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User reward programs in online social media ☆

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ABSTRACT

Online social media (OSMs) have become a popular and growing Internet phenomenon, as exemplified by the millions of followers of websites like YouTube, Twitter, and Facebook. Given the Internet's ease of access and the high degree of competition to attract users to these sites, a question arises as to whether OSMs should develop revenue-sharing programs as a way to reward their contributing users. We present an *ex ante* asymmetric duopoly OSM game, where heterogeneous users are either active or passive with respect to each OSM. The game includes two steps: First, the OSMs simultaneously announce their rewards for active users; and second, based on their preference, users choose their level of contribution with respect to each OSM. We show that this game has a unique Nash equilibrium in pure strategies, and we identify the conditions under which a symmetric equilibrium exists, despite the asymmetry between the OSMs. Moreover, at equilibrium, no user chooses to contribute content exclusively to the less favourable OSM, even when the more favourable firm shares a lower reward than the less favourable firm. Furthermore, in some circumstances, a higher asymmetry can diminish the net revenue of the more favourable firm and vice versa.

1. Introduction

During the last decade, *online social media* (OSMs) have become a popular and growing Internet phenomenon. Hundreds of millions of users from all over the world visit and contribute to these websites on a daily basis. As of October 10, 2014, LinkedIn, Twitter, YouTube, and Facebook had around 300 million, 950 million, 1 billion, and 1.28 billion unique users, respectively[1]. In this paper, we define an online social medium as any website providing a platform that allows online users to join and post user-created content (UCC). This definition includes *social news* websites, such as Digg and Reddit; *video- and photo-sharing* websites like YouTube, Flickr, and Metacafe; *social network* websites, such as MySpace, Facebook, Google+, Tencent QQ, and Twitter; and *portal* sites such as Yahoo Groups. The key benefit for users comes from the predominantly free service that allows them to stay connected with their communities and friends, sharing knowledge and user-created content like photos, videos, files, software, bookmarks, and blogs. These features contribute to OSMs' appeal for advertisers.

Although some OSMs generate revenue through membership fees, affiliate programs, donations, and merchandise sales, the most common source of revenue is through advertising. Advertisements are displayed to users, and revenue is generated (to an OSM) based on the amount of time the advertisement is displayed and/or the number of times it has been clicked. Based on Deane and Agarwal [8], in the United States alone, annual revenues from ads on social media sites were estimated at over $26 billion in 2010. Hu [17] argues that advertisers have started to realize that the Internet is a much more accountable and measurable medium compared to other forms of traditional media like television. Therefore, the larger the online community, the more lucrative the site is for advertisers to post their ads, and the greater the opportunity for higher revenue. Consequently, community retention and expansion stand out as key issues for OSMs.

Broadly speaking, there are two types of OSM users: *active* and *passive*. Active users post content and observe other active users' contributions, while passive users simply review content generated by active users. Within each category, there is, of course, a continuum. For example, the active category is likely to contain very active users who contribute on a daily or even hourly basis, as well as minimally active users who infrequently post a contribution. Likewise for passive users: some may be "active passive" in that they visit the site frequently, while others visit the site so infrequently that they may not even be considered a user. For the purpose of this paper, we restrict the discussion to consider only two categories. More details are provided in Section 3.

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[1] URLs: press.linkedin.com/News-Releases/333/LinkedIn-reaches-300-million-members-worldwide; businessinsider.com/number-of-users-who-abandon-twitter-2014-2#!JxoTo; youtube.com/yt/press/statistics.html; newsroom.fb.com/company-info/; accessed 2014-10-10.

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Table 1
Categories of revenue sharing in OSMs (accessed October 10, 2014).

Category	Examples	Structure of payment
Written content	Helium	Earnings range from $10 to $200 per article plus a $3 bonus
	Oondi	Writer gets 100% of the advertisement profits
Video sharing, podcasting, audio and music	YouTube	YouTube pays video developers between $2 and $5 per 1000 plays
	About	Video producers are paid a flat fee of $250 per video
	Blip.tv	On a 50/50 basis, Blip.tv shares its advertising revenue with producers
Photography	Shutterfly	A Shutterfly Affiliate earns $9 per new customer
	PhotoWorks	Users earn money from photos, illustrations, vectors, and footage
Professional and reviewing community	RateItAll	It shares 50% of the Google Adsense revenue generated by the pages users create
	Newsvine	Users receive 90% of revenue from advertisements
Answer services	Ether	Users earn money over e-mail
	Mahalo	The most helpful users receive payment from those who submit the question
Miscellaneous	RedBubble	An online art community that allows users to sell their works
	Kongregate	A large community of independent game developers with weekly prizes

Since users visit OSMs because of UCCs created by active users, some OSMs provide active users with monetary incentives through *revenue-sharing programs*. Under these relatively new practices, OSMs share a portion of their revenue as *rewards* to their active users. The main purpose of these programs is to increase the traffic and popularity of OSMs, which ultimately drive higher revenue. Table 1 categorizes OSMs with user reward programs. For example, YouTube, although not explicitly declared, pays video developers of original content approximately $2 to $5 per 1000 views of their posted video[2].

We consider two online social media sites that compete *simultaneously* by rewarding active users (e.g., YouTube and Metacafe). The firms are assumed to be asymmetric in that online users have a general preference for one of the sites. We label one as "more favourable" and the other as "less favourable" and investigate ways for the less favourable firm to compete with the more favourable firm. Both firms decide on the amount of reward they will offer as their strategy. We demonstrate how to derive the optimal reward levels and show that the game has a unique Nash equilibrium in pure strategies. At equilibrium, some users may be indifferent with respect to making a choice between two firms, but we show that the possibility of this case is zero and corresponding firms' market size based on users' choices are unique.

This paper makes the following contributions. First, we find that, for any level of asymmetry, there exists a revenue structure such that the game has a symmetric equilibrium [i.e., the two OSMs provide the same level of reward to their active users]. Consequently, although a symmetric allocation of users signals a symmetric game, a symmetric equilibrium does not necessarily imply a symmetric game. Second, when users have economy of scale for contribution to both firms, at equilibrium, no one chooses to contribute content exclusively to the less favourable firm, even when this firm shares a higher reward. This result may seem counterintuitive, but it is anecdotally consistent with what is observed, both with regard to OSMs that provide reward programs (e.g., YouTube versus Metacafe), as well as those that are based merely on users' perceptions (e.g., Facebook versus Google+). Third, although one may expect that, as the asymmetry between the OSMs increases, the more favourable firm would decrease its reward amount, we show that *both* websites end up sharing higher rewards. Finally, we demonstrate the conditions under which the probability of users being active in the less favourable firm increases when the asymmetry increases between the OSMs (and vice versa). Interestingly, although the less favourable firm never sees an advantage in a higher asymmetry, under certain conditions, a higher level of asymmetry can also diminish the more favourable firm's net revenue.

[2] In addition, popular users often may receive additional payment from their own advertisement sales, sponsorships and product placements. For instance, Michael Buckley, famous for his YouTube video blog "What the Buck?!", reportedly earns $20,000 a month [29].

2. Literature review

Different perspectives of OSMs have been studied in literature. For a general review of topics related to OSMs, see Bainbridge [5], Messinger et al. [23], Kim et al. [19] and Clemons [7]. These authors agree that OSMs face unique business challenges, such as selection of a financially sustainable business model and managing the customer relationship, and more research needs to be done to address these challenges. The need for further studies about OSMs also has been identified in the operations management and management science literature, although the primary focus of the studies in these fields has been mainly on *online retailing*, *advertising,* and *network science*. (See Ahmed and Kwon [1], Alderson [2], Basua et al. [3], Fridgeirsdottir and Najafi-asadolahi [11] and Perdikaki et al. [26] and the papers referenced therein.)

A stream of research that relates – though somewhat orthogonally – to our study is *online consumer behaviour*, which has been empirically studied by social psychology and marketing science; see Schau and Gilly [27], Benabou and Tirole [4], Johnson et al. [18] and Teo and Yu [32]. This field highlights the crucial role and characteristics of content contributors on the success of any user-generated content website. (See Zhang et al. [37] and Grewal et al. [15].) Moreover, some studies, such as Tirunillai and Tellis [33] and Luo et al. [22], investigate the relationship between social media and the market performance of the firm. Our study focuses on the effects of monetary incentives and revenue-sharing programs on the dynamics that exist between users and the OSMs on the Internet. Our paper contributes to the call for further research in this field, such as OSM profitability and revenue generation.

The subject of *competition* between media sites has been studied in the literature (see Gal-Or and Dukes [13], Godes et al. [14], Zhang and Sarvary [38] and Zhu and Dukes [40]), with a focus on different dynamics based on price and other factors of service quality, such as product variety and advertising intensities. Shin and Sudhir [28] present a related paper that focuses on rewarding customers within symmetric competition. These authors adopt a Hotelling model with two retailers geographically located on the two ends of a unit line. Similar to our setup, they assume there are two types of consumers in the market with value heterogeneity and unstable preference. They present the conditions in which it is optimal for a firm to offer a lower price as reward only to its own