App Store Competition

Gastón Llanes
Catholic University of Chile

Leonardo Madio
University of Padua

Workshop on the Economics of the DMA
September 22-23, 2025

App stores and fees

- Apple and Google charge 15-30% fees for in-app purchases (paid downloads, subscriptions, content).
- They have traditionally prevented or hindered third-party app store installation,
- Have also prohibited or hindered steering and side-loading by app developers.
- This has lead to complaints from developers over what they see as excessive fees, and to extensive litigation.
  - E.g., Epic vs. Apple and Google in 2020, and Epic vs. Samsung in 2024.

Third-party competition

- In 2023, the EC designated Apple's App Store and Google's Play Store as *Core Platform Services*.
  - DMA Article 6 requires them to allow seamless third-party app store installation.
  - Article 5 requires them to allow for steering free or charge.
  - Expected outcome: increased competition and lower fees

"if other distribution channels were effective constraints on the App Store and Play Store, we would expect to see lower commission rates or increased quality"

– CMA (2022, p. 82)

Post-DMA

- Limited entry of third-party app stores.
- Mostly specialized (niche) or superstar-backed stores (e.g., Epic Games).
- Third-party stores have not attracted many users (and developers).
- Initially, Apple and Google allowed steering but charged high fees to do so.
- They were fined by the EC, after which they enabled steering for free.

This Paper

- Study the effects of within-device app store competition and steering.
- Find that head-to-head competition from a third-party store is unlikely to succeed in lowering fees.
- Steering will succeed in lowering fees, but app prices may not change and even increase.
- Show which policies can induce effective competition and benefit consumers.

Related Literature

- Competition between app ecosystems
  - Etro 2023, Jeon and Rey 2024, Teh and Wright 2024
- Monopoly app stores
  - Anderson and Bedre-Defolie 2024, Gans 2024
- Freemium pricing models
  - D'Annunzio and Russo 2024
- Platform fee regulation
  - Bisceglia and Tirole 2024, Gomes and Mantovani 2024, Wang and Wright 2024
- Edgeworth Paradox
  - Armstrong and Vickers 2024, D'Annunzio and Russo 2024, Karle, Preuss and Reisinger 2025

Baseline model

Agents

- Two-sided market:
  - Mass 1 of consumers, each owning a device
  - Mass 1 of developers may develop and sell apps through app stores
  - Store A is an integrated store, pre-installed on user devices
  - Store B is a third-party store, which requires user installation

Actions

- Users choose whether to install B and which apps to consume.
  - Valuation $v_i \sim F$ for app i (different across apps, common across stores)
  - Cost $\sigma \sim G$ for installing store B
- Developer i charges p_{iA}, p_{iB} (possibly different) in A and B.
  - Earns "untaxed" complementary revenue λ per consumer (e.g. ads, data)
  - Has cost $k \sim H$ for developing the app
- Stores charge ad valorem fees on transaction revenues
  - a for store A and b for store B

Timing

1. App stores set commission fees, which become publicly observable.
2. Each developer decides whether to develop and on which store to sell. These decisions become publicly observable.
3. Each consumer decides whether to install store B.
4. Each developer i sets app prices p_{iA} and p_{iB}.
5. Consumers observe prices and learn their valuations. Each consumer decides which apps to consume, and from which store to buy each. Consumers pay prices to developers, which pay commission fees to app stores.

This timing makes sense if developers are *"small"* (do not affect adoption of B).
In an extension, we invert 3 and 4 for *"superstar apps"* that can affect adoption.

Analysis of the baseline model

Stage 5. App Purchase

- Suppose for the moment that developers multihome.
- If a consumer has installed B, she will either consume the app from the store with the lowest price or not consume it.
- If a consumer has not installed B, she will either consume the app from A or not consume it.
- If p is the lowest available price for an app, demand and consumer surplus are

$$d(p) = 1 - F(p), \qquad s(p) = \int_p^\infty (v - p) dF(v).$$

Stage 4. Price Setting

- Suppose m consumers have installed store B (which implies that $1-m$ consumers can only access apps through A).
- If $p_{iB} \leq p_{iA}$, m consumers buy from B and $1-m$ from A, and developer i's profit is

$$m\left[(1-b)\,p_{iB}+\lambda\right]d(p_{iB})+(1-m)\left[(1-a)\,p_{iA}+\lambda\right]d(p_{iA}).$$

- If $p_{iB} > p_{iA}$, all consumers buy through A, and i's profit is

$$\left[(1-a)\,p_{iA}+\lambda\right]d(p_{iA}).$$

Optimal prices

- Suppose $b < a$ and $\lambda > 0$, and consider the prices $\hat{p}_{iA}, \hat{p}_{iB}$ that maximize the profits coming from each store, assuming $\hat{p}_{iB} < \hat{p}_{iA}$.
- The *Edgeworth paradox* leads to a negative pass-through:
  - As the fee increases, the seller turns to increasing revenue in the "untaxed" market, for which it lowers the price in the taxed market.
- But then $\hat{p}_{iA} < \hat{p}_{iB}$, which violates the assumption that $\hat{p}_{iB} < \hat{p}_{iA}$.

Proposition: Price parity

- If $b < a$ then the optimal prices are such that $p^*_{iA} = p^*_{iB}$.

- The price-parity result holds even more directly if $\lambda = 0$.
- If $b > a$, the seller prefers not to sell through B, and sets $p^*_{iB} > p^*_{iA}$

Natural monopoly

- Stage 3. Installation of store B
  - If $b > a$, consumers anticipate that prices will be larger in B.
  - If $b < a$, consumers anticipate that developers will choose price parity.
  - In either case, they have no incentive to install store B.
- Stage 2. Development
  - Developers anticipate that no consumer will install store B.
  - Thus, they only care about fee a.
  - No equilibrium with singlehoming on B. Multihoming or SH on A are equivalent
- Stage 1. Fee setting
  - The integrated store behaves as a monopolist.
  - The equilibrium fee does not change.

Alternative policies and strategies

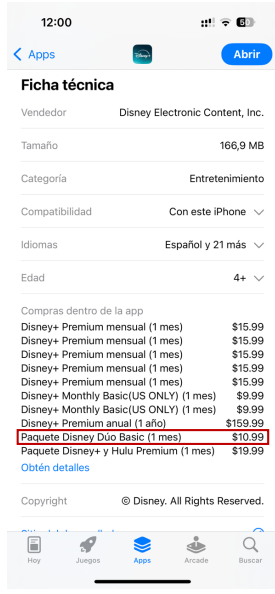
- Exclusive content provision by the third-party store allows for market sharing but does not lower fees.
- Competition for superstar apps decreases the fees for these apps, but not for small developers.
- Removing default advantages through choice screens is unlikely to work.
- A net price parity clause by the third-party store (a type of vertical restraint) leads to lower fees and app prices, benefiting developers and consumers.
- The third-party store can also succeed by targeting apps with positive marginal cost.

Steering

- Steering lowers commission fees, thereby benefiting developers.
- But the Edgeworth Paradox still holds, and thus app prices may increase.
- Consumers may still benefit because the number of apps increases.
- If consumers' nuisance cost for outside payments is heterogeneous, then developers may find it optimal to allow for multiple payment channels.
- In this case, app prices fall and consumers benefit.


11:55
¡Lo mejor de Disney+, Hulu e ESPN+ en un mismo plan!
Podrás crear y administrar tu cuenta en
disneyplus.com/apple
INICIAR SESIÓN
© 2025 Disney y sus entidades relacionadas. Todo esto y mucho más ya disponible.


11:57
Cerrar sesión
PASO 1 DE 2
Elegir plan
Podrás cambiarlo o cancelarlo* en cualquier momento.
Paquete Disney+ y Hulu Basic
Series, películas y originales de Disney+ y Hulu.
Planes con o sin anuncios**
Desde
$10.99/mes
SELECCIONAR
Se aplican términos.
disneyplus.com


12:00
Apps
Abrir
Ficha técnica
Vendedor Disney Electronic Content, Inc.
Tamaño 166,9 MB
Categoría Entretenimiento
Compatibilidad Con este iPhone
Idiomas Español y 21 más
Edad 4+
Compras dentro de la app
Disney+ Premium mensual (1 mes) $15.99
Disney+ Premium mensual (1 mes) $15.99
Disney+ Premium mensual (1 mes) $15.99
Disney+ Premium mensual (1 mes) $15.99
Disney+ Premium mensual (1 mes) $15.99
Disney+ Monthly Basic(US ONLY) (1 mes) $9.99
Disney+ Monthly Basic(US ONLY) (1 mes) $9.99
Disney+ Premium anual (1 año) $159.99
Paquete Disney Dúo Basic (1 mes) $10.99
Paquete Disney+ y Hulu Premium (1 mes) $19.99
Obtén detalles
Copyright © Disney. All Rights Reserved.
Hoy
Juegos
Apps
Arcade
Buscar


1000 monedas V
US$8,99
Elige cómo pagar
EPIC GAMES STORE
Recupera un 20 % (US$1,80) con las recompensas de Epic
compra en la aplicación
CANCELAR

Findings

- App store competition may not lead to lower fees.
- Even if fees go down, app prices may not.
- Two cases in which app prices go down:
  - Vertical restraints from third-party app stores.
  - Consumers' costs for using alternative payment channels are heterogeneous and developers offer multiple payment channels.

Thank you!

Exclusive content or standalone functionality

- Suppose users receive an exogenous benefit δ when installing B (similar to assuming some consumers have zero installation cost)
- In equilibrium, some users install store B (although price parity remains)
- B can induce sellers to sell in its store by charging a smaller fee than A
- Mixed strategy equilibria in the simultaneous-move game
  - Firms mix in an interval that includes the monopoly fee
  - Both firms have positive expected profits
- Similar issue with other extensions (they endogenize B's advantage, but have similar price equilibria)

Consider three extensions

- Free or open source store
  - B charges zero fee
  - A internalizes the effect on developer's profit and increases its fee until the average fee is equal to the monopoly one
  - A's profits decrease. No effects on developer entry, app prices, and consumer surplus
- Price leadership (by A)
  - A sets a price first, then B
  - A sets the monopoly fee, B imitates it. Average fee does not change.
- Penetration pricing (by B)
  - B chooses a fee such that A does not want to exclude it from the market
  - A sets a higher fee than the monopoly one. The average fee increases.

Superstar apps

- Superstar affects adoption of B by consumers.
- Stores charge fees a_S and b_S to the superstar.
- If $b_S < a_S$ the superstar sets a lower price in B. Price parity breaks down (for the superstar).
- As a store lowers its superstar fee, it increases its revenues from other apps.
- A and B compete intensely for the superstar.

Superstar apps: results

- Focus on free third-party store to avoid mixed strategies.
- If the Edgeworth effect is not too large, A sets a smaller fee for the superstar than when it is a monopolist.
- Superstar and entrant benefit, but there is no effect on the average fee of other developers.
- Consumers obtain a higher surplus from the superstar.
- The superstar may lose from auctioning off exclusivity.

Steering

- Consumer valuations fixed at $v > 0$.
- No store B, but developers can offer an alternative payment method.
- Alternative method has nuisance cost $\eta \sim Z$ for consumers.
- Developers set price $p_{iA} = v$ on store A and $\tilde{p}_i < v$ on side-loading channel.
- Store lowers its fee to induce developers to increase their side-loading prices.
- Consumers and developers benefit.

Removing Default Advantage

- Regulatory intervention introduces a choice screen (such as those for web browsers or search engines).
- Device has no pre-installed store. First installation (of A or B) is free, second incurs positive cost.
- If consumers do not multihome, price parity breaks down.
- Multiple equilibria, depending on whether and where consumers and developers singlehome.
- Refinement: integrated store has focal point advantage.
  - Same equilibrium as benchmark model.

Positive marginal costs

- Some developers have positive marginal costs, larger than complementary revenues (e.g., AI-powered apps).
- For these developers, there is positive pass through and no price parity.
- Third-party store has incentives to lower its fee to go after these developers.
- Integrated store does not lower fee much because it focuses on the other developers.
- Third-party store is able to attract these developers, and also captures value from other developers.
- App prices of developers with positive marginal costs decrease, prices of other developers increase.