


ORIGINAL ARTICLE

Friends or foes? Examining platform owners' entry into complementors' spaces

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Abstract

As platform owners continue to expand their ecosystems, many of them have started to provide consumers with their own complementary applications. These moves position the platform owners as direct competitors to their complementors. This paper surveys empirical studies that examine the direct entry of platform owners into complementors' product spaces. It finds that both the motivation and impact of such entries on complementors are multifaceted. The motivation behind platform owners' direct entry goes beyond value capture, and the impact of platform entry on complementors varies across empirical settings. It identifies several future research directions that can help advance our understanding of the relationships between platform owners and complementors.

KEYWORDS

multisided markets, platform-owner entry

1 | INTRODUCTION

As platforms become increasingly important in our economy, concerns are growing about platform owners' misuse of their market power with respect to their value creation partners. In particular, many platform owners imitate complementors and enter their product spaces with similar offerings. These moves position the platform owners as direct competitors to their complementors. For example, Netscape, a complementor on Microsoft's Windows platform, was effectively extinguished by Microsoft's own offering, Internet Explorer (see, e.g., Cusumano & Yoffie, 1998). Meerkat, a mobile app that enabled Twitter users to broadcast live video streaming to their followers, vanished after Twitter acquired its competitor Periscope and cut off Meerkat's access to Twitter's social graph. Apple, having offered Google Maps as a popular preinstalled application on its iPhone and iPad mobile devices since 2007, has built its own replacement map service. Many third-party sellers in Amazon's marketplace complain that Amazon is competing against them by sourcing the same products directly from manufacturers (e.g., Zhu & Acocella, 2017; Zhu & Liu, 2018). The European Union (EU) imposed a record-high fine on Google for leveraging its dominance in the search engine market to favor its own comparison-shopping service. These examples suggest that the business model of building complementary products on a platform may involve considerable risks. Except in a few high-profile cases—such as the Microsoft antitrust trial (see, e.g., Shapiro, 2009; Whinston, 2001) and the EU's fining of Google—antitrust measures have rarely offered any remedy.

The textbook explanation for why a platform owner should provide some of the complementors itself is that these complementary applications help solve a chicken-and-egg problem (e.g., Evans, Hagiu, & Schmalensee, 2006; Hagiu & Spulber, 2013): Without an existing base of platform users, no complementors would be interested in supporting that

TABLE 1 Summary of empirical studies examining platform-owner entry

References	Method	Data	Key findings
Cennamo et al. (2018)	Regressions, difference-in-differences	Video-game industry, 1995–2008	When more first-party blockbuster games appear in a genre, third-party developers release more games in the same genre. They also reduce their efforts in developing these games.
Edelman and Lai (2016)	Regressions, difference-in-differences	ComScore Search Planner, January–April 2012	Google's prominent placement of its flight search service increased the clicks on paid advertising listings while decreasing the clicks on organic search listings by about the same quantity.
Foerderer et al. (2018)	Regressions, difference-in-differences	Apps on Google's Android, 2014, 2015	Google's entry into photo apps increased the demand for third-party photo apps and their developers' incentives to update these apps.
Gawer and Cusumano (2002)	Qualitative	Intel, 1990–2004	Intel tries to avoid competing directly with complementors and enters markets in which it is not satisfied with complementors' products.
Gawer and Henderson (2007)	Qualitative	Intel, 1990–2004	Intel did not enter to compete with complementors' products except for those products that embodied new platform interfaces.
Huang et al. (2013)	Regressions, hazard models	Corptech, 1996–2004	Firms are more likely to become complementors for a platform when they have defense mechanisms such as patents, copyrights, and downstream capabilities.
Jiang et al. (2011)	Summary statistics	Amazon, April 2010	Amazon tends to sell high-demand products and leave long-tail products for third-party sellers to offer.
Kang (2017)	Regressions	Health apps on Apple's iOS and Google's Android, 2014–2015	The effect of platform-owner entry varies depends on platform governance and how the platform owner implements its entry strategy.
Li and Agarwal (2017)	Regressions, random coefficient	Photo-sharing apps on Facebook, April–December 2012	Facebook's integration of Instagram has a positive spillover effect on big third-party applications and a negative spillover effect on small third-party applications in Facebook's photo-sharing ecosystem.
Wen and Zhu (2018)	Regressions, difference-in-differences	Apps on Google's Android, 2012–2015	After Google's entry threat increases, affected developers reduce innovation and raise the prices for the affected apps. Once Google enters, these developers reduce innovation and increase prices further.
Zhu & Liu (2018)	Regressions, propensity-score matching	Amazon, June 2013, April 2014	Amazon is more likely to enter the spaces of third-party products with higher sales and better reviews, and is less likely to enter product spaces that require significant efforts from third-party sellers to grow.

platform; and without complementary applications, no consumers would be interested in adopting the platform. What is not clear, however, is whether a platform owner should still offer complementary products by itself after the platform has taken off, as in the examples above.

Theoretical studies have suggested that platform owners can bundle their own complementary applications with their platforms to foreclose complementors' access to their customers and profitably capture the whole of their markets (Carlton & Waldman, 2002; Peitz, 2008; Whinston, 1990). Complementing these theoretical studies, a number of empirical studies have investigated platform-owner entry in a variety of settings (see Table 1 for a summary). They have examined the motivations for such entry, their impact on platform users and complementors, and the defense strategies that complementors have used. This paper surveys these empirical studies and identifies opportunities for future research in each of these areas.

2 | MOTIVATIONS FOR PLATFORM-OWNER ENTRY

Gawer and Cusumano (2002) and Gawer and Henderson (2007) have conducted in-depth field studies of Intel, whose microprocessors serve as a platform that enables complementors to build various hardware devices such as memory sticks, network cards, and sound cards. They find that in all of the markets that Intel had the capability to enter, Intel did not enter to compete with complementors' products except for those products that embodied new platform interfaces, which they refer to as "connectors." Even for those connectors, they find that Intel used organizational structure and processes as commitment mechanisms to signal that it wanted complementors to make money. Their research thus supports the view that the direct entry of platform owners sends negative signals to complementors and may discourage complementors' incentives to innovate (e.g., Gans & Stern, 2003; Iansiti & Levien, 2004). As a result, platform owners should only do so when the growth potential is substantial.

Several studies have examined platform owners' entry patterns to infer their motivations. Jiang, Jerath, and Srinivasan (2011) and Zhu and Liu (2018) examine Amazon's entry pattern into third-party sellers' product spaces. Both of these studies find that Amazon is more likely to target successful products sold by third-party sellers. In particular, over a 10-month period, Zhu and Liu (2018) show that Amazon enters 3% of complementors' product spaces, most of which have great reviews and high sales. They also find that platform-specific investment by complementors could be the key reason that Amazon does not behave the same way that Intel did. Since the platform-specific investments required to build devices on top of Intel's microprocessors are often costly, complementors would not be willing to make such investments if they suspected that Intel might enter and compete with them in the future. In contrast, third-party sellers on Amazon do not typically make Amazon-specific investments. As a result, Amazon is not as concerned as Intel was when pondering whether or not to enter complementors' product spaces: Third-party sellers may nevertheless be willing to sell their products on Amazon as long as they can profit from them for a short period.

Studies have identified motivations for platform-owner entry beyond value capture. Gawer and Cusumano (2002) point out that Intel enters certain product spaces because it is not satisfied with complementors' products and wants to motivate them to innovate by introducing competition. Wen and Zhu (2018) examine Google's introduction of its own mobile apps for its Android system. Similar to Wang, Li, and Vir Singh (2018), they find that in each of the three entry events they studied, there are a large number of third-party apps offering similar features. Because Google's entry makes these markets less attractive for app developers, its entry pushes these app developers to innovate in other product spaces, which may reduce wasted efforts in developing these duplicate apps. They also point out that platform owners may use direct entry to exercise better quality control. For example, the timing of Google's introduction of its own flashlight app may be influenced by users' privacy concerns about some third-party flashlight apps. Zhu and Sun (2018), in their case study on JD, one of the largest e-commerce companies in China, find that JD wants to offer products in certain categories by itself to minimize counterfeiting.

Broadly, this entry decision is related to whether a firm wants to become more like a vertically integrated firm or a multisided platform. Hagiu and Wright (2015) show that firms will prefer to be vertically integrated when there is a strong need to coordinate decisions that generate spillovers across complementors. It is often difficult to infer platform owners' exact motivations through quantitative analysis because different motivations can lead to the same empirical patterns. Overall, we need more qualitative studies to help understand platform owners' motivations. It would also be interesting to identify other factors that may shape platform owners' motivations to enter. For example, when platform owners compete aggressively to gain market dominance, they are likely to depend on support from complementors, and thus are unlikely to compete directly against them. If platform owners want to enter such markets because of the markets' growth potential, they are likely to acquire or contract exclusively with complementors (e.g., Lee, 2013). This strategy also reduces the attractiveness of rival platforms to consumers.

3 | IMPACT OF PLATFORM-OWNER ENTRY

Most empirical papers in the literature focus on the impact of platform-owner entry on platform users and complementors. While these studies have documented positive effects on platform users, the effect on complementors is mixed.

Li and Agarwal (2017) examine Facebook's integration of Instagram, a photo- and video-sharing social app, and find that the integration leads to a dramatic increase in the demand for Instagram, possibly due to the increase in ease of use and increased awareness. They also find a spillover effect from this integration on similar third-party apps on Facebook due to increased awareness of such apps. The spillover effect is positive for the large third-party apps and negative for

the small third-party apps, which suggests that this integration benefits competing third-party applications with a large user base but hurts those with a small user base. Foerderer, Kude, Mithas, and Heinzl (2018) find similar results after examining Google's entry into the market for photography apps on its own Android platform in 2015. They find that entry creates additional consumer attention and demand for photography apps, which has a positive spillover effect on complementors in the same category. The spillover effect is greater for large and more diversified complementors. They also find that after entry, complementors are more likely to incrementally innovate their photography apps and to release new apps to the affected market category. Cennamo, Gu, and Zhu (2018) find that in the video-game industry, games developed by console manufacturers (i.e., first-party games) often become blockbusters. These first-party games expand the installed base of the consoles and thus enlarge value capture potential for all third-party game developers.

In contrast, a few studies find that the impact of entry on complementors can be negative. For example, Edelman and Lai (2016) find that Google's introduction of its flight search service increased the clicks on paid advertising listings while decreasing the clicks on organic search listings. In particular, users influenced by visual presentation and page position were more likely to click on Google's own flight search listing. Zhu and Liu (2018) find that after Amazon's entry, affected third-party sellers are discouraged and carried fewer products afterwards. Wen and Zhu (2018) find that on Google's Android platform, Google's entry threat and actual entry both decrease the popularity of affected third-party mobile apps. Affected app developers on average shift their innovation efforts from the affected apps to other apps.

The mixed findings suggest that the impact on complementors may be moderated by other factors. Li and Agarwal (2017) show that the effects depend on the size of the complementors. Kang (2017) compares Apple's and Google's introductions of Health apps on their mobile systems. She finds that because Google takes a more open approach to governing its platform ecosystem, its entry has a positive effect on complementors developing health apps. By contrast, Apple's entry has a negative effect on complementors. Cennamo et al. (2018) point out that we observe a positive entry effect of console manufacturers on third-party game publishers in the video-game industry because game popularity declines rapidly and hence the market expansion effect dominates the competitive effect from first-party games. The research suggests that industry characteristics may moderate the effect of platform-owner entry. One would also expect the effect to depend on how tightly platform owners bundle their own offerings with their platforms, the degree of differentiation between platform owners' own offerings and third-party complements (Belleflamme & Peitz, this issue), and the extent to which platform owners preferentially promote their own offerings (e.g., Wu & Zhu, 2018). Future research could seek to explore these moderating factors to reconcile these mixed findings.

All empirical studies thus far have examined the short-term effects of platform-owner entry. The long-term effects could be different. For example, in the case of Amazon, although consumers may benefit from low cost because of Amazon's direct entry, existing or prospective complementors discouraged by Amazon's entry may bring fewer innovative products to the platform. In the long-term, consumers may suffer from a reduction in product variety. But on the other hand, if Amazon's entries attract more consumers, the expanded customer base could incentivize more third-party sellers to join the platform. As a result, the long-term effects for consumers of Amazon's entry are not clear. Even if platform owners' entry has a positive impact on complementors, it is not clear whether the long-term effect for platform growth will be positive if complementors shift their resources towards developing similar products. Examining the long-term effects requires researchers to collect data over a much longer period. It also requires different kinds of data. For example, to estimate the impact on platform growth, one would need to observe the entry of new users and new complementors.

4 | DEFENSE STRATEGIES OF COMPLEMENTORS

In cases where platform-owner entry has negative effects on complementors, one would expect complementors to design strategies to mitigate the negative effects. The literature has identified several strategies that complementors adopt. First, complementors can strategically form ties with platforms. Huang, Ceccagnoli, Forman, and Wu (2013) find that independent software vendors (ISVs) with a greater stock of intellectual protection rights (such as patents and copyrights) and those with stronger downstream capabilities (as measured by trademarks and consulting services) are more likely to enter markets that are complementary to an enterprise software platform, SAP. Their research suggests that these mechanisms are effective in protecting ISVs from the threat of expropriation. The finding is consistent with the literature on the "swimming with sharks" dilemma, in which small firms may not want to form ties with large firms when there is a high risk of value misappropriation, unless they have strong defense mechanisms (Diestre & Rajagopalan, 2012; Katila, Rosenberger, & Eisenhardt, 2008). Second, complementors can reallocate their resources to avoid direct competition with platform owners. As shown in Wen and Zhu (2018), app developers on Google's Android

system start reallocating their innovation efforts into other products when there is a significant entry threat before actual entry takes place. Cennamo et al. (2018) show that third-party game publishers strategically time their game releases to avoid direct competition with console manufacturers' first-party games. They also reduce their efforts in developing similar games.

Overall, these studies show that although small, complementors are strategic players and may respond proactively to platform owners' entry. Future research could examine the conditions under which certain moves are used. For example, when complementors have attractive outside options, they may avoid forming ties with platforms that have a reputation for competing against complementors. Tie avoidance is also more likely when complementors need a significant platform-specific investment to enter the market. As shown in Park and Van Alstyne (2017), complementors may choose not to form ties with a platform if they cannot recoup their investments before the platform-owner entry.

Complementors' defense mechanisms are not limited to these moves. For example, Chen and Han (2018) use a theoretical model to show that when a platform owner uses demand as a signal to identify popular product spaces to target, complementors such as third-party sellers on Amazon can strategically increase product prices to reduce their popularity. It is also not clear from prior research when complementors choose to shift their focuses to other products, what new product spaces these complementors should focus on. In particular, should complementors choose product spaces that are popular but more likely to attract platform owners' attention? Should complementors select product spaces that are not very popular and as a result are less likely to enter into competition with platform owners? The answers to these questions would depend on the capabilities complementors can develop over time. For example, third-party sellers with capabilities to continually discover best-selling products can choose to focus on selling popular products on Amazon, even if they may have to frequently compete with Amazon's own offerings.

Extant studies have focused on small complementors, but defense mechanisms of large complementors could be very different and are worth exploring in future research. For example, as Netflix continued to gain popularity and planned to develop more content on its own, Disney decided to end its distribution deal with it and launch its own streaming service in 2019.

Future research could also explore how complementors' strategies depend on the entry mode of platform owners. For example, while Apple chose to develop many apps by itself, such as flashlight and health apps, it also chose to acquire Siri, an intelligent personal assistant app. Wen and Zhu (2018) find that under entry threats, popular app developers, unlike average ones, expand their efforts on these affected apps. They attribute this pattern to the developers' desire to be acquired by Google. Based on this result, we might expect that when platform owners develop a reputation for entering complementors' spaces through acquisition, the complementors may proactively design strategies that make them attractive acquisition targets.

5 | SUMMARY

The extant research has documented the multifaceted nature of platform entry in terms of both its motivations and its impact. Different from the theoretical literature, these studies suggest that the motivations for platform entry can go well beyond value capture and may vary across various industries. While none of the studies has documented harmful effects on platform users, there is mixed evidence on whether platform-owner entry is harmful for complementors. We also lack evidence on the long-term effects of platform-owner entry. Hence, there does not seem to be a single prescription that policymakers can follow in regulating platform-owner entry.

It is also important to recognize that in addition to direct entry, platform owners can use other means to appropriate more value (see, e.g., Belleflamme & Peitz, this issue). Amazon started as a retailer, while eBay, as a pure marketplace, has not developed the capability to operate as a retailer. Although eBay has not chosen to compete directly with third-party sellers, it has increased its service fees several times to capture more value from its sellers. Hotel booking platforms such as booking.com charge hotels in popular destinations higher commissions to extract more value. Apple often uses its terms and conditions to reject applications that compete directly with its own offerings on its mobile platform. After Zynga built a successful business on Facebook by selling virtual goods in Zynga's games, Facebook wanted to take a 30% cut of this money by forcing the use of its own virtual currency. Future research could study these platform strategies and their impact.

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REFERENCES

- Belleflamme, P., & Peitz, M. (2018). Managing competition on a two-sided platform. *Journal of Economics & Management Strategy*, this issue.
- Carlton, D. W., Waldman, M. (2002). The strategic use of tying to preserve and create market power in evolving industries. *RAND Journal of Economics*, 33(2), 194–220.
- Cennamo, C., Gu, Y., & Zhu, F. (2018). *Value co-creation and capture in platform markets: Evidence from a creative industry* (Working Paper). Harvard Business School.
- Chen, F., & Han, Y. (2018). *Strategic interactions on an e-commerce platform: Pricing, demand learning, and the threat of entry* (Working Paper). Columbia University.
- Cusumano, M. A., & Yoffie, D. B. (1998). *Competing on internet time: Lessons from netscape and its battle with Microsoft*. New York: Free Press.
- Diestre, L., & Rajagopalan, N. (2012). Are all sharks dangerous? New biotechnology ventures and partner selection in R&D alliances. *Strategic Management Journal*, 33(10), 1115–1134.
- Edelman, B., & Lai, Z. (2016). Design of search engine services: Channel interdependence in search engine results. *Journal of Marketing Research*, 53(6), 881–900.
- Evans, D. S., Hagiu, A., & Schmalensee, R. (2006). *Invisible engines: How software platforms drive innovation and transform industries*. Cambridge, MA: MIT Press.
- Foerderer, J., Kude, T., Mithas, S., & Heinzl, A. (2018). Does platform owner's entry crowd out innovation? Evidence from Google Photos. *Information Systems Research*, 29(2), 444–460.
- Gans, J. S., & Stern, S. (2003). The product market and the market for “ideas”: Commercialization strategies for technology entrepreneurs. *Research Policy*, 32(2), 333–350.
- Gawer, A., & Cusumano, M. A. (2002). *Platform leadership: How Intel, Microsoft, and Cisco drive industry innovation*. Cambridge, MA: Harvard Business School Press.
- Gawer, A., & Henderson, R. (2007). Platform owner entry and innovation in complementary markets: Evidence from Intel. *Journal of Economics and Management Strategy*, 16(1), 1–34.
- Hagiu, A., & Spulber, D. (2013). First-party content and coordination in two-sided markets. *Management Science*, 59(4), 933–949.
- Hagiu, A., & Wright, J. (2015). Multi-sided platforms. *International Journal of Industrial Organization*, 43, 162–174.
- Huang, P., Ceccagnoli, M., Forman, C., & Wu, D. J. (2013). Appropriability mechanisms and the platform partnership decision: Evidence from enterprise software. *Management Science*, 59(1), 102–121.
- Iansiti, M., & Levien, R. (2004). *The keystone advantage: What the new dynamics of business ecosystems mean for strategy, innovation, and sustainability*. Cambridge, MA: Harvard Business School Press.
- Jiang, B., Jerath, K., & Srinivasan, K. (2011). Firm strategies in the “mid tail” of platform-based retailing. *Marketing Science*, 30(5), 757–775.
- Kang, H. Y. (2017). Intra-platform envelopment: The cooperative dynamics between the platform owner and complementors. *Academy of Management Proceedings*, 2017(1), 11205.
- Katila, R., Rosenberger, J. D., & Eisenhardt, K. M. (2008). Swimming with sharks: Technology ventures, defense mechanisms and corporate relationships. *Administrative Science Quarterly*, 53(2), 295–332.
- Lee, R. S. (2013). Vertical integration and exclusivity in platform and two-sided markets. *American Economic Review*, 103(7), 2960–3000.
- Li, Z., & Agarwal, A. (2017). Platform integration and demand spillovers in complementary markets: Evidence from Facebook's integration of Instagram. *Management Science*, 63(10), 3438–3458.
- Parker, G., & Van Alstyne, M. W. (2017). Innovation, openness, and platform control. *Management Science*, 64(7), 3015–3032.
- Peitz, M. (2008). Bundling may blockade entry. *International Journal of Industrial Organization*, 26(1), 41–58.
- Shapiro, C. (2009). Microsoft: A remedial failure. *Antitrust Law Journal*, 75(3), 739–772.
- Wang, Q., Li, B., & Vir Singh, P. (2018). Copycats versus original mobile apps: A machine learning detection method and empirical analysis. *Information Systems Research*, 29(2), 273–291.
- Wen, W., & Zhu, F. (2018). *Threat of platform-owner entry and complementor responses: Evidence from the mobile app market*. Retrieved from SSRN: <https://ssrn.com/abstract=2848533>
- Whinston, M. D. (1990). Tying, foreclosure, and exclusion. *American Economic Review*, 80(4), 837–859.
- Whinston, M. D. (2001). Exclusivity and tying in U.S. v. Microsoft: What we know, and don't know. *Journal of Economic Perspectives*, 15(2), 63–80.
- Wu, Y., & Zhu, F. (2018). *Competition, contracts, and creativity: Evidence from novel writing in a platform market* (Working Paper). Harvard Business School.
- Zhu, F., & Acocella, A. (2017). X Fire Paintball & Airsoft: Is Amazon a friend or foe? (A). *Harvard Business School Case*, 617–046.
- Zhu, F., & Liu, Q. (2018). Competing with complementors: An empirical look at Amazon.com. *Strategic Management Journal*, 39(10), 2618–2642.
- Zhu, F., & Sun, S. (2018). JD: Envisioning the future of retail. *Harvard Business School Case*, 618–051.

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