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Storing data on RFID tags: A standards-based approach

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VALUATION OF ONLINE SOCIAL NETWORKS – AN ECONOMIC MODEL AND ITS APPLICATION USING THE CASE OF XING.COM

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Abstract

Online social networks are gaining increasing economic importance in light of the rising number of members. The numerous recent acquisitions priced at enormous amounts illustrate this development. Therefore, the growing relevance of online social networks in science as well as in practise revealed the need for adequate valuation models, which take into account the networks' specific characteristics. Thus, this article develops an economic model for valuation of online social networks. The model allows the evaluation of whether the purchase prices on the market, which recently amounted to millions, are justifiable. Finally, the practical application of the model is illustrated by an example of the major European online social network XING.com.

Keywords: social networking, customer relationship management, business case.

1 INTRODUCTION

One of the most important current changes with regard to the use of the Internet is the transformation of passive information users into active actors, which increasingly create the content of the World Wide Web (WWW) themselves. Along with these changes, the economic impact of established media declines and experts predict heavy socio-economic and political implications (Bernoff et al. 2008). A main driver for this development is the active use of online social networks, where people are connecting and communicating more and more online with one other (Kazienko et al. 2006, Gross et al. 2005). Networking sites such as Facebook.com or XING.com not only provide a technical platform to establish and maintain relationships between users, but also enable users to present themselves to a wide public and to make visible their own social networks (Boyd et al. 2007). This emergent technical and social phenomenon generates an increasingly important economic impact and has spurred enormous attention among researchers and practitioners.

Thus, media and IT companies have been acquiring recently online social networks for considerable amounts to adapt their business models to the new environmental conditions and to reorganize their companies for the future. In 2005, for example, the media company News Corp. acquired the online social network MySpace.com for US \$ 580 m. Two years later Microsoft paid US \$ 240 m for a 1.6% minority interest in the online social network Facebook.com. The extrapolated value of this company thus amounts to staggering US \$ 15 bn. This trend can also be observed in Germany: following a bidding war with the publisher Springer, the German publishing company Holtzbrinck acquired the online student network StudiVZ.de for approximately € 85 m (Sievers et al. 2008). However, the enormous purchase prices for online social networks are also considered critical and experts compare the situation with the dotcom bubble over the turn of the millennium: Martin Sorrell for instance, CEO of the WWP Group – the world's largest communications services group (and one of the six largest advertising holding companies) –, is cited in the Financial Times Deutschland seriously questioning the valuation of Facebook.com at US \$ 15 bn (Lambrecht 2008).

This makes clear, that the important question of how online social networks can be valued using well-founded valuation methods has not yet been answered. Therefore, the objective of this paper is first to develop an economic model for the valuation of online social networks, which takes into account the specific characteristics of these companies, and second to illustrate the practical application of the model to the online social network XING.com using only publicly available data. The paper is structured as follows: In section 2 we define and describe online social networks as a current phenomenon. In section 3 we briefly review the existing valuation approaches to online social networks, before we develop our own quantitative approach in section 4. The practical use of the new model is extensively illustrated by an example of the major European online social network XING.com in section 5. The last section summarizes the results and suggests areas for further research.

2 ONLINE SOCIAL NETWORKS: A CURRENT PHENOMENON

Although Facebook.com was only established in 2004, today more than 90 m people get together in the digital friendship network (Agarwal et al. 2008). This is only one example of how online social networks – aroused by the web 2.0 boom – have evolved into a new, mostly free of cost, mass medium where users¹ present themselves to a wide public and voluntarily reveal parts of their privacy. Beside the exponential growth of online social networks there is a growing realization that online social networks are not simply forums in which individuals congregate. Rather, “these networks create

¹ The terms customer, member and user are used synonymously.

substantial value for the individuals who participate in them, the organizations that sponsor them, and the larger society in multiple ways” (Agarwal et al. 2008). The community idea itself, which was long known and extensively researched especially in the field of social sciences (see Bagozzi et al. 2006) and in social network analysis in general (Milgram 1967, Granovetter 1973, Watts 2003), took on new dimensions with the development of the Internet and the emergence of online social networks. In this context, this article focuses mainly on the users’ integration in the online social network (e.g. number of contacts etc.) and the consequences in regard to the economic valuation.

We generally perceive an online social network as a set of actors, which are represented by nodes, and a set of edges (ties) linking pairs of nodes (Adamic et al. 2003, Kazienko et al. 2006, Bampo et al. 2008). The edges represent connections between actors and describe social interactions or relationships. The nodes and edges are usually presented by a graph (Hanneman et al. 2005), as shown in Figure 1. This visualisation especially highlights so-called hubs (Bampo et al. 2008), i.e. actors who have a particularly large number of connections to other actors.

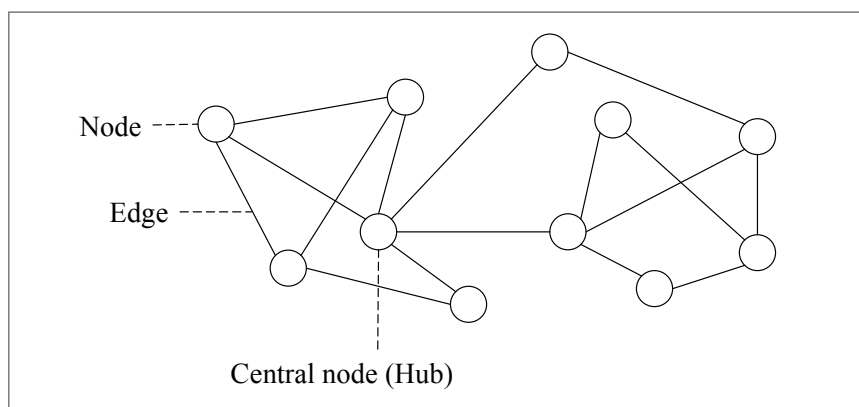


Figure 1. Elements of an online social network

In the following we define – according to Boyd et al. (2007) – an online social network in particular as a web-based service that enables “individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system” (Boyd et al. 2007). Thereby, the aspect of networking, i.e. establishing and maintaining relationships between users, is prevailing. However, relationships are not as tangible as those from the real world (Kazienko et al. 2006). Currently, there are a lot of online social networks both for business (e.g. Doostang.com, LinkedIn.com or Xing.com) and for private purposes (e.g. Facebook.com, MySpace.com or StudiVZ.de), focusing on different target groups. Moreover, they differ in size and who can see your profile and how much of it is visible as well (Howard 2008). While most of the key technological features are fairly consistent, the culture that emerges around online social networks varies (Boyd et al. 2007). Furthermore and in addition to the fostering of individual contacts, the community idea is actively lived over forum and group functions.

At the moment many online social networks are basically funded through advertising proceeds. An extension of the business model that includes user fees, is therefore a great challenge for coming years (Pauwels et al. 2008). Critical both regarding the introduction of user fees and in particular the economic valuation of online social networks is the fact that the individual benefit of members considerably depends on the number of members within the online social network. For instance, if a part of the members leaves the online social networks, the individual benefit of the remaining members consequently decreases. On the other hand, every new additional contact of a member raises his or her barrier to leave the network. Such characteristic effects have to be considered when attempting a valuation of online social networks.

3 RELATED WORK

Researchers and practitioners have written a plethora of articles and books on the valuation of firms in general (see Koller et al. 2005, Brealey et al. 2008, Damodaran 2002). However, according to the predominant view in literature standard business valuation approaches are very restricted in their ability to value young, fast growing companies in a dynamic environment, such as Internet companies (see e.g. Golotto et al. 2003). Reasons are, for instance, the backward orientation using traditional financial balance sheet figures (e.g. liquidation value, substantial value, (adjusted) book value), a lack of acceptance and application in business matters (e.g. real option approach), a lack of academic foundation (e.g. venture capital approach), and the limited history to draw on for future cash flow projections and the handling of just negative cash flows (e.g. discounted cash flow approach).

What makes the economic valuation of online social networks even more difficult is the fact that customers, relationships between customers and the resulting network effects – and therefore intangible assets (especially social capital e.g. Kazienko et al. 2006) – represent a major part of the firm value than assets being currently reflected on the balance sheet. Hence, the value of each customer and the integration of the customer in the online social network as well as the growth of the network have to be considered explicitly to get a reasonable estimate of the firm value. Established standard business valuation models do not sufficiently consider these aspects yet. However, in recent years new approaches (e.g. for the services sector) have been developed, which take into account the value of customers as the most important factor for a firm's valuation (cf. e.g. Gupta et al. 2004, Bauer et al. 2005, Krafft et al. 2005). Although these models are still based on the discounted cash flow approach, the focus has shifted from the projection of cash flows on a company level to the projection of cash flows obtained from the existing and future customer relationships.

The basic idea behind these valuation methods is measuring the value of the customer base by summing up all discounted cash flows (in and out cash flows) arising from all existing and future customer relationships. The obtained value of the customer base represents the entire value of the discounted operating cash flows of a company. Finally, the value of the customer base “and all cash flows generated from non-operating assets yield the overall value of the company” (Bauer et al. 2005). This change of perspective is quite beneficial for the valuation of online social networks. Although several methods of customer-based valuation have been developed which take into account important aspects, we are not aware of any approach so far that is applicable for the valuation of online social networks. A significant aspect which has to be taken into account when evaluating the customer base of online social networks is considering the number of individual contacts. This is crucial, since the loyalty of a customer strongly depends on the integration into the online social network, as every additional contact of a customer raises the barrier to leave the network (see Algesheimer et al. 2006). The online social network XING.com, for instance, reports that well-connected users have (due to network effects) a higher retention rate (i.e. they are less inclined to leave the network) and lead to a higher activity among users (XING, 2006).

Based on these premises, we develop a model for the economic valuation of online social networks considering the findings from previous research in customer-based valuation and network theory.

4 DESIGN OF THE ECONOMIC MODEL

The long-term value of online social networks is largely determined by the value of the network's customer relationships, since tangible assets usually play a tangential role. Hence, the online social network's existing and future customers provide its most reliable source of future revenues. Thereby the value of all existing and future customer relationships is denoted as the customer equity (CE) (Blattberg et al. 1996, Rust et al. 2004). To determine the value of a single customer the widely accepted customer lifetime value (CLV) approach is used, which is similar to the discounted cash flow

approach in firm valuation (see Koller et al. 2005, Damodaran 2002). CLV is defined as the present value of all existing and future cash flows generated by a certain customer (Berger et al. 1998).

Incorporating the CLV approach for determining the value of the online social network, we first partition all existing and future customers into different cohorts c (with $c=0, 1, \dots$), where c denotes the period in which the customer joined or will join the online social network. Then customers are referred to as $i=1, \dots, N_c$ for each cohort c , whereas all existing customers at the instant of valuation are assigned to cohort $c=0$. With this notation, an online social network's CE can be expressed as the sum of discounted CLVs of all existing (cohort 0) and future (cohorts 1, 2, ...) customers²:

$$CE = \sum_{c=0}^{\infty} \frac{\sum_{i=1}^{N_c} CLV_{c,i}}{(1+d)^c}, \quad (1)$$

where CE denotes the total value of all existing and future customer relationships,
 $CLV_{c,i}$ the CLV of customer i of cohort c ,
 N_c the number of customers in cohort c (with $N_c \in \mathbb{IN}$) and
 d the periodical discount rate (with $d \in \mathbb{IR}^+$).

In order to determine the CLV of customer i of cohort c ($CLV_{c,i}$), we obtain the present value at the beginning of period c of all cash flows $CF_{c,i,t} \in \mathbb{IR}$ that the online social network expects to receive from the customer over the entire relationship (Berger et al. 1998). Assuming $T_{c,i} \in \mathbb{IN}$ as the duration of the customer's relationship (for existing customers: remaining duration) and index t as the period of the customer relationship (for existing customers: period since the instant of valuation), $CLV_{c,i}$ can be expressed as follows:

$$CLV_{c,i} = \sum_{t=0}^{T_{c,i}} \frac{CF_{c,i,t}}{(1+d)^t}, \quad (2)$$

where $CF_{c,i,t}$ denotes the cash flow in period t of the customer relationship for customer i of cohort c and
 $T_{c,i}$ the duration of the customer relationship for customer i of cohort c .

However, the implementation of Equation (2) is not easy, as it requires detailed information regarding both the future cash flows $CF_{c,i,t}$ and the duration of the customer relationship $T_{c,i}$ for every single (future) customer. Therefore, we use a common approach to bypass the estimation of the concrete duration of the customer relationship $T_{c,i}$ and consider retention rates $r_{c,i,t}$ (cf. for example Berger et al. 1998, Gupta et al. 2004). The retention rate $r_{c,i,t}$ of a customer i of cohort c for a period t (with $t \geq 1$) is defined as the (conditional) probability that the customer remains in the online social network in period t , given that the customer has been a member in the previous period ($t-1$). Thus, an undifferentiated approach calculating average retention rates for the whole customer base is often used. To avoid this, we compute individual retention rates for each customer, considering his or her individual degree of interconnectedness in the online social network. Assuming that the online social network is modelled as an undirected graph (see Figure 1), where members are represented by a set of nodes and communication relationships (also known as contacts) by a set of edges linking pairs of nodes³ (Bampo et al. 2008), the number of incident edges of a node i represents the number of

² Strictly speaking all determined values are expected values. For simplification we avoid to state all determined values as expected values.

³ An edge respectively a contact between two members exists technical if and only if one of the members has confirmed the contact request of the other.

members customer i has a connection to or keeps in touch with. This can be expressed in terms of the period t through the variable $e_{c,i,t} \in \mathbb{N}$. Regarding the estimation of the individual retention rate $r_{c,i,t}$ for customer i the following requirements have to be fulfilled⁴:

- R.1 For a customer i with a larger number of contacts the individual retention rate should be *ceteris paribus*, higher than for a customer j with less contacts (*lock-in effect*). This results in a strict monotone increasing retention rate function of the number of contacts (i.e. $e_{c,i,t-1} > e_{c,j,t-1}$ implies $r_{c,i,t}(e_{c,i,t-1}) > r_{c,j,t}(e_{c,j,t-1})$).
- R.2 An additional contact – i.e. an increase in the number of contacts by one – leads to a *ceteris paribus* less marginal change in the individual retention rate of customer i with a larger number of contacts than in the individual retention rate of a customer j with fewer contacts. This results (in combination with R.1) in a decreasing marginal utility of the number of contacts in regard to the retention rate (i.e. $e_{c,i,t-1} > e_{c,j,t-1}$ implies $r_{c,i,t}(e_{c,i,t-1}+1) - r_{c,i,t}(e_{c,i,t-1}) < r_{c,j,t}(e_{c,j,t-1}+1) - r_{c,j,t}(e_{c,j,t-1})$).

These requirements as a starting point, we intensively searched for appropriate functions. The arctangent based formula (3) fulfils both requirements R.1 and R.2 for all numbers of contacts $e_{c,i,t-1}$ and can therefore be used for our purpose. We compress the arctangent function (*arctan*) to restrict the obtained values for $r_{c,i,t}(e_{c,i,t-1})$ to the interval $[0; 1]$. Then the individual retention rate for a customer i of cohort c in period t can be defined as a function of the number of contacts as follows:

$$r_{c,i,t}(e_{c,i,t-1}) = \frac{\arctan(\alpha_{t-1} \cdot e_{c,i,t-1})}{\pi/2}, \quad (3)$$

where $r_{c,i,t}$ denotes the retention rate for customer i of cohort c in period t ,
 $e_{c,i,t-1}$ the number of contacts of customer i of cohort c in period $t-1$ and
 α_{t-1} the calibration factor for the number of contacts in period $t-1$.

Note that the parameter $\alpha_{t-1} \in \mathbb{IR}^+$ is used to calibrate the model in regard to the empirical observed average retention rate of the particular period t of the customer relationship (the empirical observed average retention rate can be interpreted as the fraction of customers that had been members for $t-1$ periods and remained in the online social network in period t). Figure 2 illustrates the function $r_{c,i,t}$ of the number of contacts $e_{c,i,t-1}$ for some selected values of the calibration factor.

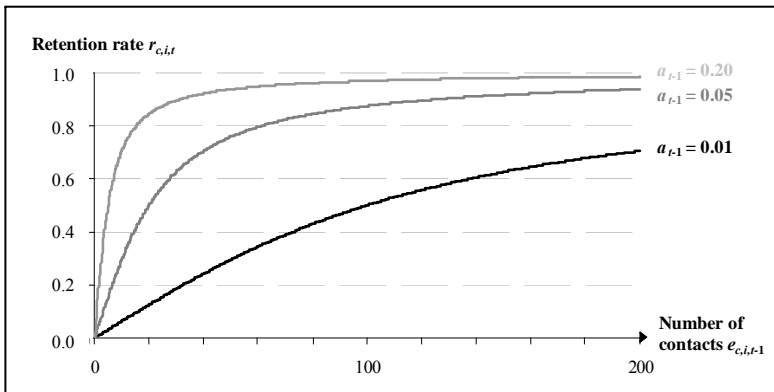


Figure 2. Retention rate as a function of number of contacts

Taking into account the customers' individual retention rates $r_{c,i,t}(e_{c,i,t-1})$ we can derive Equation (4) for the CE of an online social network⁵. Since the future numbers of contacts of a customer i are

⁴ Cf. e.g. Varian (2003), where a detailed literature overview of network effects is given.

unknown, his or her recent number of contacts has to be used for a forecast. We will demonstrate a corresponding procedure as well as how to determine all other parameters of the model in detail in the following section using the case of XING.com.

$$CE = \sum_{c=0}^{\infty} \frac{\sum_{i=1}^{N_c} CLV_{c,i}}{(1+d)^c} = \sum_{c=0}^{\infty} \frac{\sum_{i=1}^{N_c} \sum_{t=0}^{\infty} \left(\frac{CF_{c,i,t} \cdot \prod_{l=1}^t r_{c,i,l}(e_{c,i,l-1})}{(1+d)^t} \right)}{(1+d)^c} \quad (4)$$

Finally, assigning the approach of Bauer et al. (2005), we have to add up the value of the non-operating assets and to subtract the value of all non customer-specific costs as well as the market value of dept to obtain the corporate value of an online social network. However, according to empirical research, for some companies, the CE is “a useful proxy for firm value” (Gupta et al. 2004). In order to demonstrate the valuation, the following section illustrates the practical application of the model to XING.com, one of the largest and well-known online social networks in Europe.

5 APPLICATION OF THE ECONOMIC MODEL

In this section, we illustrate the application of the model designed in the preceding section and determine the corporate value of the online social network www.xing.com (referred to as XING) on January 1st 2008. As XING is a publicly listed corporation (IPO in 2006), we can resort to data published in the annual reports from 2006 and 2007 for our valuation. This ensures a better transparency and traceability. To avoid a blanket valuation of XING based on average values and the disregard of essential information such as the customers’ individual degree of interconnectedness, we drew a sample of 1,000 customers (Premium Members) on December 31st 2007. By choosing the members randomly (using the search for “random members” provided by XING), it is assured that the sample is really characteristic for the whole network. Based on this data, we determined each customer’s individual CLV considering the individual number of contacts and the initial year of registration in XING⁶. In a final step, we derive the corporate value from the CE.

5.1 The online social network XING

The online social network XING was founded in August 2003 under the name OPEN Business Club and is one of the leading online social networks within the realms of professional online networking platforms in Europe. At the end of 2007, XING counted over 5.7 m members worldwide. These customers use XING to find useful business contacts, new business opportunities, employees, jobs and ideas by posting a profile on the Internet platform. In addition to the free of cost Basic Membership, XING offers a Premium Membership for a monthly fee of € 5.95 which is the backbone of the business model and booked by 362,000 members (December 31st 2007). Besides these membership fees we disregard additional revenue generating sources like banner-ads and e-commerce in a first step as so far these sources of revenue are not crucial to the XING business model⁷.

⁵ As it is not possible to draw a conclusion of the customer’s individual retention rate directly after his or her initial registration to the online social network ($t=0$) an average value for the rate $r_{c,i,1}(e_{c,i,0})=r_{c,\emptyset,1}$ is used. For $t>1$ see (3).

⁶ We assume that all Premium Members joined the network on January 1st within their year of registration. Note that the year of registration is publicly available for each member (cf. www.xing.com).

⁷ In 2007 94% of XING’s revenues were generated by Premium Memberships (Xing 2007).

5.2 Determination of the parameters of the model

Determination of the number of members

Starting from the IPO at the end of 2006, XING reports a compound annual growth rate (CAGR) of XING's Premium Members of 64% (Xing 2007). As corporate cash flows are almost exclusively generated by Premium Members, we only consider Premium Members' cash flows in our model. Nevertheless, Basic Members contribute indirectly to the value of the online social network: On the one hand they are "potential contacts" for Premium Members and therefore increase the attractiveness of the network. On the other hand Basic Members are also "potential Premium Members" in future periods. However, a projection of a compound annual growth rate for Premium Members of 64% seems to be not reasonable. For instance, mature Internet companies like Amazon, Ameritrade, Capital One, eBay, and E*Trade usually show compound annual growth rates in the range of 15% to 25% (Gupta et al. 2004) and a survey of the Global Industry Analysts Group (Xing 2006) projects an annual growth rate of 21.1% for chargeable Internet services in the next years. Moreover, from 2007 to 2008 the number of online social network users increased by 25% to 580 m users worldwide (ComScore 2008). Thus, we adjust the annual growth rate for XING to 25% for the years 2008 to 2010 (cf. Table 1). For the subsequent time period up to 2017, we project a more conservative growth rate of 10%. Beyond the year of 2018 we do not assume any network growth for XING, i.e. numbers of new members and numbers of members leaving the online social network are the same.

Year	2006	2007	2008e	2009e	2010e
Premium Members	221,000	362,000	452,500	565,625	707,031

Table 1. Number of Premium Members of XING 2006 to 2010 (cf. Xing 2007)

Determination of the individual retention rates

As described in section 4 retention rates for $t \geq 1$ represent the probability that a Premium Member generating cash flows up to period $t-1$ will still be a Premium Member in period t . First of all, we determine average retention rates $r_{0,\emptyset,t}$ for the Premium Members derived from the published fraction of members still remaining t years (or periods) after their year of registration (cf. Table 2). As the Premium Membership fees for XING are payable in advance, we assume that all customer cash flows are generated at the beginning of a period. Considering this, we derive an average retention rate of 100% ($r_{0,\emptyset,1}=100\%$) for the first year of membership (=first period), as all new customers generate cash flows in their first year. For the second year we consequently consider only those customers, that are still Premium Members of the online social network after one year ($r_{0,\emptyset,2}=82\%$). Furthermore, the average retention rate for the third year $r_{0,\emptyset,3}$ is determined as 93% ($=76\%/82\%$), as 82% of Premium Members remain after their first year of membership in the online social network (paying members in $t=2$) and 76% of Premium Members after their second year of membership (paying members in $t=3$). Starting from year 4 onwards, we assume $r_{0,\emptyset,t}$ being constantly 99% ($=75\%/76\%$).

Period t (year of membership)	1	2	3	4 etc.
Fraction of remaining Premium Members after period t	82%	76%	75%	
\emptyset retention rate for period t ($r_{0,\emptyset,t}$)	100%	82%	93%	99%

Table 2. Rate of remaining Premium Members and average retention rates

In a second step, to account for the individual degree of interconnectedness of each Premium Member, we determine individual retention rates based on the actual number of contacts $e_{g,i,t-1}$ of a Premium Member and on the calibration factor for a specific period α_{t-1} (cf. Equation (3)). For the determination of the calibration factor, we use the average retention rate. In detail, we choose α_{t-1} so that the overall

average of the individual retention rates for period t (i.e. the average of all $r_{0,i,t}(e_{0,i,t-1})$) corresponds to the observed average retention rate for this year of membership $r_{0,\emptyset,t}$ (cf. Table 2: e.g. 82% for the second year of membership). The results of this calibration for the periods 1 to 3 are illustrated in Table 3. For further periods we do not need this calibration factor, as starting from period 4 onwards we assume constant individual retention rates.

Period t (year of membership)	1	2	3
Calibration factor for period t (α_t)	0.0643	0.1560	0.4170

Table 3. Calibration factor for the calculation of the individual retention rates

To calculate the individual retention rates for the existing customers (using Equation (3)) not only for the next period t (based on $e_{0,i,t-1}$) but also for further periods ($t+1, t+2, \dots$) we have to forecast the individual number of contacts ($e_{0,i,t}, e_{0,i,t+1}, \dots$). For this projection, we calculate in a first step the average number of contacts depending on their individual period of membership t (e.g. 126 for the second period after registration). Thereon, we derive average growth rates respectively. For example we obtain an average growth rate of 29.9% ($=126/97-1$) from $t=1$ to $t=2$. The rates are presented in Table 4, whereas these are only relevant for the periods 1 to 3.

Period t (year of membership)	1	2	3
\emptyset number of contacts for period t	97	126	230
\emptyset growth of number of contacts from period $t-1$ to t		29.9%	82.5%

Table 4. Average growth of the number of contacts

Finally, we can determine the individual retention rates using the calibration factors α_t (cf. Table 3), the individual information about the year of registration (to determine period t), the current number of contacts and the average growth rates of contacts (cf. Table 4). The latter is essential for the forecast of the individual number of contacts in the following periods. Table 5 illustrates individual retention rates exemplarily for Premium Members A1 and A2.

	Year of membership in 2007	Number of contacts 2007	Retention rate 2008e	Number of contacts 2008e	Retention rate 2009e	Number of contacts 2009e	Retention rate 2010e etc.
A1	1	50	80.8%	65	93.7%	119	98.7%
A2	1	150	93.4%	195	97.9%	356	99.6%

Table 5. Example for the calculation of individual retention rates

For better understanding, we show the calculation following the example of A2: Customer A2 has $e_{0,A2,1}=150$ confirmed contacts at the end of his first year of membership. Using the calibration factor $\alpha_1=0.0643$ and Equation (3) we determine the individual retention rate $r_{0,A2,2}(e_{0,A2,1})=\arctan(0.0643 \cdot 150)/(\pi/2)\approx 93.4\%$. Hence, the probability that A2 still remains Premium Member in the next period (i.e. in 2008) is 93.4%. For the calculation of the individual retention rate of A2 for 2009, we project the number of contacts by the end of 2008 as follows: $e_{0,A2,2}=150 \cdot (1+29.9\%) \approx 195$. This leads to a individual retention rate of $r_{0,A2,3}(e_{0,A2,2})=\arctan(0.1560 \cdot 195)/(\pi/2)\approx 97.9\%$. The individual retention rates of further years (e.g. for 2010) can be calculated analogically. For the determination of retention rates of future customers, we have to use average numbers of contacts (cf. Table 4) as their individual numbers of contacts are unknown.

Determination of the cash flows

The revenue generated per Premium Member is € 5.95 per month, which accounts to € 71.40 per year. In order to project future cash flows, we determine in a first step the EBITDAM-margin (Earnings Before Interest, Tax, Depreciation, Amortisation, and Marketing) based on figures published in the annual report 2007 (Xing 2007) in the amount of (€ 6.894 m+€ 1.651 m)/€ 19.609 m≈43.6%. Due to the negative margin of the previous year and the long-term rather truncating growth we use a more conservative margin which is extrapolated to a constant figure of 35%⁸. With regard to the amount of marketing spending we have to rely on an assumption, as we could not find precise information in the annual reports about the allocation to existing and to new customers. Therefore we follow the often used rule-of-thumb (cf. Greenberg 2001) and assume that it is five times more expensive to win new customers than to keep existing ones. Taking into account the customer distribution of existing and new customers in our sample of 2007 (55% of the sample are existing customers and 45% are new customers), we allocate marketing-spending of € 8.14/year for new customers and € 1.63/year for existing customers. Following these, we determine the cash flow per Premium Member amounting to $CF_{c,i,1} = € 71.40 \cdot 35\% - € 8.14 = € 16.85$ for the first year of membership⁹ and to $CF_{c,i,t} = € 71.40 \cdot 35\% - € 1.63 = € 23.36$ € for the following years ($t > 1$).

Determination of the discount rate

Due to the dominating equity financing¹⁰ of XING, we assume in a simplified model that the weighted average cost of capital (WACC) is solely based on equity. The cost of equity capital is derived by applying the after-tax CAPM using the average yield of a 10-year European government bond of 4.4% for the base rate (European Central Bank 2007). Applying a common used income tax rate of 35% the tax adjusted risk free rate accounts to 2.86%. Furthermore we assume an expected risk premium of the stock market after taxes of 5.5% (Stehle 2004). Taking into account that online social networks bear more risk than traditional software companies and the fact that XING is relatively small, we increase the published beta-factor of 1.27 for software-companies (Drukarczyk et al. 2007) to 1.48. In summary after applying the after-tax CAPM, we derive a discount rate of 11% ($= 2.86\% + (5.5\% \cdot 1.48)$).

5.3 Key findings of the application

Applying the economic model to XING, we obtain a CE of € 219.14 m. The value of the existing members sums up to € 63.89 m. In contrast, the value of the future members consists of the discounted cohort values of all acquired members up to the year 2026 (amounting to € 151.77 m) and of the discounted terminal value¹¹ (amounting to € 3.48 m). Table 6 gives an overview of the key findings. With our results we help investors to make well-founded investment decisions on the basis of public available data. If we take into account that further residuals such as the value of the non customer-specific cash flows, fixed costs that are not attributable to the individual customer and the value of the non-operating assets are negligible, the corporate value equals the CE. Comparing this value with the market capitalization in the amount of € 229.89 m on January 1st 2008, we can state only a slight difference of 4.7% from our findings. This difference can be explained on the one hand by general volatility of the stock market and divergent estimation of valuation parameters by the stock market. On the other hand we neglected additional revenue sources such as advertisements, e-commerce or merchandising products as these sources of revenue are (so far) not crucial to the XING business model. Therefore a stock price of € 44.21 at the instant of valuation seems to be reasonable.

⁸ This extrapolation is consistent with the projected EBITDA-margin according to the XING guidance.

⁹ As cash flows $CF_{c,i,t}$ are generated at the beginning of each period, we discount the values contrary to Equation (4) by $t-1$ periods and assign acquisition payments to period $t=1$. In period $t=0$ there are no cash flows.

¹⁰ XING shows equity of € 41.5 m and long-term debt of € 0.85 m in 2007 (Xing 2007).

¹¹ From the year 2018 on we assume a net growth of zero relating to the number of members. Therefore the cohort values are almost constant from the year 2027 on, so that we can take a terminal value based on the perpetuity.

Year of registration / Cohort	≤2007 / 0	2008 / 1	2009 / 2	2010 / 3	...	2026 / 19
Existing Premium Members	362,000	452,500	565,625	707,031	...	1.377,804
New Premium Members	164,710	129,180	147,714	178,530	...	17,651
Discounted value of cohort [m€]	63.89	20.32	20.93	22.79	...	0.42
Discounted terminal value [m€]	3.48					
Customer equity (CE) [m€]	219.14					

Table 6. Key findings of the application to XING

6 SUMMARY

The increasing economic relevance of online social networks and the numerous recent acquisitions priced at enormous amounts revealed the need for adequate valuation models. However traditional valuation approaches are restricted in their ability to value young, high growing online social networks in a dynamic environment. Thus we developed an economic model for the valuation of online social networks taking into account their specific characteristics. The model allows the evaluation of whether the purchase prices on the market, which recently amounted to millions, are justifiable. The practical application of the model was illustrated by an example of the major European online social network XING. The results show that the model fits quite well, as the results of the model were in the range of the market capitalization of XING at the instant of valuation. For the practical use of the model, we illustrated that, although some assumptions within the application to XING were necessary, public available data in connection with specific market data are sufficient to get reasonable results. These results help investors to make well-founded investment decisions. However, future research has to focus on the application of this approach to other business models of online social networks, as only membership fees which are the core basis of XING's revenue model were currently considered in a first step. For example, for online social networks without membership fees, it is possible that people do not unsubscribe but simply do not use it (passive users with low or no value for the company). In this case, it could be a good idea to check the number of contacts added or the number of accesses in a certain period of time instead of the customers' number of contacts as an enhancement of our model. Furthermore, we assumed average retention rates for future customers so far. This assumption could be released by accepting more computational complexity for the determination of the customers' individual retention rates. This can be achieved through network simulations of the development of the individual number of contacts. We are currently working on taking into account these aspects.

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