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Selective openness, fairness and the motivation to contribute to open innovation communities

Cord Gruenewald
Hamburg University of Technology
Institut for Technology and Innovation Management
gruenewald@tu-harburg.de

Abstract

Collaborating with innovation communities outside the firm boundaries and to balance value creation and value capture in such collaborative work is a delicate, demanding task for firms. In this context ? for example - firms can choose ?selective openness approaches?, which will allow them to combine openness for collaborating with external voluntary participants and closeness for retaining control and avenues for value appropriation. Knowledge on this, obviously complex approach, is still scarce. The aim of this paper is to gain a deeper understanding of how the configuration of openness affects community members? motivation, perception of fairness, and participation behavior.

We use survey data from the field of open source software and augment it by community profile data (N=253). Our findings show that there is a differential impact of openness on participants? contribution behavior, depending on whether they are use or profit-motivated. Use-motivated participants are critical for a community as they are vital for a creating a supportive environment. Furthermore, we uncover that perceived fairness has a stronger effect on motivation than the degree of openness itself.

We conclude that semi-openness is a viable strategy for commercial firms to collaborate with external innovation community while retaining mechanisms for value capture. Our key findings are that participants do not necessarily demand ?full? openness, but rather expect ?fair? openness. The degree of openness will affect the self-selection of

differently motivated participants into the community, their participation behavior, and the value a sponsor can extract from it.

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Abstract

Collaborating with innovation communities outside the firm boundaries and to balance value creation and value capture in such collaborative work is a delicate, demanding task for firms. In this context – for example - firms can choose "selective openness approaches", which will allow them to combine openness for collaborating with external voluntary participants and closeness for retaining control and avenues for value appropriation. Knowledge on this, obviously complex approach, is still scarce. The aim of this paper is to gain a deeper understanding of how the configuration of openness affects community members' motivation, perception of fairness, and participation behavior.

We develop a research model that measures openness along three distinct dimensions. We analyze the effects of openness on "use"- and "profit"-motivated participants and assess how perceived fairness mediates this relationship. Finally, we measure how different motivations affect the participation behavior in the community.

We use survey data from the field of open source software and augment it by community profile data (N=253). Our findings show that there is a differential impact of openness on participants' contribution behavior, depending on whether they are use or profit-motivated. Use-motivated participants are critical for a community as they are vital for a creating a supportive environment. Furthermore, we uncover that perceived fairness has a stronger effect on motivation than the degree of openness itself.

We conclude that semi-openness is a viable strategy for commercial firms to collaborate with external innovation community while retaining mechanisms for value capture. Our key findings are that participants do not necessarily demand "full" openness, but rather expect "fair" openness. The degree of openness will affect the self-selection of differently motivated participants into the community, their participation behavior, and the value a sponsor can extract from it.

1. Introduction

The phenomenon of for-profit companies freely revealing innovation-related information to the public has challenged the common wisdom that companies need to protect their innovation in order to profit from it (Teece, 1986). Open source software is just one example for the private-collective model of innovation in which individuals' private investments lead to the creation of a public good (von Hippel and von Krogh, 2003). Not surprisingly, this phenomenon did not start within the traditional corporate realms, but rather as a movement of technologists, hackers, and hobbyists outside corporate boundaries striving for the "freedom of information" (Stallmann, 1992).

However, since the first release of the Mozilla Firefox source code to the public domain in 1998, an increasing number of commercial firms have started to use the private-collective model of innovation (Henkel, 2004). Healy and Schussman (2003) observe that most of the successful open source software projects are backed by commercial sponsors. When for-profit companies engage in open source communities, they often do not completely "open up", but rather use hybrid forms or selective forms of openness to keep open avenues for value appropriation and control (West, 2003; Bonaccorsi et al., 2006; Henkel and Baldwin, 2011). Hence, openness needs to be understood as a gradual rather than a dichotomous concept (Henkel, 2006; Balka et al., 2010).

For companies, deploying openness is a delicate task, as they need to carefully manage the trade-off of "control vs. grow" for their community as well as the trade-off of "appropriation vs. adoption" for their products (Dahlander and Magnusson, 2005; West and O'Mahony, 2008). Scholars find that openness is positively associated with community participation (Balka et al., 2011; von Krogh et al., 2009), but the mechanisms underlying this relationship are yet insufficiently understood. Especially the role of perceived fairness of the community governance seems to play hereby a pivotal role and needs further investigation (Shah, 2006; Faullant et al., 2011). In addition, von Krogh and von Hippel (2006) conclude that, even though there is a vast body of literature on the motivation to contribute to open innovation communities, the effects of project context on motivation requires further research.

In this paper we study the following questions:

– How does the degree of openness affect different community members' motivation to contribute?

- How does the perceived fairness of community governance influence participants' motivation to contribute?

- How does their motivation affect different forms of participation?

To answer these questions, we conduct a survey (N=253) among participants of sponsored and non-sponsored open source communities. We combined this survey data with information from their profile pages detailing and validating their participation behavior.

We find that (i) the degree of openness affects community members differently depending on the nature of their motivation to participate; (ii) the nature of their motivation to contribute impacts on different kinds of participation behavior; (iii) perceived fairness of the community governance has an even stronger impact on motivation than the degree of openness per se.

With our research, we contribute to the literature on collaborative innovation of commercial firms and external volunteers. Our findings show that selective openness is a viable strategy for commercial firms to create value jointly with external volunteers while at the same time retaining avenues for value capture. To create a sustainable relationship, commercial firms need to meet their community's expectations in terms of openness and fairness. Selective openness entails self-selection of differently motivated participants and different contribution patterns.

2. Theoretical background

Openness and firm rationales

A number of different definitions of openness have been used in the literature (Dahlander and Gann, 2010; Raasch et al., 2011). Von Hippel (2010) and von Krogh (2011) argue that openness has two distinct dimensions: an open innovation process dimension and an open innovation product dimension, both of are of a gradual nature. The process dimension describes the permeability of firm boundaries that allows the inflow and outflow of innovation-related information and knowledge. The product dimension deals with the creation of information commons and that the outcome becomes a public good (von Hippel and von Krogh, 2003).

Opening the innovation process enables the firm to access innovation communities as external resources (Dahlander and Wallin, 2006). Accessing external firms' addressable resources, allows firms to offer a broader range of products and be faster to market, with lower fixed costs and thus lower risk (Sanchez, 2004; Dahlander and Magnusson, 2005; West and Gallagher, 2006; Henkel, 2006). In addition, online communities often consist of users who have valuable need knowledge and product knowledge, which enable them to improve the product and create new, better ones (Jeppesen, 2005; von Hippel, 2007).

Opening up the innovation product lowers the barriers for others to incorporate it and offer complementary products and services (Harhoff et al., 2003). If more complements are available, the solution becomes more attractive and more widely adopted, which attracts even more complementors (Andrea Bonaccorsi, 2003; Casadesus-Masanell and Ghemawat, 2006; Brydon and Vinning, 2008). Opening up innovation products can therefore increase the overall value of a product service system (Feller et al., 2008a; Henkel and Baldwin, 2011; West and Gallagher, 2006).

Challenges of openness for firms

These benefits notwithstanding, openness has inherent drawbacks for profit-oriented firms that they need to mitigate (Stuermer et al., 2009). When revealing innovation-related knowledge, firms weaken their appropriability regime and diminish opportunities to profit from their innovation (Teece, 1986). Community participants have an interest in protecting their intellectual property from being appropriated by others – which makes it harder for companies to generate returns from the community output (O'Mahony, 2003). In addition, public goods are non-rivalrous and non-excludable, and, consequently, they are also available to competitors (Henkel, 2004; 2006; von Hippel and von Krogh, 2003). Companies therefore need to find different ways to appropriate returns from open innovation products (Dahlander, 2005). Finally, community are governed by low levels of hierarchical control and incentives (Demil and Lecocq 2006), which make it difficult for firms to control the development trajectory (Dahlander and Wallin, 2006; Stuermer et al., 2009).

The use of selective openness

To balance the benefits and risks of openness, companies use selective openness (Bonaccorsi et al., 2006; Stam, 2009; Balka et al., 2011). Firms make a conscious decision about the degree of openness (Henkel, 2006; Henkel and Baldwin, 2011).

We model selective openness using three dimensions: The first two dimensions describe the gradual openness of the innovation *process*, the third relates to openness of the *product*: The degree of "transparency" captures the provision of information about the product and about decision-making in the community. "Accessibility" describes the possibilities to participate in product development and community governance (West and O'Mahony, 2008; Balka et al., 2011). Openness in terms of "intellectual property rights" describes to what extent the product is freely revealed and what usage rights are associated with it (West, 2003; West and O'Mahony, 2008).

Motivation and expectation of the community

Shah (2006) highlights the importance of fairness to build a sustainable relationship between a sponsor and the community. The way in which decision making and property rights are structured by the sponsor – the degree of openness – directly affects the community's perception of fairness and thus their participation behavior. It is important for corporate sponsors that the community perceives their behavior as fair (Franck and Jungwirth, 2003).

Füller et al. (2008) and Ebner et al. (2009) find that the willingness to participate in and contribute to open innovation communities are a function of individual differences rather than attributes of the community or its sponsor. Under this premise, it is important to understand what motivates individuals to participate in open innovation communities. Following Baldwin and von Hippel (2011), one can distinguish between user and producer innovation. While under the classical producer innovation paradigm, individuals or companies innovate in order to extract profits from their innovation, users tend to innovate in order to generate own use value from it.

3. Research model

In the following we develop two research models to test our hypotheses. The first model analyzes the effect of selective openness on the motivation to participate and

the effect of motivation on participation behavior. In the second model we analyze how fairness mediates the relationship between selective openness and the motivation to contribute.

3.1 Research model 1

In research model 1, we develop five sets of hypotheses to analyze the effect of selective openness on motivation to participate and the consequences of motivation on participation behavior (see Figure 1). We hypothesize that all three dimensions of perceived openness increase use-motivation and profit-motivation. Furthermore, we hypothesize that use-motivation has a positive effect on participants' contribution activity and supportiveness in assisting other members. Profit-motivation is hypothesized to positively affect participants' activity level, but to reduce their supportiveness towards others.
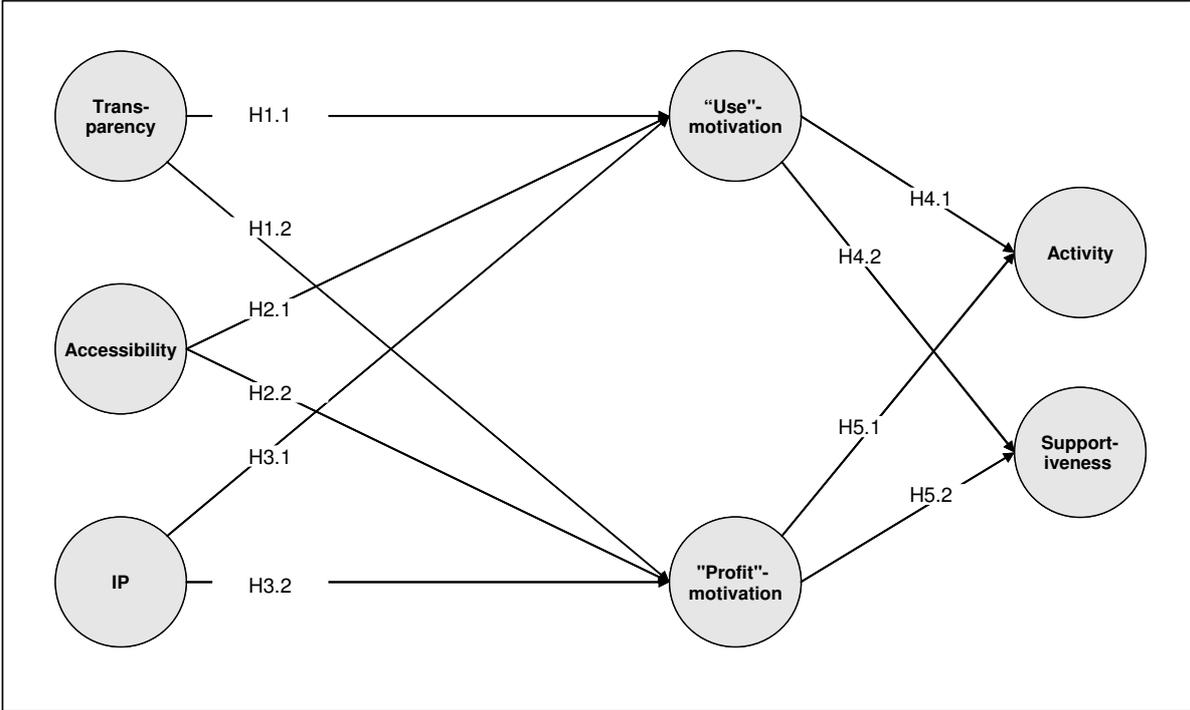
Figure 1: Research model 1

Transparency

Transparency describes to what extent information about the product, the production, and the governance of the community are made available to the community (West

and O'Mahony, 2008). Even though firms decide to reveal product knowledge, they still closely monitor this process and often restrict or delay revealing specific information (Penin, 2007). Henkel (2006) notes that, although an open source license requires the disclosure of product information, firms still might delay revealing information, only reveal binaries or only reveal information upon request, thereby limiting the availability of information. A second aspect of transparency is the availability of information about decision making within a community. In a transparent community, participants are able to observe and understand how decision are made (West and O'Mahony, 2008).

Being transparent and revealing knowledge enables community participants to understand how the product functions and how they can adjust and enhance it for their own needs (Lerner and Tirole, 2002). As transparency directly affects the ability to participate, it also affects the motivation to do so. In turn, "a loss of transparency may lead to decreased community identification and lower motivation" (Lattemann and Stieglitz, 2005; p.8). Transparency is vital for reducing information asymmetries, and thereby for building trust within the community and between the community and its sponsor. Trust is an important element with which communities coordinate work and increase community identification (Osterloh and Rota, 2007).

Transparency is important for use-motivated participants, as it affects their ability to modify the product for their own needs and increases their identification with the community. For profit-motivated participants, the reduction of information asymmetries is also important as it ensures long-term planning.

We therefore hypothesize that:

H1.1: Transparency, as perceived by the participant, will increase use-motivation.

H1.2: Transparency, as perceived by the participant, will increase profit-motivation.

Accessibility

The accessibility dimension describes to what degree the community offers possibilities to participate in the product development and take part in the

community's decision-making and governance processes (West and O'Mahony, 2008). Dahlander and Magnusson (2008) note that not all code contributions by the community are directly included in the official release, and that, before including a contribution, firm employees oftentimes evaluate and test the code on their own. Participants find it most frustrating if the sponsor controls the code commitment too heavily, as they feel that their contributions and effort might be wasted and not be sufficiently valued (Shah, 2006). For community members in sponsored communities, recognition by the firm is even more valuable than the recognition by peers (Jeppesen and Frederiksen, 2006) and they are disappointed when their contributions are not recognized by the company (Janzik et al., 2011).

The same is true for decision making within the community. When the community governance becomes more "democratic," meaning community participants have more possibilities to participate, the community becomes more open and inclusive (Markus, 2007). Agerfalk and Fitzgerald (2008) find that a sponsor needs to be very open about the overall goal that is to be achieved and should rather accept broader roadmaps that include participants' inputs, as opposed to trying to dominate the process. Otherwise, community participants may drop out if they cannot see how their own needs will be addressed in the future. Allowing the community to influence decisions in the community will also lead to higher identification (Fiol and O'Connor, 2005). It is important for contributors – especially use-motivated contributors – to feel that their voice is heard (Shah, 2006). Profit-motivated participants want to be able to ensure that the community roadmap is aligned with their own business agenda.

For these reasons, we propose that:

H2.1: Accessibility, as perceived by the participant, will increase use-motivation.

H2.2: Accessibility, as perceived by the participant, will increase profit-motivation.

Intellectual property rights

The intellectual property dimension describes to what degree the whole product is revealed to the public and what usage rights are associated with the opened up product (West and O'Mahony, 2008). On the one end of this dimension, companies

would freely reveal "all existing and potential intellectual property rights…without any imposition of any direct payments" (Harhoff et al., 2003, p.1753f). However, companies do not necessarily reveal all of the modules to the community, but may keep parts proprietary or secret – West (2003) calls this an "open parts" strategy. Henkel and Baldwin (2011) propose a model of IP modularity that distinguishes between modules that are freely available to others for collaboration and modules that are governed by protective IP rights to appropriate value. Bonaccorsi et al. (2006), as well as Stam (2009) describe this as the bundling of open source products with proprietary modules.

If only parts of the product are open, individual contributors lose their autonomy in picking the areas of interest on their own (O´Mahony and Bechky, 2008). The feeling of autonomy is important to crowd in intrinsic motivation (Frey and Jegen, 2001). This affects especially use-motivated participants for whom enjoyment is also an important motivator (Franke and Shah, 2003). Participants in open source software communities may only have interest in a specific subset of the overall system that they aim to modify to suite their individual needs or business venues. If these parts are not revealed, participants have no ability to incorporate their desired changes and may lose their interest in participating at all.

A second aspect of this dimension includes the rights associated with the open product. Companies may reveal the product under restrictions, thereby limiting the usage or the right to modify and share the product; this is also referred to as the "partly open strategy" (West, 2003). These rights are determined by the license associated with the revealed product. Whereas in open source products some licenses only allow the pure use of the software, others allow the modification and recombination thereof for own derived work that can either be used privately (permissive license), or can be required to be revealed back to the community (copyleft license) (Välimäki and Oksanen, 2005; de Laat, 2005).

O'Mahoney (2003) find that participants in open source communities have a strong desire to prevent others from proprietary appropriation of their contributions in order "to protect their collective identity and reputation" (p.1194). Franck and Jungwirth (2003) subsequently conclude that a copyleft open source license is a prerequisite for voluntary contributors to ensure that commercial providers do not free-ride on their contributions without accrediting their contributions. For use-motivated

participants, a copyleft license would ensure that they could also benefit from the contributions of others and vice versa. Profit-motivated participants could fear that the sponsor might "stipulate outrageous license terms for commercial use" for the same code that they had freely contributed by themselves (Shah, 2006; p. 1009).

Therefore, we hypothesize that:

H3.1: More open intellectual property rights, as perceived by the participant, will increase use-motivation.

H3.2: More open intellectual property rights, as perceived by the participant, will increase profit-motivation.

Use-motivation

We denote by use-motivation members' motivation to participate in open innovation communities in order to increase their own personal use value of the product. Users tend to innovate when their unique and specific needs are not met (von Hippel, 1986). In particular, due to the open license agreement, open source communities offer various ways to customize and tailor the product to suite individuals' needs (Bessen, 2006). Multiple researchers have found proof that community members' individual needs can be a major driver of participation (Hars and Ou, 2002; Roberts et al., 2006; Wu et al., 2007). As users also rely on the contributions of others – as they themselves are resource-constrained – they show a higher involvement and stronger identification with the community (von Hippel, 2007). This also leads to higher willingness to support and assists other members (Lakhani and von Hippel, 2003). Furthermore, members who participate due to solving their own needs are found to enjoy their activity more than others (Franke and Shah, 2003). Enjoyment and identification with the community have also been identified to increase the motivation to participate in open source software communities (McLure Wasko and Faraj, 2005; Wiertz and de Ruiter, 2007).

Hence, we hypothesize:

H4.1: Use-motivation will increase participation activity.

H4.2: Use-motivation will increase participants' supportiveness.

Profit-motivation

By profit-motivation, we mean members' motivation to participate in open innovation communities in order to attain monetary benefits, either directly or indirectly. The most straightforward direct monetary benefit is being paid for participation in the community by an employee (Hars and Ou, 2002; Lakhani and von Hippel, 2003). Selling services and products complementary to the community's product is also a monetary benefit from participation (Hars and Ou, 2002; Jeppesen and Frederiksen, 2006). When the community's product is the basis for further business ventures, the gain of reputation within or about the community is commercially viable. Many authors have identified the enhancement of professional reputations as a source of motivation to participate in open source communities (Lakhani and von Hippel, 2003, McLure Wasko and Faraj, 2005; Roberts et al., 2006). Participation in these communities can also be due to more indirect and future monetary rewards, such as learning and career advancements (Hars and Ou, 2002; Lakhani and von Hippel, 2003; Roberts et al., 2006).

As extrinsic monetary motivation is found to crowd out intrinsic motivation, which leads to higher involvement in the community (Frey and Jegen, 2001), we assume that profit-motivation will decrease the supportiveness of members to assist others. Lakhani and von Hippel (2003) find empirical evidence that assisting others is a voluntary task and that people who participate as part of their job are most likely less supportive.

Hence, we hypothesize that:

> *H5.1: Profit-motivation will increase participation activity.*

> *H5.2: Profit-motivation will decrease participant's supportiveness.*

3.2 Research model 2

In research model 2, we introduce the construct of fairness and analyze its mediating effect between the degree of openness and motivation (see Figure 2). We hypothesize that all three dimensions of perceived openness affect perceived fairness and that perceived fairness influences both kinds of motivation.
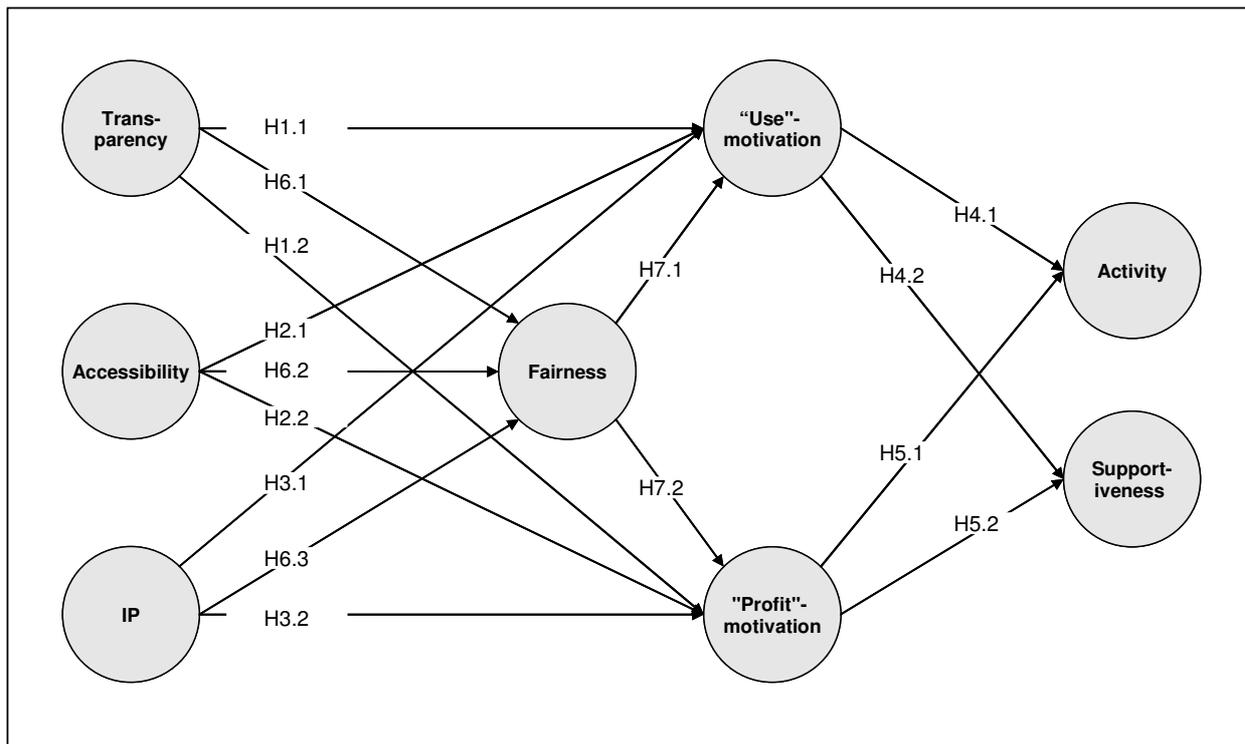
Figure 2: Research model 2

Fairness

Within the social science literature, fairness is viewed as a multidimensional construct constituted by distributive justice and procedural justice[1] (Colquitt, 2001). Distributive justice is fostered when the allocation of outcomes, in terms of rewards or resources, are perceived as fair (Greenberg, 1987). This concept is rooted in the balance theories that conceptualize justice as the balance between a person's contribution and his or her outcomes (cf. Feistinger, 1957). Procedural justice deals with the procedures that lead to the allocation of the outcomes and is fostered when individuals perceive the procedures as consistent, free of personal bias, correctable, accurate, and ethically (Leventhal, 1980).

For community members to be able to judge the fairness of procedures, transparency about governance and decision making processes is a necessary prerequisite. Furthermore, individuals perceive it as unfair when they presume a mismatch between their own and another's contributions and outcomes (Greenberg, 1987). This relates to the notion of expected reciprocity in open innovation communities

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[1] Please note that interpersonal justice and informational justice are also often used in an overarching organizational justice construct, but are not used in this analysis as we consider distributional and procedural justice more suitable for assessing the fairness of the innovation processes' and products' openness.

(Lakhani and von Hippel, 2003). It is considered fair to reveal information and assist others in the same way as one has received this assistance from others (Franke and Shah, 2003). Community members would therefore expect the sponsor to reveal knowledge and act transparent in the same way as they are, in order to consider the relationship fair.

Greenberg (1986) finds that procedures are perceived to be more fair when they entail two-way communication. Giving the community the possibility to participate in governance decisions (accessibility), will therefore lead to an increase in the perceived fairness. In addition, participation rights will also increase the legitimacy of the procedures (Solum, 2005). Opportunistic behavior, in turn, will be regarded as unfair by the community (Shah, 2006)

"Being specific about licensing practices is a prerequisite for firms to be trusted in the community" (Dahlander and Magnusson, 2008, p. 640). In order to assess distributional justice, community members need to know how they and others can use the community's contributions. Participants regard it as unfair when others cannot benefit from their contributions, as they also aim to benefit from the contributions of others (Shah, 2006). A copyleft license is therefore required to ensure that the community effort cannot be appropriated by others and remains accessible to everyone (Osterloh and Rota, 2007). Furthermore, not revealing all code to the community also restrains reciprocity, as – from a distributional justice point of view – it seems unfair that a participant should reveal all his or her contributions while the sponsor holds something back.

For these reasons we hypothesize that:

H6.1: Transparency, as perceived by the participant, will increase perceived fairness.

H6.2: Accessibility, as perceived by the participant, will increase perceived fairness.

H6.3: More open intellectual property rights, as perceived by the participant, will increase perceived fairness.

Fairness is found to improve job satisfaction and organizational commitment (Konovsky, 2000). Furthermore, Jansen (2004) finds that high levels of distributive and procedural justice will lead to higher innovative behavior. We can therefore

conclude that fairness will not only increase motivation but also performance in the community. Moreover, the perception of fairness plays an important role when people decide whether they want to work together with someone or not (Barkow et al., 1992). As communities consist of volunteers, it is important that contributors regard the community structure as fair (O'Mahony and Ferraro, 2007).

For use-motivated participants, knowledge sharing is essential as it enables them to gain a deeper understanding of the product, which allows them to adjust it to their own needs. Knowledge sharing is facilitated by a sense of fairness, as it fosters reciprocity and a sense of equal returns and contributions (Wasko and Faraj, 2000).

Procedural justice is an important element for building trust (Colquitt, 2001). For companies and profit-motivated participants, trust in the community and the sponsor is important as they rely on the community and a formal/legal mechanism of control is not present (Feller et al., 2008b). Procedural justice and trust are also important to profit-motivated participants, as they might fear that the source code could be made proprietary by the sponsoring firm (Dahlander and Magnusson, 2008), which could deter their future business ventures. Moreover, profit-motivated participants would see their contributions as an investment and would therefore be more rational in judging the actual and potential outcome of it. Distributive justice would therefore be important to profit-motivated participants.

For these reasons, we hypothesize that:

H7.1: Fairness, as perceived by the participant, will increase use-motivation.

H7.2: Fairness, as perceived by the participant, will increase profit-motivation.

Table 1: Overview of hypotheses

H1	1: Transparency, as perceived by the participant, will increase use-motivation.
	2: Transparency, as perceived by the participant, will increase profit-motivation.
H2	1: Accessibility, as perceived by the participant, will increase use-motivation.
	2: Accessibility, as perceived by the participant, will increase profit-motivation.
H3	1: More open intellectual property rights, as perceived by the participant, will increase use-motivation.
	2: More open intellectual property rights, as perceived by the participant, will increase profit-motivation.
H4	1: Use-motivation will increase participation activity.
	2: Use-motivation will increase participant's supportiveness.
H5	1: Profit-motivation will increase participation activity.
	2: Profit-motivation will decrease participant's supportiveness.
H6	1: Transparency, as perceived by the participant, will increase perceived fairness.
	2: Accessibility, as perceived by the participant, will increase perceived fairness.
	3: More open intellectual property rights, as perceived by the participant, will increase perceived fairness.
H7	1: Fairness, as perceived by the participant, will increase use-motivation.
	2: Fairness, as perceived by the participant, will increase profit-motivation.

4. Research approach

Research design and sampling strategy

We choose a deductive approach to test the relationship between constructs that have received little prior investigation. As our objective is to analyze the impact of selective openness on differently motivated external participants, we aim to create a research setting with maximal variance in the constructs of openness and different motivation. To increase the variance in openness, we selected communities with and without a corporate sponsor. To increase the variance in different motivations to participate, we choose a field in which established open innovation communities are common and stable products are available that attract profit-motivated participants. For these reasons we selected three sponsored and four non-sponsored open source software communities that develop comparable e-commerce solutions or content management systems. We selected this industry as open source solutions have a fair market share compared to proprietary offerings and the solutions are used in a professional context. Furthermore, we selected communities that have reached a mature state, i.e. that offer a stable product and have a large and active community. The surveyed communities are listed in Appendix A.1.

Data collection and sample constitution

We develop the questionnaire using existing and, when necessary, new item scales (the questionnaire can be found in Appendix A.2). We measure the construct activity based on self-reported community activity times for discussion, development or other community tasks (cf. Hars and Ou, 2002; Lakhani and von Hippel, 2003; Balka et al., 2011). We measure supportiveness with complementary data from the community profiles of each individual respondent. For every respondent, we calculate the ratio between answers and questions in the community forum as an indication of the participant's supportiveness (cf. Spaeth et al., 2010). All other constructs are measured via the survey on a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5); in all cases the option "no answer" (6) is also possible.

For the motivational constructs, we use existing item scales that have also been used in other surveys for open source communities. "Use-motivation" is measured using ten items derived from measures for own need (cf. Hars and Ou, 2002; Wu et al., 2007), enjoyment (cf. Lakhani and von Hippel, 2003; Roberts et al., 2006), and identification (cf. Balka et al., 2011; Bruner et al., 2005). For "profit-motivation" seven items are used for monetary rewards, career advancement (cf. Wu et al., 2007, Lakhani and von Hippel, 2003; Roberts et al., 2006), and reputation (cf. McLure Wasko and Faraj, 2005; Roberts et al., 2006). "Fairness" is measured using five items for distributional and procedural justice (Colquitt, 2001; Leventhal, 1976; Leventhal, 1980; Thibaut and Walker, 1975). The items for openness are developed according to West and O'Mahoney's (2008) framework for openness. "Transparency" and "accessibility" are measured using four items each. Items from Balka et. al. (2010) and von Krogh et al. (2009) are taken into account and complemented with new items for transparent and accessible governance developed in accordance with Markus (2007). "Intellectual property" is measured using six new items developed in accordance with West and O'Mahoney (2008), Välimäki and Oksanen (2005) and de Laat (2005). In addition to the constructs, we include eight general questions about the participants' personal and professional background. The questionnaire contains 47 questions in total and took the respondents between five and ten minutes to fill out.

Before the survey was launched, a pre-test with 10 community participants was conducted to ensure the clarity and comprehensibility of the questionnaire. The community moderators granted us permission to conduct the survey in their

community forum; members were then contacted directly via a personalized individual email. As the objective was to find active participants in a certain community, we only contacted community members who had written at least one post in the last four weeks and who had at least five posts in total. To encourage participation, three shopping vouchers, each valued at 75 USD/50EUR, were raffled off. Participants were asked to provide their community username in order to participate in the raffle.

The survey took place from 15 April 2011 to 15 August 2011. During this time, 2,284 members were invited to participate in the survey, of which 356 responded. Of these, 266 provided full responses. The majority of the 90 respondents who did not complete the survey stopped on the first page. All answers were checked for consistency and the meaningfulness of their results. 13 responses were deleted as implausible, leading to a total of 253 valid, full responses for analysis. This represents a response rate of 11.6%, which is slightly below, but still well in line with similar online surveys in online communities (cf. Hars and Ou, 2002, Lakhani and von Hippel, 2003). From those responses, 147 came from sponsored communities and 106 from non-sponsored communities. Of these responses, 119 could be complemented with data from the community profiles, as the members provided their community usernames. In this way, we gained a second independent data source to validate the self-reported activity data and calculate the endogenous variable of supportiveness.

The average age of participants is 35 years, 73% have at least a bachelor's degree. On average, the participants have spent 2.5 years in the specific community and 4.8 years in open source communities more generally and are active in two different open source communities at a time. This shows that the surveyed participants are very familiar in terms of their surveyed community and open source communities in general.

Data preparation and analysis

We use the partial least squares (PLS) method to analyze the structural equation model, as it is better suited than covariant-based methods for analyzing complex models and for theory development and prediction (Hair et al., 2011). We use the program smartPLS 2.0 to analyze the model (Ringle et al., 2005).

Following Hullund (1999), we assess the adequacy of the measurement model, proving (1) the individual item reliabilities, (2) the convergent validity of measures with the associated constructs, and (3) the discriminant validity. First, for assessing the individual item reliabilities, we assess the individual loadings of each item to their associated constructs as well as their T-values (see appendix A.3). Two items for use-motivation need to be dropped, as their T-values are not sufficiently significant and the loadings are in a range of 0.2 – 0.5, where items typically should be dropped (Hulland, 1999). We still keep the item "I want to be able to fix problems with the software by myself" even though the loading is comparatively low, as the relationship with the construct is significant and it adds another important content element to the construct.

Second, to assess the individual item reliability, we calculate Cronbach's Alpha for all constructs (see appendix A.3). With the exception of the construct activity, all other constructs have appropriate reliability values of above 0.7 (Nunnally, 1978). The lower reliability value for activity is due to the construct not being completely reflective as it enquires about different kinds of activities in the community; therefore, the construct has some formative element.

Third, for determining discrimination validity between constructs, we follow Fornell and Larcker (1981), and Chin (1998) and assess whether the root average extracted (AVE) values of each construct are higher than the correlations between the constructs (see appendix A.4). As the table shows that all root AVE values well exceed the correlation values, we can assume sufficient discriminant validity between the constructs. In addition, we also construct a cross-loading table to assess the validity of the individual items (c.f. Grefen et al., 2000) (see appendix A.5). The table shows that all items have sufficiently higher loadings on their associated construct than on other constructs, thereby supporting the convergence and discriminant validity of the measurement model.

5. Findings

The impact of selective openness on motivation and participation behavior

The PLS estimates for model 1 are shown in Figure 3. The significance values were assessed via bootstrapping according to Hair et al. (2011). Use-motivation is

significantly influenced by the perceived degree of openness; especially transparency (b = .243; p < .01) and accessibility (b = .262; p < .01) have a strong effect. The direct effects of perceived openness on profit-motivation are slightly lower than on use-motivation. Only transparency (b = .140; p < .05) and accessibility (b = .184; p = .05) have significant effects. The influence of IP is insignificant. As hypothesized, use-motivation has a significant effect on activity (b = .190; p < .05) and on supportiveness (b = .338; p < .01). Profit-motivation has only a small effect on activity (b = .176; p <.10) and a significant negative effect on supportiveness (b = -.306; p < .01).
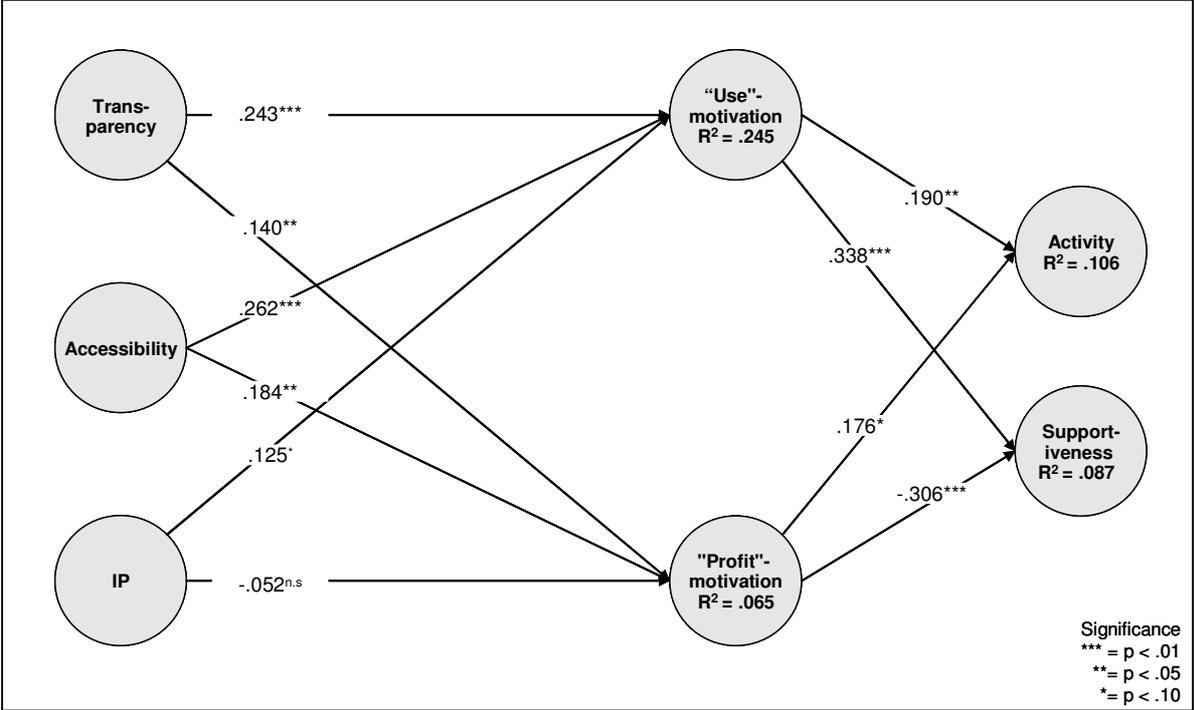
Figure 3: PLS results for model 1

We re-calculate the model including perceived fairness as a mediating construct. The results are shown in Figure 4. The effects of transparency and accessibility on use-motivation are partially mediated by the introduction of fairness (b = .196; p < .01 vs. b = .243; p < .01) and (b = .196; p < .05 vs. b = .262; p < .01). The effect of IP on use-motivation is fully mediated by fairness, as the link between them becomes insignificant. The same is true for the effects of transparency and accessibility on profit-motivation: both are fully mediated by fairness. With the introduction of fairness, profit-motivation is no longer affected by the perceived

degree of openness, but only by fairness on a highly significant level (b = .294; p < .01). Use-motivation is still influenced by transparency and accessibility, but also by fairness on a highly significant level (b = .219; p < .01). Fairness, in turn, is highly dependent on the perceived degree of openness: transparency (b = .214; p < .01), accessibility (b = .294; p < .01), and IP (b = .180; p < .01). An overview of the PLS results for model 1 and model 2 can be found in Appendix A.6.
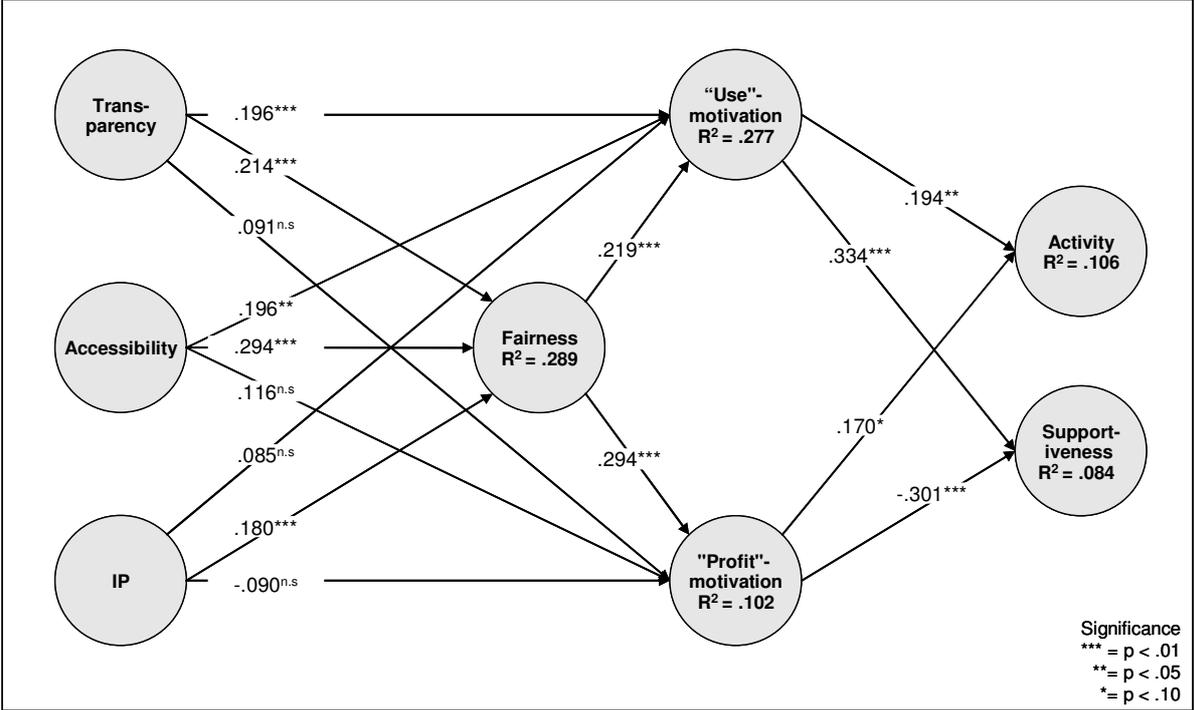
Figure 4: PLS results for model 2

Robustness checks and data validity

As we asked the participants not only for the exogenous variables, but also for the endogenous variables, there could be a common method bias, specifically in self-reported activity data (Podsakoff and Organ, 1986). Therefore, we validated the self-reported activity data using a second data source of forum posts gathered from the individual respondents' community profiles. A correlation between the different sets of activity data showed a highly significant relationship ($p < .01$), leading us to conclude that the self-reported activity data is valid.

Furthermore, as supportiveness is calculated via the ratio of answers over question, one could conclude that supportiveness is mainly influenced by the activity level of participants. To test for this relationship, we calculate the correlation between activity and supportiveness. The result reveals no significant relationship, indicating that supportiveness is not influenced by activity.

6. Discussion of findings and future research

Our findings show that the perceived degree of openness exerts a differential impact on members in open innovation communities, depending on whether they are use or profit-motivated. The kind of motivation, in turn, engenders different participation behavior in terms of activity and supportiveness towards other members. Furthermore, perceived fairness of the community governance has a stronger effect on motivation than the degree of openness itself, even mediating completely the effect of openness on profit-motivation. In the following we are offering five possible explanations for these findings and propose questions for future research

Why does openness have a differential impact on members depending on their motivation to participate?

First, profit-motivated participants are less involved and emotionally attached to the community. Balka et al. (2011) show that the degree of openness affects participants' level of involvement in open innovation communities that in turn drives participation. However, involvement and emotional attachment is more likely to be found for use-motivated participants (von Hippel, 2007). Therefore profit-motivated participants are less affected by the degree of openness, as it only means to an end to create own business opportunities.

Second, profit-motivated participants exhibit a different participation behavior and therefore have different requirements on openness. As the negative influence of profit-motivation on supportiveness shows, profit-motivated participants seem to be mostly knowledge seekers rather than knowledge providers. They maybe use the community more as a support tool for their customer projects, but are less involved

in advancing the community product per se. In this case, the possibility to participate in the innovation process (accessibility) could be less important.

Third, the degree of openness leads to the self-selection of differently motivated participants. Franck and Jungwith (2003) noticed that, while intrinsically motivated contributors help a community gain momentum in the first place, extrinsically motivated participants will join later, when they can derive value from what is already there. In the same way, profit-motivated participants are more likely to join a sponsored community in which a firm has already invested resources in the product and ensures that it is commercially viable. A profit-motivated participant would then rationally evaluate the opportunity under the given circumstances of selective openness if an engagement can still be regarded as fair in terms of the distribution of the benefits and procedures that are in place.

At a first glance, one could conclude that profit-motivated participants are less beneficial to an open innovation community, because they are less supportive and active than use-motivated participants. But this assumption does not take into consideration that they could add value in other ways outside the community. Feller et al. (2008) state that networks of small companies that offer related services to open innovation communities are critical for delivering "the whole product" to the customer. Assessing the value that profit-motivated participants could add to the overall product service system is unfortunately beyond the scope of this paper, but seems to be a worthwhile opportunity for future research.

When profit-motivated participants are less affected by the degree of openness the questions arise: What are other factors that influence the selection process of joining and participating in a sponsored open source software community and how do they interrelate? As profit-motivated participants engage in the community in order to create business opportunities, they may select a community based on the quality and reliability of the product. If this is the case, how does the attractiveness of the community's product mitigate drawbacks in the degree of openness for the participant? Do sponsors of top-notch open source software products have a higher bargaining power against the community in choosing the degree of openness more to their favor than other sponsors would be able to, without alienating the participation of the community?

Why does fairness mediate the effect of openness on motivation?

First, participants and especially profit-motivated ones seem to be more pragmatic and less ideological. In the beginning, the phenomenon of open source software could be compared to a social movement (Hertel et al., 2003), where open source norms and the idea of freedom of information played a pivotal role (Stewart and Gosain, 2006). The surveyed participants seem to be more pragmatic. For them, it is more important that the contributions and rewards of the participation are distributed fairly and that the procedures in place are transparent, consistent, and fair. Especially as profit-motivated participants may only selectively reveal their own contributions (Henkel, 2006), they would, in turn, also regard selective openness by the sponsor as fair. A quote from one of the survey participants illustrates this:

> *"For sure the sponsor also needs to make money, they have investors and can therefore not give away everything for free."*

Second, some dimensions of openness seem to be more like a hygiene factor and not a motivator. One unexpected finding is that selective openness of intellectual property rights does not directly affect motivation. This is especially surprising as, in the case of Netscape and Xara, the sponsor's reluctance to open all parts of the source code is considered the major reason why the projects failed to attract sufficient outside contributors in the beginning (Dalle and Julien, 2003; Menichinelli, 2007). One circumstance that could explain why our observation is different in this regard is that participants do not expect full openness rather than fair openness. Intellectual property rights seems to be more like a hygiene factor in that the product needs to be open enough to still be considered fair, but more openness does not lead to higher motivation. Similar Balka et al. (2011) found that members in open innovation communities value openness differently across modules and they do not expect full openness of all modules. In the same way, participants could regard it as fair, if not all components are fully available to community.

When fairness is equally or more important than openness per se, it means that commercial firms do not need to thrive for full openness, but could leave components closed for value appropriation and control. The obligation of perceived fairness entails that if the sponsor is doing so, he/she needs to ensure transparent and comprehensible procedures and communication to avoid the perception of arbitrariness. In addition, the sponsor needs to allocate enough room for value

capture of external participants; otherwise they would regard the relationship as unbalanced and therefore unfair. When selective openness is viable as long as it is regarded to be fair, the question arises what are actions of the sponsor that are regarded as unfair by external participants? And what are circumstances that even lead participants to leave the community? As in this study, we only surveyed members in mature communities who are still participating; we pre-selected respondents that more or less approve of the degree of openness set by the sponsor to be fair. Thereby we exclude the voices of participants who have left or did not join due to disapproval. Future research could take a longitudinal perspective to analyze the effects of a change in openness on perceived fairness and participation behavior, as well as what circumstances lead participants to leave the community.

7. Conclusion

Summary

This paper aimed to analyze how commercial firms can use selective openness to benefit from value creation with external to the firm voluntary participants while at the same time retain avenues for value capture.

We conducted a survey (N=253) among participants of sponsored and non-sponsored open source communities. We combined this survey data with information from their profile pages detailing and validating their participation behavior. We found quantitative evidence that the degree of openness will affect participation behavior via the mediation of motivation and perceived fairness. This general finding is in line with Balka et al. (2011) and confirms that there is a general trade-off between "control vs. grow" and "adoption vs. appropriation" ((West, 2003); (Dahlander and Magnusson, 2005; West and O'Mahony, 2008).

Furthermore, we showed that openness affects participants differently depending on how they are motivated. The degree of openness only affects use-motivated participants directly, and the effect on profit-motivated participants is fully mediated by perceived fairness. Subsequently, we can argue that a lower degree of openness will not necessarily deter participation per se, as long as participants still perceive it as fair. However, it will lead to the self-selection of differently motivated participants,

namely more profit-motivated and less use-motivated participants. We could quantitatively prove that profit-motivated participants will have a different participation behavior pattern. They tend to engage in the community to seek knowledge and assistance, but are less likely to support others.

Last, we found quantitative evidence that perceived fairness strongly mediates the effect of openness on motivation. All three dimensions of openness significantly influence the fairness perceived by the community and, in turn, the perceived fairness strongly influences motivation. Especially due to the full mediation of open intellectual property rights' effect on motivation, we can conclude that participants do not expect "full" openness but "fair" openness. Participants in sponsored open source software communities seem to have a pragmatic view on openness rather than following an ideology that information needs to be free (Stallmann, 1992).

Managerial implications

Commercial firms aiming to benefit from external voluntary participants face the trade-off between "control vs. grow" and "adoption vs. appropriation". From our findings three managerial implications emerge on how to address these trade-offs.

First, our findings suggest that a sponsor can adopt two slightly different strategies to engage in and generate value from the community. If the sponsor aims to access the community for additional knowledge or developer resources, he or she needs to ensure sufficiently high degrees of transparency and accessibility in order to attract use-motivated participants. This entails the need to loosen control over the innovation process and let the community take more responsibility. In their longitudinal analysis of the Eclipse Foundation, Spaeth et al. (2010) show that loosening control could lead to more proactive engagement from outside contributors. By contrast, if the sponsor aims to create an ecosystem of complementors to increase the value of the overall product service system, he or she needs to attract profit-motivated participants who offer related services to his or her product. This strategy entails that the sponsor needs to ensure that profit-motivated participants perceive an engagement with the community to be fair. Procedures need to be transparent, consistent, and free of personal bias. Moreover, the gains from contributing to the community should be distributed in a fair manner.

Second, sponsors of open source communities need to be aware of how use and profit-motivated participants' behavior differs. If they choose to retain more control over the innovation process, they will attract less use-motivated participants who take an active role in assisting other members. This role then needs to be substituted by employed personal of the sponsor, referred to as a "man on the inside," to assist the community. Lee et al. (Lee et al., 2012) study the behavior of firm-employed men on the inside and find that they intentionally take an active supportive role in the community by assisting others and answering questions in the community forum. Our research gives an explanation of why this action by sponsors is necessary.

Third, our findings also suggest that keeping modules and pieces of the software proprietary does not seem to be as critical as sometimes assumed. Open intellectual property rights seem to be a hygiene factor that needs to be fulfilled in order to grant participants sufficient access and usage rights and to be regarded as fair. Balka et al. (2011) also find that participants value openness across modules differently. However, assessing what modules need to be open and what modules can remain proprietary is still a delicate task, as it requires a solid understanding of what the community expects and what it perceives as fair. Finding out the right balance is most likely an iterative task that all sponsors have to consider when crafting their selective openness strategy.

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Appendixes:

Appendix A1: Surveyed communities

Sponsored communities	Non-sponsored communities
Magento	OpenCart
Oxid eSales	Redaxo
DotNetNuke	WebsiteBaker
	Concrete5

Appendix A2: Questionaire

Activity		**On average how many hours per week do you approximately spend on the following activities?**
	[SQ001]	Discussing in the forum/mailing list, chatting
	[SQ002]	Developing the community version by writing, testing and documenting software code and fixing bugs
	[SQ003]	Other community acitivities

		Why are you participating in the community?
	[MNe1]	*The software is critical to solve my needs for business or work.*
	[MNe2]	*I want to ensure that the software matches my unique and specific needs.*
	[MNe3]	I want to be able to fix problems with the software by myself.
	[MEn1]	It gives me the chance to do things I am good at.
Use Motivation	[MEn2]	I really enjoy it. It is fun.
	[MEn3]	It gives me a sense of personal achievement.
	[MId1]	This community has a great deal of personal meaning to me.
	[MId2]	I feel emotionally attached to the community.
	[MId3]	I feel as if the community's problems are my own.
	[MId4]	I feel like 'part of the family' at this community.

		Why are you participating in the community?
	[MMo1]	Participating in the community is an important part of my job.
	[MMo2]	In one way or another I will make money from participating in the community.
	[MMo3]	I sell related products or services, like consulting, training and implementation.
Profit Motivation	[MMo4]	It helps me advancing my career.
	[MRe1]	It gives me status and recognition for business or work.
	[MRe2]	It gives me the chance to attain a recognized qualification or skill.
	[MRe3]	It gives me status and recognition in the community.

		Your perception of fairness in the community
	[FDis1]	My impact in the community reflect the effort I have put into it.
	[FDis2]	My impact in the community is appropriate for the work I have completed.
Fairness	[FPro1]	The community rules are applied consistently.
	[FPro2]	I am able to influence the outcome of the community.
	[FPro3]	The community rules are free of bias.

		Availability of information
	[TPr1]	It is easy to access relevant information about the software.
Transparency	[TPr2]	The available information about the software is sufficient.
	[TGo1]	I can understand how tasks are defined and coordinated within the community.
	[TGo2]	I can understand how decisions are made in the community.

Accessibility		**Possibility to participate**
	[APr1]	My code contributions are taken up in the official software releases to a sufficient degree.
	[APr2]	The community can significantly influence the development.
	[AGov1]	I can be involved in decision making in the community.
	[AGov2]	I can be involved in the definition and coordination of tasks.

Interlectual propert		**Availability of information and possibility to participate**
	[TIp1]	I can use the source code of all relevant modules.
	[TIp2]	I can use sufficient proportions of the software free of charge.
	[TIp3]	Sufficient proportions of the source code are revealed as open source software.
	[AIp1]	I have the right to access and reuse sufficient proportions of the source code for own modifications (derived work).
	[AIp2]	I have sufficient rights to modify the source code for my own usage.
	[AIp3]	I have sufficient rights to use the modifications of other community members.

membership time in OSS	How long have you been active in this community?
	How long have you been active in open source communities in general?
	Are you active in any other open source communities?

member status	**How would you describe your position in the community?**
	Project leader
	Core team
	Active community member
	Solely user of software

Company background	**How is your community engagement related with your current job?**
	Currently, I am self-employed/working at a firm that... *
	is a user of the community's software.
	offers related services or products (e.g. consulting, implementation, hosting).
	sponsors the community .
	is not related to the community's software.

Company size	**In my current job, I am self-employed/working...**
	as a freelancer.
	in a company of 2 - 10 employees.
	in a company of 11 - 50 employees.
	in a company of 51 - 100 employees.
	in a company of more than 100 employees.

Education	**What is your highest educational degree?**
	Highschool or below
	Bachelor degree
	Master degree or diploma
	PhD degree or doctorate

Age	**How old are you?**
	20 years, or younger
	21 - 30 years
	31 - 40 years
	41 - 50 years
	51 years, or older

Appendix A3: Loadings of the indicator variables and reliability/Cronbach's α)

Construct	Indicator	Standard factor loading	T-value	Cronbach's α
Activity	[SQ001]	0,798	9,238	
	[SQ002]	0,667	4,572	0,523
	[SQ003]	0,660	5,420	
Supportivness	[Supp]	1,000 n/a		1,000
Use Motivation	*[MNe1]**	*0,121*	*1,120*	
	*[MNe2]**	*0,235*	*2,421*	
	[MNe3]	0,313	4,010	
	[MEn1]	0,670	14,586	
	[MEn2]	0,709	19,963	0,842
	[MEn3]	0,729	17,628	
	[MId1]	0,789	26,236	
	[MId2]	0,768	23,529	
	[MId3]	0,695	14,493	
	[MId4]	0,801	27,759	
Profit Motivation	[MMo1]	0,691	14,337	
	[MMo2]	0,476	5,831	
	[MMo3]	0,451	5,683	
	[MMo4]	0,688	15,746	0,776
	[MRe1]	0,795	28,276	
	[MRe2]	0,654	11,484	
	[MRe3]	0,756	18,465	
Fairness	[FDis1]	0,864	34,130	
	[FDis2]	0,832	23,081	
	[FPro1]	0,835	25,932	0,908
	[FPro2]	0,870	44,755	
	[FPro3]	0,869	36,910	
Transparency	[TPr1]	0,626	7,060	
	[TPr2]	0,627	8,467	0,750
	[TGo1]	0,846	24,759	
	[TGo2]	0,854	29,378	
Accessibility	[APr1]	0,633	11,144	
	[APr2]	0,677	11,564	0,736
	[AGov1]	0,839	24,759	
	[AGov2]	0,836	29,278	
Interlectual property	[TIp1]	0,559	7,677	
	[TIp2]	0,655	8,973	
	[TIp3]	0,622	7,811	0,817
	[AIp1]	0,818	20,748	
	[AIp2]	0,841	16,348	
	[AIp3]	0,786	23,800	

* indicators removed, not included in Cronbach's α

Appendix A.4: Correlation among constructs and root AVE*

	Activity	Fariness	O.Access	O.IP	O.Trans	Prof.Mot	Supportivenss	Use.Motivation
Activity	**0,716**							
Fariness	0,110	**0,854**						
O.Access	0,180	0,466	**0,752**					
O.IP	0,037	0,376	0,449	**0,720**				
O.Trans	0,132	0,391	0,428	0,288	**0,745**			
Prof.Mot	0,249	0,245	0,186	0,030	0,164	**0,656**		
Supportivenss	0,049	0,095	0,106	0,223	0,037	-0,149	**1,000**	
Use.Motivation	0,289	0,415	0,404	0,288	0,398	0,490	0,158	**0,701**

*diagonal elements are the root average variance extracted values (AVE)

Appendix A.5: Cross Loadings

		Activity	Supportivenss	Use.Motivation	Prof.Mot	Fairness	O.Trans	O.Access	O.IP
Activity	[SQ001]	**0,798**	0,089	0,266	0,195	0,113	0,089	0,164	0,105
	[SQ002]	**0,669**	-0,011	0,199	0,157	0,002	0,113	0,193	0,034
	[SQ003]	**0,675**	0,015	0,161	0,260	0,106	0,082	0,035	-0,066
Supportiveness	[Supp]	0,049	**1,000**	0,157	-0,101	0,095	0,037	0,105	0,223
Use Motivation	[MNe3]	0,072	0,155	**0,300**	0,137	0,076	0,049	0,053	0,093
	[MEn1]	0,271	0,084	**0,669**	0,494	0,277	0,197	0,281	0,270
	[MEn2]	0,139	0,204	**0,709**	0,325	0,269	0,364	0,284	0,311
	[MEn3]	0,216	0,063	**0,727**	0,501	0,289	0,222	0,284	0,214
	[MId1]	0,217	0,063	**0,794**	0,490	0,308	0,285	0,317	0,153
	[MId2]	0,203	0,183	**0,773**	0,350	0,329	0,320	0,350	0,288
	[MId3]	0,211	0,091	**0,694**	0,414	0,318	0,310	0,296	0,170
	[MId4]	0,271	0,082	**0,806**	0,486	0,383	0,320	0,372	0,201
Profit Motivation	[MMo1]	0,219	-0,121	0,376	**0,691**	0,201	0,104	0,186	0,034
	[MMo2]	0,059	0,035	0,210	**0,476**	0,140	0,045	0,094	0,069
	[MMo3]	0,147	-0,053	0,078	**0,451**	0,069	0,003	0,045	0,110
	[MMo4]	0,175	-0,146	0,364	**0,688**	0,159	0,164	0,155	-0,018
	[MRe1]	0,187	-0,096	0,472	**0,795**	0,188	0,134	0,108	0,005
	[MRe2]	0,161	-0,127	0,358	**0,654**	0,186	0,134	0,117	-0,016
	[MRe3]	0,280	0,052	0,607	**0,756**	0,286	0,214	0,222	0,175
Fairness	[FDis1]	0,083	0,081	0,369	0,259	**0,864**	0,333	0,355	0,318
	[FDis2]	0,067	0,119	0,334	0,255	**0,833**	0,295	0,297	0,299
	[FPro1]	0,087	0,018	0,325	0,202	**0,835**	0,364	0,398	0,313
	[FPro2]	0,104	0,127	0,397	0,279	**0,870**	0,331	0,514	0,369
	[FPro3]	0,122	0,057	0,357	0,209	**0,869**	0,334	0,398	0,288
Transperency	[TPr1]	0,043	0,039	0,239	-0,007	0,176	**0,626**	0,263	0,233
	[TPr2]	0,008	0,034	0,194	0,048	0,120	**0,629**	0,223	0,207
	[TGo1]	0,110	0,027	0,285	0,152	0,358	**0,845**	0,408	0,236
	[TGo2]	0,162	0,023	0,390	0,274	0,392	**0,854**	0,349	0,222
Accessibility	[APr1]	0,207	0,058	0,312	0,202	0,352	0,274	**0,634**	0,277
	[APr2]	0,008	0,028	0,297	0,060	0,266	0,305	**0,677**	0,359
	[AGov1]	0,125	0,104	0,320	0,192	0,393	0,287	**0,838**	0,369
	[AGov2]	0,178	0,116	0,329	0,182	0,371	0,416	**0,836**	0,342
IP	[TIp1]	0,069	0,111	0,178	0,010	0,112	0,293	0,222	**0,559**
	[TIp2]	0,011	0,114	0,190	0,032	0,201	0,240	0,195	**0,654**
	[TIp3]	0,027	0,110	0,204	0,053	0,179	0,186	0,242	**0,620**
	[AIp1]	0,061	0,212	0,280	0,100	0,351	0,224	0,418	**0,819**
	[AIp2]	0,022	0,202	0,241	0,064	0,347	0,197	0,361	**0,842**
	[AIp3]	-0,010	0,174	0,236	0,051	0,323	0,196	0,417	**0,786**

Appendix A.6: Overview of PLS results

Hypoth esis	construct 1	construct 2	Model 1			Model 2		
			path coefficient	T-value (m=5000)	signific.	path coefficient	T-value (m=5000)	signific.
H1.1	Transparency	"use"-motivation	.243	3.721	.01	.196	2.969	.01
H1.2	Transparency	"profit"-motivation	.140	2.022	.05	.091	1.365	n.s
H2.1	Accessibility	"use"-motivation	.262	3.839	.01	.196	2.803	.05
H2.2	Accessibility	"profit"-motivation	.184	2.301	.05	.116	1.434	n.s
H3.1	IP	"use"-motivation	.125	1.850	.10	.085	1.185	n.s
H3.2	IP	"profit"-motivation	-.052	.586	n.s	-.090	1.112	n.s
H4.1	"use"-motivation	activity	.190	2.034	.05	.194	2.034	.05
H4.2	"use"-motivation	supportiveness	.338	4.867	.01	.334	4.867	.01
H5.1	"profit"-motivation	activity	.176	1.776	.10	.170	1.776	.10
H5.2	"profit"-motivation	supportiveness	-.306	3.451	.01	-.301	3.451	.01
H6.1	Transparency	Fairness				.214	3.237	.01
H6.2	Accessibility	Fairness				.294	3.779	.01
H6.3	IP	Fairness				.180	2.771	.01
H7.1	Fairness	"use"-motivation				.219	3.677	.01
H7.2	Fairness	"profit"-motivation				.227	5.023	.01