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What Influences Choice of Business-to-Business Connectivity Platforms?

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ABSTRACT: Business-to-Business platforms provide connectivity and data exchange services and compete in several dedicated services, such as electronic invoicing (e-invoicing). Thus far, little research has examined the factors that influence firms' choice among competing platforms: Which platform features matter, and in what proportion in the decision maker's choice? To address this gap, we conduct an empirical study and triangulate with past theoretical explanations that have sought to account for the firm's choice. Based on the analysis, we formulate a platform selection model that includes nine features: (1) reach, (2) total cost, (3) usability, (4) ease of system integration, (5) implementation capability, (6) platform support for service improvement, (7) service customization, (8) platform reputation, and (9) long-term sustainability. We apply conjoint analysis using firms' selection data, collected from 282 firms that have recently made a purchase decision among e-invoicing platforms. All features except the vendor's implementation capability are found to significantly influence the platform choice. Two features–usability and reach–dominate the choice and account for nearly 50 percent of the likely outcome. We use cluster analysis to examine the effect of firm size on firms' preferences in platform features. As hypothesized, larger companies prefer interoperability, scale, and network effects, while smaller companies value local use efficiency and ease of use because they are more concerned with usability and cost. Our theoretical and managerial claims concerning platform choice highlight the difficulty of bootstrapping, the role of pricing and cost, the minor importance of implementation-related features, and the impact of longevity during platform contracting.

KEY WORDS AND PHRASES: B2B platforms, electronic invoicing, connectivity platform, choice problem, platform features, conjoint analysis.

Introduction

Today, businesses increasingly mediate their interactions using platforms that link trading partners through sets of central interactions [48]. In addition, business value increasingly is generated through platforms, in that today's fastest growing and most highly valued companies include platform companies like Airbnb and Uber. The often-disruptive business models underlying platforms and their exponential growth—and originating from multisided network effects—have attracted significant interest among researchers and practitioners alike. A considerable body of recent research and practitioner literature has sought to identify successful entry and

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marketing strategies that attract users on the same or different sides of the platform, thus fueling positive same-side or cross-side network effects. These strategies include seeding [48], staged [24], marquee users [48], platform envelopment [16], and product giveaways [47]. Meanwhile, the customer side in platforms remains largely an uncharted territory by researchers: We know little about how platform customers select among competing platforms and what factors influence this choice.

In this paper, we address this "reverse side" selection question in the context of Business-to-Business (B2B) connectivity platforms. Such platforms connect trading partners by mediating pivotal business transactions, such as ordering or invoicing. We ask our research question: What influences a company to select among competing B2B connectivity platforms? The probe is motivated by the significant growth in connectivity platform markets mediating distinct interactions, such as e-invoicing between trading partners. Many of these platforms now also compete in several national markets [34].[1] In this setting, understanding which features companies value in selecting among platforms is important. Beyond the platforms' core functions mediating trading interactions, the platforms vary significantly in their related service offerings: Some platforms are more open and interoperable, while others are less so, thereby influencing the rate and scope of network effects [43]. Some platforms compete with lower price or are easier to use and to integrate with the firm's trading processes. Each of these features is likely to enter into the choice calculus. To identify what platform features that firms value most highly and in which proportions while making their choice, we formulate a platform choice model. The model builds on a systematic literature review and field study and is informed by several theoretical explanations that characterize the possible logic directing the firm's choice, including network effects [28], pricing models [56], usability [44], service-dominant logic [67], transaction costs [71], and adverse selection risk [2]. We estimate the choice model using a choice-based conjoint analysis of survey data collected from 282 companies that have recently adopted an e-invoicing platform. These platforms exchange structured invoice data expressed in a standard XML (eXtensible Mark-up Language[2]) format between trading partners to enable automatic and/or digitally enabled payment and accounting processes. These services are symmetrical in that trading partners exchange invoice data typically under a many-to-many topology—that is, they both send and receive invoices through the same platform so that the services are prone to strong network effects.

The remainder of the paper is organized as follows. First, we review and synthesize research on connectivity platforms and note the lack of studies on platform choice. Second, we develop propositions concerning factors that influence the platform choice. Third, we report on an empirical study that operationalizes platform features influencing the choice calculus; to do so, we use expert and user interviews and theoretical triangulation with past vendor choice literature. We then carry out an empirical study among current e-invoicing users to validate the proposed choice model and estimate the effect of different factors in influencing the choice. Fourth, we conclude

by discussing the generalizability of the findings to other connectivity platforms and suggest avenues for future platform research.

Connectivity Platforms and Their Growth

We define a platform as "a business … enabling value-creating interactions between external producers and consumers. The platform provides an open, participative infrastructure for these interactions and sets governance conditions for them" [47, p. 5]. Structurally, a platform comprises user sides (two or more), infrastructure components (e.g., hardware, software, and services), and governance rules (e.g., IP, standards, protocols, policies, and contracts). The platform provider orchestrates an interface among various user groups that permits enabled interactions. A platform owner owns the IP and architectural knowledge, such as platform standards, protocols, and brand value.[3]

At the core of platform-enabled interactions lies a value unit that can take many forms, such as product/service listings in a marketplace, video streaming, and user profiles on social media [48]. The filter is an algorithmic, software-based tool that enables the exchange of the appropriate value units between users [48]. In this paper, we focus on specific value units exchanged between trading partners, so that the filter in this case operates on data (exchange messages) and on related interaction protocols.

Compared to the traditional, linear, value-chain-based "pipeline businesses" [48], platforms are subject to different economic principles. Platforms typically create value by enabling interactions between two or more sides of the platform in ways that are more effective or efficient (e.g., improving convenience, range, speed, and cost) than conducting the interactions bilaterally in the absence of platform-based mediation. As a result, in both two-sided and many-sided markets, the value creation and appropriation logics differ from the traditional pipeline businesses because the revenues and costs accrue on both sides of the platform [15]. Value is located on both of these sides, which in turn leads to the accentuation of network effects. Same-side and cross-side network effects [4, 30] form the necessary ingredients for making platforms work for all involved parties. Typically, when cross-side network effects are strong and the demand for variety in value unit features is low, customers affiliate with only one platform (mono-homing), in contrast to being connected to multiple platforms (multi-homing) [56, 60]. Hence, it is important not only to study whether the parties decide to use a platform at all but also to analyze what criteria influence the choice between competing platforms under conditions of mono-homing.

Thus far, researchers have spent considerable effort seeking to understand conditions that promote platform growth and that generate network effects. The seeding strategy [48] and staged strategy [24] are intended to create value units that are immediately relevant to at least one side of the platform. When these users are attracted to the platform, users on the other side follow. Other strategies focus on subsidizing and product giveaways [15, 47], which give financial incentives to one side of the platform that, in turn, attracts users on the other side. The marquee strategy focuses on key users

on either side. The participation of these users is deemed so important that their participation can make or break the platform growth [48]. Yet another strategy is platform envelopment [16], by which an orchestrator in one market enters into other markets by combining the functionality of the original platform with that of the target platform and thus creates a multi-platform hybrid that leverages the shared user bases and their relationships.

Several platform typologies have been put forth based on the nature and content of the interactions. Evans and Schmalensee [16] suggested a typology of four classes of platforms: (1) exchanges, (2) advertiser-supported media, (3) software platforms, and (4) transaction devices or connectivity platforms. Transaction devices or connectivity platforms enable the flow of transaction-related documents, such as payments, invoices, or other order fulfillment-related documents between different trading partners or their agents (e.g., logistics companies) or regulators (e.g., taxation or customs agencies). B2B connectivity platforms typically allow trading partners to exchange data electronically and generate value from such interactions for the parties involved. In the following, we focus on connectivity platforms that enable transaction processing between trading partners (i.e., B2B transaction devices), focusing in particular on e-invoicing platforms.

E-invoicing Connectivity Platforms

The recent diffusion of open networking and data standards, such as XML, has promoted the growth of connectivity platforms in multiple industries. Because of the symmetrical nature of the interactions, most of the platforms connect many companies to many companies [74]. These platforms rely on common data standards for exchanging transaction data and on the Internet stack in creating connectivity services [74]. They allow companies to make, fulfill, and enforce trading-related contracts—potentially with multiple platform providers. The platforms also offer value-added services using filters [48], including format conversion and directory and search services. An important subset of such connectivity platforms is e-invoicing (see [34], Appendix A and http://www.eespa.eu). Here, the platform's value unit [48] is the invoice data being exchanged between the trading partners, while the filters offer conversion or search services. These platforms speed up and automate invoicing, reduce related errors, provide a better overview of a firm's cash flow, and reduce carbon footprint of invoicing [64]. Additional benefits accrue from the possibilities of event-based processing and fraud detection [51]. For platform providers, these services generate a fee-based revenue stream from both trading partners and opportunities for charging for additional value-added services [51].

We chose e-invoicing platforms as our study subject for several reasons. First, the e-invoicing market is now crowded with many platforms that provide varied offerings, and no dominant player has emerged. For example, in Finland, companies currently can choose from among 24 e-invoicing platforms [66]. Studying the choice problem in settings where only one platform provider dominates is impossible. Second, volumes of invoice transactions

are significant and therefore are subject to scale and scope effects. Approximately 35 billion invoices are sent annually in Europe alone [34]. The huge volume also increases the importance of the decision to choose the platform. Third, the use of e-invoicing platforms offers immediate benefits to users that originate from the structured nature of the data exchange. These benefits include cost savings, reduced cycle times, and fewer errors [21, 34, 49]. Not surprisingly, e-invoicing now is viewed as a crucial driver for Pan-European productivity growth [26, 58]. Because of its strong institutional backing, e-invoicing has gained ground rapidly based on the number of countries adopting e-invoicing and the volume of transactions [34].

E-invoicing platforms initially face the classic challenge of creating incentives so that both trading partners use the platform: A seller needs to have a buyer to whom it can electronically send a structured invoice through the platform. Simply, the trading network needs to reach a "critical mass" to be useful. To accomplish this growth, well-established e-invoicing platforms have followed the marquee strategy [48] and first have sought to attract large companies onto the platform and then approached their suppliers. In contrast, smaller, niche e-invoicing platforms have deployed the product giveaway strategy [47]. They let their customers use the platform's services for free and charge for additional features, thus relying on a freemium model. However, all factors influencing the demand side behaviors around these platforms remain uncharted: We know little about how the firms make choices when selecting a specific platform and what enters into their choice calculus.[4] Thus far, some studies have examined how companies sequence their trading partner recruitment in bilateral one-to-many or many-to-one configurations [3, 32]. The e-invoicing platform choice problem on the customer side becomes increasingly relevant as multiple competing alternatives emerge in the market. Platform providers need to understand features and offers that attract firms to a specific invoicing platform.

Addressing the choice problem from the customer perspective also is important because of the temporal distance between users' initial adoption and subsequent deployment of services. The initial adoption decision is, in most cases, made only once, whereas the deployment decision (i.e., which platform to use) has to be made repeatedly when the use of connectivity services is routine and several alternatives exist [5]. Moreover, the connectivity contracts are, in many cases, done for a fixed period ranging from three to five years. At the end of the contract period, the company can choose either to renew the contract or to discontinue it and select a new platform. With connectivity platforms, users in principle can "multi-home" such services—that is, maintain multiple connectivity platform contracts and operate through related interfaces. However, this approach is not commonly used in e-invoicing. For a firm to affiliate with a second connectivity platform results in added contract costs, increased operating and integration costs, and increased complexity of the service, with little additional benefit. This lack of multihoming was confirmed in our empirical study: No firm reported being affiliated with more than one connectivity platform provider for their incoming or outgoing invoice flows.

Because of the loosely coupled nature of current enterprise system architectures and increasingly modular enterprise systems [73], companies now favor an orchestrated use of multiple platforms, where each platform is deployed for specific, dedicated vertical tasks (i.e., companies use monohoming strategy by employing several dedicated information systems for distinct tasks). One reason is that, in the enterprise systems arena, standardization has paved the way for increasingly modular systems architectures, which in turn enable firms to be selective in choosing their preferred system components and interfaces. Firms can achieve a smooth integration of multiple connectivity platforms to their core systems, lowering platform switching costs.

Theoretical Framework for E-Invoicing Platform Selection

The Nature of the Choice Problem and Past Research on Vendor Choice

Connectivity platform choices clearly are influenced by multiple features and needs. Moreover, the choice is not a simple optimization problem in that it is not guided by a single criterion and a few fixed constraints. Managers need to ponder simultaneously the trade-offs between several, unrelated platform features, such as total use cost, reach, and vendor characteristics. For example, they need to question whether, given equal reach, the organization should choose a platform with an excellent reputation and a higher price or a platform with an average reputation and a lower price. In this regard, the platform choice problem is closely related to the well-known vendor selection problem, addressed in the supply chain, operations, and marketing literatures since the 1960s [13]. A continuous stream of studies in these areas have come up with a wide range of selection criteria [59, 70]. Often, the goal of these literature streams has been to solicit a single universal set of (additive) choice criteria [69]. However, many researchers have observed that the criteria, by necessity, vary by industry and context [59]. Therefore, studying features that influence the platform choice requires the consideration of some unique, new features, such as the role of network effects, which has to be approached contextually. Instead of adopting a general set of selection criteria identified in past vendor selection studies [13, 59, 70], we need to approach the selection problem by drawing first on general theoretical underpinnings that are likely to drive the choice. In addition, we need to conduct field studies to probe the extent to which these feature sets make sense to actual decision makers and what other features might matter to them during selection.

As noted, the literature on platforms generally recognizes several platform features that are likely to influence platform use and accrue related benefits. These features include the price (cost) of using the platform and subsidies (giveaways) as a form of benefit. A platform provider's decision concerning management of these features has been identified as instrumental in influencing customers' platform use [15]. However, how customers initially

evaluate the connection between the platform price and other features, such as reach, has not been studied. To tackle this problem systematically, we first must identify and probe the salient platform features that existing theories already identify as influencing the customer's choice; second, we formulate an instrument by conducting a field study to validate the content validity of the identified features; third, we estimate the relative importance of each factor in influencing the choice; and fourth, we recognize how companies balance the trade-offs between the features when making the choice.

Salient Platform Features Influencing the Choice

During our initial field study, we observed quickly that the choice is typically influenced by a complex set of factors and that the past literature on vendor selection [13, 59, 70] therefore is not sufficient in explaining the choice. In contrast, several novel aspects, not previously observed in the literature, appear to dominate the choice. Moreover, these aspects have been discussed and analyzed in multiple disciplines and research streams, including in theories of network effects [28], platform pricing models [56], usability [44], principles of service-dominant logic [67], transaction cost theory [71], and theories of adverse selection risk [2]. The expanded list of features, constructed from both the vendor selection and other research streams, includes (1) reach, (2) total cost, (3) usability, (4) ease of system integration, (5) implementation capability, (6) platform support for service improvement, (7) service customization, (8) platform reputation, and (9) long-term sustainability. We next introduce key ideas from each stream. We review the extent to which each stream conveys a strong selection logic that describes how an identified platform feature is likely both to influence the platform use and to provide benefits for the platform user so that it is willing to join the platform. Based on the identification of the key features and the discussion of their identification rationale, we formulate three sets of hypotheses that express the platform user's dominant choice logic and clarify why specific platform features are likely to enter into the choice calculus, and with what effects. First, we formulate hypotheses that posit a significant positive and direct influence on the firm's choice for each identified platform feature. Second, we suggest that some features outweigh others and hence dominate the choice calculus. Third, we note that companies' dominant choice logic differs based on the characteristics of the involved company. In particular, we posit that the size of the company is a significant discriminator and proxy for the types of features that are foregrounded during the firm's choice—that is, the firm's size acts as a significant moderator for which sets of platform features dominate the choice.

Nine Features Influencing the Firm's Platform Choice

Reach is defined as the number of potential trading partners the company can access while using the platform [8]. This feature offers the strongest theoretical

logic influencing the choice in the platform context: If the user deciding whether to join the platform cannot find its trading partners, it is not likely to join! This feature explains the presence of the so-called penguin effect, whereby everyone waits until others have joined because the first few platform users can obtain very few benefits, if any, from joining the platform. Overall, reach is located at the level of direct network effects and their benefits in the chosen connectivity platform [28]. These direct effects cover both economies of scale (platform price, use cost) and scope (value added, learning effects) associated with platform use. Reach also affects the growth trajectory of the platform because of stronger network effects that can be gained by positive and cumulative feedback [61]. High levels of reach reduce the firm's need to make and maintain contractual use agreements across several other platforms or to rely on alternative interaction mechanisms, which come with a higher cost (e.g., returning to the use of mailed paper invoices in the case of e-invoicing).

> ***Hypothesis 1a:*** *User companies of a connectivity platform prefer platforms with a wider reach toward the firm's potential trading partners.*

When firms evaluate whether to join a platform, they also need to assess the *total cost* of using that platform. The implementation and continued use of connectivity platforms accrue implementation and maintenance costs (setup/learning), as well as operational costs (transaction fees and other operational costs) [20, 74]. The total price when both types of cost are combined influences the choice. The importance of costs in purchase decisions has been recognized for some time in marketing choice models, such as Kotler's well-known model of 4Ps [35] (i.e., price, product, package, and place). With regard to platform pricing, platform providers often make detailed decisions concerning the side of the platform they need to subsidize and the side from which they can generate revenues [15]. In the case of connectivity platforms, this distinction is harder to make because the benefits accrue from direct network effects, where all partners have potentially symmetrical relationships with one another. Therefore, connectivity platform providers typically charge both senders and receivers, and subsidies on either side are not common, except in seeking to offer better conditions for companies that have many trading partners (marquee strategy). Thus far, general studies on platform pricing have focused on implementation costs and set-up learning costs [74] and how they influence platform adoption (including source firm R&D costs [45]). Some studies have analyzed the effect of price on competition between proprietary and open source platforms [14]. However, no studies have evaluated the relative effect of total costs versus other platform features on the platform choice. Thus, we posit the following:

> ***Hypothesis 1b:*** *User companies of a connectivity platform prefer platforms with a lower total cost.*

Usability [44] forms an integral ingredient of the utility that can be gained from any digital service. In connectivity platforms, we define usability as the

ease of use that accrues from the intuitive nature and consistency of the proposed solution. Hence, usability effects apply also to choosing between connectivity platforms: High usability reduces training and use costs and operational errors. We posit the following:

Hypothesis 1c: *User companies of a connectivity platform prefer platforms with a higher level of usability.*

When adopting a connectivity platform, the focal company becomes exposed to implementation risks and related transaction costs [71]. When joining the platform, the firm enters into a long-term contractual agreement. The transaction comes with risks that arise from the potential friction associated with the use of the platform and the potential threat of opportunistic behavior by the platform provider. In this regard, the platform provider needs to lower the deciding firm's perceived implementation risk and expected transaction costs. The platform provider can curb such risks by smoothing the initial system integration effort (*ease of system integration*) and by improving its *implementation capability* (i.e., the platform provider's ability to control platform resources and allocate them in ways that ensure error-free and efficient operation). We posit the following:

Hypothesis 1d: *User companies of a connectivity platform prefer platforms with a higher level of ease of system integration.*

Hypothesis 1e: *User companies of a connectivity platform prefer platforms with a better implementation capability.*

Service-logic is manifested on connectivity platforms when the platform provider engages in efforts to improve the quality of the services by learning from users' experiences and being proactive in creating value-added services (*platform support for service improvement*). Such examples of co-creation are emphasized in the service-centered–dominant logics [67]. Through proactive, customer-oriented measures, the platform provider can improve the value creation for the joining firms by providing better interactivity, system integration, and customization, thus resulting in the continued coproduction of services. This ongoing development depends on the platform provider's willingness to identify and consider local user needs and to tailor the platform service toward these needs (*service customization*). We posit the following:

Hypothesis 1f: *User companies of a connectivity platform prefer platforms with a better platform support for service improvement.*

Hypothesis 1g: *User companies of a connectivity platform prefer platforms with a higher level of service customization.*

Finally, during the selection process, platform users ultimately are exposed to adverse selection risk [2]. This risk results from an increased resource dependency and asset specificity that comes from joining a single, specific platform. Joining users need to avoid getting stuck with a platform that is at risk of disappearing or exiting from the market. Platform users

typically seek to mitigate this risk and to ensure that the platform is reputable by conducting a thorough appraisal of the platform provider's installed base, references, and financial viability (*platform reputation*). The potential platform user also seeks to join an established platform because the user expects that such a platform is economically more sustainable in the long term (*long-term sustainability*).

> ***Hypothesis 1h:*** *User companies of a connectivity platform prefer platforms with a higher level of platform reputation.*

> ***Hypothesis 1i:*** *User companies of a connectivity platform prefer platforms with a better long-term sustainability.*

Dominating Features—Reach, Usability, and Total Cost

Some of the nine features identified are likely to dominate in users' choice of platform. Different features garner differential attention and different expected value for the decision makers. In this section, we discuss what factors are likely to dominate, given the nature of connectivity platforms and their use. We posit that the primary value-generating mechanism of the platform for users lies in its intermediating function [18], which allows users to harness the network effects related to platform use [48]. In the case of connectivity platforms, the potential for accruing network effects correlates positively with the number of mutual buyer and seller pairs that are reachable through the platform. Therefore, we expect *reach* to dominate the other platform features so that it forms the first and primary reason to join a specific connectivity platform.

In transferring to e-invoicing solutions and joining a connectivity platform, firms seek to increase the efficiency of their trading processes. This increased efficiency is largely determined by the ease of use. Transaction processes on the platform work only to the extent that both buyers and sellers can use it effortlessly [17]. Platform users do not want to invest significant time and resources to learn how the platform services work. A connectivity platform with a low level of usability requires companies to make additional, unnecessary investments in personnel training, with no alternative use. Therefore, during the initial phase of making a selection decision—often resulting from the short-term focus of decision makers—*usability* is likely to dominate other factors, except for reach.

Contextual properties related to connectivity platform use, such as a large volume of transactions, invite the companies to focus on making their trading processes more efficient. In this regard, a low *total cost* of transaction processing on the platform is likely to dominate other remaining factors. Thus, we posit that —given the inherent properties of connectivity platforms—three platform features dominate users' choice, in the following order: *reach*, *usability*, and *total cost*.

> ***Hypothesis 2:*** *Reach, usability, and total cost, in this order, dominate over other platform features in users' platform choice.*

Moderating Effect of Company Size

Given the differences in firms' size, their customer base, and their processes and internal organization, connectivity platforms likely provide varying values to companies. Consequently, variations are to be expected in how different features enter into companies' choice calculus and what effects they have. Some companies might be primarily interested in harnessing the benefits of reaching a majority of their trading partners, whereas other companies are more disposed to selecting a platform based on efficiency goals. To detect whether such differences exist, we focus next on the company size as a proxy for capturing these moderating effects—that is, whether firms choose differently based on distinctive traits. Generally, firm size is viewed as a surrogate for an organization's total assets and related processes in reference to trading interactions; as a proxy, firm size covers both scale and scope economies [37]. For example, when compared to larger firms, smaller firms have fewer resources and are therefore more constrained in their operations, or they have various categories of highly dedicated resources, which narrows their trading interactions [11]. Consequently, larger firms tend to have greater diversity in the roles of personnel [6] and are more likely to have personnel skilled in IT implementation and integration. Smaller companies also have fewer trading partners and less frequent trading interactions. The presence of such differences suggests that usability, ease of system integration, implementation capability, service customization and platform support for service improvement more likely dominate the choice for smaller firms. Because of their scale of operations, larger firms generally have a greater volume of transactions transmitted over a larger pool of trading partners, and for these companies, the efficiency of the connectivity service is more important, accentuating the role of reach and total cost. Larger firms also tend to be more risk averse in their business interactions [72]. Therefore, they are more likely to take long-term sustainability of the platform into account. We posit that the total cost, reach, long-term sustainability, and platform reputation dominate the choice for larger firms.

> ***Hypothesis 3:*** *For larger user companies, reach, total cost, long-term sustainability, and platform reputation dominate over other features.*

> ***Hypothesis 4:*** *For smaller user companies, usability, ease of system integration, implementation capability, service customization, and platform support for service improvement dominate over other features.*

Figure 1 and Table 1 summarize the final set of hypotheses and the proposed connectivity platform selection model.

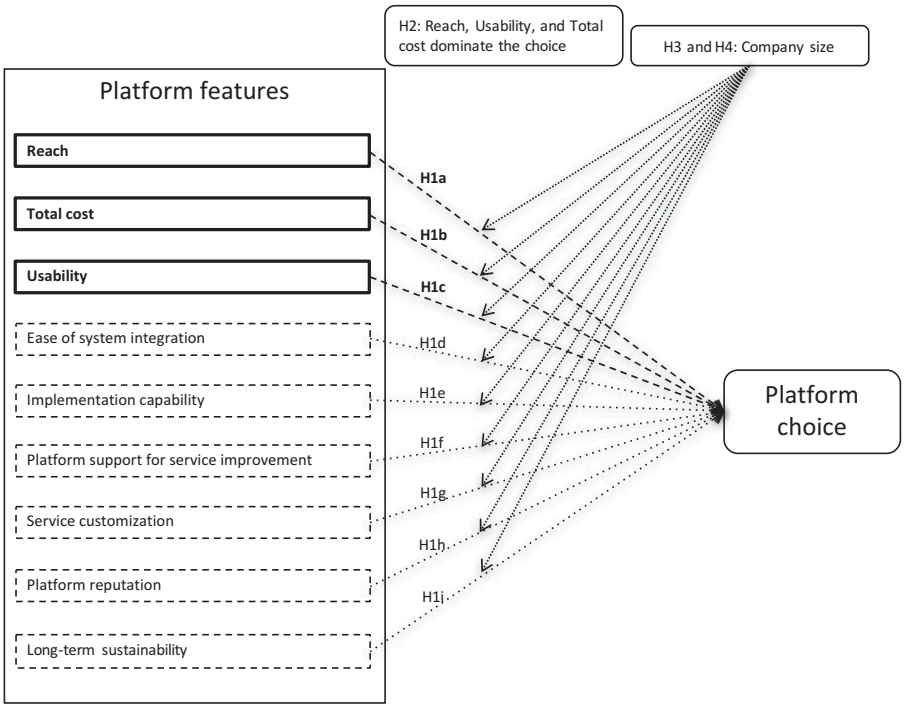

Figure 1. The research model

Empirical Study

To test the research model and associated hypotheses, we approached the problem as a multiple criteria balancing act and estimated the effect of each feature on decision outcome using conjoint analysis [22]. Although the computational capabilities currently used in analyzing preference data no longer restrict the number of features in conjoint analysis (i.e., use of a larger number of features is possible), the salient features of choice must still be factored into a relatively small number of principal choice features, such as the nine features of the platform choice in our model. The number is primarily dictated by the bounded rationality of decision makers and by their limited cognitive capability to simultaneously handle more than seven to nine features or factors while evaluating any decision situation [23, 42]. Therefore, the feature set used in conjoint analysis needs to be divided into a set of core features that decision makers view as the most salient and additional peripheral features that do not invite significant attention across all cases. The latter ones are assumed to have the same value for all the alternative profiles assessed.

Table 1. Hypotheses' Rationale.

Hypothesis	Rationale
H1: User companies of a connectivity platform prefer platforms with a…	
… wider reach toward the firm's potential trading partners (H1a).	The possibility of reaching a large number of trading partners that can be contacted through the platform is a pivotal feature affecting the choice of a connectivity platform.
… lower total cost (H1b).	Decision-makers seek efficiency and evaluate the total aggregated cost for the whole life cycle of the platform service.
… higher level of usability (H1c).	Reduction of training and use costs through usability (i.e., ease of use, intuitiveness, and consistency of the solution) is an important feature in platform choice.
… higher level of ease of system integration (H1d).	Platform users value the ability and willingness of the vendor to adjust its incompatible systems to reduce the implementation risk.
… better implementation capability (H1e).	Platform users value the platform provider's ability to control its resources and allocate them in ways that ensure error-free and smooth service operation.
… better platform support for service improvement (H1f).	The platform provider can increase the business value that the users receive by improving its service offerings (e.g., by learning from users' experience and needs).
… higher level of service customization (H1g).	Platform users appreciate service customization for focal needs and the platform provider's attempts to improve the service.
… higher level of platform reputation (H1h).	Platform users value the quality and integrity of solutions delivered by the platform provider and the platform provider's reputation to reduce adverse selection risk.
… better long-term sustainability (H1i).	Platform users value the vendor's ability to sustain its operations, ensuring the continuity of the service offering and avoiding users' adverse selection risk.
H2: Reach, usability, and total cost, in this order, dominate over other platform features in users' platform choice.	Reach, usability, and total cost dominate over other decision factors. They tap into the main value and cost drivers of the connectivity service, including network effects and economies of scale and scope.
H3: For larger user companies, reach, total cost, long-term sustainability, and platform reputation dominate over other features.	Because of larger firms' higher volume of transactions and larger pool of trading partners, reach, total cost, long-term sustainability, and platform reputation dominate in the choice of a platform among larger firms.
H4: For smaller user companies, usability, ease of system integration, implementation capability, service customization and platform support for service improvement dominate over other features.	Because of smaller firms' resource scarcity and smaller scale of operations usability, ease of system integration, implementation capability, service customization and platform support for service improvement dominate in the choice of a platform among smaller firms.

Operationalization of Features and Related Measures

For reasons stated earlier, we focused on the selection problem related to joining an e-invoicing platform in Finland. To increase the face and content validity of the final set of features used in the empirical study, we first conducted field interviews with four global e-invoicing experts and six current user organizations. These interviews served the following purposes: (1) to validate the presence of the theorized nine features, (2) to operationalize these features into the context of B2B connectivity platforms for e-invoicing, and (3) to derive scales that could be used in the conjoint analysis. The four experts were leading European specialists on electronic invoicing and included the chairman of the EU expert group on e-invoicing, the chairman of the Finnish National Board of E-invoicing, a development director from a leading e-invoicing platform, and a member of the ISO 20022 standardization committee focused on standardizing e-invoicing. All organizations in this sample had recently made a decision to adopt an e-invoicing platform. The organizations covered several industries: an automotive leasing company, an airline company, a grocery retail chain, a pharmaceuticals company, a container company, and a municipal financial service center. In each organization, we identified the key person responsible for the e-invoicing platform choice and conducted one interview per expert and per company. Both the four expert interviews and the six user interviews were semistructured and addressed all steps in the process of selecting an e-invoicing platform. We asked the respondents to describe the main stages in the selection process, after which we focused on the features that companies had considered while selecting the connectivity platform. We also asked follow-up questions concerning the main sources of information used in assessing alternatives, the number and types of alternative platforms assessed, the number of platforms currently being used, the duration of contracts, the volumes and penetration rates of e-invoicing, and materialized benefits so far. All interviews were recorded and transcribed for further analysis.

Using the expert and user interview data corpus and prior literature on vendor selection, we next defined interval scales comprising three consecutive values or levels for each included platform feature. No consensus has emerged on how to create the feature levels during conjoint analysis [38]. Green et al. [22] recommended using an equal number of levels for each feature to balance values between surveyed features and to keep the instrument simple. We followed this suggestion. In addition, to allow for clearer comparisons, we defined three consecutive values for each feature. Here, the medium level acts a "middle" anchoring point between poor performance and high performance for each feature. For example, the total cost feature received the level, "about average," as the anchoring point. To this anchoring point, two extreme opposites moving in both directions were created: "15 percent below average tender" and "15 percent above average tender." We used the insights gained from the experts' reported experiences of vendors' performance as a means to calibrate each level for each feature so that the final values would reflect users' perceptions of the true variation in performance for each feature. The levels were validated through user interviews for face, content, and scale validity by asking

Table 2. Platform Features and Their Operationalization.

Platform feature	Description	Scale		
		Level 1	Level 2	Level 3
Reach	The number of buyers and sellers that can be contacted through the platform solution.	All	A few are left out	Many are left out
Total cost	Total cost aggregated for the whole life cycle of the use of the platform.	15 percent below average tender	About average	15 percent above average tender
Usability	Ease, intuitiveness, and consistency of platform use.	Quick and easy to use	Average usability	Slow and difficult to use
Ease of system integration	The ability and willingness of the platform provider to adjust the service to buyer's present information technology systems.	Tailors to our needs	Both tailor to achieve compatibility	We tailor to platform provider's needs
Implementation capability	The vendor's ability to control and allocate its resources to provide workable platform service.	Top class	Good	Could be improved
Platform support for service improvement	Provider's improvement in its service offering over time, resulting in buyer's increased business value from the platform.	Proactive improvement	If requested	Does not develop the service
Service customization	Nature, scope, and tone of interactions between vendor and buyer of the platform when the platform is adopted and used.	We receive special treatment	We are one among others	We are less important than others
Platform reputation	Amount and quality of relevant customer references.	Several similar to us	Few	None
Long-term sustainability	Platform provider's ability to sustain operations on the basis of its current and projected revenues.	Excellent	Fairly good	Precarious

a pool of experts to read and comment on the scales for each feature and the definition of the feature. The scales for each feature are summarized in Table 2.

We included in the final instrument certain demographic and background questions that were used as controls or moderators during model estimation. The questions included the size of the company, the number of invoices on both incoming and outgoing sides, and service providers on both incoming and outgoing sides. The respondents were also asked to recall their most recent e-invoicing implementation project. This question served as a cue for the respondent to recall an actual choice experience, which would place the questions regarding platform choice that followed in a relevant context [36].

Data Collection and Sampling

We used a web-based survey tool to collect the data. This method was deemed the most efficient and easiest way to reach the respondents. We created the questionnaire based on the instrument using SSI Web 7.0.22,

Table 3. Sample Demographics.

Company size (number of employees)	Number of observations (percentage)	Employee experience with e-invoicing	Number of observations (percentage)
less than 10	86 (34.4 percent)	less than 1 year	65 (26.0 percent)
10-49	75 (30.0 percent)	1-2 years	71 (28.4 percent)
50-249	35 (14.0 percent)	3-4 years	54 (21.6 percent)
250 or more	54 (21.6 percent)	5-6 years	36 (14.4 percent)
		7 or more	24 (9.6 percent)
Purchase invoices per annum	**Number of observations (percentage)**	**Sales invoices per annum**	**Number of observations (percentage)**
less than 100	30 (12.0 percent)	less than 100	35 (14.0 percent)
101-1,000	64 (25.6 percent)	101-1,000	70 (28.0 percent)
1,001-10,000	78 (31.2 percent)	1,001-10,000	71 (28.4 percent)
10,001-50,000	31 (12.4 percent)	10,001-50,000	31 (12.4 percent)
50,001-100,000	9 (3.6 percent)	50,001-100,000	10 (4.0 percent)
100,001-500,000	16 (6.4 percent)	100,001-500,000	22 (8.8 percent)
500,001-1,000,000	1 (0.4 percent)	500,001-1,000,000	3 (1.2 percent)
over 1,000,000	2 (0.8 percent)	over 1,000,000	8 (3.2 percent)
I do not know	19 (7.6 percent)	I do not know	0 (0.0 percent)

where the selection tasks and profiles were generated with the option, "complete enumeration" [9]. This option generated a fractional factorial design. This randomized design reduced potential bias resulting from order or learning effects. In total, we used 250 versions of the questionnaire.

Respondents for the study were identified from the e-invoicing register of the Finnish Information Society Development Centre. The register contains the contact information and e-invoicing addresses of most Finnish companies participating in e-invoicing services. The individuals listed in the register (one name per company) are in charge of their respective company's e-invoicing tasks, making them the most appropriate respondents to answer to our survey. A link to the survey and a cover letter that included background details about the study and information about who would be qualified to answer were e-mailed to these individuals. We received 300 complete responses to the survey, making the response rate 12.2 percent. The sample is summarized in Table 3. In the screening of respondent data to ensure data validity, respondents who had spent less than 200 seconds in responding to the survey were deleted, as were those who had chosen the same alternative in all choice sets. The resulting drop of 18 answers led to a final data set that included 282 complete survey responses.

Data Analysis

As noted, we used conjoint analysis to estimate the influence of each feature on the final selection outcome. Conjoint analysis generally estimates the

utility functions of decision makers and has its origins in the economics of maximizing welfare or utility in the presence of constraints. The method has been used for decades in preference estimation, primarily in marketing research [22]. Today, it also is increasingly used in a number of other areas, including health care, food studies, and transportation [63]. Initially, conjoint analysis originated from decision problems that sought to produce reliable assessments of the respondents' preferences by comparing at least two features simultaneously, so that the respondent has to identify, evaluate, and decide on a trade-off between the two features. Conjoint analysis can identify market segments based on different preferences or even estimate individual respondent utility functions because perceived utilities are expected to differ between segments and individuals. One advantage of conjoint analysis is that it allows evaluation of the fit of the responses and the utility function estimated, and low-fit respondents can be culled from the analysis. The validity of the results can also easily be assessed by using holdout questions. Finally, interaction terms can be included in the final utility function, if required.

Conjoint analysis differs from the commonly used Likert scale measures, which measure "one feature at a time." Likert scales and related factor-based analyses do not follow a similar logic of revealing decision makers' preferences between a large number of factors. Instead, analyses based on Likert scales investigate, ceteris paribus, the effects on a final choice of individual traits and related perceptions, such as the "level of belief in the usefulness of a feature" (see, e.g., [54]). Although the approach is indicative of the potential significance of each feature in influencing the choice, the Likert scale–based measures fail to portray faithfully the decision maker's preferences in the choice situation [68]. Pertinent research has compared Likert-based factor/regression models and conjoint-based analyses and found that the latter method reveals better differences in decision makers' valuations [27, 54, 57][5]. Rather than forcing respondents to react to generic constructs, such as "the level of service customization," conjoint analysis pushes the respondents to react to specific defined attribute levels that influence their decision making and, thereby, makes the response situations more realistic. Because our goals were to evaluate multiple features simultaneously and to urge the respondents to evaluate the trade-offs between these features and values, we applied a specific variant of choice-based conjoint analysis [22]. When applying such an approach, the first task is to define the features and levels (our model involved nine features with three levels), the type of conjoint analysis (our choice: choice-based conjoint), and the form of the decision maker's utility function (our choice: additive). The second task is to define how many profiles to present to the respondent (in our case, three) and how many times the selection is to be repeated (in our case, 16). Appendix B provides a screenshot of our research instrument, which asks respondents to select the most attractive connectivity platform profile. Based on the selected approach, screens such as the one illustrated in Appendix B were then presented to the respondent 16 times, and the respondents' choice of profiles was carried out according to fractional factorial design principles.

This method produces so-called part-worths of feature levels on the interval scale, and the feature importance scores can be calculated on the basis of these part-worths. The ranges of the part-worth values within each feature reflect the feature's importance. We next estimated the aggregate utility function over the whole sample using the multinomial logit model of choice and the additive utility function. In the calculation, we constrained the part-worths within a feature in such a way that the part-worth of the second-best level is less than or equal to the best level, and the worst level is less than or equal to the second-best level in each feature. To obtain information about the heterogeneity of the companies' preferences, we finally clustered the respondents using latent class clustering to assess the moderation effects. Latent class clustering [12] was used to identify groups of companies that had different preference profiles. For a more formal presentation of conjoint analysis and the employed clustering method, please see Appendix C.

Findings

What Features Influence Connectivity Platform Choice?

Table 4 presents the final estimated aggregate model. The coefficients for each feature have been scaled in Table 4 in such a way that, within a feature, their total sum is zero. In addition, the higher the part-worth within each feature, the more valued the feature level.

All features except *implementation capability* had a statistically significant influence on decision makers' platform choices, supporting H1 (save H1e). Further interpretation of the results (the part-worths in Table 4) reveals that, for some features, the platform provider's ability to reach a sufficient level of service is enough. Being a high-level platform provider does not necessarily pay off because the value increase from the middle level to the highest level is small. This small increase was seen for the following features: long-term sustainability, ease of system integration, service customization, and platform support for service improvement. In contrast, investing to reach the top level in reach, platform reputation, total cost, and usability is critical for the platform provider.

Which Sets of Features Dominate?

In Table 5 we present the relative importance of the features in the aggregate solution. These feature importance scores were obtained by calculating percentages from the sum of the relative part-worth ranges of each feature presented above in Table 4. For further reading on deriving relative importance scores in conjoint analysis, see [46].

The results support major elements of H2: The two most important features were usability and reach, with a combined importance of 50 percent. Hence, users prefer platforms that are easy to use and through which they

Table 4. Constrained Part-Worths in the Aggregate Solution and Their Significance.

Platform feature	Level	Part-worth	Significance
Reach	All	0.3	< 0.001
	Few are left out	0.19	< 0.001
	Many are left out	−0.5	< 0.001
Total cost	15 percent below average tender	0.13	< 0.001
	About average	0.06	< 0.05
	15 percent above average tender	−0.19	< 0.001
Usability	Quick and easy to use	0.48	< 0.001
	Average usability	0.24	< 0.001
	Slow and difficult to use	−0.72	< 0.001
Ease of system integration	Tailors to our needs	0.08	< 0.001
	Both tailor to achieve compatibility	0.08	< 0.001
	We tailor to platform provider's needs	−0.15	< 0.001
Implementation capability	Top class	0.02	*ns*
	Good	0.02	*ns*
	Could be improved	−0.04	*ns*
Platform support for service improvement	Proactive improvement	0.16	< 0.001
	If requested	0.16	< 0.001
	Does not develop the service	−0.32	< 0.001
Service customization	We receive special treatment	0.05	*ns*
	We are one among others	0.05	*ns*
	We are less important than others	−0.1	< 0.001
Platform reputation	Several similar to us	0.11	< 0.001
	Few	0.01	*ns*
	None	−0.12	< 0.001
Long-term sustainability	Excellent	0.18	< 0.001
	Fairly good	0.16	< 0.001
	Precarious	−0.33	< 0.001

Table 5. Relative Importance Scores of the Platform Features Using the Aggregate Solution.

Platform feature	Aggregate solution, proportion (percent)
Usability	30
Reach	20
Long-term sustainability	13
Platform support for service improvement	12
Total cost	8
Platform reputation	6
Ease of system integration	6
Service customization	4
Implementation capability	1

can reach all their invoicing partners. Contrary to our initial H2, however, the element of total cost was of relatively minor importance, accounting for only 8 percent of the platform choice. The third and fourth most important features were long-term sustainability (13 percent) and platform support for service improvement (12 percent), and they were found to be almost equally important. Three other features registered relatively minor importance: ease of system integration (6 percent), platform reputation (6 percent), and service customization (4 percent). Finally, only implementation capability registered as having no significance.

Does Company Size Moderate the Effects of Platform Features?

A two-cluster solution was chosen to analyze the two moderation hypotheses (H3 and H4). We name cluster 1 as *cluster: larger companies* because it contains proportionally more larger companies and cluster 2 as *cluster: smaller companies* because it contains proportionally more smaller companies. The difference in the proportion of small companies of fewer than 10 employees across the clusters is significant with $\alpha = 0.01$. Details about both clusters can be found at the end of Appendix C.

The Consistent Akaike Information Criterion (CAIC), the lowest values of which indicate a good clustering solution, was 8,294 for the two-cluster solution.[6] In addition, the solution was managerially interpretable: The clusters were intuitively easy to understand. For the three-cluster solution, the CAIC was minimal—8,267—indicating a minor decrease from 8,294. The two-cluster solution was simpler, whereas one more cluster did not add any interesting insight into the heterogeneity of preferences. The average maximum membership probability in the chosen solution is 0.95, which can be read as the probability that each respondent belongs to only one cluster (a very high probability, similar to a confidence interval of .95). Due to these justifications, the two-cluster solution was chosen. The entropy of that solution, which measures the separability of the clusters, was 0.80 (with a maximum of 1).[7] Variations in feature importance across the two-cluster solution, as well as the cluster sizes, are presented in Table 6. The cluster sizes are the sums of the respondent memberships.

The results of the cluster analysis suggest that for larger companies, the most important feature is reach, with an importance score of 38 percent. Total cost is the only other feature that is more important for the larger company cluster than for the smaller company cluster (9 percent vs. 7 percent). This result supports hypothesis H3. The results suggest that the larger firms' invoice volumes and their spread in terms of the number of trading partners have an influence on their choice logic. For the smaller company cluster, platform support for service improvement and usability are the two most important features. Again, this finding is in line with our hypothesis H4. However, contrary to H4, we observe that platform reputation and long-term sustainability are important features for smaller companies.

Table 6. Relative Importance Scores of the Nine Features in the Aggregate Solution and the Two-Cluster Solution.

Platform Feature	Aggregate solution, Proportion (percent)	Cluster: larger companies Proportion (percent)	Cluster: smaller companies Proportion (percent)
Usability	30	23	32
Reach	20	38	9
Long-term sustainability	13	11	14
Platform support for service improvement	12	7	16
Total cost	8	9	7
Platform reputation	6	5	7
Ease of system integration	6	3	8
Service customization	4	2	5
Implementation capability	1	2	2
Size of the cluster		31 percent	69 percent

Discussion and Conclusions

Although extant literature offers several insights about how to ensure the growth of platforms and how to monetize platform operations when they gain traction, potential users' choice behaviors on the reverse side of platforms has remained largely unstudied. To shed light on this choice problem, we developed a research model with a set of hypotheses (H1–H4) about the choice of connectivity platforms. We next conducted an empirical study based on the research model to investigate platform features that influence an e-invoicing platform choice. Table 7 summarizes key findings.

Interpretation of the Results

Most of the past research on platforms has focused on network effects [56] and highlights the importance of initially attracting a large number of users to the platform so that platform users enjoy increasing returns to scale [15]. The literature consequently focuses on how critical platform growth is as a driver of network effects. Based on our analysis, this argument offers a somewhat one-sided view of the connectivity platform's benefits to users. Although the current emphasis on *reach* remains important for all connectivity platforms, we found that, overall, *usability* overrides *reach* in accounting for the choice outcomes of users across the whole population. Therefore, our results reveal that on the aggregate level, companies seek user-friendly platforms through which they can reach a sufficiently high number of users.

Table 7. Summary of Hypotheses.

Hypothesis	Supported
H1: User companies of a connectivity platform prefer platforms with a…	
… wider reach toward the firm's potential trading partners (H1a).	Supported
… lower total cost (H1b).	Supported
… higher level of usability (H1c).	Supported
… higher level of ease of system integration (H1d).	Supported
… better implementation capability (H1e).	Not supported
… better platform support for service improvement (H1f).	Supported
… higher level of service customization (H1g).	Supported
… higher level of platform reputation (H1h).	Supported
… better long-term sustainability (H1i).	Supported
H2: Reach, usability, and total cost, in this order, dominate over other platform features in users' platform choice.	Supported partially. Reach and usability are the two most important features, accounting for 50 percent of the choice problem. Total cost is the fifth most important feature (8 percent of choice problem).
H3: For larger companies, reach, total cost, long-term sustainability, and platform reputation dominate over other features.	Supported partially. Reach and total cost are relatively more important for cluster: larger firms.
H4: For smaller companies, usability, ease of system integration, implementation capability, service customization, and platform support for service improvement dominate over other features.	Supported partially. Usability, platform support for service improvement, service customization, ease of system integration, platform reputation, and long-term sustainability are relatively more important for cluster: smaller firms.

Although the argument might be made that this result is specific to e-invoicing platforms, and that reach is more dominant for other types of platform-mediated interactions, the question calls for more research.

As a result of recent software standardization efforts, most connectivity platforms are loosely coupled to different enterprise systems. Their implementation is now a relatively straightforward task, as is evidenced by the nonsignificance of implementation capability as well as the relatively low importance scores for ease of system integration and service customization. Of the two risk-related features, platform reputation was found to be of minor importance. This result can be partially explained by the study context. High trust and reliability are common features for nearly all service providers' offerings in the Finnish market, and this feature does not truly differentiate between platform providers. Finally, the low-level influence of service customization can be explained by the highly structured and routine nature of e-invoicing services.

Our findings reveal significant heterogeneity among platform user groups in that the logic underlying the platform choice is contingent upon the firm size of the platform user. Reach and total cost were relatively more important for the cluster containing proportionally a larger number of larger firms, while usability, platform support for service improvement, service

customization, ease of system integration, platform reputation, and long-term sustainability were found to be relatively more important for the cluster containing proportionally a larger number of smaller firms. These findings suggest that smaller firms have fewer resources for training personnel and developing the systems internally, and a recognition of this limitation enters into their choice calculus. In contrast, investments larger companies make to improve mediocre usability are quickly amortized, and scale and reach related factors dominate.

Surprisingly, we found that features mitigating adverse selection risk [2], such as platform reputation and long-term sustainability, were more important for the cluster containing proportionally more smaller companies. Compared to larger firms with market power [25], smaller firms have a weaker hand in negotiating the contracts with connectivity platforms. Thus, smaller companies might not have the muscle to renegotiate platform contracts under unexpected circumstances and therefore seek to avoid switching-related costs. This position generates a stronger preference for longevity in platform contracting and explains why platform reputation and long-term sustainability register as important features for the cluster containing proportionally a larger number of smaller companies.

Theoretical Implications

Based on this study, we make claims related to customers' choice of platforms concerning the following: (1) the difficulty of bootstrapping, (2) the role of pricing and cost, (3) the minor importance of implementation-related features, and (4) the impact of longevity during platform contracting.

Although most social media platforms were digital from their inception and developed through start-ups, our results suggest that, in the case of B2B connectivity platforms, this kind of bootstrapping from the margins is likely to be difficult. This claim is evidenced by the importance of reach in the firm's choice. The e-invoicing market more likely accentuates the role of larger companies in promoting platform growth. Larger companies act as marquee companies that attract smaller companies to join e-invoicing platforms [48]. Larger companies can persuade the providers of e-invoicing platforms to collaborate with them through interoperability agreements. The heightened importance of marquee users and companies' overall preference for platforms that have already established a wide reach mean that bootstrapping is relatively difficult from a green field for new enterprises. Attracting large users to a new platform requires considerable capital to incentivize new users. Some empirics support this claim: Only a few connectivity platform start-ups have been able to establish a viable installed base in Finland; in fact, only two of the 24 connectivity platforms on the market have been originally launched as startups. In contrast, e-invoicing platforms more typically have been established as a side business of an incumbent enterprise solution provider. Two of the biggest Finnish e-invoicing platforms are publicly listed companies (Tieto and Basware) and already had a large installed customer base in several business areas beyond e-invoicing.

In "pipeline businesses" [48], the price of goods and services has been the primary factor that customers consider when they choose the vendor [13]. We see a difference in the digital platform business. Total cost was only the fifth most important feature (aggregate importance score of only 8 percent). Given the context of our study (i.e., transactional interactions where scale and scope are important), this result is surprising. With digital platforms, cost and revenue lie on both sides of the platform [15], and the use of connectivity platforms has already generated lower costs per transaction at a meaningful order of magnitude. These lower costs result from the fact that platform costs (related to platform development, setup, and operations) typically are divided among a larger number of users, and as a result the e-invoicing market recently has experienced a steep price erosion as e-invoicing services have matured and platforms have grown in size.[8]

Overall, our findings recognize a relatively low importance of implementation-related features. All five top-ranking features focused on ongoing or future business concerns (i.e., usability, reach, long-term sustainability, platform support for service improvement, and total cost). Features that companies consider of minor importance focus on the initial implementation effort and related risk, or on one-time events during service installment (ease of system integration, platform reputation, service customization, and implementation capability). This finding is related to the fact that companies now use modular system components that are loosely coupled [73]. The loose coupling and modularity, combined with higher levels of data standardization, have paved the way for smoother implementation and lower integration efforts. Generally speaking, then, the dominant platform choice logic is operation oriented rather than implementation oriented. Firms are also starting to use cloud-based solutions, in which the integration between the system components (e.g., an e-invoicing system and an accounting system) is relatively straightforward.

Of the two risk-related features, long-term sustainability was more important than platform reputation. This finding hints at the presence of relatively low switching costs. Still, we were surprised by the importance of long-term sustainability. When implementation is so easy and many alternatives exist on the market, why would companies stress the longevity of the contracts? We theorize that the connectivity platform selection is inherently associated with management's desire to ensure smooth back-end operations. However, a company's top executives have a relatively short attention span for such concerns. Managers responsible for the connectivity platform operations are most likely steered toward ensuring a continued longevity of the contracts at the expense of a thorough appraisal of all elements of the platform reputation, as long as the quality of platform operations does not create enough trouble to show up on the executives' radar.

Managerial Implications

Managers of connectivity platforms should target their value propositions toward maximizing customer value in their future operations. This focus has

five implications for platform service offerings. First, platform providers should offer an easy-to-use, end-user solution that is efficient and dependable. The primary benefits the connectivity platforms should offer are time savings and the possibility of shifting employees to more productive knowledge work [26]. These results are confirmed by a significant difference in choice when the value of usability changes from average to high. Second, customers see significant value in being able to reach all their invoicing partners through the same service. The benefits of an e-invoicing service are voided if customers can use the platform for only a fraction of their trading partners and invoices. This implication is akin to the well-established critical mass [40] and penguin [19] arguments. Third, service providers should signal the economic viability of their offerings (long-term sustainability). Companies that join seek to minimize the risk of service interruption in critical business flows, such as incoming revenue, platform providers should present their market position as stable and focus on the longevity of their service. Even though the studied service industry is relatively young and has a large number of new entrants, our findings suggest that attracting customers to platforms requires solid funding and a demonstration of business continuity. Fourth, platforms should develop their services and signal to customers that they undertake such activity. Customers do not want one-size-fits-all, standardized packaged offerings; instead, they expect dedicated solutions that provide a basis for continuous improvement for the firm's business operations. To this end, platform providers need to engage customers to identify areas for improvement and to facilitate co-creation. In such settings, platform providers can price their offerings at relatively higher pricing points because the price can be justified by the observed added value. A decreasing utility in our analysis from the highest to the average price and from the average to the lowest price implies that price still plays some role in the selection decision. Fifth, managers of e-invoicing platforms can largely ignore the effects of service features that focus on one-time events during the service delivery. They need to shift their priorities into developing facets of the service captured.

Limitations and Further Research

Several limitations apply to this study. First, the set of features derived from theory had to be operationalized in the context of e-invoicing platforms to ensure that the responses were valid. To ensure such construct validity, we validated the features through expert and user interviews across several industries and across organizations of varying sizes. Second, the requirement to condense the identified features into a list of composites posed a challenge. Although this step made comprehension easier and enabled conjoint analysis, a substantial amount of information is lost in the process. Third, our framework focused solely on observed platform features and related services. The analysis did not take into account properties related to the bilateral interactions between trading partners (e.g., power) or other external effects (e.g., regulation) on the choice calculus. Trading partner influence has been

identified as an important antecedent of connectivity platform adoption in general [65] and of e-invoicing in particular [50, 53]. Thus, it might play a role in the platform choice as well. Further research should seek to assess whether external pressure, such as trading partner influence, competitive pressure, or industry pressure [10], influences the choice of connectivity platforms. These factors could be studied as additional moderators for conjoint analysis.

The data were collected only in Finland, which presents another limitation. Finland has the highest penetration of XML-based e-invoicing [34] and thus can be considered a unique context for empirical study of the choice problem. Differences in culture, regulatory environment, and industrial organization certainly are likely to influence how decisions concerning connectivity platforms are made [62]. The Finnish market likely has already experienced a significant number of implementations, and the respondents had either experienced e-invoicing themselves or had heard about it from their peers. Thus, platform reputation might prove to be much more important in other settings. This question of contextual differences encourages future research into comparative studies to uncover such differences.

As the importance of connectivity platforms continues to increase, several research directions need to be pursued. Future studies need to examine how to improve usability of platforms. In addition, reach appears to serve as a threshold property for many companies, but we do not have a good measure what is "adequate" reach in different settings. One step in this direction would be to identify varying segments of companies that have varying preferences regarding reach. Overall, we have just touched the tip of the iceberg in understanding what drives platform choice in industrial settings.

NOTES

1. A list of e-invoicing connectivity platforms can be found on the European E-invoicing Service Providers Association website (www.eespa.eu).
2. https://en.wikipedia.org/wiki/XML
3. In our empirical context, e-invoicing, platforms are closed in the sense that platform owners cannot be separated from platform providers because the platform owners are the ones providing the interface among the platform users. Therefore, for the remainder of the paper, we consider the platform owner and the platform provider as the same business entity.
4. For a recent study probing the consumer preferences regarding the selection of online platforms [52].
5. Kinter et al. [31] in a recent study examined a situation where each feature could have only two values (e.g. high/low; expensive/cheap). Here the associated Likert scale items expressed the two extreme values as the value for each variable. They found that the Likert-like scales in such situation produced more similar results with conjoint analysis when compared to previous research, which lacked the use of explicitly expressed extreme values and used more continuous variables.
6. CAIC and latent class clustering are explained in Appendix C.
7. See Appendix C for the interpretation of this measure.

8. The revenue per e-invoice is estimated to erode by 13 percent to 17 percent per annum; for further information, we refer the reader to http://www.billentis.com/einvoicing_ebilling_market_overview_2015.pdf.

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