CPRC Discussion Paper Series

Competition Policy Research Center

Japan Fair Trade Commission

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Yuta Kittaka
Assistant Professor (Specially Appointed), Hitotsubashi Institute for Advanced Study,
Hitotsubashi University and
Visiting Researcher of the Competition Policy Research Center

Susumu Sato
Assistant Professor, Institute of Economic Research, Hitotsubashi University and
Visiting Researcher of the Competition Policy Research Center

Yusuke Zennyo
Outstanding Professor, Institute for Advanced Research and
Professor, Graduate School of Business Administration, Kobe University and
Visiting Researcher of the Competition Policy Research Center

CPDP-89-2-E December 2022. Revised February 2023
(This paper was originally written in Japanese in May 2022 (CPDP-89-2-J))

1-1-1 Kasumigaseki, Chiyoda-ku, Tokyo 100-8987 JAPAN
Phone: +81-3-3581-1848 Fax: +81-3-3581-1945
URL: https://www.jftc.go.jp/en/cprc/index.html (English)
https://www.jftc.go.jp/cprc/index.html (Japanese)
E-mail: cprcsec@jftc.go.jp

Self-Preferencing by Platforms: A Literature Review*

Yuta Kittaka[†] Susumu Sato[‡] Yusuke Zennyo[§]

February 1, 2023

Abstract

We survey the economics literature on dual-role platforms and self-preferencing by them. Existing studies mainly consist of theoretical studies, but there are also some empirical studies. Regardless of whether it is theoretical or empirical, many studies on self-preferencing are concerned with the manipulation of search results and recommendation algorithms. Some recent studies have examined first-party selling by platforms that use proprietary transaction data collected from third-party sellers. However, little has been explored about other types of self-preferencing. Findings reported in the existing literature indicate that the impact of self-preferencing on consumers depends largely on the forms of self-preferencing and market environments, implying that policymakers need to gather relevant information on a case-by-case basis for better decision-making. Finally, we discuss the types of data used in existing empirical studies, which suggest what kind of data and information can (not) be accessible by researchers. Several directions for future research are also proposed.

Keywords: digital platform, ecosystem, dual-role platform, self-preferencing

JEL classification: K21, L13, L40

*This paper is a translation of our CPRC discussion paper written in Japanese (Kittaka, Sato and Zennyo, 2022). We gratefully acknowledge the financial support from JSPS KAKENHI grant numbers 20H01551, 20K22117, 21J00008, and 22H00043.

[†]Hitotsubashi Institute for Advanced Study, Hitotsubashi University, 2-1, Naka, Kunitachi, Tokyo, 186-8601, Japan. E-mail: kittaka@econ-io.jp

[‡]Institute of Economic Research, Hitotsubashi University, 2-1, Naka, Kunitachi, Tokyo, 186-8601, Japan. E-mail: susumusato.econ@gmail.com

[§]Graduate School of Business Administration, Kobe University, 2-1 Rokkodai, Nada, Kobe, Hyogo, 657-8501, Japan. E-mail: xyzennyo@b.kobe-u.ac.jp

1 Introduction

This paper presents a literature review of the recent research on dual-role platforms and self-preferencing by them to summarize the current findings reported in the economics literature on the competitive effects of self-preferencing.[1] Based on this review, we outline several issues relevant to recent competition policy debates.

Recently, some platform operators have begun selling their products and services on the platforms they operate. Likewise, some sellers have started opening platforms to invite other sellers to sell products/services therein. Examples can be seen in many industries, including search engines (Google and Bing), online shopping malls (Amazon, Walmart, and JD.com), video game consoles (Nintendo, Sony Interactive Entertainment, and Microsoft), mobile app stores (Google and Apple), and online travel agencies (Expedia and Booking.com). These companies act as both platform operators and sellers in the platform. The literature has called them "dual-role platform" (Chen and Tsai, 2019; Kittaka and Sato, 2022), "hybrid platform" (Anderson and Bedre-Defolie, 2021; Etro, 2023), "vertically-integrated platform" (Padilla, Perkins and Piccolo, 2022) and the like.[2] Throughout this paper, we use the term "dual-role platform."

From the platform perspective, having a dual role can be an effective business strategy. However, from the competition policy perspective concerns have been raised regarding dominant platforms' use of dual roles. In particular, a prominent concern is about "self-preferencing" (i.e., platforms' preferential treatment of their own products/services). Typical examples of self-preferencing include the manipulation of the order of search results and rankings in favor of platforms' own products/services as well as the exploitative use of transaction data, which they have access to as the plat-

[1] Etro (2022) also survey the recent economics literature on platform marketplaces with considerable emphasis on Amazon. He presents a framework that is useful for analyzing a variety of conducts by marketplaces, including 1P selling, self-preferencing, and copycatting. Peitz (2022) discusses the prohibition of self-preferencing in the Digital Markets Act with recent insights reported in the economics literature. Their works and ours are highly complementary.

[2] Related to the recent expansion of platform operations, Gawer (2021) illustrates the importance of considering the boundaries of digital platforms. She summarizes the economics, strategic management, and information systems literature related to digital platforms and explains that the boundaries chosen by individual platforms depend on their types (transactional vs. innovative) and extent of development (launch vs. maturity).

form operator, for marketing activities of their own products. There is growing concern that these self-preferencing behaviors may have undesirable effects on the users of the platform, including consumers and sellers, which has provoked heated debates among competition authorities and researchers worldwide.

This paper reviews recent advances in the economics literature related to self-preferencing by dual-role platforms. By summarizing the findings reported from economic analyses, this study aims to provide guidance that would help competition authorities and regulators make policy decisions. Additionally, we hope this paper will help foster further discussion by clarifying issues that have not yet been addressed sufficiently in the theoretical literature and issues that should be considered to enhance further empirical investigations.

The rest of this paper is organized as follows. In Sections 1.1–1.3, we provide several examples of dual-role platforms, introduce some specific self-preferencing behaviors and the responses of each jurisdiction to them, and describe the issues to be discussed from the perspective of competition policy. As a preparation before looking at the effects of self-preferencing, Section 2 reviews both theoretical and empirical studies about dual-role platforms. In particular, we discuss a platform's incentives to play a dual role and their impact on platform participants (e.g., consumers and sellers). Section 3 focuses on self-preferencing behaviors by dual-role platforms. In particular, we review theoretical and empirical works focusing on the following two types of self-preferencing behaviors: manipulation of the order of search results and exploitative use of third-party data for marketing activities of first-party goods. Finally, Section 4 concludes by discussing other types of self-preferencing that are not reviewed in this paper, the remaining issues, and future prospects.

1.1 Examples of dual-role platforms

We first provide examples of dual-role platforms in a wide range of industries and then present some specific examples that are especially relevant to the discussion in this paper.

Some online shopping malls play a dual role in retailing, providing a marketplace for third-party sellers while also selling their own products therein. For example, Walmart and JD.com operate Walmart Marketplaces in the US and JD.com in China, respectively, selling their private label products. In the home video game industry, major console companies, such as Nintendo (Nintendo Switch), Sony Interactive Entertainment (PlayStation 5), and Microsoft (Xbox Series X/S), provide licenses to third-party developers to develop game titles that work on their consoles while also developing their own titles.

Some platforms also serve a dual role in other industries. For instance, Salesforce, a major player in CRM (customer relationship management), began operations in 1999 as a CRM app vendor. Additionally, in 2007, the company opened its app development platform Force.com to third-party developers. As another example, Expedia and Booking.com, online travel agencies founded in the late 1990s, are integrated with trivago and KAYAK, respectively, which are metasearch engines that allow users to search for and compare travel plans. They currently continue to exist as dual-role platforms.

As shown above, many platforms play a dual role in a variety of industries in which the platforms' own products/services compete with those of third parties. This has spurred heated debates in competition policy. In what follows, we shift our attention to Alphabet, Apple, and Amazon as they have raised several policy concerns.

Google (Alphabet) operates platforms, including Google Search and Android OS. On those platforms, Google also provides its own services. For example, Google Shopping, a comparison shopping service, appears in the search results of Google Search, and apps such as Google Maps, Google Chrome, and Google Photos are available on Google Play Store, the main app store for Android OS.

Apple provides a mobile operating system, iOS, bundled with its smartphones and tablets and sells its mobile apps through App Store designed exclusively for iOS devices. For instance, Apple Music and Maps are provided by Apple itself.

Amazon operates Amazon Marketplace as an online shopping mall for third-party sellers while selling its own products. Amazon also offers Amazon Web Services (AWS) as a cloud computing service, which handles third-party vendor applications and offers its own services (e.g., Amazon Relational Database Service).

1.2 Examples of self-preferencing by platforms

As presented in Section 1.1, some platforms' operators sell their products/services that compete with those of third-party sellers. Some dual-role platforms are alleged to favor their own products/services (i.e., self-preferencing). Large platforms often engage in such self-preferencing with a dominant market position, which has been recognized as illegal or has triggered concerns raised by competition authorities in many jurisdictions. Here, we present four major examples of self-preferencing.

The first case is the European Commission's decision against Google in 2017. The Commission pointed out that Google, the dominant player in the search engine market, allegedly favored its own service, Google Shopping, by manipulating its search results. Google entered the market for comparison shopping services with its own services (initially called "Froogle") in Europe in 2004, wherein there were several established competitors. The Commission alleged that, since 2008, Google had made a significant change in its strategy and started to manipulate its search results to display its own service in a prominent position in search results and to demote the rankings of competing rivals. The Commission fined Google €2.42 billion for this conduct, in violation of Article 102 of the Treaty on the Functioning of the European Union (TFEU), which prohibits the abuse of a dominant market position. Google appealed against the decision to the General Court of the European Union. However, in November 2021, the Court upheld the European Commission's decision and fines, stating that the conduct violated European Union competition law.[3]

The second and third examples are related to the mobile app market. Since 2011, Google has forced mobile device manufacturers to pre-install its own app, Google Chrome, on mobile devices with Android OS, as a condition for licensing Google Play Store. The European Commission found that the pre-installation requirement (bundling) brought Chrome to an advantageous position in the browser market and prevented competition with rival browsers. In 2018, the Commission fined Google a total of €4.34 billion for several conducts, including bundling of its own apps, in violation

[3] Judgment of the General Court of the European Union: https://curia.europa.eu/jcms/upload/docs/application/pdf/2021-11/cp210197en.pdf

of Article 102 of the TFEU. [4]

The third case is related to Apple. Several third-party developers of mobile apps, including Spotify, filed a complaint with the European Commission alleging that Apple's rules in its App Store were designed in favor of its own apps. Apple required that all third-party developers use Apple's own in-app purchase system while restricting them from letting users know the presence of alternative purchasing methods. Under these rules, third-party developers are practically unable to avoid paying a 30% commission to Apple and must compete with Apple's apps at a cost disadvantage. Following their complaint, the Commission opened an in-depth investigation on June 16, 2020. On April 30, 2021, the Commission sent Apple a statement of objections claiming that this practice may violate Article 102 of the TFEU.[5]

Finally, we present Amazon's practices that are often regarded as self-preferencing, including the manipulation of display algorithms such as "BuyBox" and the use of proprietary sales data collected from third-party sellers.[6] The European Commission opened an investigation in July 2019 into these practices, as they potentially violated Article 102 of the TFEU.[7] In November 2020, the commission pointed out that Amazon exploited undisclosed sales data of third-party sellers to market its own products. The Commission sent Amazon a statement of objections and announced the opening of a second investigation, alleging concerns that Amazon may be arbitrarily favoring its own retail services division and retailers using Amazon's premium logistics and delivery services.[8] Similar concerns have arisen in the US, where an investigation was opened in June 2019 by the US House Judiciary Subcommittee on Antitrust, Commercial, and Administrative Law into Amazon's market power and its role as a gatekeeper. The

[4] The European Commission's decision: https://ec.europa.eu/commission/presscorner/detail/en/IP_18_4581; Summary by the Japan Fair Trade Commission (in Japanese): https://www.jftc.go.jp/kokusai/kaigaiugoki/eu/2018eu/201808eu.html

[5] The European Commission's press release: https://ec.europa.eu/commission/presscorner/detail/en/ip_21_2061

[6] The "BuyBox" refers to the place where the "Add to Cart" (and "Buy Now") buttons are displayed and used by consumers to purchase products.

[7] The European Commission's press release: https://ec.europa.eu/commission/presscorner/detail/en/IP_19_4291

[8] The European Commission's press release: https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2077

report released in October 2020 discusses the abovementioned issues and the possibility that Amazon will use Amazon Alexa as a tool for self-preferencing.[9]

1.3 Competition policy issues

As described above, many platforms sell their own products and services therein. Moreover, some dominant platforms allegedly favor their own products/services. Given this background, competition authorities worldwide have released policy reports on the regulations for digital platforms. For example, in October 2020, the US House Judiciary Subcommittee on Antitrust, Commercial, and Administrative Law released a report on the state of competition in the digital economy, particularly concerning issues related to the business practices of Apple, Amazon, Google, and Facebook.[10] This report proposes measures to restore competition in the digital economy, enhance antitrust laws, and stimulate antitrust enforcement. These proposals include "structural separation of platforms and their operators" and "prohibition of self-preferencing by platforms." Similarly, the European Commission has published several reports (e.g., Crémer, de Montjoye and Schweitzer, 2019) discussing platform regulation, including self-preferencing and the structural separation of platforms.

In addition to these policy recommendations, bills have been proposed and passed to tighten platform regulations. In January 2022, the US Senate Committee on the Judiciary voted on a bill called the "American Innovation and Choice Online Act," which prohibits discriminatory treatment by platforms, including self-preferencing.[11] In Europe, a bill entitled "Digital Markets Act" was announced in December 2020 and agreed to come into effect in May 2023.[12] The Digital Markets Act classifies

[9] Full text of the report: https://judiciary.house.gov/uploadedfiles/competition_in_digital_markets.pdf

[10] Full text of the report: https://judiciary.house.gov/uploadedfiles/competition_in_digital_markets.pdf

[11] Text: https://www.congress.gov/bill/117th-congress/senate-bill/2992/; Commentary by the Cabinet Secretariat of Japan: https://www.kantei.go.jp/jp/singi/digitalmarket/kyosokaigi_wg/dai29/siryou5.pdf

[12] Bill: https://eur-lex.europa.eu/legal-content/en/TXT/?uri=COM:2020:842:FIN. The European Commission's press release: https://ec.europa.eu/commission/presscorner/detail/en/QANDA_20_2349

certain platforms with significant influence on EU digital markets as gatekeepers and contains provisions prohibiting discriminatory treatment by gatekeepers, including self-preferencing.

In Japan, there is an ongoing discussion on policy issues regarding digital platforms. For example, the Japan Fair Trade Commission released in October 2019 "Report on Investigation into the Trading Practices of Digital Platforms (Business-to-Business Transactions in Online Malls and App Stores),"[13] and the Cabinet Secretariat's Headquarters for Digital Market Competition released a report in June 2021 ("Report for Discussion on a Future Competition Assessment").[14] These discussions include the following topics: digital platform's use of transaction data, such as sales and customer information of third parties collected through their position as the platform operator, and various restrictions imposed on third-party apps developers. Discussions on self-preferencing, such as pre-installation of the platform's own apps and control of third-party apps through app store screening, are also included.

Hence, competition authorities and regulators worldwide are facing pressure to address the issues surrounding dual-role platforms and self-preferencing by them. From an economic perspective, the following three issues need to be addressed: the impact of dual-role platforms and self-preferencing on competition and welfare; means of policy intervention; and the acquisition and evaluation of data and information in policy decision-making. Specifically, we need to understand how and to what extent self-preferencing by digital platforms affects competition and consumer welfare from a theoretical perspective. In addition, it is necessary to examine whether each policy intervention against self-preferencing can be effective. For example, possible policy interventions would consist of behavioral remedies, which prohibit self-preferencing, and structural remedies, which prohibit platforms from having a dual role. Alternatively, policymakers may regulate digital platforms by monitoring their behaviors. It is important to figure out whether and to what extent each policy intervention is effective. Furthermore, there are issues related to the acquisition and evaluation of data and

[13] Full text of the report: https://www.jftc.go.jp/houdou/pressrelease/2019/oct/191031_2.html

[14] http://www.kantei.go.jp/jp/singi/digitalmarket/kyosokaigi_wg/dai23/siryou2.pdf

information in policy decision-making. Even if theoretical studies provide conditions for when self-preferencing harms (or benefits) consumer welfare, they are of little value without data to evaluate whether each specific case meets these conditions.

In the subsequent sections, we review existing studies in the economics literature on the abovementioned issues. To conclude, theoretical work on the impact of self-preferencing on competition has gradually accumulated. Consequently, insights into relevant policy interventions have also accumulated. By contrast, relatively few studies have explored empirical methods for testing the presence of self-preferencing and its actual impact on competition.

Note that this review is not a comprehensive survey but covers a limited scope of research selected by the authors. Therefore, several important issues and research are not addressed in this review. Some of them are discussed in the last section.

2 Dual-role platforms

The term 'self-preferencing by platforms' has been used in several ways. For example, the term may refer to a situation in which a platform manipulates the rules and design of its marketplace to favor its own first-party goods (1P goods). This term is also used when a platform exploits undisclosed data collected from third-party goods (3P goods) to design its 1P goods to better meet consumer needs. It is worth noting that these self-preferencing behaviors are based on the premise that the platform sells its 1P goods and the operation of its marketplace; that is, the platform plays a dual role.

In this section, in preparation for discussing the effects of self-preferencing, we present some existing studies related to first-party selling (1P selling) by platforms. Through the insights derived in the literature, we provide an overview of how 1P selling by a platform can affect competition in the platform's marketplace and the surplus of participants in the marketplace, which will help us better understand the additional effects of self-preferencing in Section 3.

More specifically, Section 2.1 presents several studies that show that platforms may have managerial incentives to play a dual role. That is, platforms may prefer to start selling their 1P goods, and sellers may prefer to open a marketplace. Subsequently, in

Sections 2.2 and 2.3, we present theoretical and empirical studies that investigate the effects of 1P selling on consumer surplus and 3P sellers' strategies and profits.

2.1 Managerial benefits of 1P selling for platforms

Here, we present theoretical papers that focus on the managerial incentives of platforms for 1P selling.

Hagiu and Spulber (2013)'s study is a pioneering work addressing 1P selling by platforms. They focused on the role of 1P selling in solving the coordination problem between potential platform participants (so-called chicken-and-egg problem), which enables the platform to build a large network. They consider the situation in which, for example, Nintendo sells not only its video game console but also its game titles, like the Super Mario series. It is well known that in markets with network externalities, multiple equilibria can exist regarding consumers' purchase decisions. In other words, there may be an equilibrium in which all consumers join a platform (i.e., purchase the console), whereas there may also be an equilibrium in which no one joins it. The former equilibrium can arise if all consumers form the expectation that 'everyone else will also join the platform at the current price.' In such a situation, we say that the platform faces the *favorable* expectations of consumers. In contrast, the latter equilibrium may happen if all consumers form the expectation that 'no one will purchase at the current price.' We call it an *unfavorable* expectation. This coordination problem can also occur in two-sided markets where platforms are intermediate between buyers and sellers. Platforms facing unfavorable expectations must convince participants on either side (i.e., buyers or sellers) that it is worth participating, even if they are the only participant. Price discounts are considered a simple way to convince them; however, they reduce profits. Hagiu and Spulber (2013) show that platforms can solve the unfavorable expectation and coordination problem by investing in their 1P goods.

Hagiu and Wright (2015)'s study of the platform's choice of intermediation modes also provides another insight into 1P selling. Specifically, they focus on two types of distinct selling modes. The first is a marketplace mode, in which the platform operates in a marketplace to facilitate direct transactions between buyers and sellers. The second is the reseller mode, in which the platform procures goods from sellers and resells them to consumers. Hagiu and Wright (2015) allow a platform to choose to use either marketplace or reseller mode for intermediating each seller's goods. A prominent difference between the two modes is the allocation of decision-making rights. The decision-making right over prices and service levels is transferred to the platform under the reseller mode, whereas it remains with sellers in the marketplace mode. They consider the presence of uncertainty about consumer needs and then show that the decision-making right should be given to the party with more accurate information. That is, when a seller has more accurate information, the platform prefers to use marketplace mode with the seller. Additionally, other trade-off factors are examined. For example, the coordination problem described earlier makes the reseller mode more likely to be chosen by the platform. To resolve the coordination problem, even if the platform has more accurate information, the hybrid mode of applying the reseller mode to some sellers (i.e., 1P selling) and the marketplace mode to the remaining sellers can be an effective way for the platform implying that 1P selling can help the platform.

Another process by which dual-role platforms arise is that a firm selling goods opens a marketplace and invites competitors there, as examined by Hagiu, Jullien and Wright (2020). They examined the competition between a multi-product firm that sells two types of goods and a single-product firm that sells one of the two, wherein the single-product firm's good is of higher quality than that of the multi-product firm. They assume that consumers incur a trip cost to visit each firm. Thus, if consumers visit a multi-product firm, they can purchase both types of goods while saving trip costs, which is an advantage of the multi-product firm over the single-product rival. However, the benefits of one-stop shopping may discourage consumers from visiting a single-product firm, thus narrowing their options. When a multi-product firm opens a marketplace and invites a single-product rival, consumers can choose from all options by visiting the marketplace. That is, the platformalization of the multi-product firm reduces consumers' trip costs without narrowing their options. From the perspective of competition with a single-product rival, Hagiu, Jullien and Wright (2020) argue that platformalization benefits the multi-product firm by alleviating direct competition to attract consumer visits but hurts it by reducing the profit earned from the good that competes directly with the rival's higher-quality good. Specifically, they consider the case where with platformalization, the multi-product firm completely loses its profit from the good in competition with the single-product rival. Instead, however, it can monopolize the other good. Depending on the circumstances, the latter benefit dominates the former loss, driving the multi-product firm to be a dual-role platform.

As shown above, the literature has shown several benefits of being a dual-role platform, not only from the perspective of platforms starting to sell 1P goods but also from the perspective of product companies opening a marketplace.

2.2 Effects of 1P selling on 3P sellers and consumers

While 1P selling by platforms can have managerial advantages, there is a growing concern that 1P selling may have, especially if it is conducted by dominant platforms, negative impacts on the relevant parties such as 3P sellers and consumers. Given this background, many recent studies have investigated the effects of 1P selling on buyers and sellers.

A recent study by Anderson and Bedre-Defolie (2021) provided a tractable modeling framework for analyzing the welfare effects of 1P selling by platforms. Their model allows a platform to sell its 1P goods in competition with 3P sellers in its marketplace. A prominent feature of their model is that it considers pricing and participation decisions by 3P sellers, which allows the number of goods sold in the marketplace to change endogenously. Anderson and Bedre-Defolie (2021) show that, with a Logit demand system, the introduction of 1P selling makes the platform charge a higher commission to 3P sellers, compared to the case without 1P selling. Increased commission increases 3P sellers' costs, creating a greater cost advantage for the platform's 1P goods over 3P rivals. They show that while the platform's profit increases, 1P selling raises the price of 3P goods and reduces the number of 3P sellers (i.e., product variety for consumers), which is detrimental to consumer surplus. The results derived in Anderson and Bedre-Defolie (2021) imply that 1P selling by a monopoly platform can harm the consumer surplus, providing a theory of harm that justifies the introduction of regulations on 1P selling.

Etro (2023) points out that those results presented in Anderson and Bedre-Defolie (2021) depend on their demand specification. He conducts a similar analysis with a more general demand system that nests the Logit demand and shows that, depending on the shape of demand functions, 1P selling can improve consumer surplus. Specifically, when 3P goods' demand function has greater price elasticity than that of 1P goods, the introduction of 1P selling incentivizes the platform to reduce its commission fee imposed on 3P sellers. In this case, the final price of goods decreases, and thus consumer surplus increases. The intuition of this result is the following. When 3P sellers face more elastic demand, a reduction in 3P sellers' costs associated with decreased commission makes sellers lower prices more aggressively. Price reduction attracts more consumers to visit the platform's marketplace, which can increase the platform ' s commission revenue. Additionally, this price reduction by 3P sellers does not significantly diminish the demand for 1P goods if they are less elastic. With 1P selling, the platform can expand the total number of transactions made in the marketplace and thus earn greater profits from commissions without diminishing the profit from direct sales of 1P goods.

An important insight by Anderson and Bedre-Defolie (2021) and Etro (2023) is that the effect of 1P selling on consumer surplus crucially depends on whether 1P selling makes the platform increase or decrease its commission to 3P sellers. As shown in Anderson and Bedre-Defolie (2021), in market environments where the platform increases its commission with 1P selling, it hurts the consumer surplus. In other environments, when the platform has incentives to reduce its commission, 1P selling can benefit the consumer surplus, as reported by the generalized analysis by Etro (2023).

Shopova (2021) examines a model of vertical differentiation between 1P and 3P goods, which is different from Anderson and Bedre-Defolie (2021) and Etro (2023) that assume horizontal differentiation between them. She allows a dual-role platform to choose the quality of its 1P goods and shows that the platform has incentives to lower the quality of 1P goods than that of 3P goods. Moreover, it is demonstrated that lower-quality 1P goods are priced higher than the price set by a monopoly firm. This is true because the platform sells low-quality and high-priced 1P goods to induce 3P sellers to charge high prices, which helps the platform gain greater commission revenues from 3P sellers. She also showed that the dual-role platform sets a lower commission than the level that a pure-marketplace platform would choose. This result contrasts with the skeptical view that a dual-role platform will impose higher commissions on 3P sellers to create a competitive advantage in the marketplace.

As we have seen, 1P selling by platforms may improve or worsen consumer surplus. Anderson and Bedre-Defolie (2021) and Etro (2023) claim that it is important to see whether 1P selling induces the platform to increase or decrease its commission to 3P sellers. The model of Anderson and Bedre-Defolie (2021) shows that the dual-role platform has the incentive to charge a higher commission, resulting in a lower consumer surplus. Etro (2023) argues that, depending on the circumstances, the opposite outcome may arise. Moreover, Shopova (2021) adds another insight into the welfare effects of 1P selling. Her analysis indicates that vertical differentiation between 1P and 3P goods induces the dual-role platform to reduce its commission, which may make the positive consequences of 1P selling more likely to occur to some extent.

2.3 Empirical studies on 1P selling

Several empirical studies on 1P selling by platforms complement the theoretical studies mentioned above (see Zhu (2019) for a more comprehensive survey).

Although empirical studies that investigate the effects of 1P selling have not yet been sufficiently accumulated, a notable work is that of Zhu and Liu (2018). They collected data on sales of 3P goods sold at Amazon.com twice. The data were used to investigate the types of product categories Amazon started 1P selling and the 3P sellers' responses to Amazon's 1P selling. Through the first data collection, they identified four categories Amazon had not yet entered: Electronics & Computers, Home, Garden & Tools, Toys, Kids & Games, and Sports & Outdoors. In each of the categories, 0.5% of all goods were randomly selected, for which data were collected on price, shipping cost, seller rating, and whether or not the seller adopted FBA (Fulfillment by Amazon: a logistics and shipping service provided by Amazon), sales ranking, etc. The same data were collected ten months after the first collection. They categorized the goods into Amazon that started 1P selling during the ten months and those that did not. Labeling the former as a treatment group and the latter as a control group, they investigated the effects of 1P selling by Amazon on the behavior of 3P sellers.

First, to determine the characteristics of goods that Amazon started 1P selling, they ran a logit regression analysis with a dummy variable indicating whether 1P selling was started as the dependent variable and various characteristics of the goods collected from the first round of data collection as independent variables. The results show that Amazon started 1P selling more likely goods with higher prices, lower shipping costs, greater demand, and higher customer ratings. This outcome implies that Amazon does not randomly select groups of goods to enter but rather targets some specific goods that are more likely to generate high revenue. Moreover, it was reported that the more 3P sellers adopted the FBA, the less likely they were threatened by 1P selling. One can infer from this result that Amazon had less incentive to compete with 3P sellers that adopted the FBA and paid higher commissions.

Next, using propensity score matching, the effects of 1P selling by Amazon on the subsequent behavior of 3P sellers were investigated. Specifically, they matched products that face a similar likelihood of 1P selling by Amazon according to the first data. Among these products, they compared the difference between the products that Amazon started 1P selling and those that Amazon did not. The results are as follows. First, from the perspective of consumers, because Amazon's 1P goods are free of shipping charges, 1P selling can reduce the delivery fees consumers pay, which may result in greater demand. However, 1P selling makes 3P sellers less likely to adopt FBA, and even discouraging them from selling products.

Using data from the mobile app market, Wen and Zhu (2019) analyze the impact of a "threat" of 1P selling by platforms on the behavior of 3P app developers. Specifically, they identified the app categories in which Apple has already started 1P selling, but Google has not yet done so, and then called them the categories under the "threat" of 1P selling by Google. Comparing the categories under threat and the other categories, they tried to assess the impact of the threat of 1P selling. Their main results show that, in the categories under the threat of 1P selling, app developers make lower investments in quality improvement (measured by the number of updates) and charge higher prices compared to the categories that are not threatened by 1P selling. An important insight from their analysis is that threatened app developers do not simply reduce their investments. Rather, they may shift their investment capacity toward other categories not threatened by 1P selling. Based on this finding, they argue that 1P selling in categories where many similar apps exist will lead 3P app developers to shift their investment capacity toward other categories.

Zhu and Liu (2018) and Wen and Zhu (2019) provide a variety of implications. A common insight might be that 1P selling by platforms has a crucial impact on 3P sellers' decision-making, including entry and investment decisions. At the same time, however, little has been explored about its impacts on consumers, calling for further empirical investigation.

More recently, using the rich data provided by Amazon.com, Crawford et al. (2022) seek to measure the predictors of Amazon's 1P entry and its effects on consumers and sellers in the Home & Kitchen department of Germany's Marketplace from 2016 to 2021. The authors argue that their empirical analyses suggest that, in the short run, Amazon's entry creates market expansion rather than exploiting 3P sellers. In the long run, however, it may reduce new product introduction (innovation) by 3P sellers. Reduced innovation also happens with entry by large 3P sellers. Since no causal effects are estimated between reduced innovation and entry by Amazon and large 3P sellers, Crawford et al. (2022) conclude that the reduction in innovation is interpreted as a 'regression to the mean.' Finally, they also indicate that their predictors of Amazon's entry are more consistent with a strategy that makes Amazon Marketplace more attractive to consumers than 3P seller expropriation.

3 Self-preferencing by dual-role platforms

In the previous section, we observed that 1P selling could help platforms build a large and stable network. At the same time, depending on the circumstances, it may improve or harm consumer surplus.

A more important issue in terms of competition policy is the self-preferencing of dual-role platforms. Therefore, we must understand how self-preferencing alters competition on the platforms and affects consumers. Recent policy trends are leaning toward prohibiting conducts related to self-preferencing. For example, in both the Digital Markets Act of the EU and the American Innovation and Choice Online Act of the US, self-preferencing by platforms is explicitly prohibited.

From an economic perspective, the strict prohibition of self-preferencing may be undesirable if self-preferencing can improve consumer surplus. In this section, we present existing studies that theoretically identify conditions under which self-preferencing improves or worsens consumer surplus, which guides the circumstances in which regulatory intervention in self-preferencing is more likely to work well. Here, we focus on self-preferencing behaviors of two types: manipulation of the order of search results and sales ranking and exploitative use of undisclosed data collected from 3P goods. For each type of self-preferencing, we summarize existing studies below.

3.1 Manupulation of search orders and rankings

3.1.1 Manupulation by search engines

As exemplified by the European Commission's enforcement against Google in 2017, concerns have been raised about the behavior of the operator of a search engine (Google Search) favoring its own services (Google Shopping) over competitors that offer similar services (e.g., Amazon and eBay). Representative studies related to this issue include the work of de Cornière and Taylor (2014, 2019). de Cornière and Taylor (2014) consider a model consisting of a search engine and two differentiated publishers (websites). The search engine earns revenue from consumer traffic and advertising. In the advertising market, there is competition between search engines and publishers. They assumed that the search engine could steer consumers toward either publisher after observing their preferences. They consider two cases that differ in ownership structure: one in which three platforms are independently operated and the other in which the search engine integrates one of the publishers.

Their results can be summarized as follows. The search engine, regardless of whether it jointly operates with a publisher or not, has an incentive to bias consumers away from the publisher with more ads because doing so would help reduce the total ad supply and increase ad prices in the market. In addition, once the search engine integrates with a publisher, the integration incentivizes the search engine to bias consumers toward the integrated publisher. However, this self-preferencing behavior of the integrated search engine is not necessarily detrimental to consumers for the following reasons. As the search engine's revenue from sponsored ads allows the integrated firm to reduce the number of ads displayed in its integrated publisher, the integrated publisher can provide content with a higher utility level for consumers.[15] In other words, with the integration between a search engine and a publisher, self-preferencing by the integrated platform may direct consumers to the publisher with fewer ads, thereby mitigating the disutility that consumers suffer from advertising. The consumer surplus can be improved depending on the trade-off between mismatch costs associated with biased search recommendations. de Cornière and Taylor (2014) contribute to the literature by arguing that self-preferencing is not necessarily harmful in terms of consumer surplus.

de Cornière and Taylor (2019) consider a model with one intermediary and two sellers. In particular, they focus on the situation in which the intermediary integrates one seller and analyze the effects of self-preferencing by the intermediary. One may feel that this model is analogous to that of de Cornière and Taylor (2014). An important difference lies in business models. While de Cornière and Taylor (2014) consider publishers who earn from advertising, de Cornière and Taylor (2019) consider sellers selling products. In cases where sellers compete in price, self-preferencing, which directs consumers who like 3P goods toward 1P goods, undermines the quality of intermediation. The preferred seller raises the price, which results in lower consumer surplus. By contrast, in cases where sellers invest in quality, the preferred seller would have a greater incentive for quality investments, which may benefit consumers. More generally, de Cornière and Taylor (2019) show that self-preferencing may hurt consumer surplus in cases where sellers' actions to increase their per-consumer profit reduce the benefit to consumers, as in price competition. Otherwise, self-preferencing may benefit consumer surplus when sellers' and consumers' incentives are aligned, as seen in quality competition.

It is worth mentioning that, in a series of studies, platforms are not allowed to earn commissions from 3P sellers or publishers. In the model of de Cornière and Taylor

[15]For empirical evidence that ads accompanying contents can reduce the utility of consumers, one can refer to the study on TV ads by Wilbur (2008) and the study on in-app ads by Ghose and Han (2014).

(2014), commission revenues are not modeled literally. In de Cornière and Taylor (2019), the platform's behavior is given by an exogenous rule biased toward the 1P seller. Therefore, their models do not capture the platform's incentives to collect commission revenue from 3P sellers. Thus, although their results are useful for evaluating self-preferencing by search engines when it comes to self-preferencing by platforms that generate revenue from commissions, we also need to see other studies, as described below.

3.1.2 Manupulation by marketplaces

The Digital Markets Act, enacted in October 2022, prohibits online platforms from favoring their 1P goods by manipulating search rankings and results. However, existing studies show mixed results regarding the competitive effects of self-preferencing, implying that it is not necessarily anti-competitive in terms of consumer surplus and social welfare. In the following, we present recent studies on the economic impact of self-preferencing.[16] Additionally, we summarize some existing implications for behavioral and structural remedies against self-preferencing by platforms.

A pioneering work on self-preferencing by dual-role platforms is the one by Hagiu, Teh and Wright (2022). Their model allows a platform to host 3P sellers of two types. The first is multiple fringe sellers that sell homogenous goods. The second is a superior seller S that sells an innovative good with higher quality than fringe sellers' goods. Seller S can make costly investments to further increase the quality of its innovative goods. Both superior and fringe sellers use the platform to sell goods to consumers in addition to their own direct channels.

An important assumption of their model is that consumers are unaware of seller S's innovative goods unless sold through the platform. They refer to the conduct of hiding seller S's goods from consumers as self-preferencing by the platform. If seller S's goods are hidden by the platform, consumers never visit seller S's direct channel because they are unaware of it. In other words, self-preferencing is modeled as depriving seller S of opportunities to reach consumers through the platform and its direct channel.

[16] Note that manipulations by platforms can occur even without 1P selling. See Teh and Wright (2022) for an analysis of such a situation.

Therefore, in Hagiu, Teh and Wright (2022), their welfare implications include not only the effect of self-preferencing on the platform's 1P goods but also the effect of the loss of the profit that seller S would have earned outside the platform.

Hagiu, Teh and Wright (2022) argue that the consequences of the prohibition of self-preferencing can be divided into two cases, depending on the market environments. The first case is when the platform's 1P goods have so high a value to consumers that the prohibition of self-preferencing makes the platform close its marketplace and focuses on selling its 1P goods. The shutdown of the platform's marketplace makes it impossible for consumers to become aware of seller S's innovative good, which preserves the platform's competitive advantage in selling 1P goods. In other words, regardless of the presence or absence of the prohibition, seller S can never sell its innovative good to consumers; that is, competition between 1P and 3P goods does not occur. Therefore, when self-preferencing prohibition causes the platform to close its marketplace, it might not be effective in improving consumer surplus.

The second case is when the value of the platform's 1P goods is not too high, so the platform does not close its marketplace, even with the prohibition of self-preferencing. In this case, the prohibition makes price competition between 1P and 3P goods work well, resulting in lower prices and a higher consumer surplus. Therefore, one can conclude that the prohibition of self-preferencing works in an intended manner (only) when it does not induce the platform to close its marketplace.

It is worth discussing the ways of modeling self-preferencing by platforms. The modeling approach adopted by Hagiu, Teh and Wright (2022) can be said in a way that highly emphasizes the detrimental aspects of self-preferencing because it deprives 3P sellers of any opportunities to reach consumers. As they admit in the paper, their results need to be seen carefully. In practice, prominent examples of self-preferencing by marketplaces include manipulating search results, rankings, and recommendation algorithms. One may infer that these practices do not necessarily cause direct and enormous damage to 3P sellers. For instance, regarding the order of search results, Lam (2021) finds the tendency of Amazon's 1P goods to be displayed in a better position in search results using the descriptive statistics of its data. However, the descriptive statistics might not be sufficient to conclude whether this tendency stems from the platform's unfair manipulations or the simple fact that Amazon's 1P goods are, on average, more attractive to consumers than 3P goods. Thus, he estimated a structural model of consumer search using data collected from Amazon and then conducted a counterfactual analysis for a situation in which search results are randomly displayed. His results show that the random display of search results may reduce consumer surplus, which supports the possibility that Amazon's 1P goods appear at the top of search results simply because they are attractive.

By contrast, Chen and Tsai (2019) and Lee and Musolff (2021) conducted empirical research focusing on self-preferencing related to product recommendations. Chen and Tsai (2019) point out the possibility of self-preferencing in the selection of products recommended by Amazon as "frequently bought together" (FBT) in the product pages viewed by users. They focus on products sold by both Amazon and 3P sellers and then investigate whether the probability of being recommended as FBT differs between when Amazon's 1P goods are sold out and when they are listed. Their analysis shows that when Amazon's 1P good is absent in a certain product, the probability of it being recommended as FBT is reduced by approximately 8%. This outcome implies that Amazon may manipulate its recommendation algorithm in favor of its 1P goods in selecting FBT products. Moreover, it is reported that this preferential treatment may be given not only to 1P goods but also to 3P goods sold under the FBA program. Furthermore, they show that these preferential treatments in selecting FBT goods do not necessarily result in effective consumer purchases and thus infer that they can be detrimental to consumers and 3P sellers (which are not favored).

Lee and Musolff (2021) also focus on product recommendations by Amazon, although not FBT. Their results are analogous to those of Chen and Tsai (2019). For example, they demonstrate that the seller with the lowest price is not necessarily recommended and also find that Amazon's 1P and 3P goods sold with FBA are more likely to be recommended than other goods.

The empirical studies mentioned above have reported the possibility of self-preferencing by platforms and further pointed out that it may harm consumers and 3P sellers. However, because of data limitations, no empirical evidence has been provided for the fact that self-preferencing can hurt the profits that 3P sellers would earn outside platforms.

For this reason, we present some existing studies that model self-preferencing in milder ways than modeling it as causing enormous damage to 3P sellers.

First, Zennyo (2022) considers a consumer search model in which consumers do not preliminarily know the characteristics of goods sold on a platform but can learn them by searching by incurring some search costs. Consumers decide how many goods to sample and purchase the product with the highest surplus. He examines three models: (i) pure intermediary model, where the platform does not sell any 1P goods; (ii) fair encroachment model, where the platform sells its 1P goods (platform encroachment) and designs its search engine as fair between 1P and 3P goods; and (iii) biased encroachment model, where the platform encroaches into retail and manipulates its search algorithm in favor of its 1P goods. In model (iii), self-preferencing by the platform is modeled as including its 1P good in the search results of every consumer. That is, although self-preferencing can make the 1P good recognized by all consumers, the platform must compete in price with 3P sellers to sell it. Moreover, Zennyo (2022) allows consumers and 3P sellers to decide endogenously whether to join the platform. In other words, the effects of self-preferencing were examined by considering indirect network externalities between the two sides. The presence of indirect network externalities, which makes his analysis largely different from that of Hagiu, Teh and Wright (2022), plays an important role in driving the main results described below.

Comparison between models (i) and (ii) tells us the effect of 1P selling by the platform. In his model, 1P selling does not make the platform change its commission fee. Therefore, consistent with the argument by Anderson and Bedre-Defolie (2021) and Etro (2023), consumer surplus remains unchanged.

Moreover, by comparing models (ii) and (iii), one can examine the effect of self-preferencing by the hybrid platform. He shows that the platform charges a lower commission fee on sellers in model (iii) than in model (ii). In other words, the ability of self-preferencing makes the platform reduce its commission fee. Reduced commission yields higher consumer surplus, as in Anderson and Bedre-Defolie (2021) and Etro (2023). This result implies that self-preferencing is not necessarily anti-competitive.

The mechanism and welfare consequences of self-preferencing presented in Zennyo (2022) are as follows. Self-preferencing makes the platform sell its 1P goods to consumers more likely, resulting in a higher (expected) profit per consumer visiting the platform. Thus, the platform tries to attract more consumers to its marketplace. To this end, the platform charges a lower commission to 3P sellers, leading them to set lower final prices. Reduced prices associated with self-preferencing can improve consumer surplus and social welfare.

Additionally, to see whether favoring "1P" goods matters, Zennyo (2022) studies another model as an extension, in which the platform has no 1P goods but favors a prominent "3P" seller who is selected through auctions. The platform can monetize by selling the right of prominence in search results. This monetization option works in a similar way to self-preferencing improving the platform's per-consumer profit in model (iii), which incentivizes the platform to reduce its commission, resulting in greater consumer surplus. This extension analysis implies that we should carefully consider preferential treatments by platforms, regardless of whether they are put for 1P goods or 3P goods.

Second, Kittaka and Sato (2022) also consider a consumer search model, which is different from Zennyo (2022) in the following aspects. They consider a sequential search process in which consumers sequentially search for products and stop searching once they find a product with a good match. One can imagine that consumers sequentially click products from the top to the bottom of displayed search results. Kittaka and Sato (2022) model self-preferencing as a situation in which the platform's 1P good is always searched first. If self-preferencing is prohibited, consumers randomly search for 1P and 3P goods.

In Kittaka and Sato (2022), self-preferencing by a dual-role platform affects competition in two ways. The first is an anti-competitive effect that arises from segmenting consumers who prefer the 1P good and those who do not. Because consumers who continue searching for the 3P good under self-preferencing are those who do not like the 1P good, a 3P seller can set a relatively high price under self-preferencing. Anticipating such 3P seller's pricing strategy, the platform can set a high price for its 1P goods. The second effect is a pro-competitive effect that stems from mitigating the collusive pricing for the 1P good by the platform. Even if the platform fails to sell its 1P good, it can earn commission revenue from the 3P good, enabling the platform to charge a high price. By segmenting the consumers who prefer 1P and 3P products, self-preferencing turns out to mitigate the incentive for collusive pricing, because the substitutability of the two products becomes weaker. In total, if the latter pro-competitive effect dominates the former anti-competitive effect, then self-preferencing improves the consumer surplus. Kittaka and Sato (2022) show that self-preferencing is more likely to improve consumer surplus when the commission rate charged to 3P sellers by the platform is high. While Kittaka and Sato (2022) assume that the commission rate set by the platform is exogenous, it also demonstrates that self-preferencing may be pro-competitive even without the changes in commission rates, which are often necessary in other studies (e.g. Zennyo, 2022).

Lastly, Hervas-Drane and Shelegia (2022) examined the effect of self-preferencing using a model with heterogeneously informed consumers. They also analyze the impact of the exploitative use of proprietary transaction data by platforms, which we discuss in Section 3.2.

Hervas-Drane and Shelegia (2022) consider a platform that intermediates a variety of product categories. The categories are assumed to have different values they provide to consumers. For each category, a 3P seller and platform decide whether to start selling the goods. Some consumers only purchase goods recommended by the platform. In their model, the recommendations of 1P goods are regarded as self-preferencing by the platform. The platform is presumed to face two constraints: information and capacity. The former constraint means that the platform cannot know consumers' valuation for each category without entry by a 3P seller. The latter means that the platform cannot enter all the product categories. Because of the capacity constraint, for the selection of 1P selling, the platform wants to identify the categories that consumers evaluate highly. This incentive is consistent with the empirical result reported by Zhu and Liu (2018) that Amazon is likely to sell its 1P goods in product categories that are expected to be highly profitable. The platform needs to enhance entry by 3P sellers to know the consumers' valuation since there are information constraints. For this reason, the platform refrains from charging an excessively high commission to 3P sellers. Additionally, because the platform's benefit from self-preferencing is large if the number of categories 3P sellers sell goods is large, self-preferencing makes the platform more willing to lower the commission rate. Therefore, policy interventions that prohibit self-preferencing may increase the commission rate set by the platform, which can be undesirable in terms of consumer surplus and total welfare.

So far, we have presented existing discussions about the various effects of self-preferencing on consumer surplus and have argued that the conditions for prohibiting self-preferencing can work as an effective policy intervention. Finally, we focus on the competitive effects of the structural separation of dual-role platforms, which makes self-preferencing impossible. Hagiu, Teh and Wright (2022) examine not only the consequences of the behavioral remedy that prohibits platforms from self-preferencing but also investigate the impacts of the structural remedy, which prevents platforms from selling their 1P goods, on consumer surplus and social welfare. A structural remedy is highly likely to hurt consumer surplus and social welfare. Based on this result, they argue that platform regulations should be made using behavioral remedies rather than structural remedies. Zennyo (2022) also examines the effect of structural separation. In his model, consumer surplus remains the same in both cases, where self-preferencing is prohibited (i.e., behavioral remedy) and structural separation is implemented (i.e., structural remedy). Structural separation not only prohibits the platform from self-preferencing but also makes the platform impose higher commissions on 3P sellers, resulting in higher prices and lower consumer surplus. In contrast, Kittaka and Sato (2022) show that structural separation may improve consumer surplus. This is true because structural separation can eliminate the platform's incentive to increase commission revenue by setting a collusive high price for its 1P good to induce 3P sellers to follow the high price. Moreover, given structural separation, requiring the platform to treat all 3P goods fairly can unambiguously improve consumer surplus, which is in sharp contrast to the case of prohibiting self-preferencing. In this regard, Kittaka and Sato (2022) argued that structural and behavioral remedies may be complementary regarding policy interventions. However, it is worth mentioning that in their model, the commission rate is exogenously given. In other words, their analysis does not consider the effects associated with changes in commissions that Hagiu, Teh and Wright (2022) and Zennyo (2022) have addressed.

In summary, theoretical studies have shown that self-preferencing by dual-role platforms is not necessarily detrimental to consumers and 3P sellers. Moreover, even if self-preferencing harms consumer surplus, it is also shown that policy interventions like structural separation can not necessarily be effective. The effectiveness of policy interventions, such as prohibiting self-preferencing and promoting structural separation, depends largely on the type of self-preferencing and the specific environment of the market in question. When considering strict restrictions on self-preferencing, a detailed market analysis is necessary on a case-by-case basis. However, for practical and empirical methods, it may be difficult to say that sufficient insights have been accumulated in the relevant literature. As mentioned in Section 4, we need to make further progress in empirical research and thus improve the data acquisition and disclosure system.

3.2 Exploitative use of third-party data

In this section, we discuss another type of self-preferencing: platforms exploit undisclosed transaction data that they can access thanks to their gatekeeper position (e.g., 3P sellers' sales data and customer information) for their proprietary purpose for 1P goods. Because these data and information are unavailable to other 3P sellers, we regard this type of data exploitation as self-preferencing by dual-role platforms.

From an economic perspective, whether platforms should be prohibited from the exploitative use of transaction data depends on whether it harms consumer welfare and/or discourages innovation by sellers. Existing studies have focused on whether the use of data by platforms to enter the marketplace reduces 3P sellers' entry and investment incentives and, if so, whether they are severe enough to cancel out the benefits of increased ex-post competition. In the following section, we introduce some related studies.

Etro (2021) analyzes a model in which 3P sellers can make investments to create a new product category, but that new product may be imitated by a platform with some probability. Although the targets of imitation are assumed to be randomly selected in his model, he finds that imitation may have an anti-competitive effect, thus reducing the investment incentives of 3P sellers. By contrast, there can also be a pro-competitive effect of lowering prices, as 1P selling associated with imitation can stimulate competition between 1P and 3P goods. His results show that the platform's incentive for imitation might be insufficient in terms of consumer surplus. Prohibiting imitation by platforms can foster innovation by 3P sellers but may also reduce competition between 1P and 3P goods. If the latter effect is dominant, a ban on platform imitation reduces the consumer surplus.

However, in the model of Etro (2021), every product category is assumed to have the same potential demand. In other words, his model does not capture the behavior of platforms selectively entering a product category with large potential demand, as observed in the empirical work by Zhu and Liu (2018). To address this issue, we discuss below the platform's proprietary use of data regarding potential demands to selectively decide which product categories to enter.

Jiang, Jerath and Srinivasan (2011) is a pioneering work related to this issue. They consider a two-period model in which a 3P seller participates in a marketplace operated by a platform and sells its products. The 3P seller is assumed to be either high (type H) or low (type L) in potential demand size. This type is known privately by the 3P seller and unknown to the platform *a priori*. The platform can infer the 3P seller's type using data on the quantities demanded in the first period. If the platform finds the 3P seller to be H-type based on first-period data, the platform has the incentive to start selling the same goods from the second period (i.e., imitation). However, the platform has no incentive to imitate if it infers that the seller is of L-type.

Jiang, Jerath and Srinivasan (2011) demonstrate that when the expected value of the 3P seller's demand is high enough, the platform sets a sufficiently high commission in equilibrium, at which only an H-type seller participates in the platform. In the second period, the platform starts selling its own goods, which prevents the 3P seller from gaining profit because of the platform's cost advantage associated with the high commission. By contrast, when the expected potential demand of the 3P seller is sufficiently low, the platform sets a low commission that makes both L- and H-types use its marketplace. In other words, the 3P seller always participates in the platform regardless of its type. In this equilibrium, an H-type seller acts in the first period as an L-type seller to prevent the platform from becoming aware of its actual type. Specifically, to reduce first-period demand, the 3P seller suppresses their investment and effort in promotion (relative to the optimal investment level that would be chosen if there is no threat to the platform's entry). As a result, the platform cannot correctly identify the type of 3P seller and, thus, will not start selling its 1P goods in the second period. In the second period, the H-type seller that successfully deterred the platform's entry will no longer need to suppress its investment, so it will make an optimal level of investment.

Interestingly, Jiang, Jerath and Srinivasan (2011) also show that the threat of 1P selling through the use of data may increase the expected profit of the 3P seller, regardless of whether the seller is H-type- or L-type. This result can arise because the platform that seeks a chance for 1P selling sets a low commission to encourage seller participation. In contrast, from the platform's perspective, a commitment to not start 1P selling can yield a greater platform profit.

Jiang, Jerath and Srinivasan (2011) focus mainly on managerial issues. Thus, they do not explicitly address policy perspectives. For about ten years since then, not enough research has been conducted on self-preferencing through the use of data regarding 3P sellers. Growing concerns about this issue and related policy debates have spurred relevant literature in recent years. We present two papers, Madsen and Vellodi (2021) and Hervas-Drane and Shelegia (2022), below.

Madsen and Vellodi (2021) develop a model where a platform publicly commits to an imitation policy that specifies when it will start selling 1P goods by exploiting transaction data about 3P sellers. They used this model to assess the effects of policy interventions that regulate the platform from accessing 3P data. Specifically, the following three cases are considered and compared: (1) laissez-faire, (2) data ban, and (3) data patent.

First, they examine laissez-faire policy, regarded as a benchmark case. The platform can utilize demand data collected from 3P sellers that innovate a new product and then determine an imitation policy that specifies the threshold value of demand states, above which it will start selling imitating goods immediately after accessing the demand data. Next, they consider the effect of a data ban on seller innovation, in which the platform cannot utilize the demand data of 3P sellers. The ban on data usage makes the platform enter into all categories with 3P innovation after a certain duration because immediate entry by the platform completely deters 3P sellers from attempting to innovate. Therefore, under a data ban, the platform delays the timing of imitation to leave some profit to 3P sellers.

Their results show that a complete ban on data usage has two effects on seller innovation. First, a data ban can encourage innovation by 3P sellers through a delay in 1P selling (average effect). Second, however, it may diminish 3P sellers' innovation incentive by inducing the platform to start 1P selling indiscriminately, regardless of the size of demand states, which largely affects the marginal seller ' s decision (marginal effect). Madsen and Vellodi (2021) argue that if a 3P seller' good is "experimental" in the sense that it generates a large demand state with a small probability, then prohibiting data usage can enhance the innovation for such the experimental good. In contrast, if it is "incremental" such that it generates a moderate demand state with a large probability, then a data ban may not enhance innovation. Therefore, they argue that regulations that unconditionally prohibit data usage by platforms may not achieve the goal of enhancing innovation by 3P sellers.

Finally, Madsen and Vellodi (2021) examined the effect of a data patent that restricted access to data by platforms only for a certain duration. Unless its length is too long, the data patent can delay 1P selling by the platform and enhance innovation by 3P sellers. Data patents with an excessively long length, equivalent to the complete ban on data usage, lead the platform to sell its 1P goods without using demand data. Therefore, with an appropriate patent length, the data patent can enhance innovation by 3P sellers compared with laissez-faire and data-ban policies.

Madsen and Vellodi (2021) provide highly valuable implications for competition policy. However, they do not consider the choice of platform for commission fees imposed on 3P sellers. One may infer that allowing the platform to optimize its commissions will deliver new forces that might change its present results, as indicated by Hervas-Drane and Shelegia (2022).

Hervas-Drane and Shelegia (2022) consider a platform facing a partial information constraint because the platform holds prior information on consumer demand for some product categories and not for the other categories. Thus, to start 1P selling in the latter product categories, the platform needs to learn about the consumer valuation of the product from the sales data of 3P sellers. The more severe the information constraint, the more important it becomes for the platform to gather data from 3P sellers. Accordingly, market-making led by 3P sellers arises in a wide range of product categories, wherein the platform encourages entry by 3P sellers and then starts selling 1P goods.

Without any regulations, the platform uses transaction data of 3P sellers to identify the value each product category brings to consumers and then decides to enter high-value categories. The introduction of regulations restricting such data usage makes selective entry by the platform difficult. The platform needs to decide the product categories to enter based only on its own information, reducing the average consumer value of the categories with 1P selling by the platform. The lack of selective entry reduces the gains from 1P selling, discouraging the platform from attracting 3P sellers. For this reason, the regulation makes the platform charge a higher commission to 3P sellers, which may reduce consumer surplus and total surplus through an increased price and reduced market size for 3P goods. Therefore, along with their other point referred to in Section 3.1.2, Hervas-Drane and Shelegia (2022) argue that because direct regulations on self-preferencing may lead to an increase in commissions, it would be better to have regulations on commission levels instead.

All the papers presented in this subsection conduct theoretical analyses, and only a limited number of empirical studies exist. For example, as mentioned in Section 2.3, Zhu and Liu (2018) empirically show that the products for which Amazon starts 1P selling are not selected randomly. Rather, Amazon might target specific products that satisfy certain characteristics. This finding implies that Amazon is likely to use sales data from 3P sellers in its entry strategy. They also analyze how 1P selling affects the subsequent behavior of 3P sellers. However, few implications for consumer surplus and social welfare have been derived as they employ a reduced-form estimation.

As discussed at the end of Section 3.1, empirical studies on self-preferencing by dual-role platforms are scarce. In particular, for the exploitative use of 3P data, neither empirical nor fact-finding investigations are sufficient. This scarcity may stem from the difficulties in accessing data relevant to research. From a theory perspective, it has been shown that self-preferencing with data usage is not necessarily undesirable in terms of consumer welfare. However, even if it is good for consumers (on average), there are remaining issues to be addressed, such as the direct damage to 3P sellers imitated by the platform and the resulting reduction in innovation incentives for 3P sellers. Since self-preferencing might be a difficult topic to analyze empirically, more theoretical analyses will provide more innovative policy suggestions, such as the idea of "data patents" proposed by Madsen and Vellodi (2021).

4 Conclusion

Focusing on self-preferencing by dual-role platforms, we have presented some relevant studies in the economics literature. However, what we have mentioned does not cover all topics relevant to self-preferencing. Several issues could not be discussed in this paper. In what follows, we briefly mention the remaining issues.

First, throughout this study, we focus on two specific types of self-preferencing: the manipulation of search orders, rankings, and recommendations and the exploitative use of undisclosed transaction data. There are other types of self-preferencing. For example, platforms may impose a high usage fee for services that 3P sellers are obligated to use, as in the case of the App Store described in Section 1.2. Moreover, some platforms might not allow 3P sellers to use services available to the platforms themselves, as in the case of Privacy Sandbox by Google, detailed below. Although some recent studies, such as Kang and Muir (2021) and Padilla, Perkins and Piccolo (2022), have addressed related issues, little has been explored. There are some commonalities with existing studies on vertical foreclosure, and the insights derived in the literature may be helpful (Rey and Tirole, 2007; Riordan, 2008).

Second, pre-installation and bundling of software by OS providers can be another issue related to self-preferencing. As in the case of bundling Google Chrome presented in Section 1.2, platforms might endow their own services with an advantage over competing services by bundling them with the platform service. Carlton and Waldman (2002) is an earlier study addressing bundling sales with Microsoft in mind. Recently, Choi and Jeon (2021) examined the issue of bundling by focusing on a case in which some goods are free of charge (e.g., Google Chrome). However, few studies analyze bundling practices in detail as an issue of self-preferencing by platforms.

Third, there is another concern regarding self-preferencing in ad networks (or ad exchanges). For example, according to a report by the UK Competition and Markets Authority (CMA), the digital advertising market has a very complex and hierarchical structure, and Google has established an almost monopolistic position at each layer of the hierarchy, which would be problematic.[17] Specifically, Google not only operates ad auctions but, in some cases, also participates as an agent for buyers and sellers. Thanks to this position, Google allegedly wins the auctions efficiently by accessing data on past winning bids, which third parties usually cannot access.[18] Furthermore, it has also been reported that Google may win ad auctions efficiently and affordably by manipulating bids when participating in auctions as agents for multiple buyers (Decarolis and Rovigatti, 2021).

The CMA also raised another concern about the digital advertising market: Google's Privacy Sandbox. Google is allegedly considering disabling third-party cookies and replacing them with new tools for targeted advertising to improve consumer privacy on its web browser Google Chrome. However, the CMA has expressed concerns that Google may have other purposes. That is, as noted above, Google currently has a dominant position in the digital advertising market, and Privacy Sandbox may be used to weaken advertisers' profitability and market competitiveness to strengthen its market dominance.[19]

Preferential treatments by platforms are not always given to the platforms themselves (i.e., not "self"-preferencing). In some cases, platforms may favor specific third-party participants. For example, there is a concern that Amazon engages in self-preferencing and preferential treatment of sellers who join the FBA and pay higher commissions. Reportedly, some preferential treatments have been given to those sellers, including grants from the Prime badge, offers of selling opportunities for Prime

[17] The CMA's report: https://www.gov.uk/cma-cases/online-platforms-and-digital-advertising-market-study

[18] Wall Street Journal, April 11, 2021: https://www.wsj.com/articles/googles-secret-project-bernanke-revealed-in-texas-antitrust-case-11618097760

[19] The CMA's report: https://assets.publishing.service.gov.uk/media/60c21e54d3bf7f4bcc0652cd/Notice_of_intention_to_accept_binding_commitments_offered_by_Google_publication.pdf

consumers, and rise of the possibility of placement in the "BuyBox," and so on. [20] On December 9, 2021, the Italian Competition Authority fined Amazon €1.13 billion for using such preferential treatments as a means of promoting the use of FBA, thereby strengthening its own competitive advantage over competing logistics firms.[21]

Some existing studies have pointed out the possibility of preferential treatment for sellers using FBA. For example, Zhu and Liu (2018) demonstrated that, if sellers employed the FBA, there was less entry by Amazon (see Section 2.3 for more details). In addition, Lee and Musolff (2021) show that sellers' products using the FBA are more likely to be recommended by Amazon, even if their prices are not the lowest. These results suggest that Amazon considers the FBA an important source of revenue. In each product category, the percentage of products for which sellers adopt FBA is higher than that of Amazon's 1P selling (Lee and Musolff, 2021). Hence, it is necessary to conduct further research on the various effects of preferential treatment on sellers using FBA.

Finally, we must emphasize the importance of empirical studies to further understand self-preferencing. Approximately 80 percent of the studies mentioned in Sections 2 and 3 conducted theoretical and analytical studies. Although this number might depend on the fact, to some extent, that all the authors of this review have been working mainly on theoretical studies, it would be necessary to foster empirical investigations more in the near future.

A reason for the scarcity of empirical studies can be related to the limitation in data, although several researchers have recently overcome this difficulty and provided interesting empirical analyses (Gutierrez, 2021; Lam and Liu, 2021; Lee and Musolff, 2021) using external data sources. Table 1 summarizes the type and source of data used in the empirical studies presented in this paper. The data acquisition methods adopted in existing studies can be roughly classified into three types. The first is to obtain the necessary information directly from the platform's web pages using web scraping or

[20] Competition Policy International, April 11, 2022: https://www.competitionpolicyinternational.com/the-italian-competition-authoritys-decision-in-the-amazon-logistics-case-self-preferencing-and-beyond/

[21] The Italian Competition Authority's report: https://www.agcm.it/dotcmsdoc/allegati-news/A528_chiusura%20istruttoria.pdf

other methods (note that some platforms prohibit web scraping, as described below). The second is to obtain it from a market intelligence company, such as Keepa.com. The last method is to obtain third-party companies with access to the platform API (Application Programming Interface).

Table 1: Examples of data used in empirical studies

Data used	Data sources
Amazon	
1P selling and product characteristics (Zhu and Liu, 2018)	Information on the web page
FBA/1P selling and product characteristics (Gutierrez, 2021)	Market intelligence company
FBA and recommendations (Lee and Musolff, 2021)	API accessible companies
1P selling and recommendations (Chen and Tsai, 2019; Lam, 2021)	Information on the web page
App store (Apple/Google)	
1P selling and 3P investment (Wen and Zhu, 2019)	App data analysis companies

Although empirical analyses can be conducted with data obtained from web pages, there may be some limitations due to the lack of detailed information. For example, while information on sales rankings may be available on web pages, more detailed information on the sales of each product is often unavailable. Therefore, existing studies have employed procedures to estimate product sales by applying assumptions about the relationship between product ranking and the sales of each product. Access to more detailed data would be useful to reduce the noise caused by such estimations as much as possible.

It is worth noting that some platforms prohibit or limit data acquisition through scraping.[22] Therefore, researchers may face difficulties in developing datasets for em-

[22]For example, Amazon's Conditions of Use (https://www.amazon.com/conditionsofuse) describes that "[t]his license does not include... any collection and use of any product listings, descriptions, or prices... or any use of data mining, robots, or similar data gathering and extraction tools."

pirical analyses on these platforms. It is important to foster the development of rules on access to data and the periodic acquisition and disclosure of data by governments and research institutions to achieve a better balance between theoretical and empirical research. We believe that greater data availability will encourage researchers worldwide to analyze data and publish their analyses, contributing to competition policy decision-making worldwide.

References

Anderson, Simon P, and Özlem Bedre-Defolie. 2021. "Hybrid Platform Model." *CEPR Discussion Paper*, No. DP16243.

Carlton, Dennis W, and Michael Waldman. 2002. "The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries." *The RAND Journal of Economics*, 33(2): 194–220.

Chen, Nan, and Hsin-Tien Tsai. 2019. "Steering via Algorithmic Recommendations." *Available at SSRN 3500407.*

Choi, Jay Pil, and Doh-Shin Jeon. 2021. "A Leverage Theory of Tying in Two-Sided Markets with Nonnegative Price Constraints." *American Economic Journal: Microeconomics*, 13(1): 283–337.

Crawford, Gregory S, Matteo Courthoud, Regina Seibel, and Simon Zuzek. 2022. "Amazon Entry on Amazon Marketplace." *CEPR DP*. 17531.

Crémer, Jacques, Yves-Alexandre de Montjoye, and Heike Schweitzer. 2019. *Competition Policy for the Digital Era.* Brussels:European Commission.

Decarolis, Francesco, and Gabriele Rovigatti. 2021. "From Mad Men to Maths Men: Concentration and Buyer Power in Online Advertising." *American Economic Review*, 111(10): 3299–3327.

de Cornière, Alexandre, and Greg Taylor. 2014. "Integration and Search Engine Bias." *The RAND Journal of Economics*, 45(3): 576–597.

de Cornière, Alexandre, and Greg Taylor. 2019. "A Model of Biased Intermediation." *The RAND Journal of Economics*, 50(4): 854–882.

Etro, Federico. 2021. "Product Selection in Online Marketplaces." *Journal of Economics & Management Strategy*, 30(3): 614–637.

Etro, Federico. 2022. "The Economics of Amazon." *Available at SSRN 4307213.*

Etro, Federico. 2023. "Hybrid Marketplaces with Free Entry of Sellers." *Review of Industrial Organization*, forthcoming.

Gawer, Annabelle. 2021. "Digital Platforms ' Boundaries: The Interplay of Firm Scope, Platform Sides, and Digital Interfaces." *Long Range Planning*, 54(5). 102045.

Ghose, Anindya, and Sang Pil Han. 2014. "Estimating Demand for Mobile Applications in the New Economy." *Management Science*, 60(6): 1470–1488.

Gutierrez, German. 2021. "The Welfare Consequences of Regulating Amazon." Job Market Paper, New York University.

Hagiu, Andrei, and Daniel Spulber. 2013. "First-Party Content and Coordination in Two-Sided Markets." *Management Science*, 59(4): 933–949.

Hagiu, Andrei, and Julian Wright. 2015. "Marketplace or Reseller?" *Management Science*, 61(1): 184–203.

Hagiu, Andrei, Bruno Jullien, and Julian Wright. 2020. "Creating Platforms by Hosting Rivals." *Management Science*, 66(7): 3234–3248.

Hagiu, Andrei, Tat-How Teh, and Julian Wright. 2022. "Should Platforms Be Allowed to Sell on Their Own Marketplaces?" *The RAND Journal of Economics*, 53(2): 297–327.

Hervas-Drane, Andres, and Sandro Shelegia. 2022. "Retailer-led Marketplaces." *CEPR Discussion Paper*, No. DP17351.

Jiang, Baojun, Kinshuk Jerath, and Kannan Srinivasan. 2011. "Firm Strategies in the "Mid Tail" of Platform-Based Retailing." *Marketing Science*, 30(5): 757–775.

Kang, Zi Yang, and Ellen V. Muir. 2021. "Contracting and Vertical Control by a Dominant Platform." Job Market Paper, Stanford University.

Kittaka, Yuta, and Susumu Sato. 2022. "Dual-Role Platforms and Self-Preferencing: Sequential Search Approach." *Available at SSRN 3736574*.

Kittaka, Yuta, Susumu Sato, and Yusuke Zennyo. 2022. "Platform ni yoru Jikoyugu ni kansuru Keizaigakubunken no Review." *CPRC Discussion Papers*, CPDP-89-2-J.

Lam, H Tai. 2021. "Platform Search Design and Market Power." Job Market Paper, Northwestern University.

Lam, Wing Man Wynne, and Xingyi Liu. 2021. "Data Usage and Strategic Pricing: Does Platform Entry Benefit Independent Traders." Working Paper, Toulouse School of Economics.

Lee, Kwok Hao, and Leon Musolff. 2021. "Entry Into Two-Sided Markets Shaped By Platform-Guided Search." Job Market Paper, Princeton University.

Madsen, Erik, and Nikhil Vellodi. 2021. "Insider Imitation." *Available at SSRN 3832712*.

Padilla, Jorge, Joe Perkins, and Salvatore Piccolo. 2022. "Self-Preferencing in Markets with Vertically-Integrated Gatekeeper Platforms." *The Journal of Industrial Economics*, 70(2): 371–395.

Peitz, Martin. 2022. "The Prohibition of Self-Preferencing in the DMA." *CERRE*.

Rey, Patrick, and Jean Tirole. 2007. "A Primer on Foreclosure." In *Handbook of Industrial Organization*. Vol. 3, ed. Mark Armstrong and Robert Porter, 2145–2220. Elsevier.

Riordan, Michael H. 2008. "Competitive Effects of Vertical Integration." In *Handbook of Antitrust Economics*. ed. Paolo Buccirossi, 145–182. MIT Press.

Shopova, Radostina. 2021. "Private Labels in Marketplaces." *Available at SSRN 3949396*.

Teh, Tat-How, and Julian Wright. 2022. "Intermediation and Steering: Competition in Prices and Commissions." *American Economic Journal: Microeconomics*, 14(2): 281–321.

Wen, Wen, and Feng Zhu. 2019. "Threat of Platform-Owner Entry and Complementor Responses: Evidence from the Mobile App Market." *Strategic Management Journal*, 40(9): 1336–1367.

Wilbur, Kenneth C. 2008. "A Two-sided, Empirical Model of Television Advertising and Viewing Markets." *Marketing Science*, 27(3): 356–378.

Zennyo, Yusuke. 2022. "Platform Encroachment and Own-Content Bias." *The Journal of Industrial Economics*, 70(3): 684–710.

Zhu, Feng. 2019. "Friends or Foes? Examining Platform Owners' Entry into Complementors' Spaces." *Journal of Economics & Management Strategy*, 28(1): 23–28.

Zhu, Feng, and Qihong Liu. 2018. "Competing with Complementors: An Empirical Look at Amazon.com." *Strategic Management Journal*, 39(10): 2618–2642.