



# Hybrid Platform's Screening

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## Introduction

### **E-commerce and globalization of supply chains**

- Products may not meet safety standards
- Information asymmetry

### **Hybrid platforms**

- First-party vs. third-party products

### **Platforms as regulators**

- Investment in information acquisition
- Removal of unsafe products

## Motivating examples



100% of apps are automatically screened for known malware.

Every week, over 500 dedicated experts around the world review over 100K apps.

Over 1M submissions rejected for objectionable, harmful, unsafe, or illegal content.



You should never have to worry about inappropriate content.



### Product Safety

We monitor the products sold on our website for product safety concerns.

In concerning situations, we may do the following:

- Remove the product from the website.
- Contact sellers and manufacturers for more information.
- Put warnings on the product detail page.
- Take other actions depending on the situation.
- Report product safety concerns to relevant government agencies. This will strengthen their safety data and help with any necessary recalls.

## Research questions and main findings

- Impact of vertical integration on screening incentives ?
- Relationship between screening choices and commission fees ?

**Policy relevance** : Current debate on platform liability and DSA

**Theoretical model** based on Anderson & Bedre-Defolie (2022)

### Main findings

- For a given  $\tau$ , a more integrated platform has lower incentives to screen
- Negative relationship between  $\tau$  and vertical integration, as a result of platform conducting screening



## Outline

- Model set-up
- Analysis
- Welfare and screening choices
- Conclusion

## Third-party sellers

Large mass of infinitesimal potential sellers outsourcing production

If a seller finds it profitable to enter the platform

- Pay a fixed cost  $k$  to launch the production process
- Products can be **harmful to consumers** and lead to damage  $D$
- Nature then draw their type : probability  $\lambda$  of being a High risk seller (type- $H$ ), otherwise Low risk (type- $L$ )
- Probability of damage occurrence  $s_L < s_H$ , type- $H$  illegal

Once on the platform, seller  $i$  sets its price  $p_i$  with marginal cost  $c$

- **No possibility of differentiation**

## Platform

Hybrid platform  $G$  in **Gatekeeper** position

- Collects ad-valorem commission fees  $\tau$
- Sells a mass  $M$  of product with known risk  $s_G$
- Sets price  $p_G$

Can invest in a **screening technology**

- By investing  $K(m)$ , it detects at entry type- $H$  products with probability  $m$
- $K'(m) > 0$  and  $K''(m) > 0$
- Detected type- $H$  sellers are removed
- Screening investments public information

## Consumers

**Utility from buying from  $i$  :**  $u_i = v - p_i - s_i D + \mu \varepsilon_i$

- outside option  $u_0 = \mu \varepsilon_0$
- $\varepsilon_i$  iid with Gumbel distribution

**Logit product demands :**  $q_i = \exp\left(\frac{v - p_i - s_i D}{\mu}\right) \cdot A^{-1} \equiv V(p_i, s_i) \cdot A^{-1}$

- $q_G = V(p_G, s_G) \cdot A^{-1}$
- with  $A = nV(p_i, s_i) + MV(p_G, s_G) + 1$

**Unable to assess third-party seller type :**  $s_i = \frac{\lambda(1-m)s^H + (1-\lambda)s^L}{1-\lambda m} \equiv \tilde{s}^e(m)$

- $\frac{d\tilde{s}^e}{dm} < 0$





## Timing

- Platform invests in screening intensity and sets commission rate
- Free entry of third-party sellers
- Screening takes place
- Seller competition
- Consumers join and make their purchase decision



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## Free entry market size

Third party seller's pricing :  $p(\tau) = \frac{c}{1-\tau} + \mu$

Free entry market size  $\tilde{A}(\tau, m)$

- **Screening** : two opposite effects
  - Higher chance of being screened out
  - Increased attractiveness due to reduced anticipated risk

There exists  $\tilde{m} \in [0, 1]$  such that  $\frac{d\tilde{A}}{dm} > 0$  if  $m > \tilde{m}$   
 $\tilde{m}$  is low when  $\mu$  is low or  $(s_H - s_L)$  is high

- **Commission fees** :  $\frac{d\tilde{A}}{d\tau}(\tau, m) < 0$

## Platform's pricing and commission fees

**First-party pricing**  $p_G(\tau) = c + \mu + \tau p(\tau)$

■  $\implies p_G(\tau) > \tau p(\tau)$

**Profitability of seller entry**  $\Phi(\tau, m) = \frac{\tau p(\tau) - \mu MV(p_G(\tau), s_G)}{\tilde{A}(\tau, m)^2}$

- New consumers join the platform
- Business stealing

**Optimal commission fees**  $\tau^* \implies \Phi(\tau^*, m) > 0$

- For a given  $m$ ,  $\frac{d\tau^*}{dM} > 0$

## Platform's screening choices

$$\frac{d\Pi}{dm} = \Phi(\tau, m) \cdot \frac{d\tilde{A}}{dm}(\tau, m) - K'(m)$$

- A necessary condition for  $m^* > 0$  is  $\tilde{m} < 1$
- Assumption :  $\tilde{m} = 0$

- **Screening incentives and vertical integration** : for a given  $\tau$ ,  $\frac{dm^*}{dM} < 0$
- Strategic complementarity :  $\frac{d^2\Pi}{d\tau dm} > 0$

## Vertical integration and combined choices

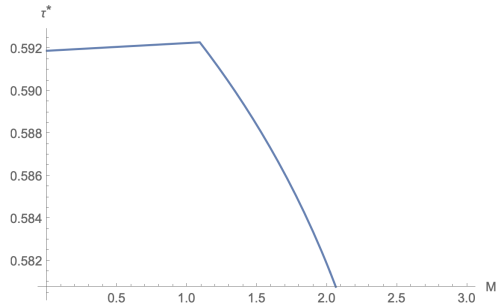
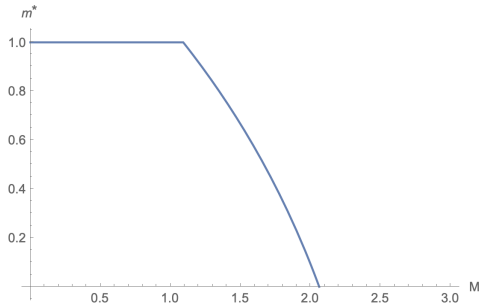
We have

- for a given  $m$ ,  $\frac{d\tau^*}{dM} > 0$ ;
- for a given  $\tau$ ,  $\frac{dm^*}{dM} < 0$ ;
- $\tau$  and  $m$  are strategic complements :  $\frac{d^2\Pi}{d\tau dm} > 0$ .

### Impact of $M$ on combined choices ?

If a platform conducts screening, it is possible observe a **negative relationship** between vertical integration and commission fees

# Simulations



with  $K(m)$  quadratic



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## Welfare and screening choices

Welfare maximising level of screening  $m^{W*} > m^*$  :

$$\left( \frac{1}{\tilde{A}(\tau, m^{W*})} + \Phi(\tau, m^{W*}) \right) \frac{d\tilde{A}}{dm}(\tau, m^{W*}) = K'(m^{W*})$$

A regulation mandating higher screening intensity has an ambiguous effect on consumer welfare :

$$\left. \frac{dCS}{dm} \right|_{\tau=\tau^*, m=m^*} = \frac{1}{\tilde{A}(\tau^*, m^*)} \left( \underbrace{\frac{\partial \tilde{A}}{\partial m}(\tau^*, m^*)}_{+} + \underbrace{\frac{\partial \tilde{A}}{\partial \tau}(\tau^*, m^*) \cdot \frac{d\tau^*}{dm}}_{-} \right)$$



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## Conclusion

Platforms invest in screening if it **enhances seller entry**

- A more integrated platform has **lower incentives** to invest in screening
- **Strategic complementarity** : negative relationship between vertical integration and commission fees
- A platform **under-invests** in screening from a social perspective, and a regulation has an ambiguous effect on consumer welfare

### Contribution to the literature

- Hybrid platforms and self-preferencing
  - Hagiu & Wright (2021), Hunold et. al (2021), Anderson & Defolie (2022)...
- Platform liability
  - Madio & Lefouili (2020), Jeon et. al (2021), Hua & Spier (2022)...