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Social Networking - Chance or Risk for Marketers?

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Abstract

Virtual communities offer firms attractive marketing opportunities. Yet, they bear a risk: negative word of mouth. While traditional advertising might be more costly and less effective than social networking in a virtual community, it is at least inherently positive. This is not true for word of mouth, which may be either positive or negative and might thus potentially lead to a negative image. We examine how this trade-off affects firm strategies by using an agent-based simulation model. Our results are fourfold. First, it is generally optimal for firms to employ a mix of traditional advertising and social networking to increase their chances of becoming the market leader. Second, firms restricted to a single marketing channel are more likely to gain new customers by means of traditional advertising. Third, the risk of negative word of mouth causing a bad image is highest right after market launch. Last, especially in an online environment, the embracement of social networking can be decisive in achieving market leadership.

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Abstract Virtual communities offer firms attractive marketing opportunities. Yet, they bear a risk: negative word of mouth. Although social networking might be less costly and more effective than traditional advertising, it potentially leads to negative publicity. We examine how this trade-off affects firm strategies by using an agent-based simulation model. Our results suggest that it is optimal for firms to employ a mix of traditional advertising and social networking to increase their chances of becoming the market leader. Firms restricted to a single marketing channel, however, are more likely to gain new customers by using traditional advertising. Lastly, we find the risk of negative word of mouth to be highest right after market launch.

Keywords: Agent-based Simulation, Word of Mouth, Marketing, Advertising, Social Networking

JEL Classification: M31, M37

1 Introduction

A well-known notion in consumer behavior is that demand is interdependent. The purchases a consumer makes are seldom solely determined by the individual's taste, but are also influenced by the choices others make (Salganik et al., 2006). This is most prominent in the case of fads and vogues, which spread by word of mouth (WOM) among family members, friends, office colleagues, etc. (e.g. Bikhchandani et al., 1992, 1998). As prior research shows, WOM influences two thirds of sales of consumer goods and is also perceived as being superior to advertising in stimulating consumers to switch brands (Katz and Lazarsfeld, 1955; Taylor, 2003). While this is not a new insight, the recent rise of virtual communities (VCs)¹ has attracted further attention among marketers. By considerably facilitating electronic WOM, VCs offer companies a cheap and influential new marketing channel (e.g. Chen and Xie, 2008). Notably, Amazon cancelled its entire budget for TV and print advertising and currently solely relies on electronic WOM and its recommendation system. According to a spokesman, “[w]ord of mouse is important because on the Web you can reach so many more people beyond your circle of friends” (Thompson, 2003, p.1).² Yet, WOM is not riskless, which entails a trade-off for marketers. While traditional advertising³ might be more costly and less effective than fostering WOM in VCs, it is at least inherently positive. This is not true for WOM, which is either positive or negative and thus potentially leads to undesired negative publicity. A notable example is the case of Canadian musician Dave Carroll, who composed the song “United breaks guitars” after

¹As Horrigan and Rainie (2002) show, 84 % of American Internet users have already participated in VCs.

²“Word of mouse” is sometimes used as synonym for word of mouth on the Internet.

³The notion of *traditional* advertising is only intended to distinguish it from social networking efforts. It is therefore not limited to traditional media like radio or TV but explicitly includes online advertising. To facilitate readability, it might occasionally be simply addressed as “advertising” in the following.

his guitar was severely damaged on a flight with United Airlines. The negative publicity triggered by the song on the Internet resulted in the airline's share price falling ten per cent, decreasing the company's market value by \$180 million (Ayres, 2009).

The main aim of the paper is to thoroughly examine how the described trade-off affects firms' marketing strategies. An agent-based simulation model is used to study a scenario where two firms strategically choose a mix of traditional advertising and social networking. By using traditional advertising, firms forgo the chance of quickly spreading a positive image in favor of total control of their marketing efforts. Engaging in social networking, on the other hand, is riskier but at the same time also more effective. If firms decide to use social networking, this implies supplying and maintaining a VC for their (potential) customers to share positive and negative opinions on a specific product. Consumers post and read opinions on the respective product/service/brand,⁴ which in turn influences their tastes. Eventually, this might persuade them to adopt the product. Yet, it might just as well result in the product becoming a non-seller if related WOM is negative.

Our results are fourfold. First, it is optimal for firms to use a mix of advertising and social networking to maximize their market share, i.e. the two communication channels are complements. A two-step strategy can be employed to combine both channels by using their respective strengths. Advertising is initially used to create a positive image, which is then diffused at a high pace by social networking means. Second, a firm which, for whatever reason, is restricted to one marketing channel, should choose traditional advertising due to the lower risk of suffering from a bad image, entailed by negative WOM. Third, the risk of negative WOM is highest right after market launch. The many undecided individuals

⁴To facilitate readability, "product" shall henceforth refer to goods, services and brands.

are more likely to adopt a negative opinion, which spreads faster than a positive view. While the risk of advertising leading to a negative image is contained, social networking can quickly misdirect a company's marketing efforts. Despite the likely low investment costs, social networking should thus be used with caution, particularly when the product is new. Finally, leadership in social networking can help firms to become the market leader. Especially when firms are less well-known, they should thoroughly embrace social networking means.

To our best knowledge, this is the first article to explicitly treat the trade-off firms face with respect to their marketing mix decision. While much research has been devoted to advertising and social networking, no prior work focussed on a combination of both. We aim at filling this gap by simulating their respective strengths and weaknesses.

Related literature investigates the role of firms in VCs like we do, but rather models the manipulative participation of these in a game theoretic model (Mayzlin, 2006). In contrast to our work, the authors find WOM and advertising to be substitutes. Chen and Xie (2008) look into the importance of electronic WOM as new marketing channel. While this is similar to our research question, the authors use a normative model to investigate the substitutability/complementarity of informative advertising and online consumer reviews. In line with our work, they find positive effects of firms' engagement in electronic WOM under certain conditions. Regarding the methodology, the works of Alkemade and Castaldi (2005) and Miller et al. (2009) are closest to ours by applying an agent-based simulation model to social networks and VCs, respectively. Although their setting is quite similar to ours, Alkemade and Castaldi (2005) rather focus on the role of the underlying network structure for the diffusion of innovations. Further, they do not consider the implications

of negative WOM, which is essential in our analysis. Miller et al. (2009) do account for this in their study of firm strategies for VCs. Yet, in contrast to us, they frame the firm as active manipulator and do not include traditional advertising as strategic alternative in their model. As we show, it is exactly this complementarity of traditional advertising and social networking which helps firms to gain new customers. Moreover, our model goes beyond their setting by including inter-firm competition, which allows us to derive managerial implications in a realistic environment.

The remainder of the article is structured as follows. In §2, we lead up to the model by introducing the key concepts of word of mouth, preference formation, and virtual communities. In §3, we present a generic agent-based simulation model, which allows us to study the dynamics of preference formation in virtual communities. A discussion of the results and concluding remarks wrap up the article in §4.

2 Background

2.1 Word of Mouth

Different disciplines have different understandings of the concept of WOM. In economics, WOM is thought of as mechanism facilitating the formation of competitive market prices. In sociology, it influences the innovation diffusion process, while in marketing, WOM complements a company's efforts to reach consumer groups (Frenzen and Nakamoto, 1993). This latter view is similar to Johan Arndt's definition which stipulates WOM communication as "oral, person-to-person communication between a receiver and a communicator whom the receiver perceives as non-commercial, regarding a brand, a product, a service or

a provider” (Arndt, 1967, p.5). This clearly distinguishes WOM from other information sources, especially from advertising, which is commercial by nature. Compared to advertising, WOM is perceived as the more credible and helpful source (Berry and Keller, 2003). At the same time it is also readily accessible through social networks (Liu, 2006). This becomes even clearer when thinking of social networks as VCs, where the (electronic) word is instantly spread.

With the advent of the Internet, conventional (offline) WOM is no longer the only way to spread the word. Electronic word of mouth (eWOM) is becoming increasingly important as the popularity of services like Twitter impressively demonstrates. Three major factors distinguish eWOM from conventional word of mouth. First, eWOM is no longer limited to a local network as conventional WOM is. Not only does this considerably increase the range of potential recipients, it also ensures a 24-hour availability. Second, postings on the Internet are impersonal as opposed to face-to-face conversations. Third, eWOM is not spontaneous as a neighbors chat, but in most cases an intentional and planned effort (Ward and Ostrom, 2002). Finally, companies may (ab)use eWOM to reach and influence consumers, which is not feasible (at a reasonable cost) in the case of WOM (Chen and Xie, 2008).⁵ Hennig-Thurau et al. (2004, p.39) define eWOM as “any positive or negative statement made by potential, actual, or former customers about a product or company, which is made available to a multitude of people and institutions via the Internet.” Note that this also includes statements by persons who have not actually experienced the good. We shall follow this definition throughout the remainder of this article.

According to the definition of eWOM, word of mouth can either reflect a positive

⁵Firms increasingly use eWOM as marketing tool by establishing opinion forums for their products. Some also actively participate in these by posting favorable product reviews (e.g. Dellarocas, 2006).

or a negative opinion.⁶ This clearly distinguishes (e)WOM from advertising, which is inherently positive. While there is some ambiguity regarding the common perception that negative WOM is more influential than positive WOM (Godes et al., 2005; Sen and Lerman, 2007), most evidence confirms this view. Anderson (1998) shows that dissatisfied customers are more likely to engage in WOM than satisfied consumers. Further, negative WOM discourages more consumers than positive WOM attracts (Chevalier and Mayzlin, 2006; Chen et al., 2011).

The separation of positive and negative WOM is also reasonable when examining motives for engaging in WOM. Though the speaker will generally lack a material interest, they still need some motivation to talk about a product. In this respect, Dichter (1966) defines four motivational categories: product-involvement (need to communicate positive experiences with the product), self-involvement (desire for positive recognition), other-involvement (altruistic sharing of experiences), and message-involvement (discussion stimulated by advertisements). However, this categorization neglects negative WOM, which is later accounted for by Sundaram et al. (1998). The authors employ a similar categorization of motives for positive WOM (product involvement, self-enhancement, altruism, helping the company) and additionally offer four motivations for negative WOM. These comprise altruism (preventing others from making the same mistake), anxiety reduction (easing frustration), vengeance (taking revenge for the negative experience), and advice seeking (obtaining advice on troubleshooting).⁷ The emergence of eWOM has entailed further motives for commenting on a product. For one thing, some online platforms might

⁶Of course, WOM can also be neutral. We neglect this case, however, as neutral WOM is unlikely to be influential.

⁷Moreover, the marketing literature also distinguishes several consumer types with respect to their propensity to engage in WOM (Godes et al., 2005).

offer monetary incentives for writing product reviews. For another thing, consumers might enjoy some utility from participating in and being part of a VC (Hennig-Thurau et al., 2004).

Not only a person's motives to engage in WOM are essential, but also an individual's motivation to listen to or read a recommendation. In Ernest Dichter's (1966, p.152) words, "the triangle - speaker, listener, and product - have to 'fit' each other" to make the addressee accept (and act on) a recommendation. The "speaker" shall be interested in the well-being of the "listener" and shall also demonstrate a convincing knowledge of the product. The importance of these criteria is empirically supported by a survey carried out by Eagly et al. (1978). While both criteria may be easily fulfilled in the case of conventional WOM, the "speaker-listener" relationship is generally far less developed in the case of eWOM. Yet, compared to online word of mouth, advertising seems even less likely to satisfy this criterion as most consumers will probably question a firm's altruistic interest in themselves.

2.2 Preference Formation

Influence by Other Individuals

Consumers base their purchase decisions on the choices others make (Bikhchandani et al., 1992, 1998; Salganik et al., 2006). While this can also happen by observation of another individual's behavior, we neglect this case and concentrate on oral or written recommendations. In this context, word of mouth has ever since been an important catalyst for the formation of opinions and preferences due to its source reliability and the flexibility of interpersonal communication (Engel et al. 1969). Ample evidence suggests that WOM has strong influence on consumer choices, for instance regarding household goods (Katz

and Lazarsfeld, 1955), air conditioners (Whyte, 1954) or movie theater attendance (Liu, 2006). In the Digital Age, recommendations and product reviews have become evermore diffused and accessible online, like Amazon's recommendation system or the independent product review platform Epinions.com.⁸ Prior research has shown how eWOM influences consumer purchase decisions in general (Thompson, 2003; Senecal and Nantel, 2004) and especially choices related to experience goods such as movies (De Vany and Walls, 1996; Liu, 2006; Dellarocas et al. 2007), video games (Bounie et al., 2008), books (Chevalier and Mayzlin, 2006), and TV shows (Godes and Mayzlin, 2004).⁹ Some evidence even suggests that eWOM has already surpassed offline WOM in terms of persuasive power. People attribute more importance to opinions found in online forums than to their friends' views (Steffes and Burgee, 2009).

Influence by the Firm

“The more consumers come to trust the opinions posted in online forums, the less effective traditional advertising will become in influencing consumer behavior” (Thompson, 2003, p.1). This view of the ever decreasing usefulness of advertisements compared to WOM is also supported by Berry and Keller (2003). Many firms' marketers have recognized this shortcoming and have begun to take advantage of the marketing possibilities that eWOM offers.¹⁰ It is well-known that companies engage professional marketers to post benevolent opinions in chat rooms and online forums (White, 1999). While this approach might be questionable, empirical evidence supports its profitability (Chen and Xie, 2008;

⁸See Dellarocas (2003) for an overview of online feedback mechanisms.

⁹For an extensive review of literature on eWOM in particular see Breazeale (2009).

¹⁰Although companies could potentially engage in offline WOM, this option is inferior to eWOM both in terms of costs and market reach.

Godes and Mayzlin, 2009). Further, such corporate manipulations need not necessarily harm the consumer if they work as quality signalling mechanism (Dellarocas, 2006).¹¹ Although people usually regard WOM as more trustworthy than advertising (Faber and O’Guinn, 1984), this is clearly not true for firm-created WOM. As consumers are aware of the possibility of manipulation, they take a potential reporting bias into account when evaluating recommendations (Eagly et al., 1978). Additionally, opinion platforms usually employ various mechanisms to deter and detect opportunistic posters, e.g. by monitoring the postings and allowing users to rate others’ reviews. Of course, this can only be seen as an attempt which will prevent some but certainly not all marketers from praising their products.

2.3 Virtual Communities

Electronic word of mouth usually takes place in virtual communities,¹² which “most often take the form of discussion forums focusing on a set of interests shared by a group of geographically dispersed participants” (Burnett, 2000, p.2). These include various online forums like shared-interest websites, blogs, shopping sites, social networking sites, gaming communities, auction platforms, and company websites (Miller et al., 2009). While casual communication and support are also characteristic for VCs, we only focus on their information exchange function. Compared to face-to-face conversations, the exchange of information is far more efficient in terms of timeliness and (search) costs. Participants in

¹¹Godes and Mayzlin (2004) and Mayzlin (2006) provide further insights into the role of firms as participants in VCs.

¹²Note that a social network might be a virtual community, but does not need to be. While this may be true for Facebook and other “computer supported social networks”, the concept has its origin in sociology, where it is not bound to the online medium. See, for instance, Johnson (2005) for a demarcation of the term “social network”.

VCs may either act as active information providers, as passive information consumers, or as both. As Smith (1992) notes, 50 % of all messages are written by 1 % of the users, a phenomenon known as “lurking”. In this respect, we shall review the motivation to participate in a VC.¹³

Although standard economic theory predicts that users would rather free ride on others’ recommendations than post themselves, empirical evidence proves that enough people are willing to contribute without being economically rewarded, even if they make a loss (Resnick and Zeckhauser, 2002). On the other hand, giving advice clearly does not constitute a new phenomenon, but is just considerably facilitated by the Internet. People have always given (free) recommendations to each other, be it about body and health, family matters or computers (Wellman et al., 1996). Also, reciprocity does not seem to be a prerequisite for posting (Rheingold, 1993). Further, users might benefit through identification and social integration and therefore participate in a VC (Oliver, 1999). Although VCs are generally composed of strangers, they still evoke a sense of belonging in their members (Wellman and Gulia, 1999). Despite the presumably loose relations, the eWOM spread in VCs affects the members’ tastes. As Hayakawa (2000) notes, preferences are interdependent via “reference groups”, which can be found in VCs. Therefore, these online forums constitute an important place for the formation of preferences. This has eventually been recognized by many companies which try to use VCs as marketing tool. A firm’s involvement in a VC may take different forms. Firstly, the firm might act as observer and just screen VCs in view of the popularity of its own (and its competitors’) products. Secondly, the company may take the role of a moderator by establishing VCs to allow customers to

¹³As we have already discussed the motivation to engage in (e)WOM, this section will specifically focus on the incentives to join a community and post recommendations there.

exchange opinions. Thirdly, a firm might take one step further and control the information flow by deciding how and to whom it spreads the information. Lastly, firms may also actively participate in consumer-to-consumer conversation by creating (e)WOM themselves (Godes et al., 2005).

3 The Model

3.1 Model Setup

Following Miller et al. (2009), we use an agent-based simulation model programmed in MATLAB 7 to emulate the agents' interactions within and across virtual communities. Compared to a classical mathematical approach, the agent-based simulation gives us the advantage of being able to trace the dynamic development of preferences over time. The population is formed by n agents who divide into c communities. Each community i is run by a firm i and has n_i participants, with $\sum_i^j n_i = n$.¹⁴ An individual's participation may take two mutually non-exclusive forms. Either the agents post their opinions on the product of interest and potentially influence others or the agents read others' posts and are potentially influenced by these. In both cases, no direct experience with the product is necessary to form an opinion. Agents might post their preferences solely based on others' experiences. The preference or taste of an agent is one of three kinds: + (favors the product), - (opposes the product), or 0 (is undecided). If agents are undecided, they will not post, but only read others' views. However, if individuals have an opinion, they will post it with probability p_1^+ in the case of a favorable view and with probability p_1^- if they

¹⁴Notable companies that have established VCs in the past include Dell, Microsoft, Procter & Gamble, Sony, Smart, and Starbucks.

oppose the product. Altogether, f_i favorable and o_i opposing posts appear in community i in a given period.¹⁵ Consequently, the relative frequencies of favorable and opposing posts are given by $\frac{f_i}{f_i+o_i}$ and $\frac{o_i}{f_i+o_i}$, respectively, as in Miller et al. (2009). These essentially influence an agent's likelihood of *adopting* a preference other than their current one. Yet, for an individual to consider another preference at all, the frequency of the alternate opinion has to pass a certain threshold t_a . This value differs depending on the person who is influenced. In this respect, we assume the threshold for undecided agents t_a^0 to be lower than both the threshold t_a^+ of individuals having a favorable opinion and the threshold t_a^- of opposing agents. As undecided individuals do not have a set opinion, they will be more likely to adopt a (new) preference.

Individuals also differ in their willingness to learn, i.e. the probability of being influenced, p_2 , which depends on the post's characteristics. If this was submitted by a "+" type, the probability is given by p_2^+ , while for a "-" type individual it is given by p_2^- . The probability of being influenced by a "0" type is zero as such an agent will not post in the first place. Given this, we can now write a "+" type's likelihood of adopting an opposing opinion within community i as $p_2^-[\frac{o_i}{f_i+o_i} - t_a^+]$ if $\frac{o_i}{f_i+o_i} > t_a^+$ and 0 otherwise. Analogously, a "-" type's probability of adopting a favorable view is given as $p_2^+[\frac{f_i}{f_i+o_i} - t_a^-]$ if $\frac{f_i}{f_i+o_i} > t_a^-$ and 0 otherwise. It follows that agents of a "+" and "-" type stick to their preferences with the probabilities $1 - p_2^-[\frac{o_i}{f_i+o_i} - t_a^+]$ and $1 - p_2^+[\frac{f_i}{f_i+o_i} - t_a^-]$, respectively. Similarly, undecided individuals adopt a favorable view with probability $p_2^+[\frac{f_i}{f_i+o_i} - t_a^0]$ and an opposing view with likelihood $p_2^-[\frac{o_i}{f_i+o_i} - t_a^0]$. Finally, agents remain undecided with probability $1 - p_2^+[\frac{f_i}{f_i+o_i} - t_a^0] - p_2^-[\frac{o_i}{f_i+o_i} - t_a^0]$.

¹⁵The number of favorable posts f_i , for instance, results from multiplying the number of "+" type agents with their probability of influencing p_1^+ .

So far, we have only looked at preference adoption within a community. However, agents might also *switch* communities with probability s . Agents who switch to another community, essentially move their interest away from the former community/product to a new community/product. In that sense, switching is the first step to the adoption of a different product. The likelihood of switching to a different community j is increasing in the relative frequency of positive posts it displays. This value has to pass a certain threshold t_s for the individual to consider switching at all. We can thus write an agent's probability of switching from community i to j as $s_{ij} = \frac{f_j/(f_j+o_j)}{\sum_i^j (f_i/(f_i+o_i))} - t_s$ if $\frac{f_j/(f_j+o_j)}{\sum_i^j (f_i/(f_i+o_i))} > t_s$ and 0 otherwise.

For the agents' movement across communities, the following *switching rule* is supposed. After moving to another community, formerly “-” and “0” type agents become undecided at first. They might then adopt a positive or negative opinion in the following period.¹⁶ Agents holding a positive view however stay “+” types after switching.¹⁷ If agents do not switch in a given period, they stay in their current community. Hence, the overall *probability of adopting* an alternate opinion within the same community i is given by $a_i = (1 - \sum_j s_{ij})p_2[\frac{f_i}{f_i+o_i} - t_a]$.¹⁸

Each firm is endowed with the same resources, which it can either use for traditional advertising (AD), social networking (SN) or both under the assumption that SN is twice as effective as AD.¹⁹ Additionally, while firms can immediately implement AD at full

¹⁶One could also assume “-” and “0” agents to instantaneously become “+” types after switching. However, this would artificially limit the possibility of negative influence on undecided agents. Further, neither “-” nor “0” types have any incentive to switch if they stay or become “-” types in the new community. Thus, we disregard this possibility too. As can be shown, however, the results would remain largely the same.

¹⁷As individuals of a “+” type are satisfied with the product, we assume them to only switch to a product whose perception is also positive.

¹⁸Note that, unlike the likelihood of adoption introduced earlier, the overall probability of adopting accounts for the possibility that some agents switch to other communities.

¹⁹As empirical evidence proves, WOM and SN are at least twice as effective as AD (Katz and Lazarsfeld,

strength, we assume SN to follow an S-shaped “learning” curve. In other words, due to its nature, SN needs some time to gain momentum. Engaging in social networking is synonymous to facilitating the diffusion of electronic word of mouth (WOM)²⁰ by providing and maintaining VCs which gather (potential) consumers and facilitate their exchange of views. By contrast, pursuing AD is tantamount to engaging in persuasive advertising. We assume both AD and SN to lower the adoption threshold within a community t_a and the switching threshold t_s . A firm’s own efforts will bind the agent to the community and thus increase the switching threshold. However, the rival firm’s efforts will work in the opposite direction by making a switch more attractive and hence lowering the threshold. Further, adopting SN positively affects both the agent’s probability of influencing p_1 and the probability of being influenced p_2 . Each period, firms decide whether to invest in SN, while spending the remaining budget on AD. As SN bears the risk of being harmful in the case of negative WOM, firms will generally only invest in SN if their product’s image in the community is not negative.

Henceforth, we assume a market with two competing companies. Each of them supplies a single product, which is discussed in a VC with an initial number of agents between 10 and 150. A community may be either an independent forum or a company-maintained VC if the firm uses SN as marketing tool.²¹ All agents are aware of the existence of the products and may already have an opinion when joining a community for the first time. As people with negative views appear more likely to post (e.g. Anderson, 1998), the

1955; East et al., 2005; Villanueva et al., 2008). In this context, higher effectiveness means greater persuasiveness, i.e. a higher likelihood that a consumer adopts a certain product if they learn about the product via word of mouth as opposed to AD.

²⁰Although the model treats electronic word of mouth, we will for simplicity refer to it as “WOM”, given the mechanism behind it is essentially the same as for conventional word of mouth.

²¹A firm needs not build up its own VC, but may acquire or invest in an independent VC, thus transforming it into a company sponsored community.

probability of influencing is assumed to be higher for “-” types (0.7) than for “+” types (0.5), i.e. $p_1^- > p_1^+$. Likewise, we assume the willingness to learn (probability of being influenced) to be 0.5 (0.7) for “+” (“-”) types due to the so-called “negativity effect”.²² As these two types of agents have set opinions, we assume their thresholds to be higher (0.5) than for undecided individuals (0.3). By contrast, the switching thresholds differ for “+” and “-” types as agents who are happy with the product (0.7) will be more bound to the specific community than those opposing it (0.3). To ensure consistency, an undecided agent’s threshold is supposed to lie in the middle of the other two (0.5). Table 1 illustrates all the parameters we use in the simulation.

Parameter	Value	Description
n	110 - 300	Total agent population
c	2	Number of communities
t	100	Number of time periods
p_1^+	0.5	Probability that “+” type influences
p_1^-	0.7	Probability that “-” type influences
p_2^+	0.5	Willingness to learn from “+” type
p_2^-	0.7	Willingness to learn from “-” type
t_a^+	0.5	Adoption threshold for “+” type
t_a^0	0.3	Adoption threshold for “0” type
t_a^-	0.5	Adoption threshold for “-” type
t_s^+	0.7	Switching threshold for “+” type
t_s^0	0.5	Switching threshold for “0” type
t_s^-	0.3	Switching threshold for “-” type

Table 1: Summary of Parameters

The timing in each period is as follows. First, firms decide whether to invest in AD and/or SN to promote their products. Then, benevolent and opposing agents have the opportunity to post their views on the firms’ products. Following this, all agents decide

²²Negative WOM is usually perceived as more informative and relevant, which is known as “negativity effect” (e.g. Fiske, 1980; Herr et al., 1991; Klein, 1996).

whether to switch communities. If they choose to stay where they are, they might still adopt a new preference. Individuals can only switch once per period and do not participate in more than one community at a time. Firms observe their product’s perception in the community and choose their strategy accordingly.

3.2 Results

3.2.1 Benchmark Scenario

As a benchmark scenario, we abstract from firm involvement for a moment and look into the preference formation without influence of the firm.²³ To keep matters simple at first, let the distribution of preferences be equal across communities and consider three cases with an initially positive, neutral and negative product perception, respectively. Figure 1 illustrates how the image of the two products evolves over time in the first case, where the initial image is positive with 45 “+” types (n_i^+), 40 “-” types (n_i^-) and 15 “0” types (n_i^0).²⁴ As Figure 1a shows, the majority of “+” types leads to both products’ overall perception becoming entirely positive over the time frame of 100 periods. Yet, it takes 20 periods for all “-” and “0” agents to be positively influenced by WOM and to “jump on the bandwagon”. In detail, the higher probability of posting and reading negative WOM leads to some “+” and “0” agents adopting a negative view. This is however offset by several “-” types switching communities and thus becoming undecided again, implying an overall increase in “0” types. In the next period, each agent is again subject to the influence of

²³Note that firms are still present in the benchmark scenario. Yet, they do not sponsor communities, which we therefore suppose to be independent and resistant to firm influence. Consequently, all exchange of views in the benchmark scenario will take place in generic VCs supplied by independent providers.

²⁴For the three cases, exemplary and comparable agent distributions were chosen to illustrate the preference formation process appropriately.

“+” and “-” types. While some adopt a favorable view, a larger number become “-” type agents. Yet, this ratio reverses after a few periods as the relative number of “+” agents in each community (and thus their influence) increases due to many “-” types switching communities. Eventually, all “-” and “0” agents will adopt a positive view, leading to a positive image in both communities.

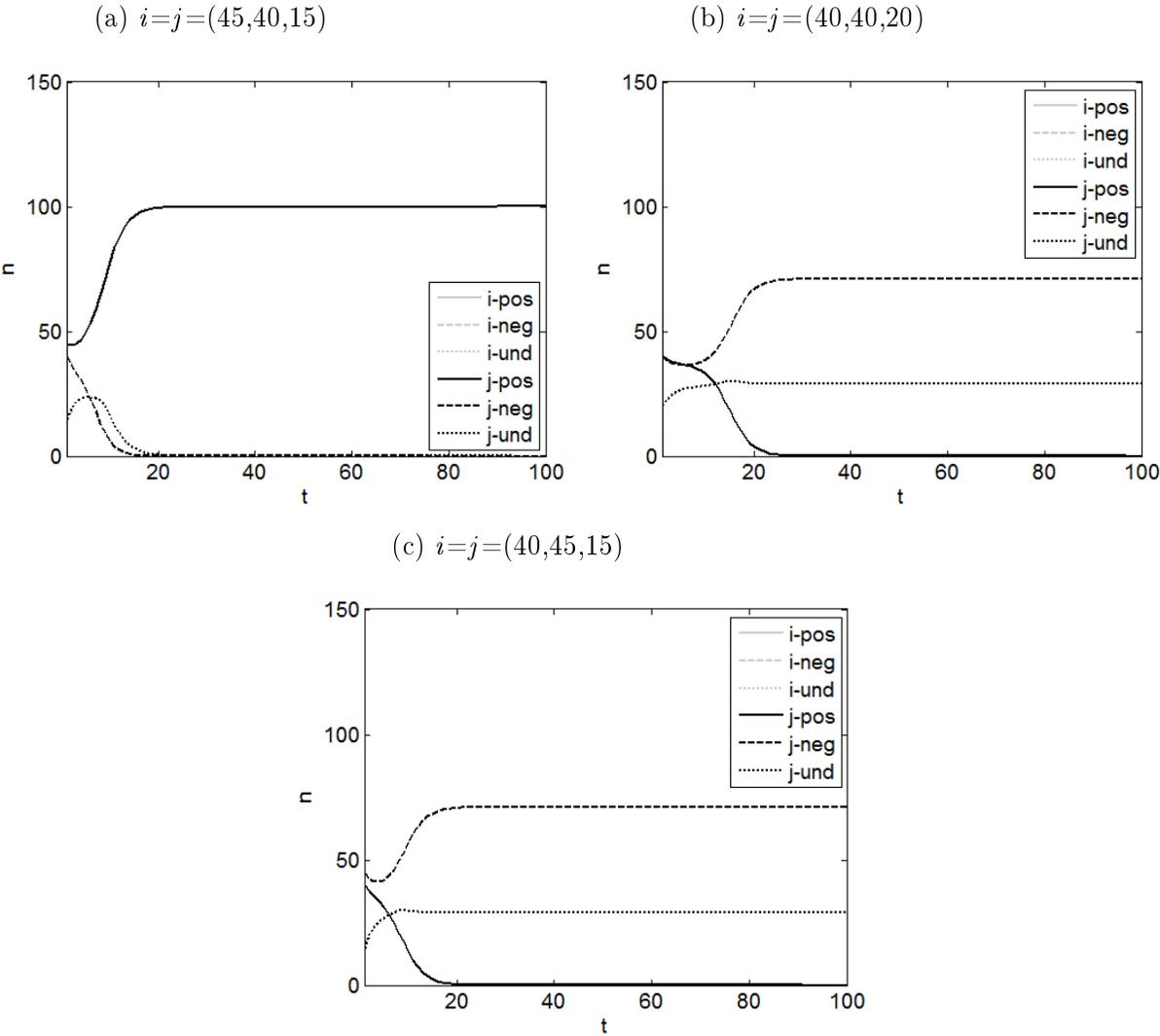


Figure 1: Benchmark Scenario

In case two, positive and negative views are balanced in the beginning ($n_i^+ = 40, n_i^- = 40, n_i^0 = 20$). Figure 1b illustrates how negative WOM spreads more quickly than positive

opinions and changes most of the “+” types in opposing agents, while the share of undecided individuals remains relatively stable at around 30 % after an initial moderate increase. As both communities are characterized by a negative image, many agents will switch and become undecided agents in the other community, which leads to the persistence this share of “0” types.

In the third case, the product’s initial perception is negative ($n_i^+ = 40, n_i^- = 45, n_i^0 = 15$), which leads to a similar picture as in the previous case (cf. Figure 1c). Again, the negative opinions impose themselves and prevail over time. As the communities are symmetric, the final preference distribution will be the same for both products in all three cases.

3.2.2 Single Channel Strategy

Let us now, *ceteris paribus*, allow firms to participate and compete with each other in promoting their respective product by engaging in either AD or SN, but not in both. Again, consider the first case where initially a favorable opinion prevails ($n_i^+ = 45, n_i^- = 40, n_i^0 = 15$). In this case, an entirely positive perception evolves over time, irrespective of whether the companies make use of AD or SN (cf. Figure 2a and 2b, respectively). If both firms employ different strategies, they will also benefit from a positive image (cf. Figure 2c). However, the company using AD (i) will enjoy more benevolent community members at the expense of its rival (j) as the latter’s SN activities need time to gain momentum, while AD is ready for implementation right from the start.

In the second case with balanced views ($n_i^+ = 40, n_i^- = 40, n_i^0 = 20$), the employment of

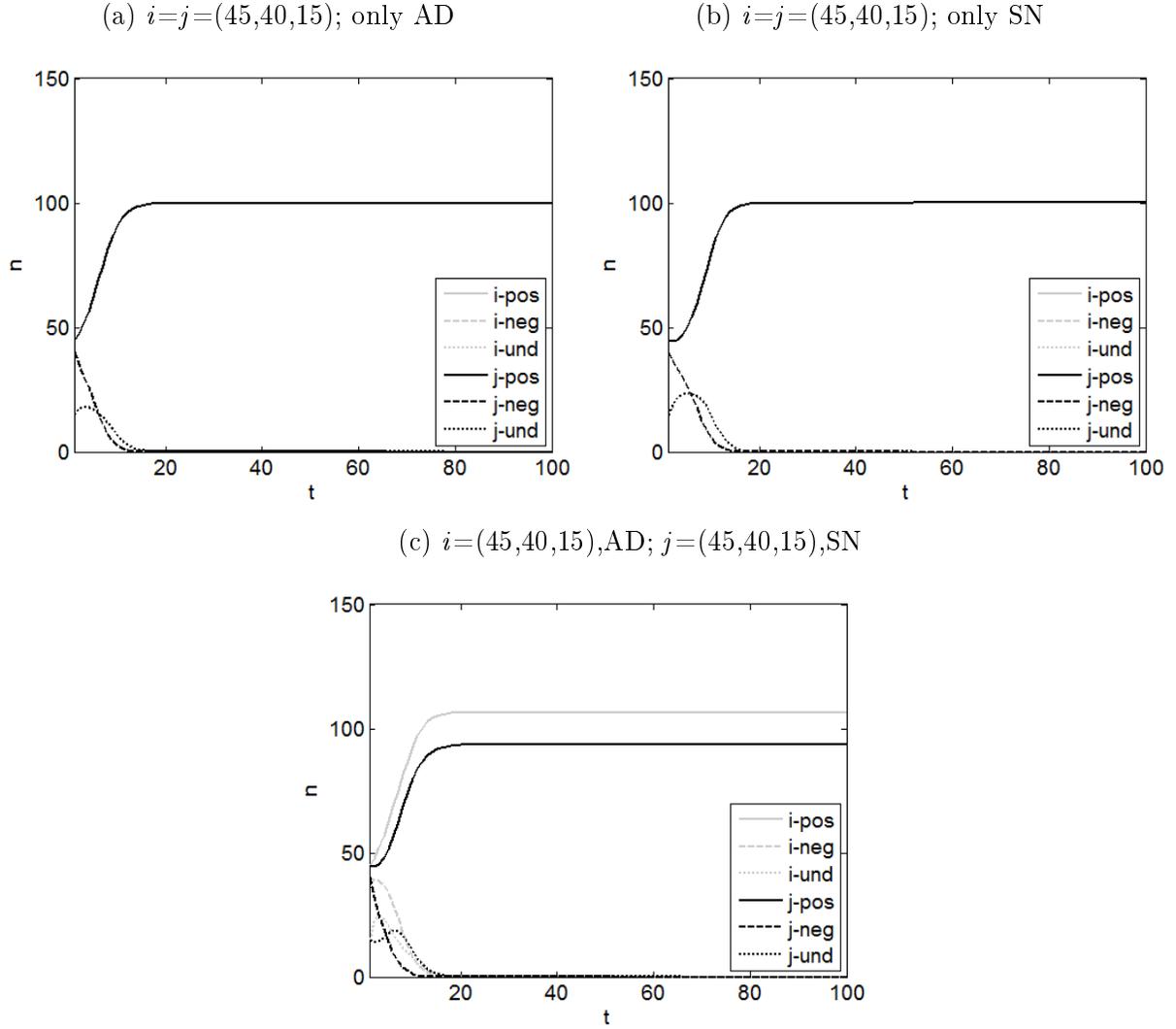


Figure 2: Single Channel (case 1)

AD lowers the adoption threshold t_a^+ enough to lead to a positive perception as in case one (cf. Figure 3a). Similarly, as Figure 3b shows, firms solely relying on SN do also manage to move their product's image in a positive direction. However, it takes considerably longer than for pure AD. If both companies make use of different strategies as illustrated in Figure 3c, the one employing SN (j) will attract more benevolent community members despite the slower implementation of SN. The high number of negative opinions hampers the AD strategy of company i , which lets its opponent benefit from the majority of “+” agents. In this simplistic model, we suppose the distribution of “+” agents between the

two communities to be a proxy for the firms' market shares.

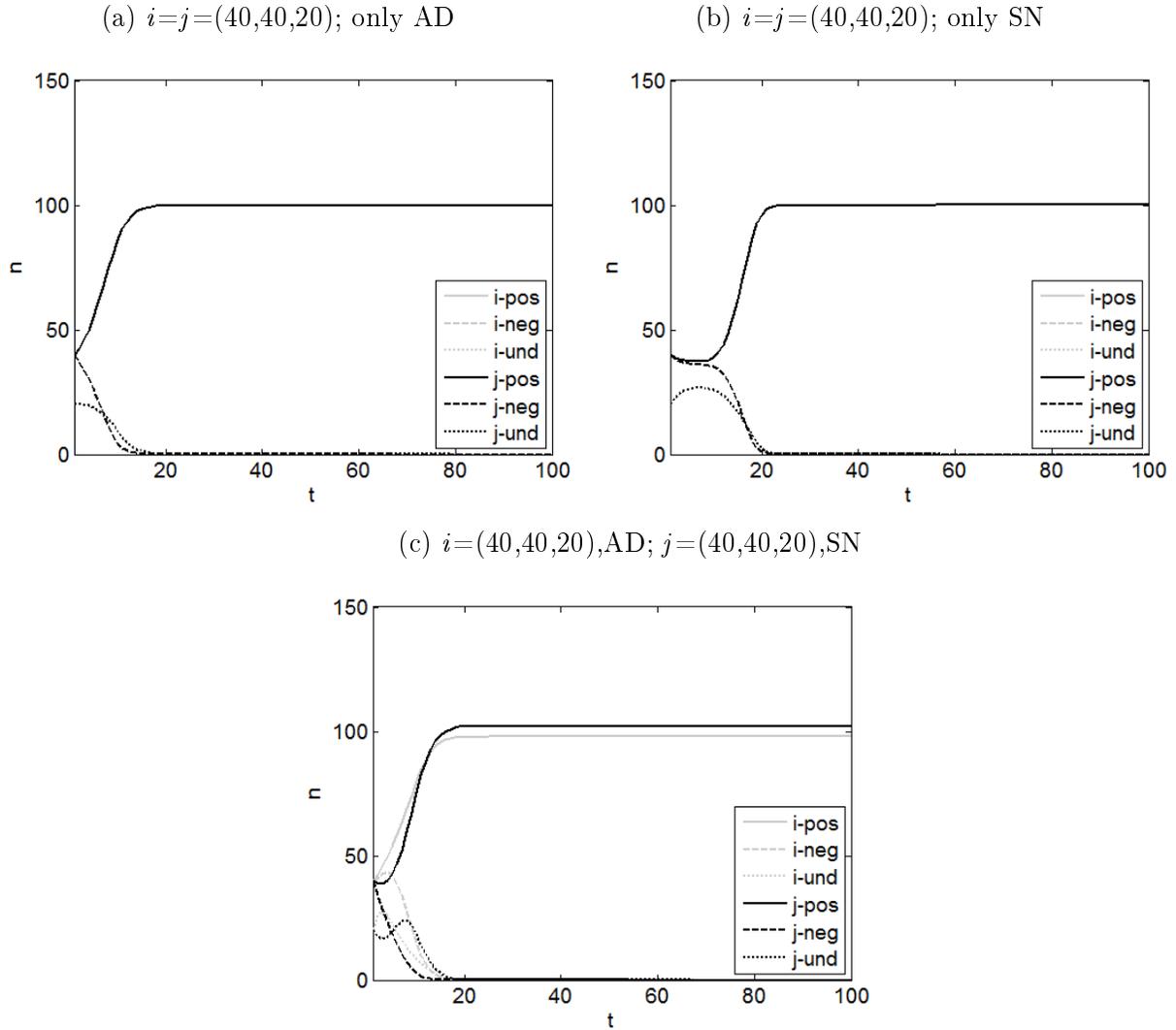


Figure 3: Single Channel (case 2)

As Figure 4a shows for case three ($n_i^+ = 40, n_i^- = 45, n_i^0 = 15$), AD is able to influence consumers to adopt a favorable view despite the initial majority of negative opinions. By contrast, the reliance on SN does not pay off without a majority of positive opinions and leads to a prevalent negative image if both companies use SN (cf. Figure 4b). In fact, roughly 70 % of opinions are negative with the remainder being neutral like in the respective benchmark case. If both firms employ different strategies, the company using SN

(j) will gain market leadership as in case two (cf. Figure 4c). It benefits from the positive effect of its competitor's AD efforts, which reduce the overall level of negative WOM in the market and thus pave the way for its SN strategy. Irrespective of its competitors, a firm which is limited in its marketing strategy choice, should generally choose AD.

Proposition 1 *A firm which is constrained to a single marketing channel is more likely to gain new customers by using traditional advertising rather than social networking means.*

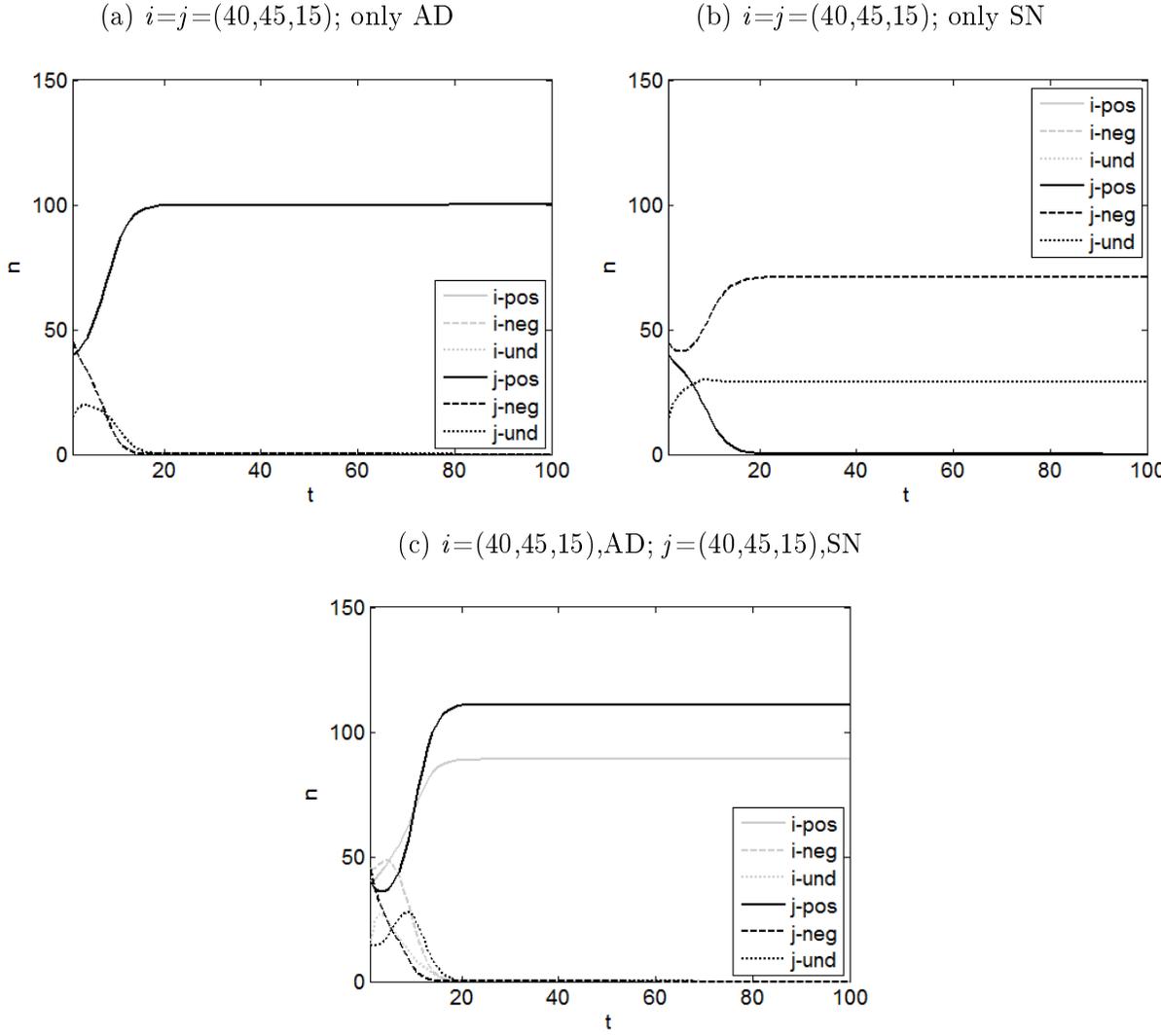


Figure 4: Single Channel (case 3)

3.2.3 Strategy Mix

After having examined the effectiveness of AD and SN separately, we allow firms to mix both marketing strategies in the following. As assumed earlier, a company will generally trade AD for SN whenever its product's image is positive and steadily increase the SN share until it solely relies on it. Further, a rival's engagement in SN strategically affects a company's own employment of SN in the following way. The firm which embraces SN first has a first mover advantage, which leaves the lagging firm with three options. First, the company might stick to its strategy and independently adopt SN whenever its product's image is (or turns) positive, accepting a possible lag to its competitor. Second, it can respond aggressively by forcing the adoption of SN at all costs. Although this entails a faster exchange of opinions, the risk of a negative image increases as the majority of opinions might still be negative. Third, the company can leave its focus on AD and react defensively by hesitantly adopting SN, implying a slower implementation. As this case does not yield additional insights and also seems unlikely supposing a firm is eager to embrace SN, we neglect this case in the following analysis.²⁵

To compare the results with the previous findings, we start by looking at symmetric communities. As this excludes the possibility of a first mover advantage, the only feasible strategy is the first, i.e. the companies independently adopt SN. Figure 5 shows how companies can positively influence the preference formation by mixing their marketing resources. In all three cases, the firms succeed in shifting the common opinion in their favor with the help of both AD and SN. As Figure 6 shows exemplarily for firm i in the

²⁵As the laggard in this case has no means to catch up (by assumption), the resulting outcome is obvious. Note that a firm could also react by not adopting SN at all. However, this case is also omitted here as it essentially corresponds to the single channel strategy treated earlier.

third case, both firms first rely on AD for a few periods to move the common opinion in the “right” direction. Once succeeded, they gradually shift their focus on SN which spreads the positive perception quicker than AD.²⁶ Overall, the results very much resemble the case of pure AD. For the specific case of symmetric communities, we can thus conclude that a mix of AD and SN is not superior to pure AD due to the time SN needs to gain momentum.

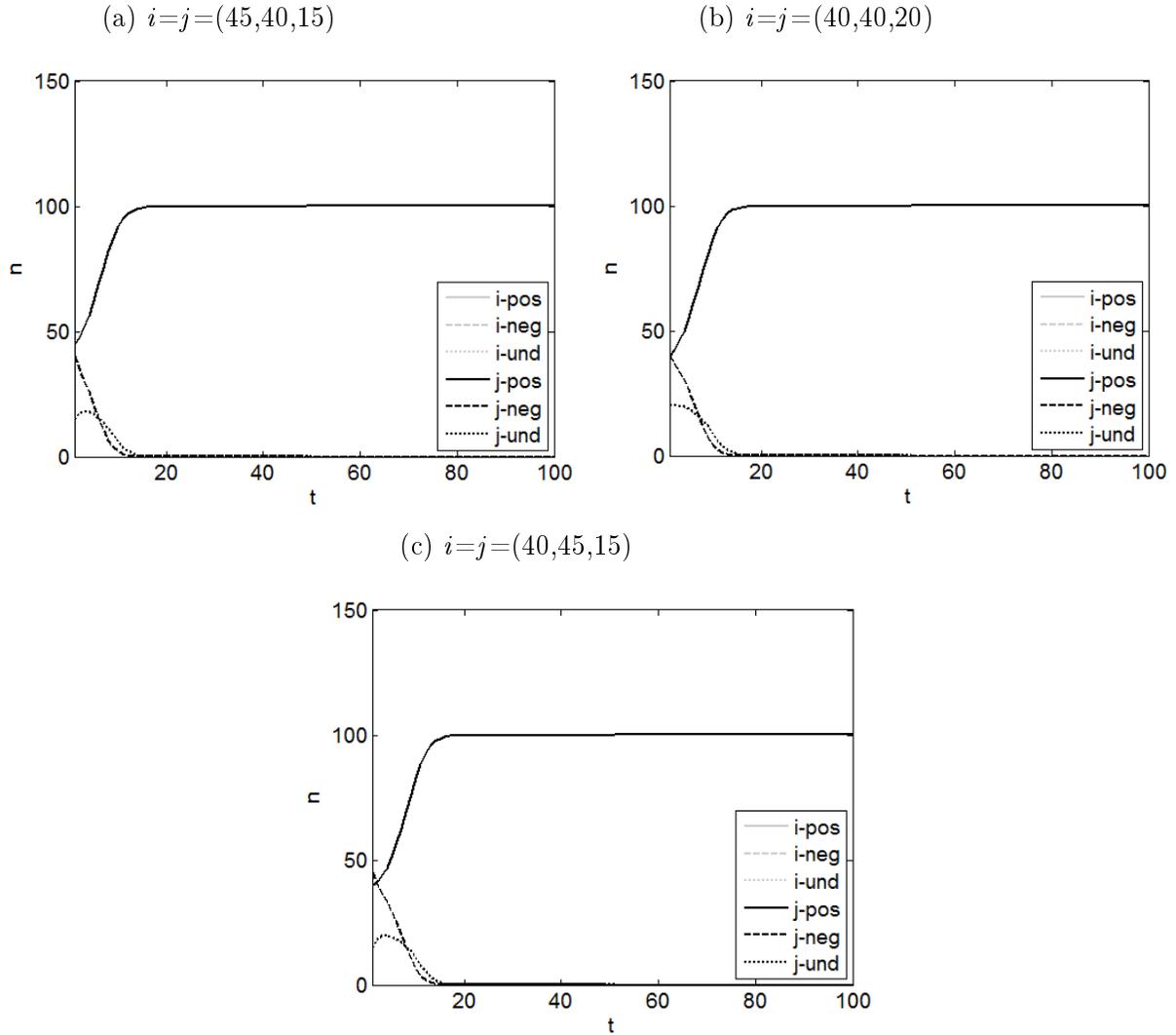


Figure 5: Strategy Mix

²⁶In this respect, keep in mind that we assume SN to be more effective than AD which results in a higher speed of preference transmission.

$$i=j=(40,45,15)$$

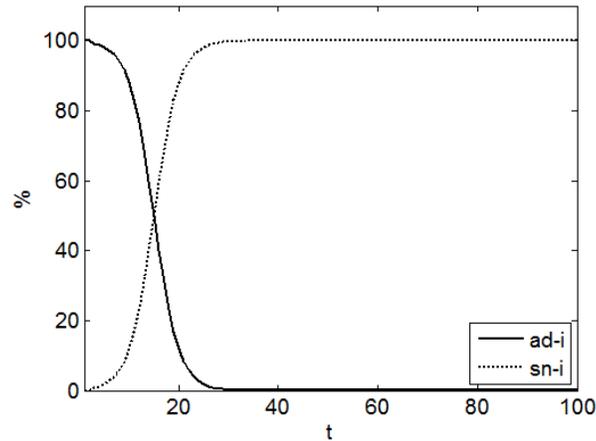


Figure 6: Strategy Mix (SN and AD shares in case 3)

Asymmetric Communities

To analyze the different strategic responses triggered by a firm’s adoption of SN, we depart from symmetric communities and introduce some heterogeneity. In a first step, we relax the assumption of an equal ratio of “+” to “-” types across communities. If a firm faces a negative product image in its community ($n_i^+ = 40, n_i^- = 45, n_i^0 = 15$), while its competitor’s community is characterized by a positive product perception ($n_i^+ = 45, n_i^- = 40, n_i^0 = 15$), it will succeed in improving its product’s image but will still lag behind its rival, unless it manages to gain leadership in SN. As Figures 7a and 7b show, the small initial difference amplifies and leads to community i losing ground on community j , if the former does not react to its competitor’s action. The picture changes if firm i reacts aggressively and manages to be the one to lead in SN regardless of the higher risk of a negative image (cf. Figures 7c and 7d). Thus, companies may use the power of SN to overcome an initial competitive disadvantage and subsequently become the market leader.

As the laggard cannot reach its competitor with the help of AD alone, a combination

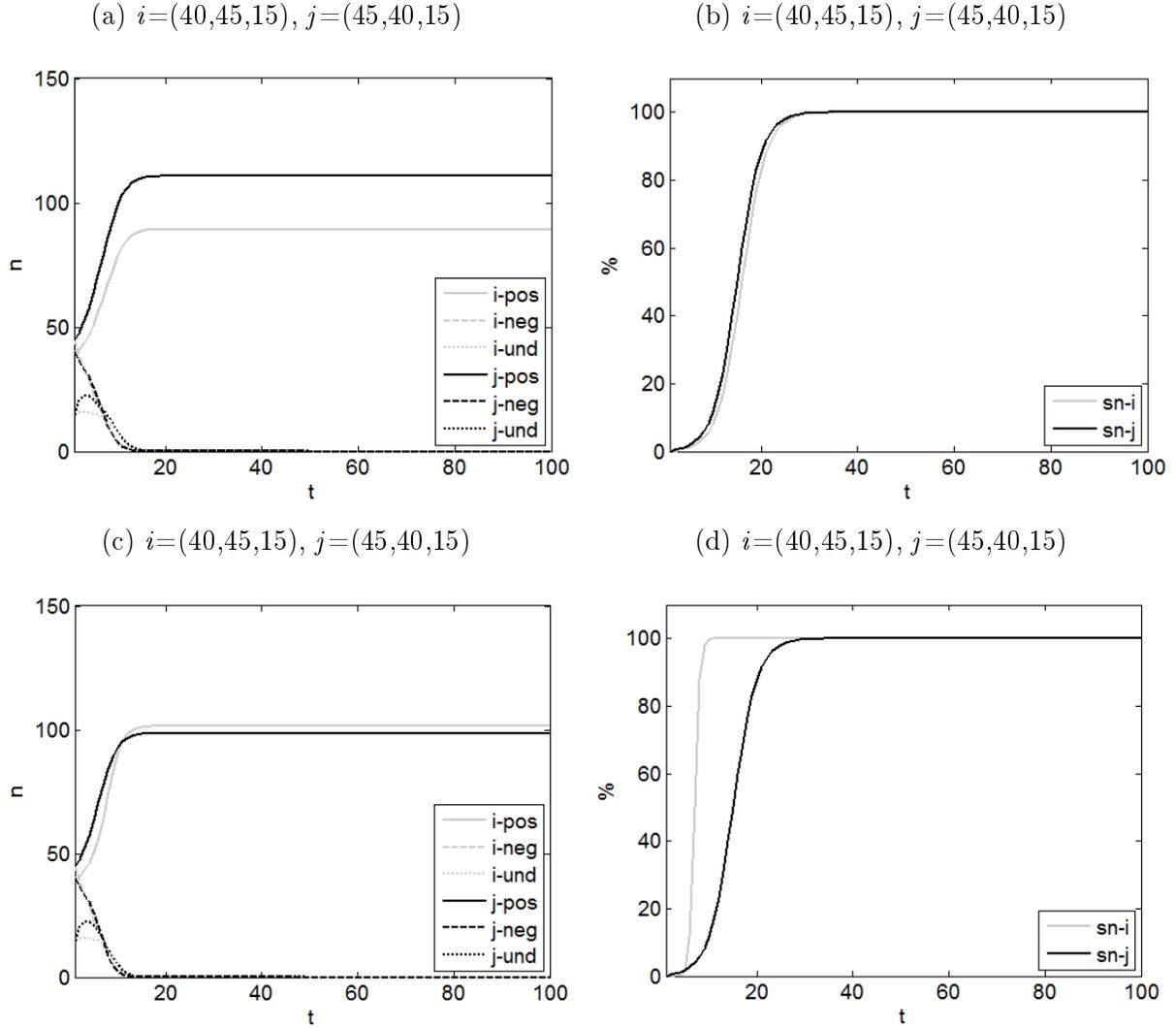


Figure 7: Asymmetric Preference Ratios

of both strategies is superior to pure AD whenever a firm suffers from a negative image and its competitors enjoy a better image. In general, a firm cannot go wrong by mixing both channels, especially when its image is bad.

Proposition 2 *A firm increases its chances to gain market leadership by combining traditional advertising with social networking means instead of using one or the other.*

In a second step, we look at communities which differ in size. Let community i be characterized by $n_i^+ = 5$, $n_i^- = 4$, $n_i^0 = 1$ and a size of 10 agents. While it displays the same relative distribution of preferences, we assume the other community j to start with

100 agents ($n_j^+ = 50, n_j^- = 40, n_j^0 = 10$). One may think of the communities as pertaining to a small new brand and a large established brand, respectively. As Figures 8a and 8b show for the case of no strategic reaction, the small company is able to considerably catch up, but nonetheless ends up with a market share of only 25 %. By contrast, Figures 8c and 8d suggest that, by pushing the implementation of SN and becoming the leader in SN, the smaller firm i can increase its (potential) consumer base by 35 % compared to the previous case. As before, a strong focus on SN helps the firm increase its market share.

Proposition 3 *A firm which thoroughly embraces social networking can compensate a relatively worse product image and eventually become the market leader.*

Negative Word of Mouth

After having highlighted the advantageous role of (positive) WOM, let us consider the downside, i.e. the risk inherent to (negative) WOM. As Figure 4b showed, SN can easily lead to a predominance of negative WOM. This is especially true for firms which solely rely on SN, but it can as well occur to those employing AD or a mix of both. Obviously, firms should try to avoid a scenario where their product's image shifts to a negative perception. The risk of becoming a victim of negative WOM increases both with the ratio of “-” to “+” types and with the number of “0” agents. The first condition is rather straightforward as, *ceteris paribus*, a higher ratio of “-” to “+” types increases an individual's chance to be influenced by a “-” type agent. While a slightly negative opinion ($n_i^+ = 40, n_i^- = 60, n_i^0 = 0$) can still be overcome, a high ratio of “-” to “+” types ($n_i^+ = 20, n_i^- = 60, n_i^0 = 0$) leads to the persistence of negative WOM (cf. Figures 9a and 9b).

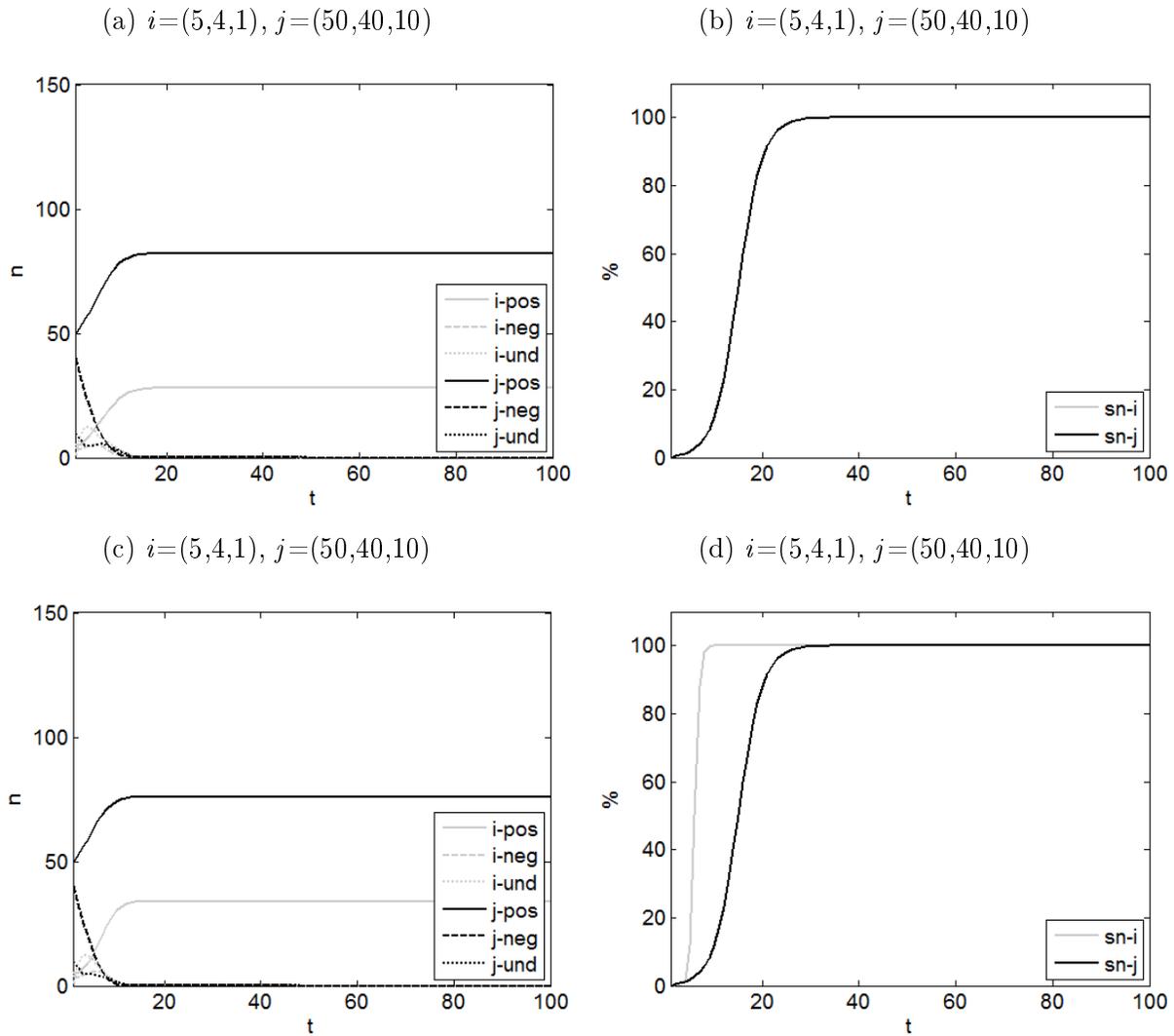


Figure 8: Asymmetric Community Sizes

Less obviously, the bare number of undecided individuals matters a lot, too. Intuitively, as negative WOM spreads faster, undecided individuals rather adopt a negative than a positive opinion. Consequently, a high number of “0” agents facilitate the diffusion of a negative product perception. *Ceteris paribus*, an increase in this number, e.g. by 50, may change the outcome from an entirely positive perception to an overly negative image with more than 70 % “-” type agents and the remainder being undecided (cf. Figures 9a and 9c). It follows that a firm’s risk to suffer from negative WOM is highest right after the initial introduction of a product as the number of undecided consumers is largest at that

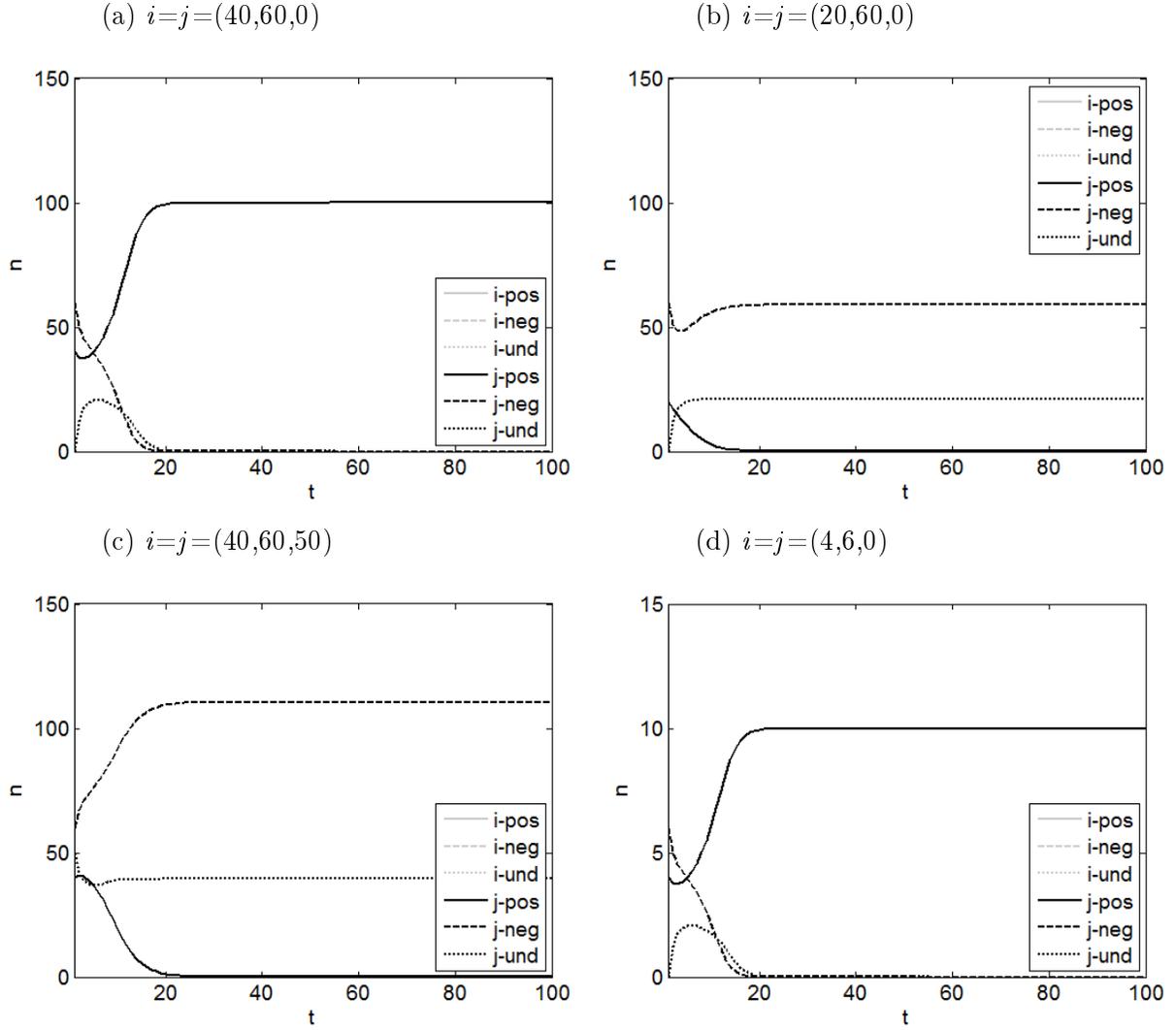


Figure 9: Negative WOM

time. Last but not least, if we compare communities which solely differ in the absolute number of negative opinions, while the ratio remains constant ($n_i^+ = 40, n_i^- = 60, n_i^0 = 0$ and $n_i^+ = 4, n_i^- = 6, n_i^0 = 0$), it is easy to see that the pure number of “-” agents has no significant influence on the outcome (cf. Figures 9a and 9d).

Proposition 4 *A firm’s risk of suffering from negative word of mouth is highest right after a new product’s market launch.*

4 Discussion and Conclusion

By simulating interpersonal behavior in the form of electronic word of mouth (WOM), we were able to analyze the endogenous formation of preferences in virtual communities (VCs). The resulting within and across community dynamics shed light into the trade-off firms face with regard to their marketing mix. As we stressed, traditional advertising might be more costly and less effective than fostering word of mouth in VCs, but it is at least inherently positive. This is not true for WOM, which may be either positive or negative and thus entails the risk of undesired negative publicity. To create a benchmark for the analysis, we first looked at two symmetric communities in three basic scenarios without the participation of firms. These online forums only differed in their participants' initial distribution of preferences regarding a company's product. We found that, unless the common perception of the product is positive at first, negative WOM leads to a poor image over time. This is partly owed to the fact that people seem more likely to spread negative rather than positive WOM (e.g. Anderson, 1998) and are also more sensitive to negative information (e.g. Fiske, 1980; Herr et al., 1991; Klein, 1996).

To minimize the risk of a negative image, firms were given the possibility to either engage in traditional advertising (AD), in social networking (SN), or in both. Firms which, for whatever reason, have to restrict themselves to one marketing channel, will be on the safe side by choosing AD. Small and/or new firms, for instance, might not have the (financial) resources to pursue a multi-channel strategy and are thus limited in their flexibility. As AD is inherently positive, it can help them move an initially negative perception in the "right" direction, which they cannot accomplish with SN. Hence, if companies only have the choice between AD and SN but cannot employ both, they should rather focus on AD.

If, however, firms have the possibility to mix both channels, they should do so. A combination of both potentially outperforms a sole reliance on AD. Although both strategies are equally well-suited for the special case of symmetric communities, a multi-channel strategy generally constitutes the optimal option. Firms should use the persuasive power of AD to “pave the way” for SN. This finding is in line with Eisingerich et al. (2011) who show that it is essential to build up a positive image to resist negative information. After a positive reputation has been achieved, the firm should then focus on SN, whose strength lies in the quicker diffusion of positive WOM. Hence, in contrast to Mayzlin (2006), we find AD and SN to be complements.

As we showed further, a firm which manages to build up leadership in SN is able to gain market shares from its competitors. This allows a firm to gain market leadership even if it initially lagged behind in consumer awareness. Owing to SN, the own community members will be more likely to stimulate other communities’ agents to switch, which in turn increases the company’s market share. A small (new) firm may thus challenge its bigger (established) rivals if it thoroughly embraces SN and achieves leadership in it. Even if its present product perception is negative, this strategy can pay off for the laggard, regardless the higher risk of negative WOM. Still, firms should generally first launch an advertising campaign to positively affect the product image and subsequently enable the company to become the leading firm by exploiting the power of positive WOM.

Yet, marketers must not neglect the risk inherent to SN. Solely relying on SN can foster negative WOM and may lead to an undesired outcome. Hence, firms should know when SN is especially risky. The likelihood of negative WOM does not per se increase with the number of negative opinions in a community, but with the ratio of opposing to

favorable views. *Ceteribus paribus*, an individual's chance to be influenced by a negative rather than by a positive type increases, which stimulates negative WOM. As mentioned earlier, companies facing a negative image should thus at first rely on persuasive advertising to improve the product's perception. Only then the risk of negative WOM is contained. Moreover, a higher number of undecided individuals spurs negative WOM. As people tend to chat more about bad experiences and are also more sensitive to them, negative WOM spreads faster than conducive gossip. Comparatively more individuals will then adopt a negative preference, all other things equal. Consequently, the risk of negative WOM and thus of a bad product image is highest right after the initial product launch due to the large number of undecided individuals. It subsequently decreases with more and more people making up their minds. Firms should keep that in mind when deciding on (the timing of) their marketing strategies.

In sum, the following managerial recommendations can be given. Firms should generally employ a two-step strategy which first uses AD to ensure a positive product image and subsequently focuses on SN to quickly gain market shares. Companies, however, which are limited in their strategy choice, should rather choose AD than pure SN due to the latter's inherent risk of negative WOM. Although potentially cheaper, firms should not completely replace traditional advertising with social networking, unless their product's perception is unambiguously positive. Finally, leadership in SN can help (lagging) firms to become the market leader if they thoroughly embrace SN.

The findings are subject to at least two limitations. First, while the employed model was designed to be as realistic as possible, an agent-based simulation model can only be an approximation of real life interactions. Assumptions had to be made on the specific

values of the model parameters. Although they were mostly in line with existing literature (e.g. Miller et al., 2009), their validity can only be proved by empirical studies. While some prior work looked at the likelihood of influencing others and of being influenced, respectively, there is need for empirical work on adoption and switching thresholds. Second, we treated the simplified example of two firms. A more realistic model could accommodate a larger number of competitors and could be extended further by studying multiple product communities.

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