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 these 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 network analysis, 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. Thus removing economic power from the established media, making 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 with one another in increasing numbers thanks to countless communities across the WWW (Kazienko et al. 2006, Gross et al. 2005). Networking sites like Facebook or XING for instance provide individuals not only a technical platform to get together, but they enable users to articulate and make visible their own social networks (Boyd et al. 2007). This emergent technical and social phenomenon generates an increasingly important economic impact and attracts the attention both of academic researchers and of the business community.

Thus, media and IT companies are currently acquiring online social networks for considerable amounts to adapt their business models to the new environmental conditions and to reorganize their companies for the future. For example in 2005, the media company News Corp. acquired the online social network MySpace for US $ 580 m. Two years later Microsoft paid US $ 240 m for a 1.6% minority interest in the online social network Facebook. The extrapolated value of this company thus amounts to a staggering sum of 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 for approximately € 85 m (Sievers et al. 2008). However, the immense 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 at US $ 15 bn (Lambrecht 2008).

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

2 ONLINE SOCIAL NETWORKS: A CURRENT PHENOMENON

Although Facebook was only established in 2004, today more than 90 million people get together in the digital friendship network (Agarwal et al. 2008). This is only one example of how online social networks – kindled through the web 2.0 boom – have evolved into a new, mostly free of cost, mass medium where users 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 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 theory 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 referring to the economic valuation.

We generally perceive an online social network as a set of actors, i.e. group of people or organizations, which are nodes of the network, and as a set of edges (ties) linking pairs of nodes (Adamic et al. 2003, Kazienko et al. 2006, Bambo et al. 2008). The edges represent the connections and describe social interactions or relationships between the actors. 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 (Bambo et al. 2008), i. e. actors who have a particularly large number of connections to other actors.

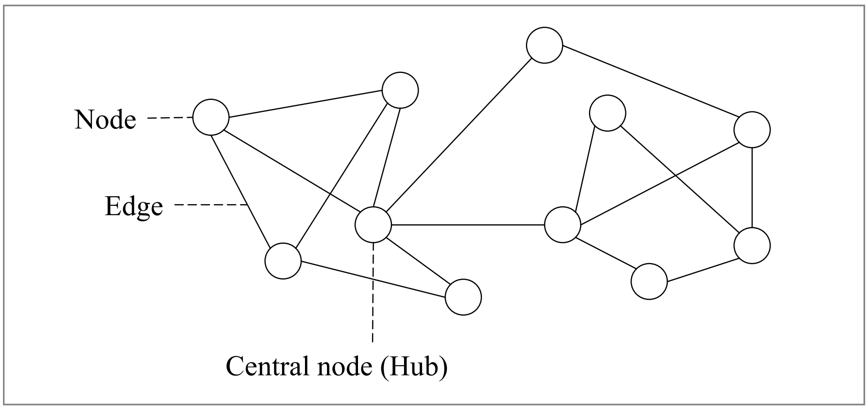

Figure 1. Elements of an online social network

In the following we define – according to Boyd et al. (2007) – an online social network in particular as a web-based service that allows "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 (fostering) of relationships between users, is prevailing, although the 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, LinkedIn or Xing) and for private (e.g. Facebook, MySpace or StudiVZ) purposes, which differ in their respective target groups. Moreover, they differ in who can see your profile and how much of it is visible as well as in their size (Howard 2008). However, in all these networks, in addition to the fostering of individual contacts, the community idea is actively lived over forum and group functions. While most of the key technological features are fairly consistent, the culture that emerges around online social networks varies (Boyd et al. 2007).

At the moment many online social networks are basically funded through advertising proceeds. An extension of the income model that includes user fees, is therefore a great challenge for the coming years (Pauwels et al. 2008). Critical both regarding the introduction of user fees and in particular for the economic valuation of online social networks is the fact that the individual benefit of members considerably depends on the number of the remaining members of the social network. For instance, if a part of the members leaves the 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

Academic researchers and practitioners have written a number 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 the literature standard business valuation approaches (for an overview see

Koller et al. 2005) are very restricted in their ability to value young, fast growing companies in a dynamic environment, such as internet companies (see e.g. Gollotto 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, “rule of thumb” approach), and the limited history to draw on for future cash flow projections and the handling of no or only negative cash flows (e.g. discounted cash flow approach).

What makes the valuation of online social networks even more difficult is the fact that customer relationships and network effects – and therefore intangible assets (especially social capital e.g. Kazienko et al. 2006) – represent a larger part of the firm value than assets being currently reflected on the balance sheet. Therefore the value of each customer, the integration of the customer in the online social network as well as the growth of the number of customers have to be considered explicitly to get a reasonable estimate of the firm’s value. Established standard business valuation models do not comprehensively take these aspects into account yet. However, in recent years they were adapted and new approaches for appropriate fields of application (e.g. for the services sector) were 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). The basis for these customer-based valuation models is the discounted cash flow approach. However, 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 und future customer relationships. This 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 considered when evaluating the customer base of online social networks is represented by their specific characteristics, meaning that the number of individual contacts of a customer has a substantial influence of his or her remaining in the online social network. This is due to the fact that every new added contact of a customer raises his or her barrier to leave the network (see Algesheimer et al. 2006). Therefore the consideration of these interactive dependencies between the customers is crucial for the valuation of online social networks.

Based on these premises, we develop a quantitative 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[1], 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. The CLV is defined as the present value of all existing and future cash flows generated from a customer (Berger et al. 1998). Incorporating the

[1] The terms customer and member are used synonymously.

CLV approach for determining the value of the online social network, we first partition all existing and future customers into different cohorts considering the period c (with c=0, 1, …), in which the customer joined or will join the online social network. In the following the customers are referred to as i=1, …, N_c for each cohort c. Thereby all existing customers at the instant of valuation belong to the very first cohort (cohort 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, …) customers[2]:

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

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 $N_c \in$ IN) and
d the periodical discount rate (with $d \in$ 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 $CF_{c,i,t} \in$ IR that the online social network expects to receive from the customer over the entire relationship (Berger et al. 1998). Assuming $T_{c,i} \in$ 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:

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

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, Equation (2) is not easy to implement, 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, before being able to compute $CLV_{c,i}$. Instead, we consider retention rates $r_{c,i,t}$ to bypass the estimation of the concrete duration of the customer relationship $T_{c,i}$ (cf. for example Berger et al. 1998, Gupta et al. 2004). Thereby 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 still been a member of the online social network 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 nodes[3] (Bambo et al. 2008), then the number of incident edges of a node i represents the number of members customer i has a connection to or keeps in touch with. This can be

[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.

expressed in terms of the period t through the variable $e_{c,i,t} \in \mathrm{IN}$. Regarding the estimation of the individual retention rate $r_{c,i,t}$ for customer i the following requirements have to be fulfilled[4]:

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 $r_{c,i,t}(e_{c,i,t-1}+1) - r_{c,i,t}(e_{c,i,t-1}) < r_{c,j,t}(e_{c,j,t-1}+1) - r_{c,j,t}(e_{c,j,t-1})$).

A function that fulfils both requirements R.1 and R.2 for all numbers of contacts $e_{c,i,t-1}$, is the arctangent. 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:

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

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*.

We note that the parameter $\alpha_{t-1} \in \mathrm{IR}^+$ 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.

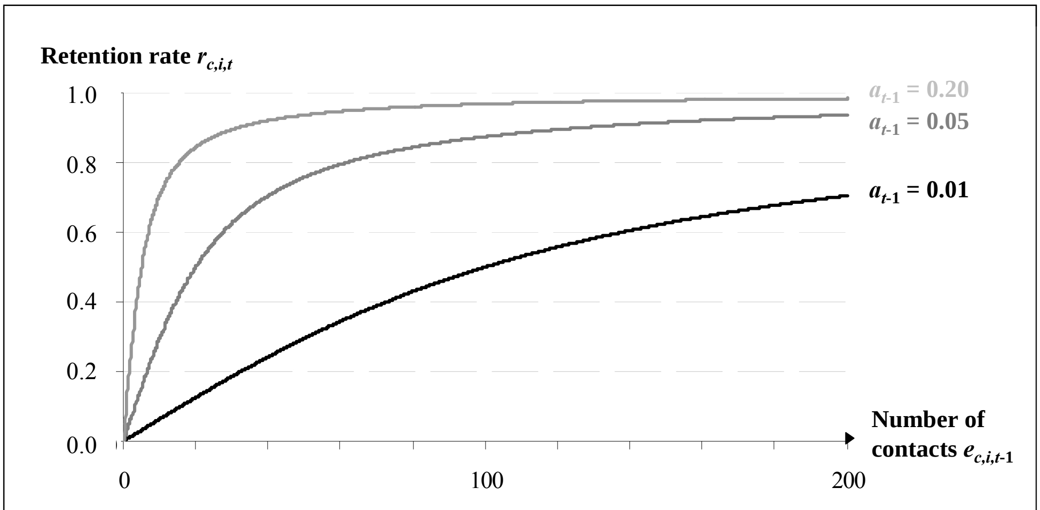

Figure 2. Retention rate as a function of number of contacts

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

Taking into account the customers' individual retention rates $r_{c,i,t}(e_{c,i,t\text{-}1})$ we can derive Equation (4) for the CE of an online social network[5]. Since the future numbers of contacts of a customer i are 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 chapter using the case of XING.

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

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 (e.g. online social networks), the CE is "a useful proxy for firm value" (Gupta et al. 2004). In order to demonstrate the valuation, the following chapter illustrates the application of the model to XING, 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 official available data published in the annual reports from 2006 and 2007 for our valuation. This ensures a better transparency and traceability of the application. 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 (cf. chapter 3), we drew a random sample of 1,000 customers (Premium Members) on December 31st 2007. Based on this data, we determined each customer's individual CLV considering the individual number of contacts and the initial year of registration in XING[6]. In a final step, we derive the corporate value from the customer equity.

5.1 The online social network XING

The online social network XING was founded in August 2003 under the name OPEN Business Club (OpenBC) and has become one of the leading online social networks within the realms of professional online networking platforms in Europe. As of the end of 2007, XING counts over 5.7 million members worldwide. 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 (as per: December 31st 2007). In our model, we do not take into account additional revenue generating sources like banner-ads and e-

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[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 $r_{c,i,1}(e_{c,i,0})=r_{c,\varnothing,1}$ is used. For l>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).

commerce in a first step as at the moment these sources of revenue are not crucial to the XING business model[7].

5.2 Determination of the parameters of the model

Determination of the number of members

Starting from the IPO at the end of 2006, the compound annual growth rate (CAGR) of XING's Premium Members is 64% (Xing 2007). As corporate cash flows are almost exclusively generated by Premium Members, we only consider Premium Member's cash flows in our model. Nevertheless, Basic Members contribute indirectly to the value of the online social network: On the one hand they are (possible) contacts for Premium Members and therefore increase the attractiveness of the network. On the other hand Basic Members are potential future Premium Members. However, a projection of a compound annual growth rate for Premium Members of 64% is not reasonable. 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. Thus, the assumption of a reduced annual growth rate for XING of 25% for the years 2008 to 2010 seems to be more reasonable (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

First of all, we determine average retention rates $r_{0,\varnothing,t}$ for the Premium Members derived from the published rate 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 a retention rate of 100% ($r_{0,\varnothing,1}$=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 ($r_{0,\varnothing,2}$=82%). Generally the 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. For instance, the retention rate for the third year $r_{0,\varnothing,3}$ is determined as 93% (=76%/82%), as 82% of the Premium Members remain after their first year of membership in the online social network (paying members in t=2) and 76% of the Premium Members after their second year of membership (paying members in t=3). Starting from year 4 onwards, we assume $r_{0,\varnothing,t}$ 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%	
∅ retention rate for period *t* ($r_{0,\varnothing,t}$)	100%	82%	93%	99%

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

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

To account for the individual degree of interconnectedness of each Premium Member we use individual retention rates based on the actual number of contacts $e_{g,i,t\text{-}1}$ and on a specific calibration factor for each period $\alpha_{t\text{-}1}$ (cf. Equation (3)). We choose $\alpha_{t\text{-}1}$ based on the sample data of 2007 so that the overall average of the individual retention rates for period t (i.e. the average of all $r_{0,i,t}(e_{0,i,t\text{-}1})$) corresponds to the observed average retention rate for this year of membership $r_{0,\varnothing,t}$ (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 $e_{0,i,t\text{-}1}$) but also for further periods (t+1, t+2, …) we have to forecast the individual number of contacts ($e_{0,i,t}$, $e_{0,i,t+1}$, …). For this projection we calculate in a first step for all members of our sample 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**
∅ number of contacts for period t	97	126	230
∅ 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 average growth rates of contacts (cf. Table 4) and both the individual information about the year of registration (to determine period t) and the current number of contacts. The following 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

We show the calculation following the example of A2: Customer A2 has $e_{0,\text{A2},1}$=150 confirmed contacts at the end of his first year of membership. Using the calibration factor α_1=0.0643 and Equation (3) we determine the retention rate $r_{0,\text{A2},2}(e_{0,\text{A2},1})=arctan(0.0643\cdot150)/(\pi/2)\approx93.4\%$. 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 (i.e. the third year of membership), we project in a first step the number of contacts by the end of 2008 as follows: $e_{0,\text{A2},2}=150\cdot(1+29.9\%)\approx195$. This leads to a individual retention rate of $r_{0,\text{A2},3}(e_{0,\text{A2},2})=arctan(0.1560\cdot195)/(\pi/2)\approx97.9\%$. The individual retention rates of all further years (e.g. for 2010) can be calculated analogically. As we cannot assume any individual number of contacts for future customers, average numbers of contacts as shown in Table 2 are used.

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 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 $CF_{c,i,1}$=€ 71.40·35%-€ 8.14=€ 16.85 for the first year of membership[9] and to $CF_{c,i,t}$=€ 71.40·35%-€ 1.63=€ 23.36 € for the following years (t>1).

Determination of the discount rate

Due to the dominating equity financing[10] 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 an 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%·1.48)).

5.3 Key findings of the application

Applying the economic model to the XING data, we obtain a CE for all existing and future customers amounting to € 219.14 m in total. 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 value[11] (amounting to € 3.48 m). Table 6 gives an overview of the key findings. 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 did not regard additional revenue sources such as advertisements, e-commerce or merchandising products as these sources of revenue are (up to now) not crucial to the XING business model. Therefore a stock price of € 44.21 at the instant of valuation seems to be reasonable in regard to the calculation.

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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. 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. 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 and studies on the development of the individual number of contacts of Premium Members. We are currently working on an extension for the model taking into account these aspects.

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