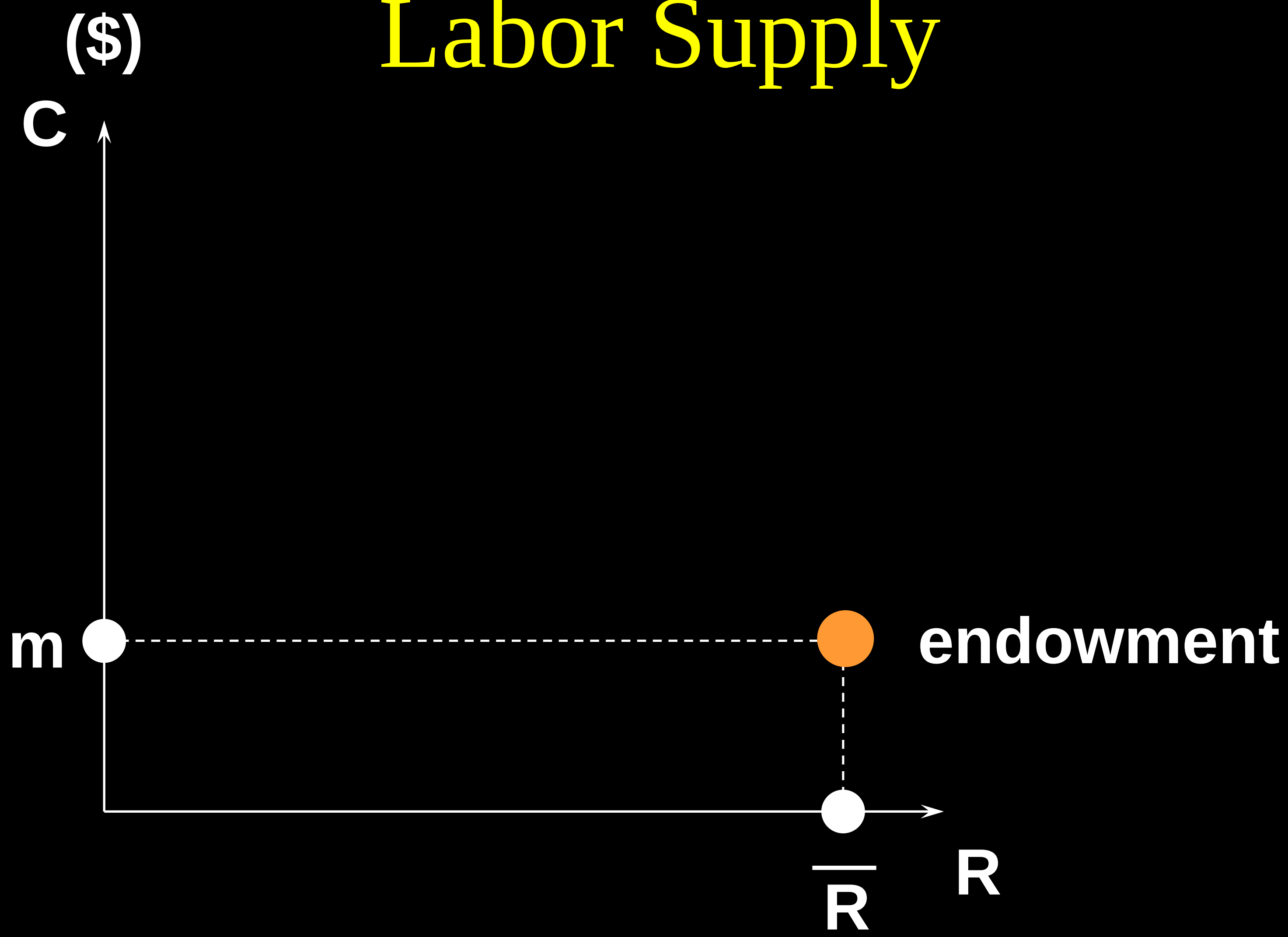
Labor Supply

$$p_c C = w(\overline{R} - R) + m$$

rearranges to

$$C = -\frac{w}{p_c}R + \frac{m + w\overline{R}}{p_c}.$$

Labor Supply



Labor Supply

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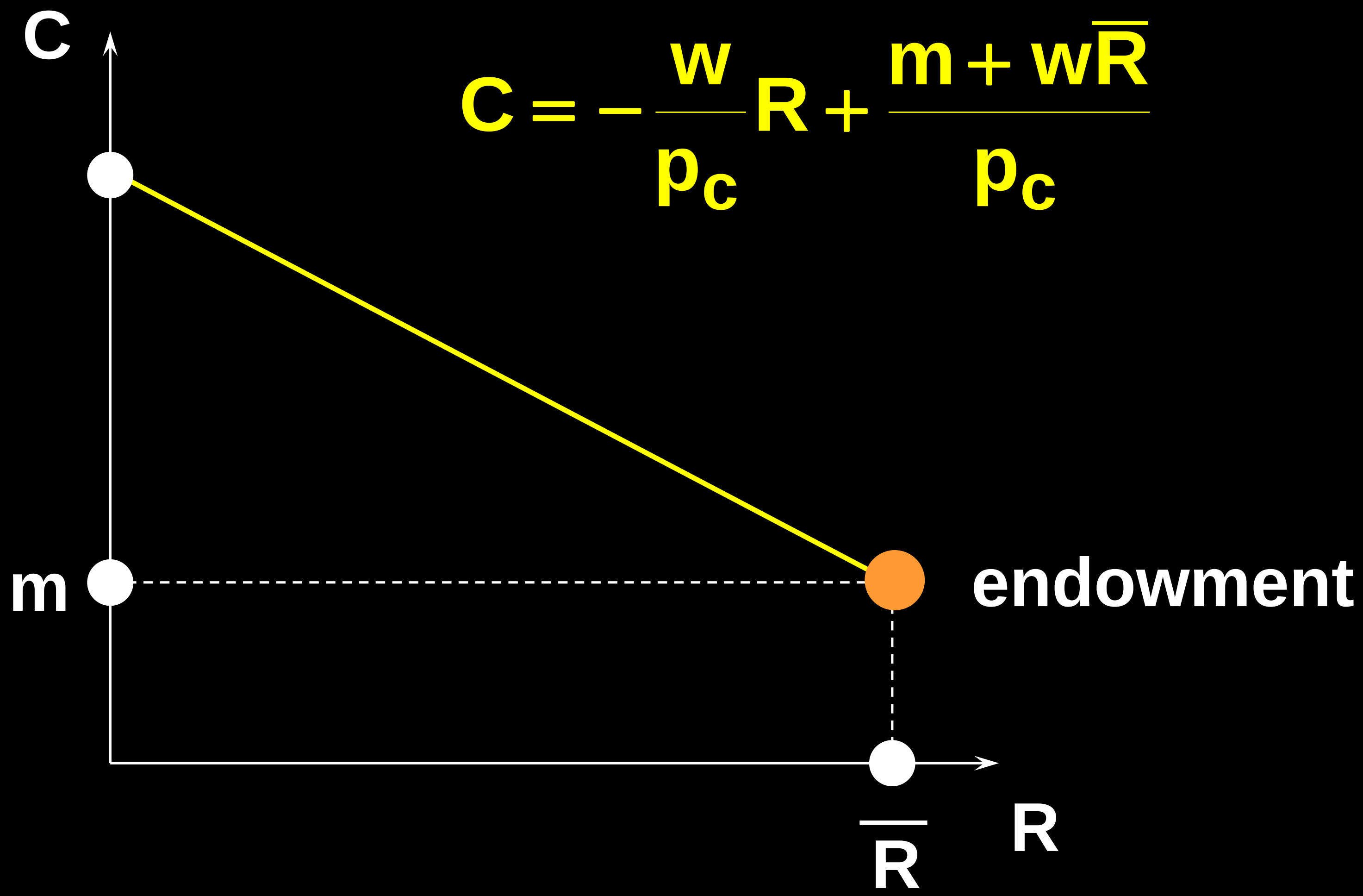

Labor Supply

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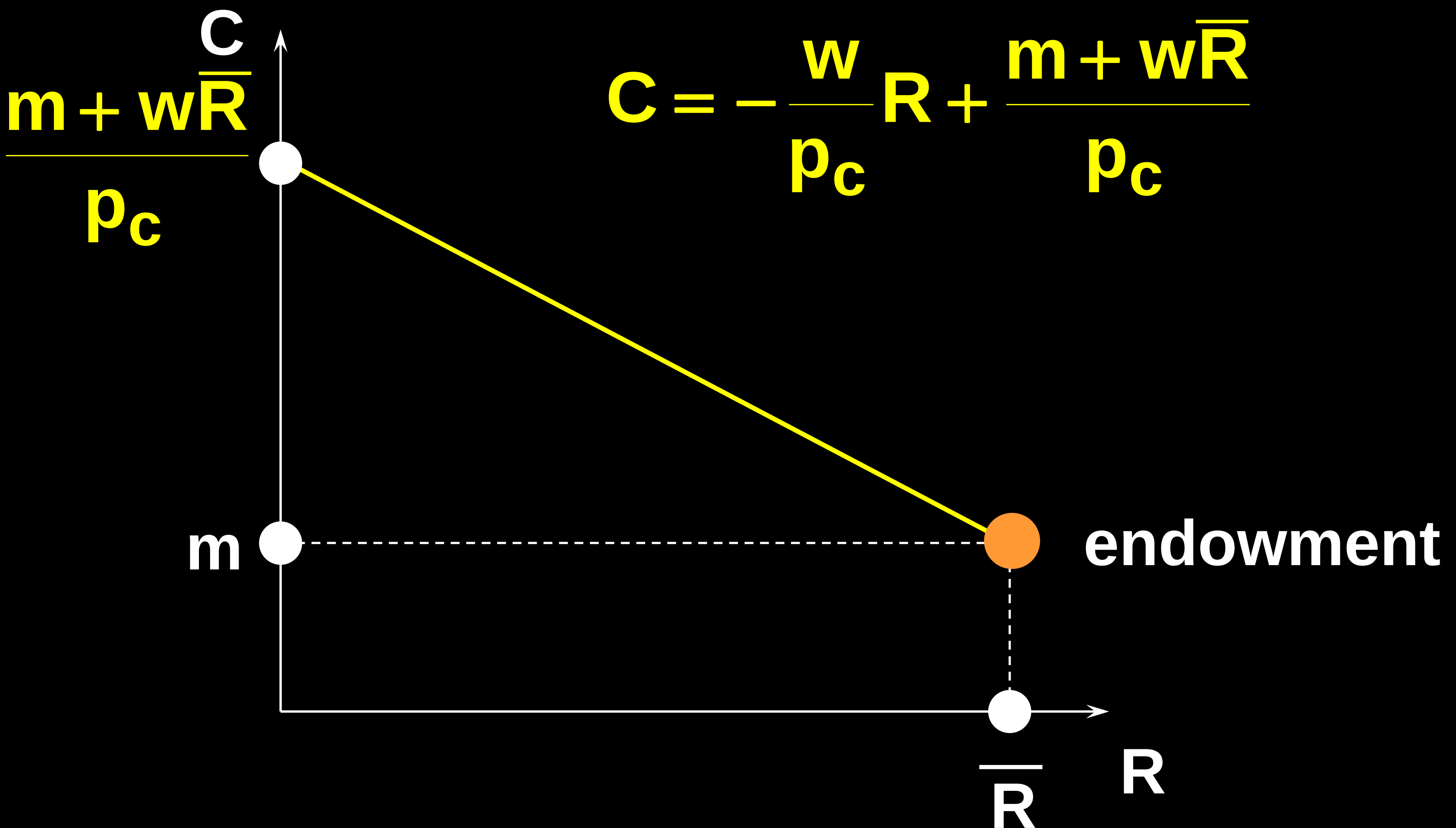

Labor Supply

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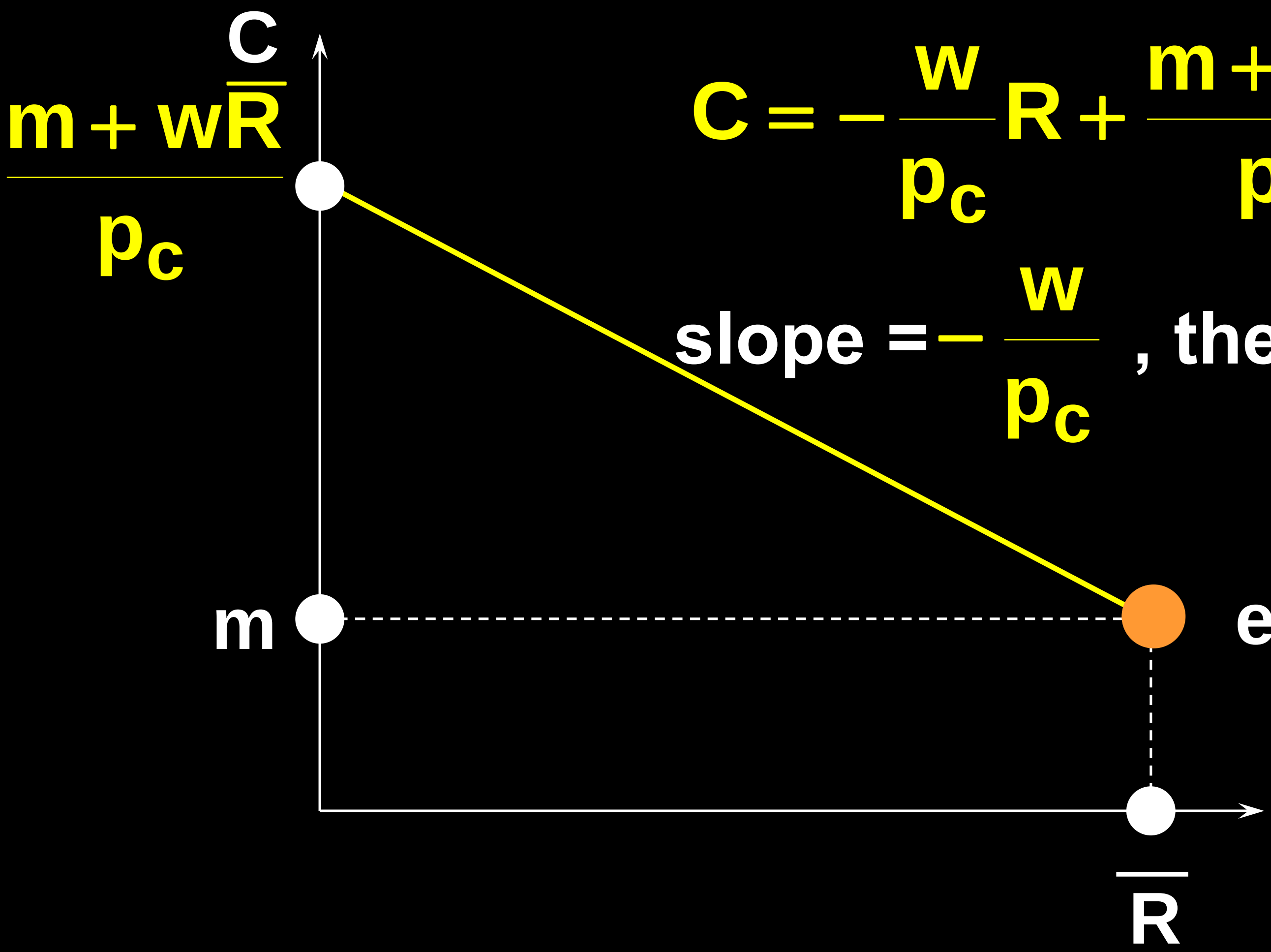
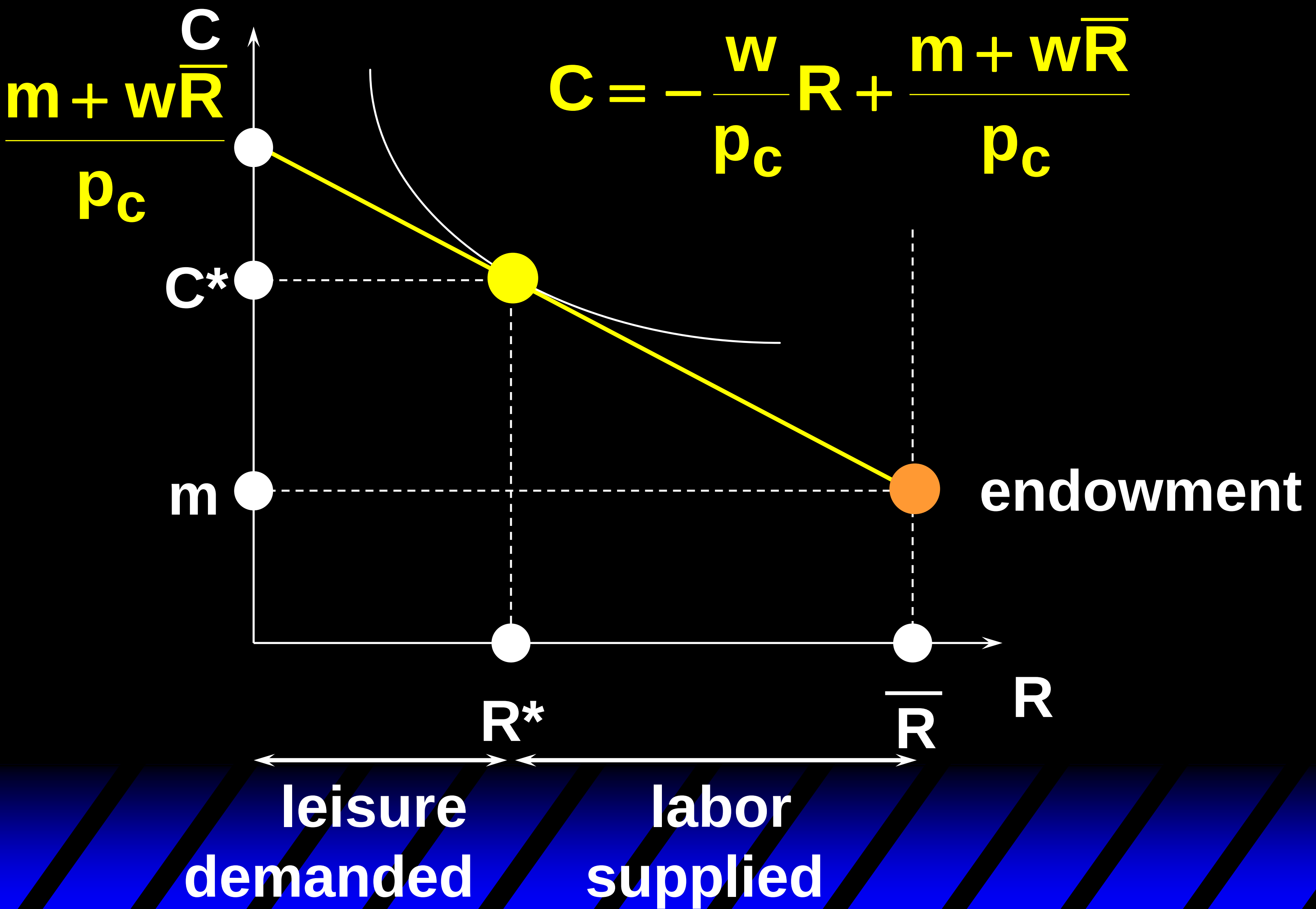


$$\text{slope} = -\frac{w}{p_c}$$, the 'real wage rate'

Labor Supply

$$C = -\frac{w}{p_c}R + \frac{m + w\overline{R}}{p_c}$$



Slutsky's Equation Revisited

- Slutsky: changes to demands caused by a price change are the sum of
  - a pure substitution effect, and
  - an income effect.
- This assumed that income y did not change as prices changed. But

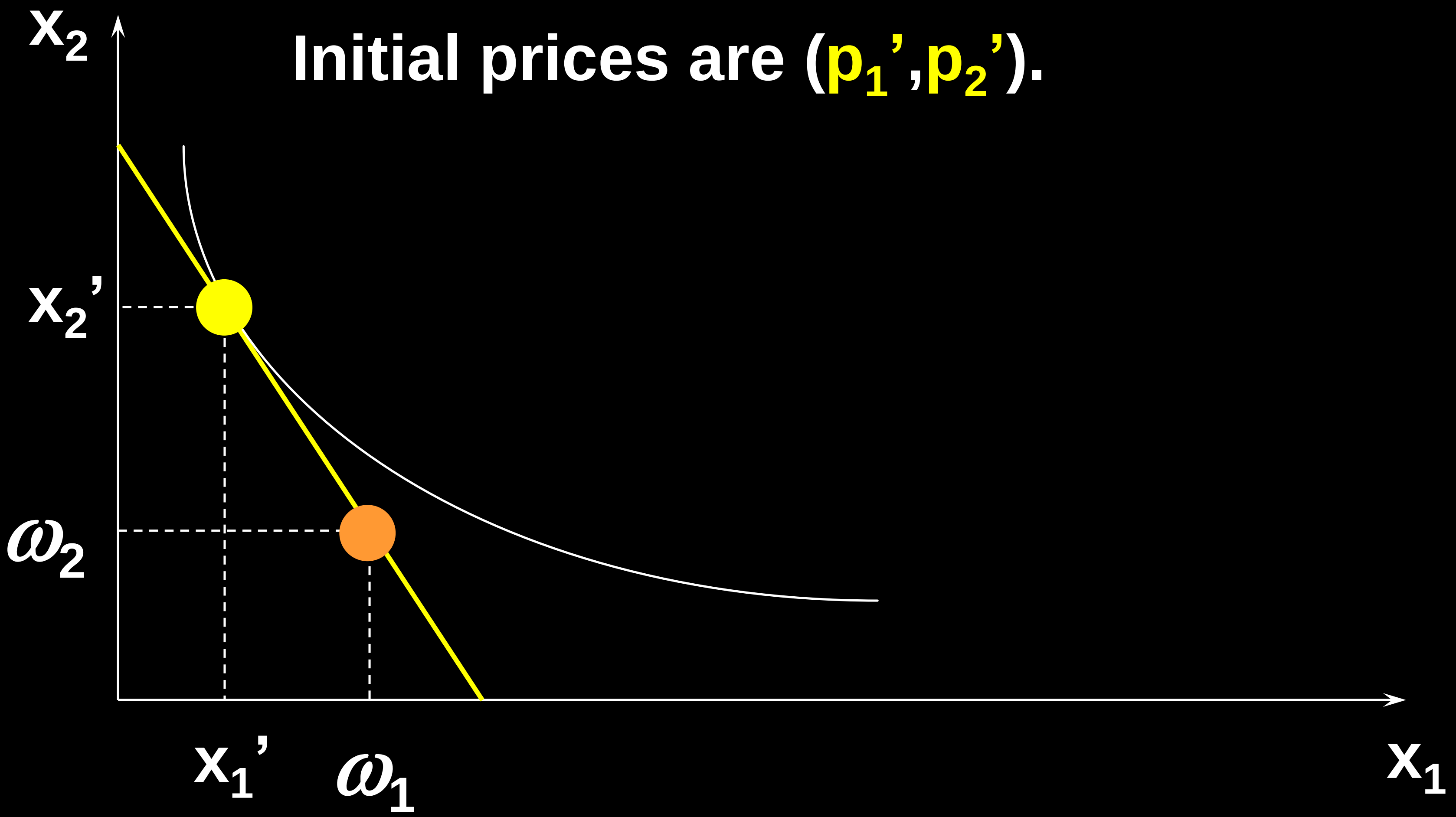
$$y = p_1\omega_1 + p_2\omega_2$$

does change with price. How does this modify Slutsky's equation?

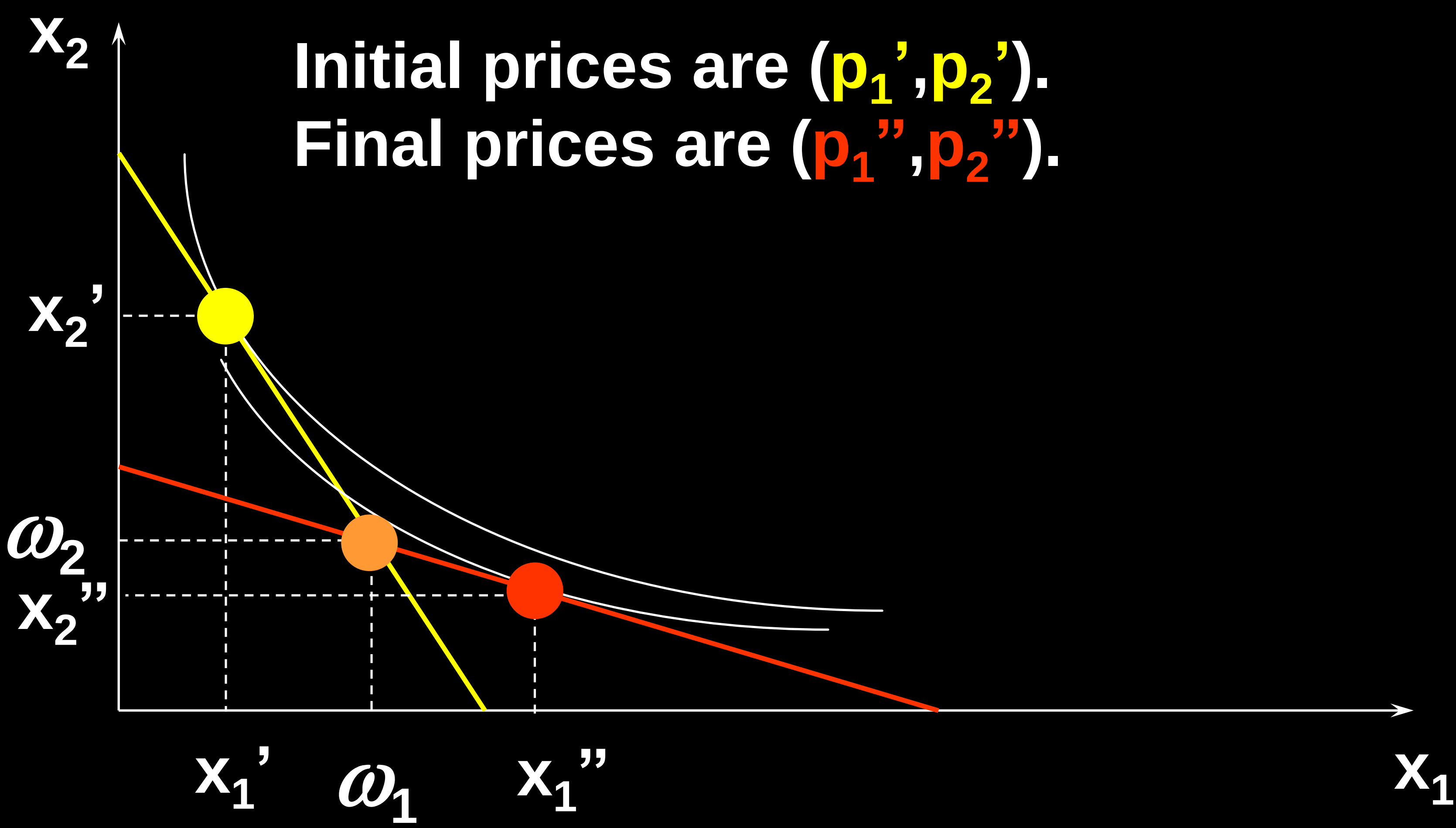
Slutsky's Equation Revisited

- A change in p_1 or p_2 changes $y = p_1\omega_1 + p_2\omega_2$ so there will be an additional income effect, called the **endowment income effect**.
- Slutsky's decomposition will thus have three components
  - a pure substitution effect
  - an (ordinary) income effect, and
  - an endowment income effect.

Slutsky's Equation Revisited



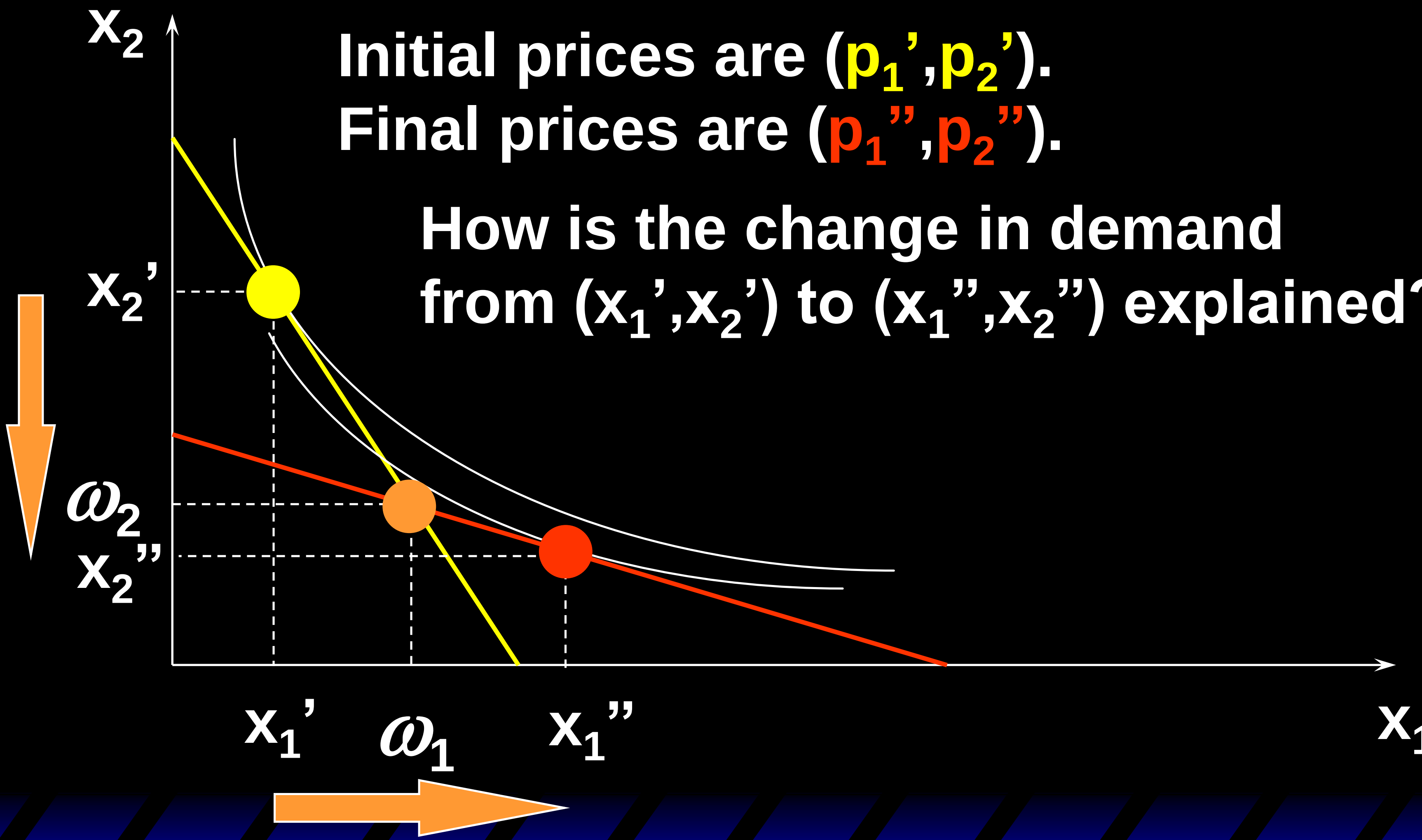
Slutsky's Equation Revisited



Slutsky's Equation Revisited

Initial prices are (p_1',p_2').
Final prices are (p_1'',p_2'').

How is the change in demand from (x_1',x_2') to (x_1'',x_2'') explained?



Slutsky's Equation Revisited

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Slutsky's Equation Revisited

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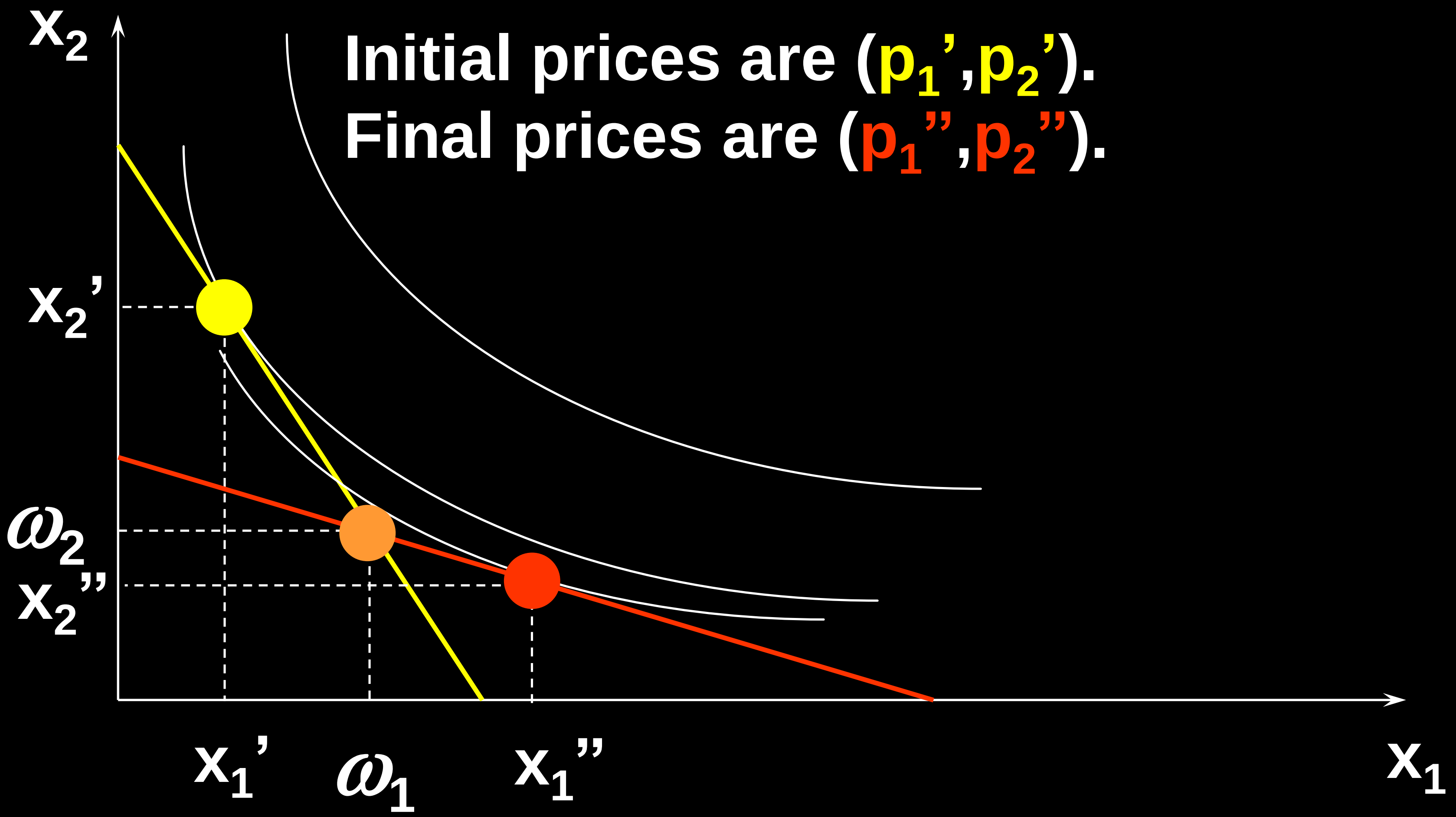
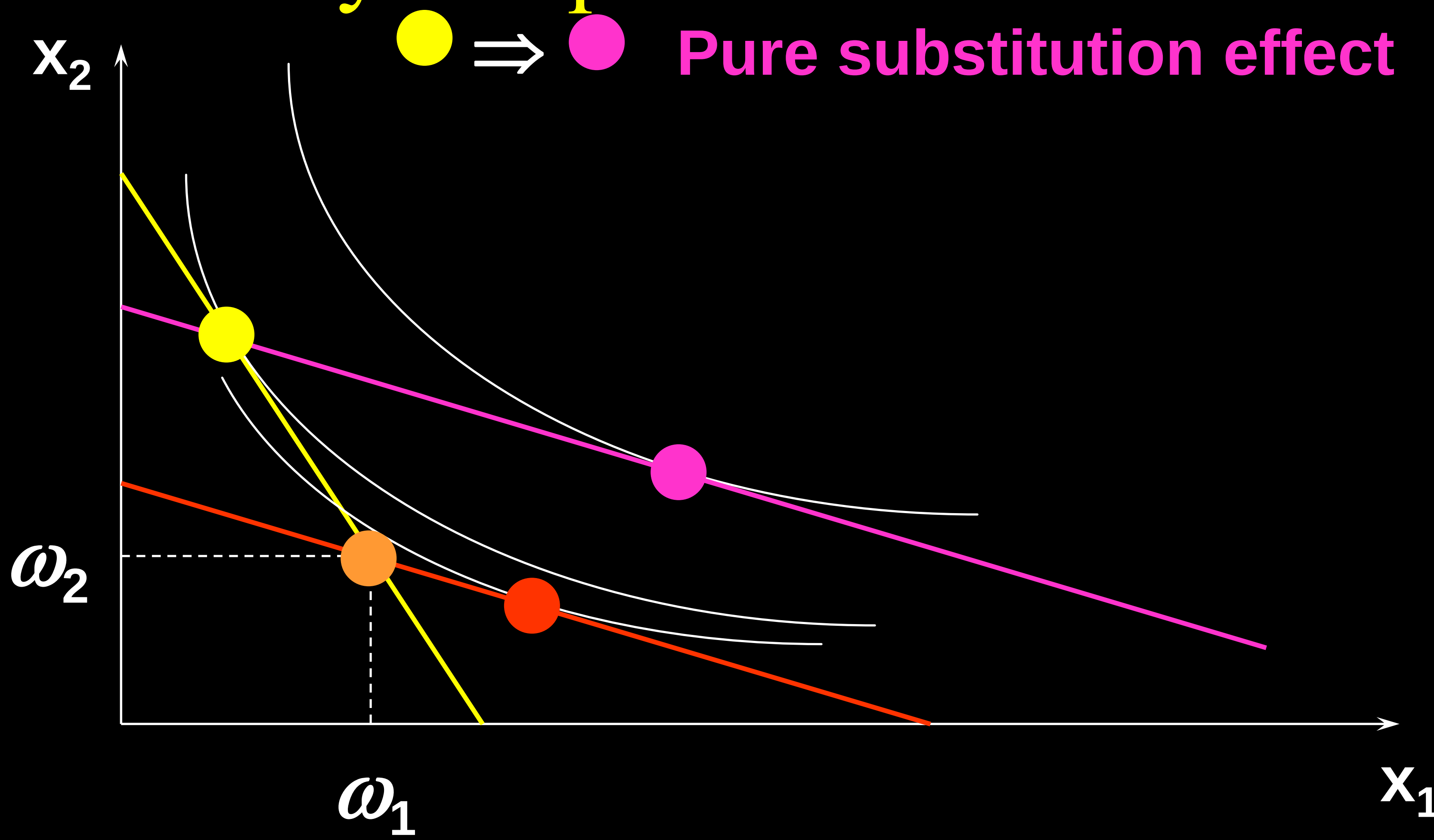
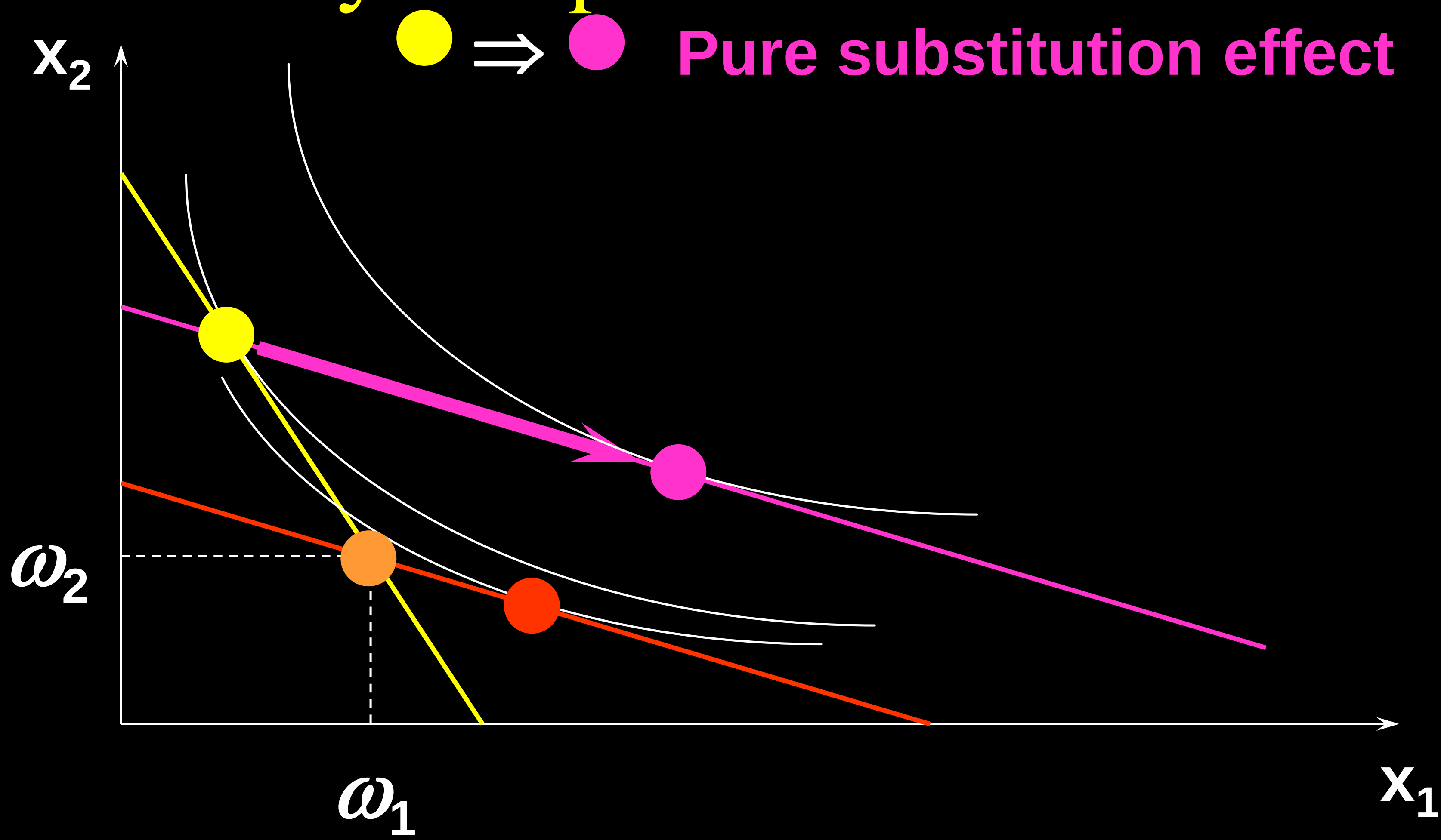


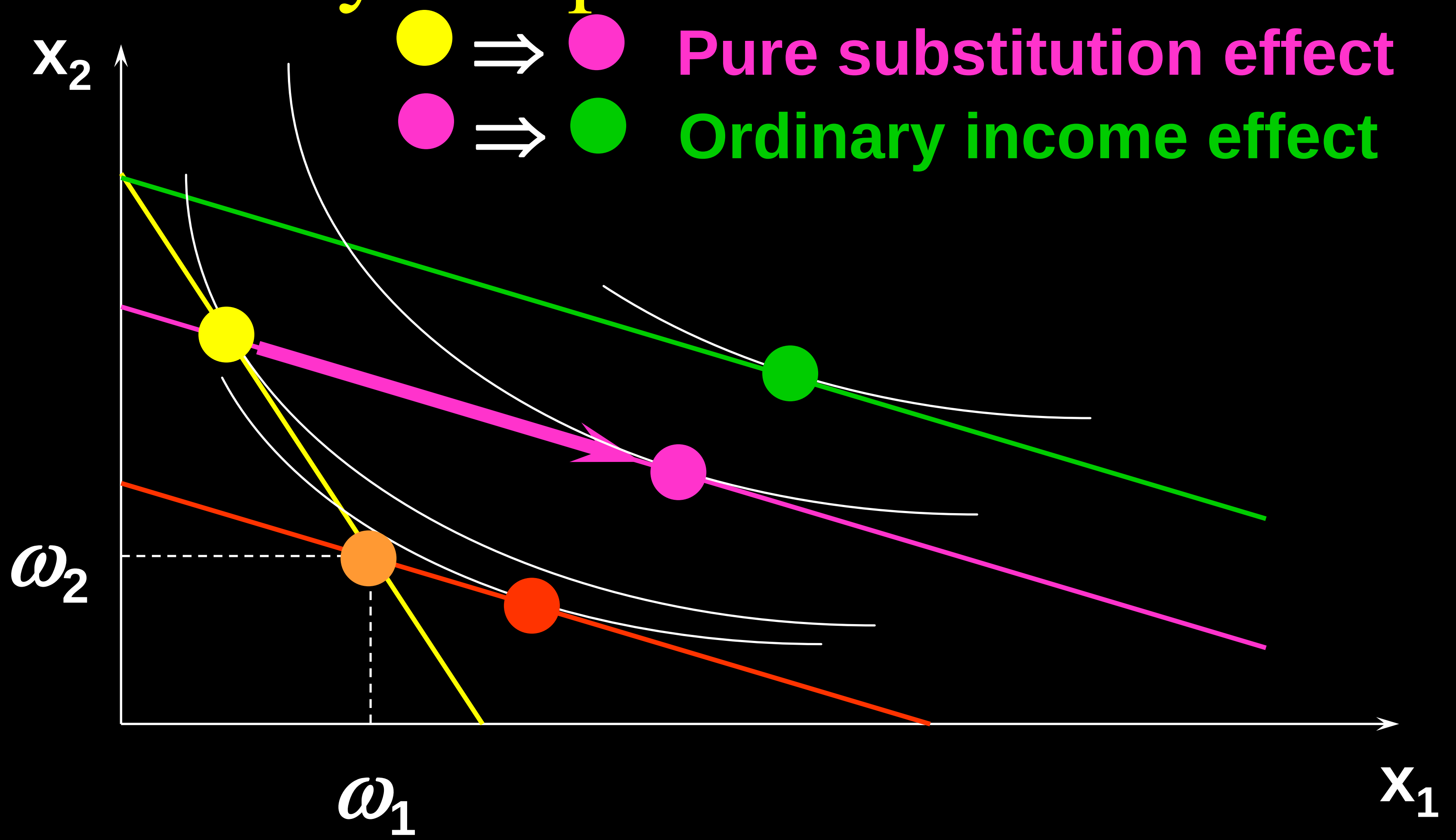
Slutsky's Equation Revisited



Slutsky's Equation Revisited



Slutsky's Equation Revisited



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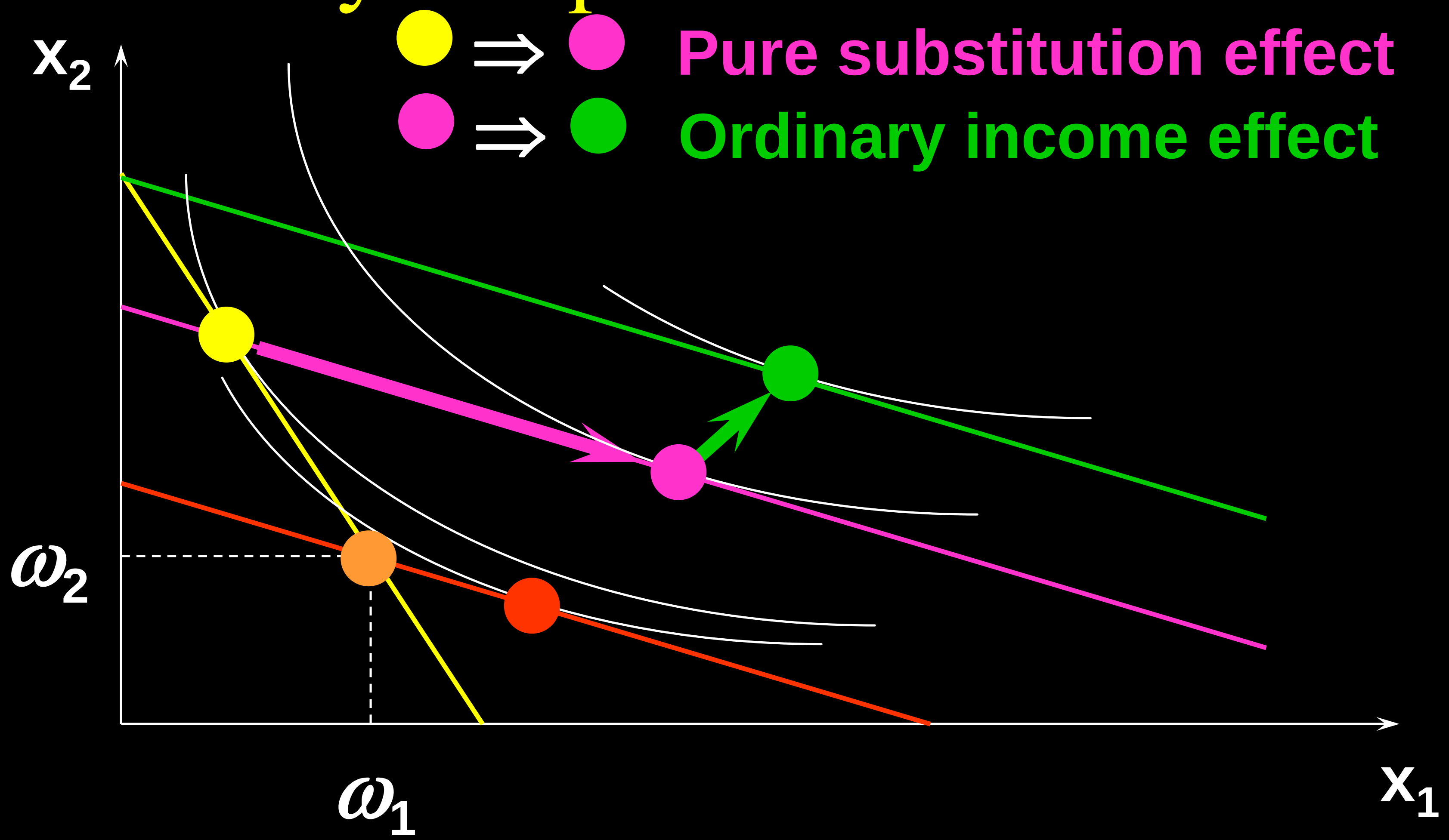
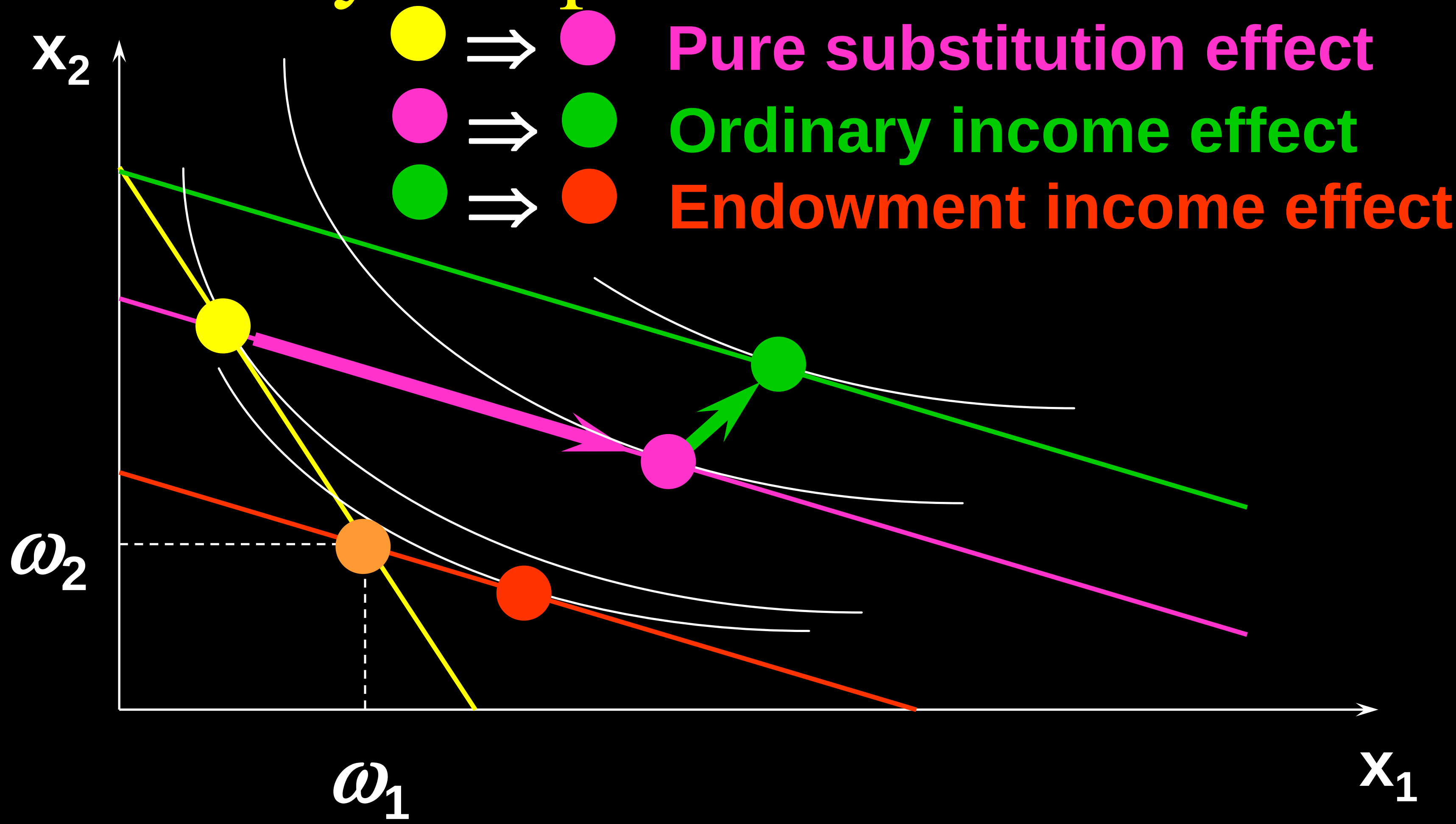
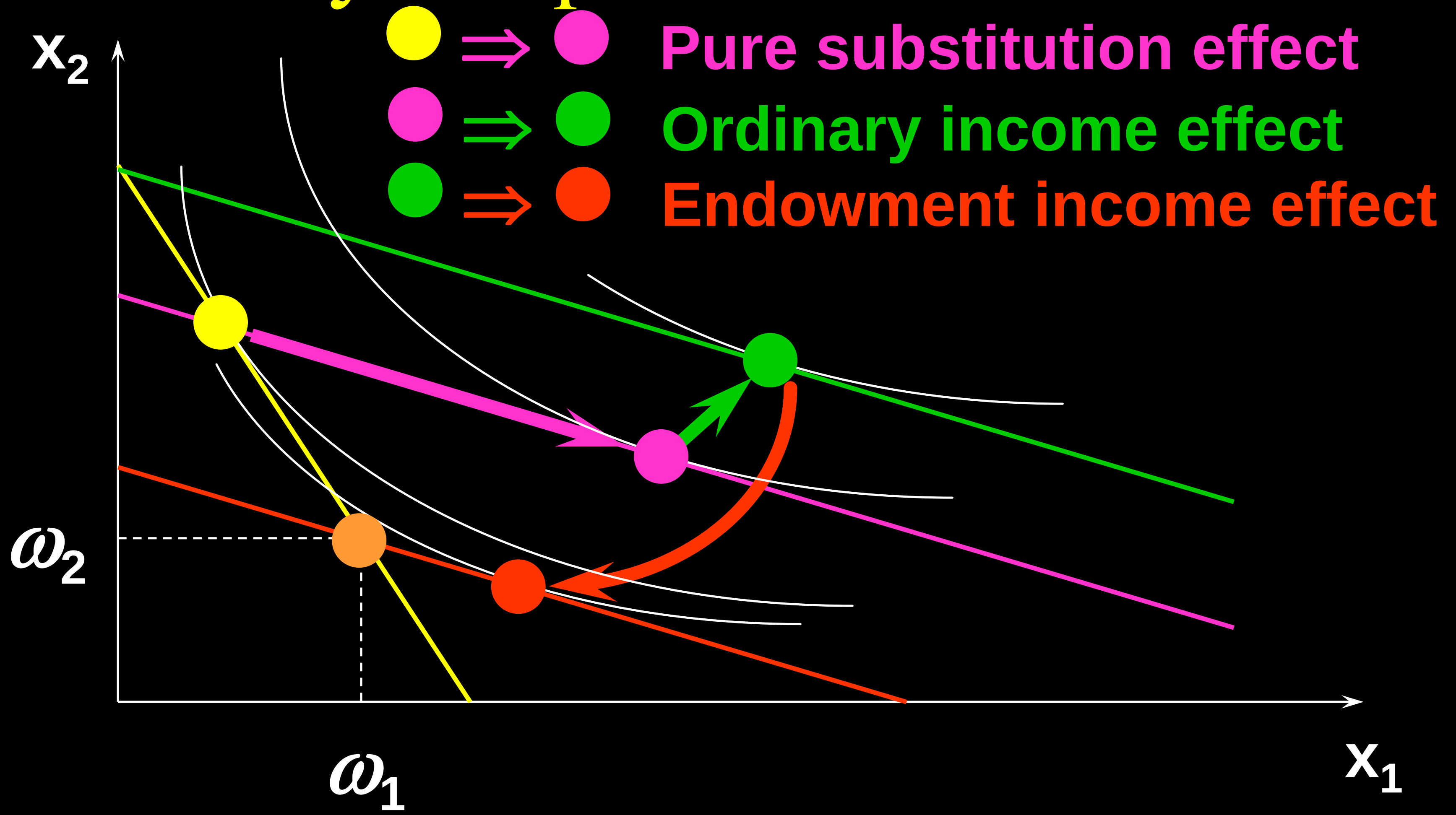


Slutsky's Equation Revisited



Slutsky's Equation Revisited



Slutsky's Equation Revisited

Overall change in demand caused by a change in price is the sum of:

(i) a pure substitution effect

(ii) an ordinary income effect

(iii) an endowment income effect