



*Game Theoretic Approach for Webrooming
with multiple Brick and Mortar Stores and a
Giant Online Retailer*

Presenting by

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Introduction

- *Webrooming* is a phenomenon where customers search about product details at *online shopping platforms* but instead of buying them from *online shopping platforms* they prefer *Brick and Mortar Stores*.
- Scenario like *Webrooming* is very common in the case of *expensive products* such as laptop, mobile phone or any kind of expensive electronic devices.
- Due to *Webrooming*, *online shopping platforms* are facing loss in terms of revenue.
- In this research we are considering *Competing Webrooming*.

Introduction

- Customers are preferring to purchase products from *Brick and Mortar Stores* instead of *online Retailers* mainly because of *reliability* and another important reason is only *Brick and Mortar Stores* can give *touch and feel experience* of any product.
- To counter *Webrooming* strategic decision making should be taken by Manufacturers and Online Retailers.
- In this research we are considering a practical market scenario where there is ‘*N*’ small *Brick and Mortar Stores* and a *Giant Online Retailer* who is strategically planning to counter *Webrooming*.

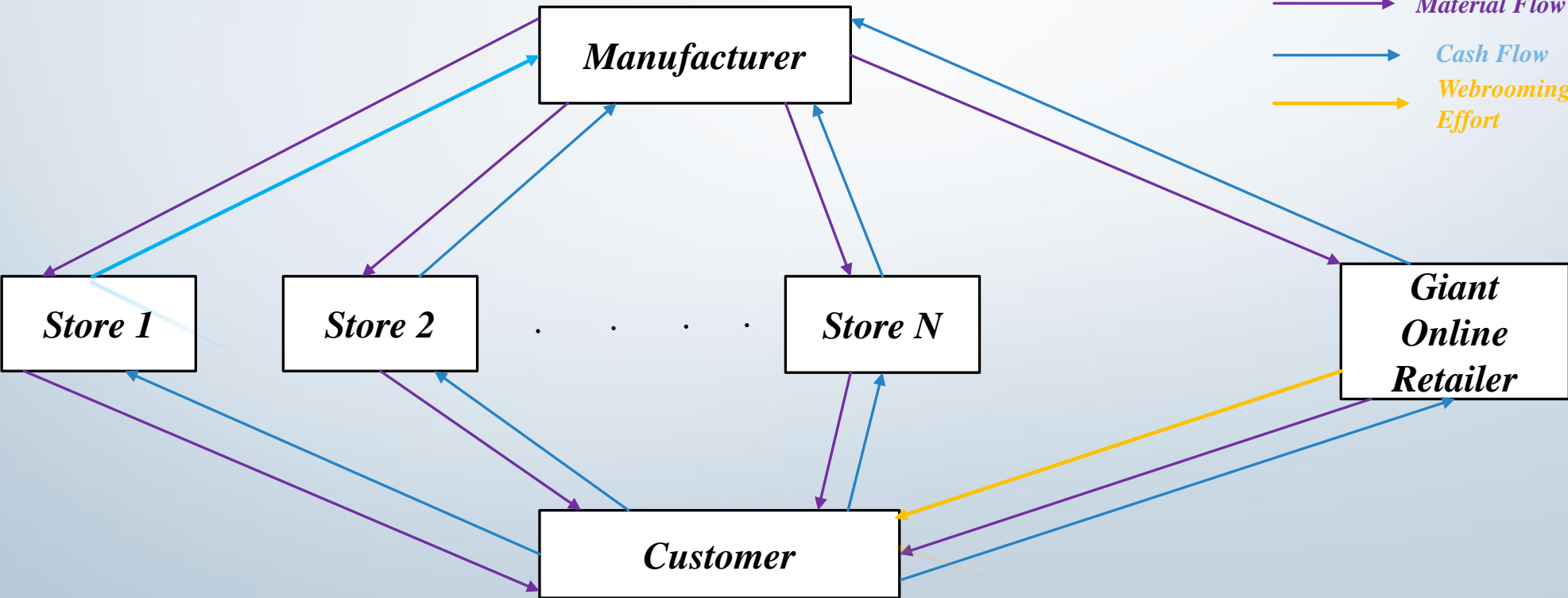
Relevant Literatures

- Arora et al. 2017 has discussed about of role of Online risk perceptions and lack of “*trust*” towards the understanding of *Webrooming*.
- Basak et al. 2017 has discussed about *Game Theoretical approach* to analyze Showrooming. They have discussed about two different context in this scenario. In the first case they have assumed the traditional retailer is behaving as a *Stackelberg leader* and in the next case they have assumed that the online retailer is behaving as a *Stackelberg leader*. By assuming this they have calculated optimal price and optimal effort functions to counter Showrooming.
- Basak et al. 2020 has discussed about several decision – making strategies in a real life market scenario. They have discussed about unintegration, *Brick and Mortar Stores* and Manufacturer collaboration and decision – making under discounted wholesale price with effort sharing.

Research Gap

- Previously research has performed with different decision – making scenario to counter showrooming. We will perform this research to counter webrooming by analyzing different decision – making scenario .
- Previously research has focused on one *Brick and Mortar Stores* and one *Online Retailer* context. We will performing research by considering ‘*N*’ *Brick and Mortar Stores* and *one Giant Online Retailer* market scenario.

Conceptual Model



Unintegrated Scenario Description

- For *Unintegrated Scenario* the Giant Online Retailer is not collaborating with any other player to counter *Webrooming*.
- For Decision – Making under *Unintegrated Scenario* we will calculate Optimal price functions which will be beneficial for *Online Retailer* to set a convenient product price to counter *Webrooming*.
- Further we will graphically analyze how different parameters such as *effort, Webrooming impact* are influencing those optimal price functions.

Mathematical Representation Of Unintegrated Scenario

- Profit function of the *Online Retailer*, $\pi_e(p_e, \theta) = [a_e - bp_e + cp_r + (1 - \zeta)\sqrt{\theta}] (p_e - w_c) - k\theta$
- Profit function of the *Brick and Mortar Store*, $\pi_r(p_r) = [a_r - bp_r + cp_e + \zeta\sqrt{\theta}] (p_r - w_c)$
- Profit function of the *Manufacturer*, $\pi_m(w_c) = [(a_e + a_r) - b(p_e + p_r) + c(p_e + p_r) + \sqrt{\theta}] (w_c - s)$
- p_e, p_r and w_c are price set by *Online Retailer, Brick and Mortar Stores, Manufacturer* respectively. a_e and a_r are overall Market potential of the *Online Retailer* and *Brick and Mortar Stores* respectively. b and c are responsiveness of consumer demand to the price by the respective and the rival channel. θ is the Effort given by the Online Retailer. ζ is the *Webrooming impact*.

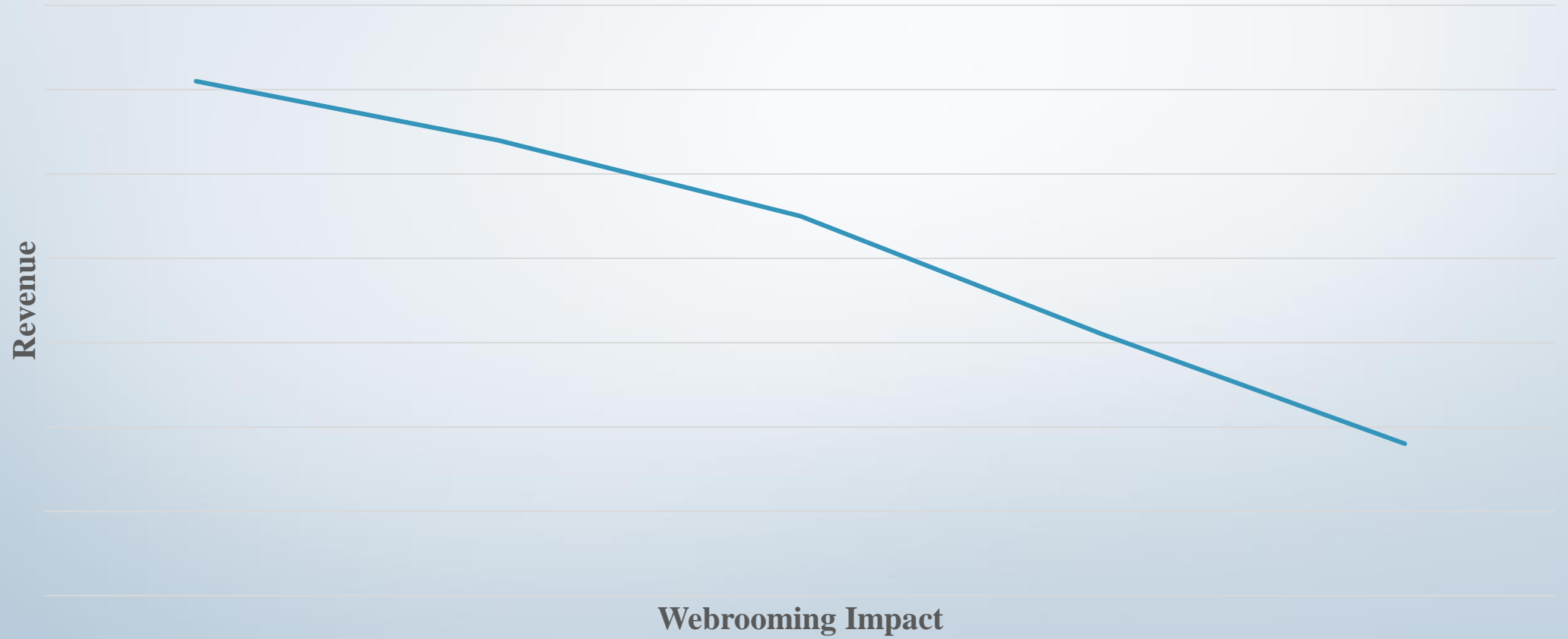
Optimal functions Of Unintegrated Scenario

- Optimal price function set by the *Giant Online Retailer*, $p_e^* = w_c^* + \frac{\beta_1 - \beta_2 w_c^*}{\alpha_1}$
- Optimal price function set by the *Brick and Mortar Stores*, $p_r^* = w_c^* + \frac{2k(a_r - b w_c^* + c w_c^*) + \alpha_2 + 4bk(\beta_1 - \beta_2 w_c^*)}{4bk\alpha_1}$
- Where, $\alpha_1, \beta_1, \beta_2$ and k are constants.

Proposition for Unintegrated Scenario

- With the increase of *Webrooming Impact* the *revenue* of the *Giant Online retailer* is decreasing and with the decrease of *Webrooming Impact* the *revenue* of the *Giant Online retailer* is increasing.

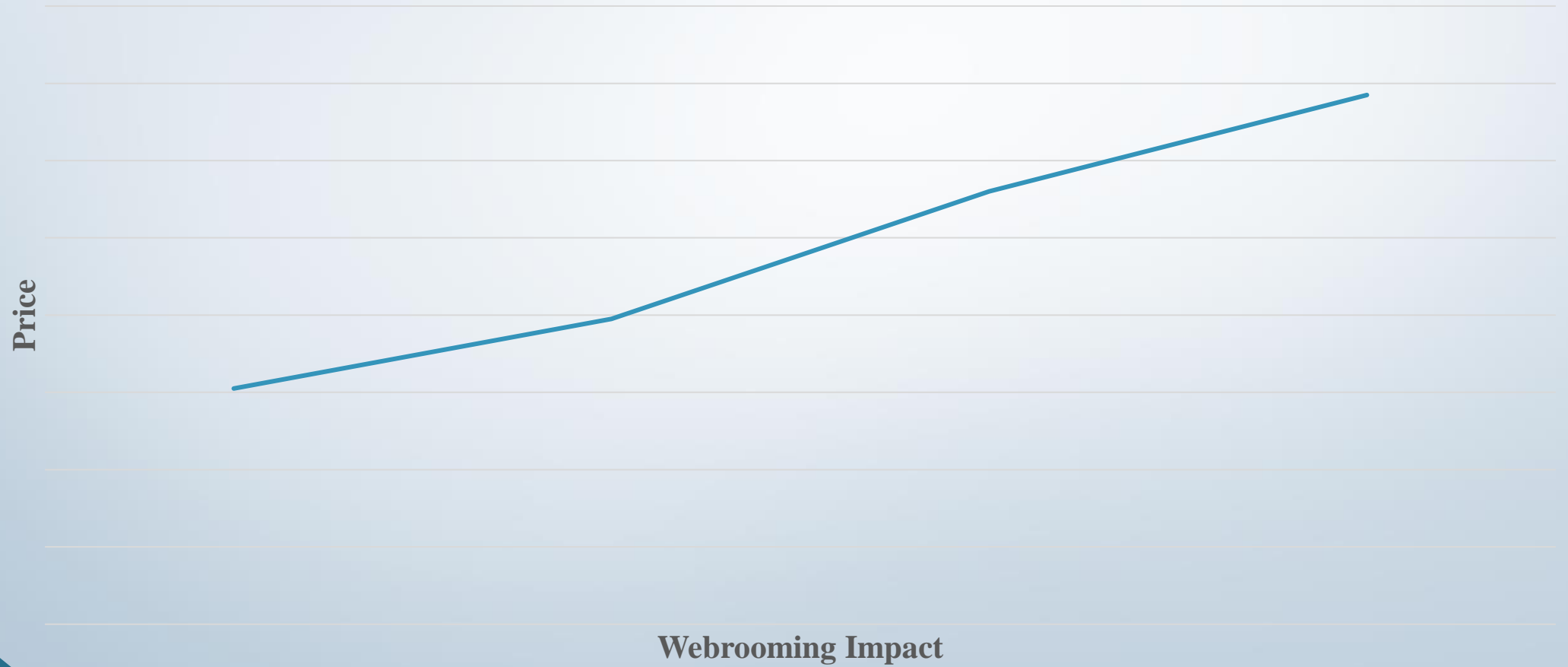
Revenue vs Webrooming Impact



Proposition for Unintegrated Scenario

- With the increase of *Webrooming Impact* Product price of the *Giant Online retailer* will increase and with the decrease of *Webrooming Impact* Product price of the *Giant Online retailer* will decrease.

Price vs Webrooming Impact



Manufacturer – Online Retailer Collaborative Scenario

- To counter *Webrooming* the Giant *Online Retailer* is collaborating with Manufacturer. Now we will be discussing about Decision – Making under Collaboration or integrated channel.
- Profit function of the integrated channel, $\pi_i(w_0, p_i, \theta_i) = [a_e - b p_i + c (w_0 + m_r) + (1 - \zeta) \sqrt{\theta_i}] (p_i - s) + [a_r - b (w_0 + m_r) + c p_i + \zeta \sqrt{\theta_i}] (w_0 - s) - k \theta_i$
- p_i, θ_i, w_0, m_r are price set, effort, wholesale price and margin of price set for the integrated channel respectively.

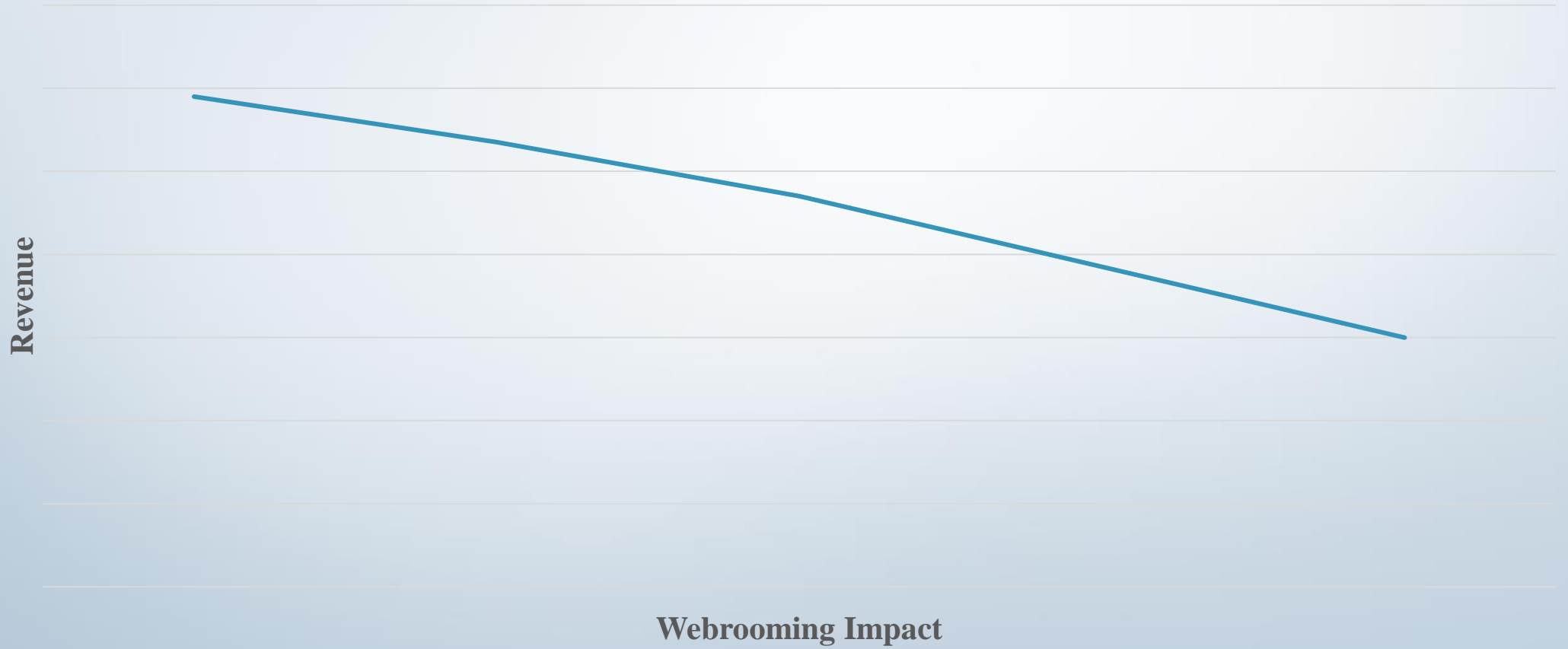
Optimal functions for the Integrated Channel

- Optimal price set by *Integrated Channel*, $p_i^* = \frac{\delta_1 + (4kc - 2kcb)w_0 + \zeta(1 - \zeta)(W_0 - S) + C\zeta^2(W_0 - S)}{\delta_2}$
- Optimal price set by *Brick and Mortar Stores*, $p_r^* = w_0 + \frac{a_r - b w_0}{2b} + \frac{c[\delta_1 + (4kc - 2kcb)w_0 + \zeta(1 - \zeta)(W_0 - S) + C\zeta^2(W_0 - S)]}{2b\delta_2} + \frac{\zeta^2(W_0 - S)}{4bk} + \frac{\zeta(1 - \zeta)}{4bk} [\delta_1 + (4kc - 2kcb)w_0 + \zeta(1 - \zeta)(W_0 - S) + C\zeta^2(W_0 - S)]$
- δ_1 and δ_2 are constants.

Proposition for Collaborative Scenario

- With the increase of *Webrooming Impact* the *revenue* of the *Giant Online retailer* is decreasing and with the decrease of *Webrooming Impact* the *revenue* of the *Giant Online retailer* is increasing.
- Revenue decrement rate under collaborative scenario will be lesser than the Unintegrated Scenario.

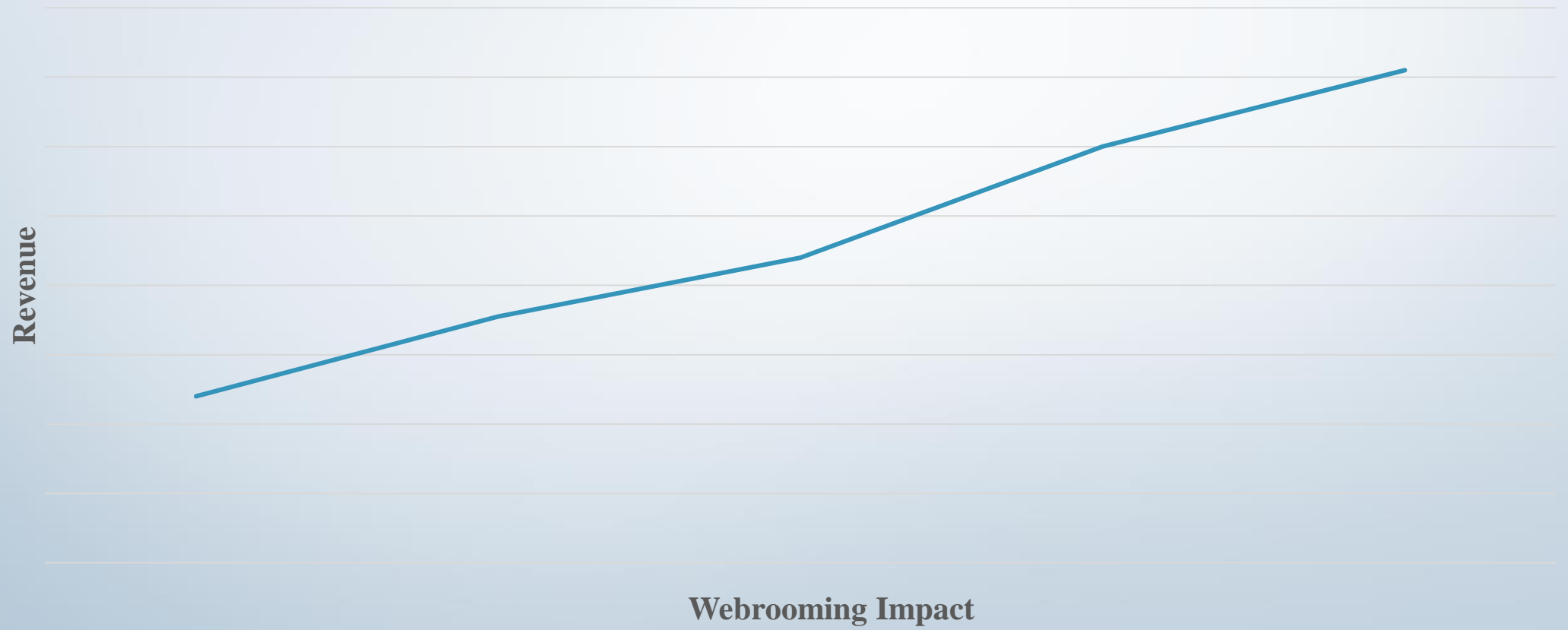
Revenue vs Webrooming Impact



Proposition for Collaborative Scenario

- With the increase of *Webrooming Impact* Product price of the *Giant Online retailer* will increase and with the decrease of *Webrooming Impact* Product price of the *Giant Online retailer* will decrease.
- Product price increment rate will be higher in the case of Collaborative scenario compared to Unintegrated Scenario.

Price vs Webrooming Impact



Conclusion and Future Research

- We have analyzed how in different scenario Pricing decisions can be taken to counter *Webrooming*.
- Several future research can be performed. Firstly, by considering *non-homogeneity* of *Brick and Mortar Stores*.
- Secondly, by considering *non-linearity of Demand Function*.

References

- Arora, S., & Sahney, S. (2017). Webrooming behaviour: a conceptual framework. *International Journal of Retail & Distribution Management*.
- Basak, S., Basu, P., Avittathur, B., & Sikdar, S. (2017). A game theoretic analysis of multichannel retail in the context of “showrooming”. *Decision Support Systems*, 103, 34-45.
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Thank you