Platform Competition and App Development

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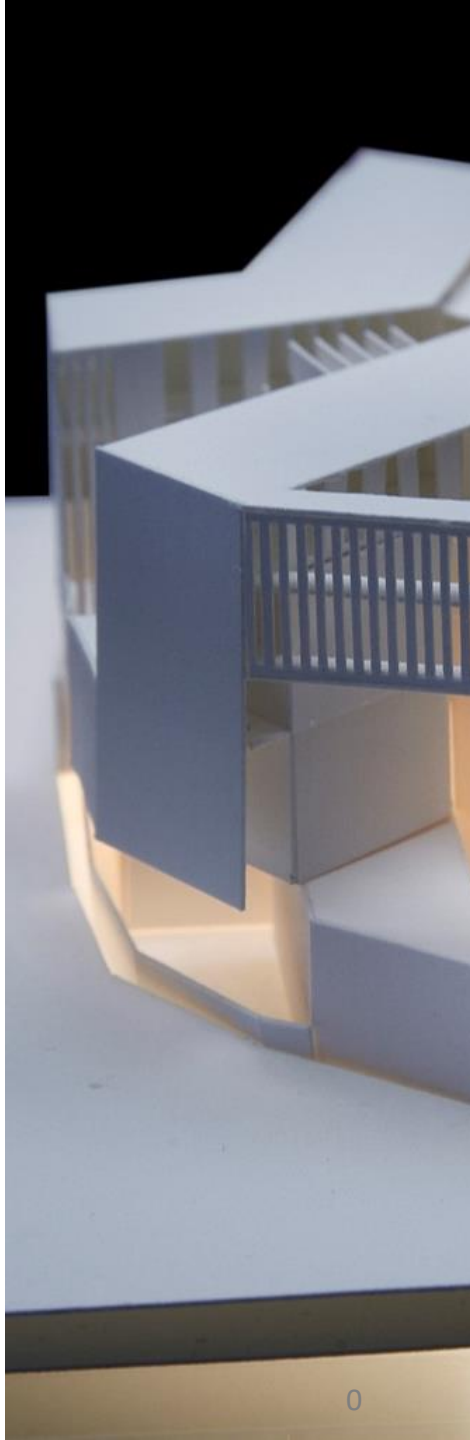


Motivation

- Apple's App Store and Google's Play Store are subject to regulation and litigation
- Europe
  - Dutch NCA: market study into mobile app stores (2019)
  - UK CMA: market study into mobile ecosystems (2022)
  - EC: DMA (2022)
- USA: legal battle (Epic vs Apple, Epic vs Google)
- South Korea: the parliament approved in 2021 a bill banning major app store operators from requiring developers to use their integrated payment systems

This paper

- Focus on 30% commission charged by app stores (Apple, Google, …)
- Concern: negative effect on app development

  "[T]he more money Apple takes from developers, the fewer resources developers have. …. They decide not to make apps at all that they might have made were it easier to be profitable" (House of Representatives, 2020, p. 350)

- Possible defense: competition between iPhones and Android phones

  "The level of the commission fee charged is used by app stores to compete with each other, as a means to attract app providers on their platform" (Google response, Dutch report, 2019, p. 92)

Question and main results

- Question: how does platform competition affect commissions and app development?

- Results: platform competition induces platforms to raise their commissions
  - Whenever economies of scope encourage app developers to multihome on both platforms
  - Then, equilibrium commissions are higher than what would maximize platforms' profit or consumer surplus or total welfare

Intuition

- Whenever there are economies of scope (in cost or demand), platforms are complements on the app side although they are substitutes on the consumer side

$\Rightarrow$ Then, they have incentives to increase commissions to raise rivals' cost

- "...the vast majority of developers consider iPhones and Android devices as complements because developers must build apps that run on both platforms due to the lack of user multi-homing. ... This market reality increases the power that Apple is able to exercise over developers that seek to reach users on smartphones.'' (DOJ, 2024)

Evidence of multihoming

- Multihoming among popular apps

  "Most large and popular third-party apps are present on both Apple's iOS and Google's Android. For example, we have estimated that 85% of the top 5,000 apps on the App Store also list on the Play Store and vice versa." (CMA, 2022, p. 121)

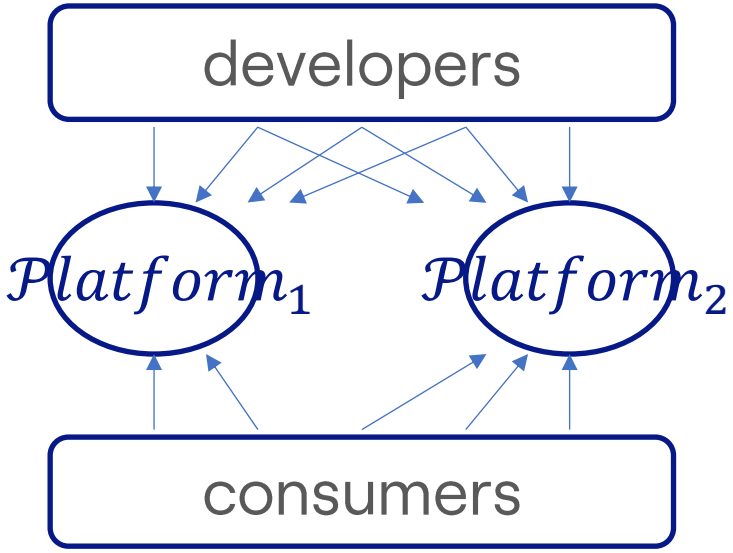
Roadmap

1. Setting
2. Benchmarks
3. Platform competition
4. Policy implications

Setting

Setting

- Two vertically integrated mobile platforms 1 and 2
  - Sell smartphones to consumers
  - Operate the only app store available on their devices
- Competition for consumers and app developers
  - Consumers: device price (p_i)
  - Apps: ad valorem commission (a_i)
- Single vs multi-homing
  - Consumers single-home
  - App developers: potentially multihome



Timing: *sequential* competition

1. Competition for apps
   a. Platforms simultaneously set ad valorem commissions, a_1 and a_2
   b. Developers draw costs of development, decide for which platform(s) to develop their app, if any

2. Competition for consumers
   a. Platforms simultaneously set device prices, p_1 and p_2; simultaneously app developers set the price of their apps
   b. Consumers decide which platform to join, if any; upon joining a platform, consumers learn their valuations for apps and decide which apps to buy

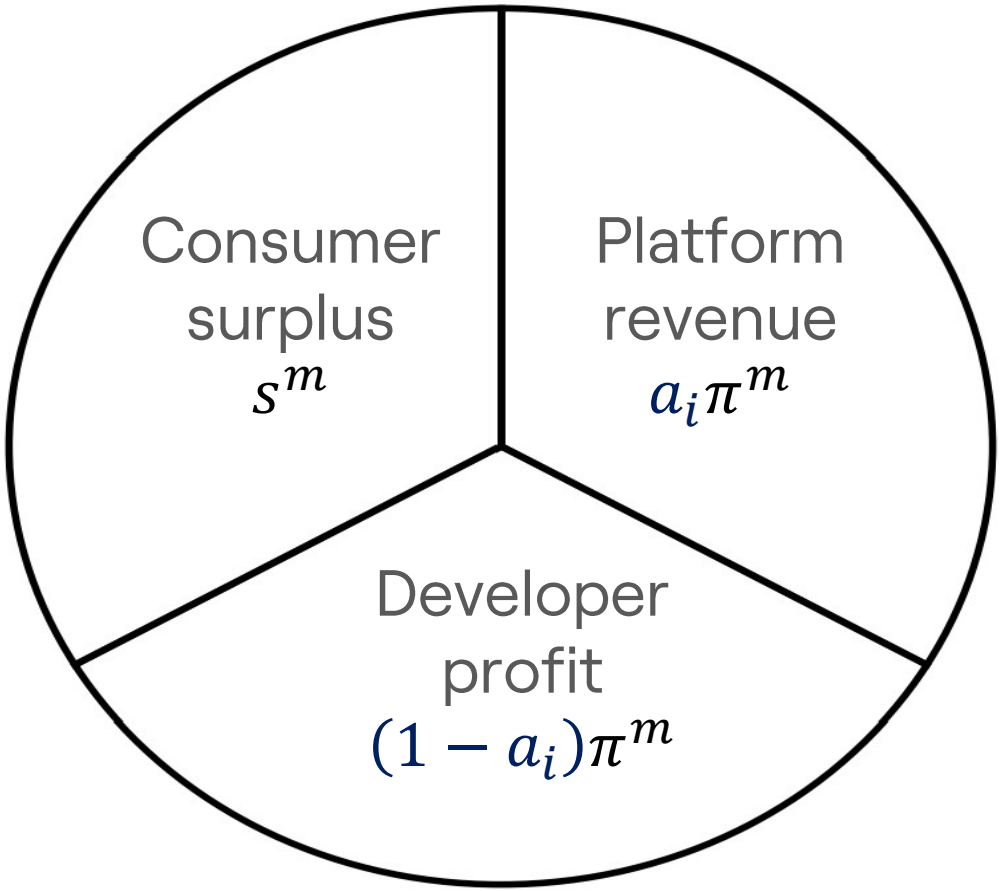
App pricing

- Given platform i's commission a_i, app developer sets app price p

$$\max\{(1-a_i)pd(p)\} \rightarrow \text{ monopoly price } p^m$$

  - Based on "zero marginal cost"
  - Does not depend on a_i
  - Does not depend on the consumer base of platform i

Commission determines the division of the pie



- Define
  - $s^m \equiv s(p^m)$
  - $\pi^m \equiv p^m d(p^m)$
- Platform *i*'s subsidy, given from y_i number of apps:

$$\sigma_i = (s^m + a_i\pi^m)y_i$$

Platform pricing on consumer side

- By joining platform i, a consumer obtains surplus s^m from y_i number of apps; so what matters for consumers is the quality-adjusted price $P_i = p_i - s^m y_i$

- Platform i's profit

$$\Pi_i = (p_i + a_i \pi^m y_i - c) D(p_i - s^m y_i, p_j - s^m y_j)$$

- Using platform i's quality-adjusted price $P_i = p_i - s^m y_i$

$$\Pi_i = (P_i - (c - \sigma_i)) D(P_i, P_j)$$

where $\sigma_i = (s^m + a_i \pi^m) y_i$ is platform i's *subsidy*

Competition for consumers

- **Assumption 1** : for any σ_1, σ_2, there exists a unique equilibrium, satisfying
  - $P_i = P^e(\sigma_i, \sigma_j)$, where $\partial_1 P^e(\sigma, \sigma) < \partial_2 P^e(\sigma, \sigma) < 0$
  - $\Pi_i = \Pi^e(\sigma_i, \sigma_j)$, where $\partial_1 \Pi^e(\sigma, \sigma) > 0 > \partial_2 \Pi^e(\sigma, \sigma)$ and $\partial_1 \Pi^e(\sigma, \sigma) + \partial_2 \Pi^e(\sigma, \sigma) \geq 0$
- Implications: If Google's subsidy is lower, Google charges a higher price and this in turn increases Apple's profit.

Benchmarks

Benchmarks: regulation

- Suppose that commissions are set by a regulator
- Timing
  - Stage 0: The regulator sets a uniform commission a
  - Stage 1: App development
  - Stage 2: Platforms compete for consumers in the device market

Benchmark I: consumer surplus

- Consumer surplus

$$S(P) = 2\int_{P}^{\infty} D\left(\tilde{P}, \tilde{P}\right) d\tilde{P}$$

  - *Maximizing* consumer surplus amounts to *minimizing* the quality-adjusted price P
  - This, in turn, amounts to *maximizing* the subsidy σ

- *Remark: Platforms' profits*
  - Maximizing the platforms' profits requires maximizing the subsidy as well
  - *Therefore, there is an alignment of interests between consumers and the platforms*

Benchmark II: total welfare

- Welfare: consumer surplus + platforms' profits + developers' profits (net of development costs)

- Maximizing welfare calls for a commission lower than a^S
  - Start from the level that maximizes consumer surplus / platforms' profit
  - A small reduction has no impact on platforms' profit and consumer surplus
  - But it increases app developers' profits (net of development costs)

Platform Competition

Prop 1

- **Prop 1**: The equilibrium commission under platform competition (a^C) is higher than the one maximizing consumer surplus (a^S) if and only if one platform's increasing its commission from a^S reduces the number of apps on the rival platform

- Intuition:
  - If raising Apple's commission reduces the number of apps on Google, this reduces Google's subsidy, which increases Apple's profit.
  - So Apple increases its commission to raise the rival's cost.

Economies of scope in app development

- **Definition**: There are **economies of scope** in app development if the cost of developing an app for both platforms is smaller than the sum of the cost of developing it for platform 1 only and the cost of developing it for platform 2 only
- **Prop 2**: The equilibrium commission (a^C) is higher than the one maximizing consumer surplus (a^S) if and only if there are economies of scope
- Intuition: Suppose that there are strong economies of scope: the cost of developing an app for both platforms is the same as the cost of developing it for one platform only. Then, if Apple raises its commission, it would reduce the number of apps on Google.

Economies of scope

- Whenever there exist economies of scope, the platforms are complements on the app side. Then, the incentive to raise the rival's cost induces the platforms to charge commissions *higher* than what would maximize consumer surplus

Examples of apps that must multihome on both platforms for demand reasons (DOJ, 2024)

- A food delivery or ride-sharing app cannot develop an app just for Android phones or just for the iPhone as developing for both platforms is often necessary for service providers to reach a viable scale
- The same holds for social apps which require users on one platform to reach users on the other. For example, the developer of a dating app must enable its users on iPhones to meet users on Android and vice versa.
- A money-sharing app must enable users on Android devices to send money to users on iPhones and vice versa
- Cloud game app
- Prospective digital wallet providers, including U.S. banks, have abandoned the development of digital-wallet apps
- Another company decided not to offer an innovative digital car key because Apple required it to add any features related to the key into Apple Wallet rather than allowing it to put its key solely in its own app.

Policy implications

- Platform competition
  - Intensity of competition plays no role
  - A larger number of platforms makes things worse
- Interoperability makes things worse : for instance, zero cost of porting can induce choke-off of app development
- Access fee regulations may work
- App store competition within each platform may work

Conclusion

- Risk of under-development of apps: complementarity of platforms on the app side and their incentive to raise rivals' cost induces platforms to charge *excessively high* commissions

- Our results provide a rationale for regulating app store commissions or introducing within-platform competition among app stores as the DMA requires

Thank you !