

Introduction to Market Failure

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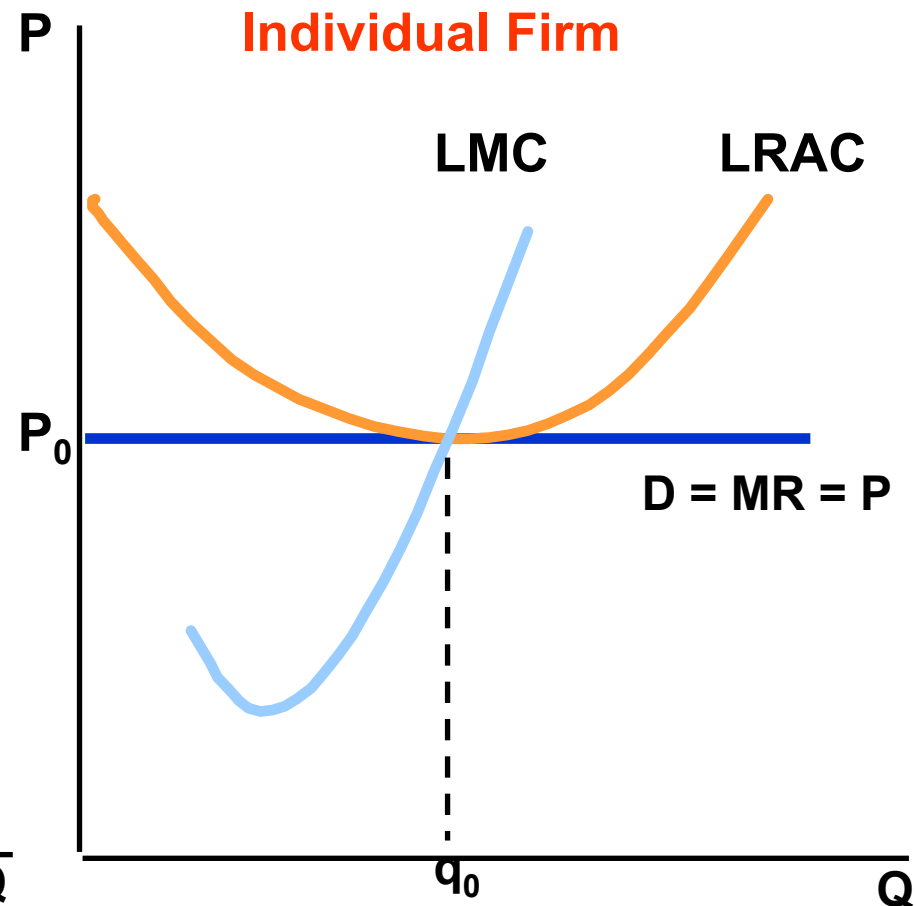
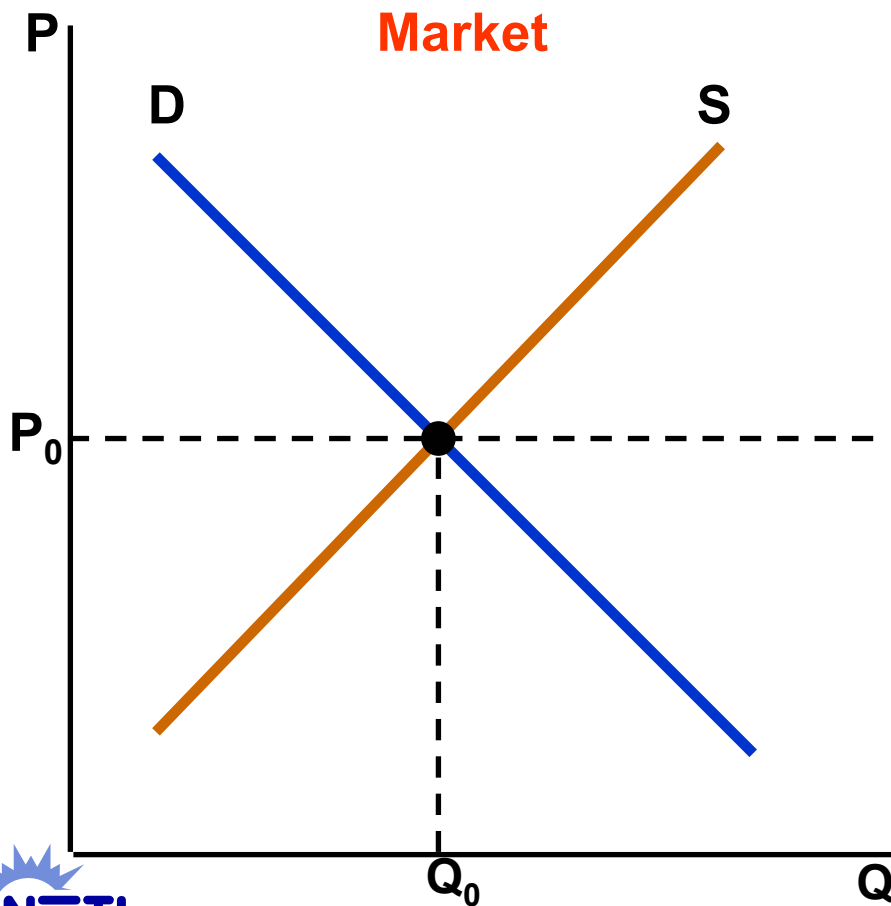


Competitive equilibrium

- **$P=MR=MC=AC$**
- **Price equals marginal revenue since firms cannot influence price (“price takers”)**
- **Firms maximize profits when MR, the revenue from the last unit sold, equals marginal cost (MC), the (opportunity) cost of the last unit produced.**
- **Marginal cost equals average cost; the firm produces as cheaply as possible; economic profits are zero**



Perfect Competition



Competitive Equilibrium, cont'd

- **$P = MC$: Allocative efficiency:** The price reflects the consumer's willingness to pay. Equality implies no other allocation of resources could obtain without making one party to the transaction worse off.
- **$P = AC$:** economic profits zero; no incentive for entry or exit
- **$MC=AC$:** Occurs at minimum of (long-run) average cost curve; firm produces as cheaply as possible at optimal scale.



Political Economy of Competition

- **Maximization of utility, for consumers and of profits, for producers, occurs at same point**
- **Opportunity costs of consumption and of production equate**
- **Equilibrium reached without intervention by non-market forces: the “invisible hand” of economic liberty.**



Market Failure

$$P \neq MC$$

- **Market failure occurs when an unregulated market in equilibrium does not achieve allocative efficiency. Competitive equilibrium conditions do not hold.**



Market Failure Types

All market failures are due to the existence of one or more of the following:

- **Market Power**
- **Public Goods**
- **Externalities**



MARKET POWER

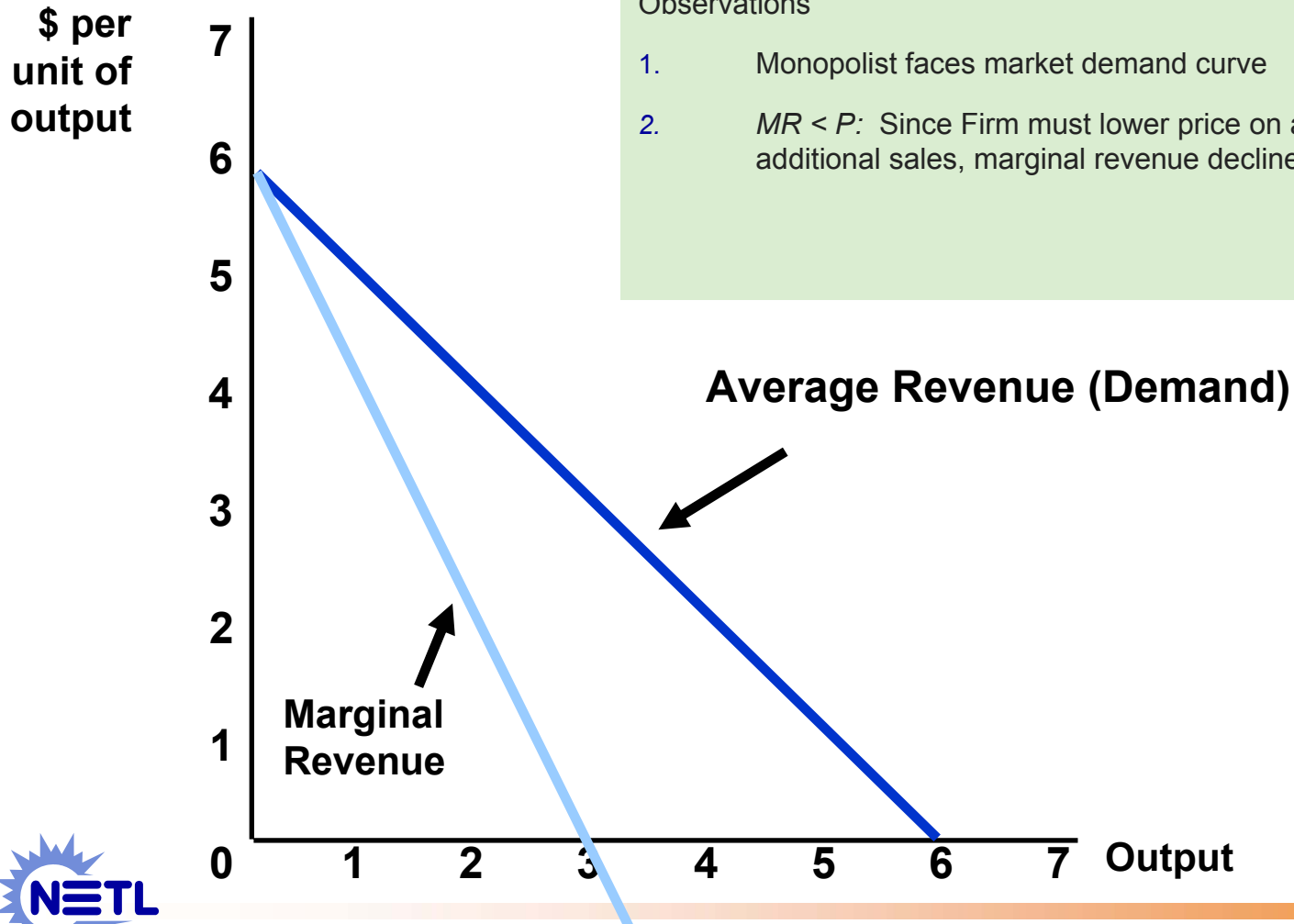
- **If a firm can influence price, it has market power**
- **Most industries display limited market power (product differentiation)**
 - Some influence over price may be desirable
- **Extreme Market Power**
 - One Seller (monopoly)
 - One Buyer (monopsony)



Firm Demand Under Monopoly (Market Power)

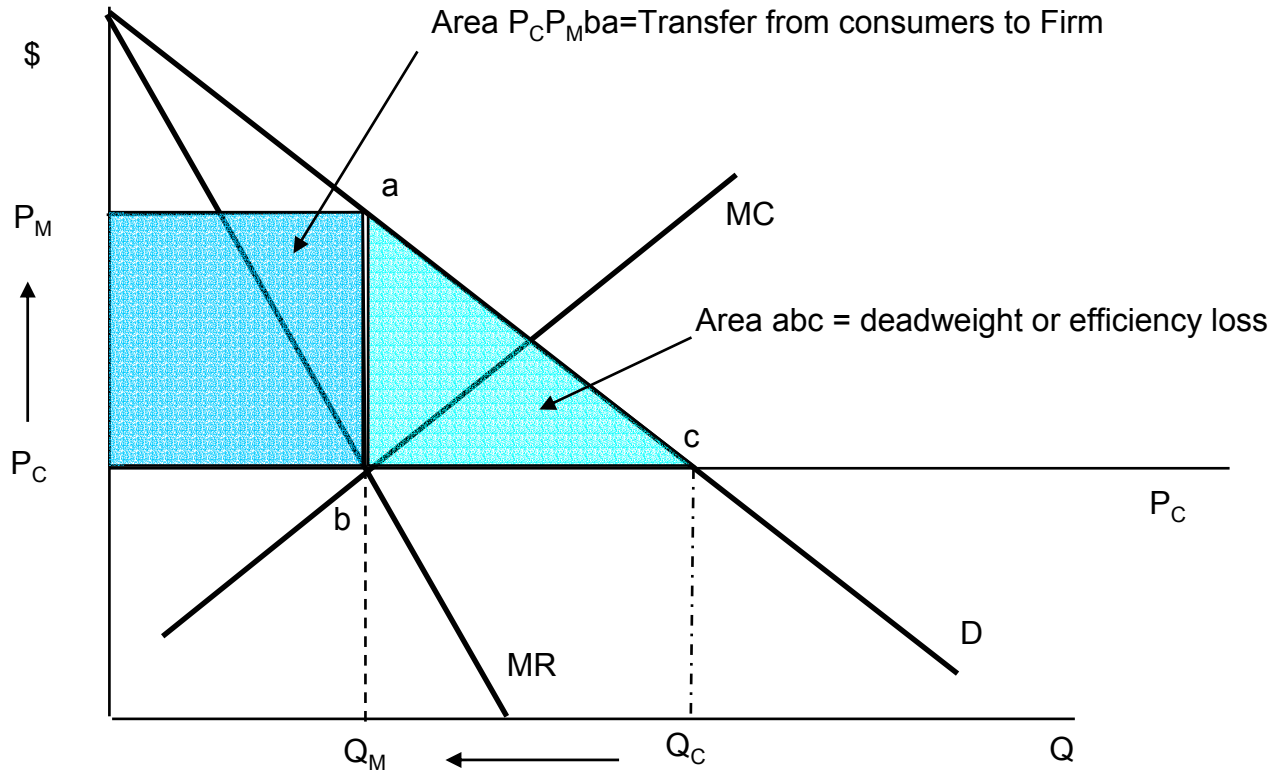
Observations

1. Monopolist faces market demand curve
2. $MR < P$: Since Firm must lower price on all units to induce additional sales, marginal revenue declines faster than price.

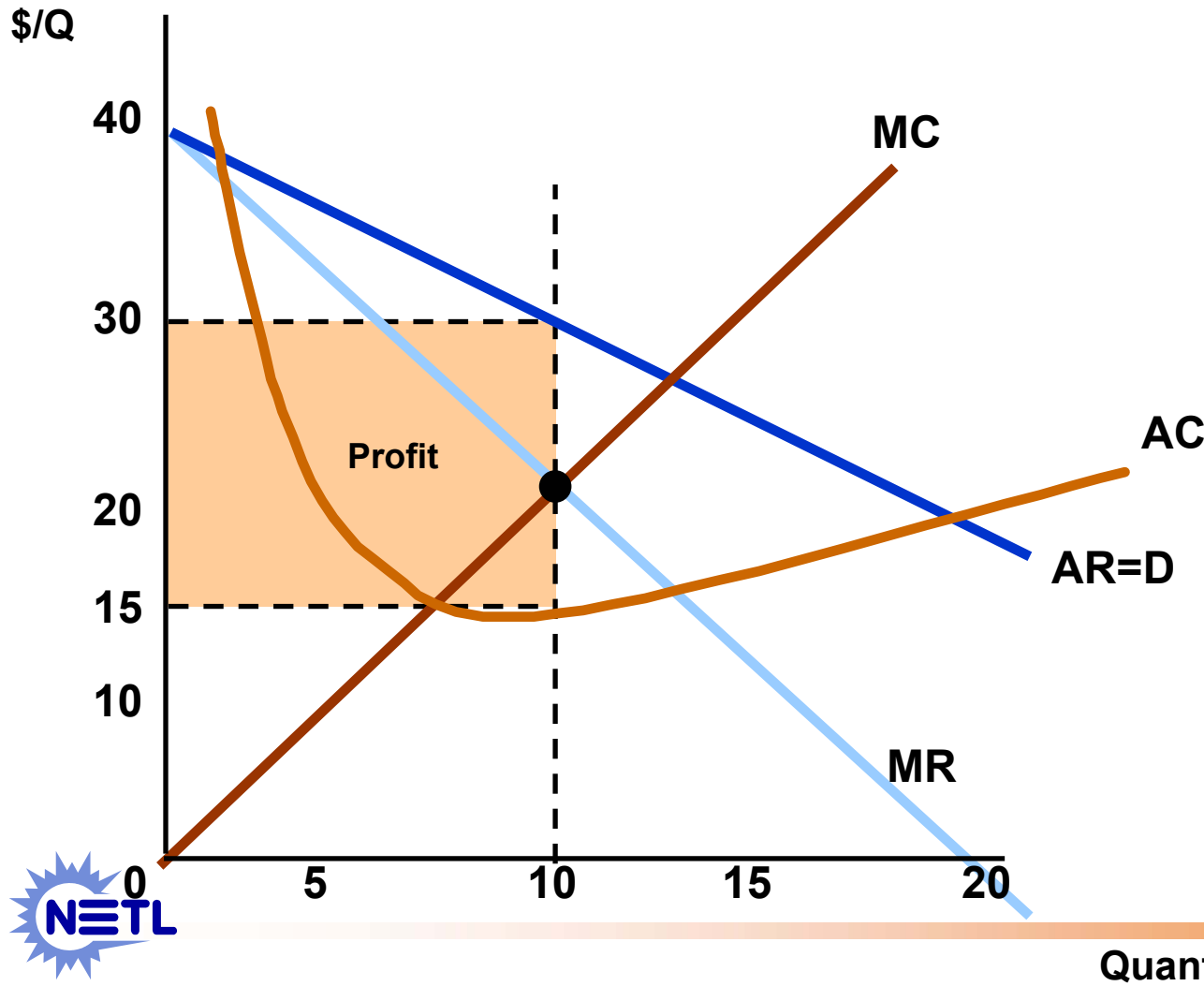


Competition v. Monopoly

Price Rises, Quantity Falls



Example of Profit Maximization under Monopoly



Observations

- $AC = \$15, Q = 10, TC = AC \times Q = 150$
 $Profit = TR - TC = \$300 - \$150 = \$150$ or
- $Profit = (P - AC) \times Q = (\$30 - \$15)(10) = \150
- Barriers prevent other firms from entering even though economic profits exist



Equilibrium Conditions under Monopoly

- $MC = MR$, but
- $MC < P = AR = D$
- Firm produces the quantity at which marginal cost equals marginal revenue, but charges the price the market will bear, given by the demand curve
- “competitive price” $P_c = AC = AR$
- $P_c < P_m$; $Q_c > Q_m$



Causes of Market Power

- **Barriers to Entry and Exit**
 - “Natural”
 - Economies of Scale; Costly Disposal
 - Remedy: Regulated Entities (e.g. traditional utilities)
 - Firm Behavior
 - Anti-competitive Practices
 - Remedy: Competition Policy, Antitrust Legislation
 - Government Policy/Fiat
 - Patents, Licenses, Charters



PUBLIC GOODS

- **Private goods (most goods/services)**
 - Unit consumption is *rival* and *excludable*: If I consume it, you can't, and we don't share.
- **“Pure” Public Goods:**
 - each unit is consumed in common: *nonrival*
 - No one can be prevented from consumption: *nonexcludable*
 - Example: National Defense, Flood Protection



Public Goods, Cont'd

- **Mixed Goods:**
 - Exhibits aspects of nonrivalry or nonexcludability
 - Example: Highways, Ports
- **Free-Rider Problem**
 - Person may consume without paying
 - Arises from nonexcludability
 - Market systems can not compel payment
 - **Underprovision** if left to market



A Basis for Gov't Intervention

- **Free-Rider problem can not be resolved by free market. Optimal provision through government procurement and taxation**
 - Optimal provision:
 - Theory (Samuelson): efficient provision requires that the sum of each individual's marginal benefit (willingness to pay) equal the marginal cost of the last unit provided. i.e. $MAX: TB-TC$
 - Practice: Individual preferences mediated through political process.



EXTERNALITIES

- **DEF'n: Costs and Benefits that**
 - Arise from economic transaction
 - Are not considered by parties to transaction
 - Fall upon persons not party to transaction
 - Social cost \neq Private cost, or
 - Social benefit \neq Private benefit

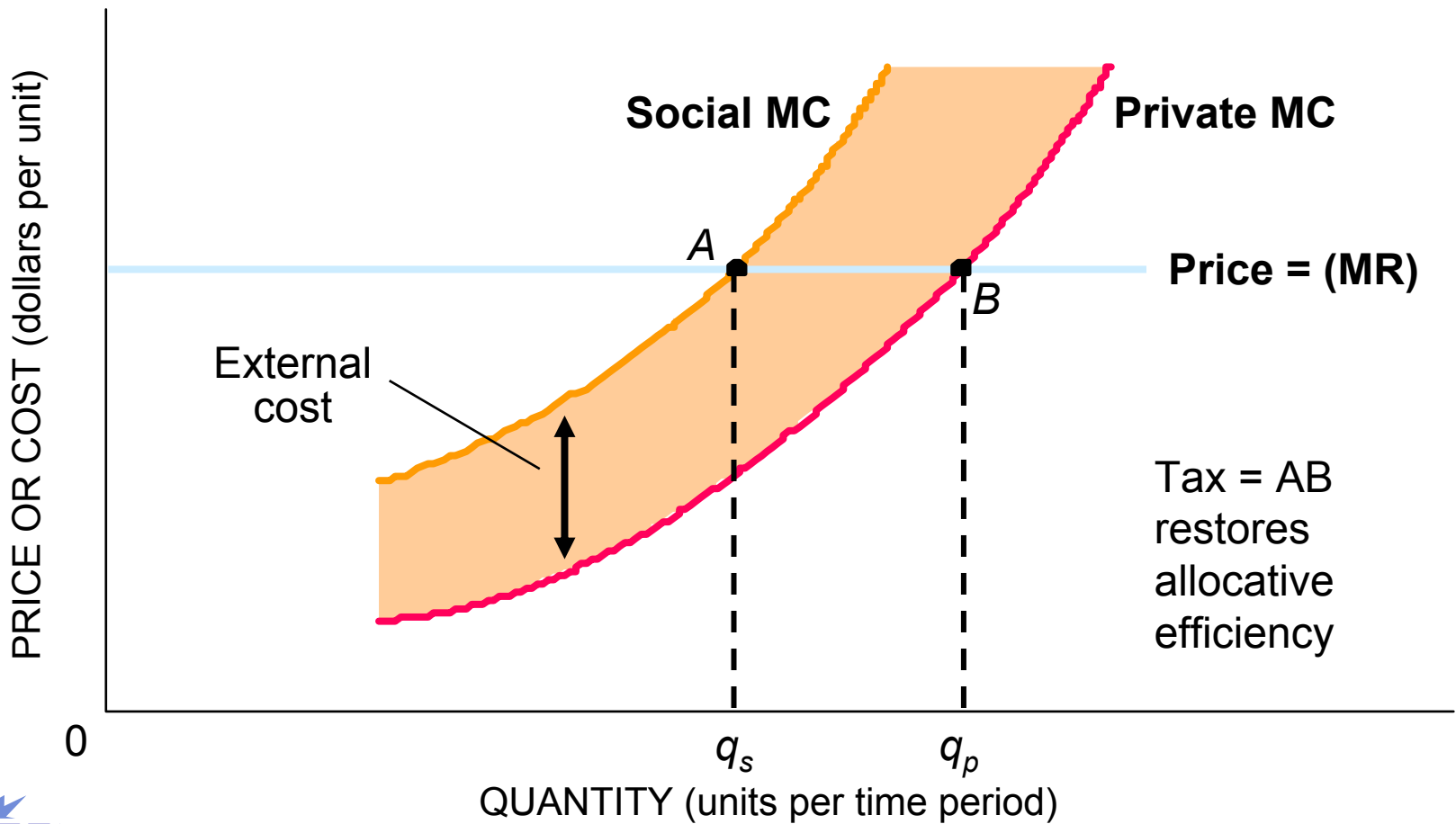


External Costs

- **External cost raises social costs relative to private costs. Producer, whether unaware, unconcerned, or powerless, does not incorporate this cost into costs of production. Thus:**
- **$P = MPC < SMC$ (alternatively $MPB > MSB$)**
 - Overprovision (e.g. goods causing pollution)
 - Overuse (goods from common resource)



External Costs

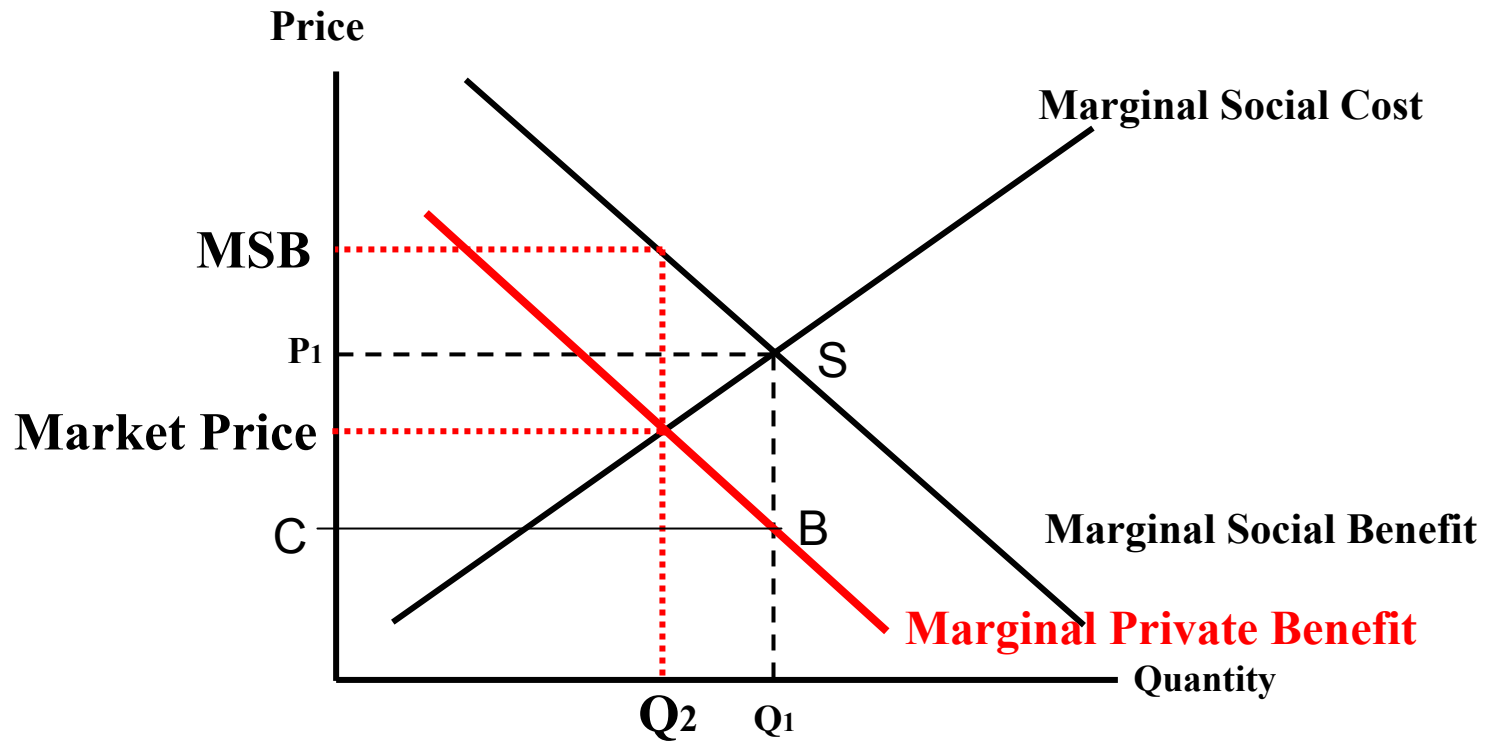


External Benefit

- **Social Benefits are greater than private or individual benefit. Consumer does not anticipate or calculate social benefits of consumption. Thus**
- **$P = MPB < MSB$:**
 - Underconsumption/provision
 - E.g. education
 - Some similarity to public goods



External Benefit



3rd parties receive benefits who are not part of the original transaction. Unit subsidy of SB restores allocative efficiency



Basis for gov't intervention

- **Government action can correct or mitigate market failures through devices that “internalize the externality”**
- **How**
 - Taxes, fees
 - Create/enforce auctionable/tradeable rights
 - Subsidies
 - R&D



Challenge

- **Identification of Market Failure(s)**
 - Public good? Mixed?
 - eg. Infrastructure, homeland security
 - Externality
 - eg. Pollution reduction, GHG mitigation
 - Market power distortion
 - Cartels: supply restriction, market disruptions
 - Other Market anomalies



Challenge, Cont'd

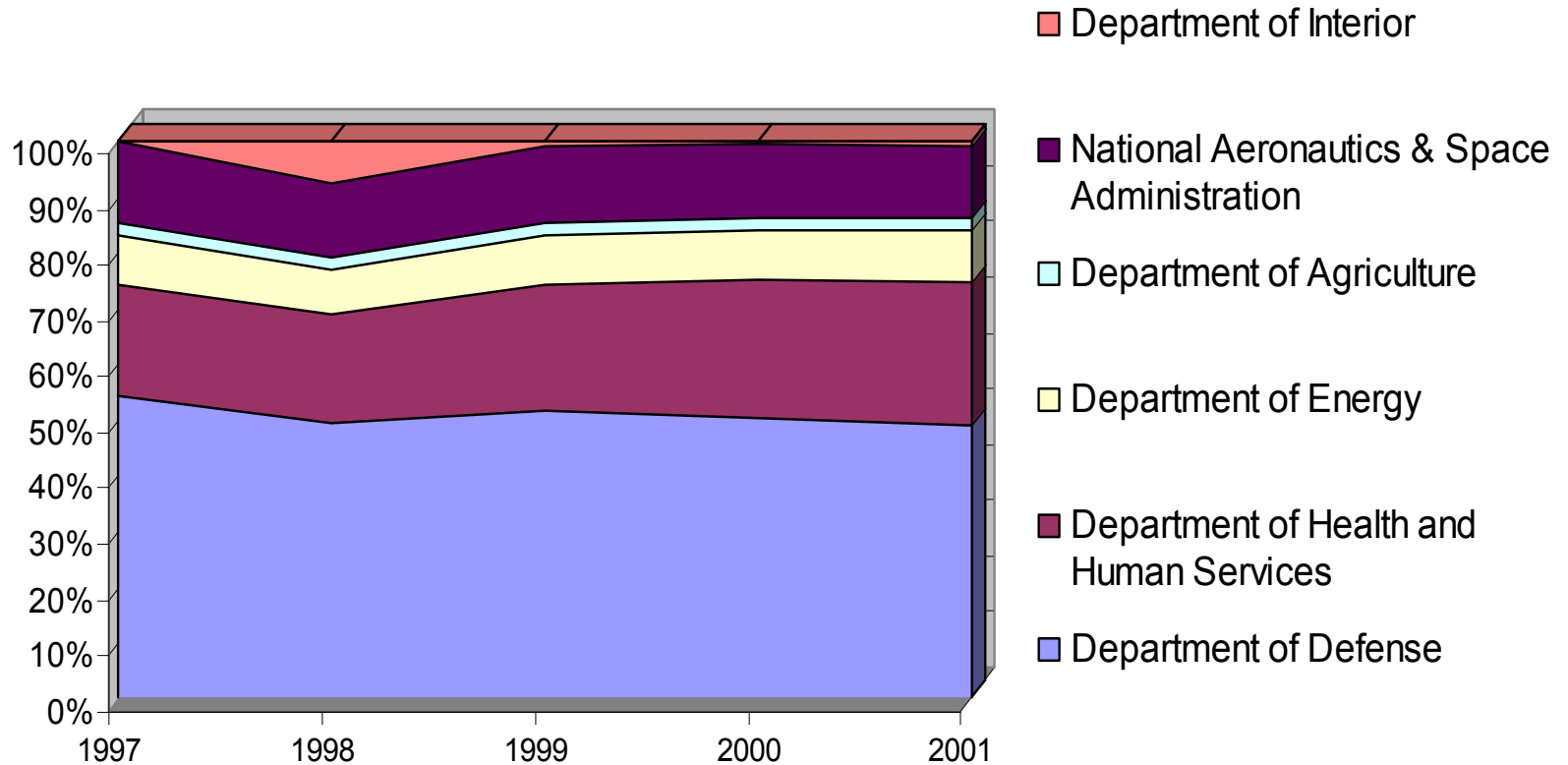
- **Efficacy of remedy**
 - Is provision adequate, more than adequate?
 - Bureaucratic interest
 - Rent seeking
 - Lobbying to create or obtain economic rents or monopoly profits
 - Crowding out?
 - Does Gov't R&D crowd out private sector R&D
 - If so, does it matter? (public good aspect?)
 - Does Gov't R&D spur private R&D?
 - spillovers



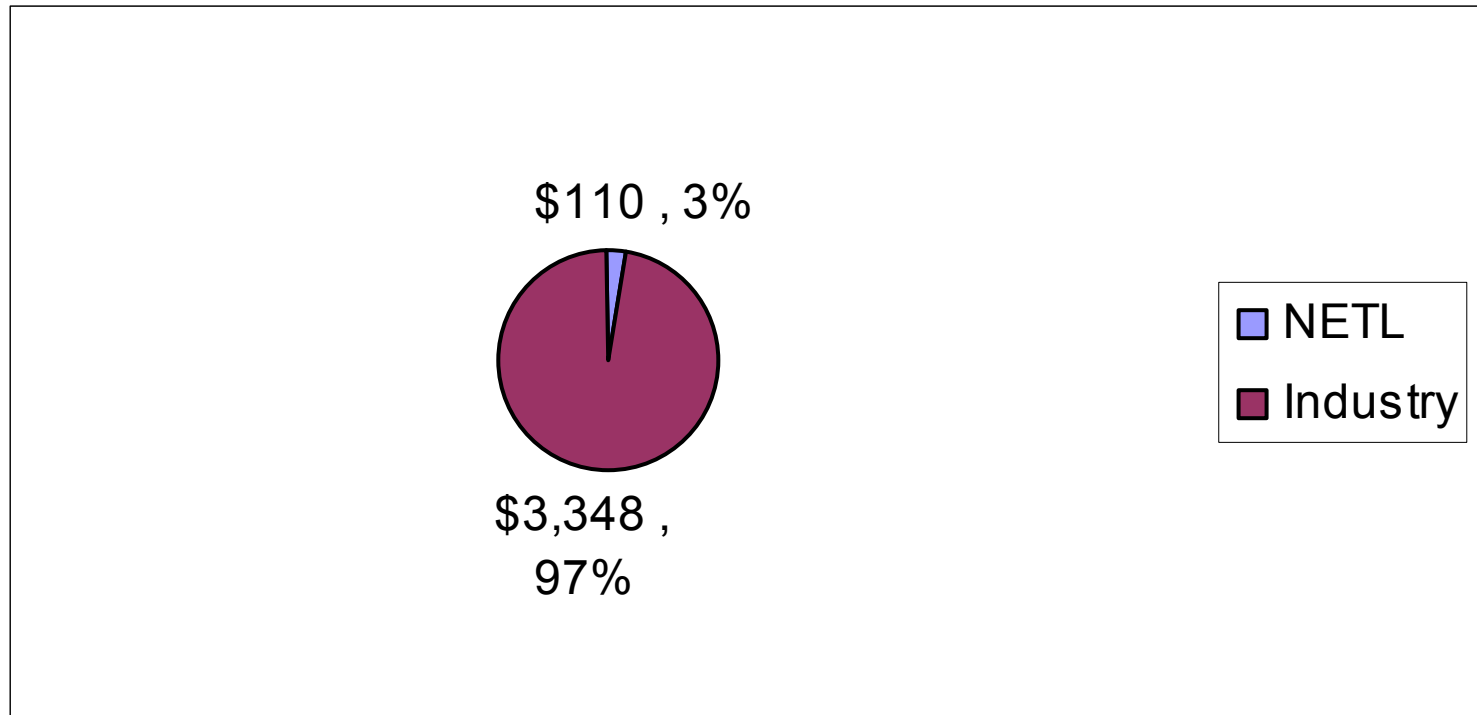
Appendix



Layout of Federal Funding for R&D



NETL O&G v. Industry



Source, Lexis, *Disclosure*, "R&D expenditures" 12 companies, FYE 12/31/2001; *S&P Company Reports*



Critique of Gov't R&D - Goolsbee

- **Goolsbee (1998)**
 - Examines employment data of scientists and engineers
 - Notes large share of gov't employment of certain professions
 - Notes large share of public R&D as % of total R&D
 - Regressions indicate that increased gov't R&D spending partially crowds out private R&D
 - Due to 'inelastic' specialized labor supply
 - Increased demand for labor leads to increased salaries in private sector, squeezing private budgets



Critique of Gov't R&D, Hall&David

- **Hall and David (2000)**
 - Analytical Model based on three types of expenditures:
 - Private sector R&D
 - Public “basic” or “grant” research
 - Not germane to particular agency mission
 - Public “contract” research
 - Supports mission of agency
 - Two-sector labor supply
 - Pose Question: Is Crowding Out Necessarily Bad
 - Examine short-run vs. long-run effects
 - E.g., short run crowding out could be reversed in long run as fixed costs/risk reduced for everyone
 - CFB; IGCC?; Fuel Cells?



Hall&David, cont'd

- Examine short-run vs. long-run effects
 - Labor supply more elastic in long run
- **Results:**
 - Analytical:
 - Public and private R&D substitutes when:
 - Gov't sector “large”
 - Labor supply inelastic
 - Gov't R&D does not enhance private productivity
 - Contribution of additional labor falls off quickly



Hall&David, cont'd

Results cont'd

– Analytical:

- Public and private R&D complements when:
 - Gov't sector “small”
 - Labor supply elastic
 - Gov't R&D enhances private productivity (either directly or through knowledge transfer)
 - Contribution of additional labor constant

– Empirical

- Goolsbee estimates plugged into H&D analytical model:
 - Short-run substitutes if gov't share over 22%
 - Long-run substitutes if labor supply relatively inelastic



Observations

- **Stylized models may:**
 - Overestimate labor supply inelasticity
 - Nonwhite males, females, and foreign nationals not considered
 - For many disciplines
 - Gov't salaries less than comparable private sector positions
 - Is gov't a wage taker? Or,
 - Are gov't wages “fixed”
 - “Joint” or cooperative research not considered
 - Probably complementary (Jaffe 2001)
 - Risk Abatement

