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Markets of joint products: theoretical model and policy implications

SHASTITKO A. E.
LOMONOSOV MOSCOW STATE UNIVERSITY,
RUSSIAN PRESIDENTIAL ACADEMY OF NATIONAL ECONOMY AND PUBLIC ADMINISTRATION, RUSSIAN FEDERATION
SHASTITKO A. A.
LOMONOSOV MOSCOW STATE UNIVERSITY RUSSIAN FEDERATION, NEW SCHOOL FOR SOCIAL RESEARCH, USA

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Motivation

- Antitrust cases on the Russian chemistry markets (caustic, chlorine , PVC) – cartel leads to monopolistic prices and market sharing
- Specific character of markets of joint product
- Goal – to show on the basis of standard microeconomic model the main characteristics of markets of joint products and possible logic of pricing policy of firms producing such products

Literature

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New model

- Profit maximization problem of a company producing joint products
- Different reasons for a glut
- Wastage of a glut
- Export and separate processing as alternatives of wastage

The main product and coproduct

- Marginal revenue from realization of the main product in equilibrium is higher than marginal revenues of other products
- Output level of the main product = level of realization of the main product
- Take output of the main product as a dimension
- Output of coproduct = output of the main product x fixed proportion
- Output of coproduct - Level of realization of coproduct = Glut

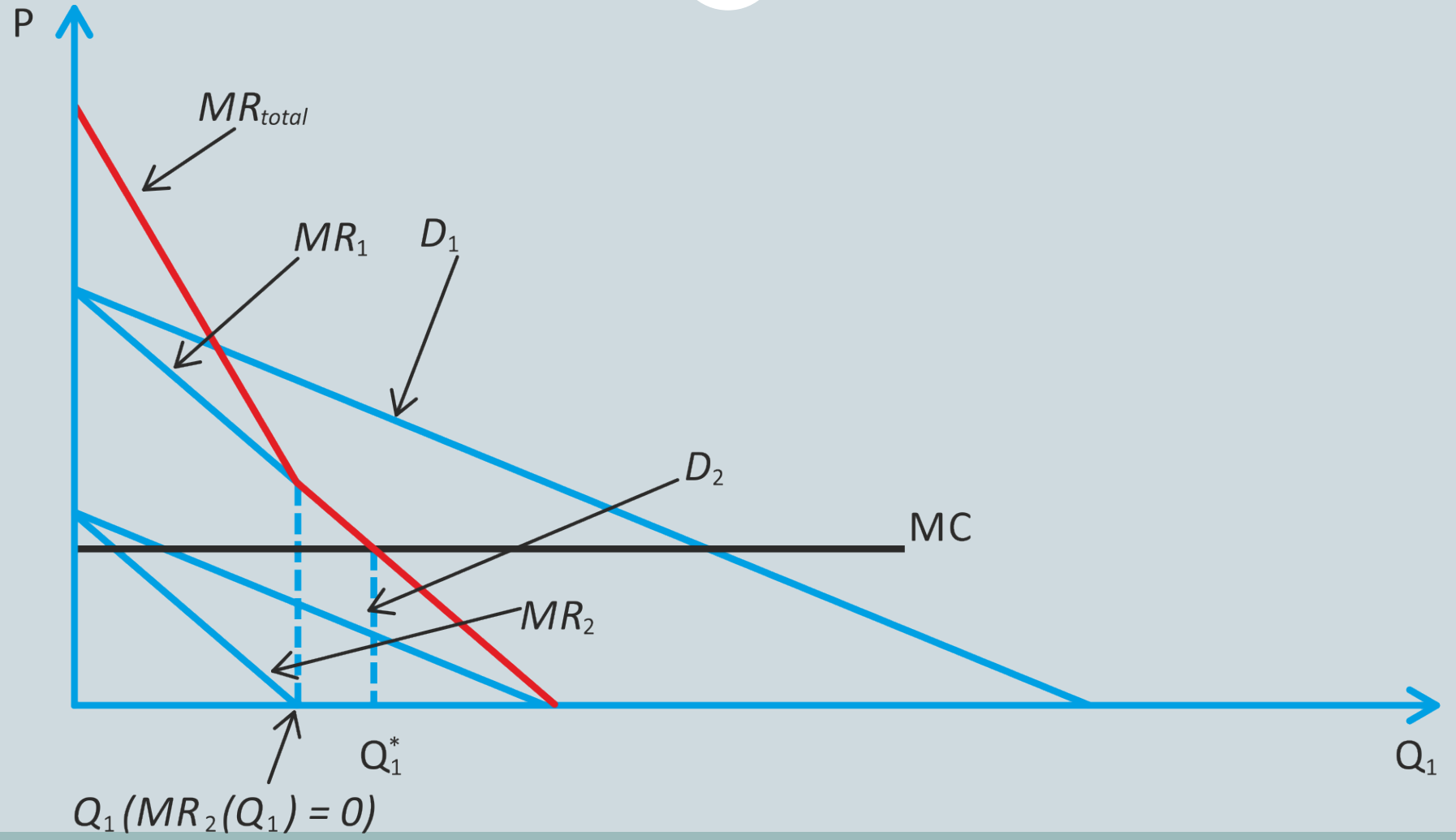
Profit maximization problem

- Objective function – total profit of a company
- Maximizing variables – output of the main product; level of realization of coproducts
- Constraints - production function with accordance to fixed proportion; and conditions that provide the possibility to achieve the optimal level of realization of coproducts.

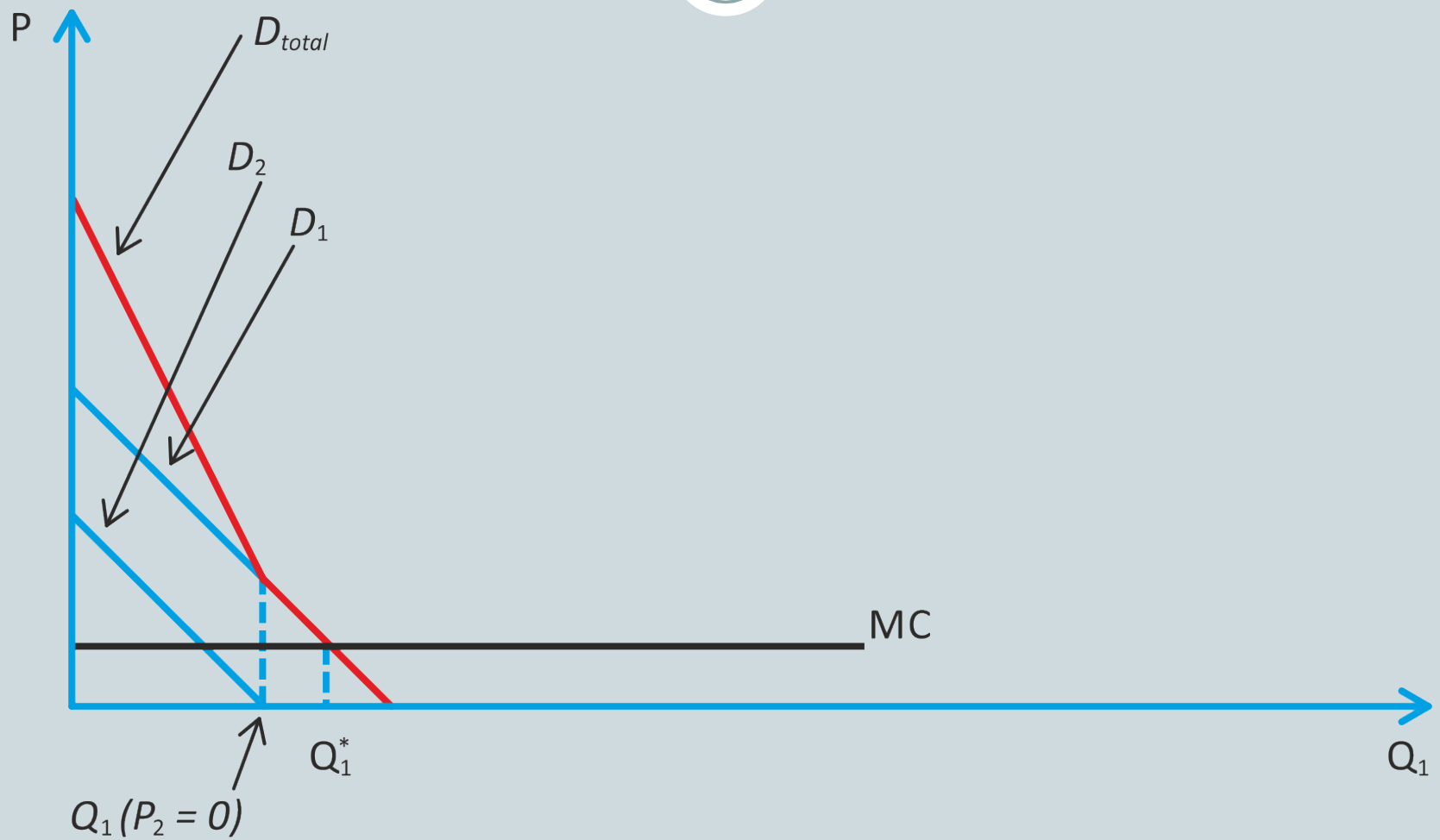
Reasons for a glut

- $\rho Q_1^* > \rho Q_1(MR_2(Q_1)=0)$, where Q_1^* **is an optimal output of the main product,** ρ is fixed proportion
- Market power
- Limited demand on competitive markets

Market power



Limited demand on competitive markets



Wastage of a glut

- $max^{\pi}_{Q_1,Q_2'} = max^{(a_2-b_2Q_2')Q_2'+(a_1-b_1Q_1)Q_1-\mathrm{TC}(Q_1)-\mathrm{d}(\rho Q_1-Q_2')}_{Q_1,Q_2'}$

$$\text{s.t. } Q_2' \leq \rho Q_1$$

- $\pi = P_1Q_1 + P_2Q_2' - TC(Q_1) - d(\rho Q_1 - Q_2')$

where Q_2' is the level of realization of coproduct

- Three cases:

1. costless wastage (d=0),
2. wastage involving cost (d>0),
3. wastage is impossible ($Q_2'^{*}=\rho Q_1^{*}$).

Conclusions 1

- If chlorine is the main product optimal, its output is less than output that corresponds to the point, where its marginal revenue is equal to marginal cost. Optimal level of realization of caustic is greater than the level corresponding to the point, where its marginal revenue is equal to zero.
- On competitive markets situation is the same (optimal level of realization of caustic is its maximum level of realization)

Export and separate processing as alternatives of wastage

- $\rho Q_1 - Q_2' \geq Q_2''$, where Q_2'' the level of realization of coproduct on the "new" market

- Three cases:

1. Market power on both markets
2. Competition on the "new" market and market power on the "old" market
3. Competition on both markets

Conclusions 2

- The price for caustic on the “new” market can fall below cost of transformation or separate processing in each case
- The price for chlorine can be higher than the marginal cost even on the market of chlorine is competitive, when realization of caustic on “new” market is impossible (conclusion 1)

General conclusion

- Specific character of markets of joint products should be taken into account in order to make a conclusion about the nature and legitimacy of pricing policy of companies producing such products

Thank you for your attention!

SHASTITKOANASTASIA@GMAIL.COM