Financing online project: willingness-to-pay for an ad-free Wikipedia

Myriam Le Goff-Pronost*

IMT Atlantique, LaTIM (INSERM 1101), M@rsouin, Brest, France
Département LUSSI, Logique des Usages, Sciences Sociales et de l'Information
Technopôle Brest Iroise, CS83818
29238 Brest Cedex 3, France
Tel: +33 2 29 00 14 61
E-mail: myriam.legoff@imt-atlantique.fr

Nicolas Jullien

IMT Atlantique, LEGO, M@rsouin, Brest, France
E-mail: Nicolas.jullien@imt-atlnatique.fr

Godefroy Dang Nguyen

IMT Atlantique, LEGO, M@rsouin, Brest, France
E-mail: Godefroy.dangnguyen@imt-atlantique.fr

Abstract

Background: the economic model of Wikipedia is based on donations. What would happen if these donations were to decrease and no longer covered all the costs borne by the Wikimedia Foundation?

Objectives: we propose to measure, through a contingent valuation model, the willingness to pay Wikipedia users for free access without advertising (traditional economic model of online projects). What is the amount they are willing to pay and what is the profile and motivation of the donors?

Method: the study is based on a survey of 16432 french-language people and a Heckman-type econometric model.

Results: the results estimate that the average amount that people are willing to pay per year for Wikipedia without advertising is € 5.64 (€ 7.73, considering only those who agree to pay). The profile of those willing to pay is identical to that of other public goods, and the value of the amount paid is highly dependent on the level of income. The amount envisaged is higher than the donation campaigns proposed by Wikipedia (€ 2) but lower than the average donation received by the Wikimedia Foundation (€ 10), but these are often non-recurring donations.

Keywords: Wikipedia, online projects, willingness-to-pay, contingent valuation

I. Introduction

Online projects aiming at building open knowledge, such as Free/Open Source Software (F/OSS), Open Street Map (OSM), or Wikipedia, may be considered at first sight as information goods and therefore public goods: based on digital production and transmission of information, they trigger a largely non-rival and non-exclusive consumption.Most of the scientific papers on the online production and distribution of open source and open access content deal with several topics: the quality of this content provided free by the contributors to the users (Stvilia and al., 2007), or the motivation of the contributors themselves to volunteer (Nov, 2007). The cost of content production is not covered by financial resources, but mostly by donations in kind from a third party: volunteers (the majority in the case of Wikipedia) or companies mandating their employees to contribute to the project (Lakhani, 2003). The objective of this paper is to examine the question of the value of a free and unrestricted access to online content. We based our reflexion on a specific case study: Wikipedia.

At the moment most people, as Wikipedia users, benefit from positive externalities. They are pleased to get a free access and to read for free all the content of the encyclopedia they want. They are not compelled to give, as compensation, their personal data, nor are they subject to ads. They may or may not respond to the regular calls for gifts by the Wikimedia Foundation. This behavior raises the issue of what is really the value of the online encyclopedia for them.

While free of charge, it is not costless: it is complex (and costly) to guarantee a quality of service regarding access times (bandwidth and server capacities) and to guarantee, on the user side, access from all terminals (computers yesterday, smartphones and tablets today). For example, during the fiscal year 2014-2015, about $21 million have been incurred for this by the US Wikimedia Foundation managing Wikipedia. The costs may increase in the future, particularly if audio and video documents are posted. At the moment these costs are covered by donations from private foundations, charities, individuals and firms, most of them of US origin[1].There are a handful of salaried contributors from the Wikimedia Foundation. They represented 31 million $ of expenses, on a total budget of 77 million $ in the fiscal year 2016. However, their main tasks are to handle administrative functions, to participate to the governance of the project and they represent a small part of contributors.

Who would be willing to pay for keeping a guaranteed access, and free of publicity?In this paper, we provide a tentative evaluation. For this, we use a questionnaire concerning the French Wikipedia, posted in February 2015 as a banner on the first page of the Website. With 16 000 answers, we have a large, but non-representative sample of Wikipedia community members in French speaking countries, in particular those members who are the more committed to the encyclopedia. The answers enable to explore two related themes:

- Who are the people showing a certain willingness to pay for Wikipedia in order to avoid advertising and what are their motivations?
- Can we estimate the value that individuals give for an access to Wikipedia without advertising (an alternative to gifts for financing)?

The first question can be answered through the statistical analysis of data collected by our questionnaire.The second question has been raised and asked to our sample in order to have theme react and reveal their true willingness to pay for using an ad-free Wikipedia.

The article is organized as follows: in section 2 we discuss the different modes of financing an informational good. We pursue with issues concerning the worthiness of the contingent evaluation method to evaluate a willingness to pay and the determinants of advertising disutility and we discuss these question on our case study. In section 3 we present our protocol, an application of the contingent evaluation applied to Wikipedia readers and contributors. In section 4 we run some econometric tests to assess the determinants of the willingness to pay for eschewing Wikipedia's financing with publicity. We discuss the consequences of these results, their limits and future research in section 5.

II. Measuring the willingness to pay for an information good

Financing modes for an information good

Collective goods are distinguished from private property by two specific characteristics: non-rivalry and non-exclusion of use (Samuelson, 1954). Information goods, when digitized, are a kind of public good, since they are mostly non-rivals with a null marginal cost of reproduction. They can be subject to exclusion however, by technical, juridical or uses constraints, so that they are impure public goods or club goods (Cornes and Sandler, 1984). For example, an online access can exclude non-users of Internet or can lead to congestion by an overuse. Information on the other hand, has a cost of production. But all in all, it is a case of fixed costs economics, with near zero marginal cost of consumption (Rifkin, 2014). Moreover, the value of information goods lies in the content, but the decision to offer them for free is very kind to the origin and culture of the Internet, but the access to them given by the content provider must be financed. What are then the possibilities?

It is possible to identify several models of financing the access to informational goods: direct sale, public financing, donations by institutions, crowfunding, advertising, or the provision of paid additional services. In case of free services, De La Igelsia et Gayo (2009) identified 4 business models for Web 2.0: advertising, freeminum, work exchange and mass collaboration.

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[1]https://wikimediafoundation.org/wiki/Benefactors/2015-2016.

The dominant business model in such circumstances is presently the third-party financing. As much as in the media domain, providing informational content is sponsored by advertisement resources. Google is the leader in that respect, attracting the largest part of publicity resources online (roughly one third). Although the main activity of Google is not content provision but operating a search engine, traditional information content producers such as newspapers and media groups, owe also most of their gains online to advertisement. Even the New York Times Group, which is the major media group to have targeted paid content online with success, still gets 41% of its overall revenues from online advertisement. Therefore, online advertisement has already overcome TV advertisement worldwide. Advertising is a more promising alternative and proves its current effectiveness in online production content. It is an usual business model for online services which provide information free of charge, but there is a risk of the objectivity of the information be threatened by advertising. Celebi (2015) shows that users with high information seeking may have favorable attitudes toward Internet advertising because of its perceived information delivery, or entertainment it provokes. But some people seek to avoid advertising (Cho and Chen, 2004). Advertisement implies some disagreement felt by the users (the information is less easy to get, ibid) and may also lead to possibilities of influence by advertisers.

The freemium model, where the basic service is free and the advanced services (premium) are sold can also be considered (Osterwalder, Pigneur, 2010). This model is close to captive models such as razors and blades business models, where obtaining a service compels to the purchase of another. This is the current model of most online newspapers where part of the content is free. While it is a second best optimum (people are grossly discriminated according to their willingness to pay), it has no allocative efficiency (some people are excluded). It implies costs triggered by discrimination (encryption of content, metering of use…). It could also have impact on the production side, as some producers may exit if the content they produced is seen by less eyes, of if they have the perception that an institution is making money on their work.

Another way is crowfunding. Crowdfunding could in theory replace or complement donations by institutions and echoes the voluntary contributions to content. The choice between in-kind or financial donations by individuals is well known[2]. Nevertheless, there is no consensus in the literature on this issue of complement or substitute. Still, donations reveal the perceived value of information, but crowdfunding is perhaps a costly way to raise funds, with uncertain results. The possibility of free riding is so great, and therefore the anticipation by potential contributors that their effort will not be matched by others, reduces the total amount of contributions.

Measuring a willingness to pay by the contingent evaluation method

The value of a good is measured by the satisfaction (utility) it brings and utility is a way of describing consumer preferences. However, preferences are not directly observable; it may be possible to deduce them from the behavior of economic agents. The method of contingent valuation (Mitchell and Carson, 1989; Portney, 1994; Diamond and Hausman, 1994) allows direct preferences to be revealed. Individuals respond to hypothetical propositions, observation of agents' intentions (intentions are assumed to be reliable indicators of their actual behavior). This method is used to estimate the demand for a public good, which is out of the market. It is also recognized that the contingent valuation allows the calculation of the total economic value which is the sum of the value of use and non-use (Carson and al., 2001) where it is assumed that utility results from both direct use value and non-use value (option value).

By summing individuals' willingness to pay, an estimate of aggregate final demand for non-market goods is obtained. It is somehow an approximation of the market value of this good. As Mitchell and Carson (1989) put it, the contingent evaluation is potentially capable of directly measuring a broad range of economic benefits for a wide range of goods, including those not yet supplied, in a manner consistent with economic theory. Its interest is to be compatible with the standard microeconomic representation of the behavior of individuals (maximization of utility under constraint of income). Since the positioning of the contingent evaluation is necessarily collective, the objective of the method is to demonstrate that the project makes it possible to increase the well-being of the community.

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[2] It has been treated by the literature both empirically and theoretically (Menchik and Weisbrod, 1987 ; Brown and Lankford, 1992 ; Duncan, 1999).

Contingent valuation method has some limitations (Hausman, 1993). Hypothetical bias has been put forward by many authors. In general, the reported willingness to pay is different from actual behavior (Johannesson,Liljas, Johansson,1998). They are often overestimated because the individuals are not confronted with a real market. Secondly, the strategic bias refers to free-riding behaviors: the individual does not wish to pay for others. Thus, the consequence could be a low participation of certain agents in the financing of the public good, and thus a sub-provision of the public good (not optimal in the Pareto sense). There is also anchoring bias when the investigator makes a proposal for a starting price for the auctions on the basis of the choice of the amount willing to pay, which influences the answers. There are also biases in the way individuals perceive the good, their positioning being able to go beyond the private sphere based on a citizen reflection that includes social and collective dimensions and could then give it another weight in the function of utility. But in this case it is not so much the method of contingent evaluation that is to be criticized, than its underlying postulate, the selfish behavior of the individual.

As mentioned, it is used to measure the non-market value of public goods: "*contingent valuation is the only method capable of estimating the total value (use, non-use and option value) of a good*" (Hansen, 1997). The method has been applied to environmental goods (Davis, 1963 ;Haneman, 1994), health (Kenkel, 1994 ; Diener, 1998 ; Klose, 1999), cultural property (Throsby, 1986 ; Hansen, 1997 ; Alberini, 2006 ; Packer, 2008 ; Fujiwara, 2013), research infrastructures (Florio, 2015). Not yet to online projects.

The factors influencing the willingness to pay of public goods are of different types. First, we find the factors derived from economic theory: income and the use of the property. Income and use have a positive effect on willingness to pay (Carson, 2001). Liebe and al. (2011) cite two other determinants of willingness to pay, derived from the public good theory: the social dilemma posed by the public good and the individual's trust in the cooperation of others in financing (Andreoni, 1990) or (Ostrom, 2000). We can also add determinants from models of altruistic behaviors such as warm glow of giving (Andreoni, 1990) or purchase of moral satisfaction (Kahneman and Knetsch, 1992).

Contingent valuation responses reflect the willingness to pay for the moral satisfaction of contributing to public goods, not the real economic value of these goods. These indicators translate a sense of subjective obligation to participate and warm glow. Studying all these determinants found in the literature to the case of environmental public good, Liebe, (2010) concluded that the determinants having an impact on the willingness to pay were different between the decision to do so on one hand and the amount envisaged to be given on the other hand.

A case study: Wikipedia

Wikipedia offers free content without ads. Jimmy Wales, Wikipedia Founder, put the fact that the philosophy of Wikipedia business model must remain without advertising: "*When I founded Wikipedia, I could have made it into a for-profit company with advertising banner, but I decided to do something different. We've worked hard over the years to keep it lean and tight*". Wikipedia, the largest provider of online information and knowledge good, is able to avoid advertising resources, since most of its content is produced by voluntary contributors. De la Iglesia and Goye (2009) caracterised the Wikipedia Business Model as mass collaboration "*communities of users that agree in creating something (generally contents or software) by given their work with the condition that the service will remain free to everybody*" (De La Iglesia and Goye, 2009). This strategy has enabled the encyclopedia to dwarf or kill its competitors (Britannica, Encarta). Therefore, the users have been accustomed to a consumption model, which is a complete free content provision.So that, it is difficult to consider freemium model: in the case of an encyclopedia, providing (paid) additional services would signify to limit the access to some content to subscribers only.

However, the encyclopedia has still to finance the free access given to this content and for this mainly relies on gifts.The gifts come from individuals, companies, but above all charities and foundations (of the 19 largest donors, 9 are foundations, 4 are anonymous donors, 3 are twinning programs (Google, Apple and Microsoft), 2 individuals and one company). Donations are thus, from a user's point of view, third party financing which enables the free access but allows Wikipedia to avoid the disadvantages of advertisement. This seems to be convenient to everybody and has clear efficiency consequences: in particular, people who could not afford the access to the content, if they had to pay for it, are allowed to (allocative efficiency). In addition, since this content is mainly knowledge, this helps to improve wellbeing, by having people more knowledgeable. However, nobody knows whether this first best outcome will last for long.Moreover, the regular calls for funding by Wikipedia are a form of crowdfunding.

There are some drawbacks to the present situation. Donations are provided mainly by foundations which are themselves fed by donators. Hence, they act as intermediaries between donators and the Wikimedia Foundation. This enables to enlarge the population of potential donators, but may raise unnecessary costs of fund raising. Also, the foundations have their own political agenda, and may decide to diminish or even suppress their donations in the future for any reason. Finally, most foundations are of American origin, and Wikipedia is thus indirectly financed by American citizens or institutions. While this may not be perceived as a problem, it probably has the indirect consequence to favor the English-speaking version of the encyclopedia. Other language speaking versions may be better developed if donations were provided by institutions from different origin. These drawbacks are still lenient, but could become more relevant in the case where the cost of giving access to the encyclopedia increases significantly, if the number of videos presented and watched raise dramatically, for instance.

Overall, there is no best way to finance a public good such as the access to Wikipedia and to compare it to its cost of production. Wikipedia can be considered as a cultural heritage, represented by accumulated knowledge from years to years. It is a property that benefits from intergenerational externalities, enabling future generations to benefit from the knowledge previously published. This generates both a use value and a heritage value (based on the surplus utility linked to its own existence, a store of value for future generations). Since its conception Wikipedia has been outside the market activities founding its existence on donations, in kind (contributions) or in cash. We want to know how much users would be willing to pay to have access to Wikipedia without advertising. Their willingness-to-pay would be equivalent to a gift. Since access is not denied when congestion come, it may be sufficient to have some people pay (donate) to preserve access for all. While most would free ride, the contribution of the few who love Wikipedia and hate advertising would suffice to maintain a reasonable quality of service.

According to this literature, our assumptions are the following:
- H1: Users give a positive value to ad-free Wikipedia.
- H2: Income, use, social dilemma, and moral satisfaction have a positive effect on willingness to pay.
- H3: In terms of behavior toward advertising online, people who use Wikipedia for professional task are not willing to support advertising when searching for information,because it can distract them from their professional task. So, they will accept to pay for a Wikipedia version without ads.

III. Materials and method

Data collection

With the kind cooperation of the French Wikimedia Foundation and the Wikipedia project, in February 2015 we put a banner on the homepage of the French-language Wikipedia. This gave respondents access to a questionnaire about their habits, contributions to, and perceptions of the platform. Almost 30,000 Wikipedia users started the survey and 16,879 finished it. We based our calculations on 16,432 responses.

Econometric work

As said before, the decision to give, and the decision about the amount given are two steps of the process of giving, and have to be modeled as so in a contingent evaluation.

From Terra (2005), when the proportion of true zeros in the sample is low (10% threshold), the appropriate model for the analysis of the determinants of the willingness-to-pay is a model of Heckman (1979). We estimated the true zeros by the response to the question "What is the reason you do not want to pay to Wikipédia?". We considered that the true zeros are those who answered "There is no need to maintain Wikipedia", which represented 5.23 % of true zeros. So that we used the Heckman procedure. This two-step Heckman selection model explained both the decision of the respondent, whether or not to pay, as well as the size of the WTP amount. In the first step, the decision of the respondent to pay or not to pay was modeled. In the second step, how much the respondents are willing to pay was modeled for all observations with a positive WTP.

Dependent variables

The first dependent variable (first step of Heckman model) was the probability to have a positive willingness to pay. The second dependent variable was the amount of the payment: €5, 7 or 10. The willingness-to-pay derived from a hypothetical scenario, a key element of a contingent valuation.

The chosen scenario (close to their donation campaign, but different in terms of issue) was "let's assume that the free encyclopedia Wikipedia may be in danger, because donations no longer suffice to finance its operation (payment of servers, payment of the connection ...). In order to avoid the use of advertising on the site, Wikipedia proposes to charge access. Would you support that?" and for the payment: "Wikipedia would offer an annual subscription to its site. Payment would be done online and would give individual access to Wikipedia on all media (web, mobile). Would you be willing to pay 7 euros a year to access Wikipedia?" If the respondent said "yes", we proposed €10 and if he said "no", "€5". Therefore, the study of contingent valuation used the double-bounded dichotomous choice format (Bishop and Heberlein, 1979) and the vehicle of payment of the consumer was an annual subscription.

Explanatory variables

The survey provided us information about the respondent's Wikipedia knowledge and behavior. As mentioned in the literature review, the variables likely to influence the probability of accepting to pay for Wikipedia are four types: income, Wikipedia uses, social dilemma, moral satisfaction.

When analyzing the willingness to pay (WTP), income is an important variable because the answers obtained on the WTP should be consistent with the budget constraint of each respondent. In its monthly budget, the respondent can't devote all his income to the use of Wikipedia. For the income level, we preferred financial sentiment rather than a declared value (indeed, in the survey, we had also the level of income, but it is a sensitive data and 10% of the sample did not answer). Dang Nguyen and al. (2016) showed that there is a strong correlation between income level and income perception, in the same situation. So, the question used was: "If you consider all your financial resources, you would say that: 1) you have a very comfortable level of income, 2) you have a comfortable level of income 3) income meets needs 4) income makes life difficult".

The survey also asked respondents whether they used Wikipedia for professional (job or, for the students, studies), or personal purposes, with the hypothesis that the impact on the WTP will be different. For professional uses, should the respondent pay or its employer? In the same time, having ad may be more disturbing, and thus must be avoid in job situation. We asked respondents about their intensity of use, based on a scale of "never", "little", "medium", "often".

The seniority of use may also make it possible to understand the willingness to pay. Indeed, if they use Wikipedia regularly, they know the type of information available and make a judgment on their usefulness. We had a variable called seniority, the number of years they had been using Wikipedia. It is a continuous variable ranging from 1 to 5, increasing with seniority. The question was "For how long have you used Wikipedia? 1) Less than a year 2) Between 2 and 4 years 3) Between 5 and 8 years 4) Between 9 and 12 years 5) More than 12 years".

We tested a type of Wikipedia use: the fact of being able to copy the information of Wikipedia by citing or not the sources, the plagiarism. Those who cite their sources understand the value given to information by others. The question was "In your work or in your studies, for the documents you have to write, have you ever used Wikipedia texts, copying all or part of an article without citing the source? 1) Never 2) Rarely 3) Sometimes 4) Often 5) Not concerned".

The social dilemma is a situation in which the behavior that best suits the interests of an individual is disastrous for the group when everyone adopts it. In the case of Wikipedia, it is more the notion of the dilemma of public good that those who use systematic and free public resources do not contribute to its development. Contribution to Wikipedia by adding or creating citation is one way to participate in the development of Wikipedia with in return a free use. Is this an indication of the support to Wikipedia and its philosophy, leading to a will to maintain the (ad-) free, access and a positive wilingness to pay? On the other hand, the contributors may have the impression of having already funded the project, and may not want to pay somehow a second time. We considered the frequencies of contributions: regular contributors (as defined in Dejean and Jullien, 2015), those who contributed occasionally only and non-contributors.

Wikipedia, as a common good, implies a sharing of knowledge and a certain confidence in the actions of others, especially to increase the global level of knowledge and ensure the longevity of Wikipedia. We measured trust by the following question: "would you say that in general, in relations with others ... 1) Most people can be trusted 2) We must be careful 3) No response".

We added another variable, which is a proxy for the attachment to a public service as Wikipedia. The question asked was "If Wikipedia disappeared, would it be: 1) A disaster 2) A significant loss 3) Somewhat harmful 4) A non-event (no impact) 5) A good thing".

Finally, we asked the respondents whether they believed that "some of those who edit articles in Wikipedia are paid to do it" (true or false) in order to identify differences in the positioning of users in their relation to the public good.

Moral satisfaction is also known as "Warm glow of giving" (Andreoni, 1989, 1990). It is the voluntary contribution to the provision of public good. Wikipedia being free, we considered those who voluntarily donated to Wikipedia. The question was "Have you already donated to Wikipedia? 1) Yes,one time 2) Yes, several times 3) No, you have not succeeded (technical problem, payment problem ...) 4) No". We added another question about cash donation to charity, in general, to test for the impact of the warm glow attitude on this particular situation of giving: "Have you already donated more than 10 € to a charity? 1) Yes 2) No".

Moral satisfaction makes it possible to highlight community values. "We can speak of a Wikipedia community" was an affirmation in the survey, with 5 possible answers: "strongly agree", "somewhat agree", "neither agree nor disagree", "rather disagree", "do not know". We also wanted to test the possible community actions by all, by the following affirmation: "the fact that Wikipedia is modifiable by everyone is a main quality" ("strongly agree", "somewhat agree", "neither agree nor disagree", "rather disagree", "do not know").

Control variables

We also considered other potential determinants of willingness to pay, notably the usual socio-demographic characteristics (gender, age, professional category, free time and education).

IV. Results

Descriptive statistics

As our survey was promoted on the homepage of the French-language Wikipedia, all respondents were French speakers. Table 1 describes all the variables.

Table 1: Descriptive statistics

Variables	Description	Observations	Percentage
Gender	Woman	5945	36.18%
	Man	10487	63.82%
Age	Under 20	5248	32%
	20-30	3553	21.67%
	30-50	3217	19.62%
	50-60	1610	9.82%
	Older than 60	2770	16.89%
Professional situation	At school	5131	31.40%
	Student	1577	9.65%
	Employed	2445	14.96%
	Unemployed	3875	23.71%
	Retired	3313	20.27%
Education	Less than bachelor	4070	25.19%
	Bachelor	2127	13.17%
	Undergraduate	4814	29.80%
	High school	5144	31.84%
Income	Very comfortable level	1483	9.17%
	Comfortable level	7273	45%
	Income meets needs	5361	33.17%
	Income makes life difficult	2047	12.66%
Free time	No free time	1114	6.87%

	A little free time	8431	51.99%
	Some free time	4852	29.92%
	A lot of free time	1819	11.22%
Relationship to others	We can trust people	4458	27.44%
	We should be careful	10126	62.32%
	Without opinion	1664	10.24%
Cash donation to an association	Yes	10075	61.31%
	No	6357	38.69%
Household size	1 person	3377	21.23%
	2 persons	4134	25.99%
	3 persons	2546	16.01%
	4 persons	3283	20.64%
	5 persons or +	2565	16.13%
Professional uses	Never	1342	8.17%
	Little uses	2370	14.42%
	Medium uses	3805	23.16%
	Often	8915	54.25%
Personal uses	Little uses	8278	50.38%
	Medium uses	1999	12.17%
	Often	6155	37.46%
Have you ever used Wikipedia texts, copying all or part of an article without citing the source	Never	9022	58.35%
	Rarely	2430	15.72%
	Sometimes	1408	9.11%
	Often	1080	6.98%
	Not concerned	1522	9.84%
Wikipedia uses seniority	Less than 3 years	1316	8.01%
	Between 3 and 5 years	2958	18%
	Between 5 and 9 years	7474	45.48%
	Between 9 and 12 years	3436	20.91%
	More than 12 years	1248	7.59%
Wikipedia donation	Yes one time	1907	13.83%
	Yes several times	1235	8.96%
	No, not succeed	876	6.35%
	No	9768	70.85%
Wikipedia preferences	A disaster	5458	33.41%
	A major loss	9084	55.61%
	Somewhat harmful	1792	10.97%
Some article writers are paid to do so	True	4821	29.34%
	False	4818	29.32%
	Do not know	6793	41.34%
We can speak of a Wikipedia community	Strongly agree	5800	35.30%
	Somewhat agree	5477	33.33%
	Neither agree nor disagree	2111	12.85%
	Rather disagree	1136	6.91%
	Do not know	1908	11.61%
Wikipedia is modifiable by everyone is a main quality	Strongly agree	3210	19.54%
	Somewhat agree	5083	30.93%
	Neither agree nor disagree	4107	24.99%
	Rather disagree	4032	24.54%
Contribution to Wikipedia	Never	10967	67.33%
	One to two times	3112	19.10%

Sometimes	1453	8.92%
Regular contributor	757	4.65%

The respondent population is a relatively young sample with degrees. 45% think they have a comfortable income. 71% have never donated to Wikipedia whereas 61% have already donated to an association.

They are users rather professional or at school and they have used Wikipedia for more than 5 years. 67% of the respondents have never contributed to Wikipedia articles.

The distribution of the results on the question of contributors' retribution show a rather poor knowledge of the economic model of Wikipedia. On the other hand, respondents attach a great importance to Wikipedia and 69% believe that one can speak of a Wikipedia community.

We can consider two profiles in the sample: Wikipedia Lovers (those who said that the disappearance of Wikipedia would be a disaster: 33,41%) and potential free riders (said that the disappearance of Wikipedia would be a disaster but have never donated :26,3%).

Direct calculation of WTP

64% of the respondents agreed to pay an amount for Wikipedia and they gave a positive value to the encyclopedia. Indeed, the direct calculation of the willingness to pay to use Wikipedia without advertising gives an average value from €5.64 for a year (Figure 1). The maximal Willingness to Pay is €8.82 (only considering persons who had a positive willingness to pay). We can compare that to the recent campaign of donation, which asked all users to give €2, knowing that the average donation is €10. Our difference comes from the fact that our scenario is based on advertising avoidance. The first assumption H1 is validated.

Figure 1: Direct Willingness to Pay and repartition of the respondents
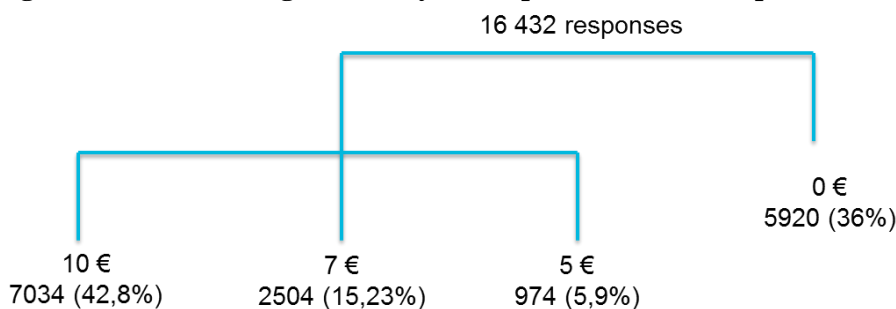
The Profile of the Payers
With the Heckman model, we can identify the profile of the people who accepted to pay and the profile linked to the amount of payment (Table 2).

Table2: Econometrics results

Variables	Step 1: WTP>0	Step 2: WTP
Constant	-0,07 (0.11)	+9.19*** (0.66)
Demographic characteristics		
Gender Woman Man	 -0,0008 (0.02) Ref	 - 0.16 ** (0.07)
Age < 20 20-30 30-50 50-60 > 60	 -0.60*** (0.08) -0.53*** (0.07) -0.48*** (0.07) -0.27*** (0.07) Ref	 +0.58** (0.29) +0.41*(0.24) +0.47**(0.22) +0.25 (0.20) Ref
Household size 1 person 2 persons	 +0.11** (0.03) +0.10** (0.03)	 -0.16 (0.13) -0.09 (0.12)

3 persons	+0.05 (0.03)	-0.16 (0.12)
4 persons	+0.008 (0.03)	+0.05 (0.11)
5 or more	Ref	
Professional situation		
At school	-0.11 *** (0.04)	+0.35** (0.14)
Student	-0.08* (0.05)	-0.14 (0.16)
Employed	-0.12 (0.08)	+0.04 (0.22)
Unemployed	+ 0.009 (0.04)	-0.18 (0.16)
Retired	Ref	Ref
Education		
Less than bachelor	-0.08 ** (0.04)	-0.02 (0.13)
Bachelor	+0.0009 (0.03)	-0.17 (0.12)
Undergraduate	-0.02 (0.03)	-0.05 (0.09)
High School	ref	Ref
Free time		
No free time	-0.16*** (0.05)	
A little free time	-0.08** (0.03)	
Some free time	-0.002 (0.04)	
A lot of free time	Ref	
Income		
Income		
Very comfortable level	+0.35*** (0.04)	+0.62*** (0.19)
Comfortable	+0.25*** (0.03)	+0.49*** (0.14)
Income meets needs	+0.14*** (0.03)	+0.03 (0.12)
Incomemakeslifedifficult	Ref	Ref
Uses		
Professional uses		
Never	-0.09* (0.05)	-0.07 (0.15)
Little uses	-0.06* (0.03)	-0.16 (0.11)
Medium uses	-0.03 (0.02)	-0.17 (0.09)
Often	Ref	Ref
Personal uses		
Little uses	-0.06 ** (0.02)	-0.29*** (0.08)
Medium uses	+0.04 (0.03)	-0.04 (0.11)
Often	Ref	Ref
Wikipedia uses seniority		
Less than 3 years	+ 0.15*** (0.05)	-0.15 (0.18)
Between 3 and 5 years	+ 0.20*** (0.05)	-0.18 (0.16)
Between 5 and 9 years	+0.23 *** (0.04)	-0.38** (0.15)
Between 9 and 12 years	+0.19*** (0.04)	-0.32** (0.15)
More than 12 years	Ref	Ref
Copying without citing the source		
Never	-0.06 (0.03)	-0.015 (0.10)
Rarely	- 0.01 (0.04)	+0.05 (0.13)
Sometimes	-0.09 * (0.04)	+0.24 (0.16)
Often	- 0.03 *** (0.05)	+0.21 (0.18)
Not concerned	Ref	Ref
Social dilemma		
Contribution		
Never	+0.37*** (0.04)	-0.39** (0.19)
One to two times	+0.37*** (0.05)	-0.41** (0.20)
Sometimes	+0.30*** (0.05)	-0.29 (0.21)
Regular contributor	Ref	Ref
Trust		
We can trust people	+0.11***(0.03)	+0.64*** (0.20)

We should be careful	+0.03 (0.03)	+0.33** (0.19)
Without opinion	ref	Ref
Wikipedia extinction		
A disaster	+0.41*** (0.03)	+0.64*** (0.20)
A major loss	+0.37*** (0.03)	+0.33** (0.19)
Somewhat harmful	Ref	Ref
Some articles writers are paid to do so		
True		+0.003 (0.07)
False		+0.03 (0.07)
Do not know		Ref
Satisfaction morale		
Wikipedia donation		
Yes one time	+0.52*** (0.04)	+0.13 (0.17)
Yes several times	+0.65 *** (0.05)	+0.10 (0.20)
No, notsucceed	+0.32*** (0.05)	+0.14 (0.17)
No	Ref	Ref
Cash donation to an association		
Yes		Ref
No		-0.45***(0.06)
We can speak of a Wikipedia community		
Strongly agree	+0.06* (0.03)	+0.32*** (0.12)
Somewhat agree	+0.04 (0.03)	+0.13 (0.12)
Neither agree nor disagree	-0.03 (0.04)	+0.12 (0.14)
Rather disagree	-0.18*** (0.05)	+0.26 (0.18)
Do not know	Ref	Ref
Wikipedia is modifiable by everyone is a main quality		
Strongly agree	+0.06* (0.03)	
Somewhat agree	+0.16*** (0.03)	
Neither agree nor disagree	+0.07** (0.03)	
Ratherdisagree	Ref	
Mills ratio		-4.07*** (0.67)
Observations number	16432	11993

*Standard errors in parentheses; * p<0.1, **p<0.05, ***p<0.001*

The Heckman procedure shows that our respondents' willingness to pay raises to €7.73 on average per year for a Wikipedia use without advertising. It is both a value of use but also of non-use, even if only the users of Wikipedia were questioned. Indeed, WTP makes it possible to measure both option values (pay to maintain future consumption possibilities), leg values (value passed on to future generations, a kind of social value). We can imagine that the sum of knowledge provided by Wikipedia is seen as an exceptional good with an intergenerational value.

In the first stage, all the variables, except the gender, have a significant influence on the dependent variables and therefore determine whether an individual stated a WTP for an ad-free Wikipedia. In terms of demographic characteristics, youngsters have a lower probability to pay, the same for persons who have an education level lower than the bachelor does. Small households have a higher probability of paying. Income is highly significant and positive. There are no differences between professional and personal uses; those with low usage have a lower willingness to pay. A counterintuitive result in terms of experience, those who used Wikipedia recently have a stronger probability of accepting to pay than others. People who practice a copy of information without citing sources have a lower willingness to pay. An interesting result comes from contributors to Wikipedia: those who do not contribute have a higher willingness to pay. This can be seen as a compensatory effect, or, as the result regarding the seniority of the use, a condemnation of the alternative (ad or money) propose in our scenario, with regard to the model advocated today by Wikipedia.

Trust is significant, and those who trust others, are willing to pay. People who attach a great importance to Wikipedia ("the extinction of Wikipedia would be a disaster") also accepted to pay. In terms of moral satisfaction, those who have already given to Wikipedia or to an association were also willing to pay. The fact that Wikipedia was perceived as a community and allows everyone to participate implied a higher willingness to pay.

In the second stage, explanatory variables are quite different. Once the Wikipedia user has decided to participate, the exact amount of the WTP depends more on income and social dilemma factors. Those who have a comfortable or very comfortable income are willing to put a larger amount per year for an ad-free version of Wikipedia, as those who trust others and those who have a strong attachment to Wikipedia. Those who do not contribute to Wikipedia, once they have agreed to enter the market, have a lower payment amount than regular contributors. The substitution effect no longer works; if I do not contribute I value less Wikipedia than the contributors. The fact of having already given to Wikipedia has no significant effect on the amount. On the other hand, those who give to associations are ready to give more. When the user of Wikipedia sees it as a community then its amount of participation is also higher. In terms of use, only those with personal uses have a significant effect on the amount of payment, and their amount is higher than those who not have personal uses. We validate H3, those who use Wikipedia in their work or at the school level have a willingness to pay to have a Wikipedia without ads but once entered, they do not have significant differences on the amount compared to those who do not have use.

A possible explanation is that that their request is price-inelastic since the employer or the training center could be the payer of this subscription. There are no significant gender differences in the market entry issue; however, once women have agreed to pay, the amount awarded to Wikipedia is lower than men. In conclusion, we can validate H2 too.

The Mills ratio is significant, which implies that the two-step Heckman's procedure is appropriate. The first decision (accept to pay) dominates the second decision (how much to pay), which can only be adopted once first has been taken.

V. Discussion and conclusion

The Wikipedia business model is not known to most of its users. Apart from the fact that the service appears as public and free, few know its actual financing. Currently based on donations, mostly from American donors or at least English-speaking, can the model be sustainable? Our objective was to measure the value given to such a good as Wikipedia. If its users value it, perhaps new economic models may emerge. For this purpose, we used the contingent valuation method to estimate the willingness to pay for non-market goods. Our work is based on the idea that users of Wikipedia would be willing to pay for advertising-free use, thus coming closer to the current economic models of encyclopedias. Indeed, the business models of the traditional encyclopedias changed due to the emergence of Wikipedia, offering free online services with advertising without the assurance of the quality of the information and paid services without ads and a good quality.

Wikipedia users give a value of €7.73 for an annual use. This is a positive value but what does this figure of €7.73 represent? The value may seem low, but it is higher than the donation campaigns made by the Wikimedia Foundation (call of €2), and less than €10, the mean of the gifts, according to the Wikimedia Foundation (but without any specifying frequency for the donor). It is also much lower than a subscription to an online encyclopedia like Britannica or Universalis (between €50 and €70 per month). It should be noted that the results are biased by the starting amount announced during the survey (€7), this is the anchoring effect, under the labor of starting point bias (Boyle et al., 1985; Mitchell and Carson, 1989; Silberman and Klock, 1989; McFadden, 1994). A large sample size can compensate for this bias (here, *n = 16,432* so larger) and avoids abnormal observations. This starting point was obtained by observing the tariffs of an online encyclopedia, which demands €3.99 for a sheet and 9.99 € for a complete file. We took a median rate.

This work is the first work that seeks to measure the value given to Wikipedia and especially its economic value. This is the first contingent valuation protocol for an online encyclopedia. The sample is consistent (n = 16,432) and it is rare to see contingent assessments with such a large number of respondents.

The profile of the respondents is consistent with the results for other public goods and presented in the literature review. It is striking to observe that once people have agreed to pay, the only significant economic variable is income. Age, gender, education, professional situations are not significant. Besides this, moral attitude, a personal feature, explains the level of valuation.

The paper has some limitations. The sample is over-represented by Wikipedia users and is likely to provide a sampling bias, an overestimation of the Wikipedia value. This can be confirmed by the number of respondants: 16432, this number represents 56% of those who started the questionnaire. We can assume that those who were up to the end of the questionnaire had a stronger motivation and a strong interest for Wikipedia. Besides, the survey did not allow us to show the effects of advertising and the reaction of users to the disutility of advertising when one consults an information site. The willingness to pay reveals the value attributed to Wikipedia, but does it also consider the positive impact of Internet advertising (perceived informativeness or perceived entertainment (Celebi, 2015)) and / or its negative impact (perceived goal Impediment, perceived ad clutter, prior negative experience (Cho, 2004))?

Concerning the payment vehicle, we preferred the subscription, a traditional model on the Internet to go beyond the current economic model of Wikipedia, based on donations. However, donations may be used by the contingent valuation method as a payment vehicle. According to Champ and Bishop (1997), donations can be interpreted as the theoretical lower limit of the compensatory surplus, even if the effect of warm glow is considered. However, Kotchen (2014) announced that donations might exceed the contingent valuation provisions of the preference elicitation mechanism implemented. Kotchen (2015) used the Andreoni gift model (1989, 1990) and differentiated the monetary donation from the monetary measure of the surplus. The amount of the donation reflects the fact that it makes it possible to produce the property but also provides an advantage by giving (warm glow). For the willingness to pay, the amount corresponds to the amount at which the individual is indifferent between the option to pay or not, the behavior of the other individuals being constant. Moreover, depending on the hypothetical bias, it can be assumed that the willingness to pay is the upper limit of individual preferences. Nunes and Schokkaert (2003) distinguished between the "cold WTP" for calculating the willingness to pay by the "warm WTP" contingent valuation method, which is the amount an individual is willing to pay for improvement of the public good in the knowledge that the individual also receives a "warm glow" benefit by paying.

More than the warm glow, paying for Wikipedia also means making sure that knowledge is transmitted, shared, increased ... one would expect an invaluable value!

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