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IMPACT OF GROUP USERS ON TWO-SIDED PLATFORM COMPETITION

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Abstract

Two-sided markets exhibiting network effects often face coordination problems, which may lead to an inefficient outcome where a lower-quality platform wins the market. Some users make collective decisions as a group, potentially affecting the choices of others. This paper analyzes the impact of group users on two-sided platform competition. We develop a model with two platforms: one with a quality advantage (the higher-quality platform) and the other with a network advantage due to its focality (the lower-quality platform), meaning that users expect others to join it when multiple equilibria exist. There are two types of users: individual users and group users. An individual user makes decisions independently, whereas group users make collective choices that can affect others' decisions. Our main findings are as follows: First, the group affects individual users' choices if its size is sufficiently large, meaning it is pivotal. However, even if the group is pivotal, it may join the lower-quality platform unless it is large enough. The group joins the higher-quality platform only when it is both pivotal and sufficiently large. Second, we examine how the group size affects surplus distribution. Increasing group size improves market efficiency but exacerbates the disparity in the surplus between the group users and individual users. Our results highlight the dual role of group users in platform competition: while they can enhance efficiency by steering the market toward the higher-quality platform, they may also contribute to imbalances in surplus distribution.

Keywords: Coordination problem, Divide and conquer, Platform competition, Two-sided markets

1 Introduction

Two-sided markets exhibit cross-network effects, whereby users on one side benefit when users on the other side join the same platform. These markets often face coordination problems, resulting in multiple equilibria in which users on both sides may coordinate on either platform. If a user on one side believes users on the other side join a certain platform, he derives a higher utility from the platform, resulting in joining the same

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platform they join. This implies that a lower-quality platform may win the market, resulting in an inefficient outcome.

In many markets, group users have a significant influence on individual users' decisions. For example, consider the electronic payment service market. Many consumers shop at major supermarkets and adopt the electronic payment services available there. In this sense, supermarkets shape consumers' platform choices. This suggests that group users can steer market outcomes and potentially mitigate inefficiencies. Our research addresses the following questions: (i) Does the presence of group users lead to an efficient outcome in which the higher-quality platform wins the market? (ii) If so, under what conditions? (iii) How does the group size affect welfare?

We analyze a model of platform competition in a two-sided market featuring two platforms: one with a quality advantage and another with a focality, meaning that users believe that others will join it when multiple equilibria exist. On one side of the market, there are individual users and a group of users. Individual users make decisions independently, while group users make collective decisions and can affect others. Platforms first compete for the group and then for individual users.

Our key findings are as follows: First, the group's decision can affect the choices of individual users when the group is not too small. Specifically, individual users follow the group and join the same platform. In other word, the group is pivotal when its size exceeds a certain threshold. However, even when the group is pivotal, it may still choose the lower-quality platform unless its size is sufficiently large. The higher-quality platform wins the market only if the group is both pivotal and large enough. This result can be explained as follows: when the group is pivotal, the competition for it intensifies because the platform that attracts the group also captures individual users and profits from them. Each platform's competitiveness for the group stems from the profit it can derive from individual users. As the group size increases, the network advantage of platform L, driven by its focality, diminishes. Consequently, platform H becomes more competitive and eventually overtakes platform L when the group size is large enough. However, if the group size is small, the lower-quality platform may still win the market despite offering inferior service.

Second, group size affects the distribution of surplus between the group and individual users. When the group is not pivotal, competition for the group is weak, allowing platform L to extract most of the group's surplus. When the group is pivotal, competition for the group intensifies: as the group size increases, the group's surplus increases while individual users' surplus declines. When platform L wins the market, the gain in group surplus outweighs the loss in individual users, and total surplus increases. Conversely, when platform H wins the market, the loss in individual users dominates, and total surplus decreases, except when the group is sufficiently large. Therefore, the group size that maximizes total user surplus coincides with the threshold at which the winning platform shifts.

The rest of the paper is organized as follows. Section 2 reviews the related literature. Section 3 presents the model. Section 4 characterizes the condition that would result in an inefficient outcome in the absent of the group. Section 5 analyzes the effect of introducing the group. Section 6 examines surplus implications. Section 7 concludes the paper.

2 Related Literature

Our paper relates to the literature on platform competition with coordination problems, where beliefs about others' choices play an important role. The pioneering work by Katz and Shapiro (1985) introduces the concept of rational expectations, and many subsequent papers have built upon this foundation.[1] Caillaud and Jullien (2001, 2003) assume that an incumbent platform has a focality or favorable belief: if both joining the incumbent and joining the entrant are equilibria, then joining the incumbent becomes a dominant strategy. In their model, the incumbent has full focality, whereas Hałaburda and Yehezkel (2016); Halaburda and Yehezkel (2019) allows for a partial degree of focality. In many markets, the incumbent platform often enjoys focality, whereas the entrant may have a quality advantage.[2] Our paper analyzes the conditions under which the latter platform can successfully enter and dominate the market. Halaburda et al. (2020) examines a dynamic competition where a platform that dominated the market in the previous period becomes focal. It shows that the higher-quality platform dominates the market when competition persists for long periods or when the future is not heavily discounted. In Biglaiser et al. (2022), users have multiple opportunities to migrate from the incumbent to the entrant. However, counterintuitively, the more opportunities they have, the less likely they are to migrate.

Exclusive deals play a crucial role in gaining a competitive edge in platform competition. D'Annunzio (2017) and Carroni et al. (2024) examine exclusive deals with superstars who can potentially attract a large user base, while Bedre-Defolie and Biglaiser (2022) analyzes an exclusive deal involving products that lower costs.

Various pricing strategies are observed in the platform competition. In one-sided markets, introductory pricing is often adopted, where platforms initially set low prices to build a network base. Fudenberg and Tirole (2000) uses this strategy to deter entry. In contrast, in two-sided markets, the divide-and-conquer strategy is commonly employed. Caillaud and Jullien (2001, 2003) analyze a static model where platforms subsidize users who exert a larger cross-network effect while monetizing those who benefit from it.

Markovich and Yehezkel (2022) is particularly relevant to our study. It considers a one-sided market

[1] See Economides (1996), Griva and Vettas (2011), and Tolotti and Yepez (2020). Some papers consider irrational or naive consumers, including Cabral (2011, 2019), and Hattori and Zennyo (2018).

[2] Biglaiser et al. (2019) provides various factors that give incumbent an edge in platform competition.

where platforms exhibit within-network effects, meaning that users benefit from others joining the same platform. As a result, the group is treated as the subsidy side, while individual users are treated as the monetized side. Our paper extends this framework to a two-sided market, where platforms can even charge negative prices to individual users. In other words, our study considers a broader range of pricing strategies.

3 Model

There are two platforms, platform H and platform L, and two classes of users, side A and side B. Each class consists of a unit mass of identical users. The utility of a user on side k who joins platform i is given by

$$v_i + \beta^k n_i^\ell - p_i^k,$$

where v_i is the quality of platform i, β^k is the benefit a user on side k receives from each user on the other side ℓ who joins the same platform, n_i^ℓ is the number of users on side ℓ joining platform i, and p_i^k is the price charged by platform i to users on side k. We assume $v = v_H > v_L = 0$ and $\beta^B > \beta^A$. Thus, platform H has a quality advantage over platform L, and users on side A exert a larger network effects on users on side B.

The unit mass of users on side A is divided into group and individual users. The proportions of group and individual users are exogenous and given by x and $1 - x$, respectively. Users on side B consist only of individual users. The group users make a collective decision, and the utility of the entire group joining platform i is given by

$$x(v_i + \beta^A n_i^B) - p_i^G,$$

where p_i^G is the price charged by platform i to the group.

The game proceeds as follows: In the first stage, both platforms simultaneously set prices for the group, p_H^G and p_L^G. The group then chooses whether to join either platform. In the second stage, both platforms simultaneously set prices for individual users on each side, $p_H = (p_H^A, p_H^B)$ and $p_L = (p_L^A, p_L^B)$. Individual users on each side then decide whether to join either platform.

Each platform i chooses a price p_i^G for the group and a price p_i^k for individual users on side $k = A, B$, respectively, from the set $\mathbb{R}$ of real numbers. The group and each individual user on side $k = A, B$ make choices d^G and d^k from the set $D = \{H, L, \emptyset\}$, where $\emptyset$ represents no participation. We assume that the group cannot delay its decision until the second stage. A strategy for each platform i consists of its price p_i^G for the group and its price profile $p_i = (p_i^A, p_i^B)$ as a function of the group choice $d^G \in D$. The group's strategy is its choice d^G as a function of the price profile $p^G = (p_H^G, p_L^G)$, whereas the strategy of each individual user on side $k = A, B$ is the choice d^k as a function of the price profile $p^k = (p_H^k, p_L^k)$ and the group choice $d^G \in D^G$.

Each platform i has zero marginal cost and its profit is

$$p_i^G I_i^G(d^G) + p_i^k n_i^k + p_i^\ell n_i^\ell, \quad \text{where } I_i^G(d^G) = \begin{cases} 1 & \text{if } d^G = i, \\ 0 & \text{otherwise.} \end{cases}$$

We analyze the subgame perfect equilibrium (SPE) of this game. Typically, there are multiple equilibria in platform competition, and the beliefs play an important role. We assume that each individual user has the same belief such that he believes that others join platform L if, given the group choice d^G, price profiles $p_H = (p_H^A, p_H^B)$ and $p_L = (p_L^A, p_L^B)$, both "joining platform H" and "joining platform L" are equilibria. In other words, the platform L has a focality or favorable belief.

4 Benchmark case: no group

Our paper aims to show that the presence of the group can improve an inefficient outcome, where the lower-quality platform wins the market. In this section, we derive the condition under which platform L wins the market in the absence of the group. Suppose that $x = 0$. Each user believes that others will join platform L if both joining platform H and joining platform L are both equilibria. For each user on side k, joining platform H is a dominant strategy if

$$v - p_H^k > \beta^k - p_L^k \quad \Leftrightarrow \quad p_H^k < p_L^k + v - \beta^k.$$

Given a price profile p_L, if joining platform H is a dominant strategy for users on side k, then users on side ℓ will also join platform H if and only if

$$v + \beta^\ell - p_H^\ell \geq \max\{-p_L^\ell, 0\} \quad \Leftrightarrow \quad p_H^\ell \leq \min\{p_L^\ell, 0\} + v + \beta^\ell.$$

This strategy, employed by platform H, is known as the *divide-and-conquer strategy.* Platform H subsidizes users on side k to encourage users on side ℓ to join. It then monetizes users on side ℓ and ultimately attracts users on both sides. Following this strategy, platform H's profit is given by

$$p_L^k + v - \beta^k + \min\{p_L^\ell, 0\} + v + \beta^\ell.$$

To retain users, platform L must set a price profile $p_L = (p_L^A, p_L^B)$ such that platform H's profit is non-positive. The conditions are as follows:

$$p_L^A + v - \beta^A + \min\{p_L^B, 0\} + v + \beta^B \leq 0, \tag{1}$$

$$p_L^B + v - \beta^B + \min\{p_L^A, 0\} + v + \beta^A \leq 0. \tag{2}$$

In addition to the divide-and-conquer strategy, platform H can also adopt a strategy that targets only one side. In this case, it does not set a negative price for the side because its profit would be negative if it could attract users. Therefore, for platform L to retain users, the price profile p_L must also satisfy the following conditions:

$$p_L^A \leq \beta^A - v, \tag{3}$$

$$p_L^B \leq \beta^B - v. \tag{4}$$

In Figure 1, the gray area represents the price profile $p_L = (p_L^A, p_L^B)$ where platform L wins the market, and the red dot and line indicate the price profile at which platform L earns the maximum profit in winning the market. For platform L to win the market in the absence of the group, the profit must be positive.

Lemma 1. When there is no group, the condition under which platform L wins the market is given by

(a) $\beta^B \geq 2\beta^A - v$

$$\frac{1}{3}\beta^A > v \quad \text{and} \quad \beta^B > \frac{5}{3}\beta^A,$$

(b) $\beta^B < 2\beta^A - v$

$$\frac{\beta^B - \beta^A}{2} > v \quad \text{and} \quad 2\beta^A > \beta^B.$$

The equilibrium prices and profit are as follows:

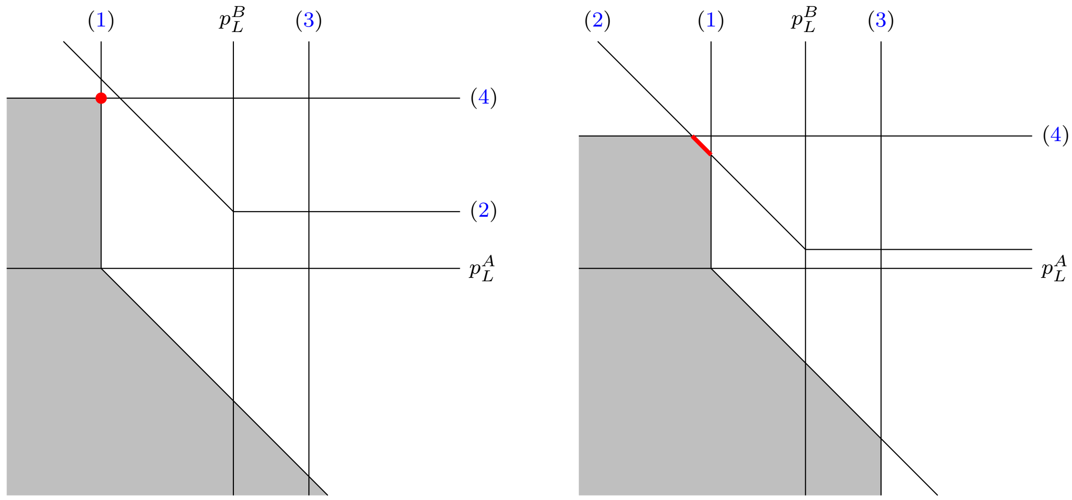
(a) $\beta^B \geq 2\beta^A - v$

$$p_L^{A*} = \beta^A - \beta^B - 2v, \quad p_L^{B*} = \beta^B - v, \quad \pi_L^* = \beta^A - 3v.$$

(b) $\beta^B < 2\beta^A - v$

$$p_L^{A*} = q \in [-\beta^A - v, \beta^A - \beta^B - 2v], \quad p_L^{B*} = -q - \beta^A + \beta^B - 2v, \quad \pi_L^* = -\beta^A + \beta^B - 2v.$$

Lemma 1 states that platform L wins the market if platform H's quality advantage is not too large



(a) $\beta^B \geq 2\beta^A - v$ (b) $\beta^B < 2\beta^A - v$

Figure 1: Equilibrium price profile

(1) and (2) are the conditions under which platform H's profit is non-positive when it adopts the divide-and-conquer strategy. (3) and (4) are the conditions under which platform L can retain users when platform H employs a strategy that targets only one side, side A in (3) and side B in (4), respectively.
When $\beta^B \geq 2\beta^A - v$, as shown in the figure on the left, since the network effect exerted by users on side A is sufficiently large, the equilibrium price profile p_L is constrained by the divide-and-conquer strategy where platform H divides users on side A and conquers users on side B. On the other hand, when $\beta^B < 2\beta^A - v$, as shown in the figure on the right, the equilibrium price profile p_L is constrained by the divide-and-conquer strategy where platform H divides users on side B and conquers users on side A.

compared to platform L's network advantage due to its focality. In other words, the inefficient outcome occurs when the network advantage dominates the quality advantage.

5 Impact of the group

In this section, we consider the case where there is a group on side A and analyze how the presence of the group affects the outcome of platform competition. In what follows, we assume $\frac{1}{3}\beta^A > v > 2\beta^A - \beta^B$ and $\beta^B > \frac{5}{3}\beta^A$. This assumption ensures, as shown in Figure 1, that when platform L wins the market, the divide-and-conquer strategy where platform H divides individual users on side A and conquers individual users on side B constrains platform L's equilibrium price profile. Suppose that $x > 0$. Then, there are two subgames in stage 2: the group joins platform L ($d^G = L$) and the group joins platform H, ($d^G = H$).

5.1 Competition for individual users when the group joins platform L

We consider the subgame $d^G = L$. Intuitively, since the group joins platform L, its network advantage due to its focality remains unchanged from the benchmark case without the group. Therefore, individual users on both sides are expected to join platform L. We confirm this intuition more formally below. As in the benchmark case, platform H has two strategies to attract individual users: the divide-and-conquer strategy and targeting only one side. If platform H attempts to attract individual users by subsidizing those on side A and monetizing those on side B, it must set its price profile p_H such that

$$v - p_H^A > \beta^A - p_L^A \quad \Leftrightarrow \quad p_H^A < p_L^A + v - \beta^A,$$
$$v + \beta^B(1-x) - p_H^B \geq \max\{\beta^B x - p_L^B, 0\} \quad \Leftrightarrow \quad p_H^B \leq \min\{p_L^B - \beta^B x, 0\} + v + \beta^B(1-x).$$

Since the group joins platform L, even if platform H succeeds in attracting individual users on side A, the network benefit from side B is $\beta^B(1-x)$. Thus, as the group size increases, platform H's competitiveness in attracting individual users on side A weakens. Conversely, if platform H attempts to attract individual users by subsidizing individual users on side B and monetizing individual users on side A, it must set the price profile p_H to satisfy

$$v - p_H^B > \beta^B - p_L^B \quad \Leftrightarrow \quad p_H^B < p_L^B + v - \beta^B,$$
$$v + \beta^A - p_H^A \geq \max\{-p_L^A, 0\} \quad \Leftrightarrow \quad p_H^A \leq \min\{p_L^A, 0\} + v + \beta^A.$$

In either divide-and-conquer strategy, platform L can retain individual users only if it sets a price profile $p_L = (p_L^A, p_L^B)$ such that platform H's profit is non-positive. These conditions are given by:

$$(1-x)(p_L^A + v - \beta^B) + \min\{p_L^B - \beta^B x, 0\} + v + \beta^B(1-x) \leq 0, \tag{5}$$
$$(1-x)(\min\{p_L^A, 0\} + v + \beta^A) + p_L^B + v - \beta^B \leq 0. \tag{6}$$

Moreover, in response to the strategy of platform H which targets only one side, platform L must set a price profile $p_L = (p_L^A, p_L^B)$:

$$p_L^A \leq \beta^A - v, \tag{7}$$
$$p_L^B \leq \beta^B - v. \tag{8}$$

Lemma 2. When the group joins platform L, it can attract individual users on both sides. The equilibrium prices and profit are given by

$$p_L^{A*}(L) = \begin{cases} \beta^A - v - \frac{1}{1-x}\{v + \beta^B(1-x)\} & \text{if } x \le 1 - \frac{v}{\beta^B}, \\ \beta^A - v - 2\beta^B & \text{if } x > 1 - \frac{v}{\beta^B}, \end{cases} \quad p_L^{B*}(L) = \beta^B - v,$$

$$\pi_L^*(L) = \begin{cases} \beta^A - 3v - (\beta^A - \beta^B - v)x & \text{if } x \le 1 - \frac{v}{\beta^B}, \\ \beta^A - \beta^B - 2v - (\beta^A - 2\beta^B - v)x & \text{if } x > 1 - \frac{v}{\beta^B}. \end{cases}$$

5.2 Competition for individual users when the group joins platform H

Next, we consider the subgame $d^G = H$. Unlike in the subgame $d^G = L$, the group's choice weakens platform L's network advantage due to its focality. As a result, even if platform L succeeds in attracting individual users on side A, it may not be able to recoup its subsidy from individual users on side B. Consequently, platform H may attract individual users. In what follows, we derive, in turn, the condition under which platform L attracts individual users and that under which platform H does so. As in the previous analysis, in order for platform L attract individual users, it must set a price profile p_L such that joining platform L is optimal for individual users in response to two types of strategies by platform H. These conditions are given by

$$(1-x)(p_L^A + v - \beta^A) + (\min\{p_L^B, 0\} + v + \beta^B) \le 0, \tag{9}$$

$$(1-x)(\min\{p_L^A, 0\} + v + \beta^A) + p_L^B + v - \beta^B(1-2x) \le 0, \tag{10}$$

$$p_L^A \le \beta^A - v, \tag{11}$$

$$p_L^B \le \beta^B(1-2x) - v. \tag{12}$$

Conditions (9) and (10) ensure that platform H's divide-and-conquer strategy yields non-positive profit, while (11) and (12) ensure that joining platform L is a dominant strategy for individual users when platform H targets only one side. The group's joining platform H significantly impact condition (12). By weakening platform L's network advantage due to its focality, it forces platform L to lower the price for individual users on side B in order to compensate for the diminished advantage. The profit π_L at the maximum price profile satisfying the above conditions is given by

$$\pi_L = \beta^A - 3v - (\beta^A + 2\beta^B - v)x^A.$$

Therefore, platform L can attract individual users only if the profit is non-negative, that is, when $x \leq \bar{x}^L = \frac{\beta^A - 3v}{\beta^A + 2\beta^B - v}$.

Lemma 3. When the group joins platform H, platform L can attract individual users if $x \leq \bar{x}_L = \frac{\beta^A - 3v}{\beta^A + 2\beta^B - v}$. Then, the equilibrium prices and profit are given by

$$p_L^{A*}(H) = \beta^A - v - \frac{1}{1-x}(v + \beta^B), \quad p_L^{B*}(H) = (1-2x)\beta^B - v,$$
$$\pi_L^*(H) = \beta^A - 3v - (\beta^A + 2\beta^B - v)x.$$

On the other hand, in order for platform H to attract individual users, it adopts the divide-and-conquer strategy. For the price profile $p_H = (p_H^A, p_H^B)$ of platform H to be the equilibrium, the profit π_H must be non-negative;

$$\pi_H = (1-x)p_H^A + p_H^B \geq 0. \tag{13}$$

Furthermore, there are two possible deviations for platform L: a deviations that attempts to attract all individual users and that attempts to attract individual users on only one side. The profit of platform L from these deviations must be non-positive. Since platform L is focal, the price must satisfy the following conditions for platform L attract all individual users,

$$\beta^A - p_L^A \geq v - p_H^A \ \text{ and } \ \beta^B(1-x) - p_L^B \geq \max\{v + \beta^B x - p_H^B, 0\}.$$

Platform L's profit from this deviation must be non-positive:

$$\pi_L = (1-x)p_L^A + p_L^B \leq (1-x)(p_H^A - v + \beta^A) + \min\{p_H^B - v - x^A\beta^B, 0\} + \beta^B(1-x) \leq 0. \tag{14}$$

The requirement for platform L to attract individual users on only side k is given by

$$-p_L^k \geq v + \beta^k - p_H^k \quad k = A, B.$$

Since it is not profitable for platform L to set a negative price, the price p_H must satisfy the following conditions:

$$p_H^A \leq v + \beta^A, \tag{15}$$
$$p_H^B \leq v + \beta^B. \tag{16}$$

Lemma 4. When the group joins platform H, platform H can attract individual users if $x \geq \bar{x}_H = \frac{\beta^A - 2v}{\beta^A + \beta^B - v}$. Then, the equilibrium prices and profit are given by

$$p_H^{A*}(H) = -\beta^A - \beta^B + v, \quad p_H^{B*}(H) = \beta^B + v,$$
$$\pi_H^*(H) = -\beta^A + 2v + (\beta^A + \beta^B - v)x.$$

Taken together, Lemma 3 and 4 indicate that whether the group's choice can affect the choices of individual users depends on the size of the group. Specifically, if the group size is sufficiently large, $x \geq \bar{x}_H$, the group can affect the choice of individual users, and individual users follow the group and join the same platform. In this sense, the group becomes pivotal in determining the market outcome.

5.3 Competition for the group

Based on the results of stage 2, we examine two cases in turn: (i) when the group is not pivotal (i.e., $x < \bar{x}_H$), and (ii) when the group is pivotal(i.e., $x \geq \bar{x}_H$). First, we analyze the case where the group is not pivotal. When the group is not pivotal and its size lies in the range $\bar{x}_L < x < \bar{x}_H$, individual users will follow the group and join platform L if the group joins platform L. However, if the group joins platform H, the platform choice of individual users becomes indeterminate. We assume that when $\bar{x}_L < x < \bar{x}_H$, individual users choose platform L even if the group joins platform H. Under this assumption, the group cannot benefit from the network effect by joining platform H. Therefore, the entire utilities of the group joining H and L are given respectively by

$$xv - p_H^G \ \text{ and } \ x\beta^A - p_L^G.$$

As a result, the condition under which the group joins platform L is

$$x\beta^A - p_L^G \geq xv - p_H^G \quad \Leftrightarrow \quad p_L^G \leq p_H^G + x(\beta^A - v).$$

Since platform H earns no profit from individual users in this case, the lowest price it can charge the group is 0. When $p_L^G = x(\beta^A - v)$, the total profit of platform L is given by

$$\begin{aligned}\Pi_L &= p_L^G + \pi_L^*(L) \\ &= \beta^A - 3v + \beta^B x > 0.\end{aligned}$$

Proposition 1. When the group is not pivotal (i.e., $x < \bar{x}_H$), platform L wins the market. The equilibrium price charged to the group and the total profit of platform L are given by

$$p_L^{G*} = (\beta^A - v)x \quad \text{and} \quad \Pi_L^* = \beta^A - 3v + \beta^B x.$$

When the group is not pivotal, efficiency is not improved. This outcome is intuitive since the platforms differ significantly in terms of competitiveness for attracting the group, which stems from the profit each platform can extract from individual users. Interestingly, however, the presence of the group enhances platform L's profit. Because platform H is less competitive in attracting the group, platform L can charge a positive price $p_L^G = (\beta^A - v)x$ to the group. In contrast, the price charged by platform L to individual users on side A is $p_L^{A*}(L) = \beta^A - v - \frac{1}{1-x}\{v + \beta^B(1-x)\}$, which is negative. As the group size increases, platform L earns more profit from the group while the subsidy required to attract individual users on side A decreases. These combined effects allow platform L to extract more surplus from side A and achieve a higher total profit.

Next, we consider the case where the group is pivotal, i.e., $x \geq \bar{x}_H$. Unlike the case where the group is not pivotal, the platform that succeeds in attracting the group also captures individual users. As a result, the group benefits from the network effect regardless of which platform it joins. The entire utilities of the group joining H and L are respectively given by

$$x(v + \beta^A) - p_H^G \;\text{ and }\; x\beta^A - p_L^G.$$

Hence, the condition under which the group joins platform L is

$$x\beta^A - p_L^G \geq x(v + \beta^A) - p_H^G \quad \Leftrightarrow \quad p_L^G \leq p_H^G - vx.$$

Since the platform that attracts the group also earns profit from individual users, each platform can offer a price to the group as long as its total profit remains non-negative. Therefore, the minimum price that platform i can charge the group is $-\pi_i^*(i)$, and the condition under which the group joins platform L is rewritten as $p_L^G \leq -\pi_H^*(H) - vx$. If Platform L sets $p_L^G = -\pi_H^*(H) - vx$, its total profit is given by

$$\Pi_L = p_L^G + \pi_L^*(L) = -\pi_H^*(H) - vx + \pi_L^*(L),$$

and platform L wins the market if the total profit is non-negative.

Proposition 2. When the group is pivotal (i.e., $x \geq \bar{x}_H$), platform L wins the market if $x \leq \hat{x}$, and platform H wins the market if $x > \hat{x}$, where $\hat{x} = \frac{2\beta^A - 5v}{2\beta^A - v}$. The equilibrium price charged to the group and total profit are given by

(i) $x \leq \hat{x} \;\Rightarrow$ Platform L

$$p_L^{G*} = \beta^A - 2v - (\beta^A + \beta^B)x \quad \text{and} \quad \Pi_L^* = 2\beta^A - 5v - (2\beta^A - v)x.$$

(ii) $x > \hat{x} \;\Rightarrow$ Platform H

$$p_H^{G*} = \begin{cases} -\beta^A + 3v + (\beta^A - \beta^B)x & \text{if } x \leq 1 - \frac{v}{\beta^B}, \\ -\beta^A + \beta^B + 2v + (\beta^A - 2\beta^B) & \text{if } x > 1 - \frac{v}{\beta^B}, \end{cases}$$

$$\Pi_H^* = \begin{cases} -2\beta^A + 5v + (2\beta^A - v)x & \text{if } x \leq 1 - \frac{v}{\beta^B}, \\ -2\beta^A + \beta^B + 4v + (2\beta^A - \beta^B - v)x & \text{if } x > 1 - \frac{v}{\beta^B}. \end{cases}$$

The intuition behind Proposition 2 is as follows: When the group is pivotal ($x \geq \bar{x}_H$), its choice significantly impacts on individual users. Since the platform that attracts the group also secures individual users and associated profits, the competition for the group intensifies. Each platform's competitiveness stems from the amount of profit it can earn from individual users upon securing the group. As the group size increases, platform H becomes increasingly competitive. While it may seem that the group would always join platform H (the efficient outcome), this is only the case when the group is sufficiently large. If the group is pivotal but its size is relatively small, users join platform L, which is a coordination failure. The threshold at which the platform winning the market changes from platform L to platform H decreases in the quality advantage v of platform H. This implies that sufficiently large group is required for platform H to win the market when the quality advantage is weak. Extremely, if $v = 0$, $\hat{x} = 1$, and platform L wins the market regardless of the group size.

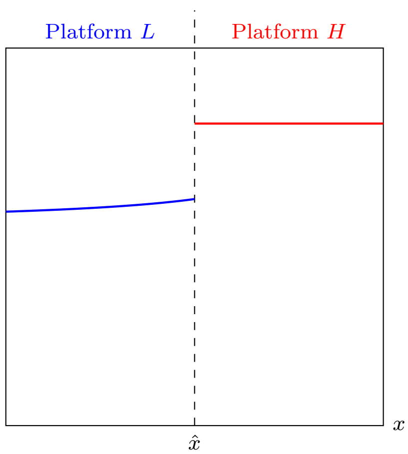
6 Welfare analysis

This section analyzes how the group size affects user surplus. Let u_k denote the surplus of each individual user on side k, u_G the surplus of each group member, and US the total user surplus.

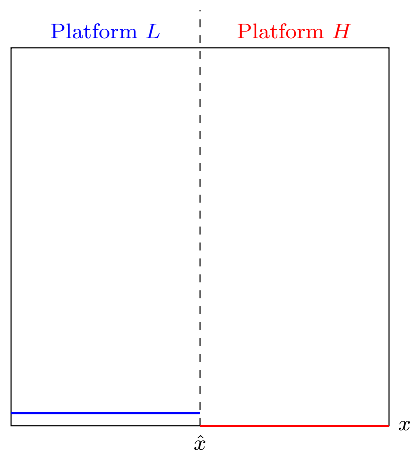
Lemma 5. The surpluses of each individual user on side A and B are given respectively by

$$u_A = \begin{cases} v + \frac{1}{1-x}\{v + (1-x)\beta^B\} & \text{if } x \leq \hat{x}, \\ 2\beta^A + \beta^B & \text{if } x > \hat{x}, \end{cases} \quad \text{and} \quad u_B = \begin{cases} v & \text{if } x \leq \hat{x}, \\ 0 & \text{if } x > \hat{x}. \end{cases}$$

Figure 2 illustrates the result of Lemma 5. Each platform provides subsidies to individual users on side A and recovers the cost from individual users on side B. For individual users on side A, the subsidy level is determined by the potential profit that losing platform could have earned from individual users on side B had it succeeded in attracting individual users on side A. When platform L wins the market (i.e., $x \leq \hat{x}$), it attracts the group, and platform H loses the chance to earn $v+(1-x)\beta^B$ from individual users on side B. As a result, platform H can set the price p_H^A for individual users on side A such that $p_H^A \geq -\frac{1}{1-x}\{v+(1-x)\beta^B\}$. This means that as the group size increases, the competition to attract individual users on side A intensifies. Consequently, platform L must provide a more subsidy to attract them, leading to a higher surplus for each individual user on side A. In contrast, when platform H wins the market (i.e., $x > \hat{x}$), the potential profit of platform L is $(1-x)\beta^B$, which result in $p_L^A \geq -\beta^B$. Since this value does not depend on the group size, the level of competition for individual users on side A remains constant, and thus, the surplus of each individual user on side A remains unchanged. For individual users on side B, their surplus is extracted in order to cover the subsidy offered to individual users on side A. When platform L wins the market, the quality advantage v of platform H must be subtracted from the network effect to prevent the strategy that platform H targets only on individual users on side B. On the other hand, when platform H wins the market, the surplus of each individual user on side B is fully extracted.



(a) Side A



(b) Side B

Figure 2: Surplus of each individual user

Lemma 6. The surplus of each group member is given by

$$u_G = \begin{cases} v & \text{if } x \le \bar{x}_H, \\ 2\beta^A + \beta^B - \frac{1}{x}(\beta^A - 2v) & \text{if } \bar{x}_H < x \le \hat{x}, \\ \beta^B + v + \frac{1}{x}(\beta^A - 3v) & \text{if } \hat{x} < x \le 1 - \frac{v}{\beta^B}, \\ 2\beta^B + v + \frac{1}{x}(\beta^A - \beta^B - 2v) & \text{if } x > 1 - \frac{v}{\beta^B}. \end{cases}$$

Figure 3 illustrates the result of Lemma 6. If the group is not pivotal (i.e., $x < \bar{x}_H$), platform H cannot charge a negative price to the group, so platform L extracts most of the group's surplus. On the other hand, if the group is pivotal (i.e., $x \ge \bar{x}_H$), the platform that succeeds in attracting the group wins the market, making competition for the group fierce. Thus, when the group size is $\bar{x}_H$, the surplus jumps up. The competition for the group is driven by the profit derived from individual users when a platform attracts the group. As the group size increases, the profit increases for both platforms, but the effect is greater for platform H than for platform L. Thus, for the group size $x \in [\bar{x}_H, \hat{x}]$, where platform L wins the market, the subsidy for the group gradually increases, leading to an increase in the surplus of a single group user. However, for the group size $x > \hat{x}$, where platform H wins the market, the increment of subsidy for an increase in the group size becomes smaller, and the subsidy for a single group user decreases, resulting in the decrease in surplus. The exception is when the group is on side A and $x > 1 - \frac{v}{\beta^B}$, where platform H wins the market. If platform L had succeeded in attracting the group, its profit from individual users would have been quite large. Thus, competition is fierce, leading to an increase in the surplus of a single group user.

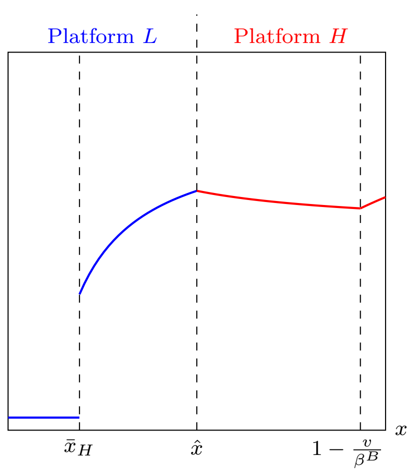


Figure 3: Surplus of each group member

Proposition 3. The total user surplus is given by

$$US = \begin{cases} \beta^B + 3v - \beta^B x & \text{if } x \leq \bar{x}_H, \\ -\beta^A + \beta^B + 5v + (2\beta^A - v)x & \text{if } \bar{x}_H < x \leq \hat{x}, \\ 3\beta^A + \beta^B - 3v - (2\beta^A - v)x & \text{if } \hat{x} < x \leq 1 - \frac{v}{\beta^B}, \\ 3\beta^A - 2v - (2\beta^A - \beta^B - v)x & \text{if } x > 1 - \frac{v}{\beta^B}. \end{cases}$$

Figure 4 illustrates the result of Proposition 3. When the group is not pivotal (i.e., $x \leq \bar{x}_H$), competition for the group is weak, allowing to platform L to extract surplus from the group. As the group size increases, the group's total surplus rises, but this increase is smaller than the decrease in surplus of individual users on side A. As a result, total user surplus declines. When the group is pivotal (i.e., $x > \bar{x}_H$), competition intensifies, leading to an increase in the group's surplus as the group size grows. Thus, total user surplus increases in the range $x \in (\bar{x}_H, \hat{x}]$, where platform L wins the market. At $x = \hat{x}$, the winning platform shifts from L to H, resulting in a discrete jump in total user surplus. This jump occurs because the competition for individual users on side A intensifies, increasing their surplus due to the greater subsidies required to attract them. However, as the group size increases beyond $\hat{x}$, the decrease in surplus of individual users on side A outweighs the increase in group surplus, causing total user surplus to decline. An exception occurs when $x > 1 - \frac{v}{\beta^B}$, where the increase in group surplus becomes large enough to offset the loss in surplus of individual users on side A, resulting in a rise in total user surplus. This analysis highlights an important insight: while a sufficiently large group size can improve market efficiency, where platform H wins the market, but the total user surplus may decline if the group becomes too large. This is because a large group size has two opposing effects: it raises group surplus but lowers the surplus of individual users on side A, with the latter dominating except when $x > 1 - \frac{v}{\beta^B}$.

7 Conclusion

We examine the impact of group users who collectively make decisions on platform competition. First, we show that the group's choice affects individual users' choice when the group size is not too small. Even though the group can steer the market outcome, it may still choose to join the lower-quality platform unless its size is sufficiently large. An efficient outcome, where the higher-quality platform wins the market, is achieved only when the group size is both pivotal and large enough. The threshold at which the winning platform shifts decreases with the quality advantage of the superior platform. Moreover, if there is no quality difference between platforms, platform L always wins due to its focality.

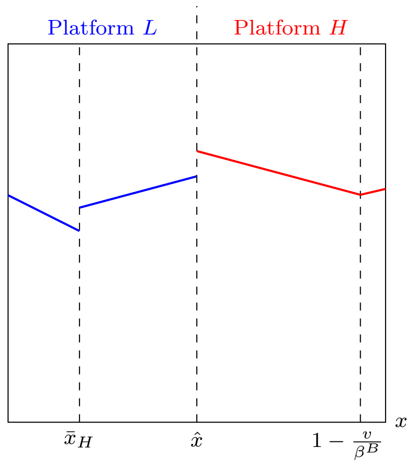


Figure 4: Total user surplus

We also analyze how group size affects surplus distribution. As group size increases, the group's surplus rises, while the surplus of individual users declines. When the group is not pivotal, platform L can extract surplus from it, reducing total user surplus. However, when the group is pivotal, competition for the group intensifies. Since platform H can extract more profit from individual users once it attracts the group, compared to platform L, total user surplus gradually increases when platform L wins the market, and decreases when platform H wins, except when the group size is very large. Consequently, the group size that maximizes total user surplus corresponds to threshold at which the winning platform changes.

Our findings have important implications for competition policy. Since the group's decision can determine the market outcome, competition authorities should intervene in practices that hinder migration from lower-quality to higher-quality platforms. For example, vertical integration by a lower-quality platform may discourage market entry by a higher-quality competitor and should therefore be closely monitored or regulated.

References

Ö. Bedre-Defolie and G. Biglaiser. Competition for exclusivity of a superior input and quality implications. *Available at SSRN 4278448*, 2022.

G. Biglaiser, E. Calvano, and J. Crémer. Incumbency advantage and its value. *Journal of Economics & Management Strategy*, 28(1):41–48, 2019.

G. Biglaiser, J. Crémer, and A. Veiga. Should i stay or should i go? migrating away from an incumbent platform. *The RAND Journal of Economics*, 53(3):453–483, 2022.

L. Cabral. Dynamic price competition with network effects. *The Review of Economic Studies*, 78(1):83–111, 2011.

L. Cabral. Towards a theory of platform dynamics. *Journal of Economics & Management Strategy*, 28(1): 60–72, 2019.

B. Caillaud and B. Jullien. Competing cybermediaries. *European Economic Review*, 45(4-6):797–808, 2001.

B. Caillaud and B. Jullien. Chicken & egg: Competition among intermediation service providers. *RAND journal of Economics*, pages 309–328, 2003.

E. Carroni, L. Madio, and S. Shekhar. Superstar exclusivity in two-sided markets. *Management Science*, 70 (2):991–1011, 2024.

A. D'Annunzio. Vertical integration in the tv market: Exclusive provision and program quality. *International Journal of Industrial Organization*, 53:114–144, 2017.

N. Economides. The economics of networks. *International journal of industrial organization*, 14(6):673–699, 1996.

D. Fudenberg and J. Tirole. Pricing a network good to deter entry. *The Journal of Industrial Economics*, 48(4):373–390, 2000.

K. Griva and N. Vettas. Price competition in a differentiated products duopoly under network effects. *Information Economics and Policy*, 23(1):85–97, 2011.

H. Hałaburda and Y. Yehezkel. The role of coordination bias in platform competition. *Journal of Economics & Management Strategy*, 25(2):274–312, 2016.

H. Halaburda and Y. Yehezkel. Focality advantage in platform competition. *Journal of Economics & Management Strategy*, 28(1):49–59, 2019.

H. Halaburda, B. Jullien, and Y. Yehezkel. Dynamic competition with network externalities: how history matters. *The RAND Journal of Economics*, 51(1):3–31, 2020.

K. Hattori and Y. Zennyo. Heterogeneous Consumer Expectations and Monopoly Pricing for Durables with Network Externalities. MPRA Paper 89893, University Library of Munich, Germany, 2018.

M. L. Katz and C. Shapiro. Network externalities, competition, and compatibility. *The American economic review*, 75(3):424–440, 1985.

S. Markovich and Y. Yehezkel. Group Hug: Platform Competition with User Groups. *American Economic Journal: Microeconomics*, 14(2):139–175, 2022.

M. Tolotti and J. Yepez. Hotelling-bertrand duopoly competition under firm-specific network effects. *Journal of Economic Behavior & Organization*, 176:105–128, 2020.