Externalities

April 25, 2011

Waters

Drink waters out of thine own cistern, and running waters out of thine own well. — Proverbs 5:25

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- Noise pollution
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- Scenic view pollution

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- Common pool resources

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- Common pool resources
- Congestion with excludable resources

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- Water pollution
- Air pollution
- Noise pollution
- Waste pollution
- Scenic view pollution
- Common pool resources
- Congestion with excludable resources
- Congestion with non-excludable resources
- Angry dog

The Coase Theorem

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- Nice cottage beside a train track.

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- Fresh white laundry hung out to dry

The Coase Theorem

- Nice cottage beside a train track.
- Fresh white laundry hung out to dry
- Coal burning steam locomotive passing by

Graphical Analysis

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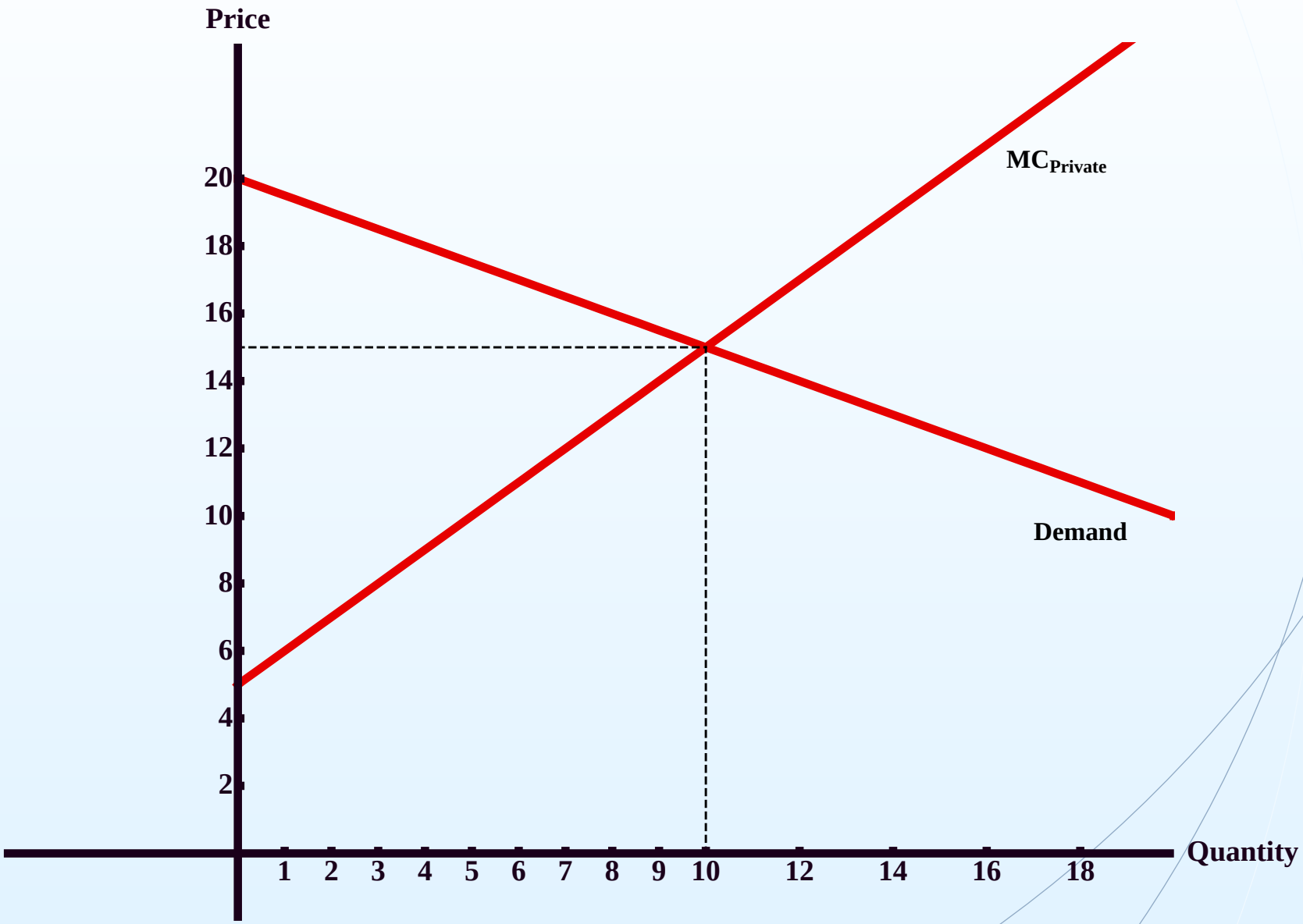

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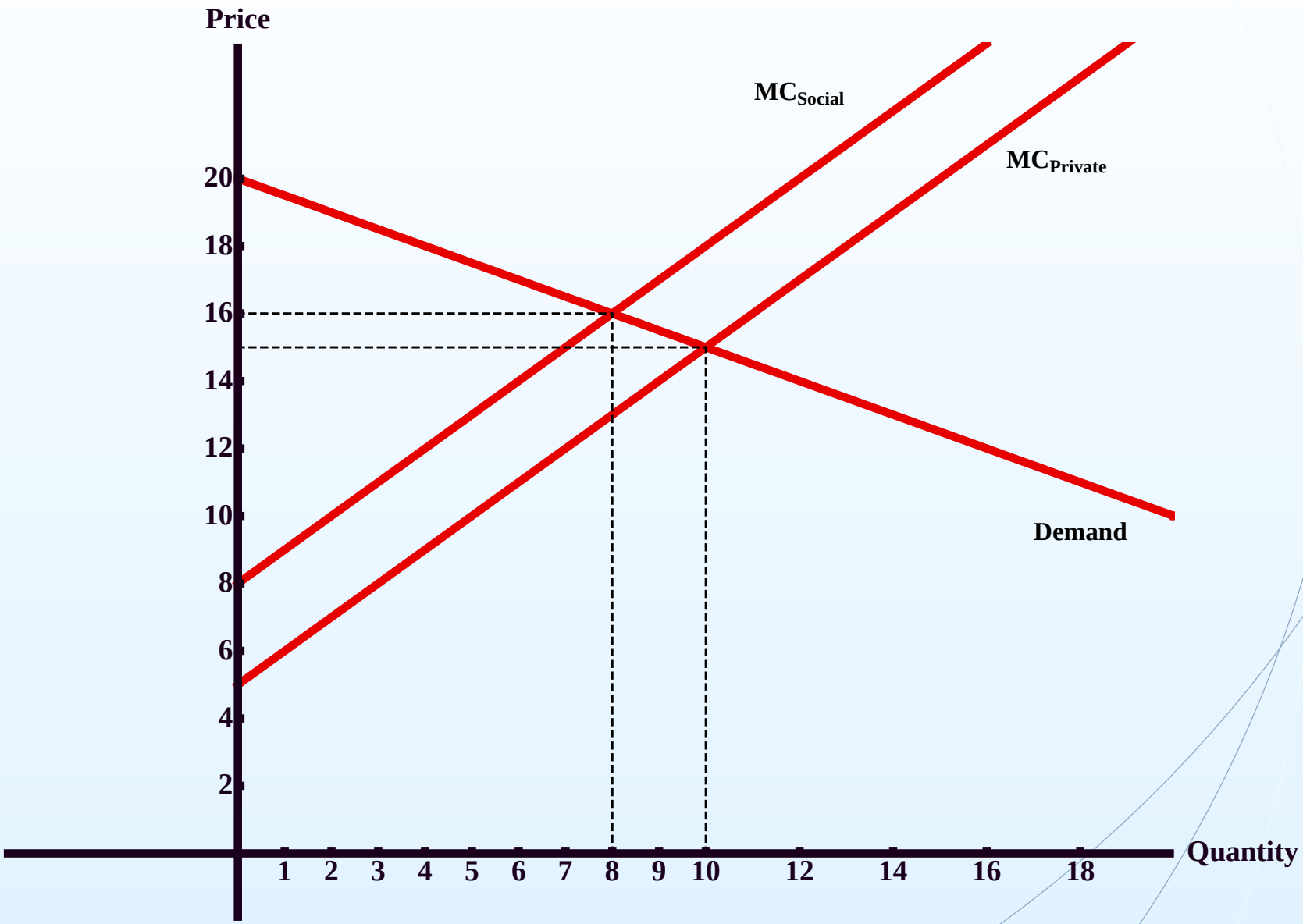

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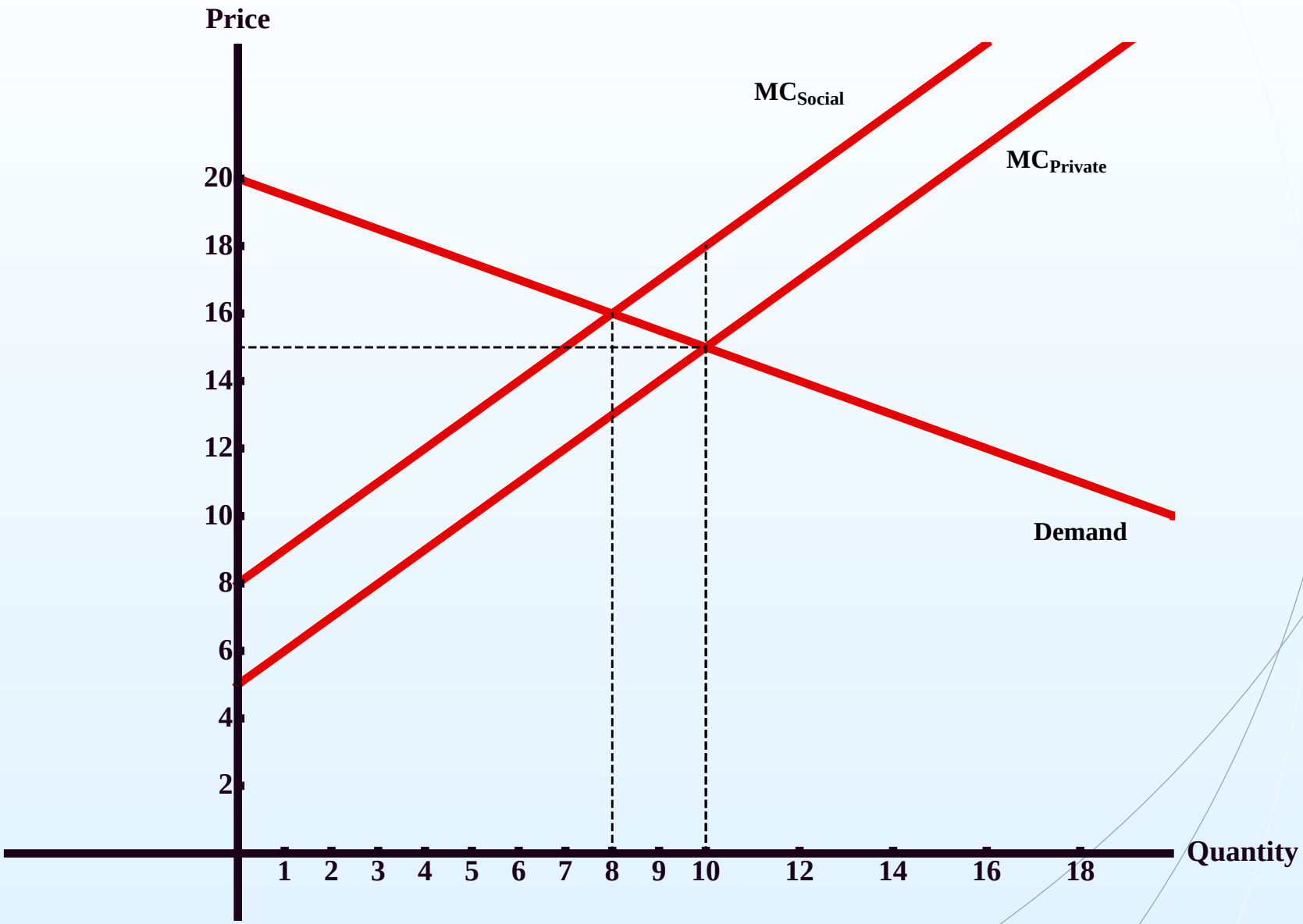

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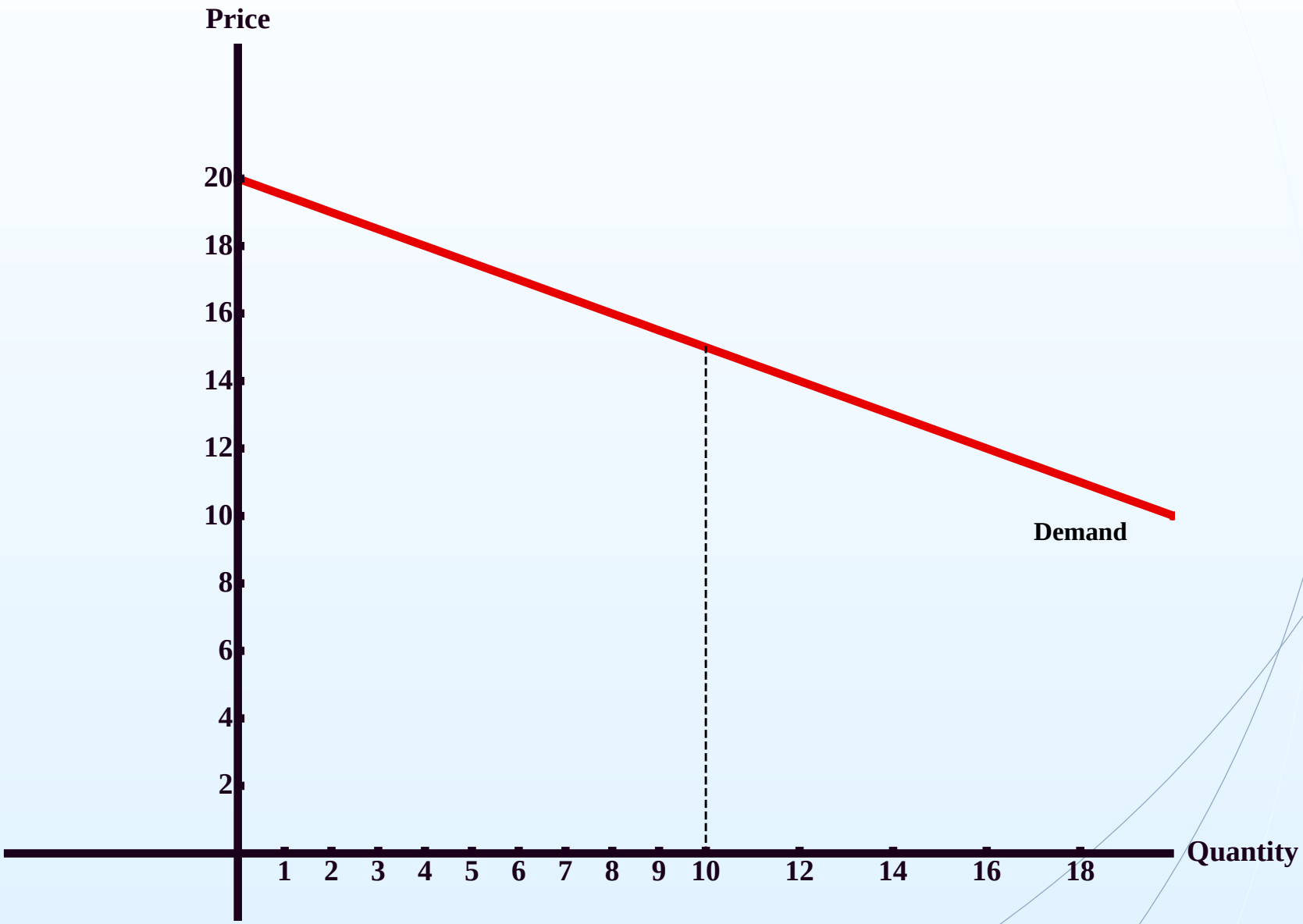

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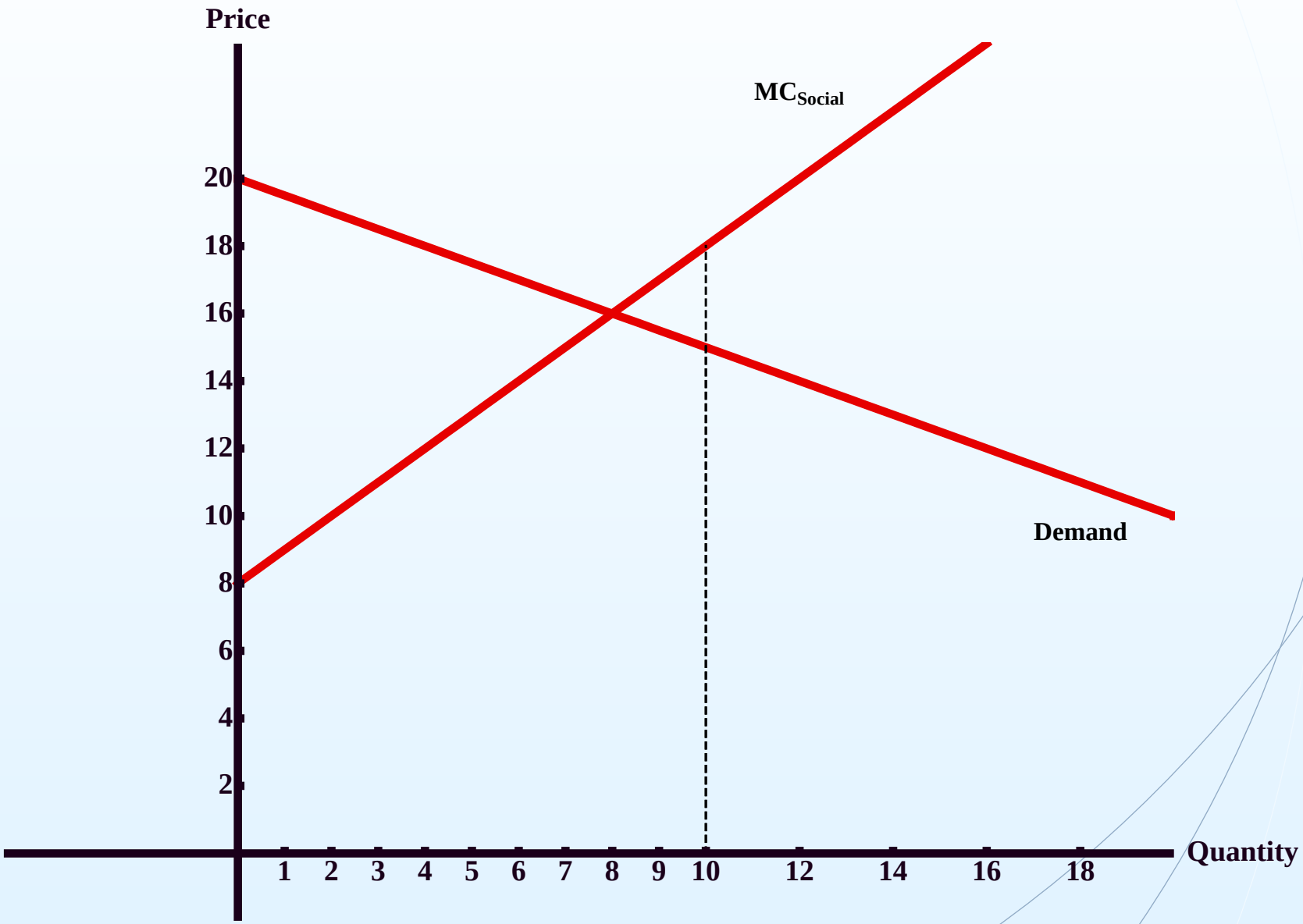

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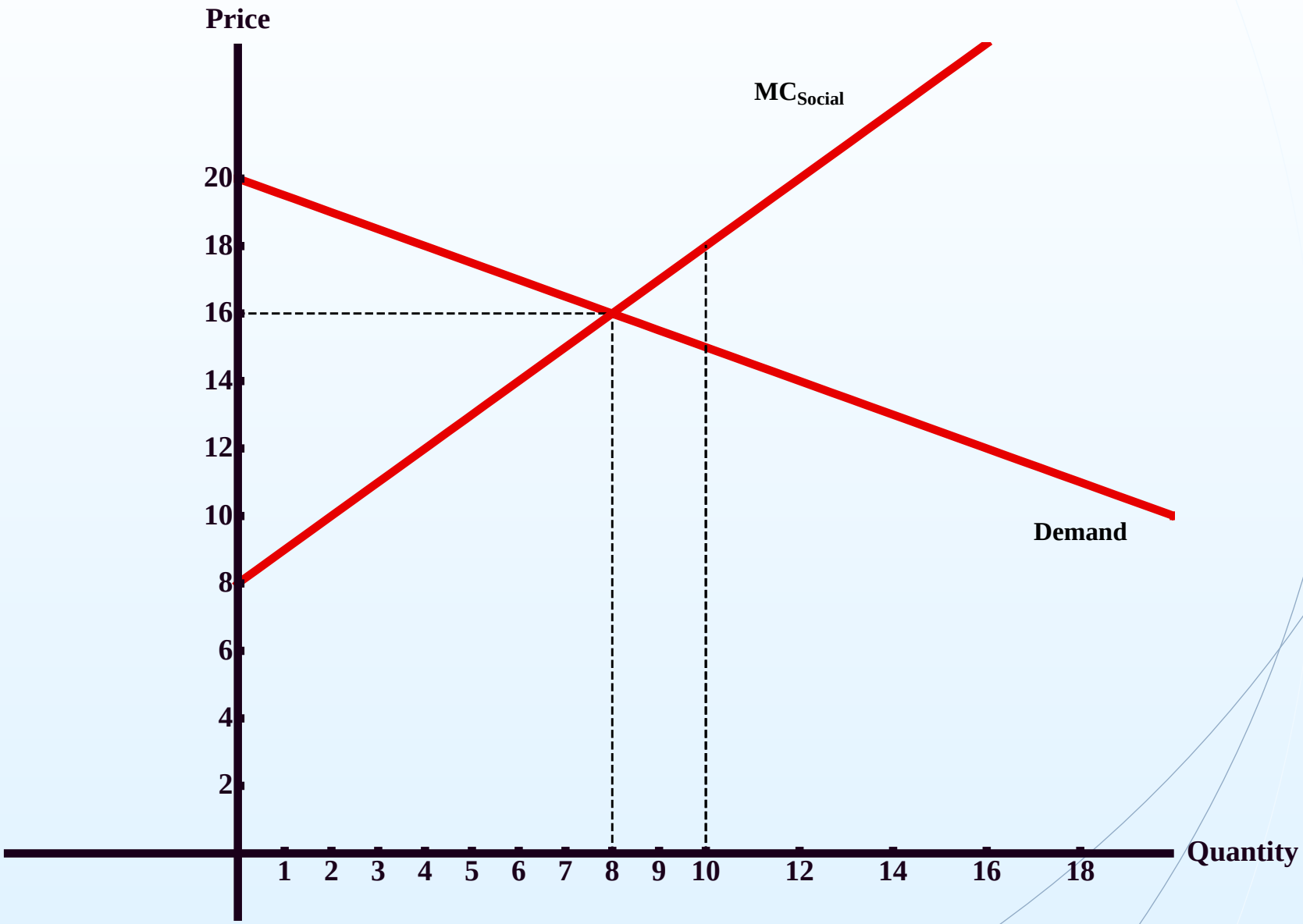

Competitive Equilibrium

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Specifically, the allocation $(x^{1*}, x^{2*}, \ldots, x^{I*}, y^{1*}, y^{2*}, \ldots, y^{J*})$ and price vector $p^* \in R^L$ constitutes a competitive or *Walrasian* equilibrium if the following conditions are satisfied.

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1. Profit Maximization
2. Utility Maximization
3. Market Clearing

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1. Profit Maximization
2. Utility Maximization For each consumer the consumption bundle is maximal for $\succeq_i$ in the budget set defined by the initial endowment (valued at the equilibrium prices) and their share of the profits of the J firms in the economy. Specifically, for each consumer i, x^{i*} solves

$$\max_{x^i} v^i(x^i)$$

$$\text{such that } \sum_{\ell=1}^{L} p_\ell^* x_\ell^i \leq \sum_{\ell=1}^{L} p_\ell^* \omega_\ell^i + \sum_{j=1}^{J} \theta_j^i p_\ell^* y_\ell^{j*}$$

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1. Profit Maximization
2. Utility Maximization
3. Market Clearing The total consumption of products by consumers is equal to initial endowments plus the net output of firms. Specifically, for each good $\ell = 1, 2, \ldots, L$,

$$\sum_{i=1}^{I} x_\ell^{i*} \leq \sum_{i=1}^{I} \omega_\ell^i + \sum_{j=1}^{J} y_\ell^{j*}$$

$$\Rightarrow \sum_{i=1}^{I} x_\ell^{i*} \leq \omega_\ell + \sum_{j=1}^{J} y_\ell^{j*}$$

First Theorem of Welfare Economics

- If the price p* and allocation $\left(x_1^{1*}, x_1^{2*}, \ldots, x_1^{I*}, q^{1*}, q^{2*}, \ldots, q^{J*}\right)$ constitute a competitive equilibrium, then this allocation is *Pareto Optimal*.

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- A feasible allocation $(x^1, x^2, \ldots, x^I, y^1, y^2, \ldots, y^J)$ is *Pareto Optimal* or ***Pareto Efficient*** if there is no other feasible allocation $(x^{1'}, x^{2'}, \ldots, x^{I'}, y^{1'}, y^{2'}, \ldots, y^{J'})$ such that $u^i(x^{1'}) \geq u^i(x^1)$ for all i, with strict inequality for at least one i.

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- A Pareto optimal allocation is efficient in the sense that there is no other way to reorganize society's productive facilities in order to make somebody better of without harming somebody else.

Market Failure

If the various assumptions of the *First Theorem of Welfare Economics* do not hold then we have what is called a *market failure*.

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- Public goods
- Externalities
- Natural monopoly

Possible Solutions to Market Failure

- Taxes

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- Taxes
- Subsidies

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- Subsidies
- Quotas

Possible Solutions to Market Failure

- Taxes
- Subsidies
- Quotas
- Tradable permits