

# Consumer cooperatives as a new governance form : the case of the cooperatives in the broadband industry

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Eindhoven Centre for Innovation Studies

***Consumer Cooperatives  
as a new Governance Form:  
The Case of the Cooperatives  
in the Broadband Industry***

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# Consumer Cooperatives as a new Governance Form: The Case of the Cooperatives in the Broadband Industry<sup>1</sup>

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## **Summary**

Since Williamson's semi-final paper (1975) on governance forms in a market economy, a growing number of studies have focused on new forms of governance, but research seems to have neglected consumer cooperatives despite their growing importance in some sectors of the economy. With an increasing emergence of consumer cooperatives in industries such as electricity generation or broadband telecommunications, however, there is a need to study the specific structure and function of consumer cooperatives in the market economy. In the literature, the growth of consumer cooperatives has been attributed to problems of market failure in conjunction with high risk and uncertain investment. In order to examine incentives for consumers to join a consumer cooperative, we make a distinction between different types of risks and benefits. The evolution of broadband markets in the Netherlands provides an interesting example to examine the function and structure of local cooperatives in a dynamic market. In the paper, we analyze the incentives of 759 consumers to opt in favor of setting up of a cooperative aimed at providing broadband services via a fiber network. We found that the risks associated with creating cost-efficiencies and switching cost are important determinants for consumers to join a cooperative. In addition, benefits expected from consumers with respect to user network externalities and indirect gains derived will affect the probability of consumers to join a cooperative.

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<sup>1</sup> This paper would have been impossible without the data collection by B. Driessen and the support by the cooperative HSLnet.

## Introduction

Williamson's well-known distinction between markets and hierarchies (Williamson, 1979) has not only influenced studies on governance forms (Williamson, 1996), but also stimulated to a lesser extent research on consumer cooperatives (Hansmann, 1996). In this tradition, consumer cooperatives are considered as a rather instable governance form that can fulfil a function in markets characterized by market failure, i.e. investor-owned firms are not able to sufficiently supply products and services in these markets (Hansmann, 1996; Mikami, 2010; Rey & Tirole, 2007). Even if investor-owned firms have an essential role in facilitating sectoral development and technological change in an economy, they can cause market failures in product markets. Their actions can cause inefficiencies based on asymmetric information (Akerlof, 1970) and they are able to exercise market power over consumers (Tirole, 1990). In general, investor-owned firms might encounter problems in markets where risks and uncertainties are high and private investment is considered as inefficient for the firm.

In industries where consumer encounter these market failures combined with high risk and uncertainties surrounding new investments, consumer cooperatives might have advantages over investor-owned firms (Mikami, 2003, 2010). In their early phase, consumer cooperatives have been set up in order to provide market transparency and protect consumers from excessive prices by investor-owned monopolists (Hansmann, 1996; Mikami, 2003; Rey & Tirole, 2007). Recent research has shown that consumer cooperatives are important in case an investment are not undertaken by investor-owned firms due risk and uncertainty surrounding the financing of this investment (Mikami, 2010; Rey & Tirole, 2007). Compared to activities of investor-owned firms, however, the extent to which consumer cooperatives are prevailing remains rather limited with markets being still dominated by investor-owned firms.

In this context, the paper examines the idea that consumer cooperatives are set up in markets characterized by market failure in conjunction with high uncertainties and risks surrounding private investment. As has been shown (Mikami, 2010), consumer cooperatives can provide a viable alternative form of governance in these markets as they provide additional equity finance via the membership market. However, the incentives for consumers to set up a cooperative and generate additional finance are related to the utility they can gain in terms of financial and non-financial incentives. In the following, we examine the utility of consumers to join a cooperative related to financial and non-financial incentives.

In this context the paper examines the extent to which the incentives of consumers to join a cooperative are linked to two types of risks surrounding (expected) cost-sharing arrangements and switching costs as well as two types of benefits related to (expected) network size and (indirect) infrastructure considerations. Based on these two types of risks and two types of benefits, the paper examines the incentives of consumers to join a cooperative. Cost-sharing related incentives are important for consumers as they create incentives about future prices for the service, availability of new services, etc. Switching costs will provide disincentives for consumers. Expected network-externality benefits will provide positive incentives relate to the extent to which consumers can (actively) become involved in the process of (user-driven) innovation and in the development of new services. Indirect infrastructure benefits will have positive effects on the consumers joining a cooperative. In studying the incentives of consumers to join a cooperative, we utilize a sample of 759 consumers collected using an internet-based survey in June 2012 in a small town in the Netherlands. These users had to take a choice on whether (or not) to join a cooperative aimed at providing broadband services via a fiber network in their local community. In contrast to

previous research, our model shows that these incentives - prior to the establishment of the cooperative - explain better consumer decisions to opt for broadband networks compared to traditional market-based incentives (such as income or price).

In the following, the paper briefly reviews the existing economic literature on consumer cooperatives with respect to the incentives of consumers to join. Second, the paper derives an empirical model applying Mikami's framework (2010). Third, we utilize a sample of consumers to examine their choice behavior in favor (or against) joining a cooperative and explain the factors explaining their choice. Fourthly, we discuss the results of our analysis and draw some conclusions with respect to managing cooperatives and characterize some new research directions.

## **2. Consumer Cooperatives as New Governance Form**

### **2.1. Recent Discussion on Consumer Cooperatives**

In the theoretical literature on cooperatives (Glaeser & Shleifer, 2001; Hart & Moore, 1996), the discussion has, in particular, been focused on different forms of corporate governance and conflict issues. Early research by Hausmann (1996) has shown that cooperatives not only dominate or are at least are predominantly existing in a number of sectors (in the United States) such as agriculture, banking or electricity but that these forms of ownership share some common features with respect to cost of ownership and cost of contracting (Hansmann, 1996). Other forms of related cooperative undertakings can be found in strategic alliances, joint ventures or consortia. There is a common belief that cooperatives will provide an important input into the growth of the economy in the near future in areas such as standard-setting or business-to-business exchanges (Hansmann, 1999). More recent research by Rey and Tirole

(2007) has shown that cooperatives are intentionally set up by consumers to protect themselves from monopolistic behavior.

## 2.2. Incentives to join a Consumer Cooperative: An Empirical Model

As has been suggested in the literature (Mikami, 2010), consumer cooperative can represent a promising alternative to an investor-owned firm in case the latter induces serious market failure in a product market. In such situation, consumer cooperatives are able to use the *membership market* to procure equity capital based on selling ownership shares (Mikami, 2010). According to Mikami (2010), the utility function of a consumer  $i$  can be described as

$$u_i(x_i, m_i) = v_i(x_i) + m_i \quad \text{for } n \text{ consumers } (i = 1, \dots, n) \quad (1)$$

where  $x_i$  indicates the quantity of the good and  $m_i$  the money consumed. Furthermore, the value  $v_i(x_i)$  shows the utility from the consumption good, which is given by

$$v_i(x_i) = \begin{cases} v\hat{x}_i & \text{if } x_i \geq \hat{x}_i \\ 0 & \text{if } x_i < \hat{x}_i \end{cases} \quad \text{for some } \hat{x}_i \geq 0 \quad (2)$$

According to Mikami (2010), consumers in a consumer cooperative receive sufficient information about the type of investment undertaken and the product to be provided. In the initial stage 0, the cooperative will issue membership certificates (e.g. obligations) to consumers as a way for consumer to generate to obtain equity capital via the membership market. As a result of the decision of the consumer to join the cooperative, she receives with the membership the right to participate in the distribution of the benefits of the produce to be provided by the cooperative. In order to control the distribution of these benefits,

members of the cooperative can cast votes at the meeting of the members. The members of a consumer cooperative are expected to receive the gains from production at stage 1, in which the cooperative is able to distribute the benefits of production to its members (e.g. in form of payments related to obligations, cheaper and better services, etc.) (Mikami, 2010).

As the utility function of the consumer (1) has as quasilinear form, social welfare can be represented in an additive form (Mikami, 2010).

$$U = \sum_{j=1}^k m_j + \sum_{i=1}^n u_i(x_i, m_i) + m_l + I \quad (3)$$

where  $m_j$  and  $m_l$  are related to the consumption of money by investor  $j$  and the lender, respectively, and  $I$  denotes the retained earnings of the cooperative.

In case the utility function of the consumer (1) has as quasilinear form, social welfare is represented in an additive form. Based on the linearity of subutility  $v_i$  in  $x_i$  in (2) social efficiency can be judged on the basis of the option whether or not a project of a certain type is undertaken or abolished. In the model, the threshold value  $\hat{x}_i$  indicates the quantity of the good consumed in equilibrium (Mikami, 2010).

In Mikami's model (2010), the project imposes risks<sup>2</sup> for an investment at stage 0. Such investment can either be safe with a prior probability  $\alpha$  or risky with probability  $1 - \alpha$ , where  $0 \leq \alpha \leq 1$ . In case the investment fails, the physical capital acquired is worthless and investment cannot be

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<sup>2</sup> Mikami assumes in his model a credence good, where the cause of the loss  $z > 0$  is difficult to specific even after consumption (Mikami, 2010). In the case of broadband, a cause – effect relationship is difficult to specify as for consumers it is difficult to judge whether the service provider they selected is best even after they purchased the service. If a particular service provider is selected e.g. based on consumer surveys, consumers consider the service as credence good. Credence goods are related to the reputation or the brand of the service (Strouse, 2004).



recouped by any means (Mikami, 2010). If the investment fails, the consumer incurs a private loss  $z > 0$  per unit of the product he consumes, with  $z > v$ .

In case, investment carries a high risk, investor-owned firms might not undertake an investment because of fears that consumers will not buy the product. Consumers might expect that the product will not be safe or fear that it might be hazardous to use leading to social inefficiency. Consumer cooperatives provide, in contrast, consumers with information on the type of product indicating whether or not the product is safe to use (or dismiss it) (Mikami, 2010). If the investment is considered as risky, there is no production of a good or service, that means  $x_i = 0$  for  $i=1, \dots, n$ .

$$v_i(x_i) = \begin{cases} (v - z)\hat{x}_i < 0 & \text{if } x_i \geq \hat{x}_i \\ 0 & \text{if } x_i < \hat{x}_i \end{cases} \quad (4)$$

Based on utility framework outlined above, the propensity of consumers to join a cooperative is estimated using a logit model. Individual  $i$  joins the cooperative if and only if

$$Pr, (Coop) = \Pr(X_i\beta_i + \alpha_i R_i + \gamma_i B_i + \varepsilon_i \geq 0) \quad (5)$$

where  $X_i$  is a vector of individual-level controls including socio-demographic variables, and  $R$  (indicating risk of investment) and  $B$  (benefits received) with  $R \geq z$  and  $B \geq v$ .

Based on the model, a number of hypotheses can be derived related to incentives of consumers to set-up a cooperative with respect to a) two types of risks expected from high fixed costs (cost-sharing externalities) and risks relate to switching to a new technology (switching costs) and b) two types of benefits generated by the cooperative related to benefits of an increasing number of users on the network (user externality benefits)

and indirect effects related to managing public and social goods (infrastructure benefits) (Frischmann, 2012).

In order to further specify the risks involved in investment by a consumer cooperative, Rey and Tirole develop the concept of “cost-sharing network externalities” which are related to the fixed costs of setting up a cooperative (Rey & Tirole, 2007). In the case of fiber based networks in telecommunications, these large fixed costs are sunk as they involve high capital investment with very long depreciation rates. These fixed costs can be shared among users in a cooperative which gives rise to cost-sharing network externalities (Rey & Tirole, 2007). As these risks can be rather high if high fixed costs are involved, it is interesting to observe whether or not consumers are aware of the risks and convinced that a cooperative can successfully manage these risks efficiently.

*H1: Expectations about an efficient management of risks surrounding an investment increases the probability that consumers will join a cooperative.*

In case of broadband networks, risks are also related to the extent to which switching costs for consumers are involved. As there are switching costs related to the old technology, these costs will hamper consumers to join the cooperative (and adopt the new technology). Switching costs have extensively been discussed in the literature on network economics (Belleflamme & Peitz, 2010). Weizsäcker (1984) developed the major argument with respect to switching costs by proposing that suppliers will provide incentives to user to switch to a new technology (Weizsäcker, 1984). Klemperer (1987) showed that the effects of switching costs can also be negative as suppliers have incentives to keep users locked-in and to raise prices after lock-in (Klemperer, 1987). The literature has shown that the scope of switching costs includes not only cost related to

technical issues related to the acquisition of the new technology, but also includes costs of learning (Shapiro & Varian, 1999). Therefore we assume that there a variety of technical as well as cost related factors hampering users to switch to new technology.

*H2: Expectations about the risks related to switching costs will negatively affect the probability that consumers will join a cooperative.*

According to Rey and Tirole (2007), consumer cooperatives can generate returns to scale involving (traditional) network externalities in which the value of the network to the individual user is related to the total number of users of the network (Katz & Shapiro, 1985). The latter form of network externalities has more easily been able to examine in the case of a traditional telephone network (Rohlf's, 1974), but they are more difficult to detect in the case of fiber-based networks (Howell & Grimes, 2010). As consumers have been able to observe the market and have some information on competing offers of companies, they expect that the cooperative will provide cheaper prices, more competition on the network and more innovation compared to existing firms in the market. Similar to Rey and Tirole (2007), it is expected that these user externalities serve as a major incentive for consumers to join a cooperative.

*H3: Expectations about user externality benefits positively affect the probability that consumers will join a cooperative.*

There are additional benefits generated by consumer cooperatives is to the generation of positive externalities based on the production of public and social goods which do not necessarily increase the willingness to pay by consumers. These benefits can be generated in other sectors e.g. local governmental sector. Expectations about these "infrastructure benefits" (Frischmann, 2012) will have an positive effect on the probability that consumers will join a cooperative.

*H4: Expectations about infrastructure benefits positively affect the probability that consumers will join a cooperative.*

In the following, we examine these four hypotheses in the context of a cooperative in the broadband market. The key issue is here that consumers opt with a fiber network for a new technology in the market, which investor-owned firms are not able or are not willing to invest in.

### **3. The Incentives of Consumers to Join a Cooperative: The Evidence from Broadband Markets in the Netherlands**

#### **3.1. Broadband markets in the Netherlands**

Technological change in broadband has been rapid over the past ten years. In 2008 the development of broadband technologies reached a new phase with the emergence of a new generation of access technologies<sup>3</sup> based on fiber (OECD, 2008). But since 2008, the climate in broadband markets has not been "favorable" for investments in these new technologies (Huigen & Cave, 2008) and incumbent companies in the Netherlands had insufficient incentives to invest in fiber technologies (de Bijl & Peitz, 2008).<sup>4</sup> This has affected the rate of fiber deployments in the Netherlands. Currently, the Netherlands has been at 11<sup>th</sup> place at fiber deployments in the world (measured as proportion of fiber technologies in

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<sup>3</sup> In 2009 the European Commission defined these technologies in the European Guidelines as Next Generation Access ("NGA") networks which are technologies that provide permanent access to broadband services and are fully or partially based on optical components. These networks can deliver broadband services with better features (such as higher throughput) than services provided via the existing copper telephone network (CEU, 2009).

<sup>4</sup> The reason for the lack of stimulating the rollout of fiber lies in the responses of incumbent companies to technological change and innovations in the broadband market (Huigen & Cave, 2008). The revenues of these companies are threatened by the emergence of Internet Protocol (IP) - based technologies, increasing competition in the broadband market and entry of new companies (like Google) in the market (Huigen & Cave, 2008). Incumbent companies (xDSL provider KPN and cable modem providers like Ziggo or UPC) lose market share in traditional market segments such as voice telephony threatened by new Voice over IP (VoIP) services or cable television vulnerable to the emergence of digital television.

total broadband penetration) with 4.19 percent just behind Portugal (10.6 percent) and Hungary (12.6 percent) (OECD, 2012). There have been about 165 municipal fiber initiatives in May 2012 in the Netherlands in which Reggefiber was active (Poulus & Compter, 2012)(OPTA, 2012a). Consumer cooperatives accounted for approximately five percent of the broadband market.

Since the installation of the first fiber networks in the Netherlands in 2004 and 2005, the critical level of investments has decreased. Was initially a 50 percent enrollment of users considered as a profitable business model (OECD, 2008), this limit quickly decreased to 40 percent (Sadowski, Nucciarelli, & de Rooij, 2009) and reached in 2010 30 percent (Pijper, 2012). Learning effects in the construction of local fiber optic networks have been very important for these cost decreases (Pijper, 2012). At this moment in the construction of new fiber networks, a distinction between "urban" and "rural" areas has become important as the cost of construction (per user) of a fiber network in urban areas has been much lower compared to these costs in rural areas (Provincie Overijssel, 2010). Therefore rural regions have been excluded in the construction of new fiber networks by incumbent firms as the cost of installing of a local fiber network were considered as increasing dramatically and therefore unprofitable.

## **3.2 The Emergence of the Cooperatives in the Netherlands and the Cooperative HSLnet**

### **3.2.1 Short history of the Cooperative HSLnet**

Netherlands has a cooperative tradition in the construction of fiber networks with Ons Net Nuenen (established in 2004) and Ons Net Eindhoven (2005) as response to market failure (Sadowski, Nucciarelli, & de Rooij, 2009). The initiative to set up a fiber network in Heeze-Leende

(located in the province of Noord-Brabant, 10 kilometers southeast of Eindhoven, 15,000 inhabitants) goes back to 2008 when a number of fiber initiatives North Brabant municipalities in Noord Brabant were emerging. In 2009, the council of Heeze-Leende took a major decision to opt for a local broadband network which should have NGA character and should be based upon the principle of General Economic Interest (SGEI) laid out in the Broadband Guidelines of the European Commission (2009). A survey of residents, businesses and institutions undertaken in 2009 showed that about 70 percent of the respondents were in favor of setting up a fiber network in the local community.

After initiating a public offer, the council recognized that incumbent firms were not interested in constructing a network in the peripheral regions of Heeze-Leende. But as the objective of the founders of the initiative was to connect "all residents, businesses and institutions in all areas and all industrial parks" and to provide an "open network" it became necessary to develop a new business model based on a cooperative framework which was called "HSLnet". A conscious choice of the cooperative HSLnet was to have a very long term vision (of more than 30 years) for the construction of the network for which profit and efficiency reasoning have been secondary by nature compared to the purpose, construction and operation of the network by its users (HSLnet, 2012).

On May 19, 2012 demand aggregation among residents, businesses and institutions started (Compter, 2012). Despite skepticism, HSLnet achieved on July 15, 2012 a 56 percent enrollment of households, businesses and institutions to the cooperative. This meant that the cooperative became a valid business model (with a total cost € 9 million, for which the municipality guaranteed 80 percent for a loan of 4.75 million, the rest was raised through bank financing and ownership of, among others, membership certificates)(Compter, 2012). This result has been reached due to the activities of two professional quartermasters, partnering firms,

and in particular a large group of 30 volunteers from the local community. This local involvement reflected the approach of the cooperative HSLnet, which responded to the local situation and made the best use of the existing social cohesion in Heeze-Leende (Morsink, 2012). The question now is whether or not the inhabitants of Heeze-Leende shared a joint vision in opting for HSLnet.

### **3.2.2. Results of the user survey on the cooperative HSLnet**

To answer the question about the incentives of users to opt for the cooperative HSLnet, an Internet-based survey was undertaken in 1,800 households with Internet access in Heeze, Leende and Sterksel in the period June and July 2012. The objective of the survey was to gain insights into the Internet use of residents, their expectations and the challenges for HSLnet. The survey achieved with 759 respondents a high response rate (42.2 percent).

Most respondents to the online survey indicated that they lived in one the three villages (82.5%). 60% of respondents came from Heeze, 28% from Leende and 10% from Sterksel. The mean age was 55.6 years. Furthermore, 46.9% of respondents lived in households without children (36.1% in households with at least one child). Of the respondents 36.5% had higher and vocational education followed. 45% of households have on average more than € 2500 to spend. Compared to CBS data, there are no major differences regarding level of income, age or family composition, with men being overrepresented in the survey (78.5%). In the survey, 64.3% of respondents indicated that they are already members of the cooperative HSLnet (for the characteristics of these respondents, see Appendix 1).

For differences based on socio-economic characteristics of members of the cooperative HSLnet, see Table 1.

	Cooperative HSLnet		Mean test <i>F-value</i>
	Non-members	Members	
EDU (in years)	15.84	15.23	6.799*
GEN (male)	1.19	1.22	1.307
AGE (years)	54.8	56.1	1.537
OWN (House)	0.90	0.89	0.15
INC (mean income per month)	4061	3721	8.703**
No of observations	271	481	

(Note: \*\*\* = significant at 1 %; \*\* = significant at 5 %; \* = significant at 10%).

**Table 1: Socio-economic characteristics of members of cooperative HSLnet**

Table 1 provides a contingency table displaying the means of the variables used in the model by membership in the cooperative. It provides some preliminary evidence that there are significant differences along some parameters between members and non-members of the cooperative HSLnet. There are significant differences with respect to the level of education and the level of income both are lower for HSLnet members.

An important question in the study was the following: "To what extent do you think the cooperative model of HSLnet has an added value compared to other fiber initiatives in the Netherlands?" In response to this question, 60.7 percent indicated that the cooperative model added value, only 8.2 percent thought that this model has "no" or a "low" input (see Table 2).



Consumer perception of cooperative model HSLnet	Number	Percent
Very Important	156	20.6
Important	304	40.1
Neutral	184	24.2
Not important	44	5.8
No added value	18	2.4
No opinion	53	7.0
	759	100.0

**Table 2: Consumer perception of the cooperative model HSLnet**

We used different variables derived from the explanatory factor analysis (for a results on the analysis, see Appendix 2 and 3) to investigate the incentives of consumers to join a cooperative by using a logit analysis. The dependent variable is the choice of consumers to join (or not to join) the cooperative (denoted by *Coop*). The first independent variable *RCS* refers to the risks of cost-sharing and is measured as the extent to which consumers are expecting to generate sufficient returns from the investment. The second independent variable *RSW* denotes the risks related to customer switching costs and is calculated as the extent to which consumers expect problems from switching to a new network. The third independent variable indicating benefits to consumer (*BUE*) is linked to benefits consumers can gain from joining the cooperative. It is measured as the extent to which consumers expect new services in the near future e.g. in the area of health. The fourth independent variable in the model with respect to benefits is associated with the calculation of indirect 'infrastructure' benefits based on the expected benefits for the local community (*BIB*).

In addition to the independent variables, some control variables have been introduced to link the decisions of consumers to join a cooperative to willingness to pay (*PRICE*) and some socio-economic demographical characteristics such as education (*EDU*) measured in the number of years

of schooling, gender (*GEN*) a binary variable (male versus female), age (*AGE*) and income which we related to a ownership of a house (*OWN*) or income (*INC*) (For a full description on the variables see Appendix 4).

According to the observed level of membership in the cooperative, we have chosen a threshold level of 0.64 for the logit analysis. Based on the empirical model developed, the underlying regression has been defined as:

$$Prob_i(Coop) = \Pr(X_1\beta_1 + RCS\beta_2 + RSW\beta_3 + BUE\beta_4 + BIB\beta_2 + \varepsilon_i) \quad (6)$$

where  $\beta$  are the estimated coefficients and  $\varepsilon_i$  is a normally distributed error term (Greene, 2003). We observe

$$Coop_i f(x) = \begin{cases} 1 & \text{if } Coop^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (7)$$

where  $Coop_i = 1$  represents the probability that a consumer will join the cooperative and  $Coop_i = 0$  if he does not. In other words, there is a critical threshold of the index called  $Coop^*$  in a way that if  $Coop_i$  exceeds  $Coop^*$  the consumer will join the cooperative otherwise he will not. The application of a logit model allows to estimate the probability that a consumer joins the cooperative conditional on a number of independent variables (The results of the analysis can be found in Table 3).

	Coop (1)	Coop (2)	Coop (3)	Coop (4)
PRICE	-0.717*** (0.099)	- 0.441*** (0.121)	-0.718*** (0.122)	0.462*** (0.155)
RCS		0.550*** (0.144)		0.657** (0.183)
RSW		-0.227** (0.093)		-0.319*** (0.121)
BUE		0.268* (0.140)		0.373* (0.182)
BIB		0.250** (0.118)		0.331* (0.154)
EDU	-0.045* (0.023)	-0.038 (0.027)	-0.045 (0.033)	-0.070* (0.039)
GEN	-0.022 (0.206)	0.097 (0.239)	0.357 (0.289)	0.337 (0.336)
AGE	0.006 (0.006)	0.009 (0.007)	0.002 (0.008)	0.009 (0.010)
HOU	0.126 (0.295)	0.177 (0.343)		
INC			-0.114 (0.133)	- 0.022 (0.155)
Observations	736	736	467	467
Sign.	0.000	0.000	0.000	0.000
Nagelkerke R2	0.123	0.195	0.148	0.276
-2LL	883.556	666.752	547.620	401.073
Chi-Square	68.559	90.812	52.712	85.812
Prediction	66.2	68.8	67.0	73.0

Note: \*\*\* = significant at 1 %; \*\* = significant at 5 %; \* = significant at 10%. Standard errors are in parentheses. The estimates are robust maximum-likelihood logit estimates.

**Table 3: Choice of consumers to join the cooperative: Results of Logit estimates**

Before the analysis was undertaken, the level of correlation between variables in the data was checked. It appeared that there have been no unexpected multi-collinearity problems in the data with respect to the use of a multivariate model. Due to missing observations in some independent variables specified in the empirical model, 736 observations remained valid for the model with house ownership as independent variable and 468 observations for the model with the income variable. As can be seen in Table 4, all models have a high explanatory power of independent variables as indicated by the significance level and the Chi-square in the different regressions. For both models (1) and (3) the overall fit of the model improved by moving from a restricted (including just the control

variables) to the full models (2 and 4) that included the four factors: local transparency factor, the switching factor, the efficiency factor and user-externality factor.

In model 1, the percentage of cases rightly predicted increased from 66.2 percent (model 1) to 68.8 percent (model 2). The Wald test showed that the four variables under consideration belong to the subset of coefficients that contributed to the explanation of the regression model. In model 2, the cases rightly predicted by the regressions increased from 67.0 (model 3) to 73.0 percent (model 4). A constant was included in all models.

The coefficients in Table 4 are the estimated partial derivatives of probabilities with respect to the vector of characteristics. The coefficient reflects how much the probability that consumers join the cooperative increases with an increase in a particular independent variable, holding other independent variables constant. The signs of most coefficients are as expected. The variable for willingness to pay (*PRICE*) is negative and significant in all models. This indicates that a lower price increased the probability that consumers would join the cooperative. The variables of interests showed the following significance levels: The coefficients for risks of cost-sharing (*RCS*) have been positive and significant. This showed that consumers expecting sufficient returns from their investment were more likely to participate in the cooperative. With respect to consumer switching costs (*RSW*), the significant negative sign showed that extent to which consumers expected problems from switching to a new network affected negative their probability of joining the cooperative. With respect to the user network externality benefits (*BUE*), the significant positive sign indicated that the probability of consumers joining the cooperative increases with the extent to which consumers expected new services in the near future e.g. in the area of health. The fourth variable related to indirect 'infrastructure' benefits measuring the expected benefits for the local community (*BIB*) was positive and

significant in all models. This indicated that the benefits derived from the local community at large have been an important determinant for consumers to join the cooperative.

The other control variables for gender (*GEN*), age (*AGE*), income (*INC*) and ownership of a house (*OWN*) have been non-significant. The variable for education (*EDU*) has a negative and significant sign in the model 1 and model 4.

#### **4 Summary and Conclusions**

Based on the approach by Mizami (2010), the paper has shown that consumer cooperatives emerge as a response to different types of risks and benefits. Consumers join a cooperative in order to cope with two types of risks: Risks emerging from high fixed costs (cost-sharing externalities) and risks rooted in switching to a new technology (switching costs). In addition, there are two types of benefits which consumers motivate to join a cooperative related to benefits of an increasing number of users on the network (user externality benefits) and indirect effects related to managing public and social goods (infrastructure benefits).

In utilizing a large sample of consumers to examine their choice behavior in favor of joining a cooperative, the different independent variable indicating the different types of risks and benefits derived from the literature were examined in a multivariate setting. The paper used a sample of 736 observations from an on-line survey undertaken in June and July 2012 in the small town in the Netherlands.

Our analysis confirmed the four hypotheses derived from the literature that consumers join cooperatives because a) they responded to risks associated with switching to new technologies and market power, b) they

expected to gain from investment in the cooperative on an individual but also social level in the near future.

The research showed that traditional analysis of cooperatives might overlook important determinants of choice behavior if the focus is on socio-economic factors only. Our analysis shows that for cooperatives the local context is very important. Even if the case for cooperatives as an alternative in case of market failure seems established (Hansmann, 1996; Mikami, 2003), less is known about their forms and development in dynamic sectors. Further research is necessary to see how cooperative models in these sectors develop which are characterized by interaction between a large number of players (such as contractors, service providers and the local community), and where the members of a cooperative have quickly and effectively be able to react to changes in the technology, the market and the industry.

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## Appendix 1: Background information on respondents

	HSLnet Survey 2012	CBS 2011
Households	1800	6144
Core/peripheral areas:	60% Heeze, 28% Leende, 10% Sterksel	60% Heeze, 23% Leende, 6% Sterksel (11% other areas)
	82,5% core areas, 17,5 % peripheral areas	89% core areas, 11% peripheral areas
Gender:	78,5% Man, 21,5% Woman	50,4% Man, 49,6% Woman
Average Age:	55,6	50% above 45 years old
Family composition:	46,9% families with no children, 36,1% families with at least one child	33-37% families, with no children*, 34-38% families, with at least one child*
Education:	36,5% Higher education, 21,3% professional education	
Average income:	€ 30600	€ 32600

## Appendix 2: Choice to opt for a cooperative: Constructs and loadings

Factor items	Factor Loadings
<b>Risk of Switching factor (Alpha – 0.663)</b>	
No need for high-speed Internet	0.469
Prices of new provider too high	0.492
Switching to a new provider is difficult	0.682
I am satisfied with my current provider	0.480
Switching to new provider causes technical problems at home	0.743
Do not want to have digging in my garden	0.558
<b>Risk of Cost Sharing factor (Alpha – 0.735)</b>	
The statutes of cooperative are well-defined	0.469
I will receive support in case of problems with my connection	0.751
Expected individual benefits from local initiatives	0.623
Individual support if new Internet applications are used	0.787
Personal impact on new developments of the cooperative and future services of the cooperative	0.531
<b>Benefits of User-Network Externality factor (Alpha – 0.648)</b>	
Expected lower prices in the future	0.405
More competitive service providers in the future	0.816
Development of new (advanced) services e.g. in the health area	0.758
Opportunity for small-scale innovations based on fiber	0.516
Participation in the development of new services	0.448
<b>Benefits of Infrastructure factor (Alpha – 0.863)</b>	
Improved communication between citizens and government	0.570
Creation of local identity	0.777
Participation in development of new services	0.438
The initiative will promote cooperatives in the rest of the country	0.863
The local area becomes a role model for other regions	0.802

### **Appendix 3: Results of the Exploratory Factor Analysis**

We expected that a number of variables can be related to specific factors (Jae-On & Mueller, 1994). We specified four factors: 1) a (local) transparency factor which should measure the extent to which the cooperative has been set-up as an alternative to market power; 2) a switching factor which should measure the extent to which users are "locked-in" into the provision of an old technology; 3) a cost efficiency factor responsible for measuring the extent to which user expected efficiency increases from the cooperative and 4) a user externality factor which should explain the extent to which users expect future externality benefits from joining the cooperative in terms of lower prices, higher quality and new services. We expected that these four factors will be sufficient to explain the incentives to join a cooperative.

For each of the items, a five point Likert scale was used. This enabled users to indicate the extent to which certain incentives have been important for them described in the item. The scale was ranging from "totally agree", "agree", "neutral", "disagree" to "totally disagree". Given that scale scores of these items possess sufficient reliability and validity, a vector of the averages for the factors can be used to profile an individual's actual level of incentives to join a cooperative. In order to get the factor loadings, a direct oblimin rotation has been used to make sure that the resulting factors are orthogonal and not depending on the method of rotation (Jae-On & Mueller, 1994)

#### Appendix 4: Description of variables in the model

Variable	Description	Mean	Standard Deviation
Coop	Member of the cooperative	1.643	.0479
RCS	Risks related to the extent of cost sharing	3.673	0.850
RSW	Risks related to consumer switching	2.249	1.114
BUE	Benefits associated with user externality benefits	3.184	0.786
BIB	Benefits associated with infrastructure benefits	2.623	0.880
PRICE	Willingness to pay	2.271	8.745
AGE	Age	55.6	13.2
HOU	House ownership	0.899	0.302
Gender	Gender	1.215	0.411
EDU	Education in years	11.368	3.916
INC	Income group	5.091	1.029