



아주대학교
AJOU UNIVERSITY



ABIZ Online Seminar Series

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Freeman School of Business

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Speaker Bio

□ Academic Background

- Joined Tulane in 2021
- PhD in Information Systems & Operations Management at Univ. of Florida
- MS in Industrial & Management Engineering at POSTECH
 - Research/Teaching Assistant at POSMIT Lab under the supervision of Prof. Euiho Suh

□ Teaching

- Introduction to Business Analytics; Managerial Operations Analysis

□ Research

- Domain: Retail Operations, e-Commerce, Supply Chain Management
- Method: Optimization, Game-theory, Machine Learning

Speaker Bio – Tulane University

□ Tulane University

- Private university located in New Orleans, Louisiana (14,062 Students, 1,200 Faculty)
- Founded in 1834 as a medical state college → a private university in 1884



Speaker Bio – Tulane University

□ Freeman School of Business, Tulane University

- Established in 1914, a founding member of AACSB
- 3,252 undergrad, 570 grad students, 106 full-time faculty, 6 areas (accounting, business & legal studies, finance, management, management science, marketing)



Speaker Bio – Research Interest

❑ Research Interest

Retail Operations in Supply Chains

❑ Supplier Encroachment

❑ Retailer Encroachment

❑ Emergence of new consumers

❑ Contracts

❑ Product Line Design

❑ Add-on/Bundling

How
Retail Operations
Impact on
Supply Chains

IT-Enabled e-Commerce

❑ Digital Goods and Piracy

❑ VR / AR applications

❑ Fake Review and Detection

❑ Policy in e-Commerce

Supplier Encroachment through Online Marketplaces

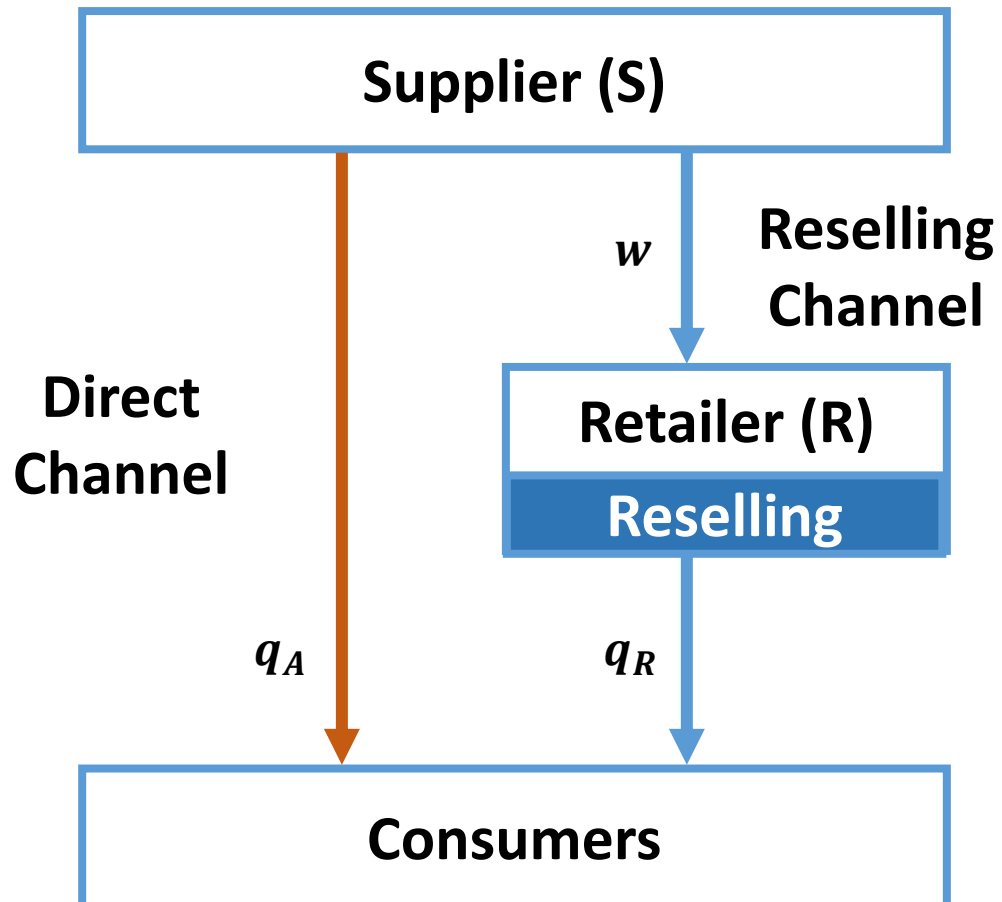
Hongseok Jang
Tulane University

Joint work with:
Quan (Ben) Zheng,
University of Science and Technology of China

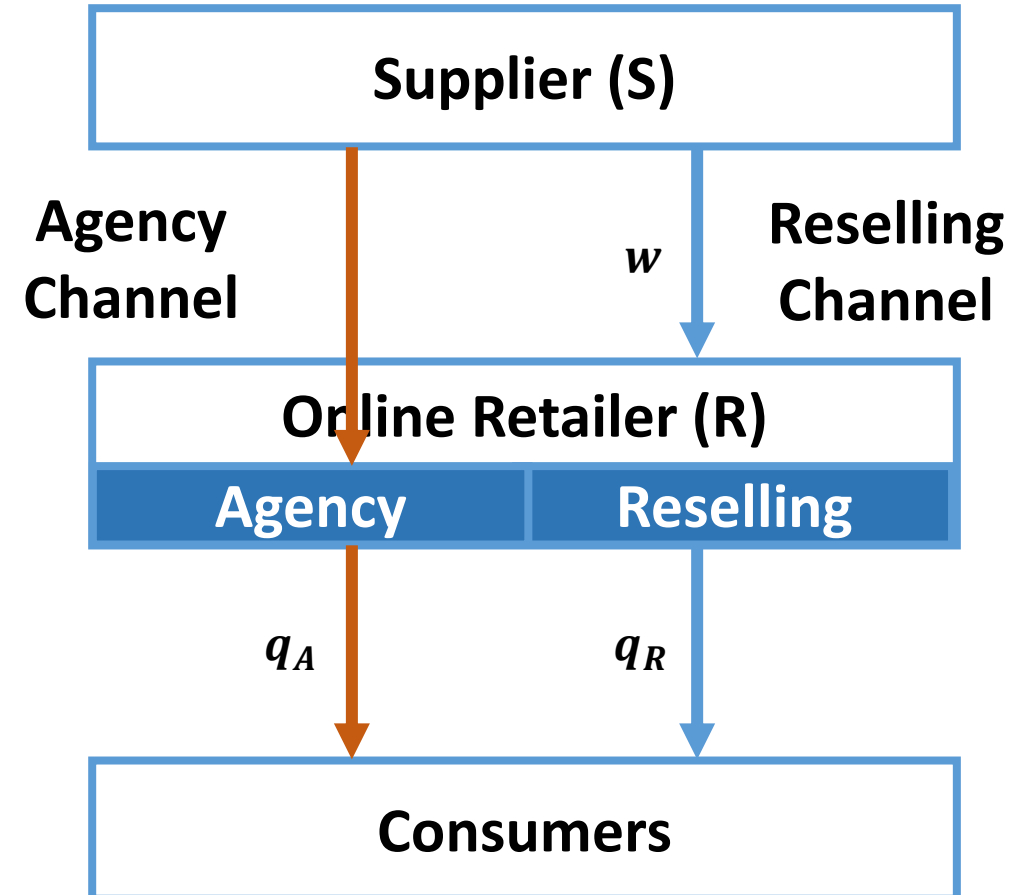
Xiajun Amy Pan,
University of Florida

Supplier Encroachment

❑ Traditional Supplier Encroachment



❑ Supplier Encroachment through Online Marketplaces



Online retailers Offering both Channels



Reselling Channel



Suppliers sell their products through retailers based on reselling contract

Agency Channel (marketplace)

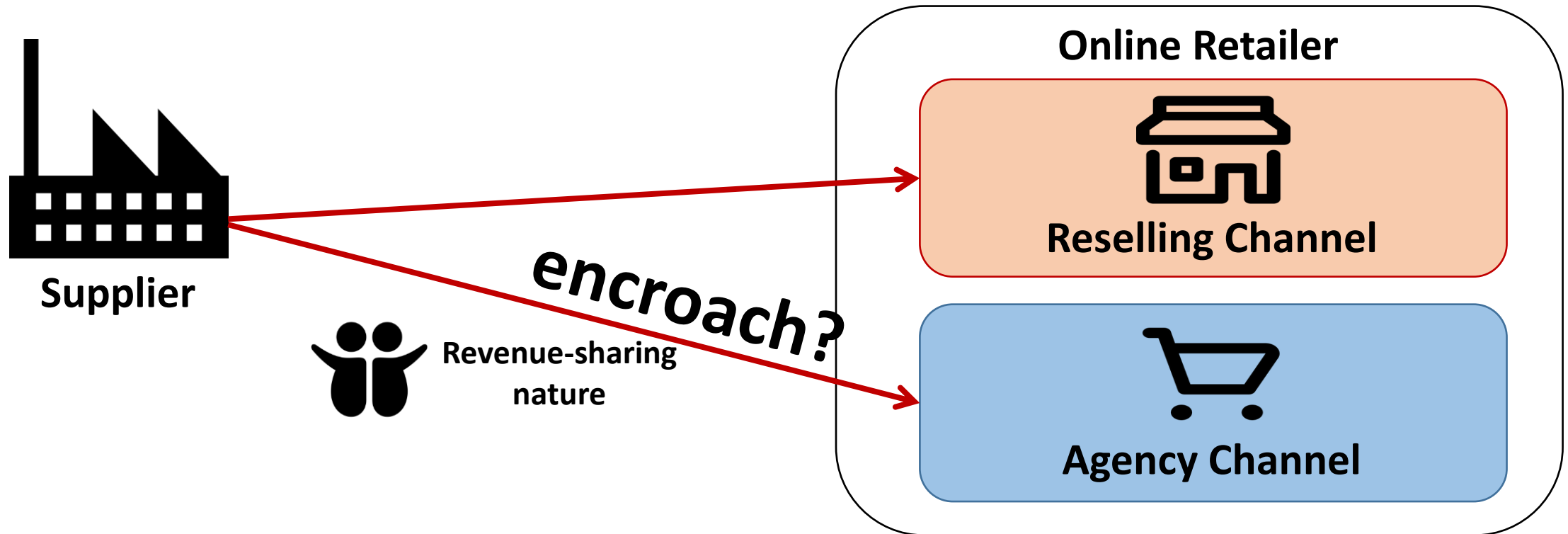


Suppliers sell their products on retailers' online marketplaces based on agency contract

❑ Other Examples



Supplier's Encroachment Decision



Amazon Hybrid Selling Model: Capitalizing On Seller Central & Vendor Central

A Hybrid Account on Amazon is a model of selling as both a vendor and a seller. Amazon Vendor Central (1P) vs. Seller Central (3P): Pros and Cons

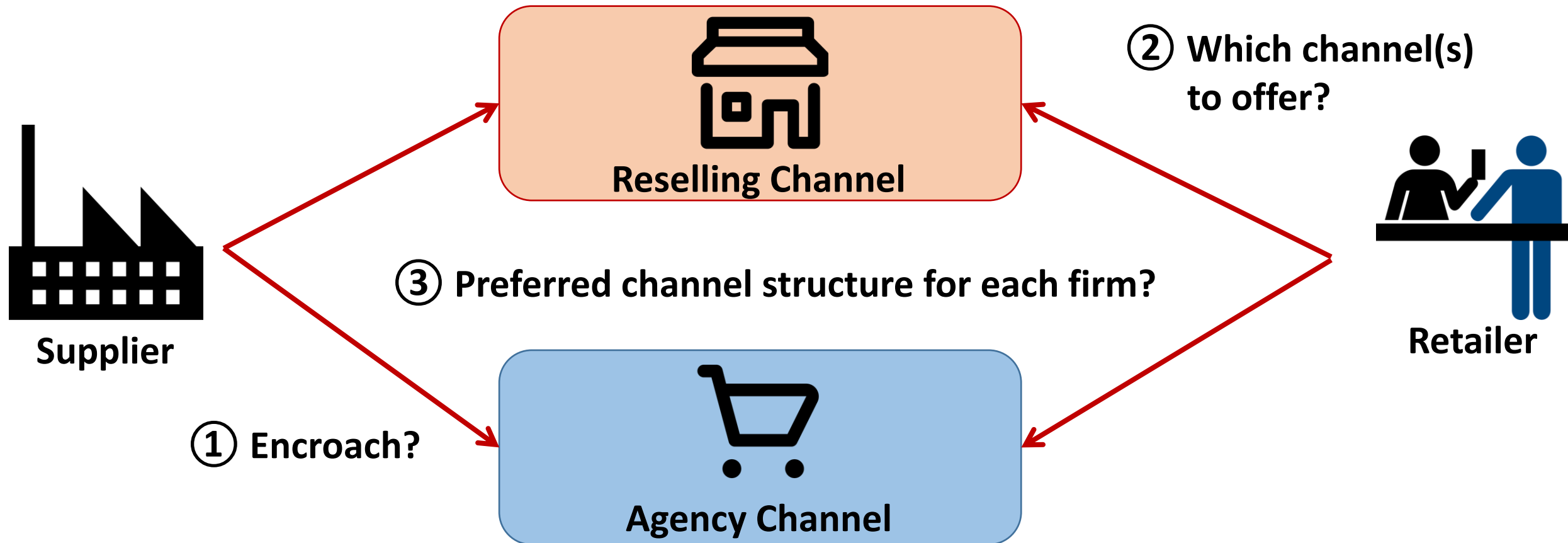
<https://www.bebolddigital.com/blog/amazon-hybrid-selling-seller-central-vendor-central>

The Amazon Hybrid Model: Take Control of Your Growth on Amazon

BY GREG SWAN | OCT 2, 2018 | AMAZON & MARKETPLACES

<https://tinuiti.com/blog/amazon/amazon-hybrid-model/>

Research Questions



Literature Review

Traditional Supplier Encroachment

- **Early works in supplier encroachment** (e.g., Chiang et al. 2003, Cattani et al. 2006, Arya et al. 2007)
- **Double marginalization** (Chiang et al. 2003)
- **Info. Asymmetry, Quality decisions** (Li et al. 2014, 2015, Ha et al. 2016)

Channel Strategies between Reselling and Agency Channels

- **Market players' preferences** (e.g., Hagiwara and Wright 2015, Abhishek et al. 2016, Tan and Carrillo 2017)
- **Upstream competition and order fulfillment cost** (Tian et al. 2018)
- **Retail pass-through** (Hu et al. 2022)

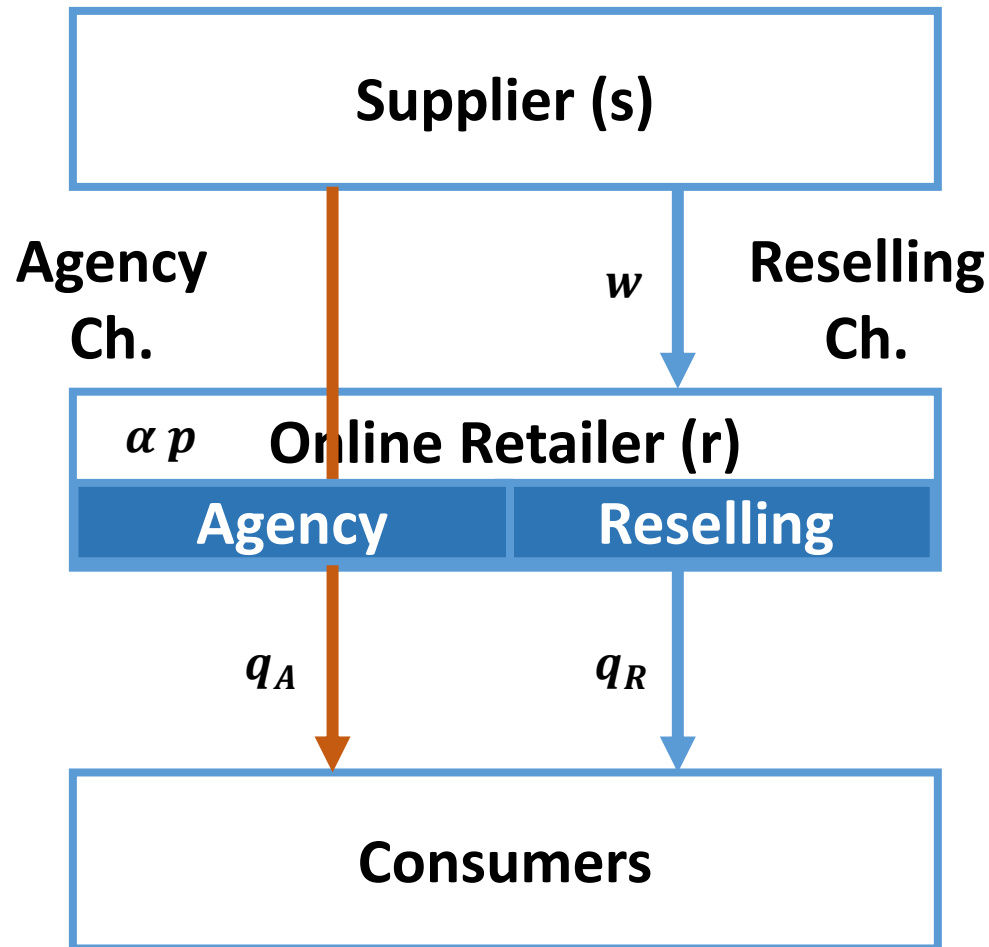
Supplier Encroachment in e-Commerce

- **Information sharing between a retailer and a supplier** (Ha et al. 2021a)
- **Service effort** (Ha et al. 2021b)
- **Control over direct channel** (Liu et al. 2021)

1. **Supplier's encroachment decisions** in revenue-sharing nature
2. **Retailer's channel offering decisions** when the supplier can encroach
3. Impact of supplier encroachment on consumers and supply chains

Model Structure and Strategy

□ Model Structure



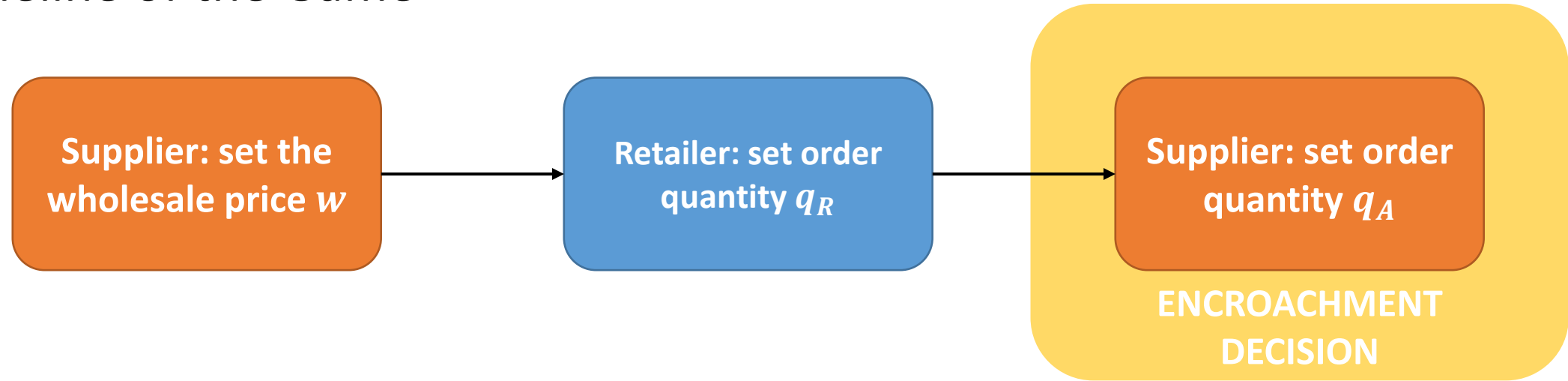
□ Supplier's Channel Strategy

- **Reselling:** selling to the reselling channel
- **Hybrid:** selling on both channels

w : wholesale price
 p : market clearing price
 α : commission rate

Timeline of the Game and Demand Func.

□ Timeline of the Game



□ Linear Demand

$$p(q_A, q_R) = a - q_A - q_R$$

p : Market clearing price

a : Market potential of the product ($a = 1$)

q_A : Ordered quantity in the agency channel

q_R : Ordered quantity in the reselling channel

Profit Functions

□ Profit Functions

- Supplier's Profit Maximization Problem $\rightarrow \hat{q}_A$

$$\max_{q_A \geq 0} \pi_S(q_A; q_R, w) = \underbrace{((1 - \alpha)(1 - q_A - q_R) - c)q_A}_{\text{Profit from the agency channel}} + \underbrace{(w - c)q_R}_{\text{Profit from the reselling channel}}$$

Profit from the agency channel

Profit from the reselling channel

- Retailer's Profit Maximization Problem $\rightarrow \hat{q}_R$

$$\max_{q_R \geq 0} \pi_R(q_R; w) = \underbrace{\alpha(1 - \hat{q}_A(q_R) - q_R)\hat{q}_A(q_R)}_{\text{Profit from the agency channel}} + \underbrace{(1 - \hat{q}_A(q_R) - q_R - w)q_R}_{\text{Profit from the reselling channel}}$$

Profit from the agency channel

Profit from the reselling channel

- Supplier's Profit Maximization Problem $\rightarrow w^*$

$$\max_{w \geq c} \pi_S(w) = \underbrace{((1 - \alpha)(1 - \hat{q}_A(\hat{q}_R(w)) - \hat{q}_R(w)) - c)\hat{q}_A(\hat{q}_R(w))}_{\text{Profit from the agency channel}} + \underbrace{(w - c)\hat{q}_R(w)}_{\text{Profit from the reselling channel}}$$

Profit from the agency channel

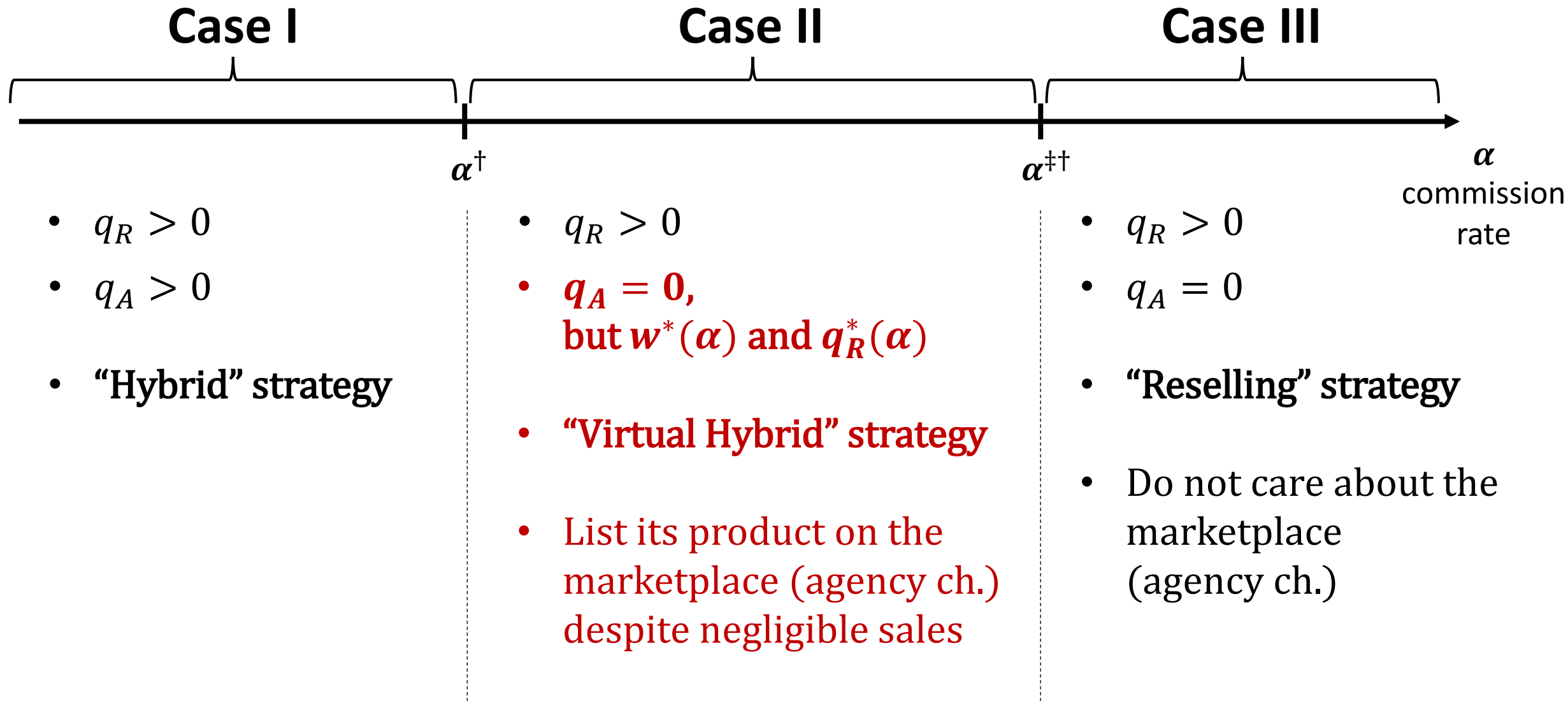
Profit from the reselling channel

α : commission rate

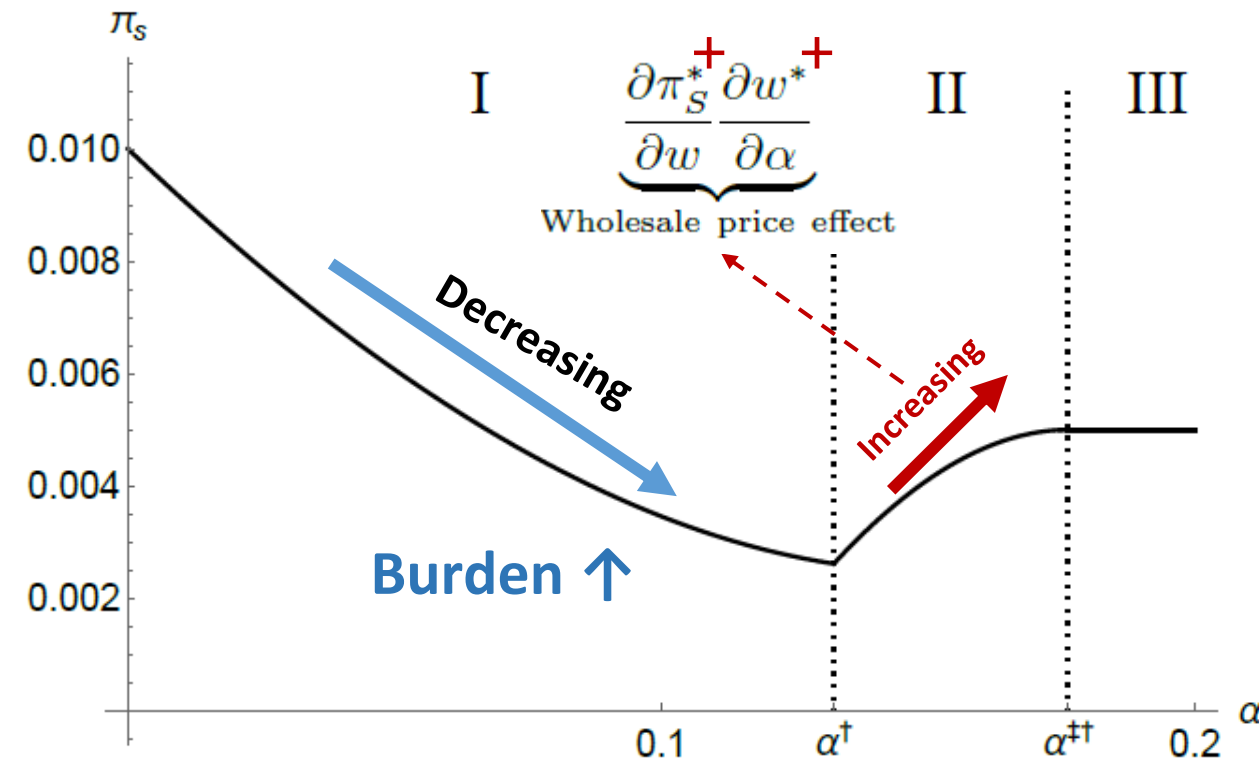
c : marginal production cost

Backward
Induction

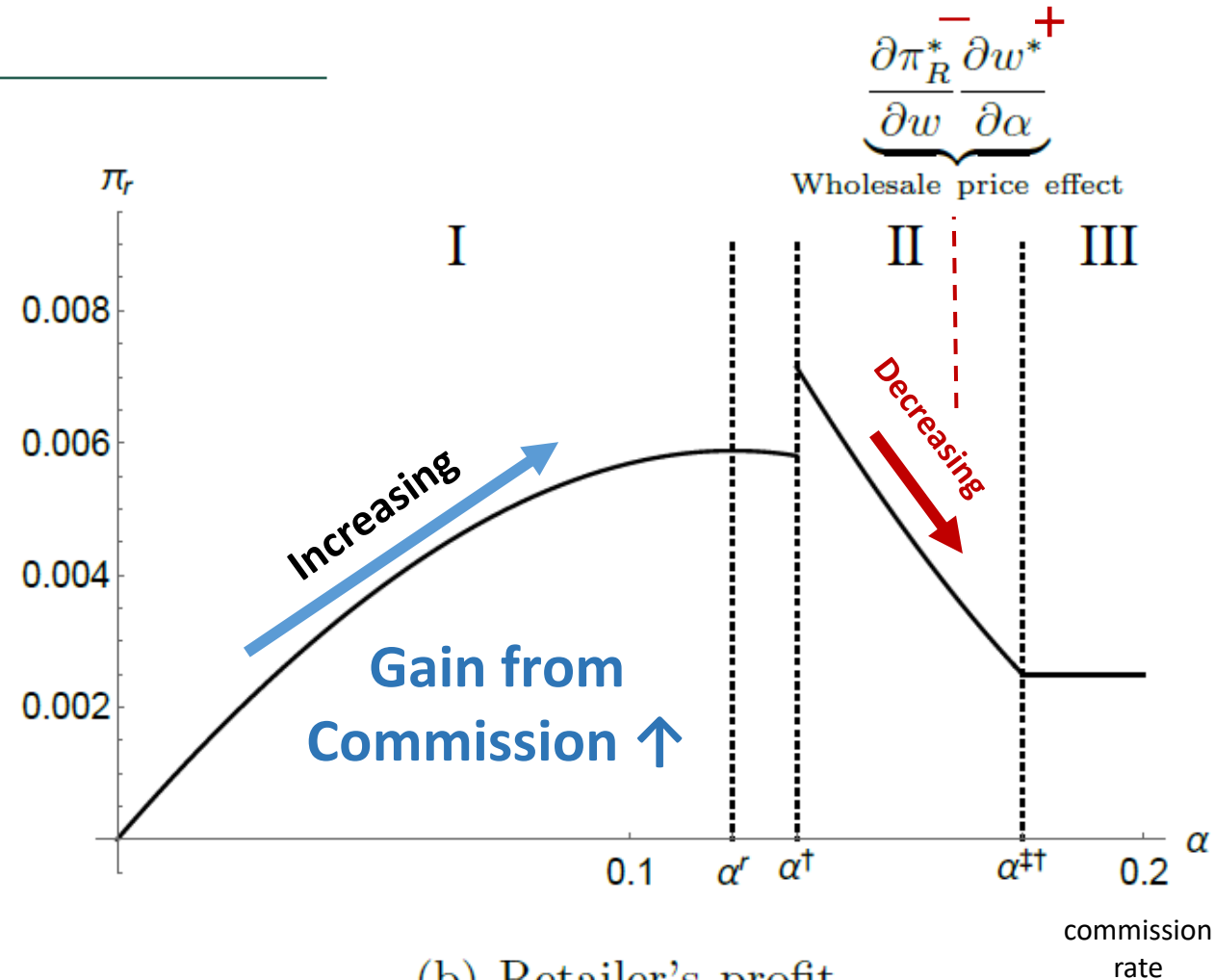
Equilibrium Structure



Comparative Statics



(a) Supplier's profit



(b) Retailer's profit

Virtual
Hybrid

Retailer: large q_R
 $\therefore q_A = 0$

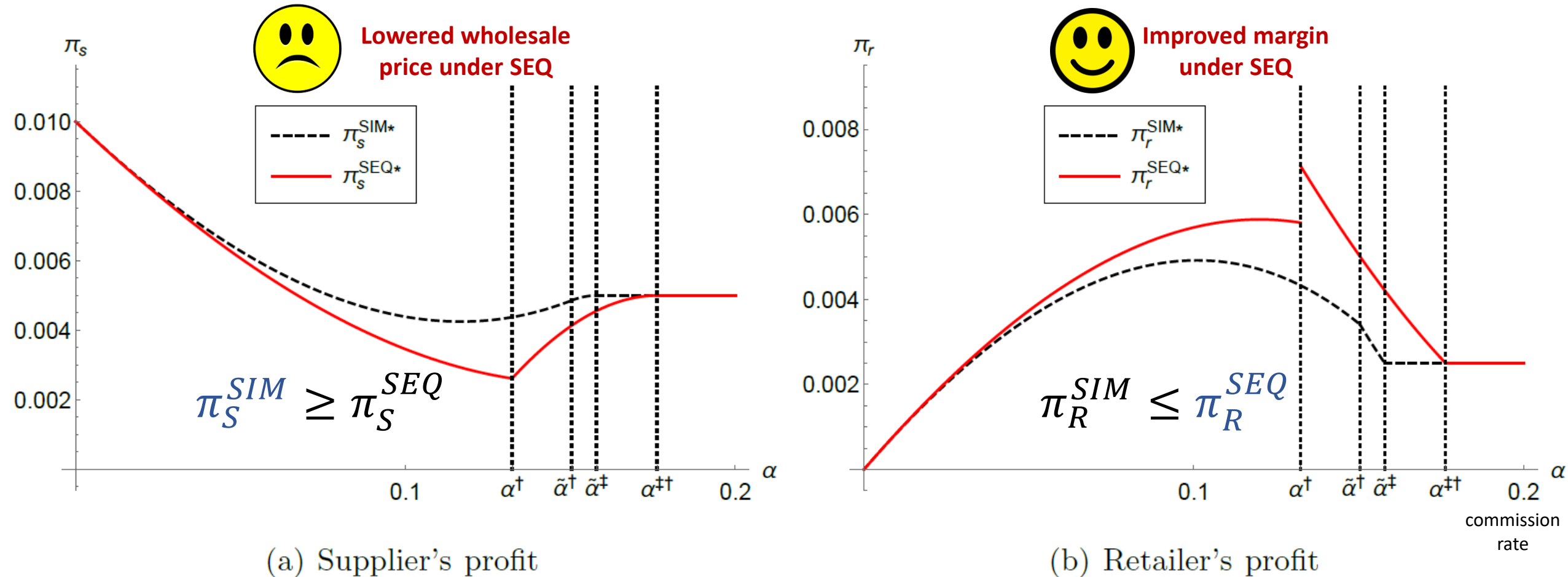
of the ex
(e.g., Ar

Supplier:
increase w as $\alpha \uparrow$

of the ex
(e.g., Ar

Supplier: better-off
Retailer: worse-off

Ext. 1. Sequential Ordering (SEQ) vs. Simultaneous Ordering (SIM)



(a) Supplier's profit

(b) Retailer's profit

SEQ
order

Supplier lowers w
to encroach

to
SEQ

Retailer: R Ch. and A Ch.
are complementary

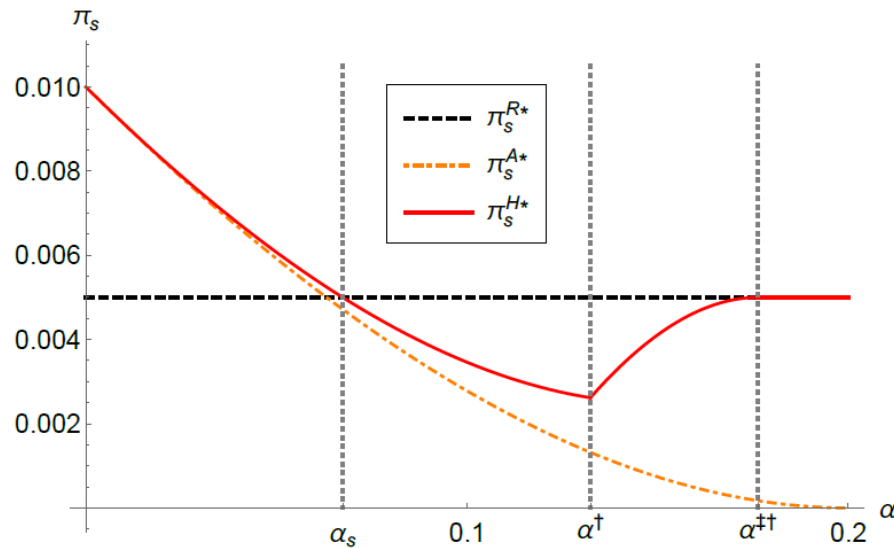
to
SEQ

\therefore Retailer is **less**
willing to Set q_R high

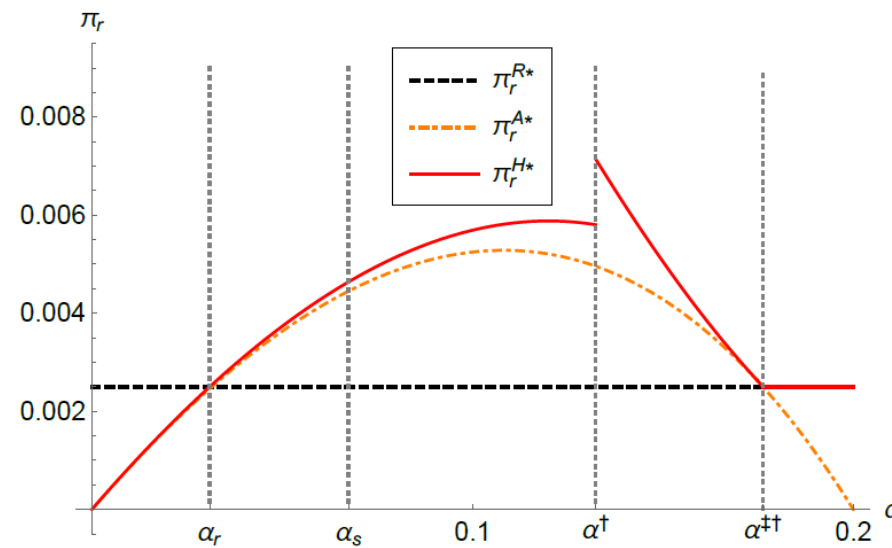
Ext. 2. Retailer's Channel Offering Decision (1/3)

□ Retailer's Strategic Channel Offering

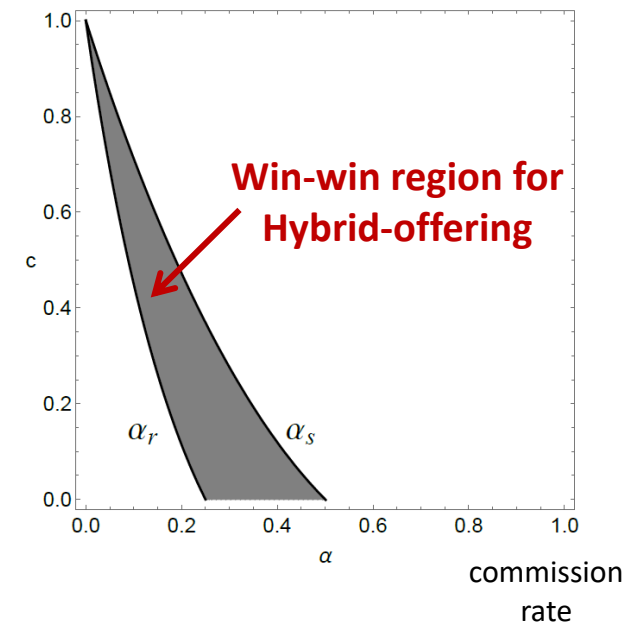
- Reselling-Offering ($\wedge R$): offer the reselling channel only
- Agency-Offering ($\wedge A$): offer the agency channel only
- Hybrid-Offering ($\wedge H$): offer the both channels (i.e., the main model)



(a) Supplier's profit



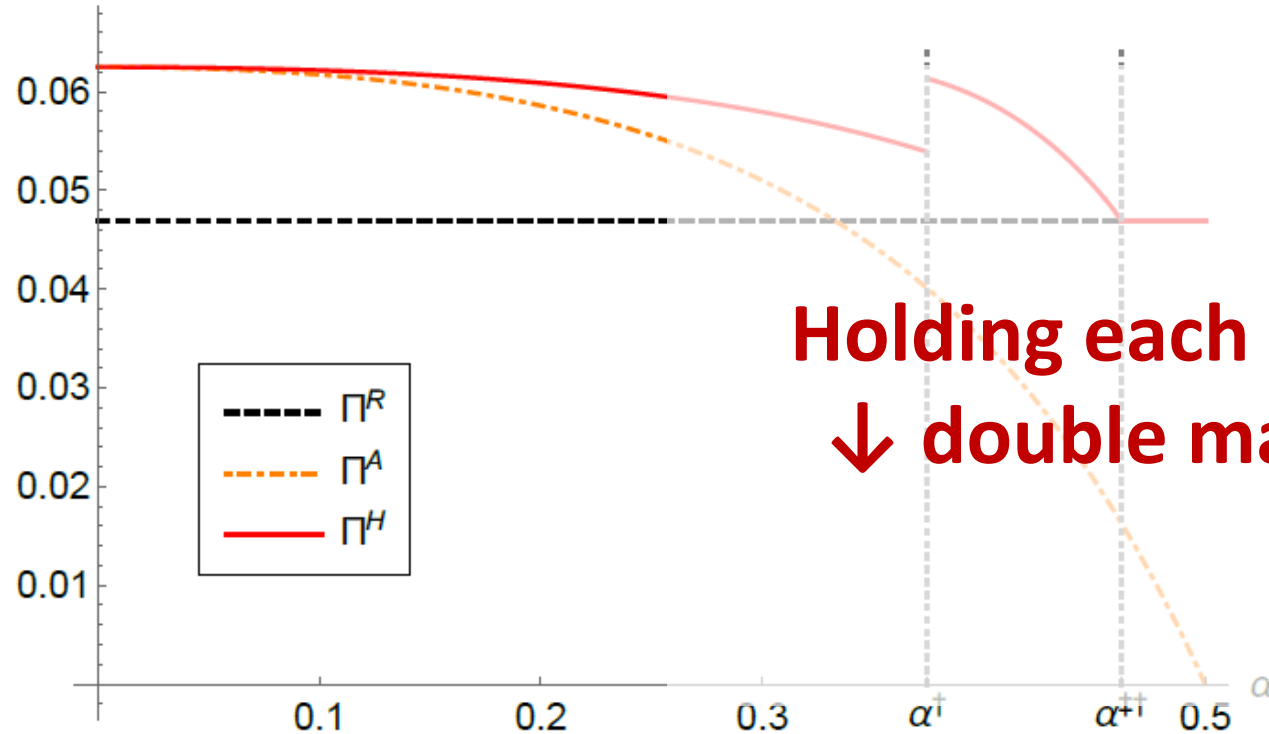
(b) Retailer's profit



Having an additional channel is **not always beneficial** to the supplier

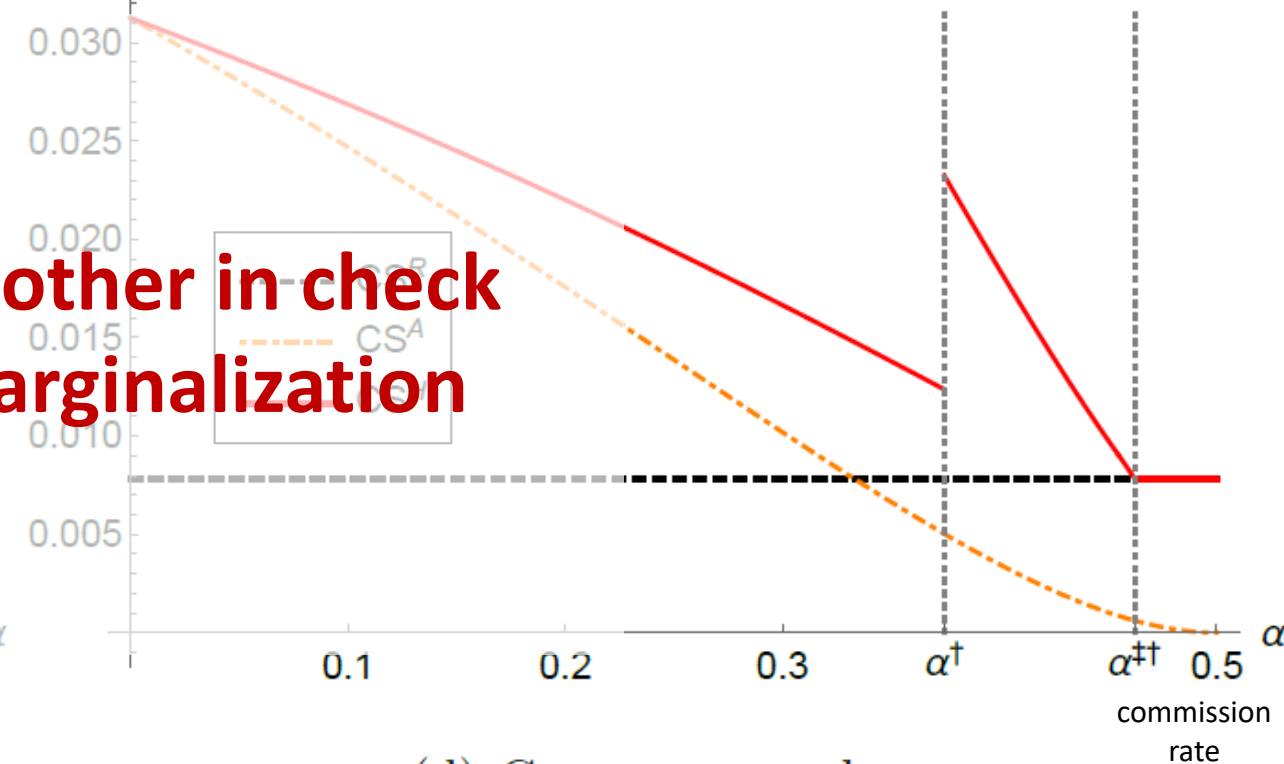
Ext. 2. Retailer's Channel Offering Decision (2/3)

π : Supply chain profit



(c) Supply chain profit

CS: Consumer surplus



(d) Consumer surplus

**Holding each other in check
↓ double marginalization**

Hybrid-Offering can be a **Pareto-Dominating** Strategy

Ext. 2. Retailer's Channel Offering Decision (3/3)

❑ Amazon's Stance on "Hybrid Strategy"

Although Amazon's official policy is to advise its vendors or sellers not to sell their products on both channels, **there is no evident enforcement of this policy** (Leigh 2020).

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Future Studies

- ❑ *Online Dominant Platform as a Stackelberg Leader*
- ❑ *Optimal Product Line Design with Supplier Encroachment*
- ❑ *Optimal Product Differentiation with Supplier Encroachment*



Thank You

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