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RESEARCH PAPER

When 'Just' is Just Not Enough

Why Consumers Do Not Appreciate Non-Neutral Internet Access Services

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Abstract Although Internet service providers (ISPs) are technically capable as well as legally allowed to offer non-neutral Internet access services, where the data flows of customers who pay a premium are prioritized over others, such an access service is currently not offered by ISPs. We argue that ISPs are hesitant to tap the price discrimination potential of prioritized Internet access services, because in the context of the ongoing public debate on net neutrality (NN), their customers would consider such differentiation unjust. In a representative survey among German Internet access customers, we find that the customers' perceptions of justice as well as the framing of the mechanism by which prioritized Internet access is provided are indeed decisive for whether customers would prefer this access regime over NN. In particular, we find that perceptions of distributive and procedural justice influence customers' choice for non-neutral Internet access. Moreover, customers are more likely to accept a regime that offers an absolute rather than a relative prioritization of data flows.

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1 Introduction

Net neutrality (NN) is a long-standing principle of the Internet, which prescribes that all traffic flows through the network, independent of their source, destination or content, are to be treated equally (Wu 2003). In particular, pay-for-priority data transmissions, where customers can choose to pay extra in order to have their traffic flows prioritized over the remaining data flows, are in violation of the NN principle. Although there is a growing body of literature on the possible effects of abolishing the NN principle (see Krämer et al. 2013 for a review), there still is no consensus on whether NN should be enforced by law. In any case, to date literature and policymakers have only scrutinized non-neutral arrangements at the B2B level, i.e., between content providers and Internet service providers (ISPs). In contrast, in this paper we focus on the B2C relationship between ISPs and their customers and ask whether customers would appreciate it if their ISP replaced the neutral Internet access service with a non-neutral Internet access service.[1] Under a non-neutral Internet access regime, customers would have to decide whether they opt for the priority service (at some extra charge), which would then prioritize their traffic flows over those of

[1] On February 26, 2015, the United States regulatory body ruled in favor of net neutrality by reclassifying broadband access as a telecommunications service. However, the new regulatory regime is concerned with the relationship between Internet service providers and content providers (B2B) and therefore makes it even more likely that ISPs now shift their focus on non-neutral Internet access to consumers (B2C).

the remaining customers, or whether to stay with the de-prioritized best-effort service (possibly at some reduced charge). In this context, it is important to highlight that, given a fixed network capacity, prioritizing the traffic of some customers will have an unavoidable negative effect on the expected congestion level of the remaining customers (Choi and Kim 2010; Krämer et al. 2013). Therefore, some customers may consider a non-neutral Internet access service as 'unjust'.

The focus of this paper is to explore whether customers perceptions of justice are indeed a main impediment for the introduction of non-neutral Internet access services. Although non-neutral services are commonplace in other domains, including expedited postal services, fast lanes in amusement parks, or toll lanes on roads, no ISP currently offers a non-neutral Internet access service for residential customers.[2] Clearly, prioritizing the data transmission of some users is a violation of the NN principle, but to date worldwide no legislation exists that would prohibit an ISP to offer non-neutral Internet access regime to users. In reverse, non-neutral Internet access was theoretically shown to "significantly boost the profits of the service provider" (Bandyopadhyay and Cheng 2006, p. 47), and generally price discrimination practices for broadband data services are well explored in the literature (see Sen et al. 2013 for a comprehensive overview). Moreover, the prioritization of traffic flows is technically feasible and could be implemented at relatively low costs, as the currently deployed routers already provide the capability to prioritize certain data packets (Dischinger et al. 2010). Thus, there are no evident economic, technical or legal obstacles to offering a non-neutral Internet access for consumers.

The contribution of this paper is threefold: First, we explain differences in Internet access customers' choice between neutral and non-neutral Internet access based on differences in their perceptions of justice. To this end, we conceptualize different notions of justice in the context of Internet access services and develop suitable instruments to measure them. Second, we analyze differences in the choice between neutral and non-neutral Internet access depending on how the prioritization mechanism is presented. In particular, we compare the results when non-neutral Internet access is framed as a relative priority mechanism (in which prioritization is achieved by expediting certain traffic flows over others), rather as a dedicated priority mechanism (in which prioritization is achieved by reserving a portion of the available transmission capacity for the priority service). Third, based on stated preferences of customers' willingness to pay (WTP), we provide a first exploration of whether non-neutral Internet access may present a viable business case for ISPs.

Based on a survey among 977 representative German Internet access customers, our results indicate that customers' perceptions of justice in the specific context of Internet access services are important determinants for the appreciation of non-neutral Internet access. Moreover, the acceptance of non-neutral Internet access depends crucially on the framing of the mechanism by which prioritization is provided. We discuss how these insights can support ISPs in communicating prospective non-neutral Internet access offerings. However, even based on stated preferences and an optimistic calculation, our data also indicates that offering non-neutral Internet access will hardly become a business success. This may explain the ISPs' reluctance to offer such access for residential customers.

The remainder of this paper is organized as follows: The next section provides the theoretical background and develops our research hypotheses. Then, we describe the research method and survey design. Thereafter, the data analysis and results are presented. Finally, we conclude with a discussion and managerial implications of our results.

2 Theoretical Background and Research Model

Our research model (see Fig. 1) centers on the assumption that a customer's appreciation of a non-neutral Internet access service is (beyond control variables) significantly influenced by the individual perception of justice in Internet access and how prioritization is achieved, i.e., by the priority mechanism. This is motivated and described in more detail in Sects. 2.1 and 2.2, respectively. The set of control variables that we consider is described in Sect. 2.3.

2.1 Impact of Justice on the Choice of Non-Neutral Internet Access

The perception of justice is often the reason for a powerful opposition (Alexander and Ruderman 1987; Kaufmann and Stern 1988; Samaha et al. 2011). Previous research has acknowledged that the success of (electronic) services depends, among others, on users' perceptions of justice and trust (Patterson et al. 1997; Turel et al. 2008; Martin-Ruiz and Rondán-Cataluña 2008; Messerschmidt and Hinz 2013; Gefen et al. 2008; Mattila 2001; Mayser and von Wangenheim 2013). Note that our study does not rely on the concept of trust, because we explicitly abstract from a direct trustee (i.e., a specific ISP) in an effort to identify the general underlying drivers for the success of prioritized Internet access. This approach helps us to eliminate the

[2] Note that non-neutral Internet access is not to be confused with the data rate of an Internet access. The data rate [measured in megabit per second (Mbps)] states the maximum rate at which data packets can be sent through the network without congestion. When the network is congested, however, delays occur independent of the data rate.

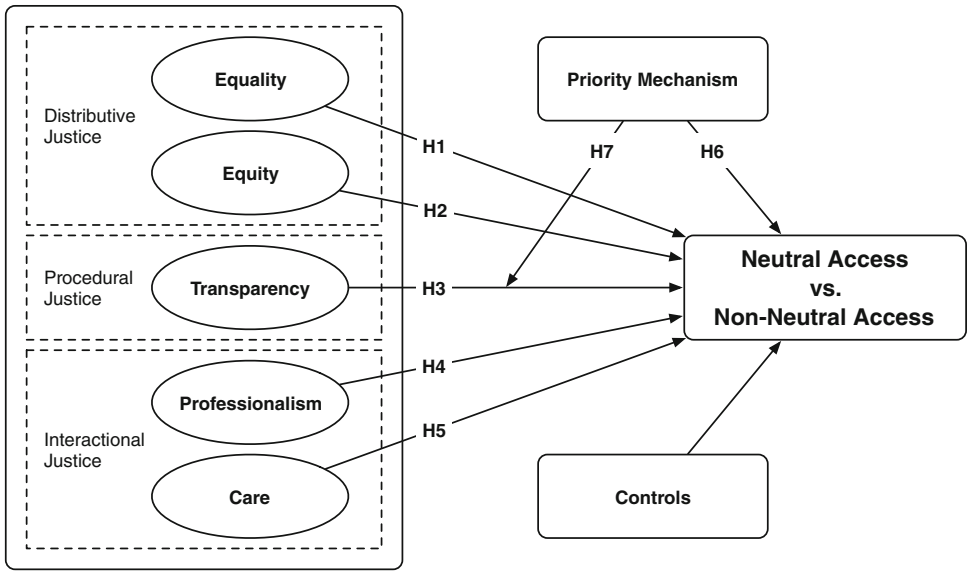

Fig. 1 Research model and research hypotheses. Latent variables are denoted by *ovals*, whereas observed variables are denoted by *rectangles*

individual influence of ISP-customer relationships at the time of the survey.[3] Moreover, Turel et al. (2008), who analyze users' acceptance of e-services, conclude that trust merely mediates the relationship between justice and choice.

Service fairness can be defined as "a customer's perception of the degree of justice in a service firm's behavior" (Seiders and Berry 1998, p. 9). However, "although subtle differences in the concepts of fairness and justice are recognized, in common usage the terms are interchangeable: a fair decision is a just decision." (Seiders and Berry 1998, p.10). Therefore we follow justice theory (Cohen-Charash and Spector 2001), which provides a rich and evolved framework to assess service provider - customer relationships. According to justice theory, we differentiate between distributive justice (Adams 1965; Deutsch 1985), procedural justice (Homans 1961; Thibaut and Walker 1975; Folger and Greenberg 1985; Lind and Tyler 1988), and interactional justice (Bies and Moag 1986; Bies 2001).

Each of the justice dimensions is described in turn and research hypotheses are developed accordingly.

2.1.1 *Distributive justice*

Distributive justice is evaluated with respect to the fairness of the outcome of allocations (Adams 1965). It is based on the assessment of one's own outcome relative to the outcome of others, rather than on an assessment of the absolute outcome with respect to some expectation or standard (Patterson et al. 1997). Distributive justice has the principles of equity and equality as its main foundation (Kabanoff 1991; Cook and Hegtvedt 1983). The equity principle suggests that the allocation received should be based on the individual contribution (Cropanzano et al. 2007). In other words, following the equity principle, the transmission quality or priority a user receives should be based on his payment for the Internet access service. Those users that are willing to pay more are thus rightly entitled to receive a better Internet service. By contrast, the equality principle suggests that everyone should receive the same allocation, independent of the individual contribution (Deutsch 2010). Those two opposing concepts exemplify the discussion about Internet access as a 'public utility', a service that in the view of some consumers should be equally available to all members of the society. Opponents argue that Internet access is a private business and therefore equal treatment not the suitable concept in contrast to discussions about, e.g., access to water. It is therefore evident that these two principles are at the core of the NN debate, because the transition from a neutral to a non-neutral Internet access regime can be considered as a transition from an equality-driven network regime to an equity-driven network regime. Thus, users who approve of the equity principle, or disapprove of the equality principle, should favor a non-neutral regime over NN. Mayser and von Wangenheim (2013) survey equality and equity as two opposing forces of the same underlying principle. However, our construct validation (c.f. Sect. 4.1) procedure revealed that in the present context both principles are two distinct constructs and sufficiently distinct from each other to incorporate them as two separate measures in our study. Thus, we hypothesize with respect to equity: **Hypothesis 1**

[3] Nevertheless, in order to control for a potential halo-effect of current satisfaction with the ISP or the lack thereof, we incorporated control measures in our survey (see Sect. 2.3).

(H1): Equity (distributive justice) has a positive effect on the choice of non-neutral over neutral Internet access.

Accordingly, we hypothesize the opposite effect with respect to equality: **Hypothesis 2** (H2): Equality (distributive justice) has a negative effect on the choice of non-neutral over neutral Internet access.

2.1.2 Procedural justice

Procedural justice relates to whether the procedure or mechanism that determines the outcome is perceived as just (Folger and Greenberg 1985). Procedural justice was, for example, previously found to be relevant in the context of information privacy concerns (Culnan and Armstrong 1999), consumers' responses to service failures (Goodwin and Ross 1992) and, most related to the present context, the allocation of IS resources (Joshi 1989). With respect to non-neutral Internet access, procedural justice refers to the level of transparency that the ISP provides to its users with respect to how certain data packets are prioritized and the delivered quality of the Internet connection (Faulhaber 2010; Sluijs et al. 2011; Krämer et al. 2013). For users that have a strong desire for transparency, it is important that they understand how priority is provided, that they have detailed information about the priority mechanism itself, and that information about connection parameters is verifiable. If distributive justice is not experienced in a transaction but customers perceive high procedural justice, they will believe the unfavorable outcome was merely a mistake and will assume distributive justice is not permanently violated (Greenberg 1990). In reverse, if a user showing a strong desire for procedural justice is provided with transparency about the priority mechanism (i.e., relevant and verifiable information are provided), then he should have less objections against non-neutral Internet access. Consequently, we conjecture: **Hypothesis 3** (H3): Transparency (procedural justice) has a positive effect on the choice of non-neutral over neutral Internet access.

2.1.3 Interactional justice

Interactional justice, finally, relates to the interpersonal treatment individuals receive from service providers (Bies and Moag 1986). It was found, among others, to be an important determinant of consumer complaint behavior (Blodgett et al. 1997) and purchase decisions (Bies and Shapiro 1987). Interactional justice is particularly relevant to the present context, because it has been found to increase the acceptance of outcomes that are unfavorable for oneself (Leung et al. 2004). In a non-neutral Internet access regime, the prioritization of the data transmissions of some users will inevitably lead to a de-prioritization of the remaining best-effort traffic, given some fixed network capacity. Furthermore, being a priority or non-priority customer can lead to assumptions about the general service level that customers receive from their ISP. That potential positive or negative halo-effect from the label or advertised quality of the access product could be influenced by the importance of interpersonal justice. In the presence of interactional justice, a transition from a neutral to a non-neutral access regime may still be acceptable if the ISP is considered to act professionally, treats the (non-prioritized) customers with respect and handles their concerns and complaints sensitively (Blodgett et al. 1997; Greenberg 1993). More specifically, interactional justice can be subdivided into two distinct factors, known as informational justice and interpersonal justice (Turel et al. 2008).

First, *informational justice* relates to the degree to which people feel that processes and outcomes are explained to them and are reasonably justified. In a service context customers desire timely information about why changes in products, processes and the technical systems occur and how these changes affect them. In our context, we capture the importance of informational justice in the context of Internet access services by the importance consumers attach to the fact that ISP's interaction is reliable, professional and honest. In the following, we refer to this as 'professionalism'. The introduction of non-neutral Internet access leads to price discrimination based on differentiated quality (i.e., priority and best effort). In that respect professionalism works as "[…] a buffer that helps decrease negative attributions when price discrepancies occur" (Xia et al. 2004, p 9). In other words, when an ISP acts 'professionally', this should consequently reassure consumers with a favorable perception of priority products and increase the acceptance of negative outcomes of prioritization on others and/or oneself (Leung et al. 2004). Consequently, we hypothesize: **Hypothesis 4** (H4): Professionalism (informational justice) has a positive effect on the choice of non-neutral over neutral Internet access.

Second, *interpersonal justice* is related to the importance that a user attributes to the empathy of the ISP and the impression to be understood as a service customer. Thus, we will refer to this as 'care' in the following. The importance of care should reassure priority customers in their perception that the ISP cares more about valuable priority customers compared to NN. On the other hand, customers who wish to be handled with care by the service provider are more prone to consider non-neutral Internet access based on differentiated quality (i.e., priority and best-effort) as unfair, because "they are likely to perceive it as exploitation and are more likely to punish the seller" (Xia et al. 2004, p 9).

In summary, due to the ambiguous nature of interpersonal justice we therefore hypothesize that care has a positive or negative effect on the choice of non-neutral

Internet access: **Hypothesis 5** (H5): Care (interpersonal justice) has a positive or negative effect on the choice of non-neutral over neutral Internet access.

2.2 Impact of the Priority Mechanism on the Choice of Non-Neutral Internet Access

Our research model assumes that Internet customers' appreciation of non-neutral Internet access may depend on the specific priority mechanism by which prioritized Internet access is provided. In our survey, we therefore analyze whether the way of framing prioritization has an impact on the choice of non-neutral Internet access. There are two fundamental priority mechanisms to be considered for this framing. The first is a *relative* priority mechanism that grants users in the priority class an advantage by sending their data packages ahead of any concurrent data packages from the best-effort service class. In an analogy to a congested highway, a relative priority mechanism is comparable to giving some (prioritized) cars the right to bypass the remaining (non-prioritized) cars. This priority mechanism has its technical counterpart in the DiffServ architecture (RFC 2474-2575). Such a mechanism is also considered in a number of theoretical papers on the NN debate (e.g., Bandyopadhyay and Cheng 2006; Cheng et al. 2011; Choi and Kim 2010; Krämer and Wiewiorra 2012; Reggiani and Valletti 2012). The second mechanism considered is a *dedicated* priority mechanism. In contrast to the relative priority mechanism, it reserves a portion of the available transmission capacity exclusively for priority data packets. This priority mechanism, which corresponds to the IntServ architecture (RFC 2210-2212), can be compared to an express lane on a highway that is reserved exclusively for prioritized cars. Some theoretical papers in the context of the NN consider such a dedicated priority mechanism (e.g., Economides and Tag 2012; Njoroge et al. 2014). We assess users' choice between neutral and non-neutral Internet access independently for each priority mechanism. This allows us to identify whether there are differences in choice between the two mechanisms and if so, what drives these differences.

It has been argued that the perception of justice in queues may be more important than the actual amount of delay experienced (Larson 1987). A queuing mechanism is perceived as unjust if the established first come-first serve (FCFS) principle is violated, which is clearly the case when priority customers under relative priority skip a queue (Larson 1987; Rothkopf and Rech 1987). Alexander et al. (2012) draw similar conclusions in the context of priority passes for customers. They find that "queue-skipping" by priority customers is perceived as unjust and unpleasant by best-effort customers: "I hate seeing queue-skippers, it annoys me that I have to wait in queues of up to 90 min and rich people can just skip to the front" (Alexander et al. 2012, p. 4). One could argue that both priority mechanisms violate the FCFS principle in general, however, only relative priority mechanisms violate the FCFS principle on the level of the individual queue as well. Under a dedicated priority mechanism, the FCFS principle holds for each queue individually, but not when comparing arrivals between priority and best-effort queues. Furthermore, the possibility of queue skipping reduces the perceived predictability of service quality for best-effort customers. In turn, a relative priority mechanism is perceived as less predictable, because the order of service delivery in the best-effort class can change if a priority customer arrives (Rafaeli et al. 2002). Moreover, customers typically compare themselves with "similar others" (Xia et al. 2004) and dedicated priority should reduce the perceived similarity of service between the two customer classes due to explicit resource separation. Finally, consumers are more familiar with a dedicated priority mechanism (e.g., express lanes) than with a relative priority mechanism. Therefore, we hypothesize that if prioritization is framed in the context of a dedicated priority mechanism, it is generally evaluated more positively than under the framing of a relative priority mechanism: **Hypothesis 6** (H6): If non-neutral Internet access is provided by a dedicated priority mechanism (and not by a relative priority mechanism), it is more likely to be chosen over neutral Internet access.

Moreover, there is reason to believe that differences in the evaluation of a relative and a dedicated priority mechanism may particularly arise with respect to procedural justice. In general, a mechanism can only be perceived as procedurally just if it is consistent over individuals and time (Lind et al. 1990). Evidently, this is fulfilled by both priority mechanisms considered here, and from this point of view, we should not expect any differences. However, procedural justice is more likely to be established when the respective mechanism is in accordance with an accepted norm (Turel et al. 2008). In this context, a dedicated priority mechanism could be considered as more transparent by users, who are, as argued above, likely to be accustomed to such a procedure from other aspects of their lives.

Moreover, Larson observes that customers usually feel better if they are provided with more information, which allows them to form accurate expectations about the quality of service (Larson 1987 p.900). Therefore, following a similar line of argument as with Hypothesis 6, a positive effect of transparency should be higher if priority is provided by a more predictable (i.e., dedicated) quality mechanism with a higher level of perceived control (Rafaeli et al. 2002). Similarly, the perceived value of

priority depends on the approximated gain by priority in relation to best-effort service (Alexander et al. 2012). Therefore, if transparency has a positive effect on the choice of non-neutral Internet access, a dedicated priority mechanism should strengthen that relationship due to the indirect effect of predictability on the approximated gain of priority. Thus, we hypothesize: **Hypothesis 7** (H7): If transparency (procedural justice) has a positive effect on the choice of non-neutral Internet access, it is stronger if non-neutral Internet access is provided by a dedicated priority mechanism rather than by a relative priority mechanism.

2.3 Controls

Whether a customer chooses non-neutral over neutral Internet access is also potentially influenced by a number of socio-economic factors and personal Internet usage characteristics. In order to rule out that any of the above hypotheses is in fact driven by a spurious correlation, we must therefore control for a number of possible drivers of user's Internet access preferences in our research model, although they are not in the focus of our analysis.

Next to classical socio-economic controls (household size, age, sex), we also consider techno-economic controls that describe the customer's current Internet service (bandwidth, expenditures) and the customers' satisfaction with this service (satisfaction with connection and ISP). Furthermore, we consider a set of personal Internet usage characteristics such as the time spent online, whether the use is predominantly for business or private, and the usage intensity of congestion sensitive Internet services (e.g., voice-over-IP or video streaming) and congestion insensitive Internet services (e.g., e-mail or social networking).[4] Clearly, customers that use more congestion sensitive services are more likely to have experienced network congestion and may therefore be more liable to embrace the advantages of a prioritized data transmission.

Finally, we also consider educational and psychological factors that may influence the choice of non-neutral Internet access. In particular, we consider customers' technical knowledge about the Internet and computers and their 'convenience' in choosing Internet access. Convenience has been identified as a driver for tariff choice in the marketing literature (cf. Lambrecht and Skiera, 2006) and refers to a status quo bias that induces customers to stay with the default service that they are familiar with, because they are afraid of the complexity of choosing a new type of service.

[4] Details of the elicitation of these controls are provided in Sect. 3.2.

3 Research Method

In the following, we detail the development of the instruments used in our survey, the structure of the survey as well as how the survey was conducted.

3.1 Instrument Development

Instruments were developed for the five justice constructs (equality, equity, transparency, professionalism, and care) as well as for the controls 'knowledge' and 'convenience'. The development of instruments was based on procedures described in Churchill (1979), Moore and Benbasat (1991) and DeVellis (2011). First, the extant literature was reviewed to identify validated questions for the latent constructs or to generate new questions for which no validated constructs existed. With respect to the justice constructs, Colquitt (2001) validates constructs for procedural, distributive and interactional justice in an organizational context. Although these constructs were not directly applicable in the present context, because they consider justice in a workplace environment, they were used as a general reference point in the process of generating suitable justice constructs in the context of Internet access. For interactional justice a pre-existing construct with five question items on the relationship between customers and an ISP was adapted from Chiou (2004). Textual inspection revealed that the construct contains both, items that are related to professionalism, as well as items that are related to care as described above. For allocative justice (equity and equality) and interactional justice (transparency) new constructs were developed with the guidance of Bolton et al. (2003), Martín-Ruiz and Rondán-Cataluña (2008), Wagstaff (1994) and Xia et al. (2004) as well as Faulhaber (2010), respectively. The knowledge construct was adapted from Wei et al. (2011) and the convenience construct was adapted from Lambrecht and Skiera (2006). All questions were anchored on five-point interval scales. Conceptual validity and content validity was assessed in discussions with eight information systems faculty members. Based on the obtained feedback, changes were made to some questions and some questions items were dropped altogether. The revised question items were pilot-tested with 112 students. Using Cronbach's alpha (Cronbach 1951) and factor analyses (Hinkin 1998), the validity and stability of these constructs was generally supported. Table A.1 in the appendix (available online via http://link.springer.com) summarizes the constructs and question items that were used in the final survey.

3.2 Survey Structure

The complete survey is available in Appendix C and includes three main parts. In the first part, the respondents'

current Internet usage behavior was assessed. In particular, in order to assess the demand for congestion sensitive and insensitive services, respondents had to indicate their usage intensity with respect to six different service types. These were selected from a representative list of services provided by Sandvine (2010). Three of these services (Internet telephony, online gaming, and real-time entertainment) are considered sensitive to network congestion. The other three services (e-mail, social networking, and file sharing) are considered rather congestion insensitive. Each service type was anchored on a five-point interval scale ranging from 'never used' to 'regularly used'. Only the summated scores of the three congestion sensitive and the three congestion insensitive services, respectively, enter the subsequent analysis.

In the second part, the respondents' choice of non-neutral Internet access was assessed. To this end, the effect of the dedicated and relative priority mechanism on data transmission as well as the effect of 'neutral' data transmission was explained and visualized by means of an analogy to a congested highway. Thereby, the effect of prioritization and non-prioritization was displayed to be exactly the same under the dedicated and relative priority mechanism, respectively, in order to avoid a systematic bias. Moreover, all three Internet access regimes were introduced in a neutral language (e.g., the term 'neutrality' was carefully avoided). For each of the three feasible pairwise comparisons of the regimes (relative priority vs. NN, dedicated priority vs. NN, and relative priority vs. dedicated priority), participants were asked which regimes they would prefer (binary choice).

In addition, after each comparison that involved the NN regime, an open-ended question design (Miller et al. 2011) was employed in order to elicit respondents' WTP for non-neutral Internet access. Particularly, we asked respondents (1) by how much their WTP for the Internet access would *increase* (compared to a neutral Internet access) if their Internet access service was prioritized according to the respective priority mechanism; and accordingly, (2) by how much their WTP would *decrease* if their Internet access would be de-prioritized, as in the best-effort service under a non-neutral Internet access. In order to be able to compare the WTP between the respondents, a price reference point of 20 EUR for the neutral Internet access was provided. This is important as customers evaluate prices relative to such price reference points (Bolton et al. 2003). At the time of the survey, this price reference corresponded to the lowest available offer for a standard Internet access service in Germany.

In the third part of the survey, respondents were confronted with the question items that measure the justice constructs. Moreover, demographic information (sex, age, household size) was acquired.

3.3 Data Collection

The data were collected through a web-based survey that was implemented in the open-source software "LimeSurvey" and was hosted on a university computer system. The survey was distributed to a panel of German Internet access customers in June 2011 with the help of a professional market research institute. We requested a representative sample of people in charge of the Internet access purchase decision in their household. Participants were selected by the panel provider according to their demographics in order to achieve a representative sample of that group of people in Germany. A total of 1035 users completed the survey. The obtained observations were subjected to scrutiny for data reliability. Responses of those respondents were removed, who revealed that they did not respond truthfully, who provided conflicting answers (e.g., reported an intransitive order in their ranking of the regimes: relative priority, dedicated priority, neutrality), or who showed inconsistent answers (e.g., reported the maximum value on all question items). This yielded 977 usable observations for the evaluation process. In the final sample, 49.9 % of the respondents were female and 30.4 % were 18–29, 28.3 % 30–39 and 41.4 % 40–49 years old. Educational degrees obtained were: secondary school level 19.9 %, high school diploma 39.3 %, job training 13.7 % and college 22.8 %. On average 2.41 people (median = 2, SD = 1.19) lived in the respective household. The average expenditures for communication (TV, Internet, telephone, mobile) of the respondents' households was 59.25€ (median = 55€, SD = 28.85).

4 Data Analysis and Results

Next, we present the analysis and results of our survey. To this end, we first demonstrate the discriminant and convergent validity of our instruments, then we provide statistical tests for our research hypotheses, and finally we offer an assessment of consumers' willingness-to-pay for non-neutral Internet access.

4.1 Discriminant and Convergent Validity

The perceptual questions used to measure the constructs regarding justice, knowledge and convenience were assessed for discriminant and convergent validity (Campbell and Fiske 1959). None of the correlations between the constructs exceeds the threshold of 0.8 suggested by Bagozzi et al. (1991) (see Table B.1). For discriminant validity, an exploratory principal factor analysis with

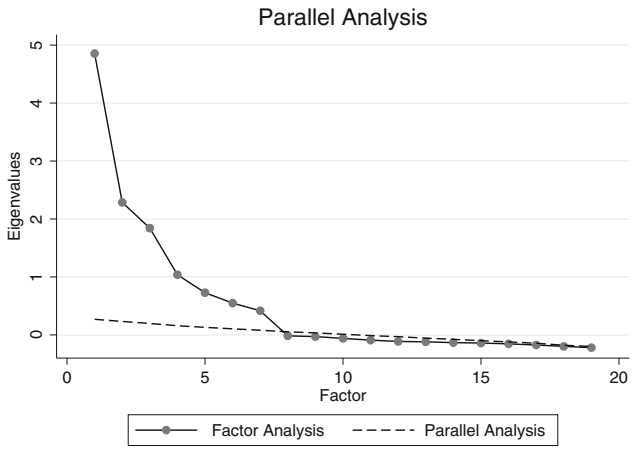

Fig. 2 Factor analysis (*scree-plot*) and parallel analysis

promax rotation method was conducted[5] and Horn's parallel analysis (Horn 1965) was performed[6] to extract the factors. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy is "meritorious" with 0.82, which confirms that the data is suitable for factor analysis (Kaiser 1974). The scree-plot (see Fig. 2) also confirms that the correct number of factors has been extracted. The extracted factors correspond to the constructs (see Tables 1, 2 and A.1). Convergent validity, i.e., the degree to which the question items measuring the same construct agree, was assessed using Cronbach's alpha (Nunnally 1967). All constructs exceed the threshold of 0.70 suggested by Peterson (1994) (see Table 1). We also report the measures for composite reliability and the average variance extracted (AVE). To check for discriminant validity, we report the maximum shared variance (MSV) and average shared variance (ASV) (Fornell and Larcker 1981). As a result, the constructs used in this study appear to have adequate discriminant and convergent validity.

4.2 Test of Hypotheses

On average, the respondents preferred non-neutral Internet access with a relative priority mechanism to neutral Internet access in 32 % of the cases (SD = 0.47) and non-neutral Internet access with a dedicated priority mechanism to neutral Internet access in 43 % of the cases (SD = 0.5). Moreover, respondents preferred non-neutral Internet access with a relative priority mechanism to non-neutral Internet access with a dedicated priority mechanism in 39 % of the cases (SD = 0.49). This suggests that respondents generally show a stronger appreciation for neutral than for non-neutral Internet access and prefer a dedicated to a relative priority mechanism. To investigate these differences further, we tested our research hypotheses, which predict several causal relationships that may explain the observed differences in the respondents' choices. The hypotheses were all tested by means of a logit regression model [see Wei et al. (2011) for a similar approach], which allows us to predict the likelihood of choosing a non-neutral over a neutral Internet access while controlling for perceptions of justice (H1–H5) and other controls. In order to test the impact of the priority mechanism (H6), a dummy variable that indicates the relative priority mechanism (denoted as 'rel. priority') as well as interaction effects between each justice construct and this dummy variable (in order to test H7) were included in the regression. For ease of interpretation, we also provide the odds ratios of the estimates for the logit regression (see Table 3).

First, distributive justice (equality and equity) is indeed found to have a significant effect on the choice of a non-neutral access regime. Those users who appeal to the concept of equality in the context of Internet access are less likely to prefer non-neutral Internet access over neutral Internet access, whereas those users that favor equity are more likely to prefer non-neutral Internet access. This supports hypotheses H1 and H2.

Second, procedural justice (transparency) is found to have a determinate positive effect on the choice of non-neutral Internet access. This supports H3.

Third, interactional justice (professionalism and care) is not found to have a significant influence on the choice of non-neutral Internet access. Thus, hypotheses H4 and H5 are not supported by the data.

In line with hypothesis H6, we find that the odds of preferring non-neutral Internet access to neutral Internet access are generally 1.8 times higher for a dedicated priority mechanism than for a relative priority mechanism. Also, notice that the positive effect of transparency on the choice of non-neutral Internet access is significantly lessened for the relative priority mechanism, which is in support of hypothesis H7. None of the other interaction effects between a justice construct and the priority mechanism is significant.

We can also observe that some of the controls are significant, as expected. For example, we find that those respondents that use more congestion sensitive services are more likely to choose a non-neutral Internet access mode. At the same time, note that the demand for congestion insensitive services is not a relevant driver for the choice of non-neutral Internet access. Furthermore, observe that

[5] Since we cannot assume that the different dimensions of justice are orthogonal to each other, Hendrickson and White (1964) suggest choosing the promax oblique rotation method, which then leads to more accurate results.

[6] Parallel analysis is widely accepted to be one of the most accurate factor extraction methods (Hayton et al. 2004). In particular, it outperforms the Guttmann-Kaiser eigenvalue greater than one rule (Glorfeld 1995).

Table 1 Construct evaluation (confirmatory factor analysis)

Construct	Cronbach's α (≥0.7)	Composite reliability (≥0.7)	AVE (≥0.5)	MSV (AVE > MSV)	ASV (AVE > ASV)
Equality	0.89	0.89	0.73	0.27	0.13
Equity	0.77	0.78	0.63	0.27	0.08
Transparency	0.83	0.84	0.57	0.28	0.13
Professionalism	0.85	0.86	0.66	0.40	0.14
Care	0.79	0.80	0.66	0.40	0.12
Knowledge	0.86	0.86	0.68	0.01	0.004
Convenience	0.84	0.84	0.73	0.20	0.09

Model fit: Chi square/df = 2.454; RMSEA = 0.039; CFI = 0.979; NFI = 0.965; TLI(NNFI) = 0.972; IFI = 0.979

AVE average variance extracted, *MSV* maximum shared variance, *ASV* average shared variance, *RMSEA* root mean square error of approximation, *CFI* comparative fit index, *NFI* normed fit index, *TLI* Tucker-Lewis index (*NNFI* non-normed fit index), *IFI* incremental fit index

Table 2 Rotated factor loadings (Exploratory factor analysis)

Item	Factor						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Equality 1	0.00	**0.85**	−0.05	0.04	−0.03	−0.03	0.02
Equality 2	0.04	**0.72**	0.08	−0.06	0.08	0.00	−0.01
Equality 3	−0.02	**0.88**	0.00	0.00	−0.01	−0.02	−0.02
Equity 1	0.02	−0.09	−0.00	0.04	−0.01	**0.70**	−0.04
Equity 2	−0.01	−0.00	0.01	−0.05	−0.01	**0.71**	0.03
Transparency 1	**0.76**	0.00	0.04	−0.03	0.00	−0.01	0.01
Transparency 2	**0.68**	0.08	−0.09	0.11	−0.05	0.06	0.06
Transparency 3	**0.76**	−0.01	0.10	−0.03	0.00	−0.04	−0.00
Transparency 4	**0.70**	−0.04	−0.02	−0.01	0.05	0.00	−0.06
Professionalism 1	0.04	−0.02	**0.73**	0.12	−0.04	−0.03	0.01
Professionalism 2	0.01	0.01	**0.85**	−0.10	0.01	−0.00	0.02
Professionalism 3	−0.01	0.02	**0.71**	0.11	0.02	0.05	−0.03
Care 1	0.03	−0.02	0.11	**0.69**	0.04	−0.01	−0.01
Care 2	0.03	0.02	0.05	**0.70**	−0.02	−0.00	0.01
Knowledge 1	0.05	−0.01	−0.00	0.00	−0.04	−0.01	**0.79**
Knowledge 2	−0.05	0.01	0.01	0.03	0.04	−0.01	**0.80**
Knowledge 3	0.00	−0.01	−0.00	−0.02	0.00	0.02	**0.80**
Convenience 1	0.03	0.03	0.01	−0.03	**0.79**	−0.01	0.04
Convenience 2	−0.01	0.00	−0.03	0.04	**0.79**	−0.01	−0.03
Eigenvalue	4.85	2.29	1.84	1.04	0.73	0.55	0.42

respondents who spend more on communications services, as well as young, male respondents seem to be less skeptical towards a non-neutral Internet access regime.

4.3 Willingness to Pay for Non-Neutral Internet Access

Along the lines of our research model, the previous analysis was concerned with explaining the choice of non-neutral Internet access. In this section, we want to shed some light on the question whether it may be profitable for ISPs to introduce non-neutral Internet access to their customer base. To this end, we analyze the data on respondents' WTP for non-neutral Internet access, as described in Sect. 3.2.

In particular, we derive the demand schedules and subsequently the optimal prices for the best-effort and priority class under non-neutral Internet access for two different scenarios. Each scenario can be viewed as

Table 3 Logit regression on the likelihood of the choice of non-neutral Internet access

Dependent variable	Choice of non-neutral Internet access	
	Log odds	Odds ratio
Priority mechanism		
Rel. priority (0 = ded., 1 = rel.)	−0.566***	0.568****
Justice		
Equality	−0.253*	0.776*
Equity	0.502***	1.653***
Transparency	0.270*	1.310*
Professionalism	0.036	1.037
Care	−0.022	0.978
Equality × rel. priority	−0.087	0.917
Equity × rel. priority	0.073	1.076
Transparency × rel. priority	−0.249*	0.780*
Professionalism × rel. priority	−0.034	0.967
Care × rel. priority	0.180	1.197
Controls		
Sensitive services	0.335***	1.398***
Insensitive services	0.153	1.165
Convenience	−0.178	0.837
Knowledge	0.022	1.022
Satisfaction ISP	0.046	1.047
Satisfaction connection	−0.034	0.967
Bandwidth	0.013	1.013
Online time	−0.004	0.996
Household size	0.060	1.062
Business use	0.038	1.039
Expenditures	0.006**	1.006***
Age	0.024**	1.024**
Male	−0.292*	0.747*
Constant	−2.593***	0.075***
Observations	1954	1954
(Nagelkerke) R^2	0.20	0.20
Respondents	977	977
Log likelihood	−1135.72	−1135.72
Chi^2/F	207.24	207.24

Robust standard errors clustered by respondent were used

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

yardstick marking the most favorable and most unfavorable extreme, and thus they may be useful in determining the feasible range of outcomes.

4.3.1 'Best-effort first'-scenario

In this scenario, we assume that all respondents with the highest WTP for the best-effort class under non-neutral Internet access would also select the best-effort class if confronted with a non-neutral Internet access service. In this way, we determine the aggregated demand schedule for the best-effort class and determine the revenue-maximizing best-effort price first. Afterwards we construct the aggregated demand schedule for the priority class, ignoring those customers that had a WTP for the best-effort class that equals or exceeds the revenue maximizing best-effort price. Based on this residual demand schedule for the priority class, we calculate the revenue-maximizing price for the priority class. For this scenario, we can then calculate the profit under non-neutral Internet access with a relative and dedicated priority mechanism, respectively, and compare it to the benchmark scenario with neutral Internet access.

4.3.2 'Priority first'-Scenario

In this scenario, we derive the demand schedules for the priority and best-effort class under non-neutral Internet access in the opposite order as in the best-effort first scenario. That is, we first derive the priority demand and revenue-maximizing price by ranking respondents according to their WTP for the priority class.

Based on the 'priority first'-scenario assumptions, the ISP would charge 9.9€ extra for priority under dedicated quality provision and 4.9€ extra for priority under relative quality provision. Those prices would maximize the ISP's revenues from priority premiums. As a result of these priority access prices, the ISP can expect that 29.79 % of the participants would be willing to buy priority access under dedicated quality provision and 49.03 % of the participants under relative quality provision. Based on the residual demand for best effort, the revenue maximizing price for best-effort service would be 9.9€ under relative and dedicated quality provision. As a result, 27.23 % of the participants would buy best-effort access under dedicated quality provision and 18.53 % under relative quality provision.

The total revenue under non-neutral access with dedicated quality provision would be 56.84 % of the neutral benchmark case and 68.80 % under non-neutral access with relative quality provision.

An overview of the results of the 'priority first' and 'best effort first' –scenario can be found in Table 4. As can readily be seen, even the 'priority first' scenario, which is calculated using the most optimistic assumptions, does not establish a revenue gain for the ISP. Both scenarios suggest that a monopolistic ISP has no incentives to deviate from the status quo of neutral Internet access.

The elicited WTP-tuples (WTP for best-effort class, WTP for priority class) can also be used to shed some light on whether respondents regard Internet access rather as a public or rather as an ordinary market good. To this end, it is useful to distinguish between the *premium WTP*, that

Table 4 Scenario comparison

	'Priority first'-scenario			'Best-effort first'-scenario		
	Price	Customers	Revenue	Price	Customers	Revenue
Relative						
Priority	24.90€	479	11927.10€	24.90€	179	4457.10€
Best-effort	9.90€	181	1791.90€	9.90€	481	4761.90€
Total	–	660	13719.00€	–	660	9219.00€
Dedicated						
Priority	29.90€	291	8700.90€	25.00€	218	5450.00€
Best-effort	9.90€	221	2187.90€	9.90€	453	4484.70€
Total	–	512	10888.80€	–	671	9934.70€
NN						
Benchmark	20.00€	977	19540.00€	20.00€	977	19540.00€

customers are willing to pay extra (in comparison to neutral Internet access, referenced at 20€) for the priority service under non-neutral Internet access, and the *compensation willingness to accept (WTA)*, i.e., the amount that customers must be compensated by (in comparison to neutral Internet access) in order to accept the deteriorated service in the best-effort class under non-neutral Internet access. The ratio between a customer's compensation WTA and premium WTP can be interpreted in a specific way. More precisely, Horowitz and McConnell (2002) survey and analyze 50 studies in which respondents similarly report their premium WTP (e.g., of a good when the quality raises from q to $q + \Delta$), and the compensation WTA (e.g. of the same good when the quality falls from q to $q - \Delta$). They find with respect to the WTA/WTP-ratio that "on average, the less the good is like an 'ordinary market good,' the higher is the ratio. The ratio is highest for public and non-market goods, next highest for ordinary private goods, and lowest for experiments involving forms of money" (Horowitz and McConnell 2002, p. 427). They find the mean-ratio of public or non-market goods in studies is 10.41, whereas the mean-ratio of ordinary private goods in studies is 2.92.

We report the ratios of our study in Table 5 and conclude that the magnitude of the ratio corresponds to other ordinary private goods. Therefore, even if profitability of non-neutral Internet access cannot be supported by our data, we cannot conclude from that result that participants perceive Internet access as 'public-utility'. The discrepancies in our WTA/WTP data are comparable to other studies using, e.g., sports tickets, chocolate, coffee mugs or other ordinary private goods. However, they are not anywhere near the levels of studies analyzing public or non-market goods.

Table 5 Compensation WTA/premium WTP ratio

	Relative priority mechanism	Dedicated priority mechanism
$\frac{Mean\ WTA}{Mean\ WTP}$	2.79	2.24
$\frac{Median\ WTA}{Median\ WTP}$	2.59	2.30

5 Discussion, Implications and Conclusions

Finally, we will discuss the theoretical and practical implications of our research findings and conclude with limitations and prospects for future research.

5.1 Theoretical Contribution and Implications

Our empirical study indicates that Internet users' perceptions of justice are an important determinant for the choice of non-neutral vs. neutral Internet access services. To this end, we were able to conceptualize relevant notions of distributive, procedural and interactional justice in this context. We document that these newly developed constructs are valid and can help to understand consumers' preferences for Internet access services. This conceptualization may also assist other researchers in their investigation of the success of other non-neutral service offerings. Furthermore, we find that the evaluation of distributive and procedural justice has determinate, but distinctive effects on Internet users' appreciation of non-neutral Internet access. However, we do not find evidence that aspects of interactional justice influence the choice of non-neutral Internet access.

Distributive justice is a key concept in explaining Internet users' appreciation of non-neutral Internet access. The users that favor a 'neutral' network over a tiered network are the ones who agree strongly to the principle of equality, i.e., that everyone should receive the same resources, or the ones who oppose the principle of equity,

which grants more resources to those who are willing to pay more. Whether one is a proponent or an opponent of NN does not necessarily have economic, technocratic or demographic roots, but can rather be traced back to a more fundamental perception about justice with respect to the distribution of an important resource.

Likewise, procedural justice, which was exemplified in our context by the concept of transparency, is found to have a definite positive impact on the appreciation of non-neutral Internet access. In this context, it is important to note that we also find that the appreciation of non-neutral Internet access is influenced by the mechanism by which priority is provided. In particular, under a dedicated priority mechanism, as opposed to a relative priority mechanism, Internet access customers are more likely to prefer non-neutral over neutral Internet access; and this effect is even more emphasized for those respondents that consider procedural justice (transparency) important. This indicates that a dedicated priority mechanism is a more salient means of prioritization, which therefore appeals more in terms of procedural justice and is hence more likely to be accepted. It is important to highlight that this finding cannot be attributed to an actually realized advantage of one priority mechanism over the other. When demonstrating the effect of prioritization (or non-prioritization) to respondents in our survey, we assured that the effect under both mechanisms was identical (see Figure C.3 in the appendix).

5.2 Managerial Implications

The results of this study bear several important managerial implications. Despite the well-known efficiency gains of product differentiation for both customers and providers, the majority of the respondents in our survey preferred NN to non-neutral Internet access. Furthermore, given the significant impact of justice perceptions on customers' choice of non-neutral Internet access, it is evident that in order for a non-neutral Internet access system to be successful from a business perspective, it is necessary to convince users that the system is indeed fair and just. Our results identify three measures that lend themselves to achieve this:

First, beside other technical constraints, ISPs should employ a dedicated priority mechanism rather than a relative priority mechanism when offering non-neutral Internet access. Offering customers a 'virtual circuit' instead of a 'speed up' could boost current customers' acceptance of non-neutral Internet access.

Second, ISPs should communicate clearly to their customers how and why they prioritize data. Moreover, they should provide their customers with tools that enable them to verify this information. This could be done, for example, in analogy to the nutrition information provided on food products (Faulhaber 2010). In this vein, ISPs can achieve transparency, which was found to have an unambiguously positive effect on the acceptance of a non-neutral Internet access. Transparency was also proposed as a regulatory remedy when deviating from NN, both by the Federal Communications Commission (FCC) as well as by the European Commission (Krämer et al. 2013). Our results should lead ISPs to realize that the provision of transparency may not just be an obligation, but may also be utilized as a means to catalyze consumers' appreciation of a non-neutral Internet access.

Third, at the same time ISPs should avoid addressing notions of distributive justice in their advertisements and communications to customers. Although the users that prefer the principle of equity were found to have a greater appreciation for non-neutral Internet access, the opposite was found for users that prefer the equality principle. Thus, addressing distributive justice when promoting non-neutral Internet offerings is a double-edged sword that is likely to be destructive. In any case, consumers' perceptions of distributive justice were found to be moderated by their invariant personality traits (Colquitt et al. 2006) and are thus unlikely to be changed through commercial communication.

However, even provided ISPs follow these measures, the stated WTP of the Internet access customers in our survey for non-neutral Internet access reveal a negative business case for the introduction of non-neutral Internet access for ISPs, even under very optimistic assumptions.

But we also find that, on average, customers consider Internet access as a standard market good, and not as a public good. This can be interpreted to the end that our results are not driven by the fact that Internet access customers object to any market-driven modification in general.

5.3 Limitations and Future Research

Although our study has provided some interesting first insights into customers' appreciation of non-neutral Internet access, it also has some limitations. First, it is based on stated rather than revealed preferences and we did not provide our participants with a real-life performance experience. However, given the fact that no major ISP has yet introduced a non-neutral access service, it is evident that currently data on revealed preferences cannot be acquired. Furthermore, our hypothetical scenarios allowed us to compare the perception of different prioritization mechanisms. Thus, at the time, our methodological approach seems appropriate to generate preliminary estimates on this issue.

Second, for reasons of complexity we have contrasted NN only with a two-tiered Internet access regime. As our

data indicates, a deviation from the status quo may elicit a rather strong response by some consumers. This can possibly be avoided if a three-tiered system is introduced, whereby the intermediate tier is to mimic the former NN service class.

Third, other studies with respect to price discrimination have concluded that the perception of unfairness may wear off over time, as customers get used to these procedures (Kimes 2002; Huang et al. 2005). Similarly, Wirtz and Kimes (2007) find out that familiarity plays a major role in the profitability of revenue management practices. Therefore, the assessment of the profitability of non-neutral Internet access might be different after customers have got used to this pricing practice. These effects may therefore work in favor of the introduction of non-neutral Internet access in the long run.

Fourth, we have not considered a possible demand expansion effect that might occur due to the decrease in prices for basic, non-prioritized Internet access. As our study was targeted at current Internet users, we cannot measure this effect on Internet access service uptake. To this end, it would be necessary to target current non-users, e.g., through a pen and paper based questionnaire.

Finally, our study does not rely on any cross-cultural comparisons of the effect of justice and fairness. Mayser and Wangenheim (2012) address the cultural differences between the USA and Germany in the perception of preferential treatment and find that U.S. customers perceive preferential treatment as less unfair, whereas German customers react more positively when preferred. It would be interesting to see whether such cultural differences prevail also for the perception of justice with respect to non-neutral Internet access.

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