

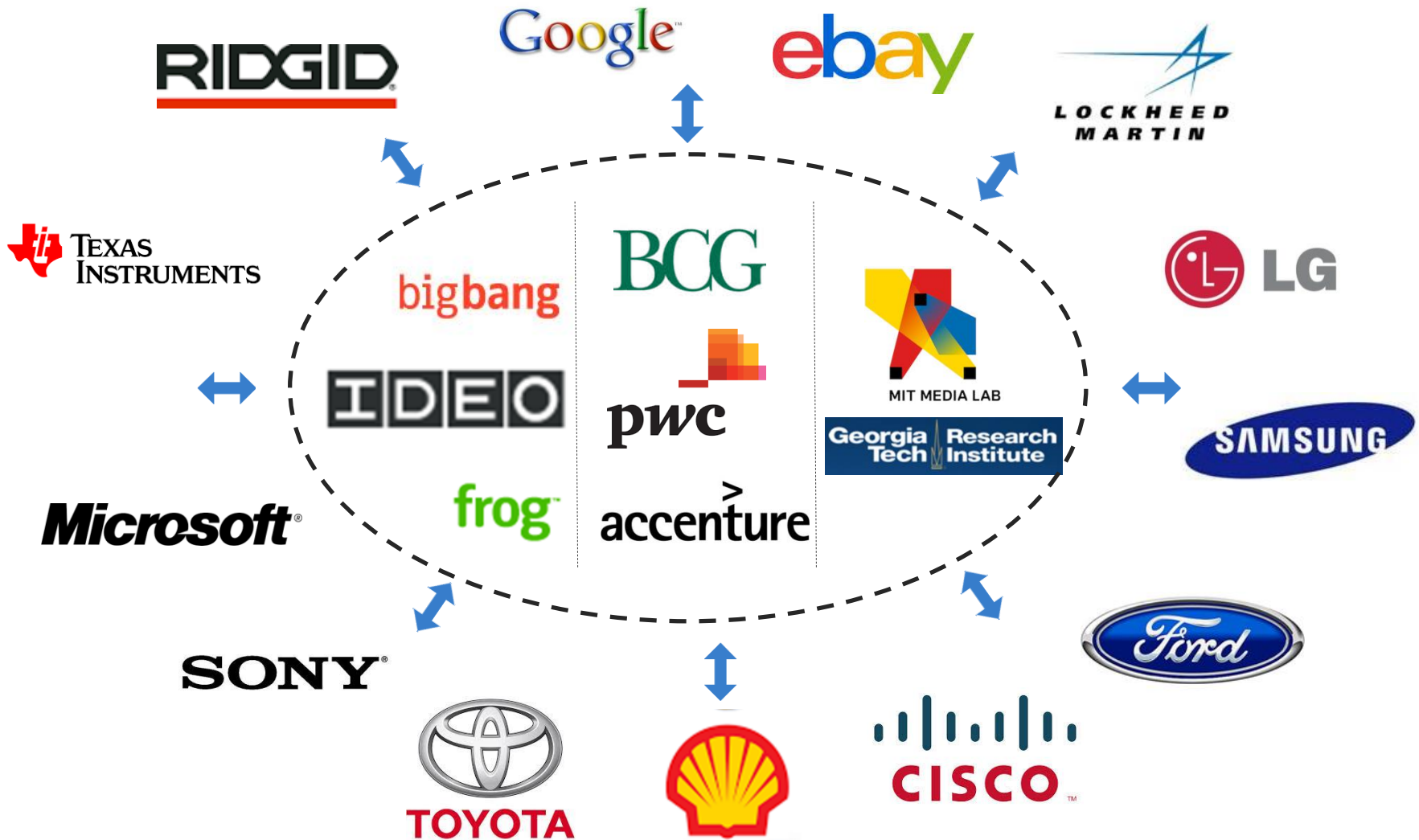
Knowledge Outsourcing for Multiple Buyers

Presented by Jaeseok Lee

Joint work with Cheryl Gaimon and Karthik Ramachandran
Scheller College of Business, Georgia Institute of Technology

May 2017

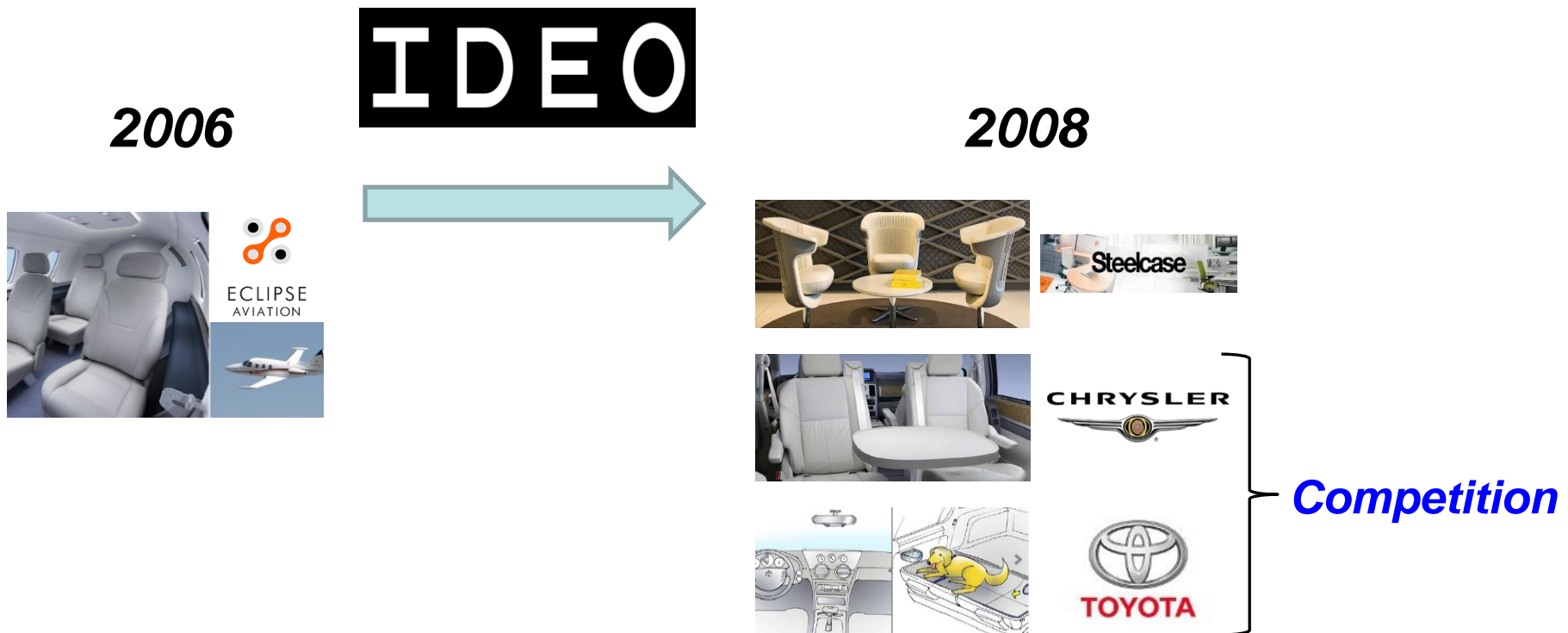
Examples of Knowledge Outsourcing



Knowledge outsourcing for Multiple Buyers

- IDEO works with several hundreds different firms in over 40 industries.
- IDEO works on 60 to 80 products at a time.

By Hargadon & Sutton (1997, ASQ)



*Source: IDEO webpage

Related Literature

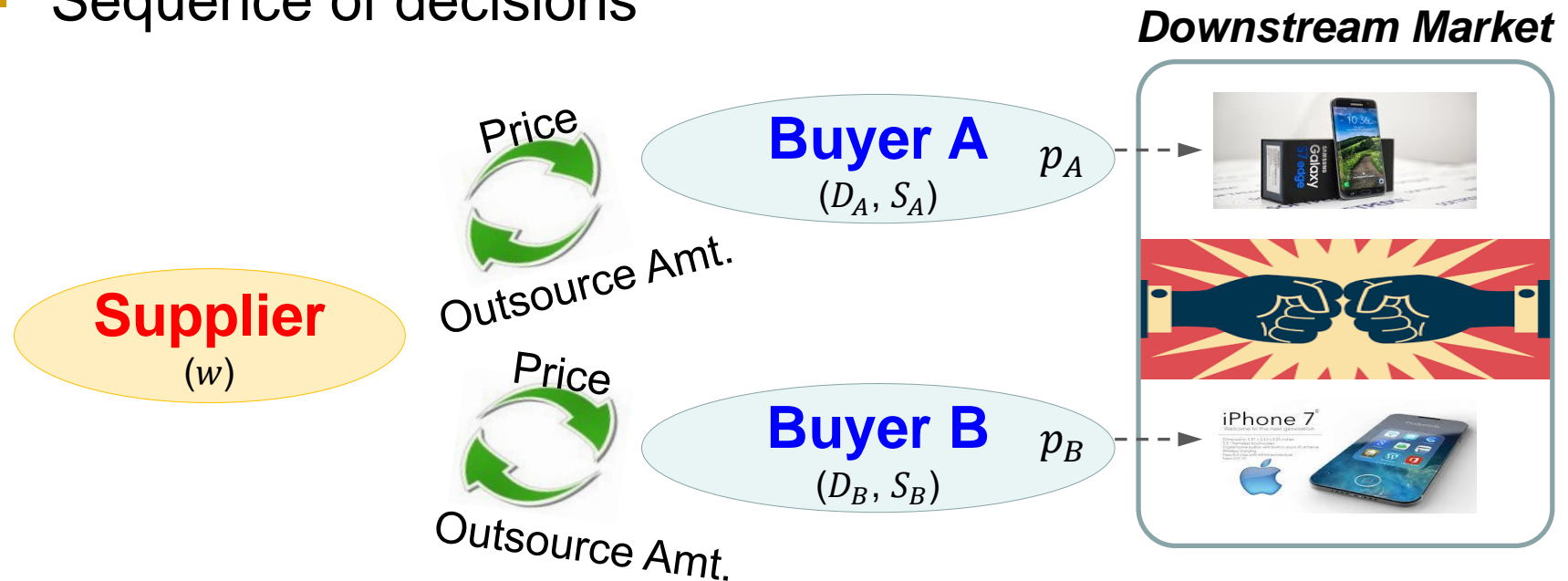
- Market for technology
 - Arora & Fosfuri (2003), Erat et al. (2013)
- Market for information
 - Iyer & Soberman (2000), Arora & Fosfuri (2005)
- Knowledge Intensive Business Services (KIBS)
 - Miles et al. (1995), Consoli & Elche-Hortelano (2010), Probert et al. (2013), Hargadon & Sutton (1997), HBR (1999)

Research Questions

- Under what conditions does *a buyer pursue knowledge outsourcing* from the supplier?
- How does *knowledge outsourcing* impact *buyers' competition strategies* in the downstream market?
- Under what conditions does the supplier want to *serve both buyers versus one buyer*?

Knowledge Outsourcing with Competition

- Sequence of decisions



(Buyers move simultaneously.)

- Buyers are *Symmetric*, supplier charges *Common price*.

Model (Duopoly, Both Buyers A & B Served)

- Downstream market competition

- $U_A = R + D_A + \phi S_A - p_A - \theta x,$

- $U_B = R + D_B + \phi S_B - p_B - \theta(1 - x).$

- Sales: $q_A = x^*$, $q_B = 1 - x^*$, where $x^* = \arg\{U_A(x) = U_B(x)\}$.

- Buyers' problem

- $Max_{S_i, D_i > 0} \Pi_i^{AB} = q_i p_i - c D_i^2 - w S_i - g S_i^2,$

where $p_i = \arg \underset{p_i > 0}{Max} \Pi_i^{AB}$ and $i \in \{A, B\}$.

- Supplier's problem

- $Max_{w > 0} \Pi_s^{AB} = w(S_A + S_B) - c_s(S_A + S_B)^2.$

Monopoly Analysis

When the supplier **serves buyer A in monopoly**,

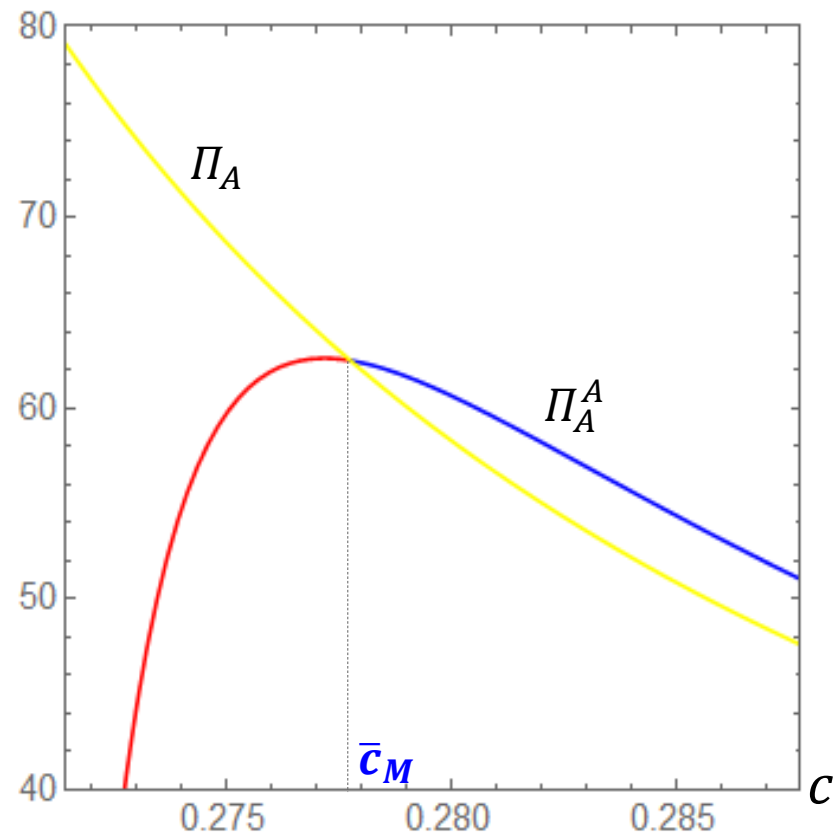
- If the **cost of internal knowledge development (c) is lower than**

the threshold ($\frac{1}{4\theta} < c < \bar{c}_M$),

buyer A does not outsource knowledge from the supplier.

- Otherwise ($\bar{c}_M \leq c$), **buyer A outsources**,

where $\bar{c}_M = \frac{g}{4g\theta - \phi^2}$.



Π_A : Buyer A's profit **without** outsourcing

Π_A^A : Buyer A's profit **with** outsourcing

Duopoly - Only Buyer A Served (cont.)

When the supplier **serves only buyer A in duopoly**,

- *i)* If the **cost of internal knowledge development (c) is lower**

than the threshold ($\frac{1}{9\theta} < c < \bar{c}_D$), **buyer A does not outsource**

knowledge from the supplier. Otherwise ($\bar{c}_D \leq c$), **buyer A**

outsources, where $\bar{c}_D = \frac{c_s + 2g}{9(c_s + 2g)\theta - \phi^2}$. (note $\bar{c}_M = \frac{g}{4g\theta - \phi^2}$)

- *ii)* Further, $\bar{c}_D < \bar{c}_M$. If $\bar{c}_D < c < \bar{c}_M$, Buyer A **outsources**

knowledge from the supplier **only if there is a competitor**.

Duopoly - Only Buyer A Served (cont.)

- *Impact of knowledge outsourcing on **buyers' competition strategies**:*

*If the **supplier serves only buyer A** in **duopoly**,*

- ***Buyer A** always charges **higher price** than **buyer B** in the downstream market.*
- ***Buyer A** pursues **premium price** strategy by **increasing the amount of knowledge** delivered to the market as **competition** increases.*
- ***Buyer B** pursues **low price** strategy by **reducing the amount of in-house knowledge development** as **competition** increases.*

Duopoly - Both Buyers A & B Served

- Participation of both buyers A and B

Outsourcing?		Buyer B	
		Yes	No
Buyer A	Yes	$(\underline{\Pi_A^{AB}}, \underline{\Pi_B^{AB}})$	(Π_A^A, Π_B^A)
	No	(Π_A^B, Π_B^B)	$(\underline{\Pi_A}, \underline{\Pi_B})$

- Nash Equilibrium

- If $\bar{c}_D \leq c$, **both buyers A and B outsource** ($\Pi_A^{AB} \geq \Pi_A^B$, $\Pi_B^{AB} \geq \Pi_B^A$).
- If $\frac{1}{9\theta} < c < \bar{c}_D$, **no one outsources** ($\Pi_A > \Pi_A^A$, $\Pi_B > \Pi_B^B$).

Duopoly - Both Buyers A & B Served (cont.)

Serving Two buyers versus One buyer:

- i) If a **buyer's KD cost (c)** is **lower than the threshold** ($\frac{1}{9\theta} < c < \bar{c}_S$),

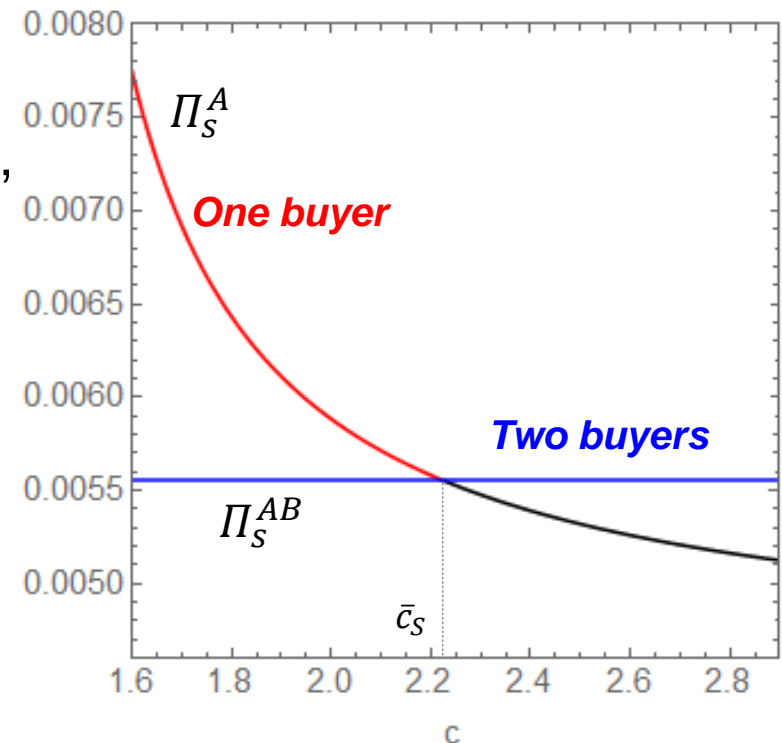
the supplier serves **only one buyer**.

Otherwise ($\bar{c}_S \leq c$), the supplier serves **both buyers A and B**,

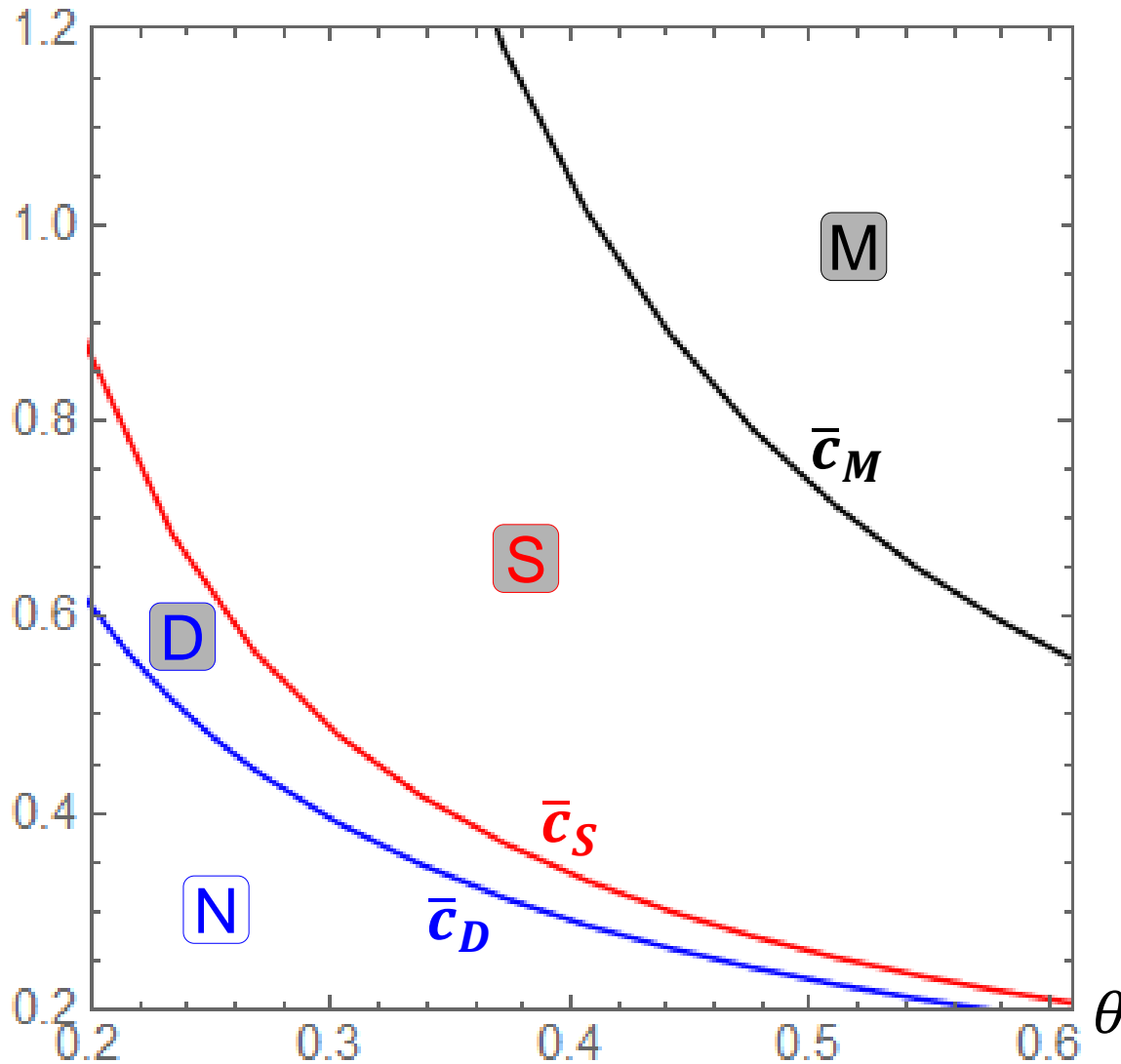
where $\bar{c}_S = \frac{g}{9g\theta - \phi^2}$.

- ii) Further, $\bar{c}_D < \bar{c}_S$. If $\bar{c}_D < c < \bar{c}_S$,

even if **both buyers pursue knowledge outsourcing**, the **supplier serves only one buyer**.



Summary of Analysis



M Supplier serves monopolist.

S Supplier serves both buyers in duopoly.

D Both buyers in duopoly pursue outsourcing but supplier serves only one buyer.

N No outsourcing

Contributions to Literature

- Identify the threshold below which the supplier provides *exclusive service* for *one buyer* rather than serving two buyers.
- Show how the *competition structure* (monopoly versus duopoly) impacts a buyer's knowledge outsourcing.
- Show how *knowledge outsourcing* impacts buyers' *competition strategies* in the downstream market.

Thank you!