

## Same Old Song with a Different Melody: The Paradox of Market Reach and Financial Performance on Digital Platforms

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**ABSTRACT** In the service sector, digital platforms now enable service providers to reach customers through an online marketplace and use the value-adding complementary services offered. However, despite the widespread prevalence of digital platforms, there has been little research on the market reach and financial performance captured by service providers. We explored these service provider-specific outcomes of digital platforms by studying a digital platform in the beauty industry. Our results show that digital platforms present a troubling paradox for service providers participating in a platform-based online marketplace: despite increases in market reach, in terms of a higher rate of new customer acquisition, those service providers participating in the marketplace have lower sales than others. However, the ‘dark side’ of this paradox is compensated by higher sales for service providers using more of the complementary services offered by the platform. Hence, although digital platforms may open new markets and add value, service providers should be wary of their paradoxical consequences. With these findings, we contribute new theoretical and managerial insight about the service provider-specific outcomes of digital platforms and add to the ongoing debate about firm strategies in the digital age concerning the platform economy.

**Keywords:** digital strategy, entrepreneurship, marketplace, platform economy, service provider, services

## INTRODUCTION

The nature of work and employment is fundamentally changing in the digital age (Stein et al., 2019). Particularly in the service sector, industries have been transformed into increasingly high-tech ventures, in which digital technologies have enabled services and

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service work to be intermediated algorithmically (Faraj et al., 2018; Wood et al., 2019). In this, so-called, platform economy (Kenney and Zysman, 2016), digital platforms, such as Airbnb, Amazon, BlaBlaCar, Etsy, and Uber, now intermediate and support transactions between independent demand- and supply-side actors, that is, customers and service providers, who, without the platform, would not be able to interact and transact as efficiently (e.g., McIntyre and Srinivasan, 2017). Acting as matchmakers between customers and service providers (Cusumano et al., 2019), digital platforms produce a broad and transparent view of the market and enable more efficient use of services than traditionally has been possible through many marketing and sales channels (Langley and Leyshon, 2017). Therefore, advances in information technology, together with the platform economy, have empowered services to become increasingly modular, distributed, cross-functional, and in many cases, global (Bharadwaj et al., 2013). Here, digital platforms now provide an online structure for many human activities (Lehdonvirta et al., 2019). The same old way of organizing service work and employment is now thus very different in the platform economy.

While research confirms that the structure, nature, and boundaries of the service sector are rapidly changing in the platform economy (Karanović et al., 2020; Orlikowski and Scott, 2016; Ostrom et al., 2015), only a few studies have focused on understanding what this means from a service provider perspective<sup>[1]</sup> (e.g., Burtch et al., 2018; Cutolo and Kenney, 2020; Rietveld et al., 2020). For example, most research emphasizes the conditions that enable digital platforms to emerge and achieve market dominance rather than the service provider-specific outcomes of digital platforms (McIntyre et al., 2020). However, a better understanding of these issues is imperative as digital platforms can have paradoxical, both favourable and unfavourable, consequences on market reach and financial performance of service providers.

Previous research has alluded to these paradoxes with numerous examples. While digital platforms promise service providers autonomy and flexibility to decide when and how they sell goods and services in the platform (e.g., Hoang et al., 2020), many service providers are concurrently marginalized, for example, owing to meagre compensation (Deng et al., 2016). This marginalization is due, in part, to intense competition on digital platforms and platform-based online marketplaces, which has been shown to suppress price and earnings (Rietveld et al., 2020) and reduce incentives for service providers to participate, or continue to participate, on digital platforms over time (Boudreau, 2012). As such, researchers argue that profits earned through digital platforms are often lower than industry averages (Kenney and Zysman, 2018) and that many platforms encourage service providers to circumvent the costs and regulations governing traditional businesses (Malhotra and Van Alstyne, 2014). Also, for example, Zhu and Liu (2018) show that while Amazon enables independent sellers on Amazon Marketplace access to a vast, global demand-side, simultaneously it pressures sellers by discouraging growth by entering, or threatening to enter, successful product spaces. Similar behaviour has been reported for the mobile app market (Wen and Zhu, 2019). Thus, further understanding of the service provider-specific outcomes of digital platforms is greatly needed as service providers play an essential role in their success and failure (Özalp et al., 2018).

In this study, we seek to understand the market reach and financial performance of service providers participating in a platform-based online marketplace in the beauty

industry. This industry provides a favourable setting to study digital platforms, as historically the sector has been quite traditional and static, and only recently, beauticians have begun to rely on digital technologies, for example, to relay promotional messages (e.g., Jones, 2010). Our case platform enables service providers to participate in a platform-based online marketplace, and to use a number of complementary services offered by the platform.<sup>[2]</sup> This is consistent with the definition introduced by Cusumano et al. (2019), in which a digital platform consists of both an online marketplace acting as a match-maker between customers and service providers, and value-adding complementary services. Like Amazon, service providers may choose to sell either in the platform-based online marketplace or through their other marketing and sales channels. Still, regardless of which channel they sell their goods and services on, they may use the complementary services offered, such as the reservation management system, similarly as Amazon sellers may use Amazon's complementary services, such as Fulfillment by Amazon (FBA), regardless of whether the actual sale made is through the Amazon Marketplace or not. Our data consist of daily transaction data of 1,856 service providers registered to the platform with 435,867 transactions over a 5-month observation period, in addition to a survey with a sample of 143 registered service providers, of which 92 participate in the platform-based online marketplace. Our study's unique empirical set-up allowed us to compare market reach and financial performance of both service providers participating in the marketplace as well as service providers registered to the platform but not opting to participate in the platform-based online marketplace.

This study presents several findings that support and advance research on the platform economy from the perspective of service providers (e.g., Burtch et al., 2018; Cutolo and Kenney, 2020; Lehdonvirta et al., 2019; Zervas et al., 2017). First, we show that digital platforms provide service providers participating in the platform-based online marketplace greater market reach, as seen in a higher rate of new customer acquisition, compared to service providers not opting to participate in the marketplace. However, while service providers may be drawn to a digital platform due to increased market reach, our findings show that service providers participating in the platform-based online marketplace have lower sales compared to service providers not opting to participate in the marketplace. Finally, we show that service providers participating in the platform-based online marketplace may be able to compensate for some of these negative implications of a digital platform on financial performance through the use of the complementary services offered. We found that the more complementary services are used by service providers, the higher their overall sales, which also holds for all service providers in our sample regardless of marketplace participation.

Our findings contribute to research on digital platforms and the platform economy by providing new theoretical and managerial insight about the service provider-specific outcomes of digital platforms. In particular, we contribute new insight into the strategic management literature about the paradoxical nature of digital platforms. While many studies proclaim that digital platforms are virtually driving service providers into a self-reinforcing cycle of lower sales and deteriorating work conditions (Cutolo and Kenney, 2020; Langley and Leyshon, 2017; Wood et al., 2019), evidently a 'dark side' to digital platforms, we find that the matter is not quite so straightforward. Specifically, we identify an important paradox: despite an increase in market reach, in terms of a higher rate of

new customer acquisition, service providers participating in the platform-based online marketplace have lower sales than others. However, the ‘dark side’ of this paradox is compensated by an essentially moderating effect of complementary service use on service provider sales. What initially appears as a negative paradox may, after all, be positive if understood and dealt with caution. Digital platforms are, therefore, not all bad, but for some service providers, such as new entrants, often a necessary evil to secure market reach. We also contribute to the growing literature on the impact of digitalization and digital business models on industry dynamics and structures (e.g., Cozzolino et al., 2018), as well as provide new insight into the ongoing debate about firm strategies in the digital age (e.g., Davis, 2016). As many firms are now joining highly competitive digital platforms and platform-based online marketplaces, this study presents new understanding of how firms should effectively position themselves within such competitive market settings (Barlow et al., 2019).

The findings of this study are generalizable across service sectors, in which digitalization and the platform economy have transformed how service providers arrange their business activities, reach customers, and exchange products, services, and information. The findings of this study could be applied by business owners to critically evaluate both the short- and long-term viability of new digital marketing and sales channels, such as platform-based online marketplaces. To survive and grow, our study shows that service providers need to be particularly aware of both the strategic opportunities and risks that digital platforms present.

## THEORETICAL BACKGROUND

Platforms refer to specific, purposefully built technology architectures that enable platform owners to tap into the innovation capabilities and resources of external firms and individuals, which are not directly part of their immediate supply chain (Gawer, 2009). Such platforms generally take a hub-and-spoke form to enable an array of peripheral firms to connect to a central platform via open, private, or shared technologies and technology standards (e.g., Jacobides et al., 2018). Regarding product development and innovation, modular platform architectures have enabled firms to achieve economies of scope in designing and developing new products and services using standardized platform components as a means to promote a variety, that is, ‘a family,’ of products. In the high-tech context, firms such as Alphabet, Apple, Facebook, and Intel have leveraged platforms to allow third-party application and software developers, as complementors, to innovate and add their products or services on top of a, more or less, standardized platform interface (Gawer, 2014). Moreover, in the service sector, digital platforms now effectively act as matchmakers between customers and service providers by intermediating a platform-based online marketplace enabling economic interactions between these independent supply- and demand-side actors (Cusumano et al., 2019), now a ubiquitous application of the platform construct in the platform economy.

In the service sector, the role of a digital platform is not to develop, manufacture or sell products and services *per se*, but to connect and intermediate a multi-sided market and marketplace to enable the direct interaction between two (or more) sides of distinct groups of platform users, that is, customers and service providers (e.g., Cennamo and

Santalo, 2013; Zhao et al., 2020). Here, digital platforms involve a business model in which, via an online digital interface and information technology infrastructure, a digital platform ‘*intermediates transactions among firms and/or individuals that may not be able to transact otherwise*’ (McIntyre and Srinivasan, 2017, p. 141). For example, Cusumano et al. (2019, p. 20) refer to such platforms as transaction platforms, that is, multi-sided markets and marketplaces functioning as ‘*intermediaries or online marketplaces that make it possible for people and organizations to share information or to buy, sell, or access a variety of goods and services*’. The economic value of a digital platform is measured mainly by the size of its user base and the potential to monetize these users, at least in the long-term (Gawer and Cusumano, 2014), which explains the massive stock market valuation of digital platforms like Uber in recent years.

Digital platforms in the service sector, therefore, act as active intermediaries between customers and service providers (Lehdonvirta et al., 2019). For customers, a digital platform enables access to products and services generally cheaper and with different qualities and features than those offered by traditional businesses (Langley and Leyshon, 2017). For service providers, a digital platform enables them to reach an extensive, even global, customer base (Parker et al., 2016). Here, digital platforms essentially create new markets by reducing transaction costs that previously made many economic interactions inefficient and costly through traditional market intermediaries, such as retailers (e.g., Kiesling et al., 2019). At the same time, digital platforms now oversee many transaction-related factors (e.g., screening transaction partners) previously at the discretion of the transaction partners themselves (Lehdonvirta et al., 2019). Digital platforms have thus arguably streamlined economic interactions (e.g., Kenney and Zysman, 2016).

Despite this increased interest in digital platforms, and their general economic role in society, very few studies have specifically focused on understanding the service provider-specific outcomes of digital platforms (e.g., Burtch et al., 2018; Cutolo and Kenney, 2020; Rietveld et al., 2020). This narrow and yet limited body of literature reports that several mechanisms, such as a platform’s communication practices (Boons et al., 2015), rules and actions (Kapoor and Agarwal, 2017), management of relationships with service providers (Rietveld et al., 2019) and dominance and governance (Rietveld et al., 2020), affect service provider participation and performance on digital platforms. Research also suggests that by enforcing new forms of control and governance, such as algorithmic management tools like platform-based rating and reputation systems (Wood et al., 2019), digital platforms seek to actively induce, produce, and program service provider behaviour (e.g., D’Angelo and Toma, 2017; Langley and Leyshon, 2017). For example, Cutolo and Kenney (2020) argue that this results in a significant power imbalance between service providers and platform owners. Therefore, digital platforms can simultaneously pose both an opportunity (e.g., increased market reach) and a threat (e.g., algorithmic control) to service providers. The extent to which this happens, however, merits much more attention in platform literature.

The question of how digital platforms are used by service providers and how they affect service provider market reach and financial performance is important as the platform economy has arguably transformed the nature of work and labour exchange (Orlikowski and Scott, 2016). Research on platform work provides further insights on these issues. As a positive, research shows that digital platforms have levelled the playing field in many

sectors of the economy, as virtually anyone can now become a service provider with minimum start-up costs and fixed fees (Kuhn and Maleki, 2017). Here, the digital platform effectively lowers entry barriers, for example, by now enabling entry into industries where work has historically been highly regulated (e.g., Kim et al., 2018). By removing entry barriers, digital platforms thus offer additional earnings opportunities to many individuals, in addition to more autonomy and flexibility (Hoang et al., 2020). At the same time, however, many of the standards and norms that used to protect established or incumbent businesses have disappeared, as digital platforms enforce transparency in prices and selections, and create new quality standards in the form of rating and reputation systems (e.g., Wood et al., 2019). For example, Karanović et al. (2020) highlight the regulatory dilemmas that follow from this. Therefore, adopting a digital platform commits service providers to an open business strategy, in which transactions with customers now hinge on transparent and commoditized transactions through an open rather than closed market presence, often limiting the ability of service providers to customize their offering and pricing outside of the terms and conditions set by the platform owner (Iacovides and Jenarond, 2018).

Furthermore, by treating service providers as independent contractors rather than direct employees, service providers are excluded from a guaranteed minimum wage, overtime, and anti-discrimination law protections, also generally meaning that taxes, social security, medical, and unemployment payments become the burden, responsibility, and duty of the service provider rather than the platform as an employer (e.g., Cunningham-Parmeter, 2016). This means that service providers are increasingly treated as external resources, not as employees (Schor, 2017). The shift from long-term employment relationships to erratic on-demand work assignments on digital platforms is also being increasingly viewed as a societal problem in that it undermines long-established conventions regarding worker rights and protections (Cornellisen and Cholakova, 2019). Many of these issues have prompted intense criticism of digital platforms and the platform economy, as digital platforms, particularly in the service sector, are found to exploit service providers and reduce their labour power, thus arguably increasing inequality and insecurity across the contemporary economy (Hoang et al., 2020).

## **HYPOTHESIS DEVELOPMENT**

Based on our literature review, we next present three hypotheses, along with their theoretical justifications, to understand the market reach and financial performance of service providers participating in a platform-based online marketplace and guide our empirical research.

### **Service Provider Market Reach**

Our first hypothesis posits that service providers participating in a platform-based online marketplace have greater market reach, in terms of a higher rate of new customer acquisition, than service providers not opting to participate in the marketplace. We base our hypothesis on traditional platform literature, namely network externalities and transaction cost economics (TCE), both canonical theories and economic principles



used to understand and examine digital platforms, focusing primarily on describing the transaction-enabling effects of digital platforms and the resulting outcomes for both customers and service providers.

Digital platforms must have both a high number of service providers and customers as users, as service providers attract customers, and vice versa, through a mechanism called indirect network externalities (Katz and Shapiro, 1985; Rochet and Tirole, 2003; Suarez, 2005). An increase in the number of customers on a platform generates spill-over effects by influencing a growth in the number of service providers participating in the platform (e.g., Mascarenhas, 1992). Due to the need to attract both customers and service providers to the platform, digital platforms face a chicken-and-egg problem in which they must attract both customers and service providers from the onset. Still, there is generally limited interest from customers and service providers to join a platform in which the other group is absent (Evans, 2003). As the economic valuation of digital platforms is based on indirect network externalities, that is, growth in the number of customers and service providers participating in the digital platform, platform owners pursue strategies such as subsidies, including free or discounted access, to aggressively attract and retain both customers and service providers onto the platform and accelerate network externalities. Thus, indirect network externalities largely explain the often-rapid growth in the number of users on a digital platform (Parker and Van Alstyne, 2005).

While indirect network externalities explain the influx of customers and service providers onto digital platforms, TCE helps in explaining the transaction-enabling effects of digital platforms, and particularly the impact of digital platforms on the rate of new customer acquisition. According to TCE, firms' primary function is to reduce transaction costs, friction in the economy, such as the cost of finding providers, comparing them, negotiating the deal, and making and enforcing contracts (Coase, 1937; Williamson, 1975). For example, as digital platforms make market offerings more readily available and transparent, in the form of rating and reputation systems and transparent prices and promotion (e.g., Wood et al., 2019), they then minimize the need for customers to independently gather market information (Parker et al., 2016). Digital platforms, therefore, lower transaction costs (Belleflamme and Peitz, 2019). This has subsequently been argued to increase customers' experimentation and switching behaviour (Chen and Hitt, 2002). As a result, some researchers argue that the nature of customer loyalty has been changing in the digital age (Kannan and Li, 2017). Studies, for example, show that customers seek variety in sensory and functional attributes for both hedonic and utilitarian product categories (Baltas et al., 2017) and value the opportunity on digital platforms to have a more extensive selection from which to choose, rather than limited offerings (Mathmann et al., 2017).

As indirect network externalities explain the growth in the number of customers using a digital platform, and TCE explains the increased experimentation and switching behaviour of customers in the platform, service providers should benefit from a digital platform via a higher rate of new customer acquisition. The rate of new customer acquisition, furthermore, grows as digital platforms increase the market reach of service providers by providing a new marketing and sales channel, with a distinct new set of customers to transact with (e.g., Tavalaci and Cennamo, 2020). Once many service providers use the digital platform, the large number of service providers registered on the

platform can also act as a signalling mechanism to customers of the quality and size of the platform, convincing more new customers to join (Fang et al., 2015). This effect provides further support for the increased market reach, in terms of a higher rate of new customer acquisition, that may ensue (Kim and Lee, 2007).

Therefore, we hypothesize:

*Hypothesis 1:* Service providers participating in a platform-based online marketplace have a greater market reach, resulting in a higher rate of new customer acquisition than for those service providers not opting to participate in the marketplace.

## **Service Provider Financial Performance**

Our second hypothesis posits that service providers that participate in the platform-based online marketplace have lower sales than those service providers not opting to participate in the marketplace. We base our hypothesis on the literature on platform competition and crowding. Here, we argue that while service providers are drawn to the digital platform due to the increased market reach, enabled for example, by indirect network externalities, sales of service providers are, nevertheless, lower than they would likely be through their other marketing and sales channels. This is due to the commoditization invoked by the substantial competition and crowding in the platform-based online marketplace.

Digital platforms include both between-platform (e.g., Economides and Katsamakas, 2006; Ruutu et al., 2017) and within-platform competition (e.g., Boudreau, 2012; Tucker and Zhang, 2010), the latter subjecting service providers to competition between all of the service providers participating in the platform. Network externalities combined with low entry barriers attract more service providers to adopt the digital platform, which in turn has been identified to lead to greater variety in service provider quality and lower prices (e.g., Belleflamme and Peitz, 2019; Loebbecke and Picot, 2015). Research suggests that these lower prices are caused by competitive crowding. For example, Boudreau (2012) argues that competition on digital platforms may lead to competitive crowding, as the high within-platform competition may reduce service provider incentives to participate in the platform altogether. Similarly, Rietveld et al. (2020) show that as a digital platform becomes increasingly dominant, when more customers and service providers join the platform, the average demand for any individual service provider decreases, resulting in lower prices. Competitive crowding can thus result in service providers either abandoning the digital platform or not opting to participate in the platform in the first place, instead of their other, and likely more profitable, marketing and sales channels. Therefore, while the increased market reach resulting from network externalities and TCE enable service providers to reach more new customers, an overly large number of service providers can lower sales due to the resulting high within-platform competition between service providers for customers (Belleflamme and Peitz, 2019). For example, Graham (2017) concludes that there is an oversupply of service providers and intense competition for customers on many platforms. Similarly, Hoang et al. (2020) argue that a characteristic of a digital platform is an aggressive global market.

Platform competition and crowding can also result in the commoditization of service provider offerings. With commoditization, we refer to the standardization of goods and



services to the degree that they can be sold as a transaction rather than as a proprietary, customized offering, that is, for a lower price (Langley and Leyshon, 2017). On digital platforms, previously unique and varied offerings can now be easily transacted as a commodity. Commoditization thus effectively brings down the prices charged for goods and services in a digital platform, including for work and labour (e.g., Bergvall-Kåreborn and Howcroft, 2014). In addition to competition and crowding, commoditization is also driven by a combination of legal and contractual devices, such as rating and reputation systems, that stabilize customer expectations and control the platform's pricing processes (Langley and Leyshon, 2017). These mechanisms, however, also exert pressure on service providers in the form of discriminatory membership or access fees (Belleflamme and Peitz, 2019) and enable digital platforms to extract monopoly rents from service providers (Langley and Leyshon, 2017). Thus, commoditization may result in lower sales for service providers than they would be likely to attain through their other marketing and sales channels (Kenney and Zysman, 2018). As the literature on platform work suggests, in addition to the pay for service providers often being low, earnings are also more uncertain due to diminished job security and pay (e.g., Deng et al., 2016). Accordingly, Nemkova et al. (2019) argue that digital platforms erode both the monetary and non-monetary meaning of work for service providers due to low pay and an unbalanced power relationship between service providers and customers.

Due to platform competition and crowding, service providers participating in the platform-based online marketplace should have lower sales than those service providers not opting to participate in the marketplace. The more that service providers sell on the marketplace, the more their sales will suffer due to having sold more of the commoditized, cheaper marketplace transactions than others. This is consistent with the emerging criticism of digital platforms, particularly on their often detrimental effects on service providers financial performance (Wood et al., 2019). Here, the negative implications of the platform competition and crowding on service providers financial performance are only aggravated due to the downsides from acting as freelancers and entrepreneurs on the digital platform and being forced to circumvent regulatory oversight and worker protections (Ahsan, 2020). Some studies have gone as far as to proclaim digital platforms as 'nightmarish' symbols of neoliberal capitalism (Martin, 2016) or 'despotism on-demand' (Wood, 2020).

Therefore, we hypothesize:

*Hypothesis 2:* Despite the increased market reach, as evident in the higher rate of new customer acquisition, service providers participating in a platform-based online marketplace have lower sales than those service providers not opting to participate in the marketplace.

## **Complementary Service Use**

Our third hypothesis posits that for those service providers participating in the platform-based online marketplace the use of more of the complementary services offered by the digital platform can compensate for some of the negative implications of the platform on

financial performance. We base our hypothesis on the theory of complementary assets. Here, we argue that the adoption of the value-adding complementary services offered should increase the sales of those service providers using more of these services (e.g., Cusumano et al., 2019; Hein et al., 2019).

In addition to the platform-based online marketplace, whose implications for service providers market reach and financial performance we considered in our first and second hypotheses, digital platforms also consist of complementary services, developed and offered by the platform owner. The purpose of these services is to add value to customers and service providers (Cusumano et al., 2019). For example, Airbnb offers hosts free professional photography of properties to reduce market entry costs for the service provider and, on the other hand, increase reliability and trustworthiness towards the platform for the tenant (e.g., Hein et al., 2019). Likewise, Uber offers drivers a navigation app to reduce entry costs and increase efficiency. For example, Liu et al. (2018) show that Uber's navigation app significantly improves its drivers' efficiency compared to conventional taxi drivers. These examples of complementary services are in line with the theory of complementary assets, which states that complementary assets help commercialize and market technological innovations (Teece, 1986). Thus, the complementary assets are all the related assets needed to produce and deliver firms' offerings (Teece, 1998). In digital platforms, the innovation is now the distinct goods and services that the service providers sell in the platform. Furthermore, however, Teece (2018) points out that complementary assets are not only potential value-capture mechanisms in the digital economy but may be needed for the technology to function altogether. For example, application programming interfaces (APIs) are critical for service providers to connect to a digital platform (e.g., West, 2003).

Traditionally it has been assumed that by partnering with other industry players, firms can integrate specialized complementary assets of other firms into their processes to improve productivity (Niosi, 1993). These innovator-specific, 'specialized' complementary assets are generally constructed over time and are valuable and difficult to imitate (e.g., Teece et al., 1997). For example, according to Snow et al. (2017, p. 1–2), digital technologies now enable '*individuals, firms, cities, and governments to become smarter – to expand their capabilities and to adapt to new and changing conditions*'. Therefore, in the digital economy, complementary assets continue to be all-important (Teece, 2018).

As complementary assets are designed to add value to service providers and promote commercialization and marketing of their goods and services, for those service providers participating in the platform-based online marketplace, those service providers using more of the value-adding complementary services offered, designed, and developed by the platform owner should have higher sales than service providers using less of these services. Thus, complementary service use may effectively act as a moderator for the lower sales captured by service providers participating in the platform-based online marketplace. Platform owners aim to offer value-adding complementary services because, as Pon et al. (2014) argue, they act as efficient control and lock-in mechanisms. This is also consistent with Amit and Zott (2001), who conclude that the value-creating potential of online businesses is the ability to lock-in strategic partners by providing incentives to maintain and improve their association with the firm. Complementary services are,

therefore, critical to attain and sustain platform-service provider integration (Suarez and Cusumano, 2009).

Therefore, we hypothesize:

*Hypothesis 3:* For service providers participating in the platform-based online marketplace, those service providers using more of the complementary services offered by the digital platform have higher sales than others.

## METHODS

We studied a digital platform in the beauty industry, targeting hairdressers, make-up artists, and massage therapists. The platform was launched in 2014 in Northern Europe and has expanded since to a few Nordic countries. The platform consists of two elements: (1) a platform-based online marketplace; and (2) complementary services. By registering on the platform, service providers can choose whether they participate in the marketplace, or only use some of the complementary services offered.

The platform-based online marketplace is a digital channel for booking appointments with service providers. Here, after selecting the service (e.g., haircut, manicure), customers are shown a map of all the available service providers providing that service in their chosen city or region, along with their prices and average customer reviews, for different dates and times. This is identical to the user interface of common digital platforms like Airbnb. Customers can access the marketplace via a mobile app (Android and iOS) and an online web interface. Once booked, the appointment is charged on the customer's credit card and is non-refundable without a force majeure reason. Originally the platform-based online marketplace was intended to enable service providers to sell last-minute appointments, such as cancellations, which would otherwise be lost revenue but now is increasingly used as either a primary or secondary marketing and sales channel by service providers. Many service providers sell appointments on the marketplace with a discount ranging anywhere from 5 per cent to 30 per cent compared to appointments sold through their other marketing and sales channels. The list price of the appointments is shown in brackets next to the price of the appointment on the marketplace to communicate to customers that the marketplace appointments are, or at least claim to be, sold at a discount compared to other marketing and sales channels. The platform takes a 10 per cent transaction fee, that is, commission, from each appointment sold through the marketplace, which service providers can deduct from their annual taxation as a marketing expenditure. A 10 per cent transaction fee is similar to other digital platforms, where such fees can range from anywhere between approximately 3 per cent (Airbnb) to 25 per cent (Uber), with or without tax.

The platform also offers several complementary services, including a calendar application, customer relationship management (CRM) system, gift card certificate creator, homepage creator, integration application interface for third-party credit card payment systems, online booking system, point of sale (POS) system, and product inventory management (PIM) system. Even if service providers opt not to participate in the platform-based online marketplace, they can still sign-up to use any number of the platform's

complementary services at their leisure. The platform charges a nominal monthly fee for the complementary services ranging from €17 to €25 per month for an individual user.

### Sampling and Data

In our analysis, we focus on hairdressers in the platform's home market. We chose this group of users due to the large population and heterogeneity of hairdressers using the platform. Based on the relatively high standard deviations of the variables such as tenure in the business and service sales (see Table II in the 'Results' section), the digital platform has attracted a diverse population of hairdressers. Hairdressers were the first segment of service providers to adopt the platform, and this occupation is a very well established and institutionalized field of business in Northern Europe. From 225 hairdressers working in 117 salons in June 2015, the platform had grown to serve 3,605 hairdressers working in 1,134 salons by the end of September 2017. Also, by focusing on hairdressers alone, we could capture the impact of a digital platform on a service sector in which the demand is supposedly stable (the average time between a haircut is generally between 3 to 6 weeks). Thus, introducing a digital platform to this sector would intuitively result mainly in the redistribution of existing demand rather than creating a new market. We further limited our study to hairdressers who recorded sales to the platform using the POS system offered by the platform as a complementary service – the latter accounts for a total of 1,856 hairdressers. Limiting our analysis to only those hairdressers recording sales to the platform allowed us to study individual transactions both through the platform-based online marketplace and any other marketing and sales channel they may use. For example, we could calculate the total sales and the number of new and returning customers for all service providers.

Our data consists of the platform's full transaction data from Spring 2015 to Fall 2017, in addition to a survey of a subset of service providers using the platform in mid-2017. This transaction data includes gross sales for all registered service providers before deducting transaction fees or any other payments made to the platform owner. Following the Echambadi et al. (2006) recommendation, the transaction data are combined with survey data, that is, multiple levels of analysis, to generate an understanding of the '*holistic and interrelated nature of complex organizations*' (Rynes, 2005, p. 14). Survey data were collected between June and August 2017 with a questionnaire sent electronically (Qualtrics) and via mail (metered mail). The survey asked hairdressers questions about their business, career, and experiences with the platform. The survey was designed based on four semi-structured interviews with five hairdressers, conducted in Spring 2017, and numerous discussions with the platform owner. From the population of 1,856 hairdressers using the POS system and recording sales to the platform on May 1, 2017, a total of 143 answered the survey between June and August 2017, with no notable differences in quality in responses between those responding electronically or via mail.<sup>[3]</sup>

Respondents were asked, among other questions, to evaluate on a scale of 1 to 5 seven items about how the digital platform affected their overall performance. Out of all respondents, 63 per cent indicated that the digital platform helped them capture higher levels of performance, and 56 per cent indicated that their reputation in the beauty industry improved, at least somewhat. Furthermore, service providers participating in

the platform-based online marketplace evaluated their performance higher than those service providers not opting to participate in the marketplace (corr: 0.20,  $p$ : 0.017), indicating that the digital platform provides tangible benefits, particularly to those service providers participating in the marketplace. Our interviewees also suggested that the digital platform helps new entrants perform better than if they only relied on their other marketing and sales channels to reach customers. For example, the interviewees explained that previously it took years for hairdressers to build a customer base. Still, now, the marketplace enables new entrants to reach customers more quickly. This insight motivated us to include a relevant psychometric scale to the survey<sup>[4]</sup> to better understand those hairdressers' entrepreneurial features who are more likely to adopt digital services and, specifically, digital platforms. We found out that on the exploration-exploitation scale (Mom et al., 2009), higher exploration correlated with higher use of the complementary services (corr: 0.24,  $p$ : 0.004), suggesting that innovativeness is associated with adopting more of the complementary services offered by the digital platform.

Due to the non-stationary nature of the platform, in terms of user growth, in our analysis, we focused on a 5-month observation period around the survey, from May 1st to September 30th, 2017, with a fixed set of hairdressers at the beginning of the observation period.<sup>[5]</sup> This approach is essentially a time-series approach that enables us to study and disentangle short-run and long-run effects of platform usage in both stable and evolving conditions (Echambadi et al., 2006). Also, this approach allowed us to account for any monthly fluctuations in sales.

Table I presents an overview of transactions during the 5-month observation period for the population and the sample. Of all appointments registered to the POS system, 11 per cent (population) and 8 per cent (sample) were sold in the platform-based online marketplace. The median price of appointments sold in the marketplace were 9 per cent (population) and 11 per cent (sample) lower than those sold by service providers in their other marketing and sales channels. We also investigated a similar observation period (5 months before the observation period around the survey) to confirm the generalizability of the identified patterns and trends about population-level descriptive statistics, with virtually identical results.

### **Sample Representativeness**

Before we provide descriptions of our variables, we compare our sample ( $N = 143$ ) to the population ( $N = 1,856$ ), with the accumulated transaction data from the 5-month observation period. We compared the distribution of the dependent variables in the sample to the population using the Kolmogorov-Smirnov test and noted no difference. Then we investigated the variance of the dependent variables across cities with Stata's intraclass correlation analysis (ICC) function 'xtmixed' with maximum likelihood estimation. The population included service providers from 74 different cities, and the city explains some of the variations in sales, but not in the sample. However, the observations in the sample came from the 11 largest cities only, and between the same cities belonging to the population, the city does not explain the variation in sales. The results of the ICC analysis with the population show that in the smaller cities, sales and rate of new customer acquisition, out of the total share of all customers, are lower. It is important to note, however, that in

Table I. Overview of transactions during the 5-month observation period for the population and sample

	<i>Population (N = 1,856)</i>	<i>Sample (N = 143)</i>
Number of transactions sold by all registered service providers	435,867	48,379
Number of transactions sold in the platform-based online marketplace by marketplace participating service providers	27,311	3,215
Share of marketplace transactions out of the total number of transactions sold by all registered service providers	6.2%	6.7%
Number of service providers participating in the platform-based online marketplace	704 (37.9%)	78 (54.5%)
Share of marketplace appointments out of all appointments sold by service providers participating in the platform-based online marketplace	11.2%	8.4%
Number of transactions of service providers participating in the platform-based online marketplace versus service providers not participating in the marketplace (mean)	439 / 528	455 / 589
Revenue (€) per marketplace transaction versus revenue per transaction sold on other marketing and sales channels by registered service providers (median)	48.8 / 53.4	49.6 / 54.5

the smaller cities, there are usually only a few service providers using the platform compared to up to hundreds of registered service providers in the largest cities. Hence, the effect of the city on the results is, at best, minimal.

As shown in Figures 1 and 2, as the number of hairdressers recording sales to the POS system grew, the cumulative sales grew at a similar pace in the platform-based online marketplace and other marketing and sales channels. However, on 1 May 2017, when our observation period began, it is evident that as there were no new hairdressers in the data due to sampling, the accumulative sales growth stops showing that the observed sales growth is due to an increase in the number of customers and hairdressers, in line with the general understanding of digital platforms and indirect network externalities.

The smoothed line in Figure 3 illustrates the share of the marketplace appointments out of all appointments in the population (MEAN = 8 per cent, SD = 6 per cent). It is worth noting that the mean number of appointments were similar, except at the beginning when the data from the appointments booked through the other marketing and sales channels were not yet registering to the POS system, as this particular complementary service was only available soon after the launch of the platform. Overall, the day-level data shows (dots in Figure 3) a great deal of variation depending on the season and day of the week, indicating that hairdressers use the platform-based online marketplace to fill empty slots in their calendar, in other words, appointments that are not booked through their other marketing and sales channels. Figure 3 and statistics of the sample correspond with the population.



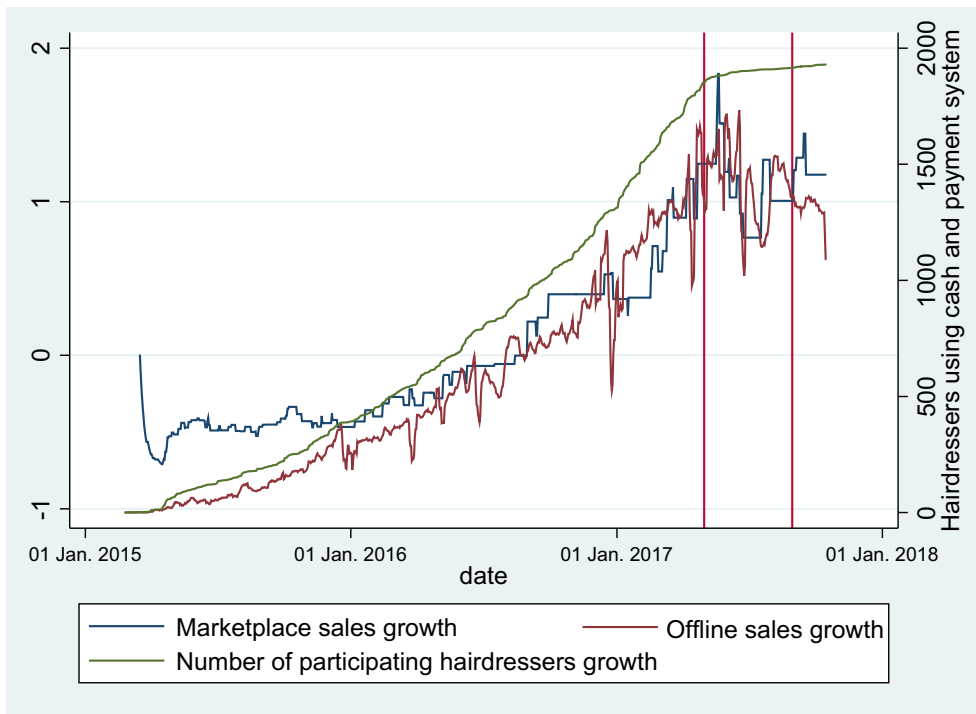


Figure 1. Descriptive statistics for the hairdresser population on the platform using the POS system ( $N = 1,856$ ), sales curves standardized to the mean

## Variables

*Dependent variables. Service sales.* We used the mean of daily service sales (gross sales) over the 5-month observation period (153 days). Service sales consisted of uniquely identified transactions and the sum of money charged per transaction in the POS system. The POS system records transactions made in the platform-based online marketplace and any other marketing and sales channels used by service providers. The mere number of transactions correlates with service sales (corr. 0.85,  $p$ : 0.000) and provided similar results. To capture financial performance, we decided to use service sales as a uniform variable to describe the average performance and to control for the variance of sales depending on the day. The measure for the *new customers* variable was the percentage of one-time customer appointments, out of the total number of customers from the same period, constructed using the calendar application data. In the calendar application, each customer was given a unique identifier. If the customer returned, the identifier was linked with the returning customer. In the case of booking from another marketing and sales channel than the marketplace, with the customer's name and/or email address.<sup>[6]</sup> In the sample, the mean number of unique customers during the observation period was 166 ( $SD = 78$ ), out of which 77 ( $SD = 55$ ) were one-time customers that did not return to the same service provider during the observation period.

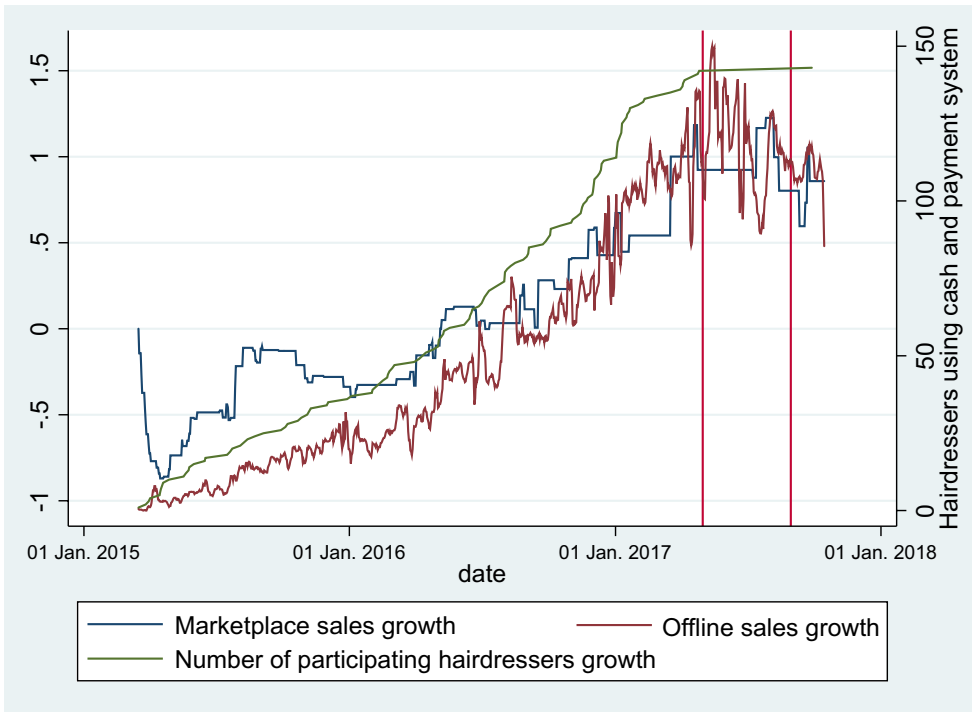


Figure 2. Descriptive statistics for the hairdresser sample on the platform using the POS system ( $N = 143$ ), sales curves standardized to the mean

*Independent variables. Complementary services.* We constructed a continuous measure for the use of complementary services by recording the number of complementary services used by respondents ( $\text{MIN} = 2$ ,  $\text{MAX} = 9$ ). The hairdressers used at least two complementary services: POS system and calendar application, totalling nine services, including the platform-based online marketplace. To capture the effect of the marketplace as a particular complementary service, we also treated it separately. We generated a dummy variable *Marketplace participant* to indicate if the hairdresser participated in the marketplace during the observation period. We further created a dummy variable labelled *Heavy marketplace participant* to capture the effect of the marketplace on the sales of those service providers selling appointments on the marketplace above the mean rate of 6.7 per cent of the total number of appointments sold. Ninety-two hairdressers out of the sample of 143 participate in the platform-based online marketplace, out of which 49 were coded as heavy marketplace participants.

*Control variables. Sales recorded to the platform.* Only sales made in the platform-based online marketplace were automatically registered to the POS system. Appointments sold through other channels were recorded manually by hairdressers either in the POS system or in some other legacy bookkeeping system the hairdresser may use. Sixty-five hairdressers out of the sample of 143 indicated using some other bookkeeping system that we did not have access to, so we asked them to evaluate the share of total sales recorded to the POS system offered by the digital platform to account for any sales recorded to a legacy

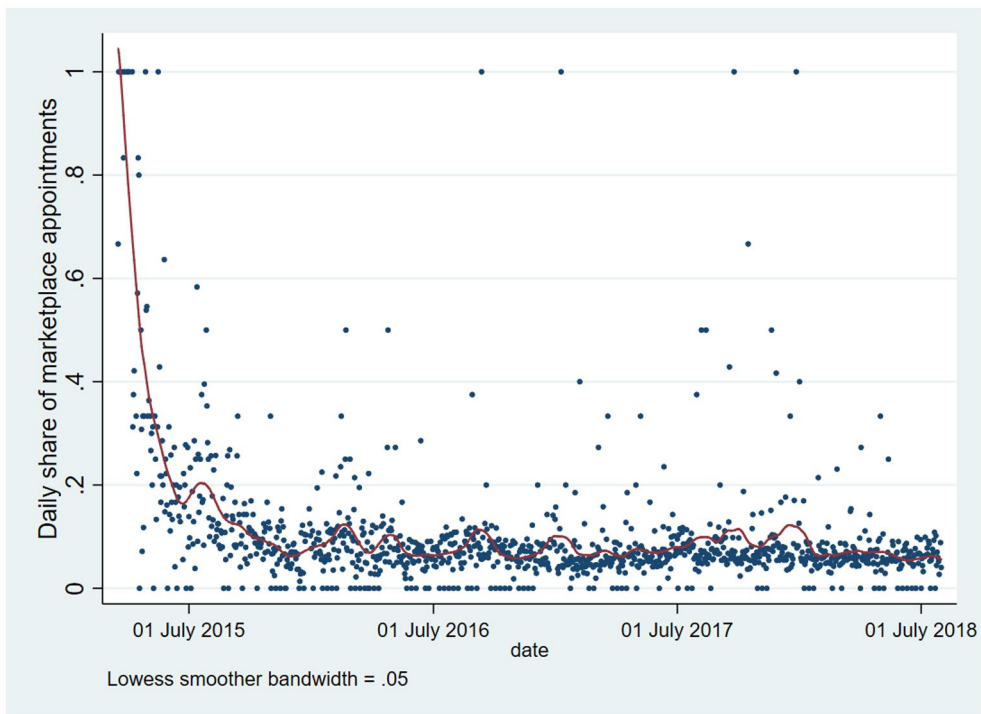


Figure 3. Daily share of marketplace appointments over time for the population (N = 1,856)

bookkeeping system.<sup>[7]</sup> By including this variable, we could determine if the sales figures were high only because the respondent used the POS system as a complementary service and control for its effect on our models.

*Tenure in the industry.* Our preliminary interviews confirmed that the beauty industry is handwork combined with social skills, where tenure significantly helps improve sales. Tenure potentially explains the number of loyal customers attained by a hairdresser, as according to our interviews, customers are generally loyal to their preferred hairdresser, at least in this specific market.

*Store owner.* A store (beauty salon) owner dummy variable was used to indicate whether the hairdresser is responsible for running a physical store or is just renting a chair at someone else's store. In Northern Europe, most hairdressers are registered as sole proprietors. This means that as an entrepreneur, they run a store or even multiple stores or operate as a tenant in a store owned by another hairdresser. Accordingly, none of the respondents declared working as a salaried employee.

## Statistical modelling

To test our hypotheses, we used linear regression analysis with OLS estimation, a modelling strategy generally considered suitable for the types of variables found in our data (e.g., Hekman et al., 2010). Also, visually examining the scatterplots of the association between the variables indicated a linear relationship between the two variables. The post

Table II. Bivariate correlations of the variables

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1. Marketplace participant	0.64	0.48	1									
2. Heavy marketplace participant	0.35	0.48	0.52**	1								
3. Complementary service use	5.49	1.51	0.30**	-0.07	1							
4. Service sales <sup>1</sup>	229.5	146	-0.26**	-0.57**	0.26**	1						
5. Rate of new customer acquisition	0.46	0.18	0.35**	0.65**	-0.09	-0.63**	1					
6. Sales recorded to the platform	70.5	36.4	-0.34**	-0.44**	0.17*	0.30**	-0.38**	1				
7. Tenure <sup>2</sup>	12.7	9.83	-0.21*	-0.28**	-0.16	0.31**	-0.39**	-0.03	1			
8. Store owner	0.66	0.48	-0.08	-0.18*	-0.26**	-0.02	-0.19*	-0.03	0.19*	1		
9. Self-evaluated performance	17	7.39	0.20*	0.17*	-0.03	-0.16	0.17*	-0.18*	-0.14	0.12	1	
10. Exploration	21.8	6.56	0.05	-0.12	0.24**	0.12	-0.09	0.01	-0.12	-0.15	0.08	1

<sup>1</sup>Daily means, in euros.  
<sup>2</sup>Years.  
\*p < 0.05; \*\*p < 0.01.

estimation of the models showed slight non-normality and heteroskedasticity of the residuals but still a linear relationship between the dependent and independent variables. To control for non-normality and heteroskedasticity, we used robust standard errors in the estimation of the models, which is a standard procedure used to overcome these issues (Antonakis and Dietz, 2011). The models examined the service provider-specific outcomes of the digital platform in terms of market reach (new customer acquisition) and financial performance (mean daily sales). The dependent variables were nearly normally distributed. To address endogeneity, we used the instrumental variables approach, as suggested by Basile (2008). This approach is widely recommended as a tool to address endogeneity in management research (Aguinis and Edwards, 2014).

## RESULTS

The mean daily sales over the 5-month observation period were €229.52 in the sample with a standard deviation of €146.00. For service providers participating in the platform-based online marketplace, the mean daily sales were €201.20 (SD = €140.71) and for service providers participating in the marketplace above the mean rate of 6.7 per cent of the total number of appointments sold €116.05 (SD = €108.57). The mean share of one-time customers out of all customers was 46 per cent (SD = 18 per cent), indicating that all the hairdressers had some customers visiting them more than once during the observation period. Service providers participating in the platform-based online marketplace had 50 per cent (SD = 17 per cent) and those participating in the marketplace above the mean rate 62 per cent (SD = 12 per cent) of their customers as one-time customers, respectively. The rate of new customer acquisition correlates negatively with sales, tenure, and store owner status, indicating that those hairdressers with a high turnover of customers were relatively new to the beauty industry, such as fresh graduates from a beauty school, corresponding with our general understanding of the beauty industry. Complementary service use correlates with both dependent variables, store owner status, and exploration. Platform-based online marketplace participation (i.e., marketplace participator status) correlates positively with the complementary service use, which is natural as the marketplace is counted as one of the complementary services that service providers can adopt. However, marketplace participator status correlates negatively with self-reported sales recorded to the platform indicating that each service provider did not manually record all of their sales from their other sales channels to the POS system, and thus were using some other POS system in addition to the one offered by the platform as a complementary service. Furthermore, marketplace participator status correlates positively with new customer acquisition and self-evaluated performance and negatively with sales, tenure, and store owner status. Moreover, heavy marketplace participator status correlates positively with marketplace participator status, as well as new customer acquisition and self-evaluated performance, and negatively with sales, sales recorded to the platform, tenure, and store owner status. Self-evaluated performance and exploration are used as instrumental variables for controlling endogeneity. Self-evaluated performance correlates positively with both marketplace and heavy marketplace participator status, new customer acquisition, and negatively with sales recorded to the platform.

Exploration correlates positively with complementary service use. Table II presents the bivariate correlations of the variables.

Hypothesis 1 about service providers participating in the platform-based online marketplace having greater market reach resulting in higher new customer acquisition than others, is confirmed in model 1 (Table III), where the marketplace participator dummy variable is positive and significant. Furthermore, for those service providers participating in the platform-based online marketplace above the mean rate, the effect is higher, indicating that the more service providers sell on the marketplace, the higher their rate of new customer acquisition. Model 1 suggests that the share of new customers out of all customers increases by 0.09 for service providers participating in the marketplace. This means that, on average, service providers gained 91 new customers during the observation period compared to the overall mean of 77 customers.<sup>[8]</sup> Model 2 further shows an increase of 0.18 for those service providers participating in the marketplace above the mean rate, indicating, on average, 106 new customers. Model 1 shows a markedly negative effect, as well as a reduced effect also for all other variables: new customer acquisition decreases for those who own a store and have higher tenure, record more sales to the POS system, and use more of the complementary services offered. This corresponds with our general understanding of the beauty industry, as hairdressers usually rely on loyal customers to generate sales; those hairdressers with many new customers are generally younger and do not yet own the stores where they work. Also, if the hairdresser is not very well established, they likely do not yet fully use all of the complementary services offered by the platform either, which explains the negative effect of complementary service use in this model. Furthermore, when examining the share of new customers for service providers participating in the platform-based online marketplace and those participating in the marketplace above the mean rate separately (Models 3 and 4), it is notable that additional complementary services are associated with a decrease of new customers along with store owner status, tenure, and sales recorded to the platform for service providers. For those service providers participating in the marketplace above the mean rate, only higher tenure remains a statistically significant negative predictor of new customer acquisition.

Hypothesis 2 about service providers participating in the platform-based online marketplace having lower sales than those service providers not opting to participate in the marketplace is confirmed with models 5 and 6 (Table IV). The marketplace participator dummy variable's effect is negative and significant, with the sales-dependent variable indicating €72.86 lower mean daily sales for service providers. For those service providers participating in the marketplace above the mean rate, the result is even stronger and significant, reporting €147.70 lower mean daily sales.

On further examination of model 5, the use of the complementary services offered by the digital platform is found to have a statistically significant effect on the sales of all service providers as this variable shows a €33.79 increase in mean daily sales per one additional complementary service used. The positive association between complementary services and sales is high, as mean daily sales more than double from the lowest to the highest rate of use. By further examining the positive association of complementary service use on service providers participating in the platform-based online marketplace and those service providers participating in the marketplace above the mean rate separately



Table III. Results of linear OLS regression models (OLS) for new customer acquisition, marketplace participants new customer acquisition, and heavy marketplace participants new customer acquisition (t-values in parenthesis) for hypothesis 1

<i>Performance</i>	<i>Model 1 (OLS): New customer acquisition</i>	<i>Model 2 (OLS): New customer acquisition</i>	<i>Model 3 (OLS): Marketplace participant new customer acquisition</i>	<i>Model 4 (OLS): Heavy marketplace participants' new customer acquisition</i>
Store owner	-0.06** (-2.59)	-0.03 (-1.31)	-0.11** (-3.06)	0.02 (0.68)
Tenure	-0.006** (-4.22)	-0.005** (-3.37)	-0.006** (-2.95)	-0.008** (-4.31)
Sales recorded to the platform	-0.001** (-3.36)	-0.001* (-2.31)	-0.001* (-2.36)	-0.001 (-1.83)
Complementary service use	-0.03** (-2.77)	-0.01 (-1.22)	-0.03** (-2.97)	-0.01 (-0.93)
Marketplace participant	0.09** (2.91)			
Heavy marketplace participant		0.18** (7.31)		
Constant	0.76** (10.79)	0.59** (8.35)	0.90** (11.91)	0.76** (11.71)
<i>F</i>	16.83	27.16	9.17	5.5
<i>R</i> <sup>2</sup>	0.37	0.49	0.34	0.26
<i>N</i>	143	143	92	49

\*p < 0.05; \*\*p < 0.01.

Table IV. Results of linear OLS regression models (OLS) and Fuller's modified LIML estimation (FULL) for sales, marketplace participants, and heavy marketplace participants (t-values in parenthesis) for hypothesis 2

<i>Performance</i>	<i>Model 5 (OLS): Sales</i>	<i>Model 5 (FULL): Sales</i>	<i>Model 6 (OLS): Sales</i>	<i>Model 6 (FULL): Sales</i>
Store owner	-1.28 (-0.05)	-0.48 (-0.02)	-28.80 (-1.26)	-31.12 (-1.39)
Tenure	4.74** (4.31)	4.55** (3.64)	3.41** (3.22)	3.23** (2.57)
Sales recorded to the platform	0.70 (1.84)	0.58 (1.20)	0.22 (0.80)	0.14 (0.38)
Complementary service use	33.79** (3.51)	36.29** (2.92)	21.75** (3.07)	21.38** (3.04)
Marketplace participant	-72.86** (-2.40)	-95.45 (-1.33)		
Heavy marketplace participant			-147.70** (-6.45)	-161.40** (-3.24)
Constant	-17.89 (-0.36)	-6.65 (-0.12)	121.40* (2.18)	137.80 (1.85)
<i>F</i>	14.88	14.16	23.94	19.97
<i>R</i> <sup>2</sup>	0.31	0.30	0.43	0.42
<i>N</i>	143	143	143	143

\* $p < 0.05$ ; \*\* $p < 0.01$ .

in models 7 and 8 (Table V), hypothesis 3, which states that for service providers participating in the platform-based online marketplace using more of the complementary services offered by the digital platform results in higher sales than others, is confirmed as one additional complementary service used by service providers increases mean daily sales by €36.26. For those service providers participating in the marketplace above the mean rate, the increase in mean daily sales is €28.07. Overall, our results show that the best performing hairdressers in our sample, in terms of sales, are those with higher tenure and who have adopted more of the complementary services offered.

The results of hypotheses 2 and 3 merits further examination to alleviate concerns over endogeneity. To assess endogeneity, we employed the instrumental variables approach (as suggested by Bascle, 2008). As instruments, we used two variables from the survey data not applied in the models, namely the aforementioned self-evaluation of performance and exploration-exploitation psychometric scale. We thus followed the roadmap presented by Bascle (2008) to assess for endogeneity in hypotheses 2 (Models 5 and 6) and 3 (Models 7 and 8). This roadmap involves first checking the relevance, that is, the strength of the selected instruments, and then checking for exogeneity as well as heteroscedasticity and serial correlation separately.

We began our assessment with the endogeneity checks for hypothesis 2 (Models 5 and 6). This hypothesis may pose an endogenous treatment effect as the service providers surveyed chose individually whether they participated in the platform-based

Table V. Results of linear OLS regression models (OLS) and Fuller’s modified LIML estimation (FULL) for marketplace participants and heavy marketplace participants (t-values in parenthesis) for hypothesis 3

<i>Performance</i>	<i>Model 7 (OLS): Marketplace participant sales</i>	<i>Model 7 (FULL): Marketplace participant sales</i>	<i>Model 8 (OLS): Heavy market- place participants’ sales</i>	<i>Model 8 (FULL): Heavy marketplace participants’ sales</i>
Store owner	11.78 (0.31)	30.05 (0.91)	−49.65 (−1.51)	−45.95* (−1.84)
Tenure	4.72** (2.74)	4.76** (2.81)	0.67 (0.37)	0.74 (0.41)
Sales recorded to the platform	0.51 (1.06)	0.27 (0.68)	−0.13 (−0.36)	−0.16 (−0.50)
Complementary service use	36.26** (2.62)	53.56** (4.12)	28.07** (2.75)	30.79** (13.96)
Constant	−101.90 (−1.31)	−199.40** (−2.42)	−8.08 (−0.13)	−23.82 (−0.73)
<i>F</i>	11.66	6.19	7.03	49.53
<i>R</i> <sup>2</sup>	0.25	0.23	0.29	0.29
<i>N</i>	92	92	49	49

\*p < 0.05; \*\*p < 0.01.

online marketplace or not. First, we determined that the selected instrument is relevant by checking the instrument's correlation with marketplace and heavy marketplace participator status. For both of these models, we had one instrumental variable, the self-evaluated performance, which correlates with both the marketplace (corr: 0.20,  $p$ : 0.018) and heavy marketplace participator status (corr: 0.17,  $p$ : 0.048) independent variables, but not the sales dependent variable (corr: -0.16,  $p$ : 0.059). The instrument relevance criteria are thus met. Second, we proceeded with the check for exogeneity. Since we only had one instrumental variable, following the Bascle (2008) roadmap, we proceeded by relying on our theoretical reasoning of the instrument's exogeneity. As this variable is simply a measure of how service providers self-evaluate that the digital platform has holistically affected their perceived performance, it has little, if any, bearing on their actual sales on the digital platform and how their sales compare with others, including service providers registered to the platform but not opting to participate in the platform-based online marketplace. Therefore, this variable has little relevance for service providers actual sales performance and the hypothesis that we seek to measure. Thus, we reason that self-evaluated performance meets the exogeneity condition. Third, we proceeded with the tests for heteroscedasticity and serial correlation. We used Fuller's modified LIML estimation (Fuller, 1977) that is robust to weak instruments with Stata 'ivreg2' option 'fuller(4)'. Due to heteroscedasticity, we also used the option 'r' for heteroscedasticity-robust standard errors, as suggested by Bascle (2008). In model 5 (FULL), the  $p$ -value for marketplace participator status becomes non-significant, but in model 6 (FULL) for heavy marketplace participants the  $p$ -value stays significant. This suggests that endogeneity is present in the association between sales and marketplace participator status but not in the association between sales and heavy marketplace participator status (see Table IV). Endogeneity is thus a limitation in the generalization and interpretation of our results from model 5 that we address in the limitations sub-section.

We then proceeded with the endogeneity checks for hypothesis 3 (Models 7 and 8). In this hypothesis, we may find an omitted variable bias since the mechanism of how the complementary services boost service provider performance is slightly ambiguous. For these models, we also had one instrumental variable, exploration, measured with the exploitation – exploration scale by Mom et al. (2009). First, we determined that the selected instrument is relevant by checking the instrument's correlation with complementary service use. We find that exploration correlated with the complementary service use (corr: 0.24,  $p$ : 0.004) independent variable, but not the sales dependent variable (corr: 0.12,  $p$ : 0.152). The instrument relevance criteria are thus met. Second, we proceeded with the check for exogeneity. Again, as we only had one instrumental variable, following the Bascle (2008) roadmap, we proceeded by relying on our theoretical reasoning of the instrument's exogeneity. As this variable measures a trait of an individual hairdresser and is not related to the digital platform (Mom et al., 2019), we reason that exploration meets the exogeneity condition. Third, we conducted the tests for heteroscedasticity and serial correlation. We again proceeded with Fuller's modified LIML estimation with robust standard errors (Fuller, 1977). As the  $p$ -value for complementary service use remains significant in models 7 (FULL) and 8 (FULL) (see Table V), we can conclude that endogeneity is not an issue in models 7 and 8.

## DISCUSSION

This study investigated the market reach and financial performance of service providers participating in a platform-based online marketplace in the beauty industry. We found that digital platforms can positively and negatively impact service provider market reach and financial performance. While benefiting from the digital platform through an increased market reach, evident through a higher rate of new customer acquisition compared to others, service providers participating in the platform-based online marketplace have lower sales than service providers not opting to participate in the marketplace. More specifically, service providers participating in the platform-based online marketplace have, on average, €72.86 lower mean daily sales in the sample, compared to others, the effect being even stronger for those service providers participating in the marketplace above the mean rate (€147.70). In our sample, sales of service providers participating in the platform-based online marketplace and those service providers participating in the marketplace above the mean rate are 12 per cent and 49 per cent lower than others, respectively. After controlling for store owner status, tenure, self-reported sales recorded to the platform and the number of complementary services used, service providers participating in the platform-based online marketplace have 32 per cent and those service providers participating in the marketplace above the mean rate 64 per cent lower sales than others. The use of the complementary services offered by the digital platform was found to compensate for some of these adverse effects of the marketplace on the financial performance of service providers participating in the platform-based online marketplace, as those service providers using more of the complementary services offered had higher sales. Service providers participating in the platform-based online marketplace and those service providers participating in the marketplace above the mean rate received a €33.79 (15 per cent) and €21.75 (9.5 per cent) increase in mean daily sales, on average, for one additional complementary service used, respectively. This finding holds for all service providers in our sample, regardless of whether they participated in the platform-based online marketplace or not.

Our findings have several important implications for both theory and practice. Here, the increase in market reach, in terms of the rate of new customer acquisition, is not able to compensate for the fact that each marketplace appointment sells for less than an appointment sold through their other marketing and sales channels. These pricing pressures are due to the platform competition and crowding that encourages service providers to sell marketplace appointments at a discount. Thus, by participating in the platform-based online marketplace, service providers are subject to heavy competition for customers between all service providers participating in the marketplace. Therefore, the digital platform may lead service providers into a vicious cycle of lower sales compared to others, as the need to rely on a platform-based online marketplace to reach customers may inherently come at the cost of sales, especially in the long-term. This is particularly relevant for new entrants who may have limited options but to accept the commoditization in a platform-based online marketplace, in terms of lower sales and average demand, in return for the market reach. In markets with a dominant platform and a 'winner takes all' situation, this is more likely to happen. Next, we describe the theoretical and managerial implications of our study in more detail, along with the limitations and suggested areas for future research.

### Implications for theory

First, for theory, we extend previous research on the platform economy by providing empirical evidence about the service provider-specific outcomes of digital platforms (e.g., Burtch et al., 2018; Cutolo and Kenney, 2020; Lehdonvirta et al., 2019; Zervas et al., 2017). While the identified effects of digital platforms on service provider market reach and financial performance are not necessarily individually unique or interesting in itself, but what is novel, however, is their joint and even coalesced paradoxical effect on service providers as determined by this study. In contrast to previous studies that proclaim that digital platforms are essentially driving service providers into a self-reinforcing cycle of lower sales and deteriorating work conditions (Langley and Leyshon, 2017; Wood et al., 2019), well-captured by the recent definition of service providers as ‘platform dependent entrepreneurs’ (Cutolo and Kenney, 2020), we present novel theory about the paradoxical nature of digital platforms. While we find evidence about some of the problems associated with platform-mediated work, such as the gap in sales between service providers and others, also proposed by some recent anecdotal studies on the platform economy (Kenney and Zysman, 2016; Langley and Leyshon, 2017), we, furthermore, simultaneously find evidence of the many positive features of digital platforms such as the increase in market reach for service providers participating in the platform-based online marketplace, in terms of a higher rate of new customer acquisition compared to others, and the compensatory effects of complementary service use on service provider sales. The ‘dark side’ of the paradox that service providers participating in the marketplace have lower sales than others is thus compensated by the compensatory effect of complementary service use on service provider sales, essentially a moderator for the lower sales of service providers identified in our study. Digital platforms are, thus, not all bad as the literature may often allude, but instead, they may provide service providers with many serendipitous outcomes. For example, platform dependence may be a small price to pay for the greater market reach, especially for new entrants and younger service providers. Firms participating or considering participating on digital platforms need to, however, understand their paradoxical nature to realize any of these benefits and avoid some of the common pitfalls of digital platforms.

This paradox is particularly important when considering the effects of the digital platform on new entrants and incumbents separately. The platform-based online marketplace may seem appealing for new entrants due to the promised market reach, in terms of new customer acquisition, unlikely to be gained through their other marketing and sales channels, at least, as fast. This market reach, however, comes at the cost of sales for new entrants, as a larger share of the appointments is then sold as lower-priced marketplace appointments, in addition to subjecting service providers to pay a transaction fee for each marketplace appointment sold and any other terms and conditions set by the platform owner. In the long-term, this may lead to a significant gap in sales emerging between new entrants and incumbents, who, in contrast, are not subject to any of the negative features of the digital platform. It is also important to note that incumbents, including those service providers with already an established customer base, are in a better position to cherry-pick those complementary services they expect will add the most value to their business. However, the use of complementary services also needs to be critically



examined and understood in light of the platform owner's goal to lock-in service providers with complementary assets, that is, the complementary services offered. While we found a positive effect of complementary service use on the sales of all service providers, this higher integration with the platform may in the long-term pose a risk of its own, as evident through some of the recent critical research on platform owner-service provider tensions (e.g., Wen and Zhu, 2019; Zhu and Liu, 2018). These findings thus contribute significantly to current research on the platform economy, which has, so far, almost exclusively, focused on understanding the implications of digital platform use on the platforms demand-side, that is, its customers, rather than from a supply-side perspective, with a focus on the service provider-specific outcomes of digital platforms (e.g., Burtch et al., 2018; Cutolo and Kenney, 2020; Rietveld et al., 2020).

Second, our findings add to the growing research on the impact of digitalization and digital business models on industry dynamics and structures (e.g., Cozzolino et al., 2018) and contribute to the ongoing debate about firm strategies in the digital age (e.g., Davis, 2016). As firms increasingly transition from traditional marketing and sales channels towards open digital ecosystems and markets (e.g., Jacobides et al., 2018), they need to simultaneously be able to critically evaluate their firm-level boundaries and resources in light of these changes (Josefy et al., 2015), and find ways to optimally position their products and services compared to rival providers (Barlow et al., 2019). As new digital technologies and channels are rapidly emerging (Verhoef and Bijmolt, 2019), small businesses, in particular, may struggle to find the time and resources to devise a long-term strategy aimed at engaging with these channels, in addition to often not having the ability to experiment with different business models and channels before their implementation (Bouwman et al., 2019). The perceived short-term gains may, therefore, outweigh the long-term potential strategic risks.

Today, these risks are ever-more relevant as the COVID-19 pandemic has led to many small businesses developing differentiated online marketing and sales channels or entering existing platforms at a fast pace and with limited resources to meet the growing demand for digital offerings. Consequently, while many small businesses have suffered immensely and failed to make a profitable digital leap under these circumstances, many digital platforms like Amazon have emerged from the pandemic stronger and with an upsurge in sales. These issues are increasingly sounding alarms about the monopolistic rule of digital platforms in the service sector. In the future, small businesses, in particular, may thus be unable to choose whether and how they engage with digital platforms, as they must likely accept the given terms and conditions from these monopolistic players to have any chance of survival in the ever-crowded marketplace. Therefore, it is vital that scholars continue to understand the sector-level implications and firm-level strategic consequences of engaging with new digital technologies and business models, such as digital platforms and platform-based online marketplaces, both now and in the long-term.

Taken together, our findings shed light on the 'dark side' of digital platforms, as portrayed in several recent critical examinations of the platform economy (e.g., Langley and Leyshon, 2017). Our results indicate that in the service sector, digital platforms, as a business model, show features of hybrid governance (e.g., Makadok and Coff, 2009), thus bringing together good and bad characteristics of both markets and hierarchies. In terms of markets, the use of the digital platform not only provides service providers access to

an open marketplace with an existing demand side but also subjects service providers to high within-platform competition, encouraging price competition and accelerating commoditization. This is evident through the lower sales for service providers participating in the platform-based online marketplace compared to service providers not opting to participate in the marketplace in our results. In terms of hierarchies, by designing and offering specialized complementary assets through the offered complementary services, the platform owner vertically integrates service providers' operative demand-supply chain, resulting in efficiency gains, however, at the expense of autonomy. The less autonomy that service providers have, the greater the leverage the platform owner has in exploiting service providers over the long-term by, for example, raising prices, changing terms and conditions, and entering the most successful markets previously vacated by successful service providers themselves. The digital platform, therefore, may present many potential pitfalls for service providers along with its evident positive sides.

### **Implications for Managers**

Our findings have several managerial implications. As our results show that digital platforms have both positive and negative consequences on service provider market reach and financial performance, service providers should carefully weigh their options for engaging with such channels. First, for service providers, our findings point to the need to identify both the short- and long-term business implications of engaging with digital platforms. Service providers face a significant trade-off regarding platform use: whether to fully or partially replace existing marketing and sales channels with the platform-based online marketplace, and adopt the offered complementary services, or only rely on their differentiated marketing and sales channels. If choosing to engage with the marketplace, service providers may need to select between differentiation and cost leadership, and either target their service offering to a niche segment of the market, not under the direct threat of commoditization or otherwise, optimize their business activities to navigate the commoditized marketplace. These decisions are essential as increased reliance on the platform reduces service provider independence and autonomy and subjects them to platform competition and crowding, and potential exploitation by the platform owner. For example, with the vertical integration through the use of the offered complementary services, service providers are more tightly coupled, that is, 'locked-in', with the platform, enabling the platform to have more data on service providers sales performance. This data are prone to be used by the platform owner to exploit service providers (Zhu and Liu, 2018). For example, the European Commission recently reached a preliminary view that Amazon has breached EU antitrust rules by distorting competition in online retail markets (European Commission, 2020), while the United States Department of Justice is continuing its investigation of the practices of market-leading online platforms, for example, regarding competition and innovation (Department of Justice, 2019). However, it is improbable that these investigations will have any profound impact on how these digital platforms and marketplaces operate.

In general, service providers in the market should consider, based on an evaluation of their existing marketing mix, not only the possible number of customers reached via the digital platform but also the potential long-term strategic opportunities and risks of

digital platforms and platform-based online marketplaces. In the long-term, it is likely worthwhile for service providers to develop differentiated marketing and sales channels to avoid lock-in with a specific platform. Negative consequences of digital platforms can, for example, be avoided by multihoming on several platforms and using other differentiated marketing and sales channels as well (e.g., Cennamo et al., 2018). Service providers should also seek to convert marketplace customers to book follow-up appointments through their differentiated marketing and sales channels. However, this strategy can be complicated, as the transaction-enabling effects of the digital platform may encourage customers to keep coming back to the platform in search of better deals and promotions. Also, the full use of the complementary services offered by the digital platform may be a great strategy and help mitigate the negative implications of the platform-based online marketplace on service providers sales. For example, suppose those service providers using more of the complementary services outperform others, as our results suggest. In that case, they are likely to continue (and even increase) the rate at which they outperform competing service providers over time. A word of caution to this logic is that it may not be in the platform owner's interest to allow any of the service providers to outperform others, especially in the long-term (e.g., Zhu and Liu, 2018).

In the short-term, however, tight coupling with the platform may be beneficial. While our results especially highlight the pitfalls of digital platform participation for those service providers more dependent on the platform (i.e., heavy marketplace participator status), for others, the results are not as conclusive. For example, the increased market reach, in terms of a higher rate of new customer acquisition, may be extremely beneficial for a subset of service providers, such as new entrants, despite the potential trade-off in sales. At the same time, it is important to note that in some cases, service providers may have little choice but to engage with the digital platform in the short-term. Especially if a dominant platform has emerged in a given sector, businesses, particularly small businesses, may have no choice but to accept the terms and conditions imposed by digital platforms to avoid losing access to the market altogether (e.g., Eisenmann et al., 2011). This access to the market, for example, largely explains why many restaurants have recently enrolled in the major food delivery platforms (e.g., DoorDash, Uber Eats) despite their strict terms and conditions and often high transaction fees. The platform may, therefore, be a good servant but a bad master.

Second, for the platform owner, our implications are twofold. Most importantly, the notion that the complementary services increase service providers sales should be considered a proxy of the platform's success in designing complementary services that act as specialized complementary assets (Teece et al., 1997), thus truly improving service providers' operational efficiency. Following this logic, those service providers using more of the offered complementary services should reap some of the monopoly-like returns of the winning platform if the platform becomes dominant. Therefore, the platform owners should use the adoption rate of the complementary services as a key performance indicator of the platform's success. For example, of the top 10,000 service providers on Amazon.com, 79 per cent use FBA (Marketplace Pulse, 2020), one potential explanation for the recent success and growth of Amazon's eCommerce business. Finally, as platform business models become commonplace in many sectors of the economy, digital platforms may have to compete for the best service providers. As complementary services lock-in

service providers to the platform, these services should be designed to attract and serve the service providers in compensating for the possible losses in sales from participating in the platform-based online marketplace. Understanding each of these implications is essential to reduce the risk of losing service providers to other platforms, a rate which, on platforms like Uber, can be up to 13 per cent monthly (CBS Insights, 2019).

### **Limitations and Avenues for Future Research**

Despite its many contributions, our study has some limitations that provide avenues for future research. First, as digital platforms along with any other digital tools and technologies are more likely to be adopted by those service providers looking for an increase in their market reach and financial performance, in addition to enabling its users to self-select the level with which they engage with the platform, some portion of the effects in our models may be explained by endogeneity. While our results show that endogeneity is not an issue in model 6 in the association between sales and heavy marketplace participator status (Hypothesis 2) and models 7 and 8 in the association between sales and complementary service use (Hypothesis 3), in model 5 we, nevertheless, find endogeneity present in the association between lower sales and marketplace participator status (Hypothesis 2). This result, however, speaks for the general nature and characteristics of digital platforms. Digital platforms, including the one that we study, are more likely to be adopted by new entrants and those service providers most in need of the market reach that the platform promises, thus meaning that a part of the results can be explained by this self-selection and may affect the generalizability of our results from model 5. Nevertheless, as we show that the association between sales and heavy marketplace participator status was negative and significant and that the result does not suffer from endogeneity, it is evident that the digital platform has a profound impact on service provider sales, particularly for those service providers more dependent on the platform. Thus, we are nonetheless able to validate our results for hypothesis 2. Moreover, the disparity between the endogeneity checks for models 5 and 6 only speaks further about the paradoxical nature of digital platforms and supports our main contributions. Future research should, however, seek to investigate the boundary conditions of this paradox more conclusively. Thus, while we controlled for endogeneity with the instrumental variables approach and followed the Bascle (2008) roadmap, we cannot entirely rule out the effect of endogeneity on our results for hypothesis 2. Hence, we include it as a limitation and an avenue for future research.

Future research could build upon the approach used in this study by, for example, using additional instruments to fully evaluate the strength and exogeneity of the instruments used (Bascle, 2008). This approach is important as although the instrumental variables approach is recognized as a viable solution to the endogeneity problem (Aguinis and Edwards, 2014), the effectiveness of this approach is, nonetheless, dependent on whether the instrumental variables satisfy relatively stringent conditions (Bollen, 2012). Also, future research could more carefully examine the impact of the time spent by service providers participating in the marketplace on sales. This research could confirm and further examine our finding in which those service providers more dependent on the platform are worse off than others. Another way to counterbalance the issue would be to

more extensively compare sales through the platform-based online marketplace and any other marketing and sales channels possibly used by service providers. As our study shows that service providers had lower sales per appointment than service providers not opting to participate in the marketplace also through their other marketing and sales channels, it would be interesting to understand whether and how the use of the digital platform affects and even cannibalizes transactions on the other marketing and sales channels used by service providers. Research on these fronts will help advance research on the service provider-specific outcomes of digital platforms and expand contextual insight into the platform economy.

Second, high-performing service providers that are more tightly coupled with the platform may be more inclined to complete a survey questionnaire on platform use than those providers not using or benefiting from the platform as much. Through the transaction data of the population, we were able to rule out this issue by comparing the dependent variables of our sample with those of the population and notice the similarities between the sample and the population. Also, since the mean complementary service use (5.5 out of 9) was relatively low, the distribution was not positively skewed towards those service providers more tightly coupled with the platform and, as such, we did not find any indication that our sample might be biased towards high users of the platform and the platform's complementary services compared to low users.<sup>[9]</sup> We also used the self-reported data to model hypothesis 3 operationalized with the construct of complementary assets together with the dependent variables constructed from the transaction data, thus avoiding common method variance. This operationalization, as the number of complementary services used by service providers, provided a uniform measure across the sample.

Third, we only studied one digital platform, limiting the generalizability of our results. To alleviate these concerns, we selected a digital platform that can be considered a model case of a digital platform and platform-based online marketplace that lets its service providers voluntarily participate in a platform-based online marketplace to reach both new and existing customers, in addition to providing a host of value-adding complementary services that service providers can adopt, or abandon, at any time. The platform's user interface, along with its earnings model, is also identical to that of other common digital platforms in different sectors and industries. Digital platforms, however, are increasingly expanding across the economy and facilitating the intermediation of a multitude of service transactions. More research is needed to investigate the consequences of the platform economy concerning different types of digital platforms and the different kinds of goods and services intermediated by them, to understand how platform design influences the market reach and financial performance captured by service providers participating in a platform-based online marketplace. For example, future research may look at supply-side characteristics and their effects on service provider sales, as those service providers geared to offering a more-niche service portfolio in the first place may be better protected from commoditization compared to those service providers with a limited and easily replicable offering. This research can also adopt richer operationalizations of market reach and financial performance that will hopefully enable scholars to uncover the true profitability of different channel choices and the performance effects that ensue and over different periods of time. While we focus on sales to measure financial

performance in our study, this may not entirely capture the true profitability of other channel choices faced by firms in the digital economy since lower sales may be in many cases better than none, especially if they cover service providers fixed costs from digital platform participation.

Fourth, our quantitative research design sets the scene for future studies with in-depth qualitative research and other quantitative data sets than those employed in this study. Our findings support the general idea of a positive reinforcement mechanism related to the adoption of complementary services and thereby raise the question of the optimum level of integration with a digital platform to increase sales. This research question is highly context-specific. Digital platforms as enablers of forms of governance (e.g., Makadok and Coff, 2009) is another research avenue that would merit further research. As one of our findings is that digital platforms represent qualities of both markets and hierarchies, further studies are needed to extensively study whether digital platforms are somewhere on the continuum between markets and hierarchies or whether they are 'true hybrids,' governance forms in which some dimensions of authority, ownership, and incentives are market-like, and other aspects are more hierarchy-like.

In conclusion, the ever-expanding platform economy provides a fruitful research area to increase understanding of both service provider and customer behaviour. Digital platforms continuously accumulate rich transaction data that can be used in testing and updating management, strategy, and economic theories. This is a vibrant area of study that can advance theory in management research on digital technologies and digitalization and provide managerially relevant knowledge regarding firm strategies in the digital age.

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## NOTES

- [1] By service provider, we refer to the individual firms or entrepreneurs registered on the digital platform (in our case the beauty salons that use the platform to reach customers and sell haircuts). This definition is identical to the term 'provider' applied by scholars, such as Parker et al. (2016), in similar settings.
- [2] By complementary services, we refer to the additional services offered by digital platforms, as per Cusumano et al. (2019). The purpose of these complementary services, for example, Fulfillment by Amazon (FBA), is to create additional value to platform users. Complementary services can be offered for free or charged separately.
- [3] We also sent the survey to those 829 not using the POS system and received 104 responses, but these answers were not used in the models due to a missing dependent variable.
- [4] In the survey, we employed the exploration-exploitation scale (Mom et al., 2009). While the scale is not part of our models, we use it as an instrumental variable to assess endogeneity.
- [5] The 5-month observation period was chosen to cover 1 month before and after the survey data were gathered to provide a strong representation of the respondents' performance during the time of answering the survey. This period was long enough (153 days) to control any fluctuation in the seasonal demand for beauty services or hairdresser-specific reasons for variations in sales, such as short-term illnesses and vacation periods. We ran the models in Table II also with dependent variables generated monthly and bi-monthly during the observation period and found consistent effects.



- [6] Sales from the other marketing and sales channels used by service providers were not always linked with the unique customer identifier, for example, due to incorrect data entry. Therefore, the rate of new customer acquisition in the other marketing and sales channels used by service providers may be slightly inflated in the data. The marketplace app, nevertheless, automatically linked each unique customer.
- [7] Platform-based online marketplace appointments are always recorded in the POS system offered by the platform. The use of this system is, however, optional for appointments sold on other marketing and sales channels. Therefore, to control for whether hairdressers use a legacy bookkeeping system to record bookings sold through their other marketing and sales channels, the survey asked respondents to estimate the share of sales recorded to the POS system offered by the platform. Sixty-five hairdressers reported using a legacy bookkeeping system in addition to the one offered by the platform in the survey.
- [8] The number of customers was calculated by adding the coefficient for service provider to the mean share of new customers and multiplying that with the mean number of unique customers. An identical approach was followed to calculate the number of customers for heavy marketplace participants.
- [9] The information on how many complementary services the service providers used, tenure, and store owner status were not available through the transaction data; hence the survey was sent to all service providers using the platform at the time (i.e., May 2017) to capture these details.

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