Technische Universität Berlin
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Essays on Trust and Reputation Portability in Digital Platform Ecosystems

vorgelegt von

Dipl.-Math.

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an der Fakultät VII – Wirtschaft und Management

der Technischen Universität Berlin

zur Erlangung des akademischen Grades

Doktor der Wirtschaftswissenschaften

– Dr. rer. oec. –

genehmigte Dissertation

Promotionsausschuss:

Vorsitzender: Prof. Dr. Maik Lachmann

Gutachter: Prof. Dr. Timm Teubner

Prof. Dr. Rüdiger Zarnekow

Tag der wissenschaftlichen Aussprache: 12. März 2021

Berlin, 2021

I

II

Essays on **Trust** and **Reputation Portability**
in Digital Platform Ecosystems

Abstract

Digital platforms increasingly shape product and service offerings around the world, change consumer behavior, and disrupt a broad variety of traditional industries. In these digital markets, to create trust and realize transactions, platform users and businesses alike rely on their accumulated online reputation such as star ratings and reviews. With the multiplicity of existing and quickly surfacing platforms and business models, reputation portability has emerged as a nascent research topic in Information Systems and adjacent fields. From a theoretical, empirical, and practical perspective, the possibility to transfer online reputation across platform ecosystems and services is a complex and constantly evolving issue. This cumulative dissertation provides a first holistic view on central dimensions of this novel topic by investigating the foundations, the economics, and the design of reputation portability in digital platform ecosystems. At the outset, general dynamics of trust-building, reputation, and data portability are formally introduced and conceptualized. Subsequently, from a user's perspective, the economic effectiveness of porting reputation across electronic markets is evaluated in a case study leveraging platform data and by applying survey-based and experimental research. Thereafter, technological, and legal requirements, as well as practical design guidelines to implement adequate reputation portability mechanisms, are derived. Throughout, this work considers the broader societal implications for individuals' digital sovereignty and identity management in online environments and, finally, concludes by providing an outlook with avenues for future research.

__Keywords:__ Reputation, trust, data portability, data sovereignty, digital identity, digital platforms, platform economy, sharing economy, peer-to-peer, multi-method approach, online experiment, multivariate statistics, interviews, thematic analysis, design guidelines, signaling, purchase intentions, cognition, behavioral economics, GDPR, Personal Information Management Systems, blockchain

Zusammenfassung

Digitale Plattformen prägen zunehmend Produkt- und Dienstleistungsangebote auf der ganzen Welt, verändern Konsument*innenverhalten und disruptieren eine Vielzahl traditioneller Branchen. Als Signal für Vertrauenswürdigkeit in digitalen Märkten und zur Realisierung von Transaktionen, verlassen sich Plattformnutzer*innen und Unternehmen gleichermaßen auf ihre angesammelte Online-Reputation – zumeist in Form von Sternebewertungen und/oder geschriebenem Feedback (d.h. Reviews). Aufgrund der großen Menge existierender und zahlreich neu entstehender Plattformen und Geschäftsmodelle, hat sich die Übertragbarkeit von Reputation zu einem eigenständigen Forschungsgegenstand in der Wirtschaftsinformatik und angrenzenden Bereichen entwickelt. Aus theoretischer, empirischer und praktischer Sicht ist die Portierung von Online-Reputation zwischen Plattformen und digitalen Diensten, ein komplexes und sich stetig veränderndes Forschungsfeld. Diese kumulative Dissertation bietet einen ersten ganzheitlichen Blick auf zentrale Dimensionen dieses neuartigen Phänomens, indem sie die Grundlagen, die ökonomische Wirkungsweise sowie das Design von Reputationsportabilität in digitalen Plattform-Ökosystemen untersucht. Eingangs werden in dieser Arbeit die allgemeinen Voraussetzungen von Vertrauensbildung, Reputation und Datenportabilität formal eingeführt und konzeptualisiert. Anschließend wird die ökonomische Effektivität von Reputationsportabilität in elektronischen Märkten aus Nutzer*innensicht beleuchtet. Dazu wird eine Fallstudie beruhend auf Plattformdaten und unter Anwendung umfragebasierter und experimenteller Forschung durchgeführt. Schließlich werden technologische und rechtliche Anforderungen sowie praktische Gestaltungsrichtlinien zur Implementierung adäquater Mechanismen für Reputationsportabilität abgeleitet. Im weiteren Verlauf erörtert die Arbeit gesellschaftliche Implikationen für die digitale Souveränität von Bürger*innen und das Management von Online-Identität, um alsdann einen Ausblick auf zukünftige Forschungsfragen zu geben.

Schlüsselwörter: *Reputation, Vertrauen, Datenportabilität, Datensouveränität, digitale Identität, digitale Plattformen, Plattformökonomie, Sharing Economy, Peer-to-Peer, methodischer Pluralismus, Multi-Method, Online Experiment, multivariate Statistik, Interviews, thematische Analyse, Design Guidelines, Signaling, Kaufbereitschaft, Kognition, Verhaltensökonomie, DSVGO, Personal Information Management Systems, Blockchain*

Acknowledgements

"No man is an island," the English poet John Donne once said. This dissertation has benefitted immensely from several people's active input but also from the silent support of many others, to all of whom I would like to express my profound appreciation. First, I thank Prof. Dr. Timm Teubner for his outstanding advice in all aspects of a doctoral student's life, especially sound guidance and supervision through the ups and downs of academic research. Second, I would like to thank everyone involved in shaping the work at hand: my co-authors (a special thanks to Prof. Dr. Marc Adam), benevolent but also overly critical and blunt peer-reviewers at journals and conferences, my colleagues at TU Berlin and the Einstein Center Digital Future, and friends for providing actionable feedback and valuable outside-in perspectives. Third and last, my deepest gratitude extends to my girlfriend and my family who carried me during unexpected challenges.

Finally, I wish to dedicate this dissertation to the memory of my mother, Beate Hesse.

Berlin, December 2020

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List of Abbreviations

Application Programming Interface (API)
Area of Interest (AOI)
California Consumer Privacy Act (CCPA)
Chief Executive Officer (CEO)
Coronavirus Disease 2019 (COVID-19)
Curriculum Vitae (CV)
Consumer-to-Consumer (C2C)
Degree of Social Interaction (DoSI)
Distributed Ledger Technology (DLT)
Dependent Variable (DV)
European Data Protection Supervisor (EDPS)
European Union (EU)
Face Visibility (FV)
General Data Protection Regulation (GDPR)
Hypertext Markup Language (HTML)
Identity Document (ID)
Indirect Stakeholders (IN)
Information System (IS)
Intellectual Property (IP)
Know Your Customer (KYC)
Ordinary Least Squares (OLS)
Peer-to-Peer (P2P)
Personal Information Management Systems (PIMS)
Profile Image Availability (PIA)
Platform Operators (OP)
Platform Complementors (COMP)
Platform Consumers (CONS)
Self-Description Availability (SDA)
Social Network Sites (SNS)
Switzerland (CH)
User-Generated Content (UGC)
United Kingdom (UK)
Trust and Reputation Information (TRI)
United States (US)
User Experience (UX)

*"A good reputation is
more valuable than money."
– Publilius Syrus, (fl. 85 – 43 BC)*

PART I: THE FOUNDATIONS OF REPUTATION PORTABILITY

Chapter 1: Trust-building and reputation

Motivation and introduction

In the 21st century, digital platforms have become omnipresent. Today, electronic marketplaces penetrate all levels of modern economic activity, shaping the way in which individuals consume and provide services and products (Alt and Zimmermann 2014; De Reuver et al. 2018; Hein et al. 2020). Following Hein et al. (2020, p. 90)'s definition, digital platform ecosystems comprise three main stakeholder groups, where a platform operator (i.e., the owner of the platform) "implements governance mechanisms to facilitate value-creating mechanisms on a digital platform between the platform owner and an ecosystem of autonomous complementors and consumers." The rise of these platforms, frequented by billions of users, has been heralded as "one of the greatest success stories of the internet" (Tadelis 2016, p. 322). In recent years, peer-to-peer (P2P) business models especially, became increasingly important and their growth has been studied closely, including by popular science (Boston Consulting Group 2017; Botsman and Rogers 2010; Sundararajan 2016). Matching online supply and demand, well-known platforms exist, for instance, in domains such as e-commerce (Amazon, eBay, Taobao), accommodation sharing (e.g., Airbnb, Couchsurfing, Wimdu), mobility (e.g., BlaBlaCar, Lyft, Uber), or crowd work (e.g., Helpling, TaskRabbit). In fact, providing essential infrastructure for mobility, food delivery and medicine supply in times of crisis, some of these platforms were considered as "systemically relevant" during recent and ongoing COVID-19 lockdowns (Bohn et al. 2020).

At the same time, certain platforms (such as Airbnb, Amazon, and Uber) have accumulated enormous market power, creating high entry barriers for nascent and/or smaller platforms (Gans 2018; Van Alstyne et al. 2016). In this context, an important issue is the so-called *lock-in effect* users face on a respective platform, which represents a considerable obstacle for switching to other platforms. This lock-in, inter alia, results from the process of building up and maintaining a reputation history on a given platform – a process that involves effort and is costly (Dunham 2011). Examples of this platform-based reputation are numerical ratings (e.g., 5-star logic) and written customer feedback (e.g., text reviews). This online reputation is indispensable for the realization of transactions and generally considered the strongest and most frequently used signal to demonstrate trustworthiness towards other market participants (Dellarocas et al. 2009; Mavlanova et al. 2012; Resnick et al. 2000; Tadelis 2016).

Now, reputation is always important for complementors, that is, for those market participants who provide a service that consumers ultimately pay for. However, platforms exist where both sides – including consumers – depend on reputation. Consider, for instance, guests on Airbnb who can book apartments only if their reputation allows them to; otherwise hosts may refuse their booking requests. The same applies to carpooling platforms and (to a limited extent) to many crowd work scenarios. This thesis focuses mainly on complementors, that is, on product and service providers. Players on this market side – the sellers, drivers, hosts, workers, etc. – ultimately provide a service and receive a financial compensation for it. For them, reputation is a crucial competitive factor on any platform.

However, this reputation is usually platform-bound, meaning that – as things stand today – it cannot be transferred across platform boundaries. This is problematic both for complementors and from a regulatory perspective. For one thing, many of these complementors are active on

several platforms simultaneously (i.e., multi-homing). Hence, they must build a reputation repeatedly, that is, one on each utilized platform (Dellarocas et al. 2009; Teubner et al. 2019). Secondly, moving to another or new platform, complementors initially cannot prove their trustworthiness to other market participants (*cold-start problem*; Kokkodis and Ipeirotis 2016; Wessel et al. 2017). And finally, because the resulting lock-in effects restrict competition between platforms.

In this sense, *reputation portability* (similarly, *reputation transfer* or *imported reputation*) refers to the idea of leveraging existing reputation from platform A and using it as a signal of trustworthiness on another platform B (see Figure 1). It is important to delineate the concept of reputation portability from the related but distinctively different notion of trust transfer. In the latter, consumers' trust in the platform itself inherently extends to complementors offering their services on that platform (X. Chen et al. 2015; Teubner et al. 2019). In the case of reputation portability, however, trust will be inserted exogenously from outside the target platform, which the existing reputation is imported to. As an example, drivers on one mobility platform, say Uber, could use their ratings to promote their services on other suitable platforms, such as Lyft. To support reputation-building, the existing history would be integrated as an additional source of information for potential passengers. Similarly, it is conceivable that ratings could be ported across platforms in different domains. For example, the rating track record of a trustworthy eBay seller may serve as a trust signal on Airbnb. This immediately raises questions of required domain comparability for reputation portability (i.e., *fit*; Teubner et al. 2020).
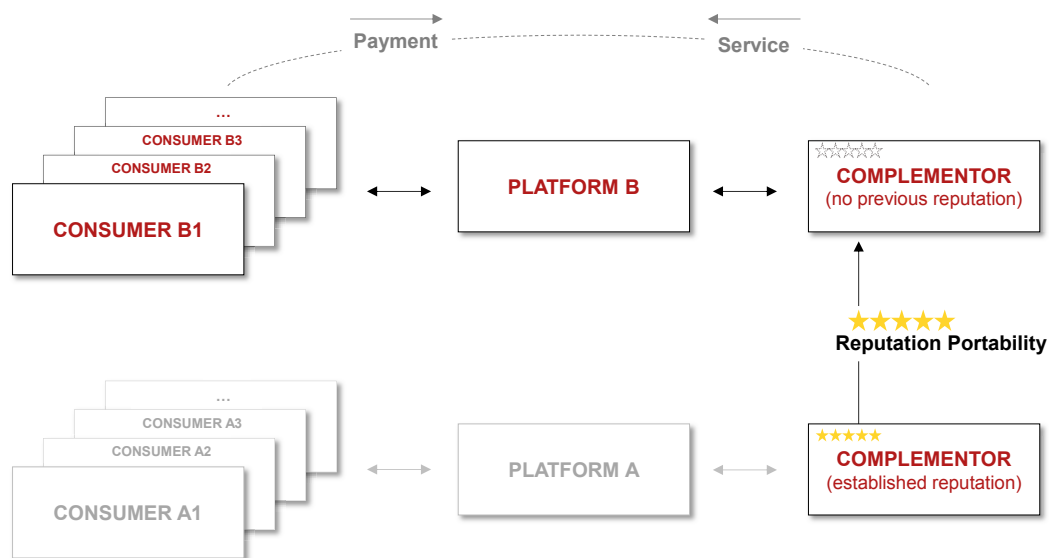
FIGURE 1: A PLATFORM TRANSACTION WITH REPUTATION PORTABILITY (SCHEMATIC)

As of today, *portability of reputation* is neither common practice in digital platform ecosystems nor is it technically supported by many platforms. The e-commerce platforms TrueGether.com and Bonanza.com are noteworthy exceptions. Both allow their users to import star ratings and/or text reviews from eBay and Amazon. In scientific literature, however, calls for portable reputation have been prevalent over the past two decades. These studies hypothesized on reputation portability's potential to increase trust between complementors and consumers. At the peak of the dot-com era, Resnick et al. (2000) already

noted that not being able to port reputation between platforms is an obstacle for sellers. In fact, a few years earlier, Amazon had allowed its sellers to import their eBay ratings. Since eBay considered these reviews to be proprietary content, the company threatened with a lawsuit, and Amazon discontinued its import function. With the emergence of further platforms and the *sharing economy*, Dellarocas et al. (2009) likewise advocated for the implementation of portable reputation for multi-homing complementors. Since then, the idea of managing digital reputation by linking profiles and creating meta-reputation scores across platforms or enabling "identity portability" has been taken up frequently (Gans 2018; Puschmann and Alt 2016; Tadelis 2016).

Beyond such calls, the transferability of reputation across platforms has thus far received only little scientific attention. Most studies deal either (a) with the effect of reputation on trust within a closed platform environment (Resnick and Zeckhauser 2002; Tadelis 2016; Ter Huurne et al. 2017; Teubner et al. 2017), or (b) with the general idea of data portability between platforms (De Hert et al. 2018; Drechsler 2018; Engels 2016), especially against the background of the European Union's (EU) General Data Protection Regulation (GDPR). The EU, for its part, is pressing for research into the mechanisms and potential benefits of reputation portability (European Commission 2016, 2017, p. 131). In this thesis, I respond to these calls and address a relevant gap in information system (IS) research. Today's platform economy is on the verge of stronger interoperability between platforms. Some platforms already offer import functions, and GDPR's Article 20 stipulates the portability of data and potentially, pending a legal consensus, also the portability of online reputation. The overarching goal of this dissertation is therefore to investigate whether, from the perspective of individual users and platforms, the establishment of reputation portability is beneficial and – assuming that this is the case – how it should be designed and implemented across digital platform ecosystems. This goal is operationalized in the following research agenda.

Structure of work and overarching research questions

Figure 2 depicts the structure of this cumulative dissertation[1]. Overall, it is subdivided in four main parts: I) the development of a general understanding of trust-building cues and the phenomenon of reputation portability, II) a detailed view on users' perception of reputation portability and its economic effectiveness, III) an exploration of the design, display, and implementation of reputation signals from different sources, and IV) an outlook with concluding remarks and avenues for future research.

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[1] This work is based on the results and contributions of seven major studies that have been published in peer-reviewed journals, conference proceedings, and publicly accessible online repositories. Most of these studies are parts of joint research endeavors together with my esteemed colleagues Timm Teubner, Marc T.P. Adam, David Dann, Fabian Braesemann, and Otto Hans-Martin Lutz. They will be indicated as such in the respective chapters of this dissertation.

Part I: THE FOUNDATIONS OF REPUTATION PORTABILITY

| Chapter 1 **Trust-building and reputation** | Chapter 2 **Conceptualizing reputation portability** |

Part II: THE ECONOMICS OF REPUTATION PORTABILITY

| Chapter 3 **User perceptions and a market data perspective** | Chapter 4 **Trust measures and import thresholds** |

Part III: THE DESIGN OF REPUTATION PORTABILITY

| Chapter 5 **Signal discrepancy and cognition** | Chapter 6 **Designing reputation portability** |

Part IV: OUTLOOK

| Chapter 7 **Quo vadis, reputation portability?** |

FIGURE 2: STRUCTURE OF THIS THESIS

This thesis is further partitioned into seven chapters. Chapter 1 is titled "Trust-building and reputation" and consists of two sub-chapters. First, it motivates the need for research and introduces the research agenda as well as the overarching structure and methodologies. Second, laying the basis for further research, it provides a cross-platform comparison of trust-building cues and examines the context-specific importance of these tools in the eyes of platform users. This chapter draws on joint work together with Prof. Dr. Timm Teubner, Dr. David Dann, and Dr. Fabian Braesemann, which was published in the proceedings of the *Hawaii International Conference on System Sciences* (Hesse, Dann, et al. 2020). It builds on the previous observation that two-sided markets are gaining increasing importance as mediators of electronic commerce. As these businesses rely on transactions among users, central aspects to virtually all platforms are the creation and maintenance of trust. The goal of this first chapter is to understand how platforms can succeed in this task. While research has considered effects of trust-building on diverse platforms in isolation, the overall platform landscape has received much less attention. The first research question thus states:

RQ1: *How do platforms build trust and how are these trust-building mechanisms perceived by platforms users?*

Having identified reputation signals as the most important trust cues on platforms, Chapter 2 ("Conceptualizing reputation portability") introduces reputation portability as one aspect of a broader dialogue on digital identity management. The article has been published in the journal *Electronic Markets* and is based on research with Prof. Dr. Timm Teubner (Hesse and Teubner 2020a). Importantly, in this chapter, I delineate the relevant terms, actors, and concepts, discuss common mechanisms, and present a conceptual overview to structure and summarize prior research on the emerging theme of reputation portability. I thereby integrate literature

on cross-platform transfer of reputation, which thus far has been fragmented, and currently observed practical approaches. Deriving both the status quo and a forward-looking research agenda for the nascent topic, the second chapter addresses the following research question:

RQ2: *How can reputation portability be conceptualized along the existing literature and current practical implementations?*

Discussing the foundations of trust-building and reputation portability in digital platform ecosystems, this thesis identifies a large gap in empirical research. Hence, the second part of this work, consisting of Chapters 3 and 4, uses a quantitative approach to assess the economic potential of reputation portability. Both chapters deal with the effectiveness of imported reputation, measured as the impact on economic target variables. This is particularly important for platform operators and complementors alike, since it helps to understand whether reputation portability may generate a positive impact for these actors and, thus, whether or not it is worth the effort of implementing it.

Chapter 3, titled "User perceptions and a market data perspective", analyzes the effectiveness of reputation portability based on consumers' attitudes towards portable reputation and a case study in a real platform environment. It is based on joint work with Prof. Dr. Timm Teubner and was published in the proceedings of the *Hawaii International Conference on System Sciences* (Hesse and Teubner 2020b). First, the study presents survey data on consumers' perception of portable reputation in the platform economy to uncover domain-specific nuances. That is, we ask potential platform consumers to critically assess the idea of reputation portability. Second, the study analyzes actual market data from an e-commerce platform to assess the impact of imported reputation on price and demand, two basic indicators of sellers' economic success. It thereby systematically compares different types of complementors: those leveraging reputation import versus those who do not and/or those with prior ratings on the platform versus those without – including all potential combinations thereof.

Chapter 4, titled "Trust measures and import thresholds", considers complementors' ability to increase consumers' trust in them by importing reputational data from another platform. The study is currently undergoing the third round of reviews at the international IS journal *Business & Information Systems Engineering* and is based on a joint research project with Prof. Dr. Timm Teubner and Prof. Dr. Marc Adam. Building on the previous chapter, this study also investigates imported reputation's impact, however, this time consumers' trusting beliefs are leveraged as a proxy for complementors' economic success. To measure trust and derive specific thresholds for reputation import, the potential lever is evaluated by means of an online experiment testing specific combinations of on-site and imported star rating scores. This could, for example, help complementors to evaluate whether the import of a specific star rating score, say 4.0 stars, is worthwhile given their already existing rating – if one is available – on the platform they plan to import to. In other words: importing 4 stars can make all the difference if no prior on-site reputation exists or if the on-site rating is a meagre 2 stars, whereas importing this rating may render potential consumers more cautious if the already existing reputation shows a stellar 5.0 stars. Results from both individual chapters have been conflated in a multi-method research approach and were published in the proceedings of the *European Conference on Information Systems* with my co-authors Prof. Dr. Timm Teubner

and Prof. Dr. Marc Adam (Hesse, Teubner, et al. 2020)[2]. The overarching research question for Chapters 3 and 4 is summarized as:

RQ3: *What is the economic effectiveness of reputation portability?*

Having empirically established reputation portability's effectiveness for trust-building, the next part of this dissertation is dedicated to a detailed exploration of the design and implementation of adequate mechanism for reputation signal import.

Chapter 5, which carries the title "Signal discrepancy and cognition", pursues the evaluation of reputation portability design from a user psychology perspective. This study is based on a joint research project with Otto Hans-Martin Lutz, Prof. Dr. Marc Adam, and Prof. Dr. Timm Teubner and the article was published in the proceedings of the *International Conference on Information Systems* (Hesse, Lutz, et al. 2020)[3]. Importantly, the cognitive and economic effects of simultaneously available signals from two different platforms – especially when the information displayed to consumers is conflicting – have thus far received only little research attention. For instance, it is unclear how users would react to two – or even more – different reputation signals on a given platform and how the availability of such data would affect their behavior and decision making. Hence, to inform the design of reputation portability and assess to what extent consumers' purchase intentions may be impaired by discrepant rating information, the fourth research question states:

RQ4: *How does reputation signal discrepancy affect cognition and purchase intentions?*

Under the title "Designing reputation portability", Chapter 6 provides practical design guidelines for direct reputation import between platforms. This article has been published as a single authorship working paper on *ResearchGate* (Hesse 2020). Since the design of adequate solutions for reputation portability has thus far received no scholarly attention, this paper addresses an important gap in the literature. Namely, to date no study exists that tries to understand how exactly reputation portability should "look", what type of information may be displayed, and which minimum set of features and functionalities such a system requires. Based on a hybrid approach of deductive and inductive reasoning, in this study I leverage qualitative data from a series of semi-structured interviews that were conducted with platform stakeholders to derive actionable design recommendations. The overarching research question for this chapter thus states:

RQ5: *How should reputation portability be designed and implemented in digital platform ecosystems?*

Lastly, Chapter 7 is titled "Quo vadis, reputation portability?" and concludes this work. It summarizes and discusses the thesis' contributions and provides answers to the research questions as set forth in this introductory chapter. Furthermore, in the final chapter I take a forward-looking perspective in considering limitations and deriving potential paths for future research. As such, this chapter re-evaluates reputation portability's ability to serve as an important lever for individuals' mobility and digital sovereignty in online markets.

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[2] Please note, however, that this short paper is not part of this dissertation as it represents a distillation of the more fine-grained results presented in Chapters 3 and 4.

[3] This contribution won the award for best short paper in the "Sharing Economy, Platforms and Crowds" track and was nominated as best overall conference paper.

Methodology

To answer the previously introduced research questions, this dissertation leverages a range of data collection and analysis methods, thereby addressing the phenomenon of reputation portability from a variety of angles. Generally speaking, research can be classified into two broad epistemological philosophies: positivism and interpretivism (Hovorka and Lee 2010; Weber 2004). While the former is often grounded in empiricism and quantitative data and demands science be reproducible and objective, the latter actively promotes the researcher's subjective role in uncovering structure and meaning in the (often qualitative) data. Nevertheless, simply allocating a particular study into one of these research paradigms may not always be fitting. As a matter of fact, IS research has historically leaned towards one end of the spectrum, that is, embedded in the positivist natural science toolkit of quantitative measurement, statistical significance, and hypothesis testing (Mingers 2001). However, given information systems' fundamental importance for modern society, the IS discipline intersects with and borrows from a wide range of fields, including the social sciences. While the practice of mixed method research[4] is common in these areas, more recently IS research has also started to embrace and actively advocate for methodological pluralism (Mingers 2001; Niehaves 2005; Petter and Gallivan 2004; Walsham 1995). Most importantly, the argument brought forward by Mingers (2001, p. 241) is that "a richer understanding of a research topic will be gained by combining several methods together in a [...] research program." In this sense, there is a *phenomenal* consideration to be made, which extends quite naturally to the case of reputation portability. Namely, that by applying different methods, attention will be drawn to different aspects of the study object. Hence, to address its full panoply, methodological diversity is indeed necessary, if not mandatory (Niehaves 2005).

In line with this reasoning, for the work at hand I therefore apply a range of research methods to investigate reputation portability and grasp in its entirety the multi-faceted and nascent topic. Considered collectively, this cumulative dissertation hence follows a mixed-method approach of combining positivist and interpretive research paradigms. However, even within individual chapters (e.g., Chapters 1, 3, and 5) both multi and mixed methodology will be proposed to collect and analyze data. Figure 3 provides an overview of these approaches, which have been mapped to the respective parts of the thesis.

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[4] One may wish to distinguish *multi-method* research, which, in its simplest definition, employs more than one method in a single study (e.g., either two quantitative *or* two qualitative) from *mixed method* research, which combines both quantitative and qualitative methods within one study (Petter and Gallivan 2004)
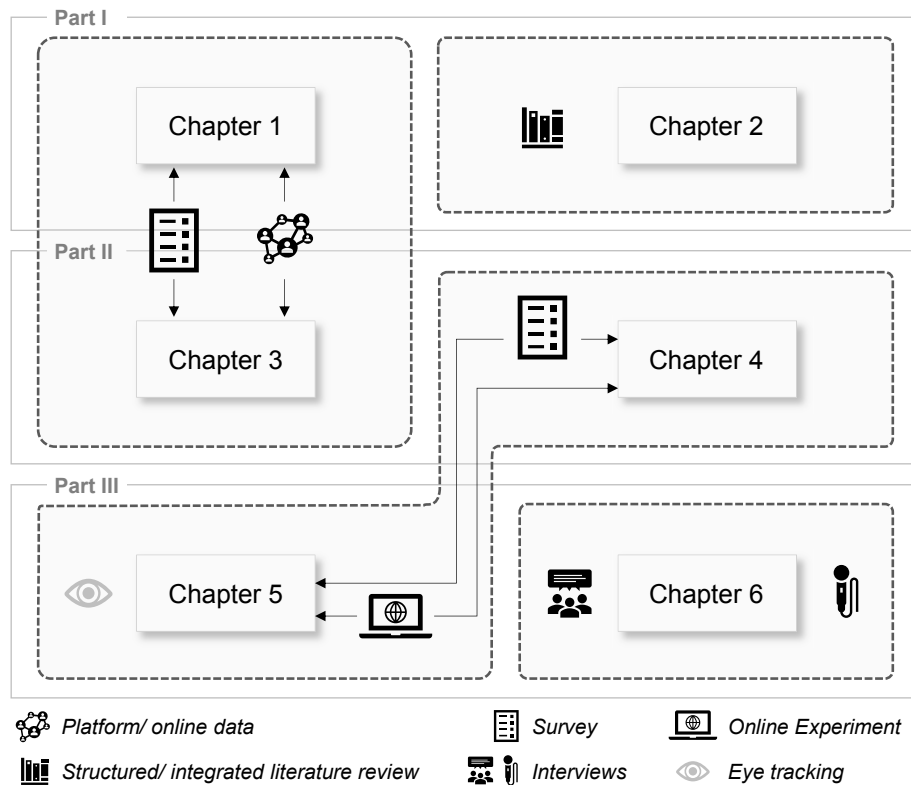
FIGURE 3: OVERVIEW OF DATA COLLECTION AND METHODS APPLIED IN THIS THESIS

Both Chapters 1 and 3 rely on empirical platform data, which is publicly accessible online. In Chapter 1, attributes of individual user profiles are retrieved to get a better understanding of the trust-building mechanisms deployed across eleven different platforms, whereas in Chapter 3, profile data from a single platform (allowing the import of ratings) is collected to investigate reputation portability's effectiveness. Additionally, both chapters leverage data from a survey administered online to study participants, with the goal of understanding their general preferences for trust-building cues (Chapter 1) and reputation portability specifically (Chapter 3). This survey also collects open-ended verbal statements on the potential use of reputation portability. In a content analysis, the qualitative data is then coded quantitatively by categorizing statements thus, again, connecting different epistemological positions (Stol et al. 2016).

Chapter 2 relies on a structured and integrative literature review as a research method in its own rights. While each chapter by itself presents a brief overview of literature relevant to the respective research question, Chapter 2 looks at the nascent body of literature as well as practical examples with the aim to assess, critique, and synthesize existing work on reputation portability and to create a first conceptualization of the emerging topic. Integrative literature reviews have been deemed particularly useful for such purposes (Snyder 2019).

Within the domain of IS research, the use of surveys has a long-standing history. Especially in the context of technology perception models, survey-based research has produced seminal work. These studies greatly advance our understanding of the usefulness and adoption of technology and e-commerce marketplaces as well as users' trusting beliefs and purchase intentions in online environments (e.g., Davis 1989; Gefen 2002; Gefen et al. 2003; Legris et

al. 2003; Venkatesh et al. 2016). Chapters 4 and 5 both leverage data gathered in an online experiment, for which a total of 500 Internet users were recruited on Prolific.co (Palan and Schitter 2018; Peer et al. 2017). Participants in these experiments were presented with a stylized reputation portability scenario, that is, complementors' profile pages exhibiting both reputation on the platform itself but also imported ratings from another platform. The items on the questionnaire are based on well-established constructs in the IS literature, borrowing, inter alia, from the pioneering works introduced at the beginning of this paragraph. From the data thus collected, different sub-samples and target variables are evaluated in Chapters 4 and 5, respectively. Moreover, Chapter 5 proposes a multi-method approach of combining this survey data with an additional explanatory layer of data from an eye tracking experiment, which was successfully tested and calibrated for application in future studies. Relying on the positivist research framework, Chapters 1, 3, 4, and 5 all apply statistical analyses (e.g., linear and multivariate regressions) to investigate the quantitative data, explain relationships between the observed variables, and infer causal effects.

Finally, I supplement these positivist approaches with a different type of knowledge on reputation portability, one that rather seeks to *understand* the context of the phenomenon under investigation than to *explain* antecedent-consequent relationships between independent and dependent variables (Hovorka and Lee 2010). Thus, in the penultimate chapter (i.e., Chapter 6), a series of ten semi-structured interviews is conducted to collect qualitative data in an interpretivist approach to research. Leveraging said data by means of a reflexive thematic analysis (Braun and Clarke 2006, 2019), the chapter explores the potential design of reputation portability in digital platform ecosystems based on the researcher's (i.e., my own) subjective interpretation of study participants' expressed views. I will provide more details on each chosen method and the overarching methodology throughout the respective chapters and in the Appendix.

Understanding the platform economy

To lay the basis for the subsequent discussion of reputation portability, in this second part of Chapter 1, I present an overview of trust-building mechanisms across digital platform ecosystems. First, this study introduces a taxonomy of trust cues leveraged on platforms. Second, it investigates the context-specific importance of these cues as perceived by platform users. The findings reveal that both platforms' provision and users' perceptions of trust-building mechanisms are informed by a platform's degree of social interaction.

Maik Hesse, David Dann, Fabian Braesemann, Timm Teubner[5]

Introduction

Two-sided platforms have gained accelerating importance and research attention over the last couple of years (Stummer et al. 2018; Van Alstyne et al. 2016). Examples from the consumer-to-consumer domain include services for accommodation (e.g., Airbnb, Homestay) and carsharing (e.g., Drivy, Turo), mobility (e.g., BlaBlaCar, Uber, Wingly), e-commerce (e.g., eBay, Gumtree), crowd work (e.g., Helpling, TaskRabbit), and many more. Such platforms have caused significant changes in many incumbent businesses along with the reorganization of a wide variety of markets, work arrangements, as well as value creation and capture (Economist 2013; Kenney and Zysman 2016; Sundararajan 2016).

As platform-based business models rely on the realization of transactions among peers, a central aspect to virtually all platforms are the creation and maintenance of peer-trust (Hesse and Teubner 2020a; Mazzella et al. 2016; Tadelis 2016; Teubner 2018). While recent research has considered the effects of trust- building mechanisms on different platforms separately (e.g., how profile images and star ratings affect trust and booking intentions on Airbnb; Ert et al 2016), the overall platform landscape as a whole has received much less research attention (Teubner and Dann 2018).

We suggest that a broader assessment of trust and reputation across platforms is urgently needed. Comprehending how platform operators act to govern and guide user behavior and usage patterns in digital platform ecosystems can allow for better understanding of resulting behaviors and outcomes—and vice versa. By offering mechanisms to build trust and reputation, platforms acknowledge that economic transactions are "socially embedded" (Granovetter 1985). Ratings, reviews, and expressive user profiles function as "systems of control" (Granovetter 2005) to counter opportunism in digital environments, as they inform about the "identity and past relations of individual transactors" (Granovetter 1985, p. 491). Based on this reasoning, we conjecture that platforms' degree of social interaction (DoSI; i.e., the extent to which personal interactions between platform users become part of the overall

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[5] This study was published in the proceedings of the *Hawaii International Conference on System Sciences* with the title "Understanding the Platform Economy: Signals, Trust, and Social Interaction" (Hesse, Dann, et al. 2020); see https://doi.org/10.24251/HICSS.2020.631.

value proposition and may enable positive social experiences; Hawlitschek, Teubner, et al. 2018) represents a key driver of the adequacy and use of trust cues.

Our research objective, thus, is threefold. First, based on actual market data crawled from the Internet, we provide a cross-platform overview and propose a categorization for the different mechanisms platforms employ to build and maintain trust between users. In addition to uncovering this full palette of trust-building tools available to platform users, we also highlight the frequency of utilizing said mechanisms. Second, based on self-reported data from a consumer survey, we analyze how the available mechanisms are actually perceived and evaluated—and thus shaped—by the specific platforms' users while also investigating which additional trust cues they would like to see. In this sense, we juxtapose the availability (platform perspective) with the usage frequency (user perspective: provider) and perceived importance (user perspective: consumer) of trust-building on two-sided markets. These perspectives help us to better understand which of the many striking observations are specific to certain platforms—and which point to more fundamental phenomena of the platform economy as a whole. Third, thanks to the multi-platform perspective presented here, we are able to compare the use and perceived importance of trust-building mechanisms with respect to a platform's degree of social interaction.

To evaluate our reasoning, we draw on two independent and unique data sets: To start with, by considering eleven platforms from various domains and assessing several characteristic statistics, including rating scores, activity concentration, and profile images from a total of over 42,000 user profiles. Next, by combining this empirical *market* data with quantitative and qualitative *survey* data that we collected from 187 participants. They evaluated the importance of different trust-building mechanisms across several platform types (e.g., accommodation, mobility, etc.).

In a nutshell, our results show that most of the investigated platforms make use of a variety of means for trust-building—yet that there exist marked differences in how users actually utilize them. Both, usage and perceived importance depend on context: the higher a platform's degree of social interaction, the more trust cues are used and deemed important.

Related Work

Typical users of consumer-to-consumer (C2C) platforms are non-professional individuals with neither an established brand image nor global recognition. Consumption on these platforms requires different levels of trust (Zarifis et al. 2019), yet many C2C transactions yield high economic, social, and physical exposure (Hawlitschek et al. 2016). Users of BlaBlaCar (rides) and Wingly (flights), for instance, literally put their lives into the hands of their respective driver or pilot. Trust (into the prospective good/service provider) is hence of utmost importance, as the degree of interaction between users is very high (Möhlmann 2015). As recent research shows, high levels of trust can be achieved without prior in-person encounters (Mazzella et al. 2016). We will now review which levers specifically create trust and propose a taxonomy for them.

Research from the domains of economics, information systems, and electronic commerce has studied the role of online reputation for trust-building, realization of transactions, and prices for almost two decades (Bolton et al. 2013; Resnick et al. 2000; Tadelis 2016). The positive economic effects of *transaction-based* trust cues (e.g., star ratings and text reviews; see (Hesse

and Teubner 2020a) for a definition) have been broadly investigated across a range of platforms: from earlier work on realized price premiums for providers on eBay (Ba and Pavlou 2002; Resnick et al. 2006) to more recent investigations of effects on sharing economy platforms such as Airbnb (Qiu et al. 2018; Teubner et al. 2017) or BlaBlaCar (Otto et al. 2018).

In view of the ever-increasing importance of platform business models and the emergence of C2C platforms with private individuals in the role of providers, online reputation and user representation are charged with particular meaning. Personal aspects and individual characteristics are essential to many C2C platforms and transactions (Möhlmann 2016), and that is for at least two reasons. First, contingent on the specific platform type, social interactions between users do take place. Certainly, the extent of these encounters can vary— from mere online communication to co-usage sharing. In the latter case, personal interactions between users are a prerequisite for the transaction to materialize. Second, scenarios that involve personal interactions may create additional, social value for consumers. This implies that providers themselves are part of the overall value proposition of the platform (pleasant and locally versed Airbnb hosts or entertaining BlaBlaCar drivers; Dann et al. 2018; Hawlitschek, Teubner, et al. 2018; Tussyadiah 2016a).

Research has thus focused on the role of social experience and benefits beyond economic and product-related considerations for platform usage. In fact, social motives are frequently reported as a driver of consumption on C2C platforms (Bellotti et al. 2015; Botsman and Rogers 2010; Tussyadiah 2015). Moreover, consumers' intention to use said platforms is shown to be positively influenced by social utility (Barnes and Mattsson 2017; Bucher et al. 2016; Oyedele and Simpson 2018; Schaffner et al. 2017). In consequence, providers can benefit from users' expectations of social value and accordingly market their product and themselves as a centerpiece of the overall usage experience (Harris and Rae 2011; Tussyadiah 2016b). Thus, the prospect of interpersonal trust from social contact enables these providers to become their own brand (Mazzella et al. 2016). However, this works only, if the transacted product or service is related to personal interaction. If the interaction is limited to the exchange of standardized goods on an e-commerce platform, for example, there is little need in providing "brand-building" trust cues.

In cases where the degree of social interaction is high, platforms provide dedicated means to create *expressive user profiles*. Trust towards a prospective interaction partner, therefore, hinges on what is conveyed through the platforms' user interfaces—including supposedly incidental clues such as personal preferences, facial expressions, wording, etc. Previous findings suggest that high-quality sellers display a wider array of signals (Mavlanova et al. 2012) and recent research has begun to examine this particular role of user representation explicitly (Abramova et al. 2017; Ert et al. 2016; Fagerstrøm et al. 2017; Ma et al. 2017). Moreover, the proliferation of trust mechanisms has raised interest in view of regulation as there arise new potential harms, including new forms of discrimination (Edelman et al. 2017) as well as possibilities for strategic manipulation and market failure (Watt and Wu 2018).

On a different note, a user's verified identity—validated and vouched for by the platform or an external institution—can signal authenticity to other participants and platform operators have developed a range of mechanisms (Mazzella et al. 2016; Sundararajan 2014). Such *identity verification* was shown to increase trust, for instance in online dating (Norcie et al. 2013). In the context of peer-to-peer accommodation sharing (e.g., Airbnb), the availability of verified

identity is a popular research topic (Dolnicar 2017; Guttentag 2015; Jung and Lee 2017). While some studies state a positive effect of verified identity on prices (Wang and Nicolau 2017) others find no significant effects (Teubner et al. 2017; Xie and Mao 2017). Another means of identity verification is the practice of linking social network accounts across online platforms (Y. Chen et al. 2014; Silvestri et al. 2015).

Moreover, platforms deploy additional mechanisms to promote trust in service providers. The use of badges as a sign of achievement has been described in the context of social networks, but can generally be extended to all types of digital platforms (Kwon et al. 2015). Empirical analyses show the effects of these badges on Airbnb ("superhosts"; Ert and Fleischer 2019; Neumann and Gutt 2017; Teubner et al. 2017; Xie and Mao 2017) but usage is prevalent on other platforms as well (e.g., Uber; Scheiber 2017). Further *implicit information* includes the number of transactions/reviews and users' membership duration (Qiu et al. 2018; Teubner et al. 2017; Xie and Mao 2017).

Beyond mechanisms to *increase* trust (e.g., through ratings), platforms also employ means to mitigate risks (e.g., fraud) and hence *reduce* users' trust thresholds. Such "e-commerce institutional mechanisms" include insurances and warranties, escrow payment services, and privacy assurances (Fang et al. 2014). In addition to trust into prospective transaction partners, also trust into the platform itself represents a prerequisite for transactions to materialize. Importantly, a platform's trustworthiness is suggested to rub off on the providers on the platform ("trust transfer"; X. Chen et al. 2015; Möhlmann and Geissinger 2018; Teubner et al. 2019).

While extant research has mainly considered platforms and trust cues in isolation, with this paper, we extend this body of literature by providing a cross-platform trust cue "panorama" and classification, which allows to take the varying degrees of social interaction as a driver of the usage and adequacy of trust cues into account.

How platforms build trust

Taxonomy for trust-building cues

Overall, platforms use a variety of mechanisms for reputation management and trust-building. Based on our review of related work and in situ exploration across a broad range of platforms from different contexts, we propose the following categorization:

(1) *Transaction-based* trust cues refer to evaluations provided by prior transaction partners. These may be numeric (e.g., star rating scales, positive/negative) or written assessments (e.g., text reviews).

(2) Socially rich and *Expressive User Profiles* are created and organized by users individually. Typical content includes photos/profile images, self-descriptions, video messages, or references to external resources. We hypothesize that such trust cues' importance increases with a platform's degree of social interaction.

(3) Next, *Identity Verification* refers to the platform examining a user's personal identity and authenticity, for instance, by email or phone number confirmation. Moreover, depending on context, identity verification may include the provision of an ID card, licenses, or linkage to online social network accounts.

(4) Last, *Implicit Information* and distinctions such as status badges or the display of a users' membership duration, number of transactions, or average response time are provided by the platform and accentuate a user's particular status, behaviors, achievements, or merits.

Degree of Social Interaction (DoSI)

Table 1 introduces the notion of platforms' degree of social interaction—defined by the level of personal interaction and social experiences on a given platform (Möhlmann 2016). A platform's classification is based on two factors: (1) the necessity for and degree of physical encounters for service provision and (2) the extent to which personal interaction with the service provider is part of the overall value proposition—in addition (and as opposed to) focusing solely on the underlying product or service. Hence, where personal experience becomes a constituent part of the overall value proposition, *Expressive User Profiles* are particularly well-suited to convey information to prospective consumers. One would expect this to be reflected in both the availability of expressive trust cues as well as their perceived

DoSI	Rationale
Low	No physical encounters between seller and buyer; very limited online communication; focus entirely on the sold product; interaction purely transactional (e.g., e-commerce)
Moderate	Physical encounter with provider possible (e.g., brief interaction for service handover); focus on underlying commodity (e.g., apartment, car); personal interaction may add to the value proposition (e.g., accommodation, carsharing)
High	Physical encounter with provider prerequisite to service provision; consumers entrust physical safety, access to property to provider; focus on service *and* provider; personal interaction part of value proposition (e.g., accommodation, mobility, crowd work)

Note: Within in the same type of platform, nuances may occur for the DoSI and are reflected here (e.g., staying in a shared apartment (*high* DoSI) vs. renting an entire home (*moderate* DoSI) on an accommodation platform)

TABLE 1: DEGREE OF SOCIAL INTERACTION (DoSI)

importance.

Proposition: *A platform's degree of social interaction is positively related to (1) the usage of Expressive User Profile elements by providers and (2) the importance of such cues in the eyes of consumers.*

Methods

Data Collection 1: To examine how platforms build trust (empirically) and to evaluate our proposition, we draw on actual and recent market data. In a first step, we inspect the outlined platforms and trust-building mechanisms manually. Note that within the scope of this paper, we focus on trust into the providers (i.e., hosts, drivers, workers, lessors, sellers). Naturally, providers' trust into consumers is essential as well since providers face considerable levels of economic exposure and, after all, usually have the last say in whether a transaction will actually be realized. Using web scraping (implemented in Java), we then retrieve samples of user profiles and the associated data such as ratings, descriptions, profile images, and so forth for each platform. Overall, we queried 11 platforms collecting data points of more than 42,000 user profiles. Data was collected between August and September 2018 and is available from

the authors upon request. Table 2 summarizes the web-crawling results on the use and characteristics of different trust cues on the respective platforms (*Airbnb, Homestay, Wimdu, EasyCarClub, Drivy, Turo, BlaBlaCar, Wingly, eBay, Gumtree, TaskRabbit*).

	Platform	(1) Transaction-based				(2) Expressive User Profiles				(3) Identity Verification				(4) Implicit Info		
		Rating Score		Text Review		Profile Image		Self-Description		Email	Phone	ID	SNS	#T	#R	Since
		Mean	Skew	Length	Sent.	Frequ.	Face	Frequ.	Length							
🏠	Airbnb	92.34	.81	189	.85	1.00	.61	.58	234	×	×	×	×	·	×	×
	Homestay	4.71	.85	216	.86	.99	.60	.54	108	×	×	×	·	·	×	(×)
	Wimdu	9.16	.79	265	.76	.89	.45	.62	140	·	(×)	·	·	·	×	·
🚗	EasyCarClub	4.91	.95	122	.89	.50	.32	.18	175	×	·	·	·	×	×	·
	Drivy	4.83	.91	76	.81	.66	.51	.26	137	·	·	·	·	×	×	×
	Turo	4.86	.93	110	.87	.93	.56	.08	139	×	×	·	×	·	×	×
📍	BlaBlaCar	4.81	.90	69	.87	.86	.81	.62	121	×	×	×	×	·	×	×
	Wingly	4.99	.99	221	.81	.90	.46	.55	234	·	×	×	·	·	×	×
📦	eBay	99.55	.99	213	.81	.16	.01	.02	136	·	·	·	·	·	×	×
	Gumtree	4.21	.62	·	·	·	·	·	·	·	·	·	·	·	×	×
🔗	TaskRabbit	95.52	.89	92	.86	1.00	.92	1.00	166	·	·	(×)	·	×	×	·

Note: Sent. = sentiment ([0, 1], English texts only); text lengths in median values; SNS = social network sites; #T = number of transactions; #R = number of reviews

TABLE 2: PLATFORMS' AND USERS' USE OF TRUST-BUILDING MECHANISMS

Data Collection 2: As a second step, we launched an online survey[6]. Participants were recruited via Prolific.ac (Palan and Schitter 2018) with a total of 204 participants from across the EU, the US, Canada, and Israel. We controlled for online shopping frequency (i.e., more than once per month) and age (i.e., 18-49; mean=33.7, 66% female) and equally divided study participants among five platform types (accommodation, carsharing, mobility, e-commerce, crowd work). A total of 187 valid responses remained after attention and completeness checks. Based on the empirical findings, we asked participants to rate the overall importance of the different trust-building mechanisms as well as the importance of individual artifacts and properties (such as face visibility) on 7-point Likert scales. We added open-ended questions that were manually coded into categories, for example, other drivers of trust and distrust, and general drivers of platform use. The data was collected in May 2019, reviewed, and coded independently by two researchers. Table 3 summarizes the survey results on the importance of specific trust-building mechanisms per platform type.

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[6] See Appendix for further details.

	Platform type	(1) Transaction-based		(2) Expressive User Profiles			(3) Identity Verification				(4) Implicit Info	
		Rating Score	Text Review	Profile Image Imp.	Face	Self-Description	Email	Phone	ID	SNS	#T	Since
🏠	Accommodation	6.59	6.36	5.05	4.49	3.69	6.49	6.44	6.56	4.41	6.15	5.85
🚗	Carsharing	6.31	5.94	4.39	4.44	3.83	5.89	6.31	6.53	3.64	5.75	5.69
📍	Mobility	6.22	5.41	6.16	6.43	2.89	5.32	6.14	6.70	3.03	5.59	5.54
📦	E-commerce	6.15	5.85	2.98	2.40	2.18	5.53	4.93	5.18	3.43	5.85	5.03
🔗	Crowd work	6.11	5.89	4.63	4.86	4.69	5.86	5.94	6.00	3.89	5.57	5.23

Note: n=187; values on Likert scale [1,7]; Imp. = importance; SNS = social network sites; #T = number of transactions; ⬜x = importance > 6.0; ⬜x = importance < 4.0

TABLE 3: IMPORTANCE OF TRUST-BUILDING MECHANISMS PER PLATFORM TYPE

Results

Platform and provider perspective

Table 2 summarizes the platforms' use of trust-building mechanisms and how these are being utilized by their users. As can be seen, many of the identified artefacts such as rating scores, text reviews, and profile images are present on most platforms, while others are less common (e.g., social media linkage). Moreover, there are marked and platform-contingent differences in how they are being used.

Rating Scores—All considered platforms use some sort of numerical rating score. The mechanisms vary in terms of scales, aggregation, granularity, and display. While some platforms display a five-star rating scale rounded to half stars (e.g., Airbnb, Turo), other platforms offer a more fine-grained display (e.g., .10 stars; BlaBlaCar, Gumtree). We observe rather skewed rating score distributions where a majority of users on most platforms exhibit highly positive ratings. This is not unexpected since rating scale skewness represents a common phenomenon across platforms and domains (Schoenmueller et al. 2018; Zervas et al. 2015). Figure 4 shows the cumulative (log-scaled) fraction of users with ratings smaller or equal to a specific rating score (from min to max). Most platforms exhibit rather similar patterns of rating score skewness, while there exist outliers in both directions. Table 2 reports a quantification of the platforms' rating score skewness (determined similar to the Gini index with 0 ≤ skewness ≤ 1). For a recent study on the antecedents of such extreme distributions on review sites and platforms, we refer to (Schoenmueller et al. 2018).

Profile Images—Faces create trust (Ert et al. 2016; Teubner et al. 2014). It is hence not surprising that almost all platforms offer the possibility to upload a profile photo. Note, however, that there occur marked differences in how this option is exerted by the users. For instance, users may upload a profile photo both on eBay and Airbnb but, while virtually all hosts on Airbnb have uploaded a photo (99.8%), only a minority has done so on eBay (15.8%); a finding that is in line with our proposition. In addition, facial recognition analysis (using Microsoft's *Cognitive Services*; Microsoft 2018a) reveals that the fraction of users with a "proper" profile photo, that is, a photo for which a face is detected by the software, ranges from 1% (eBay) to 92% (TaskRabbit).
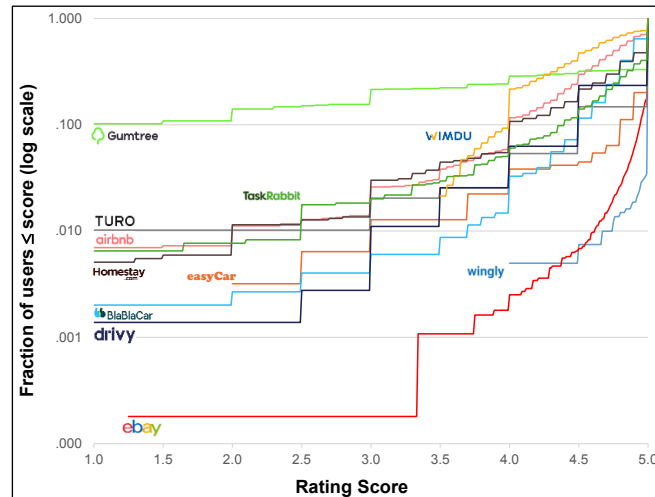
FIGURE 4: RATING DISTRIBUTION ACROSS PLATFORMS

Text—Moreover, the way people write about themselves and others differs between platforms (e.g., in terms of text length and sentiment). While on eBay, only 2% of sellers provide a (rather short) personal description about themselves, the saliency of textual self-descriptions is significantly higher on platforms characterized by a higher degree of social interaction (e.g., Airbnb: 58%). Similarly, reviews vary considerably in length between platforms. Also, there exist subtle platform-specific differences of *how* users write about each other. Text sentiment analysis (Microsoft 2018b) shows that a vast majority of text reviews is highly positive (ranging from 0 to 1).

Identity Verification—Mechanisms for identity verification are less widely used across platforms. While Airbnb and BlaBlaCar display a wide range of identity verifications (email, phone, id, social network sites), other platforms (e.g., eBay, Drivy) do not make any use of it.

User Activity—Another property for platform distinction roots in the concentration of user activity as indicated by the number of completed (and reviewed) transactions. Figure 5 shows the cumulative fractions of user activity against the user samples. As can be seen, concentration varies markedly.
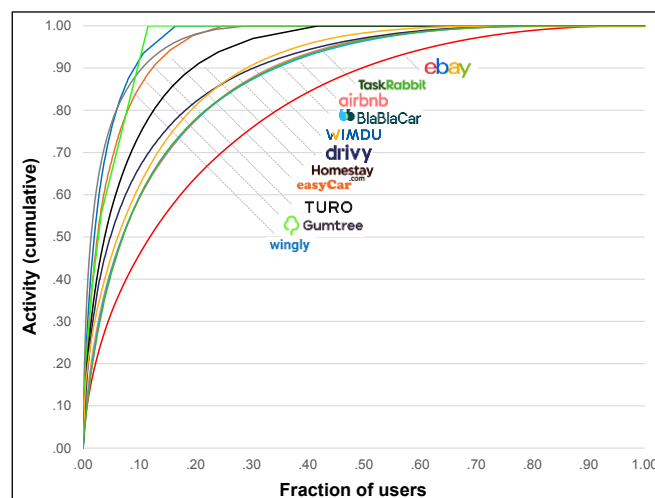
FIGURE 5: ACTIVITY CONCENTRATION ACROSS PLATFORMS

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Consumer perspective

To better understand platform users' preferences, we asked survey participants to rate how important they personally deem the different trust cues across platform contexts (Table 3; 7-point Likert scales labelled as (1)="not important at all" to (7)="very important"). Several observations are remarkable:

Rating scores—Within transaction-based trust cues, rating scores unanimously score highest in importance when deciding to book/buy a service from a prospective provider (i.e., consistently rated above 6 out of 7). This appears natural given ratings represent the most commonly deployed signal. Users rely on it more than on text reviews in each investigated platform type though the latter also receives generally high ratings for importance.

Figure 6 depicts both actually observed rating scores from across the 11 platforms and the category-specific *trust thresholds*. These thresholds are based on survey respondents' stated star rating score (on a scale of 1.0-5.0 stars) above which they would generally consider a provider as trustworthy. All platform rating scores have been normalized to the 1−5 stars interval accordingly. A striking observation is that the average thresholds are much lower than the vast majority of actual ratings with only very few outliers falling short of the thresholds.
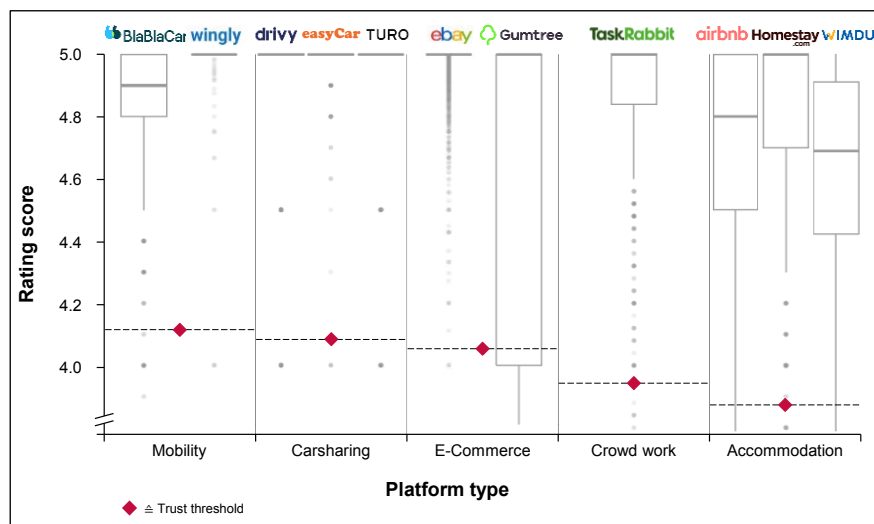
FIGURE 6: ACTUAL SCORES VS. TRUST THRESHOLDS

Profile images—We observe marked differences in the perceived importance of profile images. The results seem to be mirroring our market data findings and corroborate our reasoning on the degree of social interaction. Especially low ratings within the e-commerce category (2.98) are well in line with actual usage of profile images on these platforms (only 16% and no option to upload, respectively); if users do not find it important, as their interaction with transaction partners is limited, then there is not much reason to upload one. However, there is a high demand for profile images on mobility platforms and visible faces (each >6). As we have seen, not all providers use profile images on the investigated platforms but may benefit from doing so.

Self-description—Participants were explicitly asked to rate the availability of self-descriptive elements such as hobbies, occupation, or personal background. Overall, these seem to play a minor role for building trust. Only in the crowd work category did participants rated them as

important. When prompted to comment on particularly helpful pieces of personal information "skills" and "experience from previous jobs" occurred frequently. Other than that, users seem to be somewhat indifferent towards extensive use of such trust cues.

Identity verification—We notice clear support for verified provider identity, especially on platforms with the potential for higher degrees of social and in-person interaction such as mobility, crowd work, and accommodation but also for carsharing. In e-commerce these elements play a less important role. This makes sense given its rather transactional-focused and impersonal nature. It is noteworthy, however, that the linkage of social network accounts is not deemed as of high importance.

When directly asked for additional trust cues users would like to see, the provider's age came in on top with 11% of all participants mentioning this aspect explicitly (17% and 14% for carsharing and mobility, respectively). Albeit demanding this piece of information can be considered discriminatory, long years of experience and a certain maturity seem to play a role for services that involve driving or renting out vehicles. Other elements that have received mentions are legal background checks for providers on mobility (27%) and accommodation platforms (5%). Detailed policies on this topic are opaque though at least some platforms seem to be conducting background checks in some jurisdictions (e.g., Airbnb, Uber).

DoSI perspective

To evaluate our proposition, Figure 7 combines both platform and user perspective. It plots the empirically observed frequency of trust cues from the *Expressive User Profiles* category (i.e., profile image availability (PIA), face visibility (FV), self-description availability (SDA); Table 2) for the 11 platforms against the stated importance of these elements by survey participants per platform type (Table 3; n=33). Drawing on our reasoning from Table 1, the color-coding represents the platform's respective degree of social interaction[7]. This value seems to explain both frequency and importance of "soft" trust cues well. In addition, the fitted regression indicates a positive relation between actual usage of these mechanism and perceived importance (Figure 7).
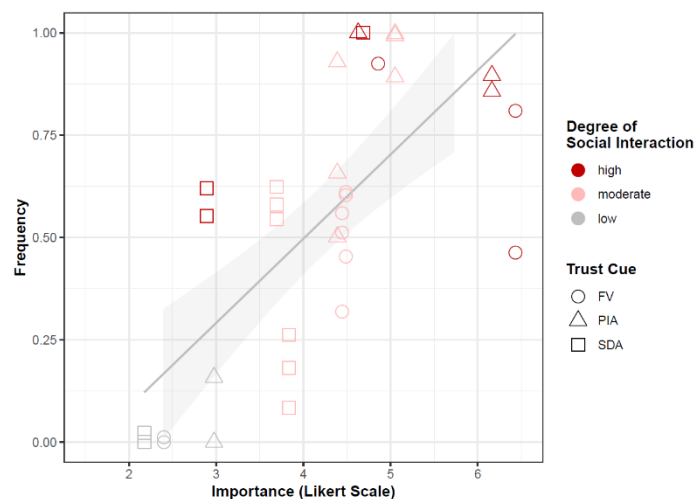
FIGURE 7: FREQUENCY OF SOCIAL CUES VS. IMPORTANCE

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[7] Low: e-commerce; Medium: carsharing, accommodation; High: mobility, crowd work

First, usage frequency and importance are in fact correlated positively (Pearson r=.711, p<.001). Moreover, two OLS regression analyses provide support for the conjectured relations between a platform's degree of social interaction (DoSI; coded numerically as 1 to 3) and *providers'* use of different trust cues on the platform (b=.362, p<.001; R^2=.53; n=33) as well as between platform domain's DoSI and *consumers'* assessment of the importance of trust cues within that domain (b=1.129, p<.01; R^2=.50; n=15).

We acknowledge the fact that nuances in the DoSI may occur depending on the type of transaction within a particular platform (see Table 1 for an explanation). Hence, we varied the DoSI value for accommodation platforms as a sensitivity check for our model. For instance, alternating the DoSI score from "moderate" to "high" for accommodation sharing yielded almost identical estimates for the regressions.

Discussion

The rise of the platform economy has led to the emergence of multi-sided markets "that shape the terms on which participants interact with one another" (Kenney and Zysman 2016). Given the paramount role of platforms' design choices for many of today's social and economic interactions, this paper sets out to provide a practical overview and empirical insight into the ways platforms build trust between their users and, in turn, how those measures are perceived by platform participants.

As outlined, for many of today's platforms dealing with experience products, a blurring occurs between trust-building, marketing, and product/service descriptions. Beyond the role for trust-building, personal information about providers can play a substantial role in the offer's value proposition as many people explicitly look for social value such as authenticity, good conversations and company, or cultural experiences (Hawlitschek, Teubner, et al. 2018; Tussyadiah 2016a). In this sense, providers on peer-to-peer platforms have themselves become part of the product they are offering and will make use of the full breadth of the trust cue palette to advertise their services. Our analysis yields some key take-aways along those lines:

Most of the studied platforms employ all four basic types of trust-building mechanisms as introduced within this work (*Transaction-based* cues, *Expressive User Profiles*, *Identity Verification*, *Implicit Information*). Despite several similarities, there exist marked differences in how these mechanisms are being utilized and how their importance is perceived by the platforms' users. Specifically, user profiles are particular expressive on platforms that are characterized by a high degree of social interaction. This is in line with the finding that "social aspects and individual characteristics become more relevant in this particular context" (Möhlmann 2016, p. 26). Contrary, expressiveness is much lower on platforms for renting and selling, i.e. those platforms on which user interactions are limited. This justifies the labeling of elements from the *Expressive User Profiles* category as soft trust cues—when deciding to book or buy from a particular provider, users, in many cases, deem "hard" trust cues (especially *Transaction-based* cues and *Identity Verification* but also *Implicit Information*) of higher importance.

Now, when accepting the premise that there exists a link between a platform's degree of social interaction and its use of expressive trust cues, one may draw on any platform's use of such cues to infer its degree of social interaction, providing a convenient and efficient parameter to compare platforms. It strikes the eye that especially e-commerce platforms such as Gumtree

and eBay (and their users) do not make use of the full breadth of user profile design and identity verification. While it appears plausible that the rather anonymous and impersonal nature of these platforms' transactions does in fact not necessitate the use of such means, it seems natural to ask whether they may nevertheless benefit from doing so.

Limitations and future work

Our approach does not come without its caveats and limitations and we delegate it to future work to explore the causes, effects, mechanisms, and limits of trust-building within the platform landscape in greater detail. A first suggestion is to extend our assessment to analyze the trust-building categories beyond *Expressive User Profiles* to uncover platform (type-) specific drivers of their usage in-depth. Further, the focus of this study could be broadened to encompass trust into consumers, that is, the *opposite* market side. Also, the rapid emergence and vanishing of platform-based businesses will yield new players, trust requirements, and mechanisms, all of which future research will have to take into account. One technical limitation roots in the use of Microsoft's cognitive services for text sentiment analysis and facial recognition. The latter appears to be rather conservative in flagging faces, resulting in many false negatives. Thus, the estimates for face visibility in Table 2 should be seen as lower benchmarks. Future work may want to apply more sophisticated tools and methods to our data.

On average, 51% of survey participants had used one or more platform from their assigned segment (i.e., accommodation, carsharing, mobility, e-commerce, crowd work). Yet, there occurred considerable category-specific differences. While 93% of respondents had previously used e-commerce platforms, only 14% stated so for carsharing. Hence, these results must be interpreted with some caution as a considerable fraction of respondents in some categories does not have actual insider experience. Future research may want to draw upon more experienced subjects. Moreover, there exist other ways of trust formation beyond the mechanisms considered here. Examples include pre-purchase communication such as typical for Taobao (Huang et al. 2017) or the formation of social capital through repeated interactions (X. Chen et al. 2017).

Eventually, in view of the multiplicity of platforms and the many parallel, unconnected reputation silos ("isolated islands"; Mazzella et al. 2016), recent research has set out to consider the transfer of reputation between platforms (Hesse and Teubner 2020a; Otto et al. 2018; Teubner et al. 2020). While platforms could thus build trust by allowing their users to import reputation from other platforms, none of the considered platforms is currently offering such a functionality. Neither are third-party solutions to reputation portability (as of yet) well known (Teubner et al. 2019). In fact, when asked about additional desirable trust cues, only one participant explicitly mentioned the use of an "identity verifying or reputation service". However, a lot of people would value imported reputation as, on average, the concept scored 5.7 on the 7-point importance scale. High-DoSI platforms (i.e., crowd work, mobility) exhibited strongest desirability of the feature and text reviews imported from other platforms were appreciated slightly more than imported star ratings (Hesse and Teubner 2020b).

Conclusion

Trust and reputation among users of two-sided platforms are imperative for flourishing markets. The process of building and maintaining trust is hence of utmost importance to platforms. As we have shown, given the specific nature of a platform type, the choice of

adequate means is contextual. For instance, nuances in the degree of social interactions on platforms impact both the provision of trust cues by platforms as well as the perceived importance in the eyes of their users. Our results with regard to the close relation between the degree of social interaction and the importance of trust-building mechanisms may be instructive for platform managers and related business models that involve the handling of online trust and reputation: the more a platform's value proposition hinges on social interactions, the more important it is to provide expressive trust cues. By providing an empirical basis and first cross-platform insights into the use of reputation systems and trust-building mechanisms (both by platforms and users), we hope to contribute to making the discussion more explicit, if not even more objective.

Chapter 2: Conceptualizing reputation portability

Having introduced general dynamics of trust and reputation-building on digital platforms, I now focus on developing a conceptual model for reputation portability. The present study thereby analyzes both the emerging literature on the nascent topic and currently observed practical approaches. It delineates relevant terms, actors, and mechanisms while also considering external influencing factors, such as novel regulation and decentralized technology. In an outlook, I present archetypical scenarios for reputation portability's future development and derive a forward-looking research agenda.

Maik Hesse, Timm Teubner[8]

"A good reputation is more valuable than money." – Publilius Syrus, (fl. 85 – 43 BC)

Introduction

With any activity on the Internet users leave a digital footprint, a data trail that lingers online, which is why the management of digital identity has become crucial for individuals and companies alike (World Economic Forum 2018). Establishing and curating online reputation is becoming more important and inherent in day-to-day life – examples include social media (e.g., Facebook, Twitter, Instagram), professional networks (e.g., LinkedIn, GitHub), e-commerce (e.g., eBay, Amazon), and sharing platforms (e.g., Airbnb, Uber). All these environments allow people to create online identities and build reputation through their actions. This includes, collecting likes and followers on social media, receiving testimonials on professional networks, or accumulating ratings on digital marketplaces. Importantly, for many of today's platforms, users also *rely* on their reputation (Dellarocas et al. 2009; Tadelis 2016), especially for trust-sensitive applications. This is particularly true for the sharing economy (Ert et al. 2016; Mauri et al. 2018; Qiu et al. 2018).

Reputational data emerges in several (platform-bound) contexts. Building and maintaining this reputation as a signal of trustworthiness and enabler of transactions is associated with effort and costs (Dunham 2011). Importantly, the majority of users is active on multiple platforms (Teubner et al. 2019) and users have to manage each reputation separately (Dakhlia et al. 2016). This raises the question whether and, if so, how reputation acquired in one context may represent a valuable signal in another.

Until now, a plethora of research has focused on either a) the role of reputation within a given (but enclosed) platform environment (Resnick et al. 2006; Teubner et al. 2017) or b) the general idea of data portability between platforms (De Hert et al. 2018; Drechsler 2018; Engels

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[8] This study was published in *Electronic Markets – The International Journal on Networked Business* with the title "Reputation Portability – Quo Vadis?" (Hesse and Teubner 2020a); see https://doi.org/10.1007/s12525-019-00367-6.

2016). However, little scholarly attention has focused on the question of reputation cross-platform portability. We hence set out to pursue the following research objectives:

- Develop an understanding and conceptual overview of the overarching dimensions of reputation portability.

- Assess whether reputation acquired by users on one platform serves as a valuable signal for trustworthiness when imported on another platform.

- Analyze the mechanisms and technologies supporting cross-platform reputation portability and elucidate platform and third-party strategies for their implementation.

With this work, we seek to portray the status quo of the emerging theme of reputation portability as one aspect of a broader dialogue on digital identity management. In doing so, we contribute to the IS literature in two ways. First, we delineate the relevant terms, players, and concepts, discuss common mechanisms, and present a conceptual overview to structure prior research – thus touching upon the *what, why,* and *how* of reputation portability. To the best of our knowledge, this study is the first to develop such a comprehensive model for this timely topic. Second, based on the rigorous exploration of our model's dimensions and summarizing the nascent body of empirical findings, we derive and discuss gaps and directions for future research. Throughout, current practical approaches are thoroughly integrated into the analysis and implications pinpointed.

The remainder of this paper is organized as follows. Sections 2 to 5 outline the state-of-the-art of reputation portability along the scientific literature while Section 6 takes a practical perspective. Specifically, Section 2 introduces the basic terms and concepts and motivates the idea of cross-platform reputation portability. In Section 3, we introduce our methodology and develop a conceptual model for reputation portability, illustrating the most relevant actors, mechanisms, data types, and external influencing factors. Section 4 considers the legal perspective by examining the impact of recent regulatory advances in the Western world. In Section 5, we then provide an overview on empirical findings on reputation portability. Section 6 considers existing and potential practical approaches and critically assesses blockchain technology as an enabler of reputation portability, decentralized platforms, and digital identity management. In this section, we complement the practical discussion by highlighting corresponding scientific work. Both views converge in Section 7, which concludes by deriving potential future scenarios and implications for academia and practice.

Trust and reputation in digital platform ecosystems

It is safe to say that electronic markets are pervasive in nature and penetrate all levels of modern economic activity (Alt and Zimmermann 2014). Today's digital commerce makes up for one out of every ten dollars spent globally and this number is expected to double over the next few years (Forbes 2018). Contributing to this development, the rise of digital marketplaces has been heralded as "one of the greatest success stories of the internet" (Tadelis 2016, p. 322). Since its early days, digital platforms, such as eBay, Amazon, Taobao, and others, provide users and businesses with the means to sell and buy goods and services online. While this constitutes a classical market model, more recently the so called "sharing economy" burgeoned – built upon collaborative peer-to-peer consumption, that is, the marketization of spare time, goods, and assets (Puschmann and Alt 2016). These consumer-to-consumer

transactions are mediated through platforms such as Uber, Airbnb, and TaskRabbit, and have quickly gained traction as a new form of economic activity attributed with the potential to disrupt entire industries (Economist 2013; Sundararajan 2016). Indeed, the sharing economy is experiencing unprecedented growth with the overall market in the EU estimated at €26.5bn annual consumer spending (European Commission 2018a) and compound growth rates exceeding 35% year-on-year (PwC 2015).

Success of digital platform businesses depends on transactions among users. In the sharing economy, an important antecedent to realizing such transactions is the establishment and maintenance of peer-to-peer trust (Tadelis 2016; Teubner and Hawlitschek 2016). After all, exemplary business models entail renting out ones home to complete strangers and entrusting ones physical safety to a driver when ridesharing. The importance of trusting prospective transaction partners has made reputation systems, aggregating transaction-based feedback into individual scores, a popular research object since their inception on eBay (Resnick et al. 2000) and other early e-commerce marketplaces. And while third-party assessments still represent the most commonly used signal to engender trust in online markets (Mavlanova et al. 2012; Teubner et al. 2019), today all major platforms – from Amazon to Zalando, from Airbnb to Uber – employ a whole variety of trust-building mechanisms to support users in managing and leveraging their reputation (Jøsang et al. 2007; Tadelis 2016; Teubner and Dann 2018). We refer to Bolton, Greiner, and Ockenfels (2013), Dellarocas et al. (2009), and Resnick et al. (2000) for more extensive discussions on the general mechanics of reputation building.

Many reputational elements have been found to positively affect perceptions of trustworthiness (Ter Huurne et al. 2017). Examples include, (star) ratings and number of reviews on Airbnb (C. Chen and Chang 2018; Qiu et al. 2018), reputation scores on eBay (Resnick et al. 2006; Resnick and Zeckhauser 2002), or text reviews from transaction partners in peer-to-peer rental markets (Cheng et al. 2019; Zloteanu et al. 2018). Thus, many trust-building and reputational cues function as reliability signals towards future transaction partners on the respective platforms (Dellarocas et al. 2009).[9] In this sense, Internet users' digital footprint has been described as "a cumulative record of how well we collaborate and if we can be trusted." (Botsman and Rogers 2010, p. 217). In the spirit of Syrus' quote, a good *digital* reputation might soon be more valuable than money, becoming our single most valuable asset in the reputation economy (Fertik and Thompson 2015).

Therefore, it comes as no surprise that calls for reputation portability are frequent in the literature. In their seminal work, Resnick et al. (2000) mention the lack of portability from system to system as a difficulty. The authors highlight the case of Amazon which, back in the 1990s, initially allowed users to import their ratings from eBay but discontinued the services when eBay claimed the ratings as proprietary content.[10] Similarly, Dellarocas et al. (2009) make a strong case for the advantages of portable reputation, especially if users are active on several platforms (i.e., "multi-homing").

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[9] Besides transaction-based reputation mechanisms, the list of such artifacts includes profile images, self-descriptions, identity verifications (incl. social media presence) and implicit information, such as badges, membership duration, and number of transactions (Teubner and Dann 2018).

[10] There is an ongoing debate among legal scholars about the ownership of transaction-based feedback in the form of reviews; we touch upon this aspect in Section 4.

A few years later, Botsman (2012) describes a world in which our aggregated online reputation becomes a constituent part of the reputation economy and raises questions of ownership and portability. Namely, if a platform user has been working towards, say, an impeccable reputation for hospitality as a host on Airbnb or achieved a sublime chauffeuring score with Uber – shouldn't they then be able to use that hard-earned reputation to get a head start for offering services on another sharing platform?

In this light, scholars from the field of electronic markets have recently called for research on how consumers can manage their online identity across platforms and connect existing profiles on a variety of sharing services (Puschmann and Alt 2016). Building on this thought, others propose a broader notion of "identity portability" that could encompass "ratings and reviews used by platforms to form reputations" (Gans 2018, p. 15). It is remarkable, however, that – despite two decades of theoretical arguments in favor of reputation portability – to this day, little empirical evidence has been presented to substantiate its hypothesized value.

Reputation portability: a conceptual model

To identify the relevant dimensions of a conceptual model for reputation portability, we conducted a structured literature search. We chose Google Scholar to perform this task for multiple reasons. First, it represents the most comprehensive tool for academic and bibliographic search (Gusenbauer 2019). Second, it is rapidly expanding compared to other services (De Winter et al. 2014), includes full-text search, books and conference papers, and is now essentially regarded a superset of other databases "with substantial extra coverage" (Martín-Martín et al. 2018, p. 1). As a first step, we queried specific terms (and combinations thereof) which have previously been used to describe what we refer to as "reputation portability"[11]. We included results after 2010 (i.e., the advent of sharing platforms) and screened the first 50 results' abstracts, selecting articles for in-depth review. We continuously extended the list of search queries based on new findings and included a forward and backward search. Next, we developed a draft framework with the aim to capture the most relevant aspects of reputation portability: actors, mechanisms, data types, and external influences. We further broke these down into sub-categories and challenged our conceptual overview in discussions with senior scholars from the fields of IS and economics. Additionally, we conducted workshops (internally and at an external research institution) to validate our proposal. In these moderated discussions, attended inter alia by senior scholars of different tenure, we presented intermediate results of the literature review and our initial proposal for the model's dimensions. Based on the feedback obtained, we refined the conceptual model and investigated its dimensions along the identified literature. Throughout, we added relevant research and practical findings as we dug deeper into specific aspects. Figure 8 gives an overview on the process:

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[11] See Appendix for a detailed list of considered search terms. In total, 42 terms (excl. combinations) were derived. These include "reputation transfer", "cross-platform signaling", "review portability", "reputation aggregation", "digital identity management", "reputation economy", and various combinations of terms such as reputation, signal, rating, review, platform, aggregation, portability, transfer. To specify the search in an additional step, we used combinations with platform names (e.g., eBay, Airbnb, and Uber).
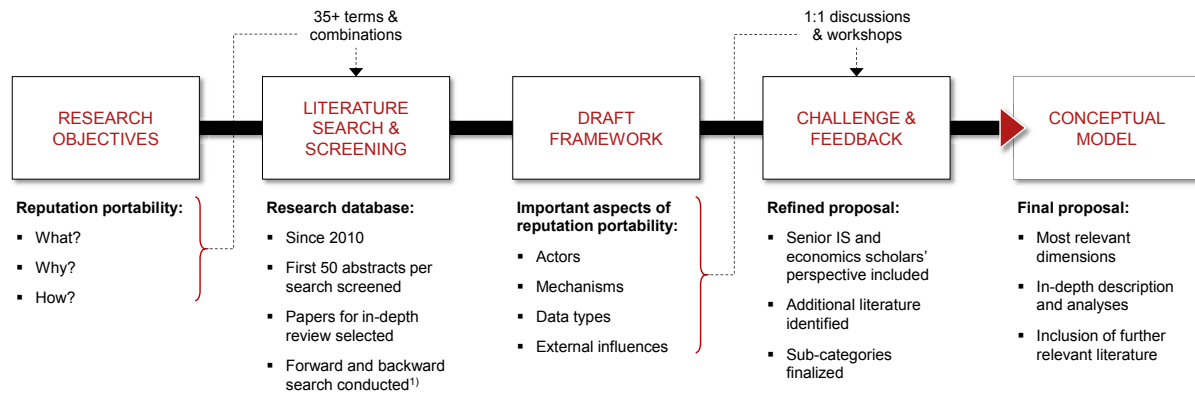
FIGURE 8: STRUCTURED LITERATURE REVIEW METHODOLOGY

Figure 9 sketches out the conceptual model for reputation portability[12]. It illustrates the most relevant dimensions, including digital platforms and users, feedback providers, data transport (e.g., through linking, embedding, or importing), Personal Information Management Systems (PIMS), as well as external influencing factors such as (novel) regulation and the emergence of decentralized technology.

First, the PLATFORM USER is at the very center. Users can be active across platforms, acting both as a consumer and/or provider of content, goods, and services.

Second, for exposition, a selection of DIGITAL PLATFORMS – acting as online intermediaries of data, content, and services – is shown at the top of the figure. We distinguish between *a) social & professional networks* (e.g., Facebook, Twitter, LinkedIn), b) *e-commerce marketplaces* (e.g., eBay, Amazon, Shopify), and c) *sharing & collaboration platforms* (e.g., Airbnb, Uber, TaskRabbit).

Third, FEEDBACK PROVIDERS are prior transaction partners of the platform user. They play a pivotal role by providing either a written statement (i.e., text review) or a numerical (star) rating. These form the basis of a platform's aggregated (transaction-based) reputational data on a user. There are certain implications regarding ownership and copyright of this received reputation, which we will touch upon in our discussions of legal and technical aspects of portable reputation (in Sections 4 and 6 respectively).

Fourth, the REGULATORY FRAMEWORK represents an important dimension as current legislation and policymaking greatly influence both the platform landscape as well as individual user rights. Political foundations have recently discussed the desirability of aggregated and portable ratings to avoid losing one's reputation when migrating between platforms (F. A. Schmidt 2017). Moreover, several EU reports see the lack of cross-platform portability as a critical issue, stating that monopolistic situations impeding data portability of profiles ought to be monitored (European Commission 2016, 2017). In Section 4, we investigate current policies in the Western world – with a particular focus on the EU given the

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[12] Note that within the context of research in the field of electronic markets, we focus predominantly on the economic dimension of reputation portability (incl. its legal and technological triggers and implications). Other aspects such as societal, ethical, and cultural dimensions are an important part of the general topic, though, for the sake of focus and brevity, we chose to only briefly touch upon these items where applicable.

recent developments around data portability laws[13] – and assess their applicability for and support of reputation portability.
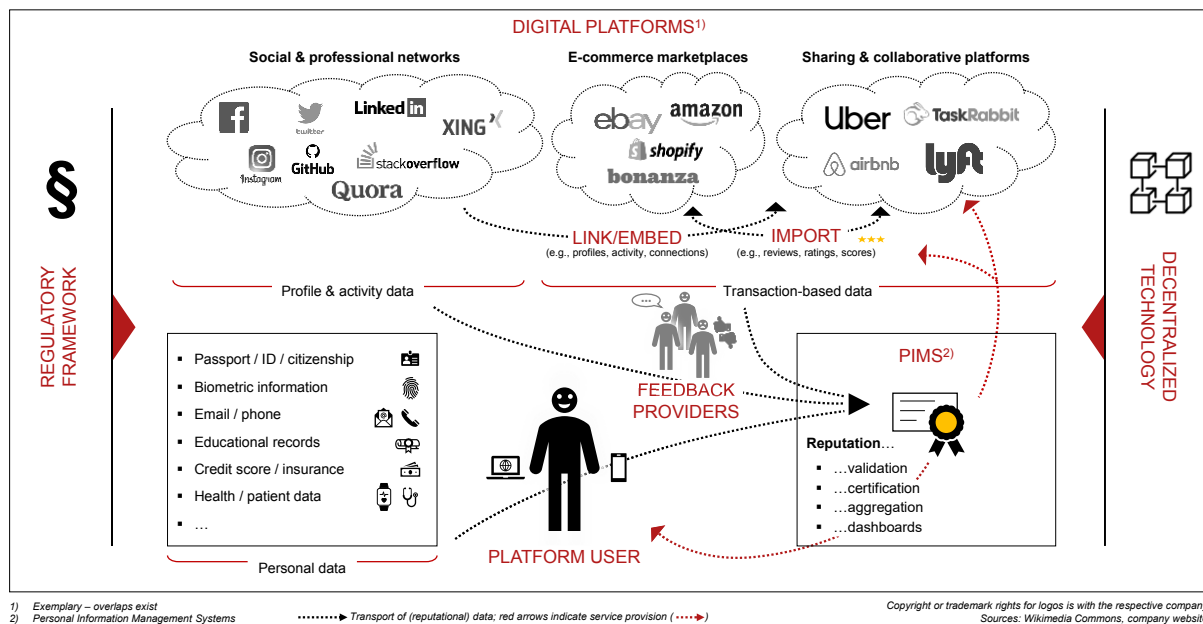
FIGURE 9: A CONCEPTUAL MODEL OF REPUTATION PORTABILITY

Fifth, the arrows represent the transport of (reputational) data with a focus on the LINK/EMBED and IMPORT functionalities between digital platforms. Several types of data are associated with users' online and offline activity:

- *Personal data* is the basic information that pertains to the individual user, including identification documents, citizenship, educational records, email address, and phone/mobile number. This category can also be extended to include information such as biometric data, health/patient data, or even credit and insurance records, which become relevant in a broader digital identity management.

- On social and professional networks, users build and cultivate their own profiles. Their activity on the respective platforms results in rich data sets, for instance, by gathering connections (e.g., friends, colleagues, followers), acknowledging other users' contributions via "likes", or by providing "user-generated content" (UGC, e.g., text, images, video/audio; Daugherty et al. 2013; Van Dijck 2009). We refer to the entirety of the data generated in these networks as *profile and activity data*.

- As previously introduced, *transaction-based data* occurs typically on e-commerce marketplaces and sharing platforms. The most common types are third-party ratings (numerical) and reviews (textual) as well as the resulting agglomerated scores (Teubner and Dann 2018).

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[13] Note that laws such as the EU's *General Data Protection Regulation* (GDPR) or the *California Consumer Privacy Act* (CCPA) apply to platforms universally, that is, irrespective of their home jurisdiction, so long as they are active in the European Union (or in California, and hence the United States (US), respectively).

Figure 9 shows the mechanisms of linking/embedding and importing data from one platform to another. Linking/embedding refers to the common practice of integrating one's profile information from social or professional networks on another platform to function, inter alia, as a signal of trustworthiness (Y. Chen et al. 2014; Silvestri et al. 2015). Other scholars have investigated the effects of mutual friends on social networks as an external trust signal between service consumer and provider in the context of ride sharing (Otto et al. 2018).

For the present work, we are particularly interested in the import of transaction-based reputational data, such as star ratings and reviews. Even though Amazon had to discontinue its import of eBay ratings early on, examples of such practices exist. For instance, the e-commerce platform Bonanza.com allows its users to import feedback directly from eBay, thereby translating their positive, neutral, or negative eBay ratings into Bonanza's 5-star rating scheme (Bonanza 2019a). Similarly, TrueGether.com allows buyers and sellers to import their reputation from eBay, Amazon, and Shopify as well as to link/embed their Facebook and LinkedIn profiles (TrueGether 2019). Notwithstanding these practical advances, research on the effectiveness of cross-platform reputation is scarce. We provide an overview of the few empirical findings on this matter in Section 5.

Sixth, PIMS (Personal Information Management Systems) aggregate and verify (reputational) data from disparate sources (e.g., *transaction-based data* such as ratings/reviews from across the web) and combine it with verifications from social and professional accounts (*profile & activity data*) or even government-issued IDs (*personal data)* to build individual trust and reputation profiles, widgets, and dashboards. Since there is typically no technical integration across platforms and users have to manage separate reputations, such systems allow for a reduction of transaction costs and opacity (Botsman 2012; Teubner et al. 2019). Specifically, PIMS such as Deemly and Traity offer their services to peer-to-peer marketplaces, sharing economy platforms, and individual users (Deemly 2019a; Traity 2019a). We consider practical approaches to reputation portability and the role of PIMS in Section 6.1.

Last, DECENTRALIZED TECHNOLOGY promises to be of importance for reputation portability and the broader concept of digital identity management. High expectations have recently evolved around blockchain technology[14] as a tool that could empower individuals with more control over their digital identities (CBInsights 2019). Unlike today's siloed approach to reputation management, distributed ledger technology is expected to enable alternative concepts and business models for cross-platform reputation portability (Catalini 2017). We discuss the technology's implications in Section 6.2.

Data portability regulations: friend or foe?

Given the power of reputation, users' benefits from portability between platforms become obvious – be it to avoid lock-in effects (European Commission 2017), overcome the inherent "cold-start" problem when first using a platform (Wessel et al. 2017), or to realize price premiums (as providers) and increase chances of being able to book services (as consumers) (Otto et al. 2018; Qiu et al. 2018; Resnick and Zeckhauser 2002). Consequently, platforms could indirectly benefit from imported trustworthiness, increased sales numbers, and higher prices and, in turn, fuel their own business model.

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[14] Or, more generally, distributed ledger technology (DLT) of which blockchains form a subset of (Burkhardt et al. 2018). We use both terms interchangeably.

Thus, enabling (or even enforcing) reputation portability has emerged as an interesting option for regulation (European Commission 2017). In this regard, many scholars have recently referred to Article 20 of the European Union's General Data Protection Regulation (GDPR; European Union, 2016b). It aims to foster and enable unprecedented competition in online markets by breaking the monopoly of incumbents and large platforms. The Article in fact compels platform operators (referred to as "controllers") to grant their users (referred to as "data subjects") the right to data portability. Specifically, a user "shall have the right to receive the personal data concerning him or her, which he or she has provided" to the platform "and have the right to transmit those data to another controller without hindrance" (European Union 2016a, p. 45). In a similar vein, data privacy laws are being introduced around the globe. Most notably, the California Consumer Privacy Act (CCPA) follows suit in incorporating EU GDPR's data portability rights and will become effective for entities doing business in the largest US state economy on January 1, 2020 (Barrett 2019). In the following, we analyze GPPR's implications for reputation portability as a proxy and de facto standard for comparable data regulations worldwide.

Legal scholars have mostly welcomed the European legislation as a laudable step (Kathuria and Lai 2018) and strong tool that could enable increased competition between digital platforms and give users more control over personal data (De Hert et al. 2018; Engels 2016). Yet, since authorities have not provided clear instructions on the interpretation and boundaries of "data portability" in the sense of GDPR (De Hert et al. 2018; Ursic 2018), it remains unclear, which type of data can be ported from one platform to another. This leads many authors to conclude that the wording and vague scope of GDPR's Article 20 might hamper cross-platform portability of data altogether (Drechsler 2018; Vanberg and Ünver 2017).

It is indeed quite unlikely that this provision applies to reputational information such as rating scores and text reviews (i.e., *transaction-based data*) in any meaningful way. To start with, the Article explicitly refers to information which data subjects have provided themselves (i.e., comments, posts, likes, photos, etc.; *profile & activity data*), effectively limiting the scope to data users contributed directly to the platform (Gans 2018). As many authors have pointed out, this data – provided by users *themselves* – is not the most interesting when it comes to reputation portability (Drechsler 2018; Graef et al. 2013).

Instead, reputation data is usually provided by *others*, namely prior transaction partners (i.e., the "feedback providers" in our conceptual model). Based on these third-party assessments, platforms calculate aggregated scores. The exact scope of data encompassed by the regulation is debatable. But since ratings are provided by the data controllers' reputation systems and not the data subjects themselves, GDPR's Article 20 will most likely not cover this type of information (Graef et al. 2013; Vanberg and Ünver 2017).

Further, when looking at textual reviews provided for platform users by previous transaction partners, neither existing intellectual property rights nor the GDPR seem to support cross-platform reputation portability in a plain sense. In fact, since the data object's rights "shall not adversely affect the rights and freedoms of others" (European Union 2016a, p. 45), Kathuria and Lai (2018) conclude that from the perspective of traditional IP law, "today's legal reality is […] that ownership will lie in either the authors or platforms" (p. 6). Platforms, however, may demand a *waiver of rights*, so that the feedback becomes a public property and

can be displayed at the platform's will. The authors go on to infer that review portability, if achieved, aims at informing a public interest (i.e., facilitating information about one's reputation to other consumers). Yet, GDPR's Article 20 is inapplicable when data processing is necessary for this particular purpose (European Union 2016a, p. 45). Martinelli (2019, p. 139), however, states that interpreting the right to data portability less strictly and extending it to "non-personal" or "observed" data would ensure that "comments of the buyers in the reputational feedback system could be ported too". Others claim that a user's "reputation or feedback score is related to the data subject, even though this data was not given by the individual, and should therefore fall under the scope of data portability as personal data" (Van der Auwermeulen 2017, p. 14). These arguments, when considered jointly, indicate that the ownership and copyright situation for personal reputation on a platform does not obviously favor the individual platform user. At best, the debate is still up to more concrete clarifications and guidelines.

Despite this, let us now assume that reputational data (e.g., reviews) could be exported or downloaded technically, or, as formulated specifically "in a structured, commonly used and machine-readable format" (European Union 2016a, p. 45). Several reasons come to mind why this data could lose its credibility and hence trust-building potential as soon as it leaves the platform it originates from (e.g., in the form of a data dump file):

- It could be subject to post hoc manipulation by users.

- The reputation system of a target platform onto which the data is supposed to be imported might not allow for an import.

- Even if users can upload text reviews or individual numerical ratings onto a target platform, they might be only a weak signal if not available in aggregated form.

Given that most reputation systems' effectiveness relies on the fact that they are hard to tamper with, such data would either require some sort of encryption or digital signature or be processed in a way that allows for full technical integration of aggregated reputational data between platforms. Neither of these are warranted by EU's regulation nor is it likely that the major platforms are willing to implement such measures any time soon.

For one, "forced" interoperability (i.e., a requirement for controllers to configure systems so that data portability between platforms is supported) did not become part of the GDPR, although originally envisioned (Drechsler 2018). This could have required incumbents to offer a direct data import/export functionality, which in turn, would significantly increase competition in online markets given network effects and high switching costs for users once a platform has acquired scale (De Hert et al. 2018; Engels 2016; Kathuria and Lai 2018; Martinelli 2019). However, the proposed passage was taken out of the regulation's draft after "heavy criticism" from the private sector (Drechsler 2018). Instead, GPPR now states that data shall be portable directly between platforms "where technically feasible" (European Union 2016a, p. 45). Additionally, Recital 68 GDPR adds that users' rights "should not create an obligation for the controller to adopt or maintain processing systems which are technically compatible" (European Union 2016b, n. 7). Given the leading platforms' large user bases and their efforts to create lock-in effects, it is easy to imagine how the GDPR's wording may lead them to "contend that such a transfer is technically infeasible" (Vanberg and Ünver 2017, p. 4).

Hence, Krämer (2018) expects platforms (that invested in user lock-in) to design their information systems in a way that renders data portability difficult. What is more, it could lead to silent agreements between incumbents to *not* offer import functions for data from their respective competitors. The author likens this situation to the well-known prisoner's dilemma in business and economics: even though each platform would profit from winning over users, it eventually weakens its own position by increasing overall competition.

Despite calls for more collaboration among platforms to define norms and mandatory interoperability standards (Drechsler 2018; Vanberg and Ünver 2017) it seems somewhat unlikely that incumbents will deploy mechanisms aimed at enabling portability of reputational data. The concept, however, is likely to yield economic value both for users and entrant platforms. It remains to be seen whether and, if so, how legislative bodies around the globe will do them justice.

Empirical findings on reputation portability

As outlined in previous sections, prior research underpins the economic value of on-site reputation, that is, the reputation acquired and used within the confines of a given platform. The results are, for instance, increased trustworthiness, price markups, and higher chances to book or buy (Qiu et al. 2018; Resnick et al. 2006; Tadelis 2016). Given this value, there have been attempts to develop theoretical models and reputation systems that allow for aggregation and usage of reputation across online communities (Grinshpoun et al. 2009; Pingel and Steinbrecher 2008) and subsequent evaluation of such models based on empirical data (Gal-Oz et al. 2010). Furthermore, scholars conducted research to predict user trustworthiness and performance based on prior reputation data from other contexts (Kokkodis and Ipeirotis 2016; Venkatadri et al. 2016). In this context, it was demonstrated that social media data (e.g., from Facebook or Twitter) can be leveraged to infer users' trustworthiness on newer networks (Venkatadri et al. 2016). Similarly, gig workers' future performance at a given task is indicated well by prior reputation earned at tasks from different categories (Kokkodis and Ipeirotis 2016).

However, although this research hints at the concept of reputation portability, neither of those projects informs entirely about the economic value of *transaction-based data* (i.e., reviews and ratings) when imported onto a *different* platform. Specifically, Venkatadri et al. (2016) focus on *profile & activity data* and Kokkodis and Ipeirotis (2016)'s analysis remains within the confines of a single platform. Yet there have been prominent calls for applied research to "combine economic thinking and analyses with human-computer interaction" (Tadelis 2016, p. 338) and "how consumers [might] connect different identities on different sharing platforms towards a cross-platform identity management" (Puschmann and Alt 2016, p. 98). This motivates our review of empirical findings on reputation portability. Only recently, though, first work-in-progress has been made in empirically assessing the effectiveness of portable reputation from a user's psychological perspective (Otto et al. 2018; Zloteanu et al. 2018).

Otto et al. (2018) conduct a laboratory experiment where they present users on BlaBlaCar, Europe's largest ride sharing platform, with imported ratings from Airbnb as well as mutual friends on Facebook. This allows them to make inferences about the trust-building potential of these signals for users without prior rating on BlaBlaCar. They find that imported star ratings function as a driver of people's trust in prospective service providers, whereas mutual friends alone have no significant influence.

In three consecutive studies, Zloteanu et al. (2018) explore the impact of trust and reputation information (labeled as "TRI") on users' perceptions and intentions to book on a hypothetical accommodation platform. Unanimously, the studies uncover a positive impact of TRI on users' perception of a host's trustworthiness and increased tendencies to book. As one type of TRI the authors consider "online market reputation," that is, ratings imported from other platforms (here: Airbnb and Uber). Based on the data presented, it is somewhat difficult to assess which type of TRI users value most, though it seems that online market reputation falls somewhere in the middle.[15]

Teubner et al. (2019) underline the potential for "reputation transfer" presenting survey data on multi-platform usage as an indication for its effectiveness. They find that most participants (65%) use more than one platform. However, they also illustrate that practical solutions to reputation portability (PIMS such as Deemly and Traity) are hardly known (1.4%). The authors go on to discuss future research opportunities, including aspects of platform strategy, legal considerations, boundary conditions of reputation transfer, and user interface design.

Table 4 summarizes the nascent body of empirical findings on reputation portability where *transaction-based data* is considered. We focus explicitly on this data type, even though some of the included papers also consider on-site reputation (Zloteanu et al. 2018) or imported *profile & activity data* (Otto et al. 2018). All studies find supporting evidence for either positive effects or the potential of imported reputational data.

Authors (Year)	Platform Scope		Signal	Signal Range	Method	Sample	Theory	Terminology	Cross-platform findings
	Target	Source							
Kokkodis and Ipeirotis (2016)	oDesk		Star rating	[0, 1]	Empirical	>1 million trans-actions	—	Reputation transferability	Increases accuracy of performance predictions
Otto et al. (2018)	BlaBlaCar	Airbnb	Star rating	4.0	Survey	141	Signaling theory	Incorporation of external trust signals	Star ratings from other platform increase trust in providers
Zloteanu et al. (2018)	Fictional accommod. platform	eBay, Uber	Star rating	{4.0, 4.5, 5.0}; {90, …, 100%}	Surveys	120; 117; 189	—	Online market reputation (≙ cross-platform reputation)	Online market reputation not within top-three selected items
Teubner et al. (2019)	28 peer-to-peer platforms		—	—	Concept; Survey	494	Signaling theory	(Cross-platform) reputation transfer	Evidence for multi-platform usage but low user familiarity with PIMS

TABLE 4: EMPIRICAL FINDINGS ON REPUTATION PORTABILITY

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[15] The other TRI-elements used were: host verification, guest reviews, host reviews, social media presence, number of reviews, and star rating.

Practical approaches to portable reputation

As outlined above, there are many good reasons to employ mechanisms geared towards reputation portability. Yet most large platforms are thus far reluctant to offer any import functionality, presumably to deliberately create lock-in effects or because they assess its benefits as too low or dread the organizational effort. In this section, we give an overview on past, current, and potential future approaches to reputation portability in practice[16].

The past and the present

When Amazon allowed its users to import their ratings from eBay in the 1990s, it appeared as though this might become common practice between online marketplaces. However, legal claims around the proprietorship of reputational data quickly put a stop to the service (Dellarocas et al. 2009; Resnick et al. 2000). It is still possible, though, to "extract" ratings from several platforms and despite the reluctance of incumbents to offer reciprocal reputation import, newer e-commerce market players do advertise such services to their customers. For instance, *Bonanza* and *TrueGether*, two popular eBay alternatives, both allow users to directly import their existing eBay and/or Amazon ratings onto the platform (Bonanza 2019a; TrueGether 2019). While Bonanza supports the import of users' eBay ratings (i.e., positive/ neutral/negative) and translates them into their own 5-star rating scheme, TrueGether does the same but displays next to it both the corresponding text comment and the feedback provider's username on eBay. This enables sellers who are new to these platforms to circumvent the "cold-start" problem by importing countless ratings and reviews. Such a practice promises to be advantageous for both seller and platform (Wessel et al. 2017).

Personal Information Management Systems

Such examples are not limited to e-commerce platforms. A range of third-party applications and services have specialized on accessing ratings on users' behalf. They retrieve data from several sources[17] to validate, certify, and aggregate it – either via integration into reputation dashboards or by calculating proprietary reputation scores. These services form part of a broader category, referred to as Personal Information Management Systems (PIMS). PIMS provide trust-based data management tools and technical infrastructures to put consumers in control over their own data and digital identity (European Data Protection Supervisor 2016). First, users allow PIMS to access their data (e.g., personal data, profile & activity data, transaction-based data). Then they set preferences and grant consent on the extent to which the data can be used and shared with online service providers, businesses, and authorities. Thus, PIMS can be understood as intermediaries connecting "individuals offering their data for (re)use […] and organisations wishing to (re)use this data" (European Data Protection

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[16] Examples were selected in a structured way: as they occurred in the academic literature that was found in the search process (see Section 3) or based on a list of previous startups working on solutions to gather and aggregate reputational data from across online services (Botsman 2012). It is quite remarkable that, at the time of writing, none of the companies is still in existence. However, the list served as a starting point for our search of current players. An additional search of non-scientific work around reputation portability was conducted, for instance, on company websites or – in the case of blockchain technology – in (technical) whitepapers.

[17] For example, Airbnb offers such an "export functionality" in that it enables users to copy an HTML-code of reviews they have received and embed this badge on personal websites or blogs: https://www.airbnb.com/users/badges (only accessible when logged in).

Supervisor 2016, p. 11). The services are typically free to users while online service providers, platforms, or other third parties usually pay fees to access the PIMS' technology and interfaces.

Current examples of providers with a particular focus on reputation portability are Deemly.co and Traity.com. Traity, for instance, has been described as "general-purpose portable reputation platform" (Sundararajan 2016, p. 65). The company generates a holistic profile of users based on ratings from sharing platforms, several social network accounts, official identity documents, and recommendations from friends (Traity 2019a). Similarly, Deemly connects a range of sources to create trust profiles for users, thus, allowing them to make use of their digital reputation and trustworthiness across peer-to-peer marketplaces (Deemly 2019a). Both services ask individuals to provide their credentials (i.e., username and password) for the sources they wish to connect. Albeit a one-time procedure to pull relevant ratings and reviews, it still requires a leap-of-faith from users and may inhibit these services' more wide-spread adoption (Greiner et al. 2018). Indeed, historically, these third-party reputation aggregators have not fared well and there is a long list of failed startups and inactive services (e.g., famust.com, erated.co, trustcloud.com, peertru.st, tru.ly). Research also shows that companies such as Deemly and Traity are still largely unknown to sharing economy users with recall rates between 1 and 2 percent (Teubner et al. 2019). Deemly's trust score can currently only be used for a few smaller Danish and Dutch sharing platforms. And Traity, seven years since its founding in 2012, is focused on providing alternatives for traditional credit scores (e.g., with banks and insurance companies). Yet, considering GDPR and the recent rise of PIMS, both companies might be in a pole position to help with implementing reputation portability for platform users. At least, both startups claim to be fully compliant and providing the golden standard of GDPR (Deemly 2019b; Traity 2019b).

It remains to be seen if third-party providers can provide the technical means and tools to practically establish reputation portability and if users are willing to adopt these services. However, if platforms themselves fail to come up with satisfying solutions, PIMS may have a competitive edge and seem to be the regulator's favored option. The European Data Protection Supervisor (EDPS; an EU body) suggests in a recent report (2016) that pure data aggregators are best suited to implement by design the right to data portability – a view that is supported by legal scholars (Kathuria and Lai 2018). The EDPS (2016) argues that for PIMS to effectively penetrate a market dominated by large platforms, the EU will have to create incentives for platform operators. These should support platforms in establishing interfaces with data protection compliant PIMS for direct export of personal and reputational data. PIMS in turn, should take an active role in addressing crucial interoperability requirements and standardization.

Presumably, PIMS are among the most promising efforts to facilitate a broader digital identity and reputation management for individuals. Moreover, the practice of aggregating a variety of (digital) reputation elements into trust profiles, dashboards, or reputation passports could take traditional (credit) scoring to a new level (Heiland 2018). It might certainly pave the way to more holistic solutions for digital identity management, as has been hypothesized for some time (Botsman 2012; Botsman and Rogers 2010). Especially the transfer of (aggregated) reputation from online to offline context bears potential. For instance, as a reference on a CV

for job applications[18] or to allow access to innovative financing solutions (Traity 2019b; Trustbond 2019). Some platforms also offer such services directly: Uber in East Africa has partnered with local banks to grant high-reputation drivers access to vehicle financing (Stanbic Bank 2017). To qualify as eligible, drivers must have completed over 500 rides at an average rating of above 4.6 out of 5 stars. A few hundred drivers (more than 8% of Uber's active fleet in Kenya) have already participated in the deal and receive interest rates that are substantially lower than those normally charged for car loans by commercial banks (Business Daily Africa 2018)[19].

State-Controlled Reputation

One might ask how far practices of aggregated and portable reputation may reach when state-controlled trust scores come into play. China is currently implementing a national reputation scheme labeled "Social Credit System" that penalizes and rewards individuals and businesses based on their activity across a range of dimensions (Hatton 2015; Kobie 2019). The system explicitly includes online behavior such as electronic shopping and social media conduct. By 2020, it will assess every citizen nation-wide with a unique, standardized, and publicly ranked score. Interestingly, the Chinese government is currently testing several systems in pilot projects launched across the country's biggest digital platform ecosystems[20], (Botsman 2017a) which also provide parts of the technology stack and software. Western observers and governments by and large criticize such plans for big data-powered scoring algorithm as dystopian, Orwellian, or chilling (Campbell 2019; Human Rights Watch 2017). However, many also opine that with an abundancy of digital platforms, predictive algorithms, and scoring mechanisms, the Western world is closer to the Chinese system than one might be willing to admit (Botsman 2017a; Forbes 2019a). Specifically, Wong and Dobson (2019) invoke China's plans as a looming vision of what to expect for democratic countries should strict data policies for the digitization of identity and reputation not be applied. Hence, scholars suggest closely studying the Chinese system, assessing its compatibility with more liberal forms of Western society, and transferring learnings to inform discussions about aggregated reputation and law-making (Síthigh and Siems 2019).

The future: decentralized technology on the rise

While state-controlled surveillance of citizen's reputation and trustworthiness might (still) appear as an extreme scenario, it is true that a substantial share of what is considered our online reputation emerges within the boundaries of centralized institutions, that is, digital platforms. As a possible alternative to such central and state-like platforms, blockchain technology promises to empower users with more control over their data – irrespective of intermediaries (Drescher 2017; Narayanan et al. 2016). Blockchain first gained prominence as the underlying technology of the cryptocurrency bitcoin, a cryptographically secured, public,

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[18] As happened with reputation earned on Stack Overflow, a question and answer page for programmers; eventually headhunters screened the platform for high-scoring developers with specific skill sets (Botsman and Rogers 2010).

[19] We had the opportunity to talk to Uber's CEO for East Africa, Alfred Msemo; the company plans to extend these services throughout the region and looks into more innovative ways to make use of drivers' reputation scores.

[20] Incl. Alibaba Group, WeChat owner Tencent, and the leading Chinese ride-sharing and online-dating services.

append-only, and distributed database (or "ledger"), which facilitates tamper-proof transactions between parties in a peer-to-peer network without the need of a central authority (Nakamoto 2008; Risius and Spohrer 2017). Werbach (2018, p. 55) introduces the technology as the new architecture of trust and likens its possibilities to Google and other platforms as being capable "of similarly powerful data aggregation, but without the downside of centralized control". Decentralization, technically achieved by a distributed consensus mechanism across a peer-to-peer network, is unanimously seen as principal characteristic and core value proposition of a blockchain (Beck et al. 2017; Glaser 2017; Plansky et al. 2016; Seebacher and Schüritz 2017; Werbach 2018). The distributed ledger technology, thus, is predestined to fundamentally impact three closely interrelated concepts that serve as crucial enablers of reputation portability: reputation systems, decentralized platforms, and digital identity management.

Blockchain-based reputation systems

Previously, we discussed the role and importance of reputation systems in online transactions. Blockchain technology could be instrumental in developing new designs for these systems, for example, supporting digital platforms with the effective detection of fraudulent ratings (Cai and Zhu 2016). While this helps to improve existing "centralized" reputation systems, Carboni (2015) shows how a rating and feedback mechanism, like that of eBay, can be mimicked in a decentralized and distributed way on the Bitcoin blockchain. Similarly, attempts at developing blockchain-based reputation systems that are applicable in traditional e-commerce settings (e.g., eBay) or peer-to-peer service platforms have been made (Dennis and Owenson 2016; Schaub et al. 2016). These approaches have in common that reputation would be calculated and stored in a decentralized manner, thus, diverging from the principle of central ownership, which could support the factual establishment of portable reputation (Catalini 2017). DREP ("Decentralized Reputation"), a cross-national decentralized reputation ecosystem, takes a somewhat different approach. Specifically, they propose a reputation protocol that aims to quantify and aggregate reputation across different centralized platforms (e.g., traditional e-commerce, gaming, content, social networking) (DREP Foundation 2019). DREP plans to connect reputation values from both traditional platforms and decentralized blockchains, but in that approach also depends on the willingness of these players to participate in its solution. Hence, the concept of a decentralized sharing economy platform may be more promising to start with.

Decentralized platforms

There is broad scholarly consensus that blockchain technology bears the potential to disrupt existing platform business models (Catalini and Gans 2016; De Filippi 2017; Glaser 2017; Puschmann and Alt 2016; Werbach 2018). Especially multi-sided market platforms such as Airbnb and Uber could be fundamentally challenged by decentralized blockchain technology, poised to replace these providers altogether (Glaser 2017). Some suggest that most of a platform's mechanism design features (e.g., reputation systems, payment infrastructure, resolution processes) "can be implemented in a distributed, verifiable way on top of a blockchain" (Catalini and Gans 2016, p. 19).

Today, the most common technology and native blockchain for decentralized platforms to run on is *Ethereum*. It was proposed by Buterin (2014) and allows the execution of so-called "smart contracts" that function as software programs running on top of the distributed ledger. This

enables developers to script applications using Ethereum's proprietary programming language. These scripts can be executed using the built-in virtual machine, effectively turning Ethereum into a distributed computing platform for all kinds of decentralized applications – commonly referred to as DApps (Glaser 2017; Werbach 2018).

Based on the Bitcoin blockchain and Ethereum's smart contract functionality, Buechler, Eerabathini, Hockenbrocht, and Wan (2015) were among the first to design a decentralized system to record transactions and calculate proprietary reputation scores for counterparties. Following up, Bogner, Chanson, and Meeuw (2016) present a DApp for object sharing and Xu et al. (2017) propose a privacy-preserving, blockchain-based sharing economy platform. However, most of these proofs-of-concepts and prototypes, have remained rather theoretical, lacking, for example, a visual user interface.

A range of Ethereum-based platforms are already in the prototyping phase. Swarm City, for instance, identifies itself as a blockchain-based marketplace with a built-in reputation system (Swarm City 2019). Users can create specific services (e.g., ridesharing or accommodation) and build communities in which contextual reputation is earned. At doing so, Swarm City has been described as "Ethereum-based blockchain infrastructure to empower sharing economy applications" (Beck et al. 2018, p. 1023). Similarly, Arcade City, which the Swarm City team forked off in 2015, started as blockchain-based ridesharing services, but recently pivoted to "decentraliz[ing] and disintermediat[ing] the entire corporate sharing economy" (Arcade City 2019). Origin is another example of a DApp enabling the creation of peer-to-peer marketplaces on Ethereum (Origin 2019). Notably, Hub introduces a *Human Trust Protocol* where one can gain verifiable and portable reputation from interactions and transactions on a "professional achievement network[21]" based on blockchain technology (Ly et al. 2019).

Common to all these models are the direct communication, interaction, and value exchange between users – facilitated through smart contracts without intermediaries. For one, this promises to be more cost-effective by eliminating provider fees[22]. What is more, these ecosystems are built and maintained by decentralized peer-to-peer networks and their participants retain full control over the data involved (Werbach 2018). This includes *transaction-based data* as introduced in our conceptual model (Figure 9). Here, reputation is publicly verifiable, fully resides with the individual user, and can be built across communities in the decentralized environment where intermediaries' (i.e., platforms') claims over ownership of reputational data are non-existent. Catalini and Gans (2016) envisioned this as an open reputation platform with the "ability to port and use the resulting reputation scores across different services and contexts" (p. 22). Since blockchains could play a substantial role in achieving more interoperability in electronic markets (Glaser 2017), this reputation can certainly be imagined to travel seamlessly across the boundaries of blockchain-based platforms.

However, intermediaries today still serve a valuable role in matching demand and supply and inserting trust in transactions between strangers. Near-term full disintermediation might thus be inefficient and the sharing economy is unlikely to run entirely trust-free, that is, free of "centralized trust" (Catalini and Gans 2016; Hawlitschek, Notheisen, et al. 2018). Moreover,

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[21] Note that the project's CEO is Eric Ly, co-founder and former CTO at LinkedIn.

[22] However, there might still be fees involved for validation of transactions on the network.

the sociotechnical challenges of trusting and governing decentralized systems have been outlined repeatedly (Beck et al. 2018; Glaser et al. 2019). Thus, given the early development stage and limited user base of DApps so far, much experimentation, prototyping, and real-world evidence will be required before reputation portability on decentralized platforms may become a wide-spread reality. Until then, several (already observable and promising) attempts at establishing portable reputation should be explored and assessed with regards to their potential to co-exist and mutually benefit from blockchain-based approaches.

Digital identity management

For decentralized platforms as those discussed above, we explicitly contemplate *transaction-based data* for reputation portability. Yet, a full digital identity management on blockchain has the potential to encompass all three types of data we introduced in our conceptual model in Figure 9. This includes decentral storage, user ownership and full control, as well as proof-upon-consent for all types of *personal data* (e.g., citizenship, biometric information, educational records, insurance and health/patient information, memberships) (Garcia 2018; Sharples and Domingue 2016; Zyskind et al. 2015). Note that, for instance, one's personal health data stored on a blockchain could be leveraged to negotiate individually tailored insurance contracts[23]. Similarly, blockchain technology could be used to share validated educational records with potential employers or other entities. Likewise, *profile & activity data* can be generated on distributed social networks where contributors gather reputation and receive rewards[24] for upvoted content (De Filippi 2017). Current popular examples include Steem.com, Minds.com, and HyperSpace.app (HyperSpace 2019; Minds 2019; Steem 2019).

Of course, digital identity is a much broader topic than online reputation. However, similar principles apply. According to the ID2020 alliance[25], the four P's are core requirements for digital identity to empower and protect individuals: *private* (i.e., control over shared data), *portable* (i.e., accessible anywhere and through multiple methods), *persistent* (i.e., from life to death), *personal* (i.e., unique) (ID2020 2019). Corporations, public organizations, and governments are developing use cases for decentralized blockchain-based approaches to verified digital identity that are owned and controlled entirely by individuals. For comprehensive overviews of state-of-the-art solutions, we refer to Lim et al. (2018) as well as Dunphy and Petitcolas (2018).

Building on Section 6.1., these solutions qualify as blockchain-based PIMS. They utilize the decentralized technology infrastructure and cryptographically signed user permissions to

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[23] There are, however, significant legal challenges associated with storage and sharing of patient data that we chose to not further dwell on here.

[24] Usually paid out in the respective blockchain's underlying cryptocurrency.

[25] A consortium bringing together governments as well as public and private organizations such as Accenture, Microsoft, the open source blockchain consortium Hyperledger (with Linux, IBM, SAP), and the United Nations. Besides such joint approaches to establish decentral digital identity, several big technology companies are eyeing opportunities to build decentral solutions for the management of individual's social, professional, and financial data. Among those are IBM's *Verify Credentials*, Microsoft's planned *Identity Overlay Network* (ION) for decentralized identity (DID) built on top of the Bitcoin blockchain, and Hyperledger's shared infrastructure toolkit *Aries* for DLT-based digital identity management.

share data items, previously provided by individuals, with third parties. This allows users to retain full ownership and control of their data and is commonly referred to as "self-sovereign identity" (Lim et al. 2018). Already we see PIMS following a similar path. Traity recently introduced the blockchain-based "reputation network" as a decentralized ecosystem allowing people to leverage their reputational data from a variety of sources for access to risk-based services (Traity 2019c). PIMS seem to be jumping on the blockchain bandwagon, as offerings are converging.

One challenge to overcome in the design of distributed systems for portable and aggregated reputation may be blockchain's transparency and immutability (Dunphy and Petitcolas 2018; Werbach 2018). The GDPR framework grants users a right to be forgotten and obliges controllers to erase user data upon request. Yet, data, once written on the ledger, is persistent, irreversible, and often publicly available. Hence, providers must be careful to design mechanisms which avoid scenarios of networked shame (Botsman 2017b). More importantly, though, the irreversibility of blockchains and users' right for deletion and correction of their data seem fundamentally incompatible (FinTech Council 2019). Either GDPR needs to be updated to also include distributed ledgers or the latter must be designed in a way that ensures certain data may still be deleted after being written on the ledger. This, however, is in stark contrast to the original paradigm of a public blockchain. Either way, the right to have one's data erased should not be falsely interpreted as an opportunity for cherry picking only the best ratings to be displayed. As Dellarocas et al. (2009) suggested a decade ago – certainly unbeknownst of distributed ledger technology – systems may be designed in a way that leaves users with a discretional choice to disclose previous ratings. That is, either import all available reviews for full transparency or chose to have none shown at all. For GDPR and reputation on a blockchain there is no intuitive solution. In this regard, a first conceptual design and high-level architecture for a GDPR-compliant blockchain-based personal data and identity management system (BPDIMS) has been presented (Faber et al. 2019). Yet, further analysis on how to map requirements of data protection law into decentral systems is imperative.

As with any business model, the success of new approaches to portable reputation and digital identity will ultimately hinge on user experience and usability (Weinhardt 2017) – irrespective of the technological basis. Time will tell whether PIMS and/or DLT can live up to the high expectations of becoming viable alternatives to existing "centralized" reputation mechanisms. And, in turn, whether they can solve the issue of reputation portability for individuals where today's platforms refrain from presenting satisfying solutions themselves.

Outlook and conclusion

In this final section, we conclude by laying out archetypical scenarios for the future development of portable reputation[26] and highlighting implications for research and practice.

Scenarios for reputation portability

Based on our review and learnings, we briefly discuss potential future scenarios for reputation portability. Figure 10 gives an overview on the four scenarios:

Scenario 1: Platform silos

Scenario 2: Enforced portability

Scenario 3: Universal PIMS

Scenario 4: Distributed reputation
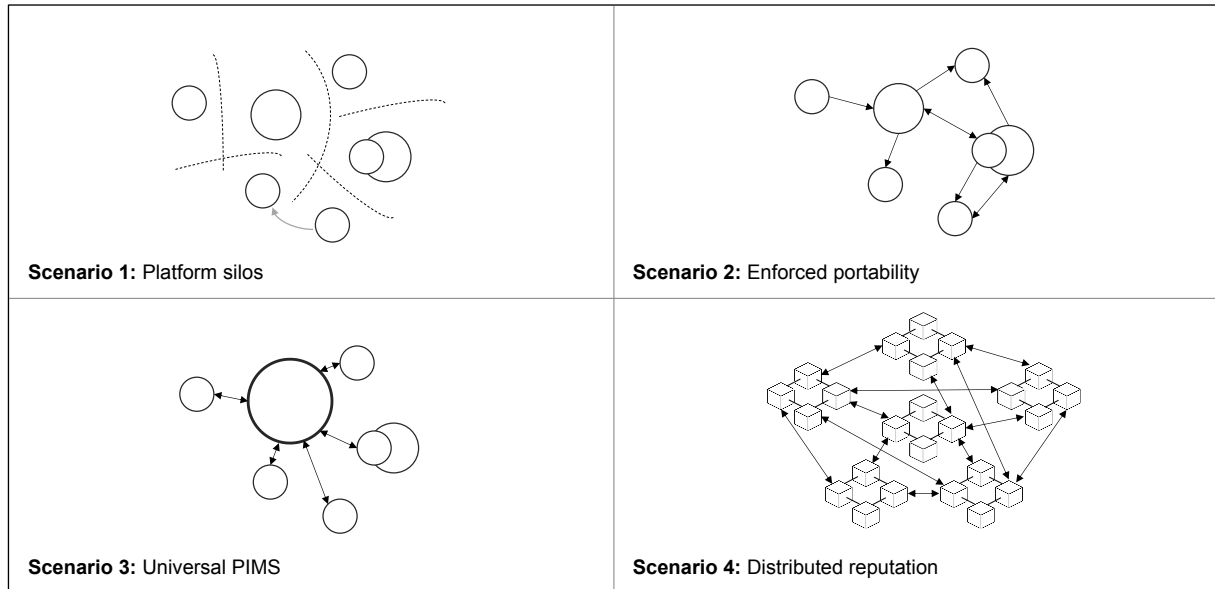
FIGURE 10: FUTURE SCENARIOS FOR REPUTATION PORTABILITY

Scenario 1: *Platform silos*—In this scenario, similar to today's status quo, regulation around portability of reputational data remains fuzzy (Martinelli 2019). Hence, major digital platforms refrained from offering reputation import and/or export. Similarly, PIMS for reputation aggregation and individual trust scores remain a niche offering (Teubner et al. 2019). At the same time blockchain-based solutions were unable to gain traction in light of usability and data privacy issues. Isolated approaches to portable reputation, however, are observed (Bonanza 2019a). In consequence, seamless cross-platform reputation portability remains a hypothetical idea – as it has been for over two decades.

Scenario 2: *Enforced portability*—In this scenario, reputation portability is enforced by regulation. Precisely, platforms are obliged to offer a) APIs for accessing reputational data from outside with ease and b) import functions that allow users to incorporate reputation earned elsewhere without hindrance. Especially between platforms from the same or similar categories (i.e., multi-homing) users make ample use of this option. On a much smaller scale and with some legal uncertainty, Bonanza and TrueGether have pioneered this practice by allowing the import of eBay and Amazon ratings early on (Bonanza 2019a; TrueGether 2019).

Scenario 3: *Universal PIMS*—In this scenario, one or several PIMS – compliant with GDPR and other data regulations – have emerged and serve as universal data custodians. Such

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[26] We thank the reviewer for the valuable idea of developing these scenarios.

services are backed by platforms working with their preferred third-party service (i.e., PIMS) and hence propelled towards consumer adoption (European Data Protection Supervisor 2016). Eventually, a leading platform itself endorsed the development of a single intuitive and wide-spread solution (think of Google's or Facebook's sign-in services). However, in the light of discussions about monopolistic online platforms and increased competition in electronic markets (European Commission 2017), this concentration of (reputational) data with a single or only few providers faces harsh criticism by data protectionists who demand to break up large data companies rather than to let them acquire additional market power (Forbes 2019b).

Scenario 4: *Distributed reputation*—In this scenario, decentral systems have replaced today's platform providers and are well-established as a *de facto* standard for facilitating trusted online interactions (Glaser 2017). Ratings and reviews are not bound to a platform's reputation system but become transparent and verifiable in an entire ecosystem – specifically across platform borders (Catalini and Gans 2016; Werbach 2018). However, crucial issues of blockchain interoperability had to be addressed and solutions to "bridge" information across several chains/ledgers (i.e., to create an "internet of blockchains") were designed (EU Blockchain Observatory & Forum 2019; Johnson et al. 2019).

Note that all depicted scenarios are to be understood as possibilities, deliberately leaning towards the ends of the spectrum of conceivable future developments. Most likely, a *combination* of all outlined scenarios will emerge, rather than a pure form of a single scenario. In the future, today's platforms, facilitators of reputation portability, and distributed approaches may well co-exist and benefit from each other.

Conclusion

We conclude our conceptualization and review of reputation portability with a distillation of challenges, opportunities, and associated implications for research and practice. Reputation portability is found to be effective according to most of the few empirical studies (Section 5). Naturally, this rather thin body of research can and should be extended in several ways:

- Research should assess cross-platform reputation's tangible economic value – both for users and platforms. Who profits from portable reputation in which way? When is it beneficial to import reputation given different boundary conditions and signal types and qualities? Answers to these questions would also extend signaling theory. To do so, empirical and experimental approaches are needed. Existing research is limited in that it is mostly based on (self-reported) survey data.

- More research on adequate import/aggregation mechanisms for reputational data is required. Looking at Scenario 2, how should import mechanisms be designed? How can reputation systems be (re-)designed to enable portable reputation? Specifically, most existing studies are limited to one platform or source/target combination. Multiple scenarios, platforms, and source/target fit should be considered.

As with any research, there are limitations to this paper. Intended to give a broad overview on the topic, we acknowledge that our work relies on publicly available information in its reasoning. Future research should – besides building on empirical analysis – use qualitative methods to generate inside views. For instance, drawing on interviews with platform operators and/or PIMS may help clarify *why* major platforms are currently not offering an import function or other adequate means for reputation portability.

Distributed ledger technology is here to stay (Scenario 4). Albeit in the conceptual and prototyping phase, it is imperative for practitioners to explore and experiment with blockchain technology's potential – regardless of it being beneficial or disruptive to their own business models. There are many open questions as to which role blockchains will play for portable reputation and digital identity:

- DLT is said to promise giving individuals more control over their (reputational) data. But are users willing to put their trust and data into technology rather than a centralized actor? Can decentralized systems be designed to enable similar usability, experiences, and (security) features as today's platforms? What about their business model?

- Using blockchain technology, value exchange, trust mechanisms, and organizations may become decentralized. What are adequate governance frameworks for these types of business models? On decentralized platforms with self-executing smart contracts to facilitate the organization of economic activities, what type of dispute and resolution mechanisms are in place? How will blockchains have to be designed to comply with GDPR's requirements? For a comprehensive agenda, we refer to Beck et al. (2018)'s governance-related perspective as well as Risius and Spohrer (2017) for an overarching blockchain research framework.

While research can help to underline the value of reputation portability with evidence-based approaches, regulatory bodies, platforms, and third-party providers will have to develop strategies to address increasing claims for portable and aggregated online reputation:

- In its current state, the GDPR does not explicitly cover reputation portability (Section 4, Scenario 1). To let portable reputation between platforms become a reality, policymakers will need to set out for an advancement (or, at minimum, a clarifying interpretation) of the current legislation.

- The long list of (previously) unsuccessful startups and PIMS for reputation portability and aggregation suggests this is not (thus far) a viable business model. How can PIMS succeed in becoming mainstream solutions for reputation and identity management (Scenario 3)? How do they ensure compliance with data privacy law?

With this work, we have introduced reputation portability as one aspect of a broader dialogue on digital identity management. We are the first to provide a comprehensive conceptual model, thus, touching upon the *what, why,* and *how* of portable reputation. Our model portrays and defines the most important actors, mechanisms, data types, and external influencing factors. By detailing these dimensions, we derive the need for clear regulatory guidance and identify an obvious gap in empirical research. Where today's leading platforms currently forgo implementing adequate mechanisms for users, PIMS and blockchain technology might provide the means to factually establish reputation portability and empower individuals with a digital identity. However, for these approaches to appeal for wide-spread adoption, usable and intuitive solutions will have to be designed and sociotechnical challenges need to be overcome. To that end, we derived future scenarios, implications, and critical assessments for platforms, PIMS, entrepreneurs, and governing bodies. We hope they will inform the ongoing debate among researchers and practitioners and help with answering a (not so) simple question: *Quo vadis, reputation portability?*

PART II: THE ECONOMICS OF REPUTATION PORTABILITY

Chapter 3: User perceptions and a market data perspective

After establishing theoretical and conceptual foundations, in this second part of the thesis, I assess the effectiveness of reputation portability in digital markets. This chapter leverages two approaches to develop respective answers: first, a survey asking potential platform users to rate and discuss the importance of portable reputation as an additional trust cue, and second, a case study analyzing actual platform data to understand the impact of applied reputation portability on basic indicators of economic success.

Maik Hesse, Timm Teubner[27]

Introduction

The management of reputation and digital identity has become imperative for any business that attempts to sell products and/or services online (Tadelis 2016). On electronic commerce platforms such as Amazon, eBay, Gumtree, or Bonanza, sellers build an online reputation based on evaluations of prior customers. Importantly, sellers *rely* on this reputation since it greatly determines their capability of 1) enforcing profitable prices and 2) attracting demand (Dellarocas et al. 2009; Tadelis 2016).

It is quite common that sellers are active on multiple platforms ("multi-homing") and, in this case have to manage each reputation separately (Dakhlia et al. 2016; Dellarocas et al. 2009; Teubner et al. 2019). Building up such a reputation as a signal of trustworthiness towards prospective buyers requires effort and is costly (Dunham 2011). Especially when starting to sell through a new channel, the lack of reputation may represent a crucial barrier for economic success since, from the buyers' perspective, such sellers represent dark horses with no credible track record on the platform, a phenomenon which is also referred to as the "cold-start" problem (Wessel et al. 2017).

This raises the question whether the reputation a seller acquires in one platform represents a valuable signal of trustworthiness when imported on another platform. In other words – and put as a concise research question:

RQ: *Can sellers with little or no reputation on a platform draw on existing ratings from another platform to their benefit?*

With this exploratory work, we address buyers' perceptions and sellers' economic implications of such cross-platform reputation portability. Until now, research has devoted broad attention to either a) the roles of trust and reputation within the confines of a given platform environment (Resnick and Zeckhauser 2002; Teubner et al. 2017) or b) the general concept of

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cross-platform data portability (Drechsler 2018; Engels 2016). Overall, there is still an evident gap of empirical work on the portability of reputation between platforms.

With this work, we seek to address this gap. We do so by considering 1) the perception of imported reputation from the buyer perspective (Study 1; Survey) and 2) the effectiveness of imported reputation based on actual market data from an e-commerce platform (Study 2; Empirical Data). In a nutshell, our results show that e-commerce customers state to be receptive for imported reputation in general. Specifically, they value the additional information for increased levels of reliability and consistency in provider ratings—indicating their good (or maybe not so good) online behavior across a range of sources. Looking at actual market data, however, we observe a more intricate picture. While a large fraction of sellers makes in fact use of reputation import and substantially increases rating scores by this, it does not seem to be converted into tangible economic results. Quite to the contrary, we observe that reputation imports and the resulting improved rating scores are associated with less demand and lower prices. We discuss these peculiar findings in view of the rapid proliferation of the platform economy and alternative approaches to reputation management (e.g., third-party services, decentralized technology).

The remainder of this paper is organized as follows. We describe the general idea of cross-platform reputation portability and review existing work on this subject in Section 2. Section 3 then reports the results of an online survey in which we roughly assess the potential of reputation portability from the consumer perspective. We then analyze a real-world case of reputation import based on market data from 4,506 sellers of an e-commerce platform in Section 4. Section 5 provides a general discussion of our findings—linking them to current developments in policy making and technology. Section 6 concludes.

Related Work

Trust and reputation on platforms

Today's online platform landscape is ubiquitous, transforming almost every industry, and pervading many levels of modern economic activity (Alt and Zimmermann 2014; De Reuver et al. 2018). Digital platforms, such as Amazon, eBay, Taobao, and others mediate transactions between sellers and buyers by providing them with means to exchange goods and services online. For a platform business to thrive, the willingness of buyers and sellers to engage in transactions is imperative. For this to happen, the most important antecedent is the establishment and maintenance of trust between prospective transaction partners. Hence, trust and reputation have been a popular research objects within and across platform ecosystems over the past decades (Resnick and Zeckhauser 2002; Tadelis 2016).

In the context of digital platforms, a seller's reputation is usually referred to as the accumulated and documented evaluation by prior transaction partners based on their experiences with this seller (Jarvenpaa et al. 2000). Reputation systems aggregate transaction-based feedback into individual buyers' rating scores to function, inter alia, as a signal of trustworthiness (Dellarocas et al. 2009; Jøsang et al. 2007; Resnick et al. 2000). Since their introduction in electronic commerce, reputation systems have been designed and developed to insert trust in online transactions by providing "future buyers with a window into a seller's past behavior with previous buyers" (Tadelis 2016, p. 326). Besides the use of reputation systems to aggregate third-party assessments, today, all major platforms deploy a variety of trust-enhancing

mechanisms that allow users (e.g., buyers, sellers, hosts, renters, etc.) to showcase a track-record for reputable online conduct (Teubner and Dann 2018). Yet, feedback by others, that is, third-party ratings (e.g., 1-5 stars, positive/negative) or written assessment (i.e., text reviews) still represents the most frequently used signals to demonstrate trustworthiness in digital environments (Mavlanova et al. 2012; Teubner et al. 2019).

There is a wide range of studies on the effects of these reputational elements within a given platform environment—both regarding their impact on buyers' perceptions of a seller's trustworthiness and, in turn, on the implied economics of seller reputation. First, ratings and reviews have been shown to positively influence buyers' trust in prospective sellers in a variety of platform contexts. For instance, for previous buyers' comments on eBay (Resnick and Zeckhauser 2002) or, similarly, written feedback from prior transaction partners on sharing economy platforms (Cheng et al. 2019; Zloteanu et al. 2018), as well as for star ratings and text reviews on Airbnb (C. Chen and Chang 2018; Qiu et al. 2018),

Second, a plethora of research investigates the resulting economic effects of higher trustworthiness, namely, the intuitive theoretical claim that it both drives demand/bids from potential buyers and allows sellers to set and enforce higher prices. We refer to Bajari and Hortaçsu (2004), Dellarocas et al. (2009), and Tadelis (2016) for more comprehensive overviews of studies reporting empirical evidence for higher sales probability and price premiums obtained by more reputable sellers.

Reputation portability

Reputation portability can be defined as "the effectiveness of a user's reputation on a source platform (e.g., a star rating score) in building trust on a different platform" (Teubner et al. 2019, p. 231). Considering the documented effects of reputation within a specific marketplace and the increasing "platformization" of our world, it seems natural to ask questions regarding the permeability of online reputation across platform borders—especially, since the idea of portable reputation is anything but new.

In the 1990s, eBay and Amazon introduced early versions of reputation systems and—for some time—Amazon allowed its sellers to directly import their ratings from eBay (Resnick et al. 2000). Back then, it seemed as though this might become a common practice, however, apparently eBay was not appreciative of the fact. Upon claims of their ratings being proprietary accompanied by legal threats, Amazon had to discontinue the service (Dellarocas et al. 2009).

There is a lively debate among legal scholars with regard to the ownership of transaction-based feedback in the form of reviews—and hence regarding its ability to be ported between platforms. In 2018, the EU introduced the *General Data Protection Regulation* (GDPR) in an effort to foster and enable unprecedented competition in online markets by breaking the monopoly of incumbents and large platforms (European Union 2016a). In fact, GPDR's Article 20 mandates platform operators to grant "data subjects" the explicit right to data portability. Note that any individual who provides data to the platform is subject to the regulation, that is, both buyers and sellers. Legal scholars have welcomed the new legislation as a promising step and strong tool to allow for increased competition between digital platforms and give individuals more control over personal data (De Hert et al. 2018; Kathuria and Lai 2018). However, given a lack of clear interpretations it needs to be clarified what type of data is supposed to be ported from one platform to another (Engels 2016; Ursic 2018)—and if GDPR

in its current form encompasses reputational information. Reputation data (both in the form of text reviews and ratings) is usually provided by others, that is, prior transaction partners, in particular buyers. In the case of text reviews, Kathuria and Lai (2018) conclude that ownership would most likely be with the author or the platform—but not with the individual seller. Further, based on third-party (star) ratings, platforms calculate proprietary aggregated scores via their reputation systems. The exact scope of data encompassed by GDPR is certainly debatable, however, since sellers do not provide these rating themselves, Article 20 is unlikely to cover them either (Graef et al. 2013; Vanberg and Ünver 2017). Also, obligatory (or better yet: "forced") interoperability to design systems so that data portability is supported was taken out of the regulation—again following critical acclaims from the platforms themselves (Drechsler 2018). In anticipation of a prisoner's dilemma—even though platforms would win over sellers by offering reputation import, they may eventually weaken their position due to increased competition—Krämer (2018) suggests large players may silently agree to *not* offer such functionality for direct competitors.

However unlikely that leading platforms will offer reputation import any time soon, the economic benefits for sellers and entrant platforms are apparent: for instance, avoidance of platform lock-in due to network effects, decreased switching cost, and mitigation of the "cold-start" problem without prior on-site reputation.

Somewhat surprisingly—given the reluctance of long-established platforms such as eBay and Amazon to offer reciprocal import functionality—it is still possible to have a seller's ratings ported from those platforms to newer, alternative e-commerce marketplaces. Bonanza and TrueGether, for instance, do promote the direct import of both Amazon and eBay ratings into sellers' profiles on their platform (Bonanza 2019a; TrueGether 2019). On Bonanza, a seller's eBay rating (i.e., positive/neutral/negative) is translated into the equivalent value on a 5-star rating scheme (i.e., 5, 3, or 1 stars), while on TrueGether both the external rating as well as the corresponding feedback text are displayed. We analyze the dynamics of imported reputation on these platforms in the next section.

These practical approaches come well-supported by calls for reputation portability to become the gold standard. Resnick et al. (2000) have made this remark almost two decades ago stating the difficulty stemming from "the lack of portability from system to system" (p. 48). More recently, Puschmann and Alt (2016), in the context of sharing economy platforms, posed the question how users (from both market sides) may connect their various profiles to comprehensively manage their online identity. Following the same line of thought, a recent EU report identifies "cross-platform reputation portability" as an important concept to address issues of data ownership, prohibitive switching costs, lock-in effects, and platform competition (European Commission 2017). Finally, Gans (2018) suggests a broader notion of "identity portability" based on the artifacts used by platforms to generate reputation (i.e., ratings and reviews).

As much advocacy there may historically be, the hypothesized value of portable reputation has so far not been corroborated by empirical insight. There has been some quantitative work on the potential of previously earned reputational data to predict trustworthiness and future performance. However, this has either been based on social media data (as opposed to transaction-based reputation; (Venkatadri et al. 2016)) or analysis was limited to different categories within the same platform (Kokkodis and Ipeirotis 2016).

Only recently, first studies have set out to investigate the effectiveness of portable reputation from the consumer's perspective (Otto et al. 2018; Zloteanu et al. 2018). Otto et al. (2018) use a controlled experiment to display imported ratings from Airbnb (a platform for peer-to-peer accommodation rental) to potential passengers on BlaBlaCar (a ridesharing platform). Based on self-reported scales, they find that imported signals positively impact trust in prospective drivers on the platform. Similarly, Zloteanu et al. (2018) use a hypothetical scenario and present study participants with different types of trust and reputation information ("TRI")— among which "online market reputation" denotes imported ratings from other platforms (in this case Airbnb and Uber). They find that the availability of TRI increases the perceptions of prospective hosts' trustworthiness as well as participants willingness to book a stay. However, it is neither possible to attribute this effect entirely to imported ratings nor to assess the latter's general importance from a consumer perspective, since the authors did not explicitly control for it (or chose to not report it). Teubner et al. (2019) use survey data to emphasize today's platform multiplicity. They show that almost two out of three respondents are active on more than one platform, underlining their claim for the relevance of "reputation transfer". Following up on this, Teubner et al. (2020) show that star ratings bear trust-building potential also across platform boundaries for several platforms (i.e., Airbnb, BlaBlaCar, eBay, Uber) and that thematic *fit* between source and target context is an important criterion for cross-platform signaling to be effective. For a comprehensive literature review on reputation portability, we refer to Hesse and Teubner (2020a).

Overall, the outlined studies unanimously find reputation portability to be effective, however they all rely on survey data, that is, on self-reported scales and assessments made by the participants. Given that such approaches are prone to intention-behavior gaps (Sheeran 2002), we complement this view by additional data-based insights into the workings of portable reputation. In the next section, we report the results from a consumer survey on perceptions of portable reputation. We then explore the effects of reputation imports based on actual market data (Bonanza.com). This allows us to empirically assess the impact of imported reputation on sellers' ability to a) attract demand and b) enforce higher prices—and come to a surprising result. To the best of our knowledge, this paper is the first to do so.

A survey on portable reputation

Study design and data

In the first study, we conducted an online survey in which participants evaluated different means of online reputation and trust[28]. Specifically, participants took the role of buyers and evaluated the concept of sellers with imported ratings and/or reviews. We recruited 204 participants via Prolific.ac (Palan and Schitter 2018), ensuring respondents had sufficient experience in online shopping on electronic commerce platforms (i.e., at least once a month) and represented a diverse global audience (i.e., Northern America, EU, Middle East). A total of 187 participants remained after attention and completeness checks. Using a between-subjects design, participants were assigned to scenarios on five different types of online platforms: accommodation (e.g., Airbnb, Homestay), P2P carsharing (e.g., easyCarClub, Getaround), crowd work (e.g., TaskRabbit, Helpling), e-commerce (e.g., eBay, Bonanza), and mobility (e.g., Uber, Lyft). Based on our previous work on the subject (Hesse and Teubner

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[28] See Appendix for further details.

2020a; Teubner et al. 2019, 2020), we introduced the concept of reputation portability as the availability of additional reputation elements (i.e., star ratings and text reviews)—pertaining to a prospective provider but stemming from a different platform. Participants then rated the importance of these additional trust cues in deciding to buy from a prospective provider (single item construct; 7-point Likert scales). We added an open-ended question asking why (if at all) and in which cases subjects considered imported reputation to be helpful for their decision process. These textual statements were reviewed to identify distinct aspects mentioned by participants (e.g., importance of fit between platforms; helpfulness for new providers). The survey was conducted in May 2019.

Results

Figure 11 summarizes the results of the survey and shows platform-specific differences. It becomes evident that respondents generally value the concept of reputation portability for e-commerce, scoring 5.6 on the importance Likert scale (1 to 7; corresponding to 76.67% when standardized). Remarkably, other platform types (i.e., accommodation, crowd work, mobility) exhibit higher scores for imported reputation. One potential explanation for these differences may root in the fact that those platforms facilitate co-sharing and physical encounters are prerequisite to service provision, that is, there occurs a generally higher degree of social interaction (Hesse, Dann, et al. 2020). Hence, they may require higher levels of "inserted" trust from external sources.
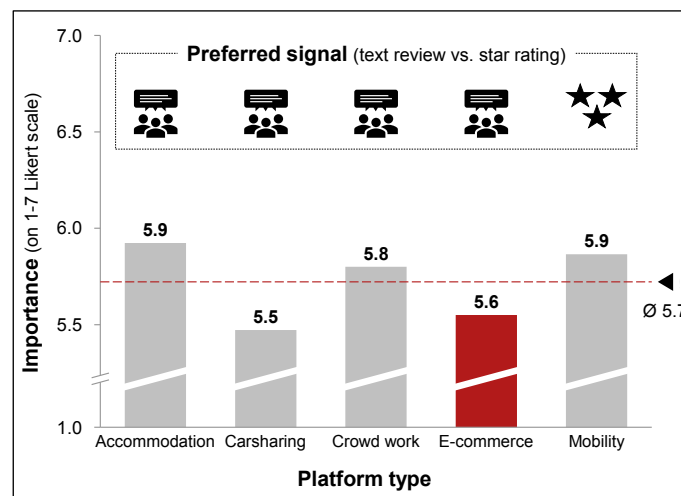
FIGURE 11: IMPORTANCE OF PORTABLE REPUTATION AND PREFERRED SIGNAL FOR IMPORT

Another observation concerns the preferred trust signal survey participants would like to see being imported from other platforms. Here, participants appreciated written text reviews over star ratings on all platforms except those for mobility services.

The reason for that can be found in the verbal statements. Participants were asked to comment *whether*, *why*, and *how* (i.e., under which circumstances) imported reputation would be helpful to them. As for their preference for text reviews, some participants mentioned star rating scale skewness as a limiting factor ("people usually assign stars/points in extremes"). In fact, positively skewed star rating distributions represent a common phenomenon for many

online platforms (Schoenmueller et al. 2018; Teubner and Dann 2018; Zervas et al. 2015). In that sense, text reviews appealed as "more informative" and to provide a "clearer picture".

Main reasons in favor of imported reputation were the general surplus of details (e.g., "the more information the better"; 30 times), the ability to prove a provider's good (or bad) conduct on other platforms (26 times), or the opportunity to check on consistency/reliability of ratings (e.g., could be "bought", "fake", fabricated", or "written by oneself"; 20 times). In particular, imported reputation was considered as potentially helpful as it allows novel providers with no or little on-site reputation to mitigate the platform-inherent cold-start problem (18 times). Specifically, one respondent stated that reputation portability could help in demonstrating an "honest online footprint".

Additionally, the issue of sellers getting rid of "a string of bad reviews" and "play[ing] the system by using another platform" was repeatedly brought up (15 times). That is, consumers would want the critical reviews from other platforms to show up. In this sense, it could prevent bad actors from successfully continuing their poor game by starting over and over on new platforms.

Last, the relevance of the fit between source and target platforms for porting reputation received considerable attention (14 times). On the one hand, participants noted that the source platform should be well-known, reputable, and trustworthy itself to instill confidence in the ratings' reliability and credibility. On the other hand, the service offering on source and target platforms should be compatible and relevant to each other because, as one participant neatly put it, "a fishmonger is not a good butcher" – an observation well in line with recent research (Teubner et al. 2020).

Reputation import on Bonanza.com

Study design and data

In this second study, we follow up the first study's findings and investigate how importing reputation affects sellers' market success, that is, their capability to 1) enforce price mark-ups and 2) attract demand. In this sense, we now investigate the overall effect of the reputation import strategy from an empirical perspective, that is, based on actual market data. Naturally, this approach is limited to uncovering *that* certain effects occur but cannot speak to *how* or *why* specifically they may appear. Thus, our approach is prone to issues of observational studies such as omitted variables which we come back to it in the general discussion.

We collected data from Bonanza.com, an e-commerce platform that markets itself as an eBay alternative. It targets business sellers, being a "marketplace that empowers entrepreneurs to build a sustainable business based on repeat customers" (Bonanza 2019b). Founded in 2008, the platform hosts about 50,000 registered sellers with an overall inventory of 35 million items. Using a web-crawler to query the platform, we collected openly accessible data for a total of 4,506 sellers and 124,067 items. The data was collected at two instances in April and May 2019.

For analysis, we consider individual sellers. For each seller, we consider data on i) overall rating score (1-5 stars in steps of 0.1 stars), ii) average price of their items, iii) number of transactions on the platform, and iv) whether they have imported ratings from eBay or not (binary variable:

yes/no). Moreover, we retrieved information on how many items a seller offers through the platform as well as their total number of reviews as an approximation of business size.

The first pass of data collection in April 2019 was followed by a second pass four weeks later. This longitudinal data structure allows us to account for sellers' capability of generating additional sales, that is, of attracting demand (i.e., delta between t=2 and t=1), as a result of their rating score in t=1. Specifically, in contrast to "snapshot" data at only one single point of time, this approach reduces endogeneity issues which make inferences on causal effects notoriously difficult. The data can be characterized as follows:

i. The *Score* reflects a seller's average star rating score (1-5 stars). Without import (n=270): 4.52 stars; with import (n=4,236): 4.97 stars.

ii. The *Price* represents a seller's average price across their items (without import: 19.82\$; with import: 19.22\$).

iii. *Demand* describes a seller's number of new transactions over the 4 weeks between data collection 1 and 2 (without import: 1.81; with import: 1.12).

iv. Average number of *Reviews*
   a. On Bonanza (without import: 21.85; with import: 9.85)
   b. Imported from eBay (without import: 0; with import: 2,803)

Results

Overall, 94% of sellers import reputation. And for 9 out of 10 sellers who import reputation, the imported ratings make up for more than 95% of their total number of ratings. Now, in order to further understand the specific characteristics of and differences between sellers with and without reputation imports, we conduct a series of OSL regressions on the above-mentioned focus variables. Table 5 summarizes the regression models for the three dependent variables *Score* (Model I), *Price* (Models II-IV), and *Demand* (Models V-VII) based on observed values from 4,506 sellers on Bonanza.com.

	i. Score	ii. Price			iii. Demand		
Imported Reviews (y/n)	.450 ***	-.314		.914	-.681 ***		-.459 **
	(.016)	(.783)		(.846)	(.144)		(.156)
Score (1-5)			-2.431 ***	-2.727 ***		-.641 ***	-.492 ***
			(.664)	(.718)		(.123)	(.133)
#Reviews (10³)	.001 *	-.073 ***	-.068 **	-.070 **	.019 ***	.019 ***	.020 ***
	(.000)	(.021)	(.021)	(.021)	(.004)	(.004)	(.004)
#Items (10³)	-.002 **	.124 ***	.117 ***	.118 ***	.098 ***	.097 ***	.097 ***
	(.001)	(.033)	(.033)	(.033)	(.006)	(.006)	(.006)
Intercept	4.519 ***	19.519 ***	31.236 ***	31.844 ***	1.570 ***	4.101 ***	3.796 ***
	(.016)	(.761)	(3.286)	(3.334)	(.140)	(.607)	(.615)
#Observations	4,506	4,506	4,506	4,506	4,506	4,506	4,506
R²	.152	.005	.008	.008	.077	.078	.080

*** $p<.001$; ** $p<.01$; * $p<.05$; standard errors in parentheses

TABLE 5: OLS REGRESSION MODELS (SCORE, PRICE, DEMAND)

First, confirming the observation from above, average rating scores are significantly higher for sellers *with* imported ratings by about half a star ($b=.450$, $p<.001$). Moreover, controlling for a seller's characteristics shows that the respective number of ratings and items have significant (but minuscule) effects on rating score ($b=.001$, $p<.05$; $b=-.002$; $p<.01$; per thousand ratings/items each).

Next, to assess the economic effect of importing/ not importing reputation, we consider regression models for price and demand. The price models show that higher star rating scores are *negatively* related to average prices ($b=-2.727$, $p<.001$) and that, beyond this, importing reviews has no significant price effect ($b=.914$, *n.s.*). Next, also the demand regressions show that higher star rating scores are negatively related to demand, that is, the number of sales a seller had between the two points of observation ($b=-.492$, $p<.001$). Importantly, we observe that beyond this rating score effect, there occurs an additional negative effect based on importing itself ($b=-.459$, $p<.01$). Thus, even for identical rating scores, sellers who have imported ratings attract less additional demand as compared to sellers who did not import.

Overall, these observations are puzzling, to say the least. The negative relation between higher rating scores and prices/demand is counter-intuitive from a common-sense perspective and inconsistent with theory and most of the literature. There exist, however, some studies that report similar negative relations between reputation and economic indicators (Dellarocas et al. 2009) and we offer some approaches of explanation in the general discussion. Importantly, when excluding the control variables from the models, none of the coefficients change in terms of sign, magnitude, or significance.

Now, as a seller's economic success can be well conflated by revenue (R), which emerges as the interaction of price (p) and demand (d). Hence, revenue can be graphically interpreted as the area of a rectangle with edges p and d, where $R=p\cdot d$. Figure 12 shows average prices and demand for sellers *with* versus *without* imported reputation (standard errors indicated by error bars in both dimensions). We see that the overall revenue difference between importing/ not importing reputation is primarily driven by the lower additional demand rather than by the difference of average prices (Figure 12).
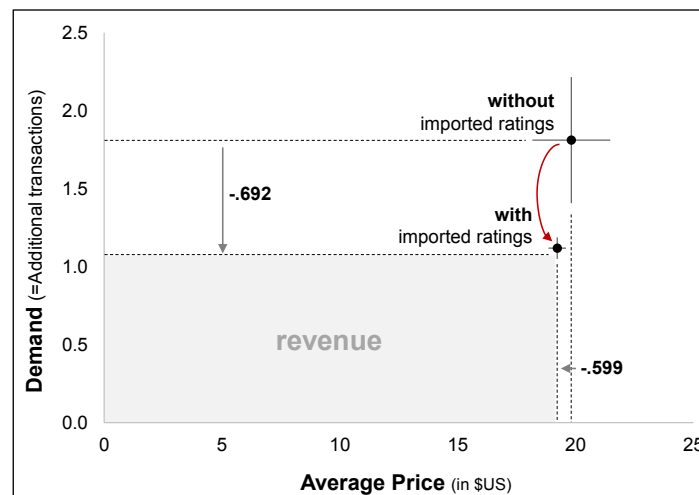
FIGURE 12: REVENUE DIFFERENCE COMPOSITION

General discussion

Full transparency of previous online conduct across digital platforms—as appreciated by some of our survey participants—would entail far-reaching implications. Having bad reviews showing up everywhere we interact online would pose a considerable threat to Western world liberal values. Along those lines, China is—as we speak—in fact implementing a national reputation scheme ("Social Credit System") that penalizes and rewards individuals and businesses (Hatton 2015; Síthigh and Siems 2019). Importantly, the system explicitly includes online behavior such as electronic shopping and social media conduct. By 2020, it intends to assess every citizen nation-wide with a unique, standardized, and publicly ranked score. Although most Western observers reject these plans outright (e.g., as dystopian or "Orwellian"), others suggest that—with the ubiquity of digital platforms, predictive algorithms, and scoring mechanisms—the Western world is not too far away from the Chinese system of networked shame (Botsman 2017a). The EU will have to find its own position in dealing with this development. The GDPR currently grants individuals the *right to erasure* (also labeled as "right to be forgotten"; Article 17). This entitles them to have their personal data (stored by platforms) deleted. Whether this also pertains to any reputational data—provided by others as previously discussed—is still up to clarification.

However, cherry-picking only the best ratings to be ported from a given platform (or choosing just those platforms where one has collected good average ratings) seems unreasonable, too. To prevent this scenario of "takeaway trust" ad libitum, systems could be designed in a way that leaves the seller with a choice: either import all available reviews (full transparency) or none at all. In that sense, it would provide sellers with the discretional option to disclose their previous ratings (Dellarocas et al. 2009). This could create an incentive for impeccable online behavior and may be more in line with the foreseeable position of the EU between the US (*reputation capitalism*) and China (*reputation tyranny*) as providing a third way: *reputation sovereignty*.

We also learned that the source-target fit of a platform is of crucial importance when considering portable reputation (e.g., a great Airbnb host could be a nightmarish driver). Services might not be comparable across platforms and what is considered good in one environment may not be such a desirable treat in another (Teubner et al. 2020). Furthermore, ratings may hardly be comparable when, for instance, one platform exhibits skewness towards highly positive scores whereas another might show a much more dispersed rating distribution (Teubner and Dann 2018).

A puzzling market—As suggested by theory and common sense, there should be a positive relation between reputation and buyers' capability to attract demand as well as pricing power. However, there have also been findings in the opposite direction suggesting either limited effects of reputation or effects in the "wrong" direction (Dellarocas et al. 2009). For Bonanza.com, we also observe a negative relation between rating scores and demand/prices. Importantly, this also holds when considering only sellers *without* imported reputation. Given these admittedly puzzling results, several (in parts rather speculative) approaches for explanation come to mind. While survey participants expressed a preference for text reviews as the to-be-imported signal, only star ratings are available which may impair their effect. Import functions may hence be extended to textual information too. Also, as shown by the cross-domain comparison (Figure 11), importing reputation is considered as *relatively*

unimportant for platforms such as eBay/Bonanza as compared to other domains with higher degrees of social interaction. Thus, albeit being one of very few platforms on which reputation imports can be studied, Bonanza.com may not be the best or most promising venue to do so. In this sense, our findings may underestimate the potential benefits of reputation imports.

Also, a mechanism of reverse causality may cause "less expensive" sellers to be perceived as having a better price-value, which is why they, in turn, receive better reviews. Hence, rather than sellers' reputation forcing/allowing them to set lower/higher prices, the prices themselves may trigger biased ratings. This, however, is still at odds with most prior research on the economic effects of reputation, where, very broadly, positive effects are reported. Specifically, the latter rationale cannot explain why sellers with better reputation at a certain point in time receive less demand *subsequently*. Another explanation could be that Bonanza.com represents a secondary sales channel for many sellers through which they sell off their stock at discounts. Following this logic, especially large (and successful) eBay sellers may treat their Bonanza accounts with less care. To address this, a promising way forward could be to link the Bonanza profiles back to their eBay counterparts. In addition, a more frequent sampling of larger sets of Bonanza profiles could allow for a comparison of sellers before and after they have imported ratings, enabling difference-in-differences estimation or regression discontinuity designs. In view of our findings, one should critically ask whether importing large amounts (i.e., thousands) of ratings and reviews to a context in which typical sellers have only very few ratings, somehow disturbs the effectiveness of market signaling altogether. Last, issues could also root in the quite different group sizes of the "treatment/control" groups. Overall, given the exploratory nature of this work, it is far too early to draw stark theoretical conclusions. Clearly, in light of the quite puzzling results and the outlined limitations of this study, more research based on larger data sets is needed to better understand the intricacies that govern reputation, price, and demand for reputation portability in general, and for Bonanza.com in particular.

Overall, our findings also prompt the question whether the cross-platform employment of reputation can and/or should be done differently. Should today's platforms, for instance, continue to forgo the implementation of user-friendly import mechanisms, Personal Information Management Services (PIMS) and blockchain technology may provide means to make reputation portability a more prevalent reality in the future.

Alternatives to direct import—Rather than drawing on direct "end-to-end" import, there may exist viable alternatives to realize portable reputation. For instance, PIMS as third-party services, aggregate and verify (reputational) data from disparate sources. Based on the combined data (e.g., ratings/reviews, verified social/professional accounts, personal IDs) these companies build individual trust-based data management tools, profiles, and dashboards. PIMS can best be understood as a data intermediary with the primary aim of putting people in control over their own reputation and digital identity (European Data Protection Supervisor 2016). However, such services have thus far been mostly unsuccessful with many failed attempts (e.g., trustcloud.com famust.com, peertru.st, tru.ly). Today, these services still struggle to develop profitable business models and to gain market recognition (Teubner et al. 2019).

Likewise, several endeavors based on blockchain (more generally: distributed ledger) technology promise to empower individuals with more control over their data—irrespective of intermediaries (Drescher 2017; Glaser 2017). Indeed, the technology's potential for portable

reputation lies in its ability to decentralize control and ownership over (reputational) data (Werbach 2018). In that way, it could break today's siloed (i.e., platform-bound) approach to reputation in favor of alternative business models for cross-platform portability (Catalini 2017). Especially, given the prevalence of "multi-homing" strategies with sellers/providers offering their services on several platforms, a blockchain-based marketplace could become a trusted, decentralized peer-to-peer network where participants retain full control over their data (Werbach 2018). Reputation in these environments could seamlessly roam across platform boundaries since it could be verified with ease, reside with individual sellers, and be built across a range of markets. Catalini and Gans (2016) envision this as an open reputation platform with the "ability to port and use the resulting reputation scores across different services and contexts" (p. 22). Eventually, combining PIMS' value proposition of self-sovereign identity management with technology to build decentralized platforms may just be the right approach in factually establishing portable reputation.

Conclusion

Digital platforms have become pervasive in basically all our daily lives. Specifically, two-sided platforms have emerged as a quasi-standard within electronic commerce. In view of the ever-increasing importance of this platform economy as well as its rules, mechanisms, and paradigms, we expect that reputation and specifically its fluidity will gain further importance for online businesses such as sellers on e-commerce marketplaces. With this first empirical account on actual reputation imports, we hope to contribute to and spark an ongoing scientific and public debate. Additionally, we expect the general topic of reputation portability to fuel a vivid legal discourse in view of privacy regulation, data sovereignty, and competition among *platfirms*.

Chapter 4: Trust measures and import thresholds

Continuing the investigation of reputation portability's economic effectiveness, in Chapter 4 I consider complementors' ability to increase consumers' trusting beliefs by importing reputational data from another platform. The presented study introduces a stylized function to measure trust and leverages data from an online experiment to estimate this function's parameters. As a result, I derive specific thresholds for when the import of star ratings from an external platform is beneficial for complementors.

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Introduction

The recent years have seen a flourishing of multi-sided market platforms, for instance, in the domains of accommodation sharing, mobility services, or crowd work. While reputation is critical for complementors to attract demand, the reputation they have built on one platform is, as of today, of limited use across platform boundaries. In this sense, *reputation portability* refers to the idea of leveraging existing reputation from one platform and using it as a trust signal on another (Hesse and Teubner 2020a; Teubner et al. 2019). For example, consider an Airbnb host looking into additionally posting listings on a competing platform such as 9flats or Homestay.com (i.e., planning to multi-home). Rather than having to re-build a reputation from scratch on the entrant platform (e.g., Homestay.com), importing their reputational history from the incumbent platform (e.g., Airbnb) would serve as an important credential to attract demand from prospective guests.

Today, however, the concept of reputation portability is not a common practice. Two notable exceptions are the e-commerce platforms TrueGether and Bonanza.com, which allow sellers to import ratings and reviews from eBay and Amazon (Bonanza 2019a; TrueGether 2019). While Bonanza translates eBay ratings into its own 5-star scheme, TrueGether also allows for the import and display of written feedback.[30] Notwithstanding these practical implementations of reputation portability in online marketplaces, a wider application across the entire platform landscape is far from sight and it remains to be seen whether any of these applications will prevail.

Yet, calls for research on reputation portability have been prevalent in academic literature for almost two decades. In the early days of electronic commerce, Resnick et al. (2000) stated that not being able to transfer one's ratings from one platform to another is problematic as

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[29] This study was originally submitted to the journal *Business & Information Systems Engineering* and carries the title "In stars we trust – A note on reputation portability in digital platform ecosystems". It is currently undergoing the third round of reviews. This version is based on the first revised manuscript.

[30] Several other mechanisms to establish reputation portability are conceivable, including Personal Information Management Systems (PIMS) and distributed ledger technology. These were discussed in EU reports and previous literature (e.g., European Data Protection Supervisor 2016; see Hesse and Teubner 2020a for an overview).

"[l]imited distribution of feedback limits its effectiveness" (p. 48). In the mid-1990s, Amazon allowed customers to import their existing ratings directly from eBay and the latter threatened to press charges claiming these ratings to be proprietary content. About a decade later with more platforms emerging and the advent of the sharing economy, Dellarocas et al. (2009) made a case for portable reputation, in particular for multi-homing complementors. The notion of managing online reputation by connecting profiles across platforms and enabling "identity portability" on the basis of transferable ratings has since been picked up regularly (Gans 2018; Puschmann and Alt 2016). These contributions unanimously point at the trust-building potential of reputation portability and ample research demonstrates that reputation represents an important driver of trust (i.e., consumers' trusting beliefs towards complementors; Resnick and Zeckhauser 2002; Tadelis 2016; Ter Huurne et al. 2017) and economic success (as measured, for instance, in conversion rates; Lee and Hosanagar 2020). However, only little scholarly work has investigated the effects of transferring reputation *across* platform boundaries (Teubner et al. 2019). The EU has identified this lack of integration as problematic and urges research on potential benefits and underlying mechanisms of reputation portability (e.g., European Commission 2017, p. 131).

From a theoretical perspective, it is well conceivable that such supplementary reputation can function as a signal of complementors' trustworthiness. As building and maintaining a good reputation is costly (Dunham 2011) and importing reputation would be at complementors' discretion, signaling theory (Spence 1973) lends itself well as a theoretical grounding. Recently, several studies have leveraged signaling as a theoretical underpinning for reputation portability. For instance, Otto et al. (2018) found that consumers of a ride sharing service exhibit higher willingness to pay and trust levels towards potential drivers (i.e., complementors) if their Airbnb ratings were available. Similarly, Teubner et al. (2020) presented prospective consumers with complementor profiles across three common application areas, namely accommodation sharing, ride/mobility services, and commodity exchange. In these either the rating on the platform, an imported rating, or no rating at all was available. They, too, found evidence for the trust-building potential of star ratings across platform boundaries and, further, identified *fit* between source and target context as a driver of this effect. However, it is important to note that the existing studies neither considered (1) the availability of *both* on-site and imported rating simultaneously nor did they (2) account for *varying or sub-standard rating scores*.

To address this gap, we consider the scenario outlined in the opening paragraph of this article: *Assuming reputation portability, under which circumstances would a complementor import their ratings from an incumbent platform when starting on an entrant platform?* Given that several examples of platforms already offer this functionality, it is important to investigate what drives a complementor's decision to make use of reputation portability. With the goal of maximizing trust from prospective consumers, we derive specific decision boundaries for complementors to decide whether or not to import ratings from one platform to another. Systematically varying both the on-site and imported rating scores, we estimate the resulting "trust function's" parameters by means of an online experiment (n=493). Based on the overarching theoretical framing of (cross-platform) signaling and building on previous empirical findings, we hypothesize that

H₁: The effect of an imported rating for consumers' trust in complementors positively depends on the rating's value.

H₂: Whether or not importing a given external rating is beneficial for the complementor depends on their on-site rating's specific value.

We find support for both hypotheses. These are important results because, on one side, they validate the assumption that reputation portability can increase trust in complementors – as hypothesized and examined in recent empirical studies. On the other side, we also demonstrate that there are boundaries to the positive effects of reputation import and that, depending on the specific scores, different trust-maximizing strategies emerge. Thus, our work contributes to both the trust literature as well as signaling theory in several ways. First, we extend the general trust literature on online reputation by studying an additional (external) signal, which can be imported from another platform. Second, we devise an experimental design with clear-cut scenarios that consider all possible combinations of these two signals' values. This provides both a quantitative and a strategic perspective on online reputation management (Otto et al. 2018; Teubner et al. 2020). With our results at hand, we then lay out an agenda for future studies on reputation portability, considering its practical relevance and discussing managerial implications for platforms and complementors.

Reputation portability scenario

Consider a multi-homing complementor. Specifically, the complementor has an existing track record on one platform (i.e., the *incumbent* platform *i*), and has additionally started to operate on another platform (i.e., the *entrant* platform *e*). Reputation on both platforms is conceptualized as a rating score ranging between 1.0 and 5.0 stars (the most common system). The complementor has acquired a rating of r_i on the incumbent platform and may (or may not) have already acquired an on-site rating of r_e on the entrant platform. We consider the complementor's decision whether to import their rating r_i from the incumbent to the entrant platform. The stylized function $f(r_e, r_i)$ describes the relation between the complementor's (on-site and imported) rating scores and their trustworthiness in the eyes of prospective consumers. Indeed, as previous research has shown, "good" reputation is a driving force for trust (i.e., trusting beliefs) in online transactions (Dellarocas et al. 2009; Qiu et al. 2018; Tadelis 2016). To be able to account for their individual and interactive effects, the two ratings r_e and r_i are not conflated into a single score but displayed independently. We thus distinguish four conceptual cases: (1) no on-site rating exists and no rating is imported; (2) on-site rating r_e exists and no rating is imported; (3) no on-site rating exists and a rating r_i is imported; (4) on-site rating r_e exists and a rating r_i is imported. This "trust function" $f(r_e, r_i)$ can hence be formalized as

$$f_j(r_e, r_i) \ = \ \alpha_j + \beta_j r_e + \gamma_j r_i + \delta_j r_e r_i = \begin{cases} \alpha_1 & (j = 1) \\ \alpha_2 + \beta_2 r_e & (j = 2) \\ \alpha_3 \qquad\quad + \gamma_3 r_i & (j = 3) \\ \alpha_4 + \beta_4 r_e + \gamma_4 r_i + \delta_4 r_e r_i & (j = 4) \end{cases} \quad \text{[a]}$$

where the parameter vectors $\alpha, \beta, \gamma, \delta$ capture the effects of the rating scores r_e and r_i on the complementor's trustworthiness across the four cases ($j = 1,2,3,4$)[31]. For the first case (1), a single coefficient α_1 suffices. For the cases in which *either* an on-site rating (2) *or* an imported rating (3) exists, we assume a linear relationship between rating and trustworthiness. If both

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[31] Please note that $f_j(r_e, r_i)$ represents a conceptual function here and not a regression. We hence do not include residual/error terms in this representation.

on-site and imported ratings exist (4), we allow for interaction between both ratings to occur (δ_4). A pair-wise comparison of all four cases results in several decision boundaries depending on the availability of rating scores r_e and r_i. First, to decide whether to import a rating of r_i if no on-site rating r_e is available, the complementor compares the cases (1) and (3). Equating these cases and solving for r_i yields the import threshold

$$r_i > r^* = \frac{\alpha_1 - \alpha_3}{\gamma_3} \quad [b].$$

Thus, the complementor will import a rating from the incumbent platform if it is greater than r^*. Second, if an on-site rating exists, the complementor compares cases (2) and (4), yielding

$$r_i > r^{**}(r_e) = \frac{(\alpha_2 - \alpha_4) + (\beta_2 - \beta_4)r_e}{\gamma_4 + \delta_4 r_e} \quad [c].$$

As opposed to r^*, note that r^{**} is not a constant but a function of the on-site rating. We will consider the pair-wise comparison of additional cases in the results section.

Experiment

Procedure and Sample—To estimate parameters for the outlined trust function, we conducted an online experiment. The dependent variable was operationalized by prospective consumers' trust in the complementor. Specifically, we recruited 500 participants via Prolific.co, which has been praised for its comparably high data quality and subject diversity as well as the option to pre-screen participants (Palan and Schitter 2018; Peer et al. 2017). In our case, we pre-filtered participants to have at least some experience in online shopping and to represent a gender-diverse and multi-national subject pool. Age ranged from 18 to 73 years (mean=35.0, median=32) and 56% of participants were female. Respondents had to opt-in for their participation, received 0.80£ upon successful completion, and took an average time of 74 seconds. Seven of 500 participants timed out and were excluded from further analysis.

Stimulus Material—Participants took the role of consumers and decided on booking a stay with a complementor on the accommodation sharing platform *Happystay.com* (see Appendix for details).

Treatment Design—Following a 2 × 2 between-subjects design, each participant experienced only one of the four outlined scenarios. The complementor either had no on-site rating (cases 1 and 3) or a rating r_e (randomly drawn from {1.0, 1.5, ..., 5.0}; cases 2 and 4). Additionally, as outlined above, the complementor had either imported a rating r_i from the incumbent platform (again, randomly drawn from {1.0, 1.5, ..., 5.0}) or no rating was imported. All possible combinations of rating scores were tested where the distribution was informed by the skewed values observed on actual platforms (Schoenmueller et al. 2018). Thus, although ratings above 3.0 stars occurred more frequently, the allocation of participants across cases (1) to (4) was mainly driven by the number of possible rating combinations per condition and by ensuring that at least a couple of observations were obtained for each possible combination. Besides rating *scores*, we also varied the *number* of ratings the complementor had received (ranging from lower single-digits to high double-digits) as a control variable. The allocation of participants across the treatment conditions and specific rating scores is reported in the Appendix.

Measurement—As a main dependent variable, we surveyed participants' *trust in the complementor* (i.e., their trust toward the prospective host; Gefen 2002). Moreover, as trust

represents an overarching theme and important prerequisite for the realization of transactions on platforms (Tadelis 2016), we controlled for participants' trust in the incumbent platform, general trusting disposition (Gefen 2000), and, additionally, individual risk-affinity (Dohmen et al. 2011). All variables were introduced as single-item 11-point Likert scales. Descriptive statistics on the participant-specific controls and the measurement instrument are provided in the Appendix.

Results

The trust-building effect of imported reputation

Moving beyond the conceptual representation of the trust function as specified in [a], we conduct OLS regression analyses to estimate the parameter set for $\alpha, \beta, \gamma,$ and δ. Table 6 reports the results for all cases (1-4); the dependent variable (*trust in complementor*) was standardized to the interval [0, 1]. Rating scores ranged from 1.0 to 5.0 (stars).

	DV: **Trust in complementor**			
	Case (1) (no rating)	**Case (2)** (on-site only)	**Case (3)** (imported only)	**Case (4)** (both ratings)
Constant	.350 ***	-.004	.016	.259 *
	(.038)	(.075)	(.082)	(.116)
On-site Rating		.128 ***		-.029
		(.021)		(.032)
Imported Rating			.116 ***	-.006
			(.023)	(.033)
Interaction				.024 **
				(.009)
Observations	24	81	83	305
Adjusted R²	—	.308	.237	.181

*** $p<.001$; ** $p<.01$; * $p<.05$; standard errors in parentheses

TABLE 6: PARAMETER ESTIMATES (TRUST)

These results are illustrated in Figure 13 (left: cases 1, 2 and 3; right: cases 2 and 4).
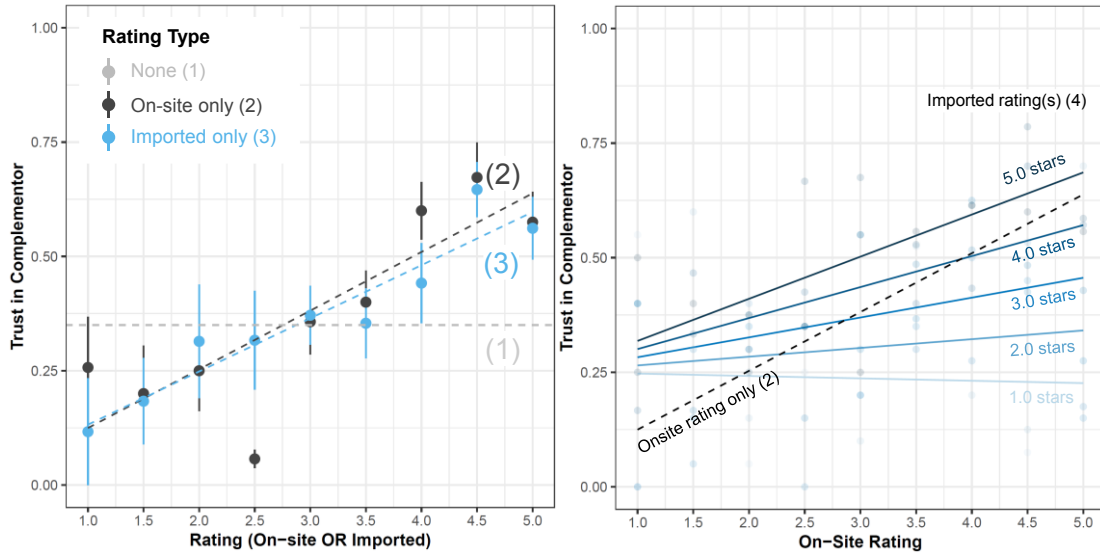
FIGURE 13: CONSUMER TRUST IN COMPLEMENTOR BY RATING SCORE

Result 1: *In the absence of an on-site rating, consumer trust in complementors is driven by increasing values of the imported rating (r_i; H_1). However, importing a rating will only be beneficial if its value is sufficiently high (i.e., exceeding $r^* = 2.9$ stars). Otherwise, complementors should not import this rating[32].*

Second, when both on-site and imported ratings are available in case (4), these two positively interact ($\delta_4 = .024$, p<.01), that is, the effect of on-site ratings on trust in complementors increases with better imported ratings – and vice versa. Figure 13 (right) shows this relation for different values of imported star ratings.

The interplay of on-site and imported reputation

Moreover, if an on-site rating r_e is available, the imported rating must exceed $r^{**} = \frac{-.263+.157r_e}{-.006+.024r_e}$. This function is displayed in Figure 14 (left). It illustrates the complementor's decision boundary for whether or not to import a rating (r_i; y-axis) from the incumbent platform in case they have to weigh it against an existing on-site rating (r_e; x-axis). For instance, importing a rating of 3.5 stars is beneficial for an on-site rating of 3.0 stars, while it is not for an on-site rating of 4.0 stars. Likewise, when having already built up an on-site rating of 4.0 stars, a complementor should import an incumbent rating of 4.5 stars while they should refrain from importing an equally valued rating of 4.0 stars. Figure 14 (left) additionally depicts r^*.

Result 2: *When an on-site rating is available, the decision threshold for importing a rating depends on the on-site rating's value (H_2). This relation is positive and concave.*

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[32] Please note that the value of exactly 2.9 stars (as well as other specific values utilized in this context), has a representative and indicative character. Certainly, any import threshold will depend at least on 1) the specific distribution (and skewness) of ratings on the source platform and 2) the applied rating scale. For the sake of exemplary computations and to derive sufficiently generalizable implications, we assume similar consumer perceptions of rating distributions across platforms and use a 5-star rating scheme.

Note that it is *always* beneficial to import an incumbent rating above 4.58 stars. Also, it is always beneficial to import *any* rating if the on-site rating is below 1.91 stars.
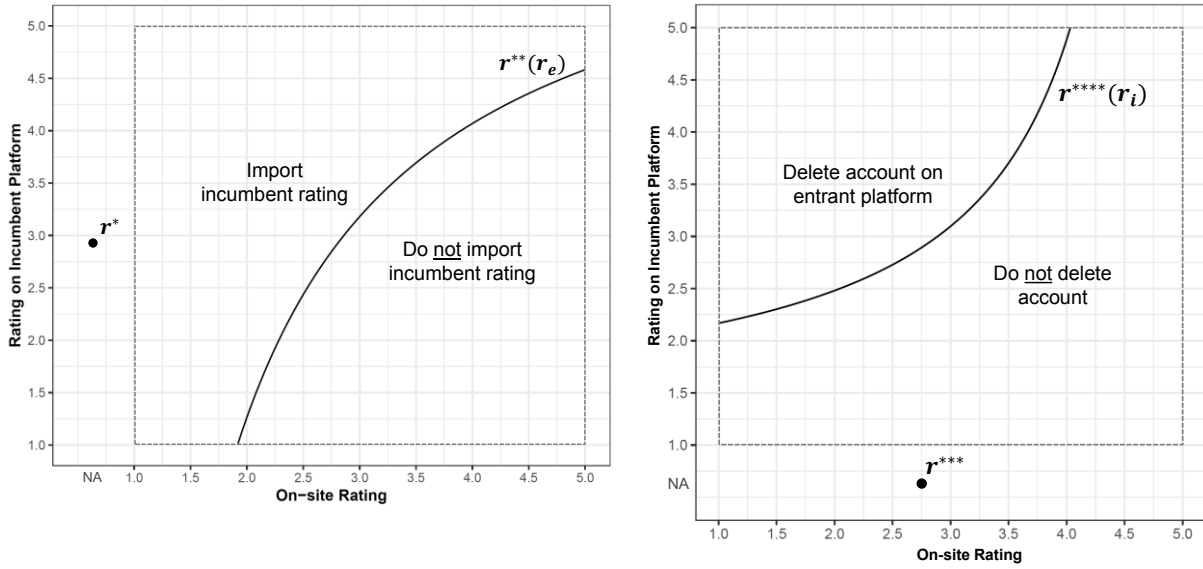
FIGURE 14: IMPORT AND ACCOUNT ABANDONING THRESHOLDS[33]

Account abandoning

Another way to look at the outlined scenario is via the strategy of *account abandoning and restart*. Complementors who have received adverse reviews may decide to give up their entrant platform account and create a new one. If no option for importing a rating from an incumbent platform is available, the threshold to do this is equal to the above-mentioned intersection between cases (1) and (2), that is, at $r^{***} = \frac{\alpha_1 - \alpha_2}{\beta_2} = \frac{.350 - .004}{.128} \approx 2.75$ stars. Hence, if a complementor's rating drops below this value, it would be beneficial to start over (with no rating at all). However, if importing a rating *is* an option, the threshold r^{****} for resetting one's account on the entrant platform will depend on the value of the external rating (i.e., the rating from the incumbent platform). Thus, a complementor will abandon their entrant platform account if r_e is lower than r^{****}, that is

$$r_e < r^{****}(r_i) = \frac{(\alpha_3 - \alpha_4) + (\gamma_3 - \gamma_4)r_i}{\beta_4 + \delta_4 r_i} \quad [\text{d}],$$

which can be obtained by the comparison of cases (3) and (4). When substituting with the estimated parameters from Table 6, we get $r^{****}(r_i) = \frac{-.243 + .123 r_i}{-.029 + .024 r_i}$. Figure 14 (right) depicts this relationship and indicates the complementor's optimal strategy given the two ratings' values. In consequence, the decision threshold for account abandoning (based on the on-site rating) depends on whether an incumbent rating exists and—if so—on this rating's value. Hence, enabling reputation import may result in a higher frequency of abandoned accounts as complementors' setbacks are smaller. This may, in turn, create new problems and necessitate additional, preventive countermeasures on the part of platform operators. Ultimately, these

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[33] Both thresholds are based on consumers' trust in complementors.

measures come down to specific platform design choices, which we can touch upon only briefly (please see the discussion section).

Trust-maximizing strategies

Next, we iterate on the idea of using the decision thresholds to identify a trust-maximizing display strategy for platform complementors' ratings. Consider a complementor who has *both* an on-site and an incumbent rating and is making a decision about which of these rating(s) to display. While, certainly, complementors would (and should) not have a choice to "drag & drop" their reputation at will, we consider these hypothetical scenarios to investigate *all* possible combinations and the resulting theoretical implications. Now, extending the pair-wise comparison from above and analyzing each resulting decision threshold (i.e., the two constant values r^* and r^{***}; the two threshold functions $r^{**}(r_e)$ and $r^{****}(r_i)$; and two additional boundaries) yields the strategy for obtaining the highest level of trust perceptions. Figure 15 plots all six resulting thresholds for the pair-wise case comparisons and highlights the respective *trust-maximizing strategies*. Depending on the specific ratings, the complementor may not display any rating, display either the imported *or* the on-site rating only, or both ratings simultaneously. Irrelevant (sections of) boundaries are shown as dotted lines.
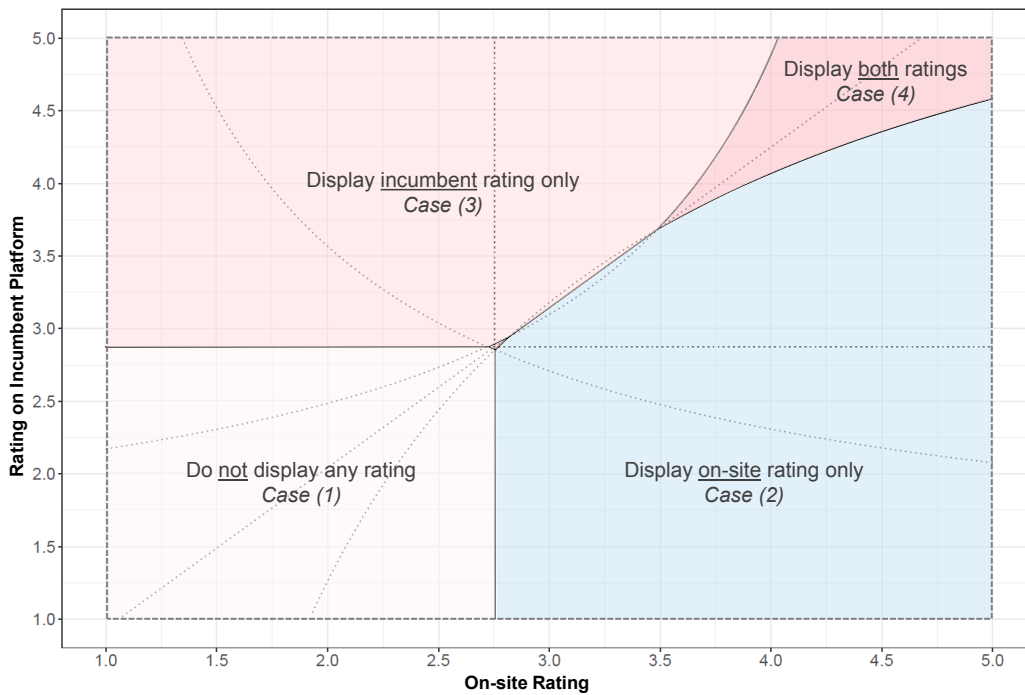
FIGURE 15: TRUST-MAXIMIZING RATING DISPLAY[34]

Control variable analysis and robustness checks

Extending scenario (4) in Table 6 by various (mean-centered) control variables shows that, first, *trust in the incumbent platform* ($\beta = .014$; $p < .05$), *general disposition to trust* ($\beta = .029$; $p < .001$), *risk-affinity* ($\beta = .031$; $p < .001$) and *Online Shopping Experience* ($\beta = -.007$; $p > .05$) have significant effects, but that, second, the main coefficients are not

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[34] We assume the availability of both ratings.

substantially affected (the same holds for all other cases; see Appendix). Next, there did not occur systematic differences with regard to the participants' characteristics across treatments (see Appendix).

Further, we conducted a robustness check for the interaction of *star rating score* and *number of reviews* received, as the latter may enforce the validity of an already good/bad rating score (*positivity/negativity effects*; Khare et al. 2011). The number of reviews had no systematic effect on trust, nor did it affect the models' main results (see Appendix).

As another supplementary analysis, we also investigated *gender effects*. In particular, we analyzed how evaluations of trust were affected when, for instance, both host and potential guest had the same gender or when a female guest is presented with a male host profile. None of these variables had any significant effect (see Appendix).

As an additional check to account for the different sample sizes across the 81 treatment cells in case (4) ($\{1.0, 1.5, \dots, 5.0\} \times \{1.0, 1.5, \dots, 5.0\}$), we repeated the analysis using the data on an aggregated level, also indicating robustness.

Discussion

This study provides a rationale for when to leverage reputation portability to increase trust across platform ecosystems. Specifically, we take a complementor's perspective and introduce a model for the trust-building capabilities of importing an external rating and estimate the model's parameters. In line with nascent work on reputation portability (Otto et al. 2018; Teubner et al. 2020), our results confirm that imported reputation can be leveraged to increase consumer trust in complementors (H_1). Extending previous research, we derive indicative thresholds for complementors to decide on when to leverage external reputation to their benefit – and when to refrain from doing so – which hinges on both on-site and to-be-imported rating scores (H_2). In doing so, this study is the first to identify trust-maximizing strategies when both on-site as well as importable ratings are available.

Given today's fragmented platform landscape, we acknowledge that the outlined scenario remains somewhat hypothetical. As of 2020, only few platforms enable the import of ratings (e.g., Bonanza.com, TrueGether.com). Hence, the concept can currently be described, at best, as a niche application. However, since novel regulation such as the General Data Protection Regulation (GDPR; European Union 2016a) fosters data subjects' rights to data portability – potentially including their reputational data – it is important to consider the strategic consequences for incumbent and entrant platforms. After all, making decisions on the cross-platform integration of reputation needs to take into account how complementors would actually use this functionality. Especially, given the all-pervasiveness of platforms (Alt and Zimmermann 2014), an abundancy of industries and services may be affected, including even dark-web markets (De Reuver et al. 2018; Norbutas et al. 2020; Sundararajan 2016). Since most users are active across multiple platforms (Teubner et al. 2019), we expect the concept of reputation portability to draw increasing practical and academic attention.

Design of reputation portability—Directly importing ratings from one platform to another has emerged as one of several potential means of drawing on one's reputation across platform boundaries. Researchers and practitioners may further explore both the design and effectiveness of such tools – and define standards for interoperability and interfaces (Drechsler 2018; Vanberg and Ünver 2017). Specifically, they should implement measures to keep

malicious actors from gaming such a system. Our results indicate that it is in the best interest of the platform to limit the import option to a set of carefully curated source platforms and to prevent exploitative strategies of frequent and/or abusive account creation and abandoning. Similarly, mechanisms need to be established to avoid that someone else's reputation is being imported (e.g., single-sign-on or confirmation links).

Other approaches to reputation portability—Directly importing ratings is by no means the only technological approach to facilitate reputation portability. Regulators and researchers have discussed third-party services, so-called *Personal Information Management Systems* (PIMS), to validate, certify, and aggregate reputational data from different sources into single profiles, with users being in control of their personal data (European Data Protection Supervisor 2016; Kathuria and Lai 2018; Martinelli 2019). Others envision distributed ledger technology to enable seamless portability of digital reputation across platform ecosystems and services (Catalini and Gans 2016; Werbach 2018). However, both these advances – just like direct transfer between platforms – are in early stages and the list of unsuccessful PIMS ventures is long (e.g., Deemly, erated.co, famust.com, peertru.st, tru.ly, trustcloud.com). Also, decentralized applications (i.e., dApps) have thus far neither gained much traction nor a critical user base (Hesse and Teubner 2020a).

Barriers to reputation portability—While the concept of reputation portability has been touted since the early 2000s, it is striking that, so far, it has experienced only limited proliferation (Resnick et al. 2000). As it stands, incumbent platforms (such as Airbnb, eBay, and Uber) seek to preserve market power and invest in lock-in by (actively) inhibiting the exploitation of their users' reputation outside the platform (Krämer 2018). Further, the lack of technical interoperability or, more precisely, the GDPR's somewhat vague wording (data shall be portable "where technically feasible"), may allow incumbents to shy away easily.

However, platform operators may not even have a say in whether "their" data is being extracted, exported, or re-used. Consider the star ratings and/or text reviews on Airbnb. As on most other platforms, these are publicly displayed for any Internet user to see (no login required). Thus, if a complementor on Airbnb starts hosting on a competing platform and wishes to benefit from their reputation on the incumbent platform, they can simply embed a link to their Airbnb page within the profile on the entrant platform *or* use the HTML code snippet Airbnb handily provides to users for such cases. They can also prove that they are actually the rightful operator of the linked profile, for instance, by providing credentials or confirmation through Airbnb's communication system. Notably, this is precisely how Bonanza and TrueGether allow complementors to import their existing reputation from eBay, with limited options for the latter to prevent this practice. What is more, by tolerating such a feature, incumbents may even enjoy free marketing if ratings from their platform are visibly embedded on other platforms.

Moreover, especially users (i.e., consumers and/or complementors) could benefit in several ways. The EU highlights explicitly that they would appreciate enhanced access to their data, including ratings and reviews (European Commission 2018b). An empirical study by Hesse and Teubner (2020b) confirms that consumers generally value the concept of reputation portability – with an approval rating of around 77%. As of today, however, complementors face a cold-start problem when beginning to operate on a new platform (Wessel et al. 2017). Hence, while it can be debated how much of a pressing issue reputation portability is for

complementors, it may certainly be useful in multi-homing (e.g., Dellarocas et al. 2009). Importantly, complementors may not want to rely on a single platform, especially since it may cease to exist someday (European Commission 2018b). Further, most prior research suggests that it is difficult to new complementors to collect "good" ratings, especially when they just started out on a new platform and find themselves competing with other users that have already gathered a positive track record (Gutt and Herrmann 2015; e.g., Resnick et al. 2006). In this regard, note that 94% of all Bonanza sellers make use of the platform's rating import feature (Hesse and Teubner 2020b). Hence, it is safe to assume that they see value in doing so.

Additional perspective on reputation portability—To augment the discourse, we conducted a series of ad-hoc interviews with relevant platform practitioners. These included current and former executives and researchers from *Airbnb*, *Uber*, *Bonanza*, the CEO of a leading European job platform (*InStaff*), and the Director of the German Data Protection Foundation (*Stiftung Datenschutz*). Interviewees unanimously acknowledged the potential benefits of reputation portability for consumers and complementors – as well as for smaller and entrant platforms. However, it was also hypothesized that especially leading platforms (as of now) do not see a clear business value in making reputation portable – be it due to legal uncertainty about the scope of portable data or because they simply refuse to share such information in a competitive environment. There was consensus, though, that empirical evidence (e.g., on either revenue increase or cost reduction resulting from ported reputation) may be helpful in convincing them otherwise. It is somewhat surprising that major platform operators seem to exhibit a lack of imagination with regard to the trust-building potential of imported reputation and its benefits. Regarding the prevalence of reputation portability, it was mentioned that a "consortium of interested platforms" may collaborate to explore the opportunities of portable reputation among themselves. These platforms may do so by developing and implementing the currently lacking "common design standard" for direct import/export of reputation, thereby pushing its visibility and acceptance.

Policy making and reputation portability—Several recent EU reports (2016, 2017, 2018b) have called explicitly for reputation portability to be further explored and criticize the current lack of interoperability and data access, in particular for its anticipated competitive value in breaking up platform monopolies. In fact, incumbents such as Airbnb and Uber have gained profound market power, which has created a *lock-in* that hinders complementors from switching to a different platform. This, in turn, represents an entry barrier for new (i.e., entrant) platforms (Gans 2018; Van Alstyne et al. 2016). Hence, reputation portability could change the strategic interplay between complementors, incumbents, and entrant platforms – mitigating lock-in, facilitating multi-homing, and increasing platform competition (European Commission 2016, 2017, 2018b). From a consumer protection perspective, stipulating the right to reputation portability hence appears consequential.

While the GDPR's Article 20 mandates portability of data provided by users (*themselves*), ratings may not be subject to this right as they are provided by *others*. Some scholars have voiced their concerns on this limiting scope (Graef et al. 2013; Inglese 2019; Kathuria and Lai 2018; Vanberg and Ünver 2017). However, in the ongoing legal debate, others argue that user reputation is in fact subject to the right to data portability (Martinelli 2019; Van der Auwermeulen 2017). It is also argued that "provided data" can be interpreted broader and that the GDPR's Article 15 grants users a general access to all data relating to their person (De Hert

et al. 2018; Ursic 2018). Similarly, it was noted in the ad-hoc interviews that, since the regulation is intended to foster data subjects' rights and sovereignty, further updates will need to reflect this notion and explicitly include reputational data. Hence, it is conceivable that regulations such as the GDPR or California's Consumer Privacy Act (CCPA) will encompass reputation at some point.

Monetization of reputation portability—We have shown that imported reputation is a driver of trust and may thus be used by complementors. This, in turn, also prompts the question whether platforms should let complementors import or export reputation "for free" or how they could, otherwise, monetize such a feature. While, initially, incumbents are likely to prohibit the export of ratings to other (potentially competing) platforms (Dellarocas et al. 2009; as in the eBay vs. Amazon dispute; Resnick et al. 2000), they may yet discover unexpected value in allowing for it. Indeed, they may explore how to capture the economic value of portability, for instance, through a fee on importing/exporting reputation [35]. Complementors' decision-making under such regimes, associated platform strategies, and competitive equilibria for optimal levels of data disclosure and portability promise interesting further insights (see also Krämer and Stüdlein 2019).

Theoretical embedding of reputation portability—As a theoretical underpinning for the notion of reputation portability, we have drawn on signaling theory (Mavlanova et al. 2012; Spence 1973). Indeed, parallels can be drawn to the theory's original example of job market signaling. Similar to an educational track record, imported ratings are "observable characteristics attached to the individual that are subject to manipulation by him [or her]" (Spence 1973, p. 357). The complementor can make an effort to import an additional signal, that is, by achieving a high star rating on a (reputable source) platform. However, such efforts incur *signaling costs* – and these cost are higher for low-quality complementors as "costs of signaling are negatively correlated with [...] capability" (Spence 1973, p. 358). Similarly, building and maintaining a "good" reputation is costly (Dunham 2011) – particularly when doing so on several platforms.

This multiplicity of sources and trust cues warrants further investigation with regard to user psychology. Visual hierarchies in information processing and the role of conflicting signals (i.e., one exceedingly "good", one "bad" rating) may play an important role for consumers' decision-making and purchase intentions (Faraday 2000; Khare et al. 2011; Mudambi et al. 2014; Riasanow et al. 2015). We expect studies that track user attention and their foci on ratings, reviews, and other trust cues to shed more light on such questions (Willems et al. 2019).

Concluding note

Recent regulation and the increasing market power of incumbent platforms have led to a rediscovery of the idea of reputation portability. With this research note, we seek to contribute to the ongoing debate on the nature and scope of data portability within the online platform economy. Naturally, our study can only offer a very limited view into the complexity of actual platform interactions. The chosen stylized experimental design is limited in providing a basic stimulus of a transaction – stripped of potential other design elements and noise typically

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[35] However, the idea of having to pay for their own reputation may not necessarily resonate with complementors.

encountered in the field. While this setting provides a suitable testbed to study the anticipated relation of (imported) reputation and trust, actual behavior will likely be influenced by additional factors not accounted for in this research. Future work may embed and explore the role of other, additional trust cues. Moreover, field experiments on actual platforms may shed light on the (real-world) effectiveness of portable reputation.

Needless to say, *obligatory* or *involuntary* reputation portability is no desirable future. In this regard, the multi-faceted debate around the Chinese Social Credit System comes to mind, penalizing and/or rewarding individuals, inter alia, based on their online activity (Wong and Dobson 2019). Note that full transparency of anyone's online conduct would have far-reaching implications and pose a considerable threat to the Western world's liberal values. Eventually, the EU may seek to find its own position in dealing with this complexity. The commencement of the GDPR ("right to access", "right to data portability", "right to be forgotten") can be seen as a laudable, yet improvable step into this direction. Ultimately, the question may not be *whether* users will have to manage their digital reputation across platforms but *how* information systems should be designed to allow them to harness this data in an effective, fair, and sustainable fashion.

PART III: THE DESIGN OF REPUTATION PORTABILITY

Chapter 5: Signal discrepancy and cognition

The third part of this thesis considers how reputation portability can be designed and implemented across digital platform ecosystems. In Chapter 5, I set out to investigate the phenomenon from a user psychology perspective. Leveraging experimental survey data, this study examines the cognitive and economic effects of displaying reputation signals from two different sources. Informing reputation systems' design, the results show that conflicting rating information confuses consumers and, ultimately, impairs purchase intentions.

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Introduction

In today's digitized world, consumers encounter reputation in various platform ecosystems (De Reuver et al. 2018; i.e., the broader research context of this study; see Hein et al. 2020). Starting off from the value of trust and reputation *within* platforms (e.g., Tadelis 2016), it has been established that importing, transferring, and aggregating reputation *between different* platforms can be utilized as a source of value too (Reputation Transfer; Teubner et al. 2019). In that regard, *reputation portability* refers to the concept of leveraging existing reputation from one platform and using it as a signal of service quality and trustworthiness to attract demand on another platform. Examples include services such as Traity.com, aggregating user ratings from different platforms and social networks into single trust scores or "reputation profiles". Moreover, end-to-end solutions for reputation import between platforms exist, for instance, provided by the e-commerce sites Bonanza.com and TrueGether.com. These platforms allow sellers to import star ratings from incumbent platforms (e.g., eBay or Amazon) for inclusion in their profile.

While extant research investigated the effects of reputation in a single platform ecosystem – including those of conflicting product or service reviews – the availability of ratings from *different* sources (i.e., on-site reputation *and* imported reputation) prompts the question of how users react to such information. Existing research on reputation portability shows that imported ratings do in fact function as a driver of consumer trust and purchase intentions (Otto et al. 2018; Teubner et al. 2020; Zloteanu et al. 2018). However, this research did not consider whether and to what extent the effectiveness of reputation portability may be impaired by discrepant rating information. When signals are sourced from more than one platform, they may be complementary (e.g., a single aggregated rating score shown next to a profile image), re-enforcing (e.g., two or more exceedingly good ratings being displayed together), or conflicting (e.g., one excellent and one bad rating appearing simultaneously). Yet, research on the impact of rating discrepancy on users' purchase intentions and the role of attention and

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cognitive processing is scarce. To address this gap, we set out to answer the following research question: *How does the degree of discrepancy in ratings from different platforms affect consumers' cognitive processing and purchase intentions?*

We apply a multi-method approach via two experimental studies. Thereby, we leverage *prospect theory* (especially the assumption of risk averse consumers) and hypothesize on the role of increased cognitive load and choice deferral for human *information processing* in the presence of conflicting signals. In Study 1, we employ survey instruments in an online experiment, assessing the effects of multiple ratings – as well as discrepancies in their values – on purchase intentions. In Study 2, we propose a laboratory experiment with eye-tracking measurements to determine the role of cognitive processes for human attention and behavior (indicated by fixation durations and transitions) when either re-enforcing or conflicting information is present. In a nutshell, our findings show that 1) larger rating discrepancies are detrimental to consumer's purchase intentions, however, 2) imported reputation does represent a driver of purchase intentions, even in the presence of discrepant ratings. Further, combining self-reported data from an online experiment (Study 1) and eye-tracking to explore the mediating influence of gaze patterns in the proposed laboratory experiment (Study 2) will allow us to take into account different perspectives on the phenomena of reputation portability and conflicting information (Niehaves 2005; Vasseur et al. 2019).

Related work and hypotheses

Trust and reputation in platform ecosystems

Since the advent of e-commerce marketplaces such as Amazon and eBay in the mid-1990s, trust-building and reputation mechanisms have played an important role in IS and Economics research (Resnick et al. 2000; Tadelis 2016). With the proliferation of digital platform ecosystems, today's major players – from Airbnb to Uber – employ a wide range of mechanisms to build and maintain trust as a prerequisite for platform activity (Hesse, Dann, et al. 2020). The most frequently used signal in this regard is *on-site* reputation – often in the form of third-party assessments such as (star) rating scores or text reviews (Mavlanova et al. 2012; Teubner et al. 2019). Complementors (i.e., service providers) on these platforms rely on their reputation as it provides potential customers with an opportunity to assess past behavior (Tadelis 2016). However, acquiring a reputation as a sign of trustworthiness is costly (Dunham 2011). Still, complementors benefit economically from accumulated reputation. Ample research demonstrates that "good" *on-site* reputation drives perceptions of trustworthiness and purchase intentions (C. Chen and Chang 2018; Jarvenpaa et al. 2000; Resnick et al. 2006; Ter Huurne et al. 2017). That, in turn, increases complementors' ability to attract demand and/or enforce price markups (e.g., Tadelis 2016).

Reputation portability—People use an increasing number of different platforms and, yet, their valuable online reputation is restricted to one platform at a time. This has led to repeated calls for *reputation portability* (Dellarocas et al. 2009; Puschmann and Alt 2016; Resnick et al. 2000). Only recently, several contributions have picked up this concept. While Teubner et al. (2019) delineate the topic from the general dynamics of trust and reputation, Hesse and Teubner (2020a) present a conceptual model and identify a need for more empirical research. Some groundwork, however, has been done on the economic potential of portable reputation. Several studies find support for the impact of imported signals – usually, star ratings – on trust or purchase intentions (Otto et al. 2018; Teubner et al. 2020; Zloteanu et al. 2018).

Discrepant ratings and economic prospects

Importantly, when introducing multiple sources of reputation, one must consider how users process this information and deal with re-enforcing or conflicting signals (i.e., discrepancies). Note that prior studies on reputation portability did neither simultaneously display two rating scores (only on-site *or* imported rating visible) nor were ratings' values varied (only 4 *or* 5 stars used), that is, no discrepancy was apparent (Otto et al. 2018; Teubner et al. 2020). Thus, existing research lacks insights into (1) how an *interplay* of specific *on-site* and *imported* ratings affects users' economic decision making and (2) the role of *discrepancy* in displayed information and how it affects consumers' information processing and attention.

To embed consumers' decision making and purchase intention in the presence of discrepant information signals in well-established economic literature, we draw upon Kahneman and Tversky (1979)'s prospect theory. One of the theory's main tenets is the assumption of *risk aversion*. Specifically, when given a choice, the theory posits that people generally prefer a certain outcome (say, $50) over any lottery with the same expected value (say, a 50:50 gamble on $0 or $100). This notion goes back to the concept of *expected utility* (rather than expected value) with decreasing marginal utility gains. [37] Applying this frame of thought, we can understand a platform-mediated transaction as an economic prospect where available rating scores serve as signals of potential outcomes. In this vein, a prospective host, driver, or seller with (at least) two such scores may be evaluated similarly to a lottery where the available rating scores define the space of economic outcomes. Applying the concept of risk aversion and given equal expected values, people will choose the prospect with lower variance. Since variance is directly related to the discrepancy between ratings, higher discrepancy will be associated with a lower likelihood of the prospect being chosen, that is, the apartment or ride being booked, or the product being purchased (again, assuming identical *average* values).

Example: A host on Airbnb has two ratings, an on-site and an imported rating, both of which are 4 stars. Another host has two ratings of 3 and 5 stars, respectively. Hence, both hosts have an average score of 4 stars. However, risk averse consumers are likely to have more confidence in the host with less variance (i.e., with no discrepancy). Even though consumers may have higher prospects if the actual service quality was 5 stars as in one of the options, they will be aware of the fact that the "bad" rating (i.e., 3 stars) indicates lower potential prospects and, hence, will tend to the *safer bet*, that is, two equal rating scores. We expect this notion of consumer decision making to be reflected in their willingness to purchase and thus suggest:

> H_1: *A higher discrepancy between the on-site and the imported rating has a negative impact on consumers' purchase intentions.*

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[37] The theory's applicability to human decision making has proven wildly successful and Kahneman was awarded the Nobel prize, "having integrated insights from psychological research into economic science […] concerning human judgment and decision-making under uncertainty" (NobelPrize 2002). The authors' seminal work reached over 50.000 citations in the academic literature.

Study 1: Online experiment on rating discrepancy and user intention

Addressing H_1, Study 1 assesses how simultaneously displayed on-site and imported rating scores affect consumers' willingness to purchase. Using an online experiment, participants take the role of potential guests on the accommodation sharing platform *happystay.com* and state their purchase intentions (i.e., the willingness to book a stay with the displayed prospective host). For that purpose, consumers were presented with a host profile that displayed both an on-site rating as well as imported reputation from another accommodation sharing platform (Airbnb).

Treatment Structure—Using a *full-factorial between-subjects* design of on-site and imported rating score combinations, the prospective host had an on-site rating (randomly drawn from {1.0, 1.5, …, 5.0}) and, additionally, had imported their rating from another platform (randomly drawn from the same set). Both ratings were displayed simultaneously with some distance (Figure 16; left). The rating values' distribution across treatments reflected the skewness towards positive scores commonly observed on many platforms (Schoenmueller et al. 2018). That is, even though all possible combinations of rating scores were tested, those above 3.0 stars occurred more frequently. At the same time, we ensured that a sufficient number of discrepancy cases could be observed per absolute value of the difference in ratings (Figure 16; right).

Imported rating (stars)	On-site rating (stars)									
	1.0	**1.5**	**2.0**	**2.5**	**3.0**	**3.5**	**4.0**	**4.5**	**5.0**	**∑**
1.0	2	2	2	2	2	4	4	4	4	**26**
1.5	2	2	2	2	2	4	4	4	4	**26**
2.0	2	2	2	2	2	3	4	3	4	**24**
2.5	2	2	2	2	2	4	4	4	4	**26**
3.0	2	2	2	2	2	3	4	4	4	**25**
3.5	3	3	4	4	4	7	6	6	7	**44**
4.0	3	3	4	4	4	7	6	6	7	**44**
4.5	2	3	4	3	4	7	7	7	7	**44**
5.0	3	3	4	4	4	7	7	7	7	**46**
∑	**21**	**22**	**26**	**25**	**26**	**46**	**46**	**45**	**48**	**305**

Rating discrepancy									
Difference	**0**	**0.5**	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**∑**
Cases	37	63	55	45	34	29	22	13	7	**305**
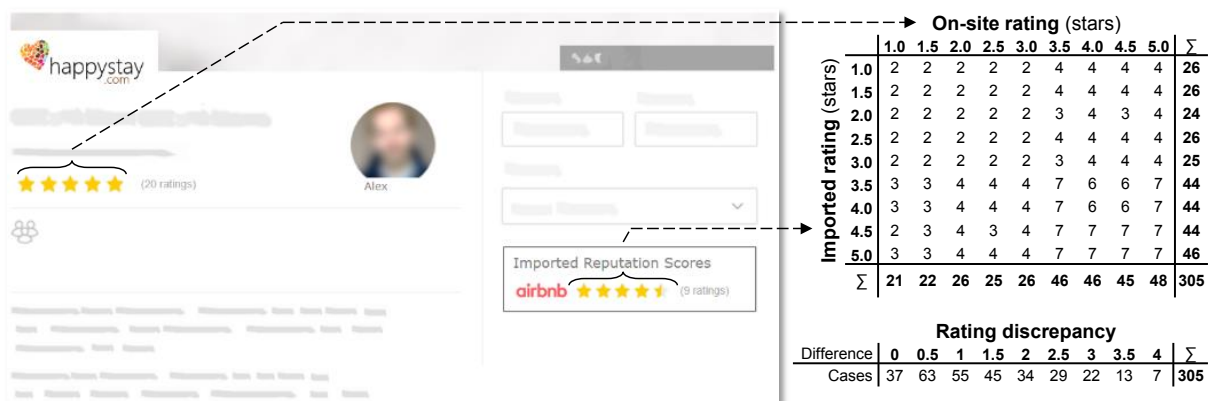
FIGURE 16: EXPERIMENTAL SETUP AND TREATMENT DISTRIBUTION

Stimulus Material—Figure 16 shows exemplary stimulus material used for this experiment. Host names and (blurred) profile images were randomly drawn from a selection of common first names and typical images. Each participant was presented with one host's profile only. Names and images had no significant effects on the dependent variable. The (random) *numbers* of reviews were displayed to create a more realistic setting as participants are used to this kind of representation of star ratings on platforms. Their effect was negligible in magnitude and significant for on-site reviews only.

Measures—Consumers' purchase intentions were measured on an 11-point Likert scale (Gefen and Straub 2003). To delineate participant-specific effects, we control for trust in the incumbent platform, general disposition to trust, as well as individuals' risk-affinity. We

measured rating discrepancy as the absolute difference between the values of on-site and imported ratings.

Sample—We recruited 309 participants with prior experience in online shopping using Prolific.ac (Palan and Schitter 2018). Participants received 0.80£ for successfully completing the experiment. On average, participants answered the survey in 76 seconds (median: 68, shortest: 22) and responses taking longer than 5 minutes were excluded from further analysis (4 cases). The final sample includes 305 participants (163 female, 142 male) from diverse Western countries and regions (e.g., Americas, Australia EU, CH and UK) and age ranged from 18 to 70 years (mean: 35.9, median: 34). The sample size was adequate for detecting a 5% deviation in purchase intentions with a statistical power of 97%.

Results

Table 7 reports the OLS regression results where the dependent variable (*consumers' purchase intention*) was standardized to the interval [0,1] and rating scores ranged from 1.0 to 5.0 (stars). First, Model I shows that *rating discrepancy* indeed has a significant negative impact (b=-.064, p<.001; Cohen's f^2=.034, small effect size) on purchase intentions, supporting hypothesis H_1. As expected, the *average score* (Model II) has a positive impact on purchase intentions (b=.165, p<.001; f^2=.315, medium) with a comparably high fraction of variance explained (R^2=.251). Importantly, controlling for both rating discrepancy *and* average scores the results hold (Contr. III), meaning a difference in displayed star ratings is detrimental to complementors' economic prospects – whether comparing 1 and 3 stars vs. twice 2 stars *or* 3 and 5 stars vs. two times 4 stars. As per Controls IV and V, both *on-site* and *imported* reputation have positive and significant effects on consumers' purchase intentions, supporting the findings in previous literature. Remarkably, the imported rating exhibits a higher coefficient (b=.087, p<.001; f^2=.176, medium) than the on-site rating (b=.066, p<.001; f^2=.103, small) and explains more variance (R^2=.185 vs. R^2=.123), which may partly result from participants' exalted levels of *trust in incumbent* (7.04 on the 11-point Likert scale; ~60.4%) compared to the unknown (i.e., fictitious) target platform *happystay.com*.

As a robustness check, we repeated the previous analyses including all measured control variables, that is, *participant-specific controls* (gender, trust in incumbent, general disposition to trust, and risk-affinity) as well as *numbers of reviews* (both on-site and imported). Extending all models by these variables shows that, first, participant-specific controls have expected effects, but that, second, the main models' coefficients were not substantially affected in terms of sign, magnitude, or significance. Further, no systematic differences occurred for evaluations of purchase intentions and the effect of discrepancies when controlling for different geographical regions of participants or excluding the quickest 5% of responses (<34 seconds).

	Model I H₁	**Model II** Avg. Score	**Contr. III** H₁ (Avg. Score)	**Contr. IV** H₁ (on-site)	**Contr. V** H₁ (imported)	**Contr. VI** Interaction
			Dependent variable: Consumers' Purchase Intentions			
Rating Discrepancy	-.064 *** (.016)		-.031 * (.014)	-.054 *** (.015)	-.039 ** (.015)	.026 (.069)
Average Score		.165 *** (.016)	.156 *** (.017)			.171 *** (.025)
On-site Rating				.066 *** (.013)		
Imported Rating					.087 *** (.012)	
Discrepancy x Average						-.018 (.022)
Constant	.494 *** (.028)	-.150 ** (.056)	-.076 (.066)	.257 *** (.053)	.168 ** (.052)	-.126 (.089)
Observations	305	305	305	305	305	305
Adjusted R²	.050	.251	.260	.123	.185	.260

*** $p<.001$; ** $p<.01$; * $p<.05$; standard errors in parentheses

TABLE 7: OLS REGRESSION MODELS (PURCHASE INTENTIONS)

One aspect to consider is an alternative explanation to the findings with regard to rating discrepancy and purchase intentions. It can be argued that, rather than discrepancy itself, the lower of the two ratings (i.e., the *minimum* score) mainly determines consumers' willingness to purchase. We concur with this notion as it was shown, for instance, for vendor reviews, that consumers draw particularly on negative information (Steward et al. 2018). Also, anecdotal evidence suggests that negative star ratings or reviews are more influential as consumers attribute a higher weight to them (*negativity effect*; Khare et al. 2011; Sen and Lerman 2007). Hence, as a control analysis, we tested the fraction of variance explained by different aggregations of on-site and imported rating scores when only this single variable was used. Comparing the ratings' minimum (adjusted R²=.246), maximum (.127), average (.251), on-site value only (.088), and imported value only (.169), shows the high explanatory power of the minimum score. Note, however, that it is impossible to control for the minimum rating while holding *both* difference *and* average rating score constant since two of these variables will always directly determine the third one.

Study 2: An eye-tracking study on attention to conflicting signals

In this second study, addressing H₁ and additionally H₂, we employ eye-tracking to add an additional explanatory layer of observational data (Niehaves 2005), potentially uncovering mediating variables such as fixation duration, distribution and gaze patterns. This will allow us to understand the role of cognitive processes in assessing different rating combinations in the presence of reputation portability and how these ultimately influence users' behavioral intention. Recently, eye-tracking was used to show how discrepancies in online ratings (of non-profit organizations) attract users' visual attention and that individuals rather focus on two unequal star ratings (i.e., a visual discrepancy) than on two identical ones in the presence of other (non-reputational) information (Willems et al. 2019). Importantly, visual attention to certain cues can be interpreted as central cognitive processing related to decision making based on these information (Rötting 2001; Schulte-Mecklenbeck et al. 2017). Following the *eye-mind assumption* (i.e., objects hit by the visual axis are subject to central cognitive processing in that

given moment) and the *immediacy assumption* (i.e., fixation duration corresponds to the amount of central cognitive processing; Rötting 2001, p. 76), eye-tracking data helps to draw inferences on cognitive processes. More specifically, (Bera et al. 2019) have shown that eye-tracking can be used to measure cognitive integration processes of information from two or more sources. We follow Willems et al. (2019)'s call to consider more variety in displayed ratings and to investigate their impact on decision making. Additionally, our study answers to several other calls for research on reputation and its transferability. First, we follow the EU's urge to investigate potential benefits and underlying mechanisms of reputation portability to break up platform monopolies and avoid user lock-in (European Commission 2016, 2017). Second, we take up Tadelis' comment to "combine economic thinking and analyses with human-computer interaction" in platform ecosystems (2016, p. 338).

Scenario—The basic scenario is identical to that of Study 1. Again, participants will take the role of guests on a sharing platform, evaluate prospective providers, and state purchase intentions based on the simultaneous availability of signals from two sources (i.e., the *on-site* and the *imported* rating score).

Treatments—Similar to Study 1, we systematically vary on-site and imported rating scores. We thereby employ a 4 by 3 *full-factorial within-subjects* design (on-site rating = {NA, low, medium, high}, imported rating = {low, medium, high}). Every participant experiences all 4×3=12 treatment conditions in random sequence. By introducing the "NA" condition as a control, we include the possibility of complementors not having obtained any on-site rating yet. Each of the 12 booking scenarios is displayed on one web page.

Eye-Tracking—Gaze data will be recorded using a *SensuMotoric Instruments RED-m* binocular eye-tracker at a 120Hz frame rate (Mele and Federici 2012). Stimuli are presented on a 21-inch external screen. Participants are able to move freely but will be asked to keep their head movements to a minimum. For each participant, we perform a 5-point calibration and successive validation procedure at the experiment's start. As glasses are prone to cause major issues with eye-tracking stability and data quality, recruiting is limited to persons not wearing glasses and participants are asked not to wear mascara or make-up in the eye region as this can significantly impair pupil detection (Holmqvist et al. 2011, p. 119ff). Areas of interest (AOIs) for gaze data analysis are defined for each experimental page: 1) on-site rating score, 2) imported rating score, 3) the prospective provider's face, 4) platform logo, and 5) the Likert scale on which participants state and submit booking intentions. The on-site and imported rating elements are designed in a very similar manner to ensure internal validity (Orquin and Holmqvist 2018) and have comparably high visual saliency to stand out in visual hierarchy (Faraday 2000). The corresponding star rating AOIs have identical dimensions.

Procedure—After arriving at the lab, participants sign a consent and data protection form. Following a brief presentation of the eye-tracking setup, the experiment starts with an introductory page explaining its sequence, scenario, and task. Subsequently, experimental treatment pages are presented in random order. We estimate the overall procedure to take 30-40 minutes (i.e., arrival and briefing, eye-tracking setup and calibration, questionnaire, debriefing, and payout). Participants are rewarded by a cash payout (e.g., 7€). The experimental setup complies with ethical standards (approval obtained; available upon request).

Measurements—On each page, participants state purchase intentions as in Study 1. The scale appears at the page's bottom after a delay of six seconds. After completing all 12 pages, we survey participants on demographic and common controls. They may add general thoughts or comments on factors that influenced their decision process. The main focus variables are individual and accumulated fixation durations on the two rating AOIs, the number of transitions between them (AOI run count) and normalization of fixations (for subject comparability; Bera et al. 2019). Besides analyzing the impact of rating discrepancy on purchase intentions (as in Study 1; H_1), these gaze patterns will be used to analyze mediating effects on participants' purchase intention and, hence, to shed light on subcomponents of hypothesis H_2 (i.e., attention to ratings, cognitive conflict, decision length). We will apply multivariate regressions to conduct the analyses. Order effects (e.g., fatigue or learning) are counterbalanced by randomizing and controlling for page sequence.

Outlook—Due to the COVID-19 lockdown of our institution, the experiment could not be conducted as originally planned. Still, the experimental setup was pre-tested, successfully demonstrating functionality. Initial test data for Study 2 uncovered promising results with regard to hypothesis H_2. Power analysis suggests a sample of n~40 for this experiment as adequate to detect a 20% difference in effect size with a statistical power of .95 (n_{total}~492). Participants will be recruited from the local subject pool at TU Berlin using ORSEE (Greiner 2015). We plan to proceed with the experiment as soon as the university re-opens and allows on-premises lab research.

Discussion and conclusion

The multiplicity of platforms in today's digital economy has led to repeated calls for reputation portability across platform boundaries (Dellarocas et al. 2009; Puschmann and Alt 2016; Resnick et al. 2000). While previous research has shown that complementors could, theoretically, benefit from reputation portability, the notion of the interplay between specific rating scores – including the possibility of conflicting information – has not been considered thus far. We set out to address this gap by means of a multi-method approach. We devised (1) an online experiment, assessing consumers' purchase intentions and (2) a laboratory experiment using eye-tracking to explore consumers' cognitive processing of ratings with different levels of discrepancy.

Key findings—Answering one part of the research question, our study's main result is that higher rating discrepancy is in fact detrimental to purchase intentions (H_1). We offer a first explanation for this finding based on general human risk aversion and the modeling of platform-based transactions as economic "prospects". Naturally, other explanations are conceivable and were discussed (e.g., minimum rating). Our findings prompt a subsequent question, namely which cognitive processes – in addition to subjects' stated perceptions – may be at play (H_2). To investigate this line of thought further, we propose and sketch out a follow-up experiment to gather an additional layer of data that may help explain these nuances in human decision making based on eye-tracking. With regard to the economic potential of imported reputation, we find a positive relationship – which is well in line with previous literature (Otto et al. 2018; Teubner et al. 2020). We address these studies' limitations of considering only one single rating and/or value at a time (e.g., on-site *or* imported; 5.0 stars) by investigating the concurrency of these ratings as well as a wide array of values for both scores (1.0 to 5.0 stars).

Considering managerial implications, our paper makes a contribution regarding design features of online reputation systems (Dellarocas et al. 2009; Tadelis 2016). In a scenario where reputational data is likely to be free-floating across platforms, platform operators must decide how to best represent users' accumulated reputation from across different sources while avoiding overburdening consumers with too many pieces of information. Limitations in human information processing will likely have implications for designing adequate mechanisms. For instance, the level of interactivity of elements (e.g., several ratings or both ratings *and* reviews) may affect users' working memory. Further, the *modality effect* may impact user judgment in the presence of different types of reputation signals, for instance, when written (e.g., text reviews) and visual information (e.g., star ratings) must be integrated by requiring consumers' split attention (see also Sweller et al. 1998). In particular Study 2 may shed light on the question whether or not individual scores should be retained, or information be aggregated into one single score. There may emerge a tradeoff between information interpretability and the potential harms of conflicting cues. In this sense, the optimal reputation display may even depend on the structure of scores (e.g., aggregating conflicting scores but retaining consistent ones). Finally, by pursuing a multi-method approach, combining survey instruments with eye-tracking data and qualitative insights, we are positive to contribute to the field of online platforms, trust, and reputation systems – both from a theoretical and methodological perspective.

Chapter 6: Designing reputation portability

In this penultimate chapter of my dissertation, I provide concrete practical guidelines for the design of reputation portability in digital platform ecosystems. Using a hybrid approach of deductive and inductive reasoning, this study explores portable reputation's impact as a strategic lever, identifies design characteristics for direct reputation transport between platforms, and highlights potential ways to implement solutions. Chapter 6 complements the previous positivist approaches of investigating reputation portability by adding qualitative data, which was collected in a series of interviews with relevant platform stakeholders, as an additional explanatory layer.

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Introduction

In recent years, digital platforms have shaped how products and service are offered and consumed by both businesses and individuals (De Reuver et al. 2018; Hein et al. 2020). The rise of early electronic markets such as Amazon and eBay as well as the advent of sharing economy platforms such as Airbnb, Uber, and TaskRabbit have provided Internet users with a multitude of opportunities to sell and buy online (Alt and Zimmermann 2014; Sundararajan 2016). An important and inherent part of orchestrating the supply and demand in these platform ecosystems is the establishment of trust between participants. Complementors (i.e., service providers; sellers, hosts, drivers) can, for instance, achieve this by showcasing to potential consumers (e.g., buyers, guests, passengers) their solid reputation in an online marketplace (e.g., Resnick et al. 2000; Tadelis 2016). Hence, platforms today support users with a variety of trust-building mechanisms, allowing them to build, maintain, and display their reputation (Hesse, Dann, et al. 2020).

What is more, complementors may use hard-earned reputation to demonstrate their trustworthiness and attract demand in an environment other than the one it originated from (*Reputation Portability*; Hesse and Teubner 2020a; Teubner et al. 2019). In fact, some smaller platforms already allow complementors to import (star) ratings and/or (text) reviews[39]. While extant research has considered design features of reputation systems across a range of existing platforms (Dellarocas et al. 2009; Jøsang et al. 2007; Tadelis 2016), little is known about how to display multiple reputation signals on a single platform. In other words, assuming reputation data were "free-floating across platforms, platform operators must decide how to best represent users' accumulated reputation from across different sources" (Hesse, Lutz, et al. 2020, p. 7). With this study we address the gap by answering the following overarching

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[38] This study was first published as a working paper on *ResearchGate* with the title "Exploring the design of reputation portability in digital platform ecosystems – A hybrid approach" (Hesse 2020); see https://doi.org/10.13140/RG.2.2.20583.47520.

[39] For instance, the e-commerce platforms and self-labeled eBay alternatives *Bonanza.com* and *TrueGether.com*.

research question: *"How should reputation portability be designed and implemented in digital platform ecosystems?"* In doing so, we first and foremost consider a direct import scenario between operators, in which one platform allows complementors to leverage their reputation from another platform.

Our exploratory study uses a hybrid approach of deductive and inductive reasoning to inform the design of reputation portability between platforms (Gregory and Muntermann 2011). To begin with, we review the emerging body of literature on reputation portability as well as prior work on (the design of) platforms' reputation systems (*deduction*). This allows us to 1) develop the basic analysis dimensions to explore a design blueprint of reputation portability in digital platform ecosystems, and 2) identify suitable stakeholder groups to be involved in deriving concrete design guidelines for portable reputation. Next, building on the theoretical groundwork, we conduct a series of exploratory semi-structured interviews (*induction*) with representatives from the identified stakeholder groups (direct stakeholders: platform operators/complementors/consumers, indirect stakeholders: policymakers, legal experts, members of academia). Following the steps outlined by Braun and Clarke (2006), we use the qualitative data thus generated to carry out a thematic analysis. Thereby, we uncover both overarching themes as well as sub-themes that are instrumental in the design of reputation portability. Combining the elements of our deductive and inductive research, we present a comprehensive *thematic framework* to address the research question. We discuss findings along the five overarching themes and develop design guidelines for practitioners and researchers. In short, our analysis comprises the *why*, *what*, and *how* of designing reputation portability as well as the most relevant contributing factors.

This paper proceeds as follows. In Section 2, we review previous research on reputation portability and reputation system design in online platform markets. In Section 3, we introduce the method(s) applied in our research. Then, in Section 4, we present the result of our hybrid approach by introducing the *thematic framework* and discussing its components. We thereby develop five concrete and actionable design guidelines. Subsequently, Section 5 discusses findings, highlights our study's limitations, and proposes avenues for future research. Finally, Section 6 concludes.

Background and related work

Reputation portability in digital platform ecosystems

Reputation portability is a nascent albeit not entirely new phenomenon. The idea of leveraging existing reputation built in one platform and using it as a signal of reliable conduct in another – or, more precisely, the issue of not being able to do so – has previously been noted (e.g., Dellarocas et al. 2009; Gans 2018; Puschmann and Alt 2016; Resnick et al. 2000). Teubner et al. (2019) formalized the concept as *reputation transfer* and delimited it from the overall process of trust and reputation building as well as trust transfer between platforms and their users. Hesse and Teubner (2020a) subsequently developed a conceptual overview to delineate relevant terms, actors, and mechanisms; thus "touching upon the *what*, *why*, and *how* of reputation portability" (p. 332). We chose this triad as a starting point for the development of our (deductive) analysis dimensions in Section 3.

Recent work used online experiments and surveys to investigate the impact of imported (star) ratings on trust in complementors and consumers' purchase intentions (Hesse, Teubner, et al.

2020; Otto et al. 2018; Teubner et al. 2020; Zloteanu et al. 2018). While prior research had only hypothesized on the associated benefits, these studies were able to empirically confirm the positive relationships. Others have dealt with the legal intricacies of porting reputation data (i.e., ratings and reviews) across platform borders, for instance by pointing to respective sections of the EU's General Data Protection Regulation (GDPR; European Union 2016a). While some legal scholars voiced their concern that the limiting scope of current regulation may hinder portability (Inglese 2019; Kathuria and Lai 2018; Vanberg and Ünver 2017), others argue that user reputation is in fact subject to the GDPR's right to data portability (Martinelli 2019; Van der Auwermeulen 2017). The European Union itself, has urged the investigation of potential benefits and underlying mechanisms of reputation portability, anticipating its usefulness in breaking up platform monopolies and averting user lock-in (European Commission 2016, 2017). Finally, Hesse, Adam, et al. (2020) implemented a stylized scenario of reputation portability to analyze the impact of rating discrepancy on purchase intentions. The authors deduce the need for more work on designing adequate portability mechanisms as well as the optimal display and arrangement of reputation information from different sources.

Designing reputation systems

The design of reputation and feedback mechanisms has been subject to scholarly investigation since the advent of digitally mediated commerce. Resnick et al. (2000) were among the first to discuss design features, which platforms like Amazon and eBay exhibited in their early days. For instance, the authors highlighted the nuances in leaving a (written) feedback, displaying a running total of positive/neutral/negative feedback points, or using a score that is averaged on a rating scale of 1 to 5 (stars). Jøsang et al. (2007) first define trust and reputation classes as well as semantics before providing a detailed account of reputation network architectures and computation engines. In the context of reputation system design, the authors highlight the importance of security features such as robustness against attacks and manipulation of reputation scores. Designing feedback mechanism is also the central focus of Dellarocas et al. (2009)'s work which derives concrete practical conclusions with regard to reputation scales, metrics, and the amount of information that should be visible to users. Remarkably, the authors note that allowing users to *export* their reputation and apply it across different markets, will improve reputation systems – by stimulating more platform use (i.e., multi-homing) and rendering the overall platform landscape more effective. Similarly, Tadelis (2016) discusses ideas to improve the practical design of reputation and feedback mechanisms. Importantly, he suggests two areas for future research: First, users' experience in interacting with displayed reputation information and whether they respond differently depending on the reputation format (e.g., distribution of ratings vs. average scores). Second, the aggregation of an individual's reputation across different platforms to create a meta-profile, allowing these users to jump-start their initial trust on novel platforms. Lastly, Hesse, Dann, et al. (2020) systematically compare features and functionality of trust-building mechanisms and reputation management tools across a set of eleven platforms. The authors use an online survey asking participants (i.e., platform consumers) to rate the overall importance of different design artifacts. They find that, on average, respondents deemed rating scores slightly more important than text reviews. Though some of the above studies explicitly refer to the idea of reputation portability, neither of them makes a suggestion as to *what* should be displayed and integrated on the target platform neither do they hint at *how* reputation portability schemes ought to be operationalized by platforms.

Hybrid approaches in developing design guidelines

There exists a rich body of literature using qualitative approaches, specifically, thematic analyses, to explore the design of technology and human computer interactions (e.g., Brown and Stockman 2013; Hodge et al. 2018; McCurdie et al. 2012; Tanaka et al. 2012). We complete our review of related work by highlighting two such studies leveraging a hybrid approach in deriving design considerations based on multiple stakeholder perspectives (Aljaroodi et al. 2020; Noorbergen et al. 2019). Noorbergen et al. (2019) explore the design of mHealth systems using mobile biosensors for health behavior change. In their exploratory study, the authors develop a theoretical framework and six concrete design guidelines based on semi-structured interviews with health stakeholders. Similarly, Aljaroodi et al. (2020) investigate how avatars can be designed in the context of Arabian culture. The authors first develop an integrative theoretical framework based on a literature review and follow up with a thematic analysis to establish their design guidelines. We leverage these studies' proposal of combining deductive with inductive reasoning to conduct a series of qualitative interviews with platform ecosystem stakeholders and a thematic analysis based on Braun and Clarke (2006)'s approach.

Research methods

Despite the ubiquitous use of digital platforms and research on both reputation system design and portability, no prior work has been conducted to derive practical design guidelines for direct portability of reputation between platforms. To address this gap and answer the research question, our exploratory study leverages a hybrid approach comprising deductive and inductive reasoning (Gregory and Muntermann 2011). Since deduction is often referred to as *concept-driven* or *theory-driven*, it requires the ex-ante (or top-down) establishment of a meaningful structure for the content of the data. On the contrary, induction describes a *data-driven* approach, in which patterns form directly (or bottom-up) based on iterative analysis of the data set (Kuckartz and Rädiker 2019). That is, deduction is based on concepts, while inductive knowledge forms empirically (Aljaroodi et al. 2020). Applying a hybrid approach allows us to build on the established literature on reputation portability and reputation system design, while at the same time incorporating the view of multiple platform ecosystem stakeholders in exploring design guidelines.

Deduction: analysis dimensions and stakeholders

Based on our theoretical groundwork in Section 2, we first developed analysis dimensions as well as an overview of relevant stakeholders in the context of reputation portability (Kaiser 2014). Figure 17 introduces these five basic dimensions (left) and the stakeholder overview (right).
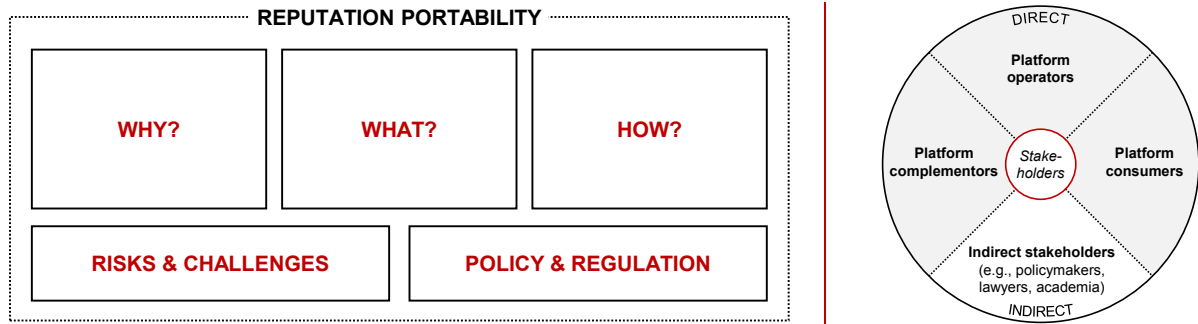
FIGURE 17: ANALYSIS DIMENSIONS AND STAKEHOLDER GROUPS

The five analysis dimensions were derived based on the critical reading of academic literature (i.e., Section 2) and previous conceptual work on the subject (e.g., Hesse and Teubner 2020a). Particularly, in this case the triad of *why*, *what*, and *how* serves as the first step in 'operationalizing' the overarching research question (Kaiser 2014). To derive general design guidelines, we hence plan to explore i) *why* reputation portability should be introduced (that is, answering the question which specific purpose reputation portability serves), ii) *what* should be displayed and made visible to user, and iii) *how* reputation portability may be implemented on and between platforms. Further, since previous research discussed the potential for fraud and manipulation in reputation system design, we added *risks & challenges* as an important analytic dimension to our initial framework. Finally, based on our review of data portability laws in digital markets and the ongoing legal debate on the scope of these legislations, we identified *policy & regulation* as an important dimension.

As stakeholders (i.e., Figure 17 right), we identified those actors most frequently involved with or subject to instances of portable reputation. We follow previous research that provided conceptual overviews of all relevant actors (Hesse and Teubner 2020a) and leverage a simple classification of *direct* and *indirect* stakeholders (Noorbergen et al. 2019). Direct stakeholders are those actors immediately involved with the utilization of portable reputation: platform operators (i.e., enabling reputation portability features in a platform ecosystems), platform complementors (i.e., leveraging said reputation portability features on their profiles), and platform consumers (i.e., interacting with the complementor profiles using reputation portability). Indirect stakeholders are those influencing and/or leading the public discourse about data and reputation portability. This group comprises of policymakers (i.e., those actors *shaping* policymaking from nonprofit organizations, foundations, or think tanks) as well as legal experts and members of academia. Next, we will leverage the analysis dimensions and stakeholder groups to inform our inductive theorizing.

Induction: qualitative interviews and thematic analysis

In the inductive part of our study, we built on the analysis dimensions and stakeholder groups to conduct a series of semi-structured interviews as input for a thematic analysis and the development of tangible design guidelines. Throughout this process, we closely followed Kaiser (2014)'s guidelines for qualitative (expert) interviews. Specifically, we operationalized the five analysis dimensions by developing a comprehensive interview guide consisting of open-ended questions along each dimension (see Appendix for details). The interview guide was pre-tested to ensure clarity in wording and common understanding.

Interview sample—For the interviews, we recruited representatives from each of the identified stakeholder groups. Besides our own private and professional networks, we leveraged Internet searches on Google (Scholar) and LinkedIn to find suitable candidates. Thus, we ensured that participants possessed the required experience – that is, operational, contextual, and interpretive knowledge (Kaiser 2014; see Appendix for an overview of participants' background). A total of ten interviews were conducted, distributed equally across the four groups (see Table 8). It is worth noting that each participant additionally qualified as a platform consumer (i.e., every individual had frequent personal experience using platforms). The sample size was sufficient for redundancy (or theoretical saturation) to occur early in the interview process (e.g., after five or six data sources; Guest et al. 2006; Kuzel 1999). Thus, given the novelty of the phenomenon, in which our aim was to uncover common design considerations for reputation portability but not to achieve maximum information variety, we limited the number of interviews accordingly.

Stakeholder group	Number of interviews	Interview length
Platform operators (OP)	3 (0 female, 3 male)	43-54 min
Platform complementors (COMP)	2 (0 male, 2 male)	25-42 min
Platform consumers (CONS)	2*) (1 female, 1 male)	29-32 min
Indirect stakeholders (IN)	3 (2 female, 1 male)	48-65 min
Total	10 (3 female, 7 male)	**25-65 min** (>7 hours total)

*) counting exclusive experience as a consumer only; please note that all 10 interviewees qualify as frequent platform consumers

TABLE 8: INTERVIEW SUMMARY TABLE

Interview procedure—Having agreed to be interviewed, all participants were contacted via mail and provided with a briefing document containing background information on reputation portability, the goal of the interview (i.e., design of reputation portability), and formalities on the process. Interviewees were asked for their informed consent to audio recording and (anonymized) data collection/analysis for academic purposes, and were given the option to receive the interview guide in preparation of the actual interview (Kaiser 2014). Participation was voluntary and no reward or compensation was involved. Interviews were either conducted in person (3) or online via Zoom video conferencing (7) and took 44 minutes on average. Before each interview began, the interviewer confirmed that participants familiarized themselves with the provided background information (i.e., the previously sent briefing document) and/or repeated the most important parts thereof. Throughout, interviewees were encouraged to ask questions and clarify potential misunderstandings. The interviews were of semi-structured nature and allowed for deviation from the five analysis dimensions whenever probing for additional information was necessary. Depending on participants' represented stakeholder group and expertise, each interviewee received a slightly different set of questions (see Appendix). The focal part of each interview, however, dealt with general design considerations for direct import of reputation data between platforms. Data was collected between June and November 2020. Concurrently, interviews were transcribed verbatim using Otter.ai software; each transcript was then thoroughly proof-read and double-checked against audio recordings by the author of this study.

Thematic analysis—Driven by the research question and leveraging our pre-existing theoretical knowledge as outlined in Section 2, we conducted a rigorous reflexive thematic analysis to find patterns of shared meaning across the data set (Braun and Clarke 2006, 2019).

We chose thematic analysis for two reasons: 1) since it is considered a highly flexible research method in its own rights that allows for providing a rich and detailed account of the data within pre-defined analysis dimensions (Nowell et al. 2017), and 2) since it has been affirmed as a robust approach when exploring a novel phenomenon such as (the design of) reputation portability (Vaismoradi et al. 2013). Figure 18 provides a detailed illustration on the thematic analysis process.
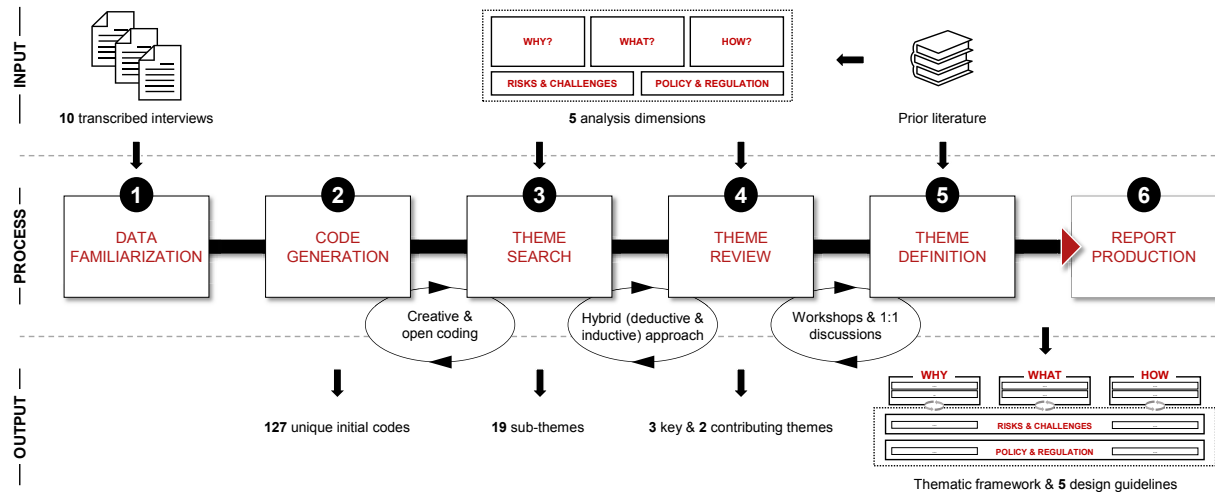
FIGURE 18: ADAPTED THEMATIC ANALYSIS APPROACH BASED ON BRAUN AND CLARKE (2006)

To start with (step 1), we reviewed all interview transcripts to familiarize with the data – meanwhile taking notes, creating memos, and ideating potential codes[40]. This step also included re-contacting several interviewees when follow-up questions arose on the transcript or to clarify parts of the recording. Next, we started a systematic coding process (i.e., open/axial coding; Corbin and Strauss 2008), in which we highlighted interesting features in the data (step 2). Some of the initial codes thus generated were informed by the interview guide or overall structure of the analysis dimensions (i.e., by deduction), however, we made sure to approach this phase openly and inductively to capture all semantic nuances in the data (see Fereday and Muir-Cochrane 2006). Hence, we assigned a substantial number of initial codes (127) in the early phases of data analysis. Leveraging those, we entered a process of *creative coding* in MAXQDA, in which we organized and sorted the initial codes, and kept condensing information to eventually form broader sub-themes and early thematic maps (step 3). Importantly, sub-themes were built inductively based on codes and without trying to fit them into pre-existing categories (Nowell et al. 2017). Next, we reviewed the code system (e.g., combine, separate, discard), which resulted in a refined list of 19 sub-themes (step 4). All codes were then checked for fit against the assigned sub-theme and overall fit of sub-themes against each other was also validated. At this point, we went full circle with the hybrid approach by revisiting our previously introduced analysis dimensions. Namely, to develop a full *thematic framework*, inductively derived sub-themes were mapped against deductive analysis dimensions. Thus, we wed the concept-driven analysis dimensions – to serve as overarching themes – with the data-driven sub-themes (Gregory and Muntermann 2011). We conducted a workshop and facilitated several discussions with fellow researchers (i.e., peer debriefing;

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[40] We used MAXQDA software to analyze the qualitative data set (Kuckartz and Rädiker 2019).

Nowell et al. 2017) to refine specifics of the coding system, sub-themes, and the broader thematic framework (step 5). This ran parallel to the development of an overall narrative for the data and the definition of the (overarching) themes. At this stage, we classified three key themes (corresponding to the triad of *why*, *what*, and *how*) and two contributing themes. Finally, we selected extracts from the data to emphasize the essence of a given (sub-)theme, developed five practical design guidelines (i.e., one per each overarching theme), and wrote up the report (step 6).

Findings

Figure 19 shows the full *thematic framework* anchoring both our deductive and inductive reasoning. It comprises five overarching themes, which, by and large, root in the previous analysis dimensions but have been further substantiated. Particularly, three themes were identified as key themes to answer the research question on reputation portability design: the *impact of portable reputation* (i.e., the "why"), the *features and functionality* (i.e., the "what"), and the *requirements for operationalization* (i.e., the "how"). Our analysis also showed that *risks and challenges* as well as *policy and regulation* classify as contributing themes playing an important role in whether and how reputation portability can be established. These contributing themes are interrelated with the key themes; however, they do not directly inform the design considerations for platform operators. Yet, disregarding them would not allow us to sketch out a coherent picture of reputation portability in digital platform ecosystems.
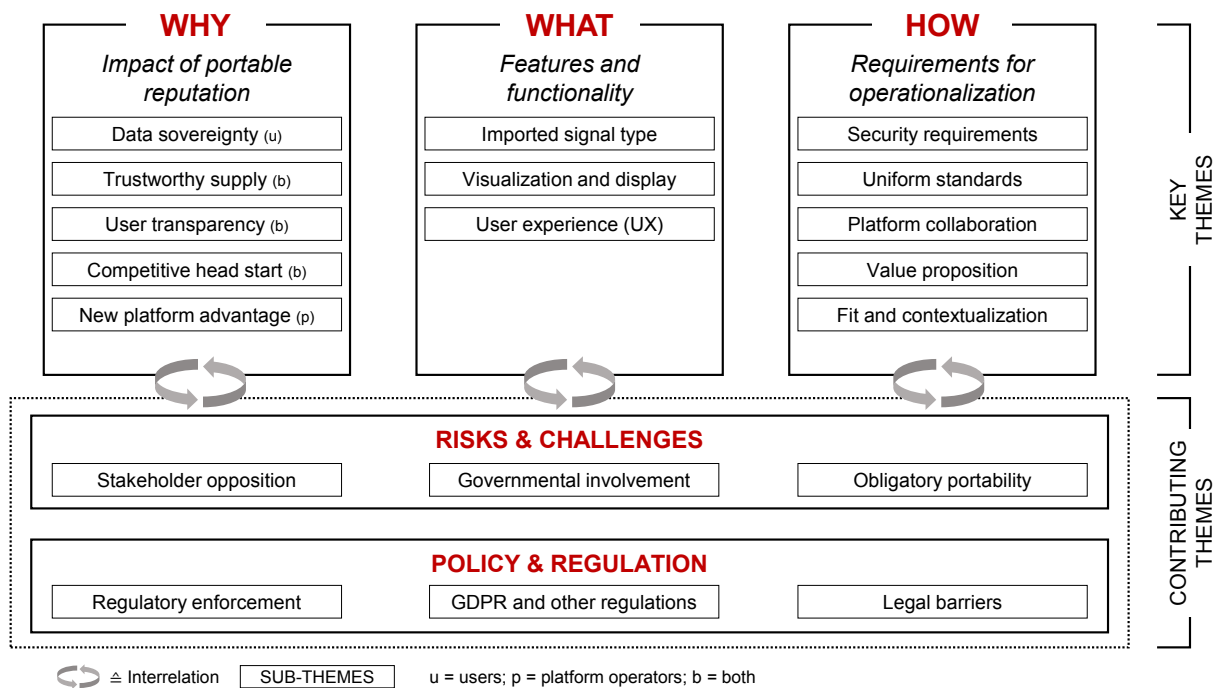

FIGURE 19: EXPANDED THEMATIC FRAMEWORK[41]

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[41] This full thematic framework includes both the five overarching themes and nineteen sub-themes.

Figure 19 also provides an overview of the inductively identified sub-themes within the overarching thematic framework[42]. In what follows, we are going to tell the story of each overarching theme and its respective sub-themes. We start with a definition, highlighting the essence of what each theme is about, before analyzing the qualitative data along sub-themes. Interview quotes from participants will be used to underscore analyses (Braun and Clarke 2006; Nowell et al. 2017). Finally, we conclude each theme's discussion with a practical design guideline that addresses relevant stakeholders, thus also summarizing key takeaways for both researchers and practitioners.

Why: impact of portable reputation

It is generally assumed that one of the most critical properties of any new technology, product, or innovation is to succeed in creating value or anticipating user needs (e.g., Mahmoud et al. 2018; Thomke and Von Hippel 2002). Reputation portability is no different. To design a direct import functionality between platforms, one first needs to understand why it will provide utility. Our interviewees identified several areas where reputation portability could benefit direct stakeholders, that is, platform complementors and/or consumers (i.e., users; De Reuver et al. 2018), platform operators, or both. The upper left column of Figure 19 indicates whether these effects occur predominantly towards a particular stakeholder group (i.e., u = users; p = platform operators; b = both). Hence, this first key theme provides a rationale as to *why* reputation portability should be utilized. It encompasses the benefits interviewees associated with the introduction of portable reputation and differentiates them by stakeholder group. In doing so, it gives designing reputation portability its purpose.

Data sovereignty was discussed as the single most important benefit pertaining to users exclusively. Our interlocutors characterized this sub-theme as user empowerment and control over their online data or as the option to "realize informational self-determination" [IN1]. In this sense, it refers to users' (and especially complementors') ability to manage their digital identity and reputation across platform ecosystems or, as IN3 said: "Users gain mobility, users gain power on data, and users gain more choice concerning platforms. And that's only a good thing for them." However, in this context some interviewees did caution that any reputation portability solution be designed in a way that upholds the data sovereignty of *all* involved actors including those that originally provided the reputation (see Section 4.5; "policy").

Within the "why" theme, the remaining four sub-themes overlap. Uniting them is the notion that additional reputation brings along advantages in acting on, using, or operating a platform. First, the creation of *trustworthy supply* is based on the idea that reputation is a driver of trust in digital platform ecosystems (e.g., Tadelis 2016). Interviewees highlighted that (positive) ratings and reviews transport a lot of trust and hence porting these across platforms may benefit platforms and users alike. For platforms, "not the demand is the problem but the supply, and actually generating supply that is trustworthy has a really big impact" [CONS1]. That observation is in line with Dellarocas et al. (2009)'s argument that registering new "good sellers" via reputation portability may improve the overall quality of trade on platforms.

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[42] Due to the extent of data variety, sub-themes come in different forms: as fully realized patterns of shared meaning united around a core concept (Braun and Clarke 2019) *or* – for instance, in the case of less consensus – as domain patterns capturing the diversity of meaning with regard to a particular focus area (Boyatzis 1998). Our research question and the novelty of the investigated topic justify this nuanced representation of (sub-)themes.

Similarly, more trustworthy complementors may translate into more reliable choices for platform consumers. For emerging platforms direct import could thus prove as an effective tool to tackle the chicken-and-egg problem of attracting both enough complementors *and* consumers to offer a valid value proposition (Hein et al. 2020). Second, interviewees associated reputation portability with increased levels of *user transparency* saying it would reduce the amount of fraud or scam accounts and that having more reputation in one place may induce an "added layer of perceived security" [OP2]; a construct, which has proven instrumental in driving trust in platforms (Mao et al. 2020; Ter Huurne et al. 2017). Third, it was expected that complementors were to gain a *competitive head start* leveraging their prior reputation. That is because it allows them to overcome the "cold-start problem", which complementors face not having conducted any transactions yet on the new platform (Kokkodis and Ipeirotis 2016; Wessel et al. 2017). Thus, for these new users without prior reputation history, it will be "more difficult to signal trust to other users. Being able to import reputation collected on other platforms may kickstart reputation scores" [IN2]. At the same time, platforms may equally benefit from enabling the import – as OP1 confirmed:

> We have a rating and review system after the first job but for us, [reputation portability] would probably be particularly interesting before the first job. Because that's still a problem we face that we cannot reliably tell if someone is actually going to work and behave well on the platform.

Fourth, some of our interviewees noted that the positive impact of reputation portability (especially of allowing direct import) may be more pronounced for niche, smaller, or entrant platforms. In this sense, offering reputation portability may lead to a *new platform advantage* "because [these platforms] could expect that users are more easily willing to leave the big incumbent platforms when it's easier to port their reputation" [IN3]. This idea is in line with the EU's thinking that portability may facilitate more platform competition and break monopolies (European Commission 2016, 2017). However, a new platform may even wish to import reputation from an incumbent platform that is active in a *different* market domain because "it might be very beneficial to have some sort of history from other sites to create trustworthy service providers" [COMP2]. Moreover, incumbent platforms themselves (such as Airbnb, eBay, Uber) may benefit from portable reputation. Specifically, OP3 pointed to the potential for operational savings: more *trustworthy supply* and *user transparency* could generate "a reduction in the number of transactions that do not go as planned," which will ultimately result in "a cost reduction on customer burden, defined as customer complaints." Finally, promotional effects for established platforms might be at play if reputational data would be (visibly) integrated on other platforms: "it's marketing. [...] That is basically the most prolific reason for bigger platforms" [OP1]. We will discuss next, *what* exactly will have to be displayed on platforms for reputation portability to work effectively.

Practical design guideline #1 (to operators): Design reputation portability with the end users in mind; while you may equally benefit from increased levels of trust and transparency on the platform, the central design directive should be individuals' data sovereignty in online ecosystems.

What: features and functionality

The second key theme explores the concrete features and functionality of direct reputation import between platforms. It addresses the question *what* type of reputation should be made

available, its visualization and aspects regarding end user's interaction with the solution (i.e., user experience; UX).

Third-party assessments, such as (star) ratings or (text) reviews, represent the most commonly used reputation signal to engender trust in digital platform ecosystems (Mavlanova et al. 2012; Teubner et al. 2019). Unsurprisingly, discussing the portability of reputation across platforms, the *imported signal type* emerged as a relevant sub-theme. Interestingly, the preferences for importing either numerical ratings or text reviews were roughly split between interviewees. While CONS1 made an argument in favor of ratings as being "the most common [and] really learned from online shopping behavior," platform operators underlined the informational value of written feedback: "there's no question in my mind that [text] reviews are the most powerful indicator where we can mine more data" [OP3]. However, there were also doubts about ownership of these reviews (see Section 4.5; "policy"). It was also suggested by some that platforms should include both ratings and reviews because they fulfill different functions and only together provide a full picture. Some interviewees went beyond to argue that other types of reputation should be made portable by platforms. These included professional certificates users acquired on gig or freelance platforms and badges like the super host status on Airbnb[43] for import or embedding on other platforms or personal sites.

The second central design (sub-)theme revolves around the *visualization and display* of reputation when imported onto another platform. Importantly, the display of numerical ratings received more attention as this aspect proved more intuitive for interviewees to envision (compared to imported reviews). Now, most participants preferred the imported reputation to be distinctively displayed, for instance, as a separate widget or dashboard. "I would say, you can display two or three of these widgets from other platforms" [OP1]. This suggests that platforms provide some sort of exportable format for their reputation that can then be showcased on other platforms. Notably, this is contrary to what the few implementations of reputation portability (e.g., Bonanza) are currently offering as they are integrating and merging (in this case eBay) ratings into their own rating scheme. Some interviewees were skeptical of this practice saying that "a lot of information may be lost through uncontrolled aggregations" [IN2]. Still, the idea of score aggregation was picked up, albeit for different reasons. OP3 argued that importing, for instance, a mediocre but unrelated score (e.g., from Airbnb to Lyft) may "hurt [a complementor] in the eyes of consumers and reduce the chances of entering into interactions. [...] And so, disaggregation of scores may create more problems for the platform. I wouldn't disaggregate, I would just give one score that is compounded somehow under the hood." Others seconded this thought and hypothesized on the introduction of an overarching score, which may be further broken down by platform domain types such as accommodation, mobility, and so forth. Tadelis (2016) described this as a meta-reputation score requiring diligently trustworthy behavior across platforms. We will discuss implications and risks of such a universal rating later (see Section 4.4; "risks"). Irrespective of whether reputation is shown distinctively or separate, interviewees suggested that information be expandable as one clicks on or hovers over it. This would allow "looking separately at reviews from different platforms" [CONS1], "breaking down the distribution of stars" [OP3], and potentially even "link[ing] directly to the other platform" [IN2]. However, as

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[43] As a matter of fact, Airbnb readily provides such a badge to platform users in the form of an exportable HTML-code.

we know, not all platforms use the common 1 to 5 stars system for reputation scores but several other metrics can be observed on digital platforms (e.g., 0-10 points, 1-100%, etc.; Hesse, Dann, et al. 2020). Thus, several interviewees highlighted the importance of rating comparison: "you need to have some way of translating one reputation into another" [IN1]. Especially for distinctively displayed ratings, a scale indicating the imported rating value's translation into the target platform's rating score standard was considered essential. As one platform operator hypothesized: "in the ideal world, there will be some sort of an agreement where everybody's using the same scale. Because every time you translate, you're introducing distortions" [OP2]. Discussing the (source) platform's visibility, OP1 stated: "obviously brand name has to be clear and visible. The ratings would have to be from famous or well-known platforms," while COMP1 added: "I would like to have reputation portability from renowned platforms"; simply because imported ratings from smaller platforms may not be so valuable. However, it was also understood that for competitive reasons, platforms may not want to 'advertise' other platforms by displaying a foreign brand logo on their own website. For those platforms, an aggregated or collated rating display may be more attractive. Other ideas were discussed, for instance, timestamping imported reputation (i.e., *when* a rating/review was received) or the option to 'pin' a favorable review, rating, or endorsement from other platforms to one's profile page (akin to the practice of cross-site linking on social or professional networks; Y. Chen et al. 2014; Silvestri et al. 2015).

As Figure 19 indicates, another prominently discussed sub-theme was *user experience* for reputation import. First, relating back to the notion of data sovereignty, interviewees suggested that users retain full control and ownership over data including the right to opt-out of reputation portability at any step of the process – even retrospectively. A viable way to do that could be to prompt users, for instance with a pop-up, and give them the option to import reputation from – or, vice versa, export existing on-site reputation to – other platforms. By doing so, platforms should consider laying bare their intentions and being fully transparent: "*This data is used for x, y, and z, are you okay with this?* – and it doesn't have to be a one time in your life decision. Instead that can be revisited" [OP3]. Second, almost all interviewees expected reputation import to be simple, quick, intuitive, and easy to use. CONS2 referred to "seamless design" and likened the desired process to that of setting up a new Apple device from an existing backup. Similarly, IN2 stressed the importance of simplicity in reputation portability design, given various (hypothetical) paths for customization: "there's already a lot of complexity when it comes to trust cues on platforms. If you're adding additional trust cues, such as imported scores, and then also add written text reviews, I would see that in many ways too complex." Third, our respondents suggested the design of a reputation portability import functionality be appealing (i.e., sleek, beautiful). Taken together, these results are little surprising since both ease-of-use and aesthetical appeal are generally understood as important factors for how users perceive website usability and evaluate design (Nielsen and Loranger 2006; K. E. Schmidt et al. 2009). IN3 summarized in saying:

> I think users expect the most convenient design you can think of. If there's a one-click solution, users would use it. If they would have to go through a cascade of menus and decision points, they might jump off the process. I think from the users' view it's really important to make the process super easy to go through.

Importantly, platforms need to ensure inclusivity and create a sense of empathy and emotional care for consumers by applying design principles to "reduce biases and create technology that

is truly available for everyone" [OP3]. This perspective resonates with recent paradigms of emotional web design (Bollini 2017).

Practical design guideline #2 (to operators): Ensure comparability of imported reputation from a set of curated source platforms. Disclose full intentions, allow users to retain data/process control, and design appealing as well as easy-to-navigate interfaces.

How: requirements for operationalization

The third key theme considers the broader picture of *how* reputation portability ought to be designed and implemented. That is, it enunciates security requirements and uniform standards as well as an overarching value proposition towards stakeholders. It also investigates *how* platforms may group together in establishing solutions for reputation exchange.

Our interviews deemed the fulfillment of adequate *security requirements* indispensable when establishing reputation portability in practice. For instance, by preventing manipulation and fraud at any point of the process (i.e., ex ante or post hoc import). To do so, platforms will have to eliminate opportunities for malicious actors to tamper with data, which is subject to porting. Moreover they must minimize the risk of importing fake reviews, which have become a prominent issue in platform ecosystems (Gutt et al. 2019; Wu et al. 2020). CONS1 suggested: "It would be a risk if it's necessary to download your reputation and upload it somewhere else. But if reputation is automatically transferred without you having access to the data, it would help. Of course, this never avoids 100% the risk of fake reviews." One way to minimize said risk is for platforms themselves to curate a set of trustworthy sources for reputation import. As a platform operator, "you need to make sure that where you import data from is a credible source and you can trust it. Because if it's not credible, it can mess around your with business" [COMP2]. This could imply for operators to "define the 10 most relevant platforms where we think the information is most valid for us" [OP3]. Additionally, platform operators will have to find ways to validate users' claim to the reputation data on the source platform, for instance, by confirming that account details, email addresses, or personal ID documents match – similar to KYC (know your customer) procedures in banking. Doing so also guarantees that reputation from a particular source platform can only be imported to one account at the time. This is crucial to avoid the occurrence of secondary reputation markets, in which rating scores (for import) are illegally offered for sale (just like in the case of fake reviews).

Interlocutors expressed their desire for *uniform standards* in designing and implementing reputation portability across platforms: "The most ambitious solution would be a general standard of reputation, which all relevant platforms could consent to, for example, five stars. This would be an ideal environment to import and export. But this is perhaps a very distant vision" [IN3]. It was also hypothesized that the EU may have an interest in promoting such a standardization of reputation scores to avoid that major platforms push their own agenda in setting de facto standards: "I think it would be nice to have some sort of standard rating from the EU that has a meaning, which everyone understands. Cross-national and cross-platform. I think achieving something like this, may be the first step" [COMP1]. To warrant a level and unbiased playing field, customization options for importing reputation may have to be limited. That is, from the platforms complementors are given an option to import from, they may either import all of their reputation or no reputation at all (i.e., cherry-picking of ratings or reviews should not be supported): "What you want to avoid is somebody just porting their positive reputation data, ideally" [IN1].

For operators, a viable way of approaching reputation portability is by exploring opportunities for *platform collaboration*. If platforms were to partner up in "a collaboration with another platform and they use APIs and [log-in] credentials to move the data, it would make me trust these ratings more" [COMP2]. Certainly, for multi-homing complementors entrusting their account details to participating platforms may require a leap-of-faith (Greiner et al. 2018). However, this barrier could be substantially lowered if an interested group of platforms can form together to create and advertise a 'trusted reputation portability consortium'. This route may prove particularly interesting for smaller or niche platforms spearheading the development of a potential solution. It would also provide users with the prospect of real-time reputation portability and automatic rating update via APIs: "I would expect something like that to lazy load while just accessing the page. We wouldn't actually import the data on our platform, we would actually just ping the API of eBay or Uber and show what it gives us" [OP1].

Two additional sub-themes are notable requirements in operationalizing direct reputation import between platforms. First, reputation portability needs to offer a *value proposition* to all involved stakeholders but, most importantly, to users. To properly engage them, effective design must highlight reputation portability's utility and purpose (Garett et al. 2016). This can be achieved by explaining and demonstrating the benefits of portable reputation (see Section 4.1; "why"). "If you're trying to design it, you have to start with the user need. You have to create something that is valuable [and] where a real problem is solved" [CONS2]. For instance, platform operators could explain in simple terms how reputation portability works, and which benefits it promises to complementors (e.g., increase consumers' trust and purchase intentions; see Section 2.1). Second, most if not all participants considered platform *fit and contextualization* to be an important issue. Some argued that imported ratings would have limited explanatory power for service provision on different platform domains and that it was at least debatable if importing reputation is helpful in those cases. "I think that a general fit is nice. If I buy, for example, some screws on eBay and I get a positive review that has definitely not the same value as a two month stay on Airbnb" [COMP1]. Indeed, Teubner, Adam, et al. (2020) show that reputation portability effectiveness crucially depends on the fit between source and target platform. In this sense, whether ratings should be converted or retained in their original form (see Section 4.2; "what") could also be tied to the degree of platform fit: "if you choose to have one rating, then you really should make sure that the ratings are specific to the same job – or the same industry at least. I think you can still show ratings from different industries, but separately" [COMP2].

Practical design guideline #3 (to operators): Explore opportunities to jointly develop prototypes with uniform standards. Solutions must demonstrate a clear value proposition to platform users and require evaluation regarding their security and reliability across platform ecosystems.

Risks and challenges

This theme draws attention to obstacles identified in the establishment of portable reputation such as stakeholders' opposition, governmental involvement, and the consequences of non-voluntary reputation portability schemes. Thus, the theme contributes to developing an understanding of the issues that must yet be overcome for reputation portability to be effective, successful, and factually established.

Our analysis thus far foreshadows some of the challenges that could be encountered in developing solutions for reputation portability, more specifically, direct import between platforms. *Stakeholder opposition*, for instance, is likely to be expected, especially from established incumbent platforms (such as Airbnb, eBay, Uber). In the absence of physical assets (e.g., properties, stores, vehicles), the biggest asset for these players are their user base and associated data (Sundararajan 2016). Leading platforms invest heavily in user lock-in and data monopolies, thus, their voluntary participation in reputation portability and data sharing is unlikely. "Nowadays reputation is platforms' currency, they see a lot of value in their community" [COMP1]. This leads many of our interviewees to believe that incumbent platforms do not see monetizable value in reputation portability. Said OP3:

> The fundamental challenge is that I don't see platforms transferring data to other platforms. There's no business model ... they don't see the benefit. [...] The people at the executive level, the CEOs, or the investors – they're not thinking that way yet. Maybe the industry will mature to a level where they will start to see the benefit of having a reputation that crosses platforms [but] we are not close, not even remotely.

We have previously presented ways in which platforms may benefit from reputation portability (i.e., *trustworthy supply*, *competitive head start*; see Section 4.1). While for these reasons platforms would probably not oppose importing data, they will have to weigh anticipated benefits of gaining more trustworthy complementors against very real threats of increased competition. This may lead to a prisoner's dilemma, in which incumbent platforms chose to forgo any action that could weaken their own position (Krämer 2018). Hence, our interviewees argued that demand for reputation portability must come from users, for instance, encouraged by smaller or new platforms offering direct import: "larger platforms could expect a drain of users if there are smaller competitors with more attractive services" [IN3]. By making reputation portability attractive and desirable for users "you're going to create pressure through the users. It's the only way how it's going to work because if they lose users, they will react to that threat" [CONS2]. While the idea is plausible and we discussed ways to create a need (i.e., *value proposition*; see "how"), users, too, will first have to be convinced of reputation portability's value. Currently, platform users are not aware of direct import functionalities on platforms, simply because not many of them exist. Also, CONS1 cautioned that demand for reputation portability may be overestimated: "maybe people are actually not working on many platforms; you rather have people who are very active on one platform than being active on five at the same time." Yet, there is reason to believe that complementors would leverage reputation import if it were available. In fact, while import on Bonanza is not obligatory, 94% of all sellers still make use of this feature and chose to import their reputation from eBay (Hesse and Teubner 2020b). Similarly, almost two thirds of users are active on more than one platform making multi-platform use the rule rather than the exception (Teubner et al. 2019).

Restraints with regard to data sharing may also impede user interest in reputation portability, especially when *governmental involvement* is expected. Interviewees unanimously pointed out that only private entities should be mandated with handling users' portable (reputation) data and offering services on that basis. As IN3 accentuated: "here in Europe, we wouldn't like the possibility to have an exchange of data between the private and the public system", and IN1 specified this further in saying: "no civil rights should be dependent on mandatory reputation portability." Discussions around this sub-theme were motivated by the ongoing development of state-sponsored reputation schemes in China (Social Credit System; Liang et al. 2018).

These data surveillance tools are designed to reward/penalize citizens based on credit scores and reputable conduct to determine their access to education, markets, or tax deductions. Notably, leading platforms and technology companies work with the government in testing and establishing the system's technical infrastructure (e.g., Alibaba, Baidu, WeChat; Botsman 2017a; Liang et al. 2018). Participants resented this notion saying "as soon as the state comes into play with tracking your reviews and your behavior, it's getting highly risky" [CONS1]. Direct fluidity of reputation between platforms – as discussed in this study – is certainly far off authoritarian control systems, which are outside Western cultural and political tradition. However, it is worth noting that with the proliferation of online markets, Westernized societies have been embracing a rating culture and the continuous collection of user data and behavior has become the norm (Wong and Dobson 2019). Thus, since Western platforms' reputation systems and the Chinese Social Credit System are not entirely incommensurable, "an ecosystem will need to be built such that it doesn't become big brother, so that we don't follow the route of other places. I think it has to be constantly in the public discourse" [OP3]. Looking at opportunities to learn from the systems in place, CONS2 added: "we see a lot of things in China and we should think about how to adapt them while keeping democracy in the right space." This approach concurs with Síthigh and Siems (2019)' suggestion of closely studying the Chinese model to assess implications for Western societies and to inform regulatory intervention and law-making.

In a similar vein, interviewees dreaded *obligatory portability*. Specifically, if failure to fully disclose gathered reputation would bring about disadvantages for platform users. "I see the danger that this becomes the new standard at some point. And if you don't have that rating, if you don't have the visibility or transparency, then you are discriminated against" [COMP1]. Study participants likened this scenario to recent discussions on having to demonstrate the use of a COVID-19 app or issuing immunity passports to control entrance to shops and access to venues or gatherings in times of a globally surging pandemic. "There could arise pressure from the common usage of platforms when users are forced sublimely to port reputation data. [...] This introduces the problem of an indirect duty to reputation management. So then [retail] shops might say: four-star customers only" [IN3]. In this sense, reputation portability between platforms may already forebode a more extensive use of reputation scores across online and offline services.

Practical design guideline #4 (to all stakeholders): In the long run, seek alignment on the necessity of reputation portability, for instance, by increasing user awareness and creating a need for portability services. Avoid reputation data sharing between platforms and governmental branches and prevent users from being obliged to involuntary reputation disclosure.

Policy and regulation

This theme comprises a regulatory view of reputation portability; including potential enforcement by means of regulation (e.g., GDPR) as well as anticipated restraints of current legislation on reputation data transfer, privacy, and ownership. Thus, the theme contributes to the overall research question by developing an understanding of current and potential future regulations and how they might affect the design and implementation of portable reputation.

As things stand, it is hard to imagine that leading platforms would be willing to work together on devising uniform standards and interoperability, especially given different design choices

in their reputation systems and the resulting lack of compatibility (Dellarocas et al. 2009; Tadelis 2016). However, "portability without interoperability is only half of the way" [IN3]. Hence, assuming that (at least major) platforms are reluctant to enable direct import, our interviewees wondered whether *regulatory enforcement* of standards and interoperability could be a viable approach: "A lot of these companies do not like to share data with other people. I don't think incentives would be a catalyst towards them for cooperation. You know the carrot and the stick model? In this situation, unfortunately, the stick might have to be used" [OP2]. However, especially policymakers cast doubt on whether it will be necessary for legislation to specify standards: "To set the conditions is not the task of legislators, there could be self-regulation within the market. This is, of course, a question of time. Will the market players align their structures? Will the market solve this problem to the benefit of users? If nothing happens, perhaps we need to have a discussion on compulsory interoperability" [IN3]. Interestingly, enforced interoperability (i.e., requiring platforms to adapt reputation systems to support data portability) did not become part of the GDPR, although originally foreseen; platforms criticized the passage and it was later taken out of the regulation's draft (Drechsler 2018). Still, our interviewees argue that there is at least "a good case for making reputation export mandatory" [IN1]. In this context, many people point to *GDPR and other regulations*, however, as we have discussed in Section 2, it is up to clarification whether GDPR's right to data portability (i.e., Article 20) even applies to reputation data. According to IN3 this may not be the case:

> The European Data Protection Board has set forth what should be portable are those data where users' concrete actions or use of connected devices are observed. I think most of the time reputation is given, those are actions of other users and some algorithm is involved. And so, other users' recommendations or assessments are not data provided on the basis of consent to the platform. It's not comprised today under Article 20.

The position is corroborated by several legal scholars (Inglese 2019; Kathuria and Lai 2018; Vanberg and Ünver 2017). However, if GDPR is to be understood as a tool for individuals' data sovereignty and an instrument for user empowerment, "then Article 20 should be expanded and also include reputation data [and] this idea should be promoted in further possible modifications of GDPR" [IN3]. Van der Auwermeulen (2017) takes a similar stand in arguing that reputation scores should fall under the scope of data portability as personal data. However, interviewees also discussed alternative regulatory paths, for instance, leveraging the EU's soon-to-be adopted *Digital Service Act*, which, inter alia, mandates leading platforms to share collected data with competitors: "Let's put this into a separate regulation, for example, under the Digital Services Act, so that we get proper real-time data portability. It's much clearer if we have data portability to promote competition, than personal data portability to realize informational self-determination" [IN1].

As the final sub-theme, we will consider *legal barriers* to designing reputation portability. While regulation may help with promoting portability, these hurdles must be overcome or, at least, require further clarification. "There are a lot of legal barriers, stopping companies from transferring data or creating reputation across platforms. I think that the new privacy regimes are making that even more of a challenge" [OP3]. Indeed, when differentiating between types of reputation (i.e., *imported signal type*; see Section 4.2; "what"), it appears unlikely that the copyright for a text review (i.e. written feedback) remains with the user who demands for the

reputation to be ported (Kathuria and Lai 2018). Interviewees with a legal background confirmed this notion: "in the case of [written] reviews, copyright might be an issue; also written lines may include names of others. This would have to be anonymized otherwise [...] data protection might be touched" [IN3]. One option, though, for platforms to include user reviews in reputation portability's scope, could be to demand a waiver of rights, so that the feedback becomes a public property to be used at the platform's will (Hesse and Teubner 2020a). As IN1 stated: "you could give users the option to consent. The person writing the review could wave their IP, like 'default on/off'. If they decide their host can port the reputation, then why not?" Similarly, ownership of (numerical) ratings will have to be clarified before wide-spread solutions can be deployed. Taking the form of a numerical value, such ratings (i.e., stars, points, percentages) are, in most cases, anonymized out of their nature. Although this appears to make that signal type less prone to copyright issues, this assumption should not be taken for granted. As IN2 remarked:

> Thinking about data and ownership as a uni-dimensional construct is too simple. [...] If everyone has to agree to the export or portability of reputation – the person who received a review, the person who left a review, and the platform – it is very unlikely that all stakeholders will always agree to that. And so, as a default, you would end up with a ported score that is flawed.

Thus, it is not entirely clear whether (aggregated) ratings can be used without the consent of either the score provider (i.e., the person assigning the rating) and/or the processing platform, both of which may 'own' the data. A look at practical examples tells an ambiguous story: on the one hand, back in the mid-1990s, Amazon allowed its users to import their reputation scores from eBay. However, after the latter claimed ratings as proprietary and threatened with legal actions, Amazon discontinued the service (Dellarocas et al. 2009; Resnick et al. 2000). On the other hand, the few platforms, which have been offering reputation import for some time (e.g., Bonanza and Truegether), enable their users to directly import ratings *and* reviews from both eBay and Amazon. We can only hypothesize whether the incumbents tolerate this practice because they do not see a potential competitive threat in these smaller players. Presumably, this outlines a viable path for smaller and nascent platforms to jump on the bandwagon. Eventually, for reputation portability to come to fruition, it is desirable for *all* involved stakeholders to receive more legal guidance "on what reputation data can be used and demanded for" [IN1].

Practical design guideline #5 (to regulators): Enhance data portability policies and regulation by making the export of online reputation (especially numerical ratings) mandatory for platforms, thus empowering users and encouraging competition in digital markets.

Discussion

General discussion

While an emerging literature stream explores reputation portability, recent studies mostly focused on conceptualizations and investigating the impact on consumers' evaluation of trust and purchase intentions. So far, however, no research has considered the concrete design of reputation portability (especially, in the form of direct reputation import) in digital platform ecosystems. Contributing to the nascent body of knowledge, we use a hybrid approach of deductive (Section 3.1) and inductive (Section 3.2) reasoning to develop a thematic framework

of reputation portability and analyze its main components. In doing so, we conducted a series of interviews with direct and indirect platform stakeholders, applied thematic analysis methods on the qualitative data, and derived five practical guidelines to inform the design of reputation portability. Both the resulting thematic framework and the design guidelines can serve as a starting point for researchers and practitioners to develop reputation portability mechanisms.

While our study's findings, especially the guidelines, outline specific steps for stakeholders to design, enable, and establish wide-spread reputation portability, many issues still require attention. Importantly, the short-term viability of reputation portability is largely dependent on platforms' willingness to participate in proposed solutions. Despite the positive impact portable reputation may entail (see Section 4.1; "why"), our analysis indicates that leading platforms are unlikely to trigger the development of direct import solutions themselves. While incumbents currently tolerate (or are unaware of) the few offerings that do exist on smaller platforms, they may not remain patient in the longer run and claim ownership of *their* reputation (as they did in the past; see Section 4.5; "policy"). Our interviewees hinted at the possibility that reputation portability may well be obstructed by leading platforms on purpose, labeling this as a "generational issue" [CONS2]. We see at least three potential ways to overcome this stalemate. First, a consortium of interested platforms (e.g., smaller, or emerging operators) could form to explore and test reputation portability features. Creating a trusted group of partner platforms may allow these players to pilot the proposed design elements (e.g., clear value proposition, uniform security/layout standards, waiver of rights for portable reputation, etc.) and increase user awareness and acceptance. Second, requesting and pushing for (reputation) portability must not be limited to interested platforms but extend to users, who should be empowered to demand respective services from operators. As OP3 stated: "making consumers willing to participate is the cornerstone." Third, discussions of users' digital sovereignty and identity management must be extended to include reputation portability. For online workers, digital reputation is their most important currency and in a world of increasing digitization and platformization, regulation must aim to enforce and strengthen users' mobility and their rights vis-à-vis platform operators. This is particularly important since operators consider complementors as contractors without access to the same rights that normal employees of the platform enjoy (e.g., minimum wage, unemployment benefits, health insurance; The Guardian 2020). Eventually, a combination of these three aspects may pave the way forward to more reputation portability in digital platform ecosystems.

Limitations and recommendations for future research

Despite its contribution, our study naturally faces limitations. For one, we develop guidelines for the design of reputation portability, however, we do not build, or evaluate an actual solution. We do believe, however, that our findings serve as an important foundation for practitioners and researchers to explore the concrete design of an IS artifact. Future research should thus leverage a design science approach to develop models, methods, and instantiations of direct reputation import for platforms (Hevner et al. 2004). Our thematic analysis and practical design guidelines can be used as a starting point (e.g., as meta-requirements or core components) to develop respective reputation portability products and theories (Gregory and Muntermann 2011). As part of this process, prototypes could be tested and evaluated by interested platforms (see Sections 4.3, "how", and 5.1).

Further, the direct import of reputation between platforms is by no means the only mechanism to establish reputation portability. Most notably, Personal Information Management Systems (PIMS) and blockchain technology have been discussed as viable alternatives (Hesse and Teubner 2020a). In fact, some interviewees suggested that third-party solutions, such as PIMS, may provide more data sovereignty and customization options to users because they act independent of platforms. Similarly, several of our interviewees believed that a decentral solution may be best suited to solve the presented challenges of reputation data ownership, security, and verification. Recent research has pointed to distributed ledger technology's potential for disrupting existing platform business models and enabling reputation portability (Bellini et al. 2020; Glaser 2017; Werbach 2018). Though it is certainly conceivable that these technological advances will play a role in establishing the portability of personal reputation in the long run, we deliberately chose to focus our analysis on the more straightforward solution, that is, direct import between platforms. Hence, while these alternative mechanisms are beyond the scope of this study, further research is needed to understand whether, and if so how, our practical design guidelines extend to these contexts.

From a methodological perspective, we contribute to the growing body of literature on reputation portability by conducting the first qualitative study on the concept. By conflating the essence of relevant stakeholders' views, this work informs platform design theory "tak[ing] into account the iterative shaping and redefinition of what is the platform by multiple distributed actors with divergent goals." (De Reuver et al. 2018, p. 130). However, to further corroborate (or even contrast) our findings and achieve maximum information variety, more interviews may be conducted. In particular, the viability of desired features and functionality would benefit from achieving a higher gender/regional diversity as well as including (visually) impaired participants to realize inclusive design principles (see Section 4.2; "what"). Throughout this research, we made sure to address the trustworthiness criteria (e.g., credibility, transferability, confirmability) put forth by Nowell et al. (2017). However, future research may wish to selectively include additional criteria, such as triangulation of different data collection modes and additional feedback loops with interviewees to confirm the findings' validity and fit (i.e., member checking[44]).

Finally, future research should aim to provide empirical evidence for reputation portability's effectiveness beyond trust and purchase intentions (i.e., demonstrable value for stakeholders; see Sections 2.1 and 4.3; "how"). For instance, this could be achieved by testing hypothesized business case drivers to assess implications on platforms' financial performance (e.g., operational savings; see Section 4.1; "why"). Similarly, effects should be differentiated by imported signal type, since extant research so far only investigated the positive effects of (star) ratings, however, existing studies have not yet considered whether imported text reviews have a comparable impact.

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[44] Note, however, that (beyond re-contacting interviewees for clarification) we chose to omit this step since it is not desirable practice according to Braun and Clarke (2006)'s reflexive approach to thematic analysis. It promotes the active, interpretive role of the researcher and, hence, does not necessarily seek to provide an account of the data that is recognizable to study participants.

Concluding remarks

Reputation portability has been established as a viable approach to increase trust and stimulate purchase intentions in online transactions. Direct reputation import, as enabled by a few existing platforms, may provide a straightforward and intuitive mechanism to facilitate seamless portable reputation between platform ecosystems. To answer how platforms should design and implement such solutions, we leveraged a hybrid approach, conducting a thematic analysis based on a literature review and a series of interviews with diverse stakeholder groups. We summarized our findings by deriving five practical design guidelines. These provide researchers and practitioners with hands-on advice on how to develop mechanisms for reputation portability. In a nutshell, our study answers *why* reputation portability should be employed by platforms in general, *what* should be displayed in potential solutions, and *how* these may be implemented by operators across platform ecosystems.

Eventually, the ideal of seamless reputation transfer should be independent of specific mechanisms. As the saying goes, "all roads lead to Rome". In this case, reputation portability, and specifically direct import, is only one means of promoting mobility in online markets. While the broader notion of self-determined digital identity management is beyond our study's scope, it is important to ask how users can be supported in leveraging their online reputation across contexts and what this data can ultimately be used for. In the words of COMP1: "In general, human trust is something that exists across platforms and maybe also across services. Perhaps, there's a good system to get something out of this [reputation] information." Thus, in a digitized world where online and offline environments merge, it becomes imperative to design adequate tools that protect, empower, and promote individuals' data sovereignty and choice.

PART IV: OUTLOOK

Chapter 7: Quo vadis, reputation portability?

In the chapters preceding this outlook, I introduced reputation portability in digital platform ecosystems and addressed the nascent research topic from a diverse range of angles. To start with, I provided an overview of the general dynamics of trust-building and reputation and formally conceptualized cross-platform reputation portability. Thereafter, I investigated the effectiveness of porting reputation, using both survey-based and experimental approaches, by analyzing the impact on basic indicators of economic success such as prices, demand, trusting beliefs, and purchase intentions. Finally, I explored reputation portability design with relevant platform stakeholders and presented practical guidelines to implement adequate solutions. This last chapter summarizes the results of this cumulative dissertation, and circles back to the starting point by answering the research questions, which were introduced in Chapter 1. To conclude, I discuss limitations of my work, provide avenues for future research, and consider the broader context of digital identity management.

Re-visiting the research questions

In this dissertation, I investigate trust-building and reputation portability on digital platforms as the central research objective. In doing so, five overarching research questions – introduced in Chapter 1 – are addressed. In what follows, I will briefly summarize the main findings and provide an answer to each research question RQ1 to RQ5.

RQ1: How do platforms build trust and how are these trust-building mechanisms perceived by platforms users?

Platforms employ a variety of trust and reputation mechanisms to support users in curating and maintaining their online presence. Chapter 1 introduces a taxonomy for trust-building cues and finds that basically all platforms utilize a combination of transaction-based mechanisms, expressive user profiles, identity verification, and implicit information to build user trust (see Table 2). We find that, by and large, transaction-based signals (i.e., numeric ratings or text reviews provided by prior transaction partners) are perceived as most important in the eyes of potential consumers (Table 3). Notably, both the frequency of specific trust cues provided by platforms and how their users perceive these tools are linked to a platform's degree of social interaction (DoSI). Hence, depending on the platform type, DoSI seems to provide a reliable indicator of platforms' choice for adequate trust-building mechanisms.

Moreover, as Chapters 1 and 3 indicate, platform users value the idea of imported reputation as a potential means to build trust – especially in high-DoSI environments (Figure 11).

RQ2: How can reputation portability be conceptualized along the existing literature and current practical implementations?

Referring to our model developed in Chapter 2 (Figure 9), reputation portability can be conceptualized along its most relevant dimensions. These include digital platforms and complementors acting thereon, feedback providers (i.e., consumers), and data transport between otherwise confined ecosystems (e.g., through linking and embedding of profiles or by

importing reputation signals). Moreover, external influencing factors play an important role, most notably novel regulation of digital platforms and services as well as the emergence of technological solutions such as PIMS and decentralized technology.

RQ3: What is the economic effectiveness of reputation portability?

As a platform complementor, leveraging reputation portability to increase the chances of selling a service to consumers can work. Specifically, Chapters 4 and 5 show that reputation portability, especially rating import, is a driver of trustworthiness and purchase intentions (i.e., two proxies of complementors' economic success). Yet, there are limits to these positive effects on platforms. As was demonstrated in Chapter 4, the decision boundary for whether it is beneficial to import reputation from another platform depends critically on the on-site and imported ratings' specific values (Figure 14). In other words: reputation portability's economic effectiveness is determined by both the existing and the imported signals' strength.

However, as shown in Chapter 3 when analyzing a real-world example of reputation portability on an e-commerce platform, counterintuitive effects, (e.g., on prices and demand) may occur (Figure 12). We can attribute these outcomes in part to the context-specific implementation of rating import on this platform. Hence, we provide suggestions for the adequate design of reputation portability in later parts of this thesis (e.g., Part III; Chapter 6).

RQ4: How does reputation signal discrepancy affect cognition and purchase intentions?

As stated in the previous answer to RQ3, there are limits to reputation import's effectiveness depending on the specific ratings' values. A closer look at survey data in Chapter 5 reveals that a higher rating discrepancy is indeed detrimental to consumers' purchase intentions (Table 7). Similarly, cognitive psychology predicts that conflicting information and the arrangement and display of two or more ratings, will have implications for consumers' processing of these signals as well as their decision making. Therefore, these considerations are an integral part of the exploration of reputation portability's design in Chapter 6 of this thesis.

RQ5: How should reputation portability be designed and implemented in digital platform ecosystems?

Establishing reputation portability requires buy-in from all involved stakeholders. To explore the design of adequate solutions, a diverse selection of representatives from the identified stakeholder groups are interviewed. Importantly, I provide five practical design guidelines for direct reputation import between platforms: 1) design to achieve data sovereignty for end users, 2) ensure comparability across platforms and disclose full intentions in easy-to-use interfaces, 3) explore joint (platform) opportunities to develop secure and reliable prototypes with uniform standards, 4) create a user need for reputation portability services but prevent governmental data access and involuntary schemes, and 5) expand current regulation and make reputation export mandatory for platforms.

These guidelines exemplify the minimum set of requirements that will have to be addressed to successfully design reputation portability. However, within the scope of this dissertation, the presented studies' goal was to provide first insights into the conceptualization, effectiveness, and design of portable reputation in digital platform ecosystems. Naturally, further research efforts are required to fully understand each dimension of reputation portability.

Conclusion, limitations, and future research

My aim with this cumulative dissertation was to provide first comprehensive groundwork, laying a basis for further studies on the concept of reputation portability in digital platform ecosystems. The presented results therefore have important implications for both theory and practice. To begin with, the research program makes several noteworthy contributions to the continuously growing body of platform literature in IS and adjacent fields:

i) *A delineation of relevant terms, actors, mechanisms, and influencing factors in a first-of-its-kind conceptualization of reputation portability,*

ii) *empirical evidence for reputation portability's trust-building potential and its ability to positively impact consumers' purchase intentions in electronic markets,*

iii) *the exploration of design requirements as an input (e.g., meta-requirements or core components) to develop respective reputation portability products and theory.*

My research also has direct implications for the practical establishment of adequate reputation portability mechanisms. Practitioners in the domain of IS (i.e., platform operators but also entrepreneurs considering a market entry) can benefit from the findings presented in this thesis. First, market entrants and smaller platforms may wish to establish reputation portability as a competitive tool against incumbent platforms. Second, the practical design guidelines, proposed in Chapter 6, may serve as a viable blueprint to design direct import solutions for and between platforms. Moreover, this work provides a summary of current discussions around policies and regulation governing online (reputation) data (e.g., GDPR) and identifies several existing legal barriers to portability. Policymakers and legislators may interpret these findings as a call for action to further strengthen consumer rights in digital markets.

Notwithstanding these theoretical and practical contributions, some important limitations should be addressed by future research. Most importantly, Chapter 1 introduced different types of transaction-based trust cues on platforms, that is, numerical rating scores (e.g., stars) and written assessments (e.g., text reviews). In Part II of this thesis, I investigate the effectiveness of portable ratings for trust-building. However, there is reason to believe that text reviews may as well be ported and leveraged across platform boundaries. In fact, participants across our studies frequently pointed to the extraordinary informational value of written assessments (e.g., in Chapters 3 and 6). Previous research confirms this notion and demonstrated a strong positive impact of (good) text reviews for both economic and social value expectations on platforms when compared to other trust-building artifacts (Abramova et al. 2017; Dann et al. 2020). However, as Fresenda and Gefen (2020) show, the helpfulness of a review depends on different aspects of the textual content (i.e., its word entropy). Now, written feedback is highly contextualized depending on the type of service and/or platform. Hence, future research should investigate which parts of the informational content are particularly helpful for promoting trust, how this information can best be extracted from reviews, and whether it is transferable across different service categories and platforms.

What is more, although I elaborate on the design of reputation portability in this thesis, an actual IS artifact was not built. As stated in Chapter 6, design science researchers may leverage the provided guidelines to build, implement, and evaluate solutions for reputation portability. In this context, a resulting artifact could be investigated in several ways. For instance, to

analyze the external validity of an instantiation of reputation portability, a field experiment could be conducted (Edelman et al. 2017; Hesse, Teubner, et al. 2020). Also, the reputation portability scenario, which we leveraged for the experiments in Chapters 4 and 5, was stripped of most other contextual platform design elements to avoid introducing too many confounding factors. This setup should be adapted for further studies to create more realistic scenarios and to compare the effectiveness of reputation portability against other typically employed trust and reputation cues on platforms (e.g., Zloteanu et al. 2018). Such a more nuanced website design, integrating reputation portability (e.g., via direct rating import), could then be tested in a laboratory experiment with users, for instance, via eye tracking (see Chapter 5; Hesse, Lutz, et al. 2020).

Beyond that, reputation portability has the potential to affect individuals more broadly than just in the context of digital platforms. I will briefly discuss some implications for technology, policymaking, and society in the closing section of this research program.

Outlook

Since I started my work on this dissertation, the importance of digital identity and reputation management, both as a research and societal issue, has lost none of its appeal. The digitization and platformization of our world are progressing fast – and this development is only accelerated by a global pandemic that forces us to rely more increasingly on digital technology and business models. Accordingly, managing online reputation is of vital importance, especially when "no reputation means 'you don't exist' in the eyes of consumers" (Gandini 2020, p. 20). As was indicated in Chapter 3 (Figure 11), the concept of portable reputation is considered a strong tool especially for crowd work type platforms (incl. mobility services). And indeed, there is a compelling case to be made for gig workers (i.e., complementors) providing their services on such platforms. On a global scale, the United States are the leading market for the provision of *gig economy* services mediated through platforms and the industry has been growing consistently during the COVID-19 crisis. That is why California's Proposition 22, which received a majority vote in the 2020 US presidential election and was funded in large parts by Uber and Lyft, is regarded as an alarming turning point in online labor law (Oxford Internet Institute 2020). In effect, for these types of platforms, the new proposition overrules a previously adopted law that would have ultimately granted platform workers more rights as regular employees. Thus, in several aspects the new proposition arguably deteriorates complementors' situation vis-à-vis platforms and has foreboding implications as a precedent for similar regulations across the globe. Without the protection and benefits of employment, crowd workers remain at the mercy of platforms' goodwill. This is precisely why reputation portability can make a difference for them and strengthen their rights.

As of late 2020, portability of reputation receives ongoing research interest and sojourns in the public discourse (Basili and Rossi 2020; Eckhardt 2020; Möhlmann and Teubner 2020). However, the maturity of different mechanisms seems to differ vastly. First, at the time of writing, both Deemly.co and Traity.com are inactive or have gone out of business[45], adding to the long list of failed PIMS and startups working on reputation portability (see Chapter 2). Second, blockchain-based platforms and decentralized reputation systems are still heavily

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[45] Therefore, their websites, as refenced in pre-published parts of this dissertation and listed in the Reference section of this work, are inaccessible at the current point in time.

researched study objects with several existing prototypes and use cases (Almasoud et al. 2020; Bellini et al. 2020; De Filippi et al. 2020; Glaser et al. 2019). Nevertheless, as Gartner in its technology hype cycle estimates, such blockchain platforms and the decentralized Internet are 5 to 10 years (if not more than a decade) away from transformational impact (Gartner 2020). In consequence, direct reputation transfer between platforms persists as an intuitive short-term option for more wide-spread adoption. In this regard, the European Union's efforts to investigate portable reputation have recently picked up steam (European Commission 2016, 2017, 2018b). Contrary to the US, European countries are historically known for strong labor law and, compared to developments across the Atlantic, the EU now seems to be going down a distinctively different route in strengthening complementors' and consumers' rights. Most importantly, the German government, representing the continent's largest economy, just recently announced to take on the issue of reputation portability in their latest effort to regulate platform work and thereby outspokenly distanced itself from practices in the US (BMAS 2020). In further comments, the current German Ministers for Justice and Labor position themselves clearly with regard to the portability of online reputation:

> "[P]latform workers must be able to take their ratings to a different platform each time. So far, this has not been possible because each platform uses its own system. This makes these service providers dependent and means that they often, nolens volens, stay on one platform to avoid having to start over somewhere else. Consequently, this strengthens the monopoly position of individual platforms and simultaneously leads to less competition to the detriment of consumers and complementors. […] We therefore want to ensure that platform workers can transfer their data to other platforms at any time via neutral interfaces. This strengthens competition and freedom of choice and, thus, also benefits consumers." (Lambrecht and Heil 2020; own translation)

It remains to be seen how Germany's planned regulation and strong commitment to reputation portability will be embedded and reflected in the broader EU's *Digital Services Act* and *Digital Markets Act*. These policy packages themselves, scheduled to be released in late 2020, aim at holding liable the big technology platforms and limiting their extend of power by fostering innovation and competitiveness in European online environments. Importantly, the regulations are expected to introduce mandated interoperability and improve data portability for consumers seeking to switch platforms (Broadbent 2020). With Germany currently holding the presidency of the EU Council, considerable overlap of the policies should be expected.

Finally, the investigated phenomenon of reputation portability will have to be considered in the broader context of digital identity and reputation management. As Kokkodis and Ipeirotis (2016) demonstrate, category-specific performance of online workers is predictive of their success in other, comparable tasks. One naturally wonders whether this transferability of reputation and skills persists when considering different scenarios, including the transfer of online reputation to offline contexts. As already noted by Publilius Syrus in Ancient Rome: "A good reputation is more valuable than money." These days, who can tell what our accumulated digital reputation will eventually be worth and what it may "buy" in the future?

APPENDIX

Supplementary Material Part I

Chapters 1 and 3: Survey design

FIGURE 20: ONLINE SURVEY[46]

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[46] This survey was administered online via Prolific.co and Google Forms. It was conducted across five different platform types (i.e., accommodation, carsharing, mobility, e-commerce, crowd work). Here, an excerpt from the survey on "Mobility Platforms" is shown exemplary. Wording, logos, and introductory texts were adapted slightly between surveys to fit the specific platform type. The overall study content and questions remained identical across contexts. Please refer to Chapters 1 and 3 for further information on the study's methodology, specific items to be rated by respondents, and sample.

Chapter 2: Literature search on Google Scholar[47]

Search term	Results since 2010	
	Term by itself	**Combined with** AND (Airbnb OR eBay OR Uber)
"Reputation portability"	21	12
Reputation AND portability	16,600	1900
"Portable reputation"	32	21
"Portability of reputation"	7	4
Portability AND ratings	16,000	889
Portability AND reviews	27,200	1,780
"Portable reviews"	25	1
"Review portability"	19	0
"Reputation transfer"	220	28
"Reputation transference"	10	0
"Transferable reputation"	17	4
"Reputational data"	237	44
"Reputational data" AND portability	41	18
Reputation AND platform	129,000	17,400
"Cross-platform signal"	8	0
"Cross-platform signaling"	0	0
"Cross-platform" AND signal	18,500	850
"Cross-platform" AND signaling	7,960	133
"Cross-platform reputation"	10	8
"Cross-platform" AND reputation	5,200	593
"Cross-platform portability"	694	14
"Cross-platform" AND portability	16,900	712
"Cross-platform" portability AND (ratings OR reviews)	5,170	335
"Cross-platform" AND "review portability"	1	0
"Cross-platform" AND "portable reviews"	0	0
"Cross-platform" AND (ratings OR reviews)	17,300	1,050
"Reputation signal"	216	28
"Reputation signaling"	254	32
Reputation AND signal	136,000	11,700
Reputation AND signaling	23,500	3,960
Reputation AND (signal OR signaling) AND portability	6,680	1,870
"Reputation aggregation"	754	229
"Aggregation of reputation"	89	37
"Aggregated reputation"	254	97
"Digital Identity Management" AND reputation	570	108
"Digital Identity Management" AND ratings	353	154
"Digital Identity Management" AND reviews	1,470	128
"Digital Identity Management" AND platforms	1,580	131
"Reputation passport"	7	6
"Reputation dashboard"	17	4
"Reputation economy"	1,010	242
"Personal Information Management System" AND reputation	56	5

TABLE 9: STRUCTURED LITERATURE SEARCH

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[47] **Notes:**
1) As of June 2019; patents were excluded from the list of results.
2) Besides these terms, various combinations of terms such as reputation, signal, rating, review, platform, aggregation, portability, transfer were searched (using Boolean operators AND/OR).
3) To specify the search in an additional step, we used combinations with platform names.

Supplementary Material Part II

Chapter 4: Stimulus material

Imagine that you would like to book a stay via the (hypothetical) Internet platform **happystay.com**. On this platform, private hosts rent out their apartments and rooms (very similar to Airbnb). You have already identified a potential host and, in the following, consider the host's profile page. Note that you will see a very stylized form of this page (i.e., with a blurred profile photo).

Based on the host's (star) ratings, we will ask you to state how likely you are to book and how trustworthy you consider the host to be.

- 1: Note, however, that the host has not collected any ratings yet.
- 2: Note that the host has already collected ratings from previous guests on happystay.com.
- 3: Note that the host has not collected any ratings on happystay.com yet but has imported previous ratings from her/his Airbnb profile.
- 4: Note that in addition to her/his ratings on happystay.com, the host has imported previous ratings from her/his Airbnb profile.
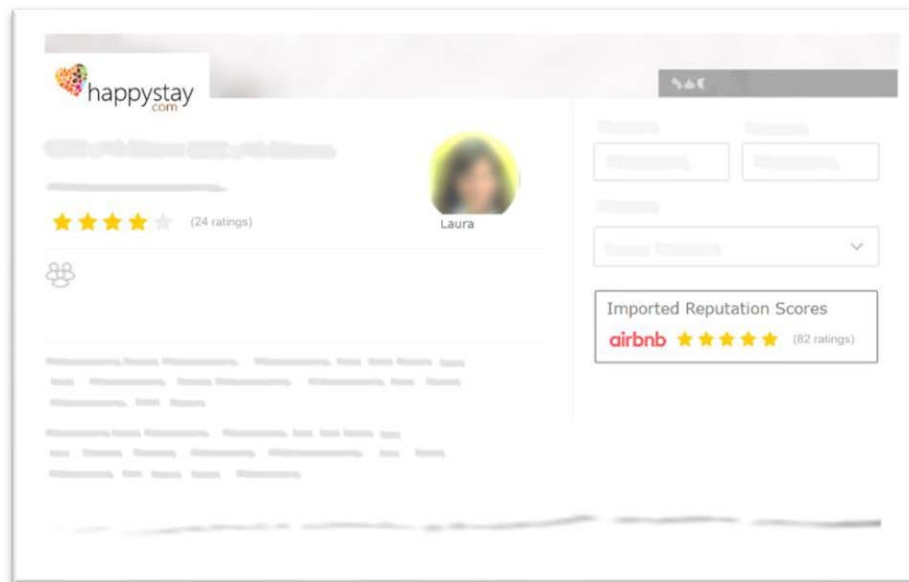

FIGURE 21: LANDING PAGE FOR ONLINE EXPERIMENT PARTICIPANTS

Names: (equally distributed; randomly drawn and allocated to blurred female or male image)

Alex, Emma, Laura, Lisa, Lucas, Michael, Paul, Philipp, Pia, Sarah, Sophia, Tim

Images:

FIGURE 22: BLURRED PROFILE IMAGES OF COMPLEMENTORS ON PLATFORM

Chapter 4: Treatment design

Table 10 shows the experiment's treatment matrix. As can be seen, when no rating is available in the 2x2 between subjects design, the condition has been coded as "NA". The participants' allocation across cases (1) to (4) is indicated by the color-coding, namely case (1) (no rating; 24 observations; yellow area), case (2) (on site only; 81 observations; blue area), case (3) (imported only, 83 observations; red area), and case (4) (both ratings; imported and/or on-site rating ranges from 1.0 to 5.0; 305 observations; grey area).

					Imported rating						
		1.0	**1.5**	**2.0**	**2.5**	**3.0**	**3.5**	**4.0**	**4.5**	**5.0**	**NA**	**Σ**
	1.0	2	2	2	2	2	3	3	2	3	7	**28**
	1.5	2	2	2	2	2	3	3	3	3	7	**29**
	2.0	2	2	2	2	2	4	4	4	4	6	**32**
	2.5	2	2	2	2	2	4	4	3	4	7	**32**
On-site rating	**3.0**	2	2	2	2	2	4	4	4	4	7	**33**
	3.5	4	4	3	4	3	7	7	7	7	11	**57**
	4.0	4	4	4	4	4	6	6	7	7	13	**59**
	4.5	4	4	3	4	4	6	6	7	7	11	**56**
	5.0	4	4	4	4	4	7	7	7	7	12	**60**
	NA	6	6	7	6	7	13	12	13	13	24	**107**
	Σ	**32**	**32**	**31**	**32**	**32**	**57**	**56**	**57**	**59**	**105**	**493**

TABLE 10: TREATMENT MATRIX

Table 11 reports descriptive statistics (i.e., mean/std. dev.) of participant-specific control variables. All controls were evenly distributed, and no systematic differences existed for participants' key characteristics across treatments (i.e., results were not driven by confounding factors).

		Case				
Control	**Scale**	1 (no rating)	2 (on-site only)	3 (imported only)	4 (both ratings)	**All cases**
Disposition to Trust	1-11	6.1 (2.5)	6.3 (2.6)	5.8 (2.5)	5.9 (2.6)	6.0 (2.6)
Trust in Airbnb	1-11	7.4 (2.2)	6.9 (2.5)	7.1 (2.4)	7.0 (2.5)	7.1 (2.5)
Risk-Affinity	1-11	3.8 (2.3)	4.4 (2.7)	4.4 (2.6)	4.5 (2.7)	4.4 (2.7)
Online Shopping Experience	1-5	3.0 (1.2)	2.5 (1.3)	2.9 (1.3)	2.9 (1.3)	2.9 (1.3)
Age	18-70	33.1 (9.5)	32.8 (12.0)	34.7 (11.9)	35.9 (12.2)	35.0 (12.0)
Gender Female	{0, 1}	66%	59%	57%	53%	56%

Note: Mean values reported (standard errors in parentheses)

TABLE 11: BALANCE OF PARTICIPANT-SPECIFIC CONTROLS ACROSS CASES

Table 12 shows that no significant differences occurred for the number of reviews that were displayed in the different groups. Please also refer to the section "**Chapter 4: Supplemental analysis**" in this Appendix, in which we additionally investigate the interaction of rating score and the number of reviews.

		Number of ratings				
Type of rating	**n**	Minimum	Maximum	Mean	St. Dev.	Median
On-site	386	1	89	22.4	28.1	9
Imported	388	1	89	24.4	29.9	9

TABLE 12: NUMBER OF REVIEWS ACROSS TREATMENT VARIATIONS

Chapter 4: Questionnaire and measurement instruments

Control	Question	Source
Trust in Complementor	I would consider this host as trustworthy.	(adapted from Gefen 2002)
Risk-Affinity	In general, I am very willing to take risks.	(adapted from Dohmen et al. 2011)
Disposition to Trust	I generally trust other people.	(adapted from Gefen 2000)
Trust in Airbnb	I think that Airbnb is a trustworthy company.	(adapted from Gefen 2002)

TABLE 13: INSTRUMENT VARIABLES[48]

Chapter 4: Supplemental analysis

Full control variable analysis—Table 14 reports the full *control variable analysis* of all used variables across the four cases. For each case 1 to 3 we show the original model results next to an extended model comprising all relevant controls per case (i.e., participant-specific controls and number of reviews; Models 1.1/2, 2.1/2, 3.1/2). Additionally, we repeated the analyses for case 4 including the original model (i.e., Model 4.1), including all controls (Model 4.2), and a model without interaction (Model 4.3; to check for significance when controlling for both ratings). Please note that for these analyses we introduced mean-centered control variables to account for the fact that the original coefficients are determined by these controls and can only be interpreted in a meaningful manner when applied to "the average population" (which is achieved by mean-centering). In particular, it can be seen that in case 1, the coefficient α_1, calculated as .350 in our model, is only slightly affected when including all (mean-centered) controls (i.e., equating to .376), despite the statistical significance of some of the control variables. The same holds for all other relevant coefficients from the "trust function", which can be checked in the control models 2.2, 3.2, and 4.2 in the Table 4.1 – they do not differ substantially in their sign, significance, or magnitude.

Interaction of rating score and number of reviews—Table 15 reports the results of a robustness check for the interaction of *rating score* and *number of reviews*. For that purpose, we calculated a series of multivariate OLS regression models to analyze the interaction effect across the three cases where at least one rating was visible (i.e., cases 2, 3, and 4). Neither in case 2 nor 3 (onsite or imported rating only; Models 2a/b/c, 3a/b/c) the number of reviews has any significant impact. Both when controlling only for the number of reviews and when additionally controlling for the interaction with the respective rating. Similarly, in case 4 (both ratings; Models 4a/b/c) the number of reviews does have a significant impact (Model 4b; b=.001, p<.05), albeit negligibly small – it would take 1,000 additional reviews to increase the evaluation of trust by one unit on the 1-7 Likert scale. Additionally, this significant effect vanishes when also controlling for the interaction(s) between rating and number of reviews (Model 4c). In conclusion, the controls barely have any influence on coefficients – neither in terms of magnitude nor significance.

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[48] Measured on 11-point Likert scales

DV: Trust in Complementor; OLS regressions

	Model 1.1 (Case 1)	Model 1.2 (Case 1)	Model 2.1 (Case 2)	Model 2.2 (Case 2)	Model 3.1 (Case 3)	Model 3.2 (Case 3)	Model 4.1 (Case 4)	Model 4.2 (Case 4)	Model 4.3 (Case 4)
Constant	0.350 ** (0.038)	0.376 *** (0.037)	-0.004 (0.075)	0.081 (0.062)	0.016 (0.082)	0.021 (0.071)	0.259 * (0.116)	0.290 ** (0.099)	-0.010 (0.057)
On-site Rating			0.128 *** (0.021)	0.106 *** (0.017)			-0.029 (0.032)	-0.017 (0.027)	0.050 *** (0.012)
Imported Rating					0.116 *** (0.023)	0.116 *** (0.020)	-0.006 (0.033)	-0.005 (0.028)	0.076 *** (0.012)
On-site × Imported (Rating)							0.024 ** (0.009)	0.017 * (0.008)	
Disposition to Trust		0.018 (0.014)		0.005 (0.009)		0.039 ** (0.012)		0.029 *** (0.005)	
Risk-Affinity		0.043 * (0.017)		0.028 ** (0.009)		0.023 * (0.010)		0.031 *** (0.005)	
Trust in Airbnb		0.001 (0.017)		0.021 * (0.010)		0.013 (0.012)		0.014 * (0.006)	
Online Shopping Experience		-0.004 (0.029)		0.058 ** (0.017)		-0.032 (0.020)		-0.007 (0.009)	
Age		-0.0004 (0.004)		-0.004 * (0.002)		0.001 (0.002)		0.002 (0.001)	
Participant Female		-0.013 (0.081)		-0.049 (0.044)		0.062 (0.052)		-0.023 (0.025)	
# Reviews (ons.)				-0.0003 (0.001)				0.001 (0.0004)	
# Reviews (imp.)						0.001 (0.001)		-0.001 (0.0004)	
Observations	24	24	81	81	83	81•	305	300•	305
R²	-	0.476	0.317	0.625	0.246	0.534	0.189	0.472	0.170
Adjusted R²	-	0.292	0.308	0.583	0.237	0.482	0.181	0.451	0.165
Res. Std. Error	0.184 (df = 23)	0.155 (df = 17)	0.244 (df = 79)	0.189 (df = 72)	0.257 (df = 81)	0.214 (df = 72)	0.255 (df = 301)	0.209 (df = 288)	0.258 (df = 302)
F Statistic		2.579 (df = 6; 17)	36.646*** (df = 1; 79)	14.988*** (df = 8; 72)	26.471*** (df = 1; 81)	10.309*** (df = 8; 72)	23.389*** (df = 3; 301)	23.364*** (df = 11; 288)	30.978*** (df = 2; 302)

*** $p<.001$; ** $p<.01$; * $p<.05$; standard errors in parentheses

•) Age information missing for some participants; observations excluded from analysis

TABLE 14: EXTENSION BY (MEAN-CENTERED) CONTROL VARIABLES

DV: **Trust in Complementor; OLS regressions**

	Model 2a (Case 2)	Model 2b (Case 2)	Model 2c (Case 2)	Model 3a (Case 3)	Model 3b (Case 3)	Model 3c (Case 3)	Model 4a (Case 4)	Model 4b (Case 4)	Model 4c (Case 4)
Constant	-0.004 (0.075)	0.002 (0.078)	0.050 (0.095)	0.016 (0.082)	0.010 (0.085)	-0.044 (0.109)	0.259 * (0.116)	0.217 (0.119)	0.214 (0.129)
On-site Rating	0.128 ** (.012)	0.128 *** (0.021)	0.114 *** (0.027)				-0.029 (0.032)	-0.022 (0.032)	-0.024 (0.035)
Imported Rating				0.116 *** (0.023)	0.116 *** (0.023)	0.131 *** (0.030)	-0.006 (0.033)	0.001 (0.033)	0.003 (0.035)
On-site × Imported (Rating)							0.024 ** (0.009)	0.022 * (0.009)	0.022 * (0.009)
#Reviews (ons.)		-0.0003 (0.001)	-0.002 (0.003)					0.001 * (0.001)	0.001 (0.001)
Rating × #Reviews (on-site)			0.001 (0.001)						0.0001 (0.0004)
#Reviews (imp.)					0.0003 (0.001)	0.002 (0.003)		-0.0004 (0.0005)	0.00002 (0.001)
Rating × #Reviews (imported)						-0.001 (0.001)			-0.0001 (0.0004)
Observations	81	81	81	83	83	83	305	305	305
R^2	0.317	0.318	0.324	0.246	0.247	0.253	0.189	0.204	0.204
Adjusted R^2	0.308	0.300	0.298	0.237	0.228	0.224	0.181	0.191	0.186
Res. Std. Error	0.244 (df = 79)	0.245 (df = 78)	0.246 (df = 77)	0.257 (df = 81)	0.258 (df = 80)	0.259 (df = 79)	0.255 (df = 301)	0.254 (df = 299)	0.255 (df = 297)
F Statistic	36.646*** (df = 1; 79)	18.152*** (df = 2; 78)	12.323*** (df = 3; 77)	26.471*** (df = 1; 81)	13.136*** (df = 2; 80)	8.910*** (df = 3; 79)	23.389*** (df = 3; 301)	15.329*** (df = 5; 299)	10.896*** (df = 7; 297)

*** $p<.001$; ** $p<.01$; * $p<.05$; standard errors in parentheses

TABLE 15: INTERACTION OF RATING SCORE AND NUMBER OF REVIEWS

Gender effects—We first analyzed mean trust values (on a scale of 0 to 1) to check for a general tendency towards differences in the assigned value of trust scores among all possible host/guest combinations. Table 16 shows these mean values for all tested combinations of male/female hosts (i.e., profile pages) as well as male/female guests (i.e., survey participants). As we can see, evaluations of trust are generally higher for female hosts than they are for males and, further, the combination female guest/participant and male host exhibits the lowest overall trust average.

Case	Observations	Trust Score
Male host, male guest	122	.393
Male host, female guest	131	.379
Female host, male guest	97	.431
Female host, female guest	143	.436
All combinations	**493**	**.410**

TABLE 16: NUMBER OF OBSERVATIONS AND AVERAGE TRUST SCORES[49]

To better understand these results, we introduced binary dummy variables for *Female Host* and *Female Guest* (i.e., participant) to check if above "effects" can be validated statistically. As we see in Table 17, a female host has a positive (albeit small) impact on participants' evaluations of trust (Model 1) – irrespective of the prospective guest's gender. However, the effect itself – as any of the investigated gender control variables – is not statistically significant. Similarly, female guests do not exhibit a significantly different evaluation of trust in hosts (Models 2/3; also, when controlling for host gender. Further, we checked the interaction term for the combination female hosts/ female guests (Model 4). As expected, this validates our results on the trust scores as reported in Table 16, however, the gender effects have no significant impact on our model. As a final check, we also controlled for the influence of the same gender on trust (i.e., a female guest evaluating a female host or vice versa with males; Model 5). Again, the effect is negligible in size and not significant (b=.015, p=.55). Table 17 summarizes the results, and we conclude that there is no systematic gender bias in our data.

DV: **Trust in Complementor; OLS regressions**

	Model (1) (all cases)	Model (2) (all cases)	Model (3) (all cases)	Model (4) (all cases)	Model (5) (all cases)
Constant	0.386 ***	0.410 ***	0.389 ***	0.393 ***	0.401 ***
	(0.018)	(0.019)	(0.022)	(0.025)	(0.019)
Female Host	0.048		0.048	0.037	
	(0.025)		(0.025)	(0.038)	
Female Guest		-0.001	-0.005	-0.014	
		(0.026)	(0.026)	(0.035)	
Interaction				0.019	
				(0.051)	
Same Gender					0.015
					(0.025)
Observations	493	493	493	493	493
Adjusted R²	0.005	-0.002	0.003	0.002	-0.001

*** p<.001; ** p<.01; * p<.05; standard errors in parentheses

TABLE 17: EFFECTS OF GENDER (HOST/PARTICIPANT) ON ASSIGNED TRUST SCORES

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[49] Per host/guest combination

Last, we also checked for the effect of host names and profile pictures on assigned trust scores. Figure 23 reports the mean assigned trust values (incl. their standard deviation) per either host name or blurred profile image as previously introduced in "**Chapter 4: Stimulus material**" in this Appendix. The analysis indicates the tendency that, on average, some female host names (e.g., Emma, Laura) exhibit higher trust scores than some of their male counterparts (e.g., Philipp, Paul, Michael). Similarly, blurred profile images with a female contour exhibit higher trust scores than male blurred profile pictures. However, neither of the observed effects is statistically significant at the 5%-level (p=.068 for names; p=.406 for images).
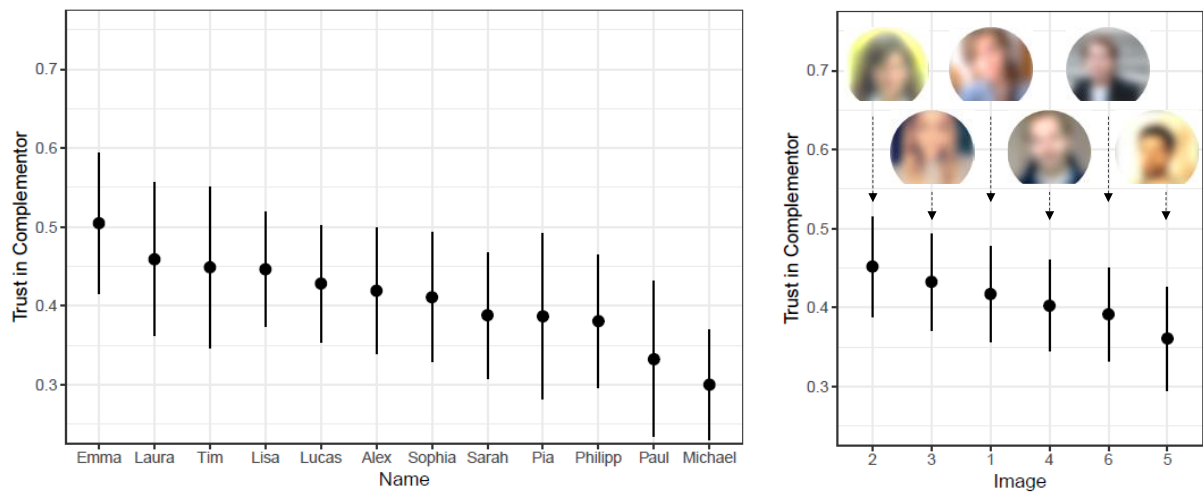

FIGURE 23: MEAN TRUST SCORES PER HOST NAME AND PROFILE IMAGE

Supplementary Material Part III

Chapter 6: Interview Guide

Opening the interview: The interviewer introduced themself to the interviewees and thanked them for their participation. Then, background information of the research and definitions of all terms and jargons used in the interview guide were clearly explained to the interviewees before the interview. Interviewees were asked if they had any questions with regard to the previously shared material prior to the interview. Interviewees were further briefed regarding their informed consent.

Opening questions:

Benefits

1. In your opinion, what are the general benefits for users and/or platforms if complementors are able to port their reputation between platforms? [ALL]

Mechanisms

2. Considering different mechanisms of porting reputation (e.g., direct import between platforms, 3rd party providers like PIMS), which of these concepts promises to be most successful? Why do you think so? [ALL]

3. Do you consider other mechanisms – besides those mentioned – as suitable to enable seamless portability of online reputation across services/contexts? [OP, IN]

Main part: In the following, we will focus on <u>direct import functions</u> for reputation.

Design

4. In general, what do you think is important when designing a direct import/export functionality for portable reputation between platforms? [ALL]

5. If external reputation could be "imported" onto a platform, what type of information should be portable in the first place? Why? *(star ratings, text reviews, both)* [ALL]

6. Considering the import of ratings (e.g., a 1 to 5-star rating, a 1-100% rating, or 1 to 10 points), how should these be displayed on the target platform? [ALL]

    i. Should these ratings' value(s) be converted into the standard on the target platform (e.g., into a star rating)?

    ii. Should these ratings be integrated into the on-site/target ratings or displayed distinctively from the on-site rating as an additional information?

    iii. If displayed distinctively, should they be retained in their original value?

    iv. Is there another way we have not discussed that these ratings should be displayed?

7. How frequently, if it all, should these ratings be updated? That is, should it be a one-time option to pull the data from the source platform or should this be designed in a way that the ratings will be continuously updated? At what frequency? *(weekly, monthly, continuously)* [OP, COMP]

8. In your opinion, should platforms (enabling the import of reputational data) define themselves from which platforms their users are allowed to import the data? Why? Why not? [OP, COMP]

9. Similarly, if complementors are allowed to import reputation how much "choice" shall they be given on the data to be pulled? That is, should they have the chance to pick the ratings they would like to import from a particular platform, or should this be designed as "all-or-nothing"? Why? [OP, COMP]

10. How feasible do you think is a "standardized" format for reputational data that is easy to handle between platforms? In your opinion, what may such a standard look like? [OP, COMP, IN]

11. What is your opinion on the role of "fit" between platforms (i.e., porting ratings between Uber and Lyft seems like a more natural fit than porting ratings between Uber and Airbnb or eBay)? Also, the gig economy faces these (cross-sector) challenges while on e-commerce platforms, users' experience with "selling stuff" is more homogenous [OP, COMP, CONS]

12. How do you think platform operators could be encouraged to offer an import/export function for reputational data? [OP, COMP, IN]

13. Similarly, how could users be incentivized to use such a feature to import reputational data from another platform? [ALL]

Policy & Regulation

14. The General Data Protection Regulation (GDPR) mandates data to be portable between data controllers (i.e., subjects). Do you think this regulation should extend to reputational data as well? That is, should general reputation portability under GDPR Art. 20 be enforced by GDPR? [COMP, CONS, IN]

15. Do you see other implications with regard to the GDPR and its applicability to reputation portability – in particular for direct import functionality – under Art. 20? [IN]

16. Do you have any other suggestions with regard to policy making and regulation for reputation portability? [COMP, IN]

Risks & Challenges

17. Do you think porting reputation could raise the risk of post hoc manipulation of data or is there another way in which such a system of rating import could be "played" or misused? If so, how? How could that be avoided? [ALL]

18. Do you see a risk that very specific/niche platforms and their communities will lose their (unique) identity with imported ratings? [ALL]

19. When thinking, for instance, of the Chinese Social Credit System, what is your opinion on the trade-off between the right of self-determination and (online) data privacy on one side and the risk of "transparent" citizens on the other side (i.e., ratings obligatory showing up everywhere)? [ALL]

20. Do you see a potential conflict of interest between different stakeholder groups (i.e., operators, complementors, consumers) with regard to reputation portability? [ALL]

Closing Questions:

21. Besides portability between platforms/services, what other types of transfer of online reputation to other contexts, for instance in the offline world, could you envision? [ALL]

22. In your opinion, why is reputation portability rarely observed in today's practice? [ALL]

23. Are there any other design considerations that need to be taken into account? [ALL]

Chapter 6: Sample

Stakeholder group	ID	Background	Gender
Platform operators (OP)	OP1	CEO at a leading European temporary job platform	Male
	OP2	Former Country Head and Operations Manager at Uber	Male
	OP3	Senior researcher and trust scientist at leading sharing platforms	Male
Platform consumers (CONS)	CONS1	Frequent platform user; Marketing Manager at an online store	Female
	CONS2	Frequent platform user; CEO & Co-Founder at a car management startup	Male
Platform complementors (COMP)	COMP1	Host on Airbnb (accommodation sharing)	Male
	COMP2	Senior UX Designer on Fiverr (freelance services)	Male
Indirect stakeholders (IN)	IN1	Project Director for data economy at a think tank; Economist	Female
	IN2	Professor of Information Systems Management; Trust expert	Female
	IN3	Director of a European Data Protection Foundation; Lawyer	Male

TABLE 18: BACKGROUND OF INTERVIEW PARTICIPANTS

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