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Cooperation in sustainability transitions: C2C online sales in Italy.

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Abstract: C2C online platforms contribute to the redistribution of goods and services in the economy, attributing value to resources otherwise wasted and fostering cooperation behaviours among consumers. However, the sustainable development of C2C markets is related to the users' motivations of participation. This study investigates what are the socio-demographic and economic characteristics of individuals who perform C2C online sales in Italy. The analysis runs a probit regression over 16.828 individuals using data collected by ISTAT in 2016. The results suggest that being environmentally concerned has a positive effect on online C2C sales. In addition, the use of different internet platforms is positively related to online C2C sales. Other insights include that generations that are not familiar with the internet use are less likely to sell online, that supply is proportional to ownership and that geographical areas present differences in sales. Therefore, the results provide a picture of the online C2C phenomenon in Italy with the aim of implementing policies in line with the Italian Circular Economy strategic framework.

Key words: online C2C markets, Circular Economy, sharing economy, second-hand markets, sustainability, cooperation

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1 Introduction

Sustainable development and innovation stand at the core of the present global discussions because the current model of economic growth is associated to environmental degradation. Economic growth boomed in the last century, leading not only to higher standards of living but also to an exploitation of the resources that the planet can provide. This development process resulted not sustainable because it does not respect the regeneration time of renewable resources, leading to a risk of depletion (Steffen et al., 2011). This scenario is presented by Leach et al. (2013) as the “doughnut” model, where the environmental limits are depicted as the larger border and can’t be overcome by both the economic and social activities. On account of this, international organizations commit to decouple economic growth from environmental degradation and work for innovative and dynamic economies that focus on people, respecting the planetary boundaries.

Governments and companies have developed strategic frameworks and business models that regulate their activities respecting the planet’s ability to regenerate resources, leading to a sustainable development. Specifically, the economic activity is meant to decouple from both the natural resources need and the effect on the environment (Ekins et al., 2016). On one hand, the demand of primary resources introduced in the economy is increasing at a high pace. Hence, finding alternative and innovative solutions is needed in order to decrease the rate of natural resources’ consumption, allowing the planet to regenerate them without passing its “tipping points” (Galaz et al., 2016). On the other hand, the impact on the environment needs to decrease in terms of carbon footprint and resources exploitation, main causes of global warming (Rockström et al., 2009; Schibsted Media Group, 2017).

At international level, the Paris Agreement on climate change, the Agenda 2030 for sustainable development and the EU 2020 Agenda are agreements developed by the member nations with the aim of regulating their economic activities while preserving the planet for future generations. Among the Sustainable Development Goals part of the Agenda 2030 for sustainable development, goal number 12 “Responsible Production and Consumption” includes the Circular Economy framework, described as recycling and re-using resources, and emissions embodied in trade in order to reduce the impact not only on the environment but also on health (Sachs et al., 2017, p.21; 27). This goal represents one of the major challenges to accomplish for the OECD countries (Sachs et al., 2017, p.12). While these issues regard people as global citizens, action plans are applied at national level according to the regulations present in the country and the local habits and needs.

The Circular Economy concept contrasts the present Linear Economy model, introduced during the industrial revolution. Mass consumption, urbanization and fossil fuels use are some of the main elements that characterize and are consequence of the linear model (Esposito et al., 2015). While the Linear Economy takes, processes, uses and in the end throws resources, the Circular Economy is based on the 3R idea: Reduce, Reuse, and Recycle (Heshmati, 2017; Kirchherr et al., 2017). In this way, any resource is valued, and actual waste is reintroduced in the economy. In order to achieve this concept, both upstream and downstream activities are needed. On one hand, increasing production rates with a lower amount of resources optimizes resources’ use. On the other hand, producing more

with the resources already available closes the economic cycle (Braungart et al., 2007; Esposito et al., 2015). Therefore, moving from a Linear Economy to a Circular Economy involves a substantial change of paradigm.

Resources optimization is not only an objective applied to processes, but it involves also a change in consumer behaviours. In fact, the sharing concept, one of the main engines of the Circular Economy idea, implies a relevant change in habits (Esposito et al., 2015). In Europe, the Circular Economy framework has diffused from 2015 thanks to the introduction of a regulation aiming at zero waste, followed by the member states. Among them, Italy signed a national strategic plan in 2017. The Circular Economy model developed by the Italian Economic Development Ministry and the Environmental Ministry states that awareness in households' demand needs to be diffused as a key factor in shaping market supply of goods and services. Adding value to existing resources is the main pillar of the Italian strategic framework, that fosters the implementation of policies with the aim of shifting consumers behaviours towards resources optimization.

In the meantime, technological progress implemented innovation and teleconnections in a fast way. Specifically, the Information and Communication Technology (ICT) revolution radically changed the way of communicating. The internet users are increasing worldwide, passing from 1,02 billion in 2005 to 3,58 billion in 2017 (ITU). In Italy, 79% of households hold an internet access in 2016 (Eurostat) and by 2021 users are expected to grow of 3 million (Statista). In fact, technological development introduced online markets and developed networks among people, increasing complexity in the economy. Nevertheless, technologies are expected to evolve coexisting in harmony with the planet in order to ensure a sustainable development.

In this scenario, actions at different levels are regulated in order to move the global economies towards a sustainable development. However, consumer behaviours and choices are still some of the main factors of impact. Looking at the goods consumption, the performance cycle is higher than the lifecycle of the products that consumers use, leading to waste production even when the good has still value. Alternatively, products are stored or underused and consumers do not exploit their potential (Lacy & Rutqvist, 2015). These concepts are applied to any asset, including knowledge and services in general, leading to inequalities in the distribution of resources that, in turn, lead to high wastes. In this sense, the ICT revolution allowed people to connect and widen the consumer-to-consumer (C2C) market dimension, breaking geographical boundaries, the consumers' role and networks limits. Consumers can become active sellers, contributing to a sustainable development (Clausen et al., 2010). Accordingly, the Agenda 2030 promotes access to the ICT for the population in order to exploit the interconnection advantages and distribute knowledge in order to foster progress and optimize the resources available.

On account of the global sustainability transition, national economies point out strategies that focus on an optimal use of resources in the eco-friendly perspective. Among them, cooperation among the stakeholders involved in the economy is fostered as a component of the social sustainability idea, and technological development is exploited to find technical solutions. C2C markets involve trade of second-hand goods, sharing goods' use and occasional services supply, all dimensions supported by a sustainable paradigm. Second-hand markets compose a relevant part of the reuse dimension of the Circular Economy. According to the IVL Swedish Environmental Research Institute (2017) and Schibsted Media Group (2017) the carbon footprints saved in online second-hand markets in Italy account for about 6 million tons of CO₂ emissions in 2016. On one hand, the results include the resources saved in the production process. On the other hand, the results account also for emissions

embodied in transportation of goods, power used to connect to the internet, and business-related ones. Hence, studying second-hand markets in Italy is relevant because it represents reuse of goods and greenhouse gas emissions savings. Similarly, sharing the use of services shifts the sale of a product itself to the use of the product. In this way, value is derived from the performance and not from the raw material, allowing the exploitation of an already produced resource (Lacy & Rutqvist, 2015). Therefore, C2C markets embrace several dimensions of the sustainable development ideas, from reuse and share, to cooperation and innovation.

Consumers behaviours towards C2C markets have been analysed mainly in explorative studies, focusing on the motivations that have led them to contribute. However, some results highlighted how C2C markets are barely perceived as connected to the protection of raw materials (Clausen et al., 2010) in countries other than Sweden (Appelgren, 2018). Hence, this study tries to identify households' habits related to C2C online sales in order to understand how to lead a transition in consumers behaviours in Italy. In this way, policies oriented toward specific groups can be implemented in order to incentivize the transition, educating conscious and informed citizens. (Ministry for the Environment, Land and Sea & Ministry of Economic Development, 2017). It is relevant to understand both what are the factors that are connected to the digitalization phenomenon in relation to sustainability and what are the socio-demographic factors that characterize individuals who resell their goods and supply services in online C2C markets.

1.1 Research Problem

C2C markets are a phenomenon of redistribution and share of resources, that is conceptually in-line with the Circular Economy strategic framework published in Italy. They facilitate the cooperation among consumers in order to extend the lifecycle of material goods and the diffusion of knowledge. This phenomenon grew its diffusion potential with the introduction of ICT, breaking geographical and networking barriers. Precedent studies on C2C markets are mainly qualitative and explore the motivations that lead the population to purchase or sell private goods or services in different countries. However, no studies have been conducted on the relationship between C2C online sales and socio-demographic characteristics in real terms and for a representative portion of the population at national level. So far, transactions occurring on internet platforms have been mainly connected to the ICT phenomenon itself, including the level of knowledge transferred through online platforms and the confidence with the use of internet (Appelgren, 2018). Assuming that the present society is internet user friendly and this level is expected to grow in the future, what are the socio-demographic, economic and behavioural determinants related to online sales of private goods and services?

1.1.1 Hypotheses

An open discussion takes place among the motivations that lead consumers to participate to C2C markets in developed countries. In the past, a low level of income was related to the participation to consumer-to-consumer markets, but nowadays other motivational factors prevail (Appelgren & Bohlin, 2015a). Appelgren (2018) found a relevant shift of the individuals' motivation towards second-hand markets in Sweden, leading country in sustainability, passing from economic reasons,

through social ones and ending to environmental reasons. Hence, reusing goods is not connected with a poverty status anymore thanks to the media contribution in shifting this idea to an attractive and convenient market. In this scenario, as the demand side grows because of new trends and motivations in C2C markets, the supply side also finds an opportunity to grow. However, the connection between C2C online markets and environmental benefits is not popular in all countries and therefore Clausen et al. (2010) argues that C2C markets are driven by other factors. Therefore, the analysis tests whether an expressed concern on different environmental issues can be predictor of households' behaviour on online C2C sales in 2016.

Hypothesis 1: Environmental concern has a positive marginal effect on online sales of private goods and services.

The second hypothesis that this study tests is the joint effect of being female and environmentally concerned on the chance of selling online private goods and services. Considering the motivations behind participation in second-hand markets presented in precedent studies, gender specifics revealed a difference. The percentage of female participating to second-hand online markets is generally lower than male. However, women who trade goods online on eBay motivate their participation as an eco-friendly behaviour, while men participating to online C2C markets reveal to be indifferent to environmental reasons (Clausen et al., 2010). In addition, several researches presented that women care more about the environment than men (Böcker & Meelen, 2017). Therefore, the study tests the positive likelihood of selling online private goods or services by women who are environmentally concerned. In this way, the results would suggest whether implementing policies on women's sensitivity to the environment is worthwhile for increasing supply in online exchanges among consumers.

Hypothesis 2: The joint effect of being female and environmentally concerned affects positively the chance to sell online sales private goods and services.

1.2 Aim and Scope

This study aims at testing the relationship between online C2C sales and environmental concern, in order to estimate the impact of environmental reasons on individuals' behaviour in concrete terms. Specifically, the analysis is focused on sales of private goods and services occurred on online platforms, representing a specific segment of C2C markets that joins ICT development and cooperation behaviours. Hence, the study leads to the extraction of a behavioural equation that, given a certain value, expresses the probability of online sales occurrence. In this way, it provides insights on the characteristics of individuals who have higher potential of developing the online C2C sector in Italy on the supply side, as a component of the sustainability transition concept. There is not any published study investigating C2C markets' determinants.

In addition, taking 2016 as reference period would give a picture of the determinants of online sales of the Italian population before the implementation of the Circular Economy strategic plan in Italy. Hence, this study aims at representing a starting point for future comparisons, in order to control the effect of implemented incentive policies. C2C markets, and specifically online C2C sales, represent several conceptual dimensions of the strategic plan, including reuse of resources, cooperation among

stakeholders, part of different industries and sectors, and innovation as leading factor to a sustainable transition. Therefore, the analysis at micro level of one specific sector would provide concrete insights for policies that aim at achieving a sustainable competitive advantage. For this reason, the analysis of the behavioural characteristics would provide insights for the governments to increase awareness on specific citizens' categories towards specific topics (Esposito et al., 2015).

1.3 Outline of the Thesis

The study first discusses previous researches in Chapter 2. Then, Chapter 3 and 4 describe respectively the data used in the analysis and the methodology applied. Next, the analysis is conducted in Chapter 5, showing the results and discussing them. In the end, Chapter 6 summarizes the study, presenting conclusions, practical implications, and leading to future research opportunities.

2 Theory and previous research

The Information and Communication Technology (ICT) revolution radically changed the way individuals interact. People from opposite sides of the world can connect, breaking the concept of distances and creating new network dynamics (Ghose et al., 2005; Chu, 2013). The ICT moved the “world of mouth” concept from physical to online platforms able to reach people at global level (Murphy & Liao, 2013; Bigné et al., 2015). In addition, internet created new online markets based on the interaction not only among companies or between companies and consumers, but also among the consumers themselves. Consumers-to-consumers (C2C) markets initially developed in form of online auctions for the trade of goods among privates, where online platforms are used for trade and products lifecycle is extended (Abdul-Ghani et al., 2011). Afterwards, C2C markets expanded also into the service sector, booming with the concept of sharing economy. This idea of collaborative consumption started to move the value of property to the value of performance obtained (Belk, 2014b; Daunorienė et al., 2015). On the drawback hand, Schor (2016) argues that the “online” dimension of C2C online markets restricts the use to internet holders, supporting inequalities.

Online markets among consumers have been widely analysed in the literature, including motivations for sales and purchases, and the dynamics taking place during these transactions. In the specific, online markets among private individuals are represented in game theory as an iterated Prisoner's Dilemma, where people who do not know each other cooperate in order to receive higher utility (Yamamoto et al., 2004). However, partial lack of information about the counterpart of the deal creates the risk of non-fulfilment of one of the parties. Hence, the role of regulated online platforms is fundamental in the transaction process because they allow buyers and sellers to create a trackable reputation through feedbacks and reviews (Strader & Ramaswami, 2002; Ye et al., 2009; Murphy & Liao, 2013; Sutanonpaiboon & Abuhamdieh, 2008). Furthermore, scholars investigated the effectiveness of the strategies used by sellers in online platforms. Quality of the advertisements and reputation are the leading factors, confirming the importance of trust in C2C online markets (Chen et al., 2016; Strader & Ramaswami, 2002; Ye et al., 2009).

Scholars conducted many qualitative studies based on interviews on the motivations that lead to sales and purchases in C2C markets for trading goods. On the buying hand, consumers appreciate how the time and space barriers are broken in online platforms and how shopping does not depend on climate conditions or personal interactions, leading to high efficiency in the market (Murphy & Liao, 2013; Nieminen, 2016). Others affirm to buy from other consumers because of the convenient supply (Bellotti et al., 2015) and for sustainability reasons. On the other hand, the missing physical experience of the product is presented as one of the major weaknesses. Therefore, honesty and trust are again at the basis of the transactions (Murphy & Liao, 2013; Nieminen, 2016). In the specific, motivations for participating to second-hand markets in Sweden, leader in sustainability, moved from economic, towards trends, to environmental reasons (Appelgren & Bohlin, 2015b).

Selling online from consumers to consumers, instead, is moved by other reasons both intrinsic and extrinsic. Chu (2013) identified a strong relationship between the buying behaviour and the reselling one. First of all, individuals resell goods in order to recover partly the purchase cost and satisfy new

needs, defining goods as an “alternative cash account”. Economic reasons are also complemented by behavioural ones because reselling goods reduces guilt feelings for high spending on goods and for resources abuse. In the end, individuals resell also to not store unused goods reducing living spaces and to create social interactions. The main drawback of online sales is represented by a rebound effect that makes consumers buy and resell more, reducing wastes but increasing consumption (Paden & Stell, 2005). Bigné et al. (2015), instead, found emphasis on motivations related to the social part of the interaction, highlighting group membership feelings, social relationships and altruism. Finally, Bellotti et al. (2015) found more recently that people providing goods and services in consumer-to-consumer private markets “place great emphasis on idealistic motivations such as creating a better community and increasing sustainability”. Specifically, they feel their cooperative actions as individual contribution to build a sustainable world.

Cooperation behaviours are mainly found in the service dimension of C2C trade, rather than the goods one. In the specific, the ICT allowed a fast development of the sharing economy market as a social innovation (Roh, 2016). Esposito et al. (2015) report that cars in Europe spend 92% of the time parked. This creates an opportunity to implement new levels of efficiency through all sectors and lifestyles. The sharing economy business is based on the idea that goods are valuable for their performance. Hence, people are not limited by selling the good itself, but they can also sell the access to the goods creating a “a growing socio-economic phenomenon driven by societal and economic forces, collaborative ICT developments, and environmental concerns” (Hamari et al., 2016). In this way, citizens started to have the opportunity to exploit owned resources, selling the performance directly to other consumers and developing a society based on accessing resources (Schor & Attwood-Charles, 2017).

Among the scholars who investigated the motivations for participating into online C2C service markets, Buda (2017) classified social and economic reasons as the main motivators for users, followed by environmental reasons. Occasional users revealed to be moved mainly by the convenient price. However, other studies have shown a relationship between motivations and the specific activity. The most common sectors include accommodation and mobility, expanding subsequently also to the meal and tool sectors. Economic reasons are still dominant in the field for more expensive goods, such as housing and cars. Then, experiences such as sharing a meal, a ride or a tool are motivated by social reasons. In the end, environmental reasons are mainly related to the mobility sector and women are more involved in sharing sustainability values (Böcker & Meelen, 2017). As a result, economic reasons are a determinant factor for users, while providers are also influenced by social and environmental reasons (Bellotti et al., 2015; Böcker & Meelen, 2017; Buda, 2017).

Tukker (2015) argues that sharing economies created a “resource revolution” because they do not limit reusing to transferring property, but also expanded the concept to renting performance, leading to efficiency in the use of the resources. This idea is embraced in many economic concepts based on both for-profit and non-profit transactions (Bellotti et al., 2015). On the social hand, the collaborative economy involves not only goods performance but also “sale” of talents in occasional activities such as tutoring and babysitting. On the environmental and economic hand, the circular economy aims at eliminating wastes in the economy. Hence, reusing practices would allow a lower resource intensity (Schor, 2016). Overall, person-to-person economies increase resource efficiency, empower cooperation and decrease environmental footprints (Botsman & Rogers, 2010; Schor & Attwood-Charles, 2017).

However, the future potential of the sharing idea is strongly related to the motivations behind it. In fact, Belk (2014a) argues that social sustainability motivations lead to true sharing markets, while economic reasons lead to a “pseudo-sharing” effect because they have limited potential to monetary convenience. In this debate, a sustainability transition occurs with a change not only in the industries but also in consumers behaviours (Böcker & Meelen, 2017). On one hand, technologies are introducing new ways of connection among consumers, creating an opportunity for changes in the current system. On the other hand, consumers’ commitment into sustainable practices is key because otherwise rebound effects would overcome the benefits (Kemp & van Lente, 2011). For example, sharing services in the accommodation field increased C2C markets but also had a strong rebound effect, increasing the total amount of travels. Another example of rebound effect takes place with car sharing. The basic principle of car sharing reduces the number of cars in absolute terms, decreasing waste and increasing efficiency in the economy. However, as the sharing sector increases, the absolute number of cars tends to increase as well, leading to more traffic and a lower use of public transportation. In this scenario, the role of the government is key in order to balance the benefits of sharing services and the magnitude of rebound effects (Esposito et al., 2015).

In addition, when resources are shared for other than collaborative reasons, the aim of the actions is not in line with the sharing economy idea. Also, practices connected to digital platforms are often related to young individuals, who do not share the cooperation idea, but rather enjoy the experience of using a new tool (Bellotti et al., 2015). Hence, motivation is the main factor that affect the sustainability transition in C2C markets. Specifically, consumers who are active users of C2C platforms for economic reasons may change them towards a sustainable direction, influenced by other users. Likewise, as the market evolves by the introduction of an innovation, motivation may change. Therefore, innovations introduced in C2C markets and motivations of participation need to be analysed step by step in order to adjust the target of operations (Böcker & Meelen, 2017).

From a macro level perspective, the sharing economy framework has been analysed in previous research through different lenses when related to the sustainability transition. Contextualizing the sustainability transition in which the sharing economy takes place using the Multi-Level Perspective (MLP) framework, climate changes and social injustices represent the landscape, while the regime involves the current system together with its social norms. Hence, the sharing economy, as a niche, exploits the friction caused by global warming and inequalities in order to enter the current system (Geels, 2002; Martin, 2016). The introduction of this innovation in the system has been analysed in the literature from two different perspectives: the actors currently part of the regime, and the niche actors (Martin, 2016).

Looking at the sharing economy from the regime lens, the actors concentrate on the economic benefits and threats. While the economic value gathered from underutilized goods and abilities converts into new sectors in the economy and consequently new job opportunities, the informality of the C2C transactions present several issues to address. Governmental regulations and policies do not employ control or impose taxes over these markets. Therefore, C2C markets involve risky exchanges and can be source of illegal practices. Again, the importance of trust in the platforms returns as a key element. In addition, actors part of the regime perceive positively rebound effects because the system relates increasing consumption to economic growth (Martin, 2016). Consequently, the regime welcomes the sharing economy as an economic opportunity, disassociating from the sustainable aspect of the transition.

Using the niche lens, instead, the sharing economy is associated to a social and environmental innovation able to influence consumers' behaviours towards a more sustainable pattern. Sharing and collaboration are the pillars of this change, that aims at empowering the population decentralizing the power (Martin, 2016). However, even if the sharing economy paradigm is perceived as a contribution to the sustainability transition, it is not sufficient to support a full system without governments. In fact, the sharing economy market is characterized by uncertain supply, depending on the ownership of assets. This point connects to uncertainty in labour demand and widen even more when economies at international level are involved. Hence, when the sharing principle involves the full economic system, governments need to present high efficiency in order to share evenly the resources (Martin, 2016). Nevertheless, this study embraces the incremental effect of the sharing idea among consumers in the Italian economy, analysing the provision of services and goods in C2C markets. While the sharing economy frameworks involves a radical system change, this study presents it as a redistribution of goods and services among consumers.

Looking at the full C2C market, Bellotti et al. (2015) argues that it not only empowered people, but also created value to the economy. In the specific, underused or unused goods otherwise wasted are reintroduced in the economy in new forms, without passing through a recycling or regeneration phase. They simply represent value for new people without requiring new resources. This leads to adjustments directly among consumers that imply efficiency in goods, labour and knowledge exchange. In this way, "the use of such services will help avert a looming global resource depletion calamity by promoting sharing, reuse and sustainability" (Bellotti et al., 2015). Acting at consumer level leads also to a change in consumer habits that, in turn, reflect to all sectors in the economy. Hence, researches on consumers' behaviour would help to identify new ways to increase their participation into Circular Economy practices, that currently represent a gap in the literature (Kirchherr et al., 2017).

3 Data

3.1 Dataset

Italian residents' habits related to online private sales are investigated in this study. In order to perform the analysis, the dataset generated by the Multipurpose Households Survey, conducted by the Italian Statistics Institute ISTAT, is used. In particular, "Aspects of daily life" is a survey conducted yearly following the Paper-and-Pencil Interviewing (PAPI) technique on about 50.000 individuals, part of about 20.000 families at national level. The questions included in the survey cover different themes at micro level, such as demographic, economic and social characteristics, nutrition aspects, ICT adoption, and perception of environmental issues and living conditions (ISTAT, 2018). Moreover, collecting data using the PAPI technique involves face-to-face interviews where the interviewer guides the interview and reports the answers, lowering substantially the risk of skipping questions (Lavrakas, 2008). In the end, the "Aspects of daily life" microdata file is relevant for the study because the population selling online private goods or services is represented by a random sample representative of the population in 2016. In this way, the study can control the analysis over more than 600 aspects, allowing for an accurate analysis and precision in estimation. Therefore, the study conducts a quantitative analysis using secondary data, reliable in terms of sample size, that can present some evidence in the profile of the Italian households related to online sales of private goods or services.

The data are published in cross-sectional form because the questions included in the survey are adjusted every year. The dataset contains 43.360 observations. Looking at the "Aspects of daily life" questionnaire distributed in 2016, individuals who used the internet in the 3 months prior to the survey accessed the group of questions related to their online activity in the same period, including online sales of private goods or services. Therefore, 15.882 observations have been dropped. In addition, minors are excluded because the policies of the most popular websites for online private trading, such as "eBay" and "subito.it", restrict the sale operations to people who are at least 18 years old. In the end, all missing values related to the model have been dropped. Hence, the final dataset used to conduct the analysis is composed of 16.828 observations. Among them, 12.191 individuals use internet daily.

3.2 Dependent Variable

The dependent variable of the models is *online sales of private goods and/or services*. It is obtained from the Multipurpose Households Survey question, translated from Italian, "Have you used internet in the last 3 months to sell private goods or services (e.g. online auctions, eBay)?" with dichotomous response. Among the interviewees, 15.147 people did not sell any private item or service in the

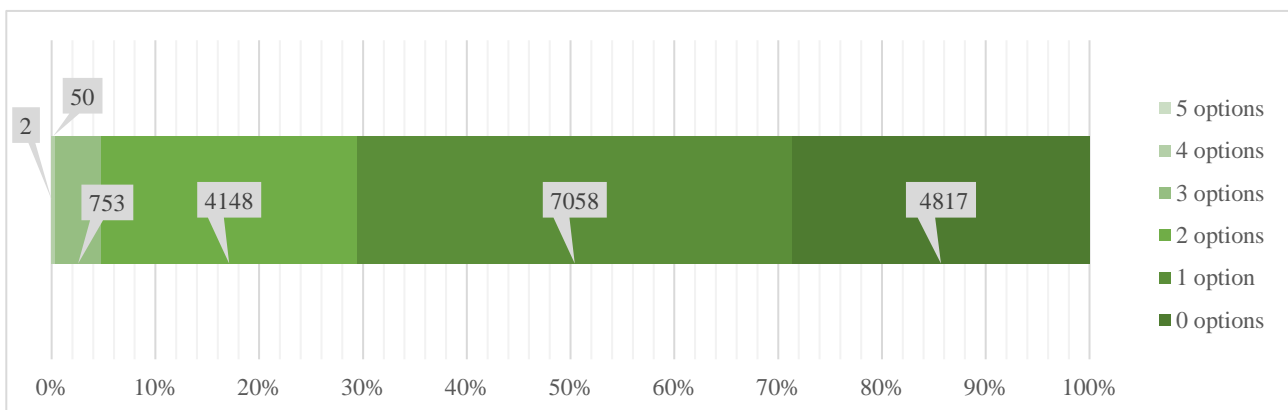
internet, while 1.681 people did. Therefore, only about 10% of the sample of internet users sold online during the three months prior to the survey. Hence, online households' sales have been re-coded into a dummy variable with values 0 or 1, where 1 corresponds to an occurred sale.

3.3 Independent Variables

3.3.1 Environmental concern

The Multipurpose Households Survey asks whether the individuals are worried about several current environmental problems. Among the fifteen options presented, the interviewees could provide the five options that they were mostly concerned about. However, as shown in Figure 1 only two people over 16.828 selected the maximum number of options and 50 of them have provided four options, jointly representing 0,31% of the sample. On the other hand, 29% of the respondents has not chosen any alternative and 42% selected only one option. Figure 1 gives an overall picture of the environmental concern expressed by the Italian population, highlighting a relatively high percentage of people indifferent to environmental issues. Surprisingly, there is an evident decrease in environmental concern, compared to the results of the questionnaire version distributed in 2014. Quaglione et al. (2017) accounted 44% of the respondents providing 5 options over 15, representing a substantial difference. This change in just two years may be influenced by the difference in the quality of the interview process and also by the restriction in observations of the final dataset.

Figure 1 - Selected number of environmental concern options



Source: *Aspects of daily life 2016, ISTAT*

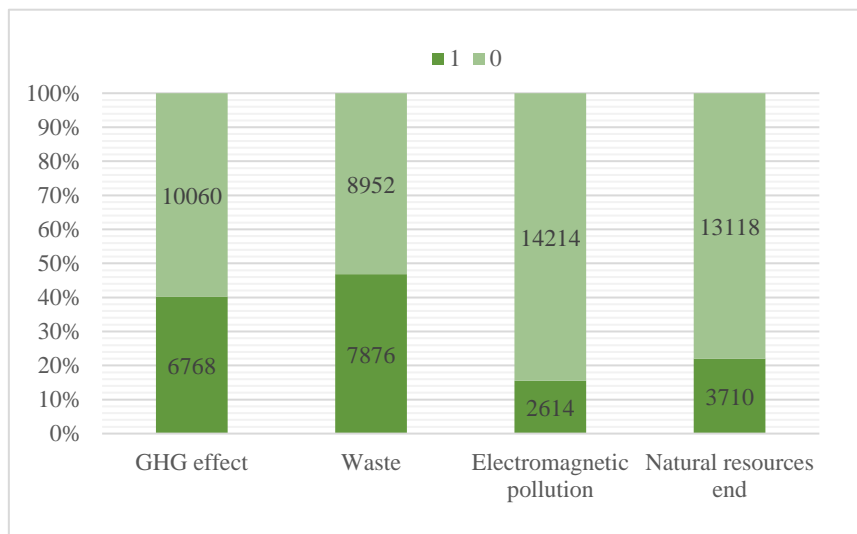
Among the 15 variables present in the dataset, the analysis is run over four selected aspects related to online C2C markets. This choice is based on two main reasons. First, when creating 15 dummy variables related to each of the 15 environmental issues, correlation is present between some of them. Second, summing all the dimensions in one “environmental concern” variable would present a general trend. Hence, given the specific nature of this micro study, keeping separated the different types of concern would result in a more detailed discussion when related to online C2C sales.

As a result, four dimensions of environmental concern are analysed. First of all, *greenhouse effect* and the *ozone hole* represent one of the major issues worldwide. Therefore, this variable would give an idea of the environmental issues' perception at global level. Second, concern on *waste production*

and disposal can find solution into the 4 R of the Circular Economy idea, including reuse. The third variable analysed is *end of natural resources in the world* (water, minerals, oil, etc.) caused by their abuse. Being worried about resources end would be a good input for resources circulation in the economy and motivation for not wasting them. Therefore, the analysis tests the relationship between resources end and reintroduction of goods and abilities already present in the economy without any transformation. All the three presented variables are expected to have a positive relationship with online C2C sales when people are environmentally concerned. In the end, concern on *electromagnetic pollution* caused by radio-tv repeaters and high voltage power lines is analysed. This variable is connected to the “online” aspect of online private sales because it can influence the use of ICT technologies, and consequently this specific market. Therefore, a negative relationship is expected in this case.

The four explanatory variables, namely GHG effect, waste, electromagnetic pollution and end of natural resources, are represented by dummy variables, where 1 represents the expressed concern. The correlation matrix (Table 4, Appendix A) demonstrates that the four environmental concern variables are not correlated among each other. Analysing with some descriptive statistics presented in Figure 2, waste production and disposal and greenhouse gas effect are the issues that the Italian population sample is most worried about, with respectively 47% and 40% of the respondents expressing concern. Nevertheless, natural resources end follows with 22% and electromagnetic pollution alarms 16% of the population sample. Overall, less than half of the respondents is environmentally concerned on each aspect.

Figure 2 - Descriptive statistics of the environmental concern variables



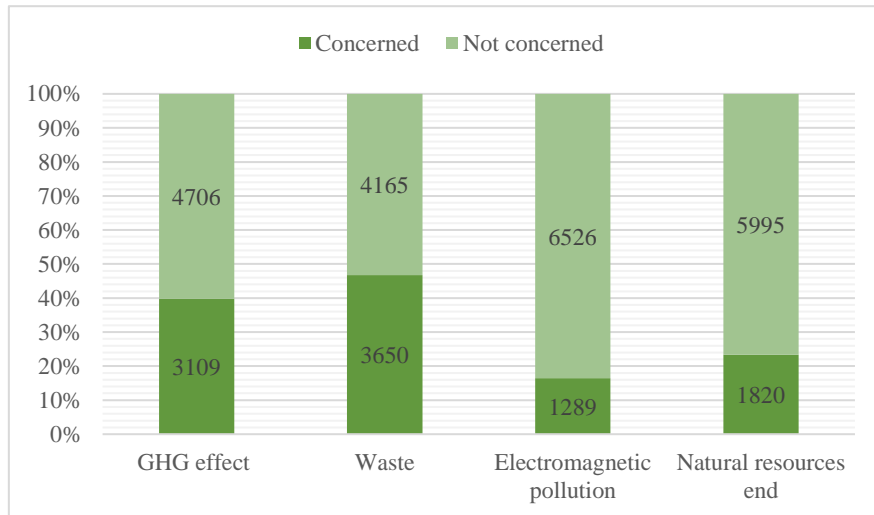
Source: *Aspects of daily life 2016, ISTAT*

3.3.2 Gender and environmental concern

In order to address the second hypothesis, an interaction term between gender and environmental concern is constructed as explanatory variable. In the specific, the study investigates the joint effect of being female and environmentally concerned on online private sales. Therefore, given the four environmental issues, four interaction terms are presented. The female variable is a dummy variable with mean 0,46. Figure 3 presents as 100% the female gender having value 1 and differentiate it per environmental concern expressed. Among the women who expressed environmental concern, 39,78%

are worried about greenhouse gas effect and 46,71% are worried about waste production and disposal. A lower number of women expressed concern on electromagnetic pollution and natural resources end, respectively 16,49% and 23,29%. In the specific, the joint frequency of being female and environmentally concerned is 21,69% of the total sample for waste, 18,48% for GHG emissions, 10,82% for natural resources end, and 7,66% for electromagnetic pollution.

Figure 3 - Environmental concern expressed by female

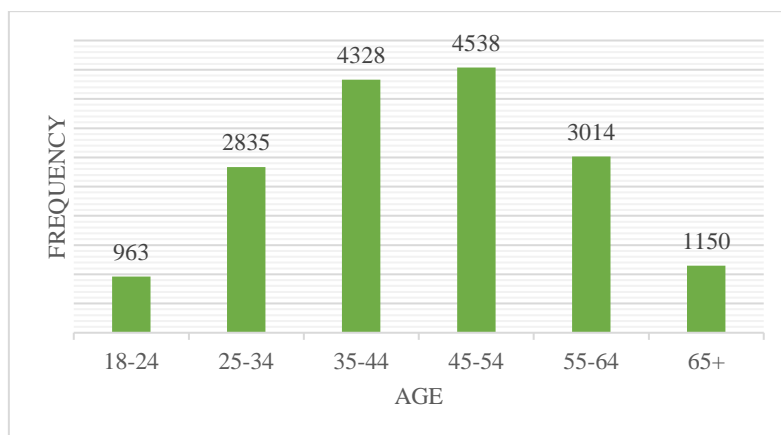


Source: *Aspects of daily life 2016, ISTAT*

3.3.3 Socio-demographic and economic characteristics

In addition to the explanatory variables, the analysis includes several control variables. The first group of variables presents socio-demographic characteristics “well-established in the relevant literature” (Quaglione et al., 2017). First, *age* is grouped into six categories, represented in Figure 4. The largest group counting 27% of the observations is constituted by people aged 45 to 54, followed by 35- to 44-year-old people with 26%.

Figure 4 - Descriptive statistics of age



Source: *Aspects of daily life 2016, ISTAT*

Moreover, the *geographical area* of residence of the respondents is controlled, including North-West (23,93%), North-East (25,46%), Centre (19,71%), South (22,94%) and the less represented Islands (7,96%). Then, two dummy variables representing the *married* marital status with 53% of the respondents in the sample, and the *Italian* citizenship with 94% are included in the analysis.

ISTAT has not published data on income because of lack of validity in the replies. Using the PAPI technique, households reply to the questions at the moment, estimating their income. Hence, self-declaration of the income in the survey is not reliable. However, income is an important control for this study in order to have some insights on the transition taking place in C2C markets, and specifically online private sales' relationship with wealth status. Therefore, the analysis controls three proxy variables for income, namely education level achieved, job position and self-estimated economic situation. Table 5 in Appendix A shows lack of correlation among these proxy variables. First, *education level* is divided into four categories representing the latest certificate obtained. About half of the respondents has a high school diploma, while both individuals holding a middle-school certificate and an undergraduate diploma or more represent about 23% of the respondents. The remaining 3% is educated at a primary school level or has no studies. Second, *job position* is represented by four categories, called labour workers, office workers, ruling class, and others. Their specifications and distribution is presented in Table 1.

Table 1 - Job position categories

Category name	Description (translated from Italian)	Frequency
Labour workers	Heads of labour activities, subordinate labourers, trainees, homeworkers for an enterprise;	31,37%
Office workers	Managers, supervisors and employees;	42,13%
Ruling class	CEOs, entrepreneurs and freelancers;	12,13%
Others	Self-employed, members of cooperatives that produce goods or provide services, assistants, coordinated and continuous collaborators (project-based or not), occasional professional service	14,37%

Source: *Aspetti della vita quotidiana 2016 - Descrizione del file, ISTAT*

The third income proxy included in the analysis is *self-estimated economic situation*. It is obtained by the question “looking at the last 12 months and considering all the households' needs, how were the overall household economic resources?” with four possible replies: optimal (1,46%), adequate (67%), scarce (27,18%) and insufficient (4,36%). The replies have been held in four categories. Given these points, socio-demographic and economic characteristics variables are designed to understand the probability of online sales based on the households' profiles.

3.3.4 Internet use

The second group of control variables represents the use of internet. In the literature, the level of online sales has been related to the use of internet and the information flow using the internet channel

(Appelgren, 2018). Therefore, the following variables control for this aspect in the analysis with five dummy variables related to activities performed in internet in the three months prior to the survey. Reading *online newspapers*, magazines and information in general is a practice performed by 62% of the individuals in the sample; *Social networks* participation (creating a profile, posting messages or other contents on Facebook, Twitter and others) is represented by 56% of the survey population; 30% of the respondents *uploaded* original self-made contents, such as texts, pictures, music, videos, software and so on, in order to share them; 18% of the individuals expressed *opinions* on social and political topics on the web, e.g. blog, social networks and others; and people taking part to a *professional network* creating a profile, posting messages or other contents on LinkedIn, Xing and others are 12% of the respondents. Table 6 in Appendix A presents the collinearity test also in this case.

4 Methods

This paper aims at studying the factors that influence the online selling practice of private goods and services. The analysis is conducted on cross-sectional data collected in 2016, as the most recent version published by ISTAT. In addition, the study provides a picture of the factors affecting online private sales before the publication of the “strategic plan for the circular economy” in 2017. Thus, it presents a base analysis useful for future studies that aim at controlling whether this picture will change. Therefore, an estimation of some aspects of the daily life of the individuals that sell private goods and services online in 2016 is conducted in order to understand this phenomenon. The quantitative approach is based on the methodology used in the papers published by Fiorillo (2013), Crociata et al. (2015) and Quaglione et al. (2017), who used the same database and conducted the analysis on the factors having effects on recycling and energy-saving behaviours in the years 1998-2000, 2007, and 2014, respectively.

4.1 The Econometric Model

4.1.1 Model 1

Online sales of private goods and services is a dichotomous choice which takes the value 1 if the individual sold online goods or services in the 3 months prior to the survey. Given the dichotomous response of the dependent variable, the study will use a probit regression model. The probit model is a regression model that explains a phenomenon Y characterized by binary outcome, considering the effect of other independent factors (Norton et al., 2004; Williams, 2012). In this case, the probit model aims at explaining the likelihood that the event “online private sales” occurs, given other unrelated characteristics of the population.

The first model evaluates the relationship between environmental concern and online second-hand sales. Environmental concern is represented by the four dimensions presented in section 3.3.1. The probit model predicts the probability of online second-hand sales using the cumulative distribution function of the standard normal distribution. In formulas, the probability that an individual sells private goods or services online using the probit model is written as:

$$\Pr(\text{OnlineSales} = 1) = \Phi(\beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + X\beta) \quad (\text{Model 1})$$

where Φ is the cumulative density function of a standard normal distribution. The independent variables x_1, x_2, x_3, x_4 represent respectively greenhouse gas effect, waste production and disposal, electromagnetic pollution, and natural resources end, accompanied by their β coefficients. The term $X\beta$, instead, represents a vector of the control variables age, geographical area, married, Italian, education level, job position, self-estimated economic situation, online newspaper, social networks, uploads, opinions, professional networks, multiplied by their respective coefficient β , and the

constant term. The output of the model estimates how likely an individual characterized by the above mentioned independent variable is to sell online private goods or services. Nevertheless, the results of the study are presented looking at the marginal effects of the model.

The results of the model are presented in the form of marginal effects in order to discuss the magnitude of the effects. Statistically, marginal effects $\partial \Pr(\text{OnlineSales} = 1) / \partial x_j$, where j represents the independent variable of reference, estimate the probability density function of the distribution, multiplied by the coefficient of the independent variable. Hence, it presents the effects of the independent variables when online private sales shifts from 0 to 1. In other words, the results present the predicted size of the impact of environmental concern on an occurred online private sale, keeping constant the independent variables (Williams, 2012). The value hold by independent variables can be the mean or the average. In the first case, the marginal effect of a variable j is calculated keeping the value of all the other independent variables at their arithmetic mean: sum of the values divided by the total number of observations. Hence, representing the average person. For example, the average person in terms of gender is represented by someone 30% woman and 70% male (Katchova, 2013). The average value, instead, considers all the individuals' marginal effects and divides them by the number of observations. The results are presented in both ways in order to check whether the model is robust. Both marginal effects at the average values and at the means are expected to have similar results (Katchova, 2013).

Once analysed the marginal effects to address the first hypothesis, the study estimates the predicted probabilities of the model and compares them with the frequency of online sales of private goods and services. In this way, the accuracy of the prediction is checked. In the end, the model's goodness of fit is presented in order to explain how many observations are correctly classified (Katchova, 2013).

4.1.2 Model 2

The second hypothesis tests the joint effect of being female and environmentally concerned on online sales. In order to estimate it, four interaction terms are created between the dummy variable female and each environmental issue. However, the marginal effect of an interaction term does not exist because "the value of the interaction term can not change independently of the values of the component terms" (Williams, 2012). Given interdependence between the interaction term and the single terms included in the interaction, the second hypothesis is tested looking at the coefficients' signs and at the statistical significance. In the second model, online private sales depend on the female gender, the environmental effect of reference, their interaction and the control variables presented before, including the constant term. Hence, the formula of probit model estimated to test the interaction is:

$$\Pr(\text{OnlineSales} = 1 | x_1, x_j, X) = \Phi(\beta_1 x_1 + \beta_j x_j + \beta_{1j} x_1 x_j + X\beta) \quad (\text{Model 2})$$

where x_1 is the female variable and x_j represents the environmental effect. Since four environmental effects are included in the analysis, four different models are estimated, each one adding an interaction term to Model 1. The vector $X\beta$ in Model 2 includes not only the control variables presented in Model 1, but also the environmental effects that are not part of the interaction. Therefore, the results of the second model express the likelihood that online sales among consumers occur as an effect of the

interaction between gender and environmental concern. Nevertheless, lack of marginal effects calculation limits the results from expressing the magnitude of the relationships.

4.2 Limitations of the Model

The probit regression model is ideal to conduct studies for dichotomous responses. However, the proportion of responses of the dependent variable in the sample is unbalanced. The frequency that an individual sold online goods or services in the 3 months prior to the survey is 10%, while 90% did not. Therefore, the estimation could be not very accurate. In addition, the economical characterization of the individual is estimated looking at income proxy indicators. Hence, the discussion on the connection between online C2C markets and individuals' economic status is driven on assumptions that connect a certain job category and education to an income level. This could create bias in the interpretation of the results. Moreover, age is analysed in categories because of availability of data. Also, the interaction terms are not interpreted looking at the magnitude, only at the likelihood. In the end, the overall study is conducted on individuals who used the internet during the 3 months prior to the survey. Therefore, the analysis does not involve transaction occurred in physical markets and is limited in a 3-month time laps.

5 Empirical Analysis

This section presents the results of the analysis. First, the analysis of Model 1 is presented in form of marginal effects at the mean, highlighting the effect of environmental concern on online private sales and including the discussion on socio-demographic and economic factors, and internet use. Second, Models 2, 3, 4 and 5 present the interactions effect of being female and environmentally concerned on the likelihood of selling online. The full outputs of the five models are presented in Appendix B, while the discussed results are reported also in the text.

5.1 Results

Model 1 provides insights on the effect of environmental concern and other personal characteristics in relation to online sales. It classifies correctly 90% of the observations, presenting a relevant goodness of fit. In addition, the mean of predicted probabilities (0,09986) is close to online sales frequency (0,09989). In the end, the marginal effects resulting from the calculation at the mean and at the average are almost equal. Also adding and removing variables significant and not from the model do not create a shock in the results. Hence, the model is robust.

Environmental concern

Environmental concern effects have positive marginal effects on online private sales in all four dimensions. Specifically, the coefficients of greenhouse gas effect and electromagnetic pollution are statistically different from 0 at 99% confidence level and waste is significant at 95% confidence interval, but natural resources end does not show any statistical significance. Moreover, when all the environmental dummies go from 0 to 1, the change in the likelihood of selling is positive but contained, ranging from 0,4% to 1,6%. Looking at the different dimensions one by one, greenhouse gas effect and waste prove the expectations, even if with a small impact on online private sales. The variable natural resources end, instead, was expected to hold a significant and relevant impact, but the results show that concern on the end of natural resources is not significantly related to online sales. In the end, electromagnetic pollution was considered a variable with a potential negative impact on the use of internet for selling purposes. Nevertheless, the model shows a positive effect on online sales.

The overall effect of the four variables has not a big magnitude. Anyway, the online C2C market is not well developed as well in the economy and this could be one of the main reasons that lead to these results. Recalling the environmental concern variables in the descriptive statistics, the sample presents that 0,01% of the respondents expressed concern on the maximum number of options about environmental issues, while 29% of the respondents did not express any concern. This picture already provides an overall idea that the Italian population is not worried about the environment in 2016. The analysis conducted by Quaglione et al. (2017) confirms this idea because it presents higher levels of

expressed concern in 2014 that decreased in 2016. Even looking at the single environmental dimensions, less than half of the sample expressed concern in all four of them. This idea could explain the low magnitude of the effect. However, the relationship is significant and positive for greenhouse gas emissions, waste and electromagnetic pollution and considering also the low participation to this market, the C2C online sales sector has a potential of diffusion in the future. Hence, the relationship between environmental concern and online C2C sales shows that both sectors are still at initial stages of development. In fact, there are plenty of policies possible to implement in order to incentivize the online C2C sector.

Considering the positive marginal effect of environmental concern on online C2C sales, policies implemented at environmental level would have a positive impact on goods and services provision among consumers. These cooperation and reuse effects have not only benefits in C2C practices but are also a factor that contributes to the broader change in consumers behaviour, as a key component of the Circular Economy strategic framework, leading to an inclusive sustainability transition. Overall, the first hypothesis of environmental concern's positive marginal effect on online private sales is not rejected for environmental concern on GHG effect, waste and electromagnetic pollution. It is rejected, instead, for resources end. Hence, people environmentally concerned are generally more likely to sell goods and services online to other consumers.

Control proxies for income

In order to control whether online private sales are related to the economic status, three proxies have been analysed. Self-estimated economic situation and education are not statistically significant and have low magnitude in economic terms. An individual part of any job category, instead, is more likely to sell online than labour workers, with marginal effects statistically significant. Even so, the magnitude of the effects lies between 1,1% and 2,2%.

It is relevant to underline how the education background, extracted from its proxy role, has no impact on online C2C sales. In Italy, higher levels of education are related to both environmental concern and energy-saving behaviours (Quaglione et al., 2017). Therefore, the education system contributes and could keep contributing in familiarizing with the new technological platforms and fostering cooperation behaviours among the students. In this way, an increase in collaboration and technology use would rise, in turn, supply in C2C markets. In addition, education would positively influence also the environmental-friendly behaviours presented above. This policy suggestions refer to the new generation as ICT adopters. In this sense, the results give a picture that includes mainly individuals part of the generations educated before the ICT revolution and implementation.

The income proxies' results could be explained by the fact that selling online involves the possession of an internet connection infrastructure. Moreover, individuals need to own more goods that they need in order to resell them online. In the same way, people need to own cars, properties, tools and others in order to offer them in a sharing platform. As a consequence, these results reconfirm the idea that resales are proportional to possession and this risks to "reinforce structural inequalities" (Martin, 2016). However, the impact of the marginal effect is low, and the level of education, together with the self-estimated economic situation, present indifference among the categories. Hence, considering a low overall income effect, policies could shape the economic factors in order to incentivize C2C online sales as cooperation behaviours. In this way, sales are incentivized with the aim of making C2C redistribution develop in a sustainable way and building a trend that affects positively and indirectly the sustainability transition.

Table 2 - Marginal effects at the mean, Model 1

VARIABLES	Margins at mean
<i>Environmental concern</i>	
Greenhouse gas effect	0,011***
Waste	0,009***
Natural resources end	0,004
Electromagnetic pollution	0,016**
<i>Socio-demographic variables</i>	
Female	-0,063***
Married	0,005
Italian	0,050***
Age (base: 18-24)	
25-34	0,014
35-44	0,006
45-54	-0,016
55-64	-0,045***
65+	-0,067***
<i>Geographical area (base: North-West)</i>	
North-East	0,005
Centre	-0,019***
South	-0,040***
Islands	-0,026***
<i>Income proxies</i>	
<i>Education (base: primary school/no school)</i>	
Middle school	-0,004
High school	-0,001
Undergraduate and more	-0,018
<i>Job category (base: labour workers)</i>	
Office workers	0,013**
Entrepreneurs and more	0,022***
Others	0,011*
<i>Self-estimated economic situation (base: insufficient)</i>	
Scarce	0,005
Adequate	0,001
Optimal	0,000
<i>Internet use</i>	
Social networks	0,020***
Opinions	0,042***
Professional networks	0,035***
Newspaper online	0,019***
Uploads	0,039***

Note: The *** sign shows that the coefficient is statistically significant at 1%, while ** shows significance at 5% and * at 10%.

Control socio-demographic characteristics

Other socio-demographic characteristics show interesting insights. Women are 6,3% less likely to sell online private goods or services than men. The magnitude is not only quite big, but also influences negatively the sector. Also in the research conducted by Clausen et al. (2010), female tend to sell less than male in second-hand markets in Germany. Even considering the difference in time and space, this trend persists. Therefore, the C2C market presents an opportunity to become more attractive and involve women, implementing sharing and second-hand sales in industries such as the fashion one. In fact, the report published by Schibsted Media Group (2017) presents that 83% of the second-hand market in Italy is covered by vehicles, that are connected to the male gender as a stereotype.

Marriage is not statistically significant for the analysis. In addition, Italians are 5% more likely to sell online. On an age-base perspective, the model shows that there is no significant difference among people between 18 and 54 years old, while people aged 55 and more are 4,7% to 6,5% significantly less likely to sell online. This phenomenon could be explained by the fact that internet generations are more internet friendly, since knowledge about digital practices is not homogeneously distributed among the population, and specifically among age groups. This phenomenon takes place because ICT has been introduced at different points in life of the current population (Kennedy et al., 2008) and this fact reflects on consumers behaviours.

In the end, the results show that there is no significant difference between people living in the north-east and north-west areas. Living in the Centre, South of Italy and on the Islands, instead, shows that people are respectively 1,9%, 4% and 2,6% less likely to sell online than people living in the north-west regions. Also Fiorillo (2013) and Quaglione et al. (2017) identified a lower trend in recycling and environmental concern in the south of Italy. Therefore, sensibility about environmental topics has a huge potential to be developed in those areas. Policies that aim at involving the south in these markets should be implemented, pointing at online platforms as a trust guarantee in the transactions management.

Control for internet use

The last group of variables controlled is internet use. As expected, people who share information online are significantly more likely to sell online than people who do not. In particular, sharing opinions online has a 4,2% positive marginal effect on online sales among consumers and uploads of self-created content has a 3,9% positive effect. The results show that the use of internet makes people more user friendly also among different practices. Therefore, exploiting the interconnections not only among people but also among platforms can be useful for implementing policies that incentivize cooperation in C2C markets.

Models 2, 3, 4 and 5 test the positive joint effect of being female and environmentally concerned on the chance to sell online private goods and services. The results are presented in Table 3. As in model 1, GHG effect, waste and electromagnetic pollution are statistically significant and natural resources end is not. Overall, people who are concerned about environmental issues are more likely to sell online. Women, instead, are less likely to sell online than men, and the coefficient is statistically significant. Given the negative effect of being female on online sales, testing whether the effect of a specific category of women reverses the results is even more interesting. However, the coefficients of the interactions are not statistically significant, showing that there is no significant difference between female and male in how environmental concern affects online sales. Also, the interaction

between male and the four environmental concern dummies has been tested and does not present significance in results. The second hypothesis is therefore rejected. Nevertheless, this result could be explained by omitted variables bias. Hence, the interaction between female and environmental concern are possibly capturing the effect of something that the model is not controlling for.

Table 3 - Interaction coefficients

VARIABLES	Model 2	Model 3	Model 4	Model 5
Female	-0.416***	-0.401***	-0.429***	-0.424***
Waste	0.060**	0.076**	0.061**	0.062**
Greenhouse gas effect	0.080**	0.075***	0.076***	0.076***
Electromagnetic pollution	0.106***	0.105***	0.089*	0.106***
Natural resources end	0.027	0.027	0.027	0.023
Female & GHG effect	-0.0131			
Female & Waste		0.042		
Female & Elect.			0.042	
Female & Resources end				0.011

Note: The *** sign shows that the coefficient is statistically significant at 1%, while ** shows significance at 5% and * at 10%.

5.2 Discussion

Selling online in C2C markets is a complex phenomenon that involves several factors defining the individual's characteristics and motivations. Factors may range from socio-demographic and economic characteristics, social motivations, environmental commitment, and engagement with digital practices. However, motivations leading to the development of C2C markets are key in order to contribute to the sustainability transition, as discussed in the literature, and avoid “pseudo-sharing” behaviours (Belk, 2014a).

The results of this research show that people who are environmentally concerned are more likely to sell private goods and services online in Italy in 2016 than people who are not, even if the impact is accounted for only about 1%. The small magnitude of this effect could be justified by the low participation into C2C online sales in the economy, as well as the contained concern on environmental issues expressed by the sample population. In addition, there is no significant difference between male and female who are environmentally concerned in relation to online C2C sales. The descriptive statistics give a picture of the Italian population, where online sales of goods and services among consumers are not very diffused and environmental concern is not often shown. Online sales cover 10% of the market, suggesting an initial diffusion of the practice itself. In addition, its positive relationship with environmental concern presents a potential for C2C online markets to grow along with sustainability motivations. Therefore, policies oriented towards environmental issues sensitization have a positive effect on C2C markets, even if sustainable reasons are not the leading factors.

Controlling for socio-demographic and economic characteristics, this study confirms a relationship among online sales and familiarity with the digital tools. This connection is confirmed looking at

both, age and use of internet for purposes other than sales. Therefore, acting towards the implementation of the education systems, that in 2016 present no significant effect on online C2C sales, could influence positively not only the use of digital tools, but also cooperation behaviours among students. Likewise, these policies do not limit to shape C2C markets, but rather have a broader scope, laying the foundations for a Circular Economy. In addition, online C2C markets should involve women, citizens living in the Centre and South of Italy and on the Islands, and people who do not have an Italian citizenship. Hence, given the small presence of C2C online markets in the economy, policies have the opportunity to increase the participation in those markets, focusing on compensating the inequalities. This action could be complemented with environmental sensitization, in order to promote a sustainable development.

Another factor to discuss is the effect of income. Scholars found that supply of services is concentrated at middle-income levels (Hulse & Yates, 2017). In fact, among the income proxies, job categories present that online sales are proportional to ownership. However, it is relevant to discuss the limit among high levels of income. As the level of income exceeds the limit, resales may not be worth it because they are time consuming. Wealthy people may gift goods rather than sell them and sharing an asset may be not needed in economic terms.

Overall, this study presents a first analysis of the socio-demographic and economic factors that lead to online C2C sales, exploring different aspects of the Italian sample population. The analysis provided a general picture of the C2C sales phenomenon on online platforms, giving some preliminary insights. On one hand, people concerned about the environment are more likely to sell online on consumer-to-consumer markets. On the other hand, this trend should be tested over different years in terms of magnitude in order to control for robustness. Limitations about data imply that the research outcomes should be generalized carefully. Therefore, the analysis has a high potential to expand following different frameworks and verifying the effect of future policy interventions. Particularly, the inclusion of income in the estimation would provide an unbiased picture of online C2C sales' association within the economic factors.

In absolute terms, environmental concern decreased from 2014, showing a lack of sensibility about the topic. These numbers clearly show how not only online C2C markets could be implemented but also how sustainability reasons lost consensus. In this sense, policies should not only incentivize at participating in C2C economies as buyers or users of services, but also at providing goods instead of underutilizing or wasting them. In fact, given the indifference among the income proxies, policies pointing at economic incentives could indirectly lead to higher cooperation.

Cooperation in the culture and the subsequent development of sharing and second-hand markets found relevant roots in the Nordic countries, helping them to reach their leading position in sustainability. As Appelgren (2018) presented, the Swedish culture moved second-hand markets from an ideal of poverty to an ideal of trends and contribution to the environment. Second-hand markets in Italy, instead, are not very popular in 2016, contributing to the middle-ranking position gained in sustainability rankings. For the future, the Circular Economy strategic framework already shows a first step of implementation in reusing at 360°. Therefore, the key point for the implementation of C2C online markets is shaping consumers behaviours towards a more cooperative and sustainable idea. In this way, consumers' actions would not only reflect on online sales, but also on other practices related to the Circular Economy strategic framework. In the end, implementing online markets among consumers do not require any infrastructure investments because they take advantage of the ICT system already developed.

On the drawback hand, a large increase in sharing economy and second-hand resales would result in a rebound effect. For example, it may be expected that this concept shifts people from using public transportation to cars. Hence, the motivations behind online sales are key in order to define how the market will grow, given the different nature of the determinants. As part of the social concept of sustainability, the key factors in the full C2C market is the spirit of cooperation and interconnection in the use of assets already present on the market. In this way, implementation of consumer-to-consumer markets would not only growth economically but also develop in a sustainable way.

In addition, environmentally concerned behaviours could express in other forms of sustainable practices, such as reusing in-house. In fact, the study needs to consider that the factors presented refer only to second-hand transactions and sharing practices occurring online, even though people who are environmentally concerned could contribute to physical second-hand markets. Hence, an integration among online and physical platforms could have positive outputs. At the same time, cooperation occurs only on an online basis, neglecting all cooperation forms that occur at physical level without passing through a platform, from sharing a drive to helping a friend. On account of this, online platforms help to facilitate transactions and connections among people where local markets do not get.

Expanding the discussion at macro level, the development of C2C markets has a potential of developing in different ways for goods and services. It is important to consider that awareness about environmental issues does not necessarily imply a contribution in the field. In fact, consumer behaviours toward sustainable practices are mainly driven by passion (van Keulen et al., 2009). Hence, as discussed in the literature, motivation leading to C2C markets growth are key in order to follow a sustainable path. Also, van Keulen et al. (2009) underline how transferring information about environmental issues has lower effectiveness than inspiring sustainable behaviours. In the current digital era, younger generations are “inspired” by influencers, popular people among the social media, that revealed to be an important factor affecting younger generations’ behaviours in sustainability (Johnstone & Lindh, 2018). Therefore, online C2C markets sustainable development has a potential in its development among future generations.

The phenomenon of trading goods among consumers is changing not only about motivations leading to its growth but also about the segmentation of the market itself. On one hand, second-hand markets are still often associated to a lower economic status. In fact, the results of the study conducted for the year 2016 present a weak relationship with sustainability concern. On the other hand, currently new platforms are arising in order to meet the new trends. An example reported by Forbes is the case of “Depop”, an online C2C trade platform that followed the concepts of online networks and sustainable business in order to achieve its development among young consumers (Knowles, 2018). Therefore, consumer-to-consumer markets are not well developed in 2016 in Italy, but they have a high potential to rise in the next years thanks to the development of new platforms.

6 Conclusion

6.1 Research Aims

This study aimed at identifying the determinants of online C2C sales in Italy in 2016 in order to provide insights for the implementation of the Circular Economy framework. Specifically, the online C2C market is analysed because it represents two main pillars of the Circular Economy idea: evaluating resources and fostering cooperation behaviours among citizens for a sustainable development. Reuse of resources avoids wastes, and sharing resources optimizes raw material use. In addition, this research gave some insights on the population habits, exploring the socio-demographic factors' marginal effects on C2C online sales of goods and services. In this way, the online C2C sales phenomenon is studied on facts rather than limiting to the motivations of the population, giving an objective idea.

Starting from motivations behind online C2C sales, the study tests whether environmental concern positively affects online private sales in real terms. In addition, considering that women are usually more environmental friendly, this research tests their joint effect on online C2C sales. Other control variables are included in the model in order to monitor if other significant effects are captured. They include socio-demographic and economic characteristics and the use of internet. To address these questions, data collected by ISTAT in the Multipurpose Households Survey for the year 2016 have been analysed in five probit regression models, where the dependent variable is represented by online sales of private goods and services occurred in the 3 months prior to the survey.

6.2 Research Results

A first analysis of the data included in the model provides an overall picture of the online C2C sales phenomenon. Only 10% of the sample population sold online goods or services to other consumers in the three months prior to the survey. In addition, also environmental concern is expressed by less than half of the sample population for all the environmental dimensions analysed. Specifically, natural resources end is expressed by only 22% of the respondents. Hence, both dimensions have high potential to grow in the future and enter the regime, given the pressures deriving from the landscape dimension (Geels, 2002; Martin, 2016; Esposito et al., 2015).

The regression analysis, instead, shows that people who are environmentally concerned about greenhouse gas emissions, waste and electromagnetic pollution are more likely to sell online to other private households, even if the marginal effect has a low magnitude. Given the positive relationship between environmental concern and online sales, policies application on connected campaigns could increase awareness on environmental issues. However, awareness does not necessarily turn into sustainable consumer behaviours (van Keulen et al., 2009). Therefore, policies aiming at inspiring

cooperative and sustainable behaviours would be more effective than information campaigns. As a result, online practices among consumers would experience a sustainable development and C2C markets are more likely to avoid rebound effects. The second hypothesis, instead, is rejected, showing that there is no significant difference between female and male in how online sales are affected by environmental concern.

Control variables present other interesting insights. Internet use is positively connected to online sales, showing interconnection benefits among different uses of the internet. Internet-friendly generations are also more likely to sell online than people aged 55 or more. These results confirm that the integration of ICT in the lifestyle of people has positive effects on the practices that depend on it. Therefore, the power of networks and cooperation among both people and platforms generates positive marginal effects on online sales among consumers. In addition, women are less likely than men to sell online. Given that 83% of second-hand sales stands within the vehicles sector in 2016 (Schibsted Media Group, 2017), there is an opportunity for implementing markets that attract women's interest, such as fashion.

Furthermore, northern regions are more likely than the centre-southern regions and islands to sell goods or services online. These results are in line with the ones presented by other researches about environmental concern and recycling behaviours, highlighting a division between northern and southern regions. Hence, policies should point at sensitizing citizens in southern regions not only for the growth of the C2C online sector but also for a complete circular economy implementation. In the end, income proxies do not show an evident trend in the relationship between economic factors and online sales. However, online sales are related to higher paid job positions, giving some insights on the positive connection between the amount of possession and the number of resales.

6.3 Practical Implications

The analysis provided insights for policies implementation to specific categories of the Italian population. First of all, they should inspire cooperation in C2C markets at absolute level and attract environmental friendly behaviours. Specifically, C2C online markets could point at involving women, people aged 55 or more and people living in the southern regions of Italy. In addition, policies that favour the use of internet could be applied in order to exploit available technologies for a sustainable development of the Italian economy. However, motivations behind C2C online sales are not always environmental and the current system is sceptic to radical changes (Esposito et al., 2015). Hence, the government should work on the implementation of short-term benefits for inspiring cooperation behaviours in C2C online markets, as a component of the sustainability transition.

Nevertheless, an increase in sharing economy would result in a rebound effect that shifts people from using public transportation to cars, for example. Even if the spirit of cooperation and interconnection in the use of assets present on the market is one of the key factors in online C2C sales, participating for economic reasons may lead to rebound effects and "pseudo-sharing" practices (Belk, 2014a). Hence, in the process of policy implementation aiming at increasing participation in the redistribution and share of resources, motivations need to be taken into consideration in order to cause a long term sustainable development of the sector. In this way, online C2C markets growth would keep the

benefits of resources optimization and lower the risk of exceeding to rebound effects (Böcker & Meelen, 2017).

Actions following this path have been implemented in form of strategic frameworks in 2017. Specifically, the Circular Economy strategic framework aims at promoting behaviours that value the resources already present in the society from all the actors in the economy, including consumers. The Circular Economy idea embraces not only reusing good, extending their lifecycle, and sharing services, but also exploiting new technologies and inspiring a sense of cooperation. However, technological development and products durability should develop together in order to realign products lifecycle and performance. In this way, the fast pace of products' obsolescence would decrease, optimizing resources use at absolute level (Esposito et al., 2015). In addition, the Industry 4.0 national plan introduced in 2017 by the economic development ministry is a first sign of action in leading the society towards digital practices. It includes development of digital skills in education and implementation of the infrastructures. The results of this research show interconnection among use of internet and online C2C sales. Hence, even if this policy is mainly published for industrial development, online sales among consumers would benefit of a general increase in the use of digital tools. As a result, tools for resources redistribution and services sharing would become more user-friendly and integrate into the societal habits.

At macro level, C2C online markets are one of the factors that may lead to a sustainable change. However, citizens contribute to sustainability also in other ways. Even if a Circular Economy looks idealistic, Esposito et al. (2015) argue that the world is moving towards a sustainable paradigm because pressures deriving from the landscape dimension are relevant and impossible to ignore. The current population may not continue to grow economically, keeping the current living standards and levels of exploitation of natural resources. Hence, the system is expected to be subjected to a transition that changes consumers behaviours. In this transition, the concept of value is expected to evolve, finding a balance among the different actors in the economy (Ritzén & Sandström, 2017). This transition is occurring in an incremental way (Martin, 2016), avoiding shocks in consumers' lifestyles. In Italy, the transition to sustainability is still a way to go, confirmed by the ranking position in global sustainability rankings, but acting at micro level would help in changing the cultural habits toward a more sustainable paradigm.

6.4 Future Research

Further researches can be conducted in several directions. First of all, the same analysis should be extended including income as a main explanatory variable. Moreover, dividing between goods and services would provide more precise understanding of the consumer-to-consumer online sales phenomenon. Extending the analysis to physical markets and purchases, instead, would give a full picture of the C2C sector in Italy. Furthermore, the Multipurpose Households Survey conducted by the Italian Statistics Institute provides more than 600 aspects on the Italian population daily life. Hence, relevant effects may be captured by other variables not included in this model. In addition, the analysis could be extended over time, increasing the time-lap of sales performed before the interview, and making a comparison among different years. The comparison could also be realized among different countries in order to understand how socio-demographic factors differ among them. In the specific, comparing the effects of the explanatory variables with a leading country in

sustainability would provide interesting insights for the implementation of new policies based on a successful model. In the end, the sustainability transition within the Circular Economy framework is a complex phenomenon and gaps in the analysis of several practices are present, such as repairing items instead of substituting them. Also, the concept of cooperation for a better management of resources has high potential for further investigation.

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Appendix A: Correlation matrices

Table 4 - Environmental concern variables correlation matrix

	GHG	Waste	Elect.	Res. end
GHG	1,0000			
Waste	-0,0487	1,0000		
Elect.	-0,0359	-0,0478	1,0000	
Res. end	-0,0208	0,0762	0,0211	1,0000

Table 5 - Income proxies correlation matrix

	Education	Job	Self-est.
Education	1,0000		
Job	0,1895	1,0000	
Self-est.	0,1883	0,0711	1,0000

Table 6 - Internet use correlation matrix

	Social net.	Opinion	Profes. net.	Newspaper	Uploads
Social net.	1,0000				
Opinion	0,3437	1,0000			
Profes. net.	0,1828	0,2792	1,0000		
Newspaper	0,0879	0,1659	0,1703	1,0000	
Uploads	0,3447	0,3358	0,2544	0,1315	1,0000

Appendix B: Models results

Table 7 - Model 1, Coefficients, marginal effects at the mean and marginal effects at the average

VARIABLES	Coefficients	Margins at mean	Margins at average
<i>Environmental concern</i>			
Greenhouse gas effect	0,076***	0,011***	0,012***
Waste	0,061**	0,009**	0,010**
Natural resources end	0,027	0,004	0,004
Electromagnetic pollution	0,106***	0,016***	0,017***
<i>Socio-demographic variables</i>			
Female	-0,421***	-0,063***	-0,067***
Married	0,031	0,005	0,005
Italian	0,333***	0,050***	0,053***
<i>Age (base: 18-24)</i>			
25-34	0,079	0,014	0,015
35-44	0,035	0,006	0,006
45-54	-0,097	-0,016	-0,016
55-64	-0,328***	-0,045***	-0,048***
65+	-0,589***	-0,067***	-0,074***
<i>Geographical area (base: North-West)</i>			
North-East	0,030	0,005	0,005
Centre	-0,119***	-0,019***	-0,020***
South	-0,282***	-0,040***	-0,043***
Islands	-0,172***	-0,026***	-0,028***
<i>Income proxies</i>			
<i>Education (base: primary school/no school)</i>			
Middle school	-0,024	-0,004	-0,004
High school	-0,006	-0,001	-0,001
Undergraduate and more	-0,123	-0,018	-0,019
<i>Job category (base: labour workers)</i>			
Office workers	0,091**	0,013**	0,014**
Entrepreneurs and more	0,146***	0,022***	0,023***
Others	0,079*	0,011*	0,012*
<i>Self-estimated economic situation (base: insufficient)</i>			
Scarce	0,036	0,005	0,005
Adequate	0,004	0,001	0,001
Optimal	0,003	0,000	0,001
<i>Internet use</i>			
Social networks	0,131***	0,020***	0,021***
Opinions	0,278***	0,042***	0,044***
Professional networks	0,232***	0,035***	0,037***
Newspaper online	0,124***	0,019***	0,020***
Uploads	0,265***	0,039***	0,042***
Constant	-1,771***	---	---

Table 8 – Coefficients Model 2, 3, 4, 5

VARIABLES	Model 2	Model 3	Model4	Model 5
Interactions				
Female & GHG effect	-0,0131			
Female & Waste		0,042		
Female & Elect.			0,042	
Female & Resources end				0,011
Environmental concern				
Waste	0,060**	0,076**	0,061**	0,061**
Greenhouse gas effect	0,080**	0,075***	0,076***	0,076***
Electromagnetic pollution	0,106***	0,105***	0,089*	0,106***
Natural resources end	0,027	0,027	0,027	0,023
Socio-demographic variables				
Female	-0,416***	-0,401***	-0,429***	-0,424***
Married	0,031	0,031	0,030	0,031
Italian	0,333***	0,333***	0,333***	0,333***
<i>Age (base: 18-24)</i>				
25-34	0,079	0,079	0,079	0,079
35-44	0,035	0,036	0,035	0,035
45-54	-0,097	-0,097	-0,097	-0,097
55-64	-0,328***	-0,328***	-0,327***	-0,328***
65+	-0,589***	-0,589***	-0,589***	-0,589***
<i>Geographical area (base: North-West)</i>				
North-East	0,029	0,030	0,030	0,029
Centre	-0,119***	-0,119***	-0,119***	-0,119***
South	-0,282***	-0,283***	-0,282***	-0,282***
Islands	-0,172***	-0,172***	-0,172***	-0,172***
Income proxies				
<i>Education (base: primary school/no school)</i>				
Middle school	-0,024	-0,025	-0,024	-0,024
High school	-0,006	-0,007	-0,006	-0,006
Undergraduate and more	-0,123	-0,123	-0,123	-0,123
<i>Job category (base: labour workers)</i>				
Office workers	0,091**	0,091**	0,091**	0,091**
Entrepreneurs and more	0,146***	0,145***	0,145***	0,146***
Others	0,079*	0,079*	0,079*	0,079*
<i>Self-estimated economic situation (base: insufficient)</i>				
Scarce	0,036	0,036	0,036	0,037
Adequate	0,003	0,004	0,003	0,004
Optimal	0,003	0,004	0,003	0,003
Internet use				
Social networks	0,131***	0,131***	0,131***	0,131***
Opinions	0,278***	0,279***	0,278***	0,279***
Professional networks	0,232***	0,231***	0,232***	0,232***
Newspaper online	0,124***	0,124***	0,124***	0,124***
Uploads	0,265***	0,264***	0,265***	0,264***
Constant	-1,773	-1,777	-1,768	-1,770