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Keeping up with the e-Joneses: do online social networks raise social comparisons?

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Abstract
Online social networks, such as Facebook, amplify the occasions for social comparisons which are detrimental to well-being. The authors test the hypothesis that the use of social networking sites (SNS) increases social comparisons using Italian data from the Multipurpose Household Survey, and European data from Eurobarometer. The results suggest that SNS users have a higher probability to compare their achievements with those of others. This evidence is robust to endogeneity concerns. The authors conclude that, by increasing the opportunities for social comparisons, SNS can be an engine of income dissatisfaction for their users.

JEL D83; I31; O33; Z1; Z13

Keywords Social networks; social networking sites; social comparisons; satisfaction with income; relative deprivation

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1 Introduction

An old way of saying states: "The neighbour's grass is always greener". People have the tendency to track their progress and assess their self-worth by comparing themselves to others. As a result, individuals' satisfaction depends, at least in part, on others' possessions and achievements.

The action of comparing oneself with others in order to evaluate or to enhance some aspects of the self is known as "social comparison". Such behaviour affects a variety of economic choices including consumption, investments in human capital, effort in the workplace, risk taking, and contribution to the provision of public goods just to name a few (Linde and Sonnemans, 2012; Cohn et al., 2014; Gamba et al., 2014). In addition, social comparisons are a relevant correlate of life satisfaction (Clark and Oswald, 1996; Ferrer-i Carbonell, 2005; D'Ambrosio and Frick, 2007; Guillen-Royo and Kasser, 2015).

The possibility to compare oneself with others relies on the availability of information about the lives of others or, in other terms, on the visibility of alternative lifestyles. Frijters and Leigh (2008) explained that leisure aspirations depend on the visibility of the lifestyles of others, which in turn is positively associated with the frequency and repetition of social interactions. In their work on inequality and conspicuous leisure Huang and Shi (2015) argue that the social comparisons that prompt emulation are likely to be linked to "the relative visibility of consumption and leisure, the cost of display, and the social preference in an economy." (Huang and Shi, 2015, p. 950).

Early studies on social comparisons have found that, on average, people report comparing themselves to others about once per day (Wheeler and Miyake, 1992). There are several reasons to believe that this average may have increased with the increasing penetration of SNS, such as Facebook, into users' daily life. First, users are likely to experience an extension of their reference group. Most users have online "friends" who are actually past friends or distant acquaintances, whose information would not be as readily, if at all, accessible without online social networks. Several studies, in fact, have provided evidence that SNS allows the crystallization of weak or latent ties that might otherwise remain ephemeral (see for example Ellison et al., 2007; Antoci et al., 2015). Moreover, because most SNS users allow all "friends" unrestricted viewing of their profiles (Pempek et al., 2009), individuals often have access to a large amount of information even about their most distant acquaintances. The easy access to such information may extend the possibilities for social comparisons.

Second, SNS allow a more efficient access to information about "friends" compared to offline interactions. While individuals may not meet or engage in face-to-face conversations with close friends on a daily basis, SNS allow users to keep in touch with, and monitor the activities of, numerous friends multiple times a day, even when those friends are very distant.

Most importantly, online social networks not only offer more frequent opportunities for comparison, but they also offer more opportunities for upward comparisons, i.e. towards those who look better off. This is due, in particular, to the mainly positive nature of information that people choose to display on-

line. Psychological studies have shown that Facebook, a prominent example of SNS, tends to serve as an onslaught of idealized existences – babies, engagement rings, graduations, new jobs, consumption of expensive goods and services such as cars and vacations – that invites upward social comparisons at a rate that can make "real life" feel like just a grey routine. This evidence is supported by studies finding that a more intense use of Facebook makes users more likely to believe that others are "happier" and "had better lives" than people who used the online social network less frequently (Chou and Edge, 2012). This evidence suggests that Facebook does leave users with a positively skewed view of how others are doing, which can be a source of frustration and dissatisfaction with own life.

We contribute to this literature testing the hypothesis that the use of social networking sites (SNS), such as Facebook, raises people's tendency to compare themselves to others in nationally representative samples. Our argument is that online social networks disclose an unprecedented volume of personal information that can be a powerful source of social comparisons.

Our contribution bridges two literatures. Some economic studies have analysed the ability of mass media to provide information about alternative lifestyles and, therefore, to stimulate social comparisons that may possibly undermine life satisfaction (Stutzer, 2004; D'Ambrosio and Frick, 2007; Guillen-Royo, 2017). For instance, Bruni and Stanca (2006) and Hyll and Schneider (2013) analysed the role of television. Clark and Senik (2010) were the first to address the role of Internet access in a broader study about the intensity and direction of income comparisons. Lohmann (2015) systematically explored the effect of information and telecommunication technologies (ICT) with a specific focus on Internet access. We contribute to these works by studying the role of online social networks. The second literature encompasses cross-disciplinary studies investigating the relationship between Facebook use and happiness (Arampatzi et al., 2016; Lim and Yang, 2015; Tandoc et al., 2015).

Our analysis uses two datasets that provide individual level information about the use of SNS, the Multipurpose Household Survey (MHS) provided by the Italian National Institute of Statistics (Istat), and the Eurobarometer provided by the European Commission. The 2010, 2011, and 2012 waves of the MHS allow to explore the association between the use of online social networks and social comparisons using a large and nationally representative number of observations. An important advantage of this dataset is that it allows to control for potential endogeneity using a conventional instrumental variable approach: we exploit the availability of fast Internet access across Italian regions as a source of exogenous variation. Territorial differences in broadband coverage depend on orographic features that exogenously determined the technological characteristics of the old voice telecommunication infrastructures. In section 3 we illustrate how, several decades after their construction, these infrastructures unpredictably turned out to be broadband-friendly or not depending on their early characteristics, thereby forming the basis for a natural quasi-experiment in the availability of fast Internet. In addition, we account for possible reverse causality using generated instrumental variables (Lewbel, 2012). This method

consists in generating instrumental variables (IV) from existing data to run two-stages least squares (2SLS) regressions when the exclusion restrictions for conventional IV are weak or do not hold. To test the generality of our findings from Italy, we turn to Eurobarometer data, which provides cross-country and nationally representative information about people's use of SNS and their propensity to compare to others. The downside of using Eurobarometer data is that we lack instruments to account for possible endogeneity. To address this issue, we follow Lewbel's identification strategy (Lewbel, 2012). We use the 2011, 2012, and 2013 waves for comparability with the results from Italy.

Our results suggest that SNS users have a higher probability to compare their achievements with those of others. This effect seems stronger than the one exerted by TV watching, it is particularly strong for younger people, and it affects men and women in a similar way.

The paper begins by providing the motivation of the study and briefly reviewing the related literature (Section 2). We then describe our data and empirical strategy in Section 3. In Section 4 we present and discuss our results. Section 5 concludes.

2 Related literature

In economics, the study of the satisfaction and dissatisfaction driven by social comparisons can be traced back to the very origins of the concept of utility. As Bentham (1781) used it, utility refers to pleasure and pain, the "sovereign masters" that "point out what we ought to do, as well as determine what we shall do" (Kahneman et al., 1997). Bentham explained how the pleasures and pains enjoyed and suffered by others are fundamental sources of human satisfaction and dissatisfaction. "The pleasures of malevolence are the pleasures resulting from the view of any pain supposed to be suffered by the beings who may become the objects of malevolence". "The pains of malevolence are the pains resulting from the view of any pleasures supposed to be enjoyed by any beings who happen to be the objects of a man's displeasure" (Bentham, 1781, pp. 37-40).

Marx explained the relative nature of utility in his early work on wage, labour, and capital: "Our wants and pleasures have their origin in society; we therefore measure them in relation to society; we do not measure them in relation to the objects which serve for their gratification. Since they are of a social nature, they are of a relative nature" (Marx, 1847, p. 45). Nearly fifty years later, Veblen (1899) introduced the concept of 'conspicuous consumption', serving to impress other persons.

However, the term social comparison was introduced by Festinger (1954) in a paper in which the author explained the role of social comparisons in evaluating own opinions and abilities: "To the extent that objective, non-social, means are not available, people evaluate their opinions and abilities by comparison respectively with the opinions and abilities of others" (p. 118). Festinger also implicitly introduced the concepts of downward and upward comparisons

(which were later formalized by Wills (1981)) by arguing that "The tendency to compare oneself with other specific person decreases as the difference between his ability or opinions and one's own increases" (p. 120). For example, an undergraduate student in an average college does neither compare herself to inmates of an institution for feeble minded (which would be a "downward comparison"), nor to colleagues attending a PhD program in a top university ("upward comparison"). In fact, comparisons with so distant others would necessarily be inaccurate.

Yet, it was Duesenberry (1949) the first one to empirically test the importance of relative income for utility. His results suggested that upward comparisons overcome downward comparisons in determining people's aspirations and satisfaction. Aspirations, in fact, tend to be above the level already reached. As a result, wealthier people impose a negative externality on poorer people, but not vice versa.

Wheeler and Miyake (1992) explained that comparisons about performance (also called "similar comparisons") are more frequent between close friends. Upward and downward comparisons (also called "dissimilar comparisons"), on the other hand, are more frequent in more distant relationships. This kind of comparison is more likely to occur in online social networks than in face-to-face interactions, since SNS like Facebook allow users to interact with – or to silently observe the lifestyles of – distant others such as friends of friends, distant acquaintances or public figures.

Brickman and Bulman (1977) suggested that close friends generally want to avoid upward and downward comparisons because they are concerned with the negative feelings that they might prompt. This may result in a particular delicacy in reporting about specific life events or achievements in face-to-face conversations with friends. For example, a happily married individual may want to use tact in talking about her marriage to a friend who has just divorced. SNS-mediated interactions, on the other hand, usually start with the unilateral sharing of information with an indistinct audience (Arampatzi et al., 2016). In this context, individuals are less likely to be concerned with specific friends' feelings. The simplified forms of communication offered by SNS – such as the acts of posting a "status" or sharing a photo – offer less ways to adopt delicacy and tact in dealing with others. In addition, Facebook research has proved that most users tend to over-share the bright side of their lives – e.g. consumption of vacations, culture, or expensive goods and services – to impress others and to attain or maintain a given social status.

Even if face-to-face interaction provides many opportunities to witness the conspicuous consumption of friends, SNS-mediated interaction offers more chances to acquire detailed information about friends', acquaintances', as well as distant or unknown others' lifestyles. For SNS users, it is virtually impossible to avoid seeing such information because of the very nature of the news feed, in which "friends" post their "status" on a regular basis.

The empirical literature has operationalized the concept of social comparisons through measures of income aspirations, relative deprivation, and dissatisfaction with income. The first tests of the role of social comparisons suggested

that individuals' income aspirations are influenced by face-to-face interactions. Using a cross-section of Swiss survey data, Stutzer (2004) showed that a higher income level in the community determines higher individual aspiration levels, and that the discrepancy between income and aspiration matters for well-being. The more an individual interacts with her neighbours, the more the income situation of the community where she lives matters in defining her aspirations.

Bruni and Stanca (2006) used World Values Survey (WVS) data to analyse the effect of television, an agent of consumption socialization, on income aspirations. Their results indicate that the effect of income on subjective well-being is significantly lower for heavy-TV viewers. Bruni and Stanca explain that "by watching TV people are overwhelmed by images of people richer and wealthier than they are. This contributes to shifting up the benchmark for people's positional concerns: income and consumption levels are compared not only to those of their actual social reference group, but also to those of their virtual reference group, defined and constructed by television programs. As a consequence, television viewing makes people less satisfied with their income and wealth levels" (2006, p. 213).

If television, a unidirectional mass medium that provides relatively limited information about the lives of others, affects income aspirations and viewers' satisfaction with their income, it seems reasonable that online social networks, which allow interactive communication and provide an unprecedented volume of personal information, can affect income aspirations even more.

Surprisingly, the role of social media has received little attention in economics. Based on data drawn from the third wave of the European Social Survey, Clark and Senik (2010) found that individuals with Internet access tend to attach greater importance to income comparisons. Using panel data from the European Union Statistics on Income and Living Conditions (EU-SILC), Lohmann (2015) found that stated material aspirations are significantly positively related to fast-Internet access. Lohmann also reported cross-sectional evidence from the WVS suggesting that people who regularly use the Internet as a source of information derive less satisfaction from their income. Due to lack of data, these authors could not assess how material aspirations relate to the use of online social networks.

A few psychological studies have assessed the possible effects of Facebook on users' self-esteem, feelings of deprivation, and subjective well-being. Based on an online survey of 736 college students recruited via email from a large Midwestern university, Tandoc et al. (2015) found that the use of Facebook triggers feelings of envy, which expose users to the risk of depression. Lim and Yang (2015) used the survey responses of 446 university students attending a Korean university to study the emotional effect of social comparisons occurring in a SNS environment. Their results suggest that a predominant activity in SNS is making social comparisons with public figures and that such comparisons trigger a range of emotional responses including envy and shame. Based on a survey administered to 231 young adults recruited by two students at the University of Amsterdam through their online social networks, de Vries and Kühne (2015) found that Facebook use was related to a greater degree of negative social com-

parison, which was in turn related negatively to self-perceived social competence and physical attractiveness. The main limitation of this body of research resides in the use of small, and biased samples, in most cases composed of self-selected groups of undergraduate students attending specific colleges. We assess the relationship between SNS use and social comparisons in large and representative samples.

3 Data and empirical strategy

The empirical analysis uses two individual level datasets providing information on the use of online social networks. First, we investigate the relationship between SNS use and proxies of social comparisons using the 2010, 2011 and 2012 waves of the MHS provided by Istat. Second, we use the 2011, 2012 and 2013 waves of the Eurobarometer survey provided by the Public Opinion Analysis sector of the European Commission.

The two datasets provide similar information about individuals' use of SNS along with their personal characteristics, perceptions, and behaviors. The Italian dataset, however, allows to exploit the availability of broadband across regions as a potential source of exogenous variation to implement a standard IV estimation strategy. Moreover, the MHS contains valuable information about how people connect to the Internet that is, unfortunately, not available in the Eurobarometer. The latter, on the other hand, allows to tackle the issue of social comparisons extending the analysis to 18 European countries.[1]

The use of two different surveys allows to test the robustness of our findings and to check the causal relationship among variables using two estimation strategies: in the case of Eurobarometer we use 2SLS with generated instruments (Lewbel, 2012); in the case of the Italian MHS we use 2SLS with standard instrumental variables, and with generated instruments. This allows also to check the consistency of Lewbel's method by comparing its results with those from standard instruments applied to the same dataset.

In both datasets we use people's dissatisfaction with their financial situation to measure social comparisons. Financial dissatisfaction is strongly correlated with relative deprivation (D'Ambrosio and Frick, 2007, 2012) and several studies used financial dissatisfaction as a proxy of social comparisons (see for example Brockmann et al., 2009; Bartolini and Sarracino, 2015). Moreover, seminal work in psychology theorized that dissatisfaction is tightly linked to social comparisons. For example, in their pioneering study on the attitudes of American soldiers during World War II, Stouffer et al. (1949) found that soldiers' feelings of dissatisfaction with their own condition were less related to the actual degree of hardship they experienced than to the situation of the unit or group to which they compared themselves. In other words, dissatisfaction basically depends on social comparisons. More recently, economic studies have ascertained that

[1]The countries included in the analysis are: Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Spain, Sweden, Turkey, United Kingdom.

satisfaction with own financial situation and subjective well-being are driven by the gap between the individual's income and the incomes of all individuals richer than him/her (Clark and Oswald, 1996; Bossert and D'Ambrosio, 2006). More specifically, using panel data, D'Ambrosio and Frick (2007, 2012) show that financial dissatisfaction is strongly associated to a measure of relative deprivation, while it weakly correlates with absolute income. That is to say that financial dissatisfaction mirrors relative rather than absolute standards, thus reflecting social comparisons, i.e. individual achievements with respect to what other people – with whom the respondent compares herself – get. Additionally, the inclusion of a control for absolute income allows to control for its possible confounding effects on financial dissatisfaction, thus allowing the latter to proxy relative concerns.

In the MHS, financial dissatisfaction is measured through responses to the question: "How satisfied do you feel with your financial conditions?", where possible responses were "very satisfied", "fairly satisfied", "not much satisfied" and "not at all satisfied". The scale of the answers has been reverted so that higher scores stand for more dissatisfaction. The use of SNS is measured through a binary variable capturing respondents' use of online social networks such as Facebook and Twitter.

In the Eurobarometer, financial dissatisfaction is observed through answers to the question: "How would you judge the current financial situation of your household". The answers range on a scale from 1 ('very good') to 4 ('very bad'). The use of SNS is measured through the answers to the question: "To what extent do you use online social networks?". The answers range on a scale from 1 ('everyday') to 6 ('never').

Since financial dissatisfaction, our dependent variable, is ordered in 4 categories – in both datasets – we adopt an ordered probit model. Formally, our baseline equation is as follows:

$$\text{financial dissatisfaction}_i = \begin{cases} 1 & \text{if } 0 < y_i \leq c_1, \\ 2 & \text{if } c_1 < y_i \leq c_2, \\ 3 & \text{if } c_2 < y_i \leq c_3, \\ 4 & \text{if } c_3 < y_i \leq c_4, \end{cases} \tag{1}$$

where $0 < c_1 < c_2 < c_3 < c_4$;

the index i stands for individuals;

and c_1 - c_4 are unknown parameters to be estimated.

$$Y_i = \alpha + \beta_1 \cdot SNS_i + \boldsymbol{\theta} \cdot \mathbf{X_i} + \varepsilon_i, \varepsilon_i \sim N(0,1)$$

Y_i is financial dissatisfaction, SNS_i is the use of SNS, $\boldsymbol{\theta}$ is a vector of parameters for the vector of control variables $\mathbf{X_i}$ and ε_i is a vector of normally distributed errors with mean equal to zero and standard deviation equal to one. In the regressions on Italian data, we use robust standard errors. In case of Eurobarometer data, we use standard errors clustered at country and year level.

The list of control variables includes:

- Age, gender, marital status, family size, education, and work status.
- The time spent watching television. This is measured through the frequency of TV watching in the Eurobarometer – on a scale from 1 ('never') to 6 ('nearly every day'), and through the number of minutes spent watching TV per day in the MHS. This control was included to account for the role of television for material aspirations (Bruni and Stanca, 2006).
- A dummy for each year when the data were collected.

Additionally, in the MHS-based analysis we also controlled for:

- Fast Internet access, measured through the use of a broadband connection given by DSL or optical fibre.
- The frequency of meetings with friends, to account for the possible relationship of face-to-face interactions with material aspirations (Stutzer, 2004).
- Regional level controls including the real per capita GDP, and internet penetration among families, and the share of residents with higher school education. These variables are meant to control for heterogeneity among regions.

The list of controls in the Eurobarometer-based analysis also includes the following variables:

- the real GDP per capita;
- the size of respondents' town of residence;
- respondents' placement in society as derived from the question: "Do you see yourself and your household belonging to?". Answers range on a scale from 1 ('The lowest level in society') to 10 ('The highest level in society').
- an index of media use reflecting respondents' exposure to media.

Descriptive statistics are reported in table 1 for the Italian sample and 2 for Eurobarometer data.

TABLE 1 APPROXIMATELY HERE

TABLE 2 APPROXIMATELY HERE

3.1 Endogeneity issues

The coefficients from equation 1 indicate the sign and magnitude of partial correlations among variables. However, we cannot discard the hypothesis that the use of SNS is endogenous to financial dissatisfaction. Personal characteristics can correlate with both the use of SNS and the dependent variable. Hence, we turn to two-stages least squares (2SLS) to check the robustness of our findings to possible endogeneity bias.

3.1.1 Multipurpose Household Survey

For the Italian data two different identification strategies are possible: one based on Lewbel's method (2012) – which we will describe in greater detail in the next subsection – and one exploiting the availability of fast Internet access across Italian regions as a source of exogenous variation (Sabatini and Sarracino, 2017). In particular, we identified the two following instruments:

1. The percentage of the population for whom a DSL connection was available in respondents' region of residence according to data provided by the Italian Ministry of Economic Development. DSL (digital subscriber line, originally digital subscriber loop) is a family of technologies that provides Internet access by transmitting digital data over the copper wires of a traditional local telephone network.

2. A measure of the digital divide given by the percentage of the region's area that was not covered by optical fibre, elaborated from data provided by The Italian Observatory on Broadband. Optical fibre permits transmission over longer distances and at higher speed than DSL.

Both variables were measured in 2008, two years before the first wave of the Multipurpose Household Survey, which we employ in our study. The validity of the instrument is justified by the fact that the availability of broadband basically depends on orographic features that exogenously determined the technological characteristics of the old voice telecommunication infrastructures several decades before the advent of the Internet. In the 2000s, the old telephone infrastructures unpredictably turned out to facilitate or to hamper the establishment of broadband depending on a specific early characteristic called 'local loop'. The local loop is the distance between final users' telephone line and the closest telecommunication exchange or 'central office'. The longer the copper wire, the less bandwidth is available via this wire. If the distance is above a certain threshold (approximately 4.2 kilometers), then the band of the copper wires cannot be wide enough to support a broadband Internet connection (Campante et al., 2013). When traditional telephone infrastructures were built, for the most part in the 1970s, the length of copper wires was exogenously determined by the orographic features of the territory. If there were natural or artificial obstacles between users' telephone lines and the central office – such as, for example, a hill or a railroad – then the length was likely to exceed the 4.2 kilometers threshold (Between, 2006; Ciapanna and Sabbatini, 2008).[2] In the 2000s, the length of the local loop unpredictably turned out to be a crucial factor for broadband accessibility, forming the basis for a natural quasi-experiment in the availability of fast Internet: Regions with relatively short local loops were advantaged in the diffusion of the broadband and where characterized by a better broadband coverage in the 2000s.

[2] In Appendix B, we provide a map illustrating the orographic characteristics of the Italian territory and one showing the broadband coverage in 2007. The latter suggests that, in Italy, the most impervious territories are those with the worst broadband coverage.

As for the second instrument, when the broadband connection cannot be implemented through pre-existing copper wires, it is necessary to turn to an optical fibre-based technology to provide fast-Internet. The possibility and the costs of installing this type of infrastructure, however, even more strongly rely on the exogenous characteristics of the natural environment. In fact, optical fibre entails the need to install new cables underground. This involves excavation works, which are expensive and generally delay or even prevent the provision of broadband in the area.

The tests of over-identifying restrictions support the assumption of the orthogonality of the instruments.

For any given set of orographic characteristics of an area, the provision of broadband – whether through DSL or optical fibre technology – may also have been influenced by some socio-demographic factors that affected the expected commercial return on the provider's investment, such as population density, per capita income, the median level of education and the local endowments of social capital. These characteristics may correlate with our outcomes of interest in ways that could confound causal interpretation. To account for possible confounding effects, we control also for the regional level of per capita GDP, and internet penetration among families.

We use the two instruments in a 2SLS model implemented in Stata by the ivreg2 command. Angrist (2001) showed that the coefficients estimated with a linear 2SLS are equal to the marginal effects produced by non linear instrumental variables models even in presence of discrete dependent variables. Moreover, although our endogenous variable is categorical, we adopt Ordinary Least Squares (OLS) in the first step because only OLS estimates produce residuals that are uncorrelated with fitted values and covariates, thus providing a valid instrumental variable (Angrist and Pischke, 2009). The first step can be written as:

$$SNS_i = \pi_1 + \pi_2 \cdot z_1 + \pi_3 \cdot z_2 + \boldsymbol{\pi_4} \cdot \mathbf{X_i} + \nu_i \tag{2}$$

where z_1 and z_2 are the two above-mentioned instruments, $\mathbf{X_i}$ is a vector of control variables, and ν_i is the error term.

The second step is as follows:

$$\text{financial dissatisfaction}_i = \alpha + \beta_1 \cdot \hat{SNS}_i + \boldsymbol{\theta} \cdot \mathbf{X_i} + \epsilon_i \tag{3}$$

where $\hat{SNS}_i$ is the instrumented SNS use from the first step, $\boldsymbol{\theta}$ is a vector of parameters of the control variables $\mathbf{X}$, and ϵ_i is the error term.

3.1.2 Eurobarometer

In case of the Eurobarometer, we did not find any suitable instrument to address potential endogeneity in the use of SNS. Hence, we adopted a 2SLS identification strategy based on generated instruments: Lewbel (2012) showed that if the errors in the first-stage regression are heteroskedastic, then it is possible to

generate valid instrumental variables when exclusion restrictions are weak or do not hold. Following Lewbel's notation, we run the following model:

$$Y_1 = X'\beta_1 + Y_2 \cdot \gamma_1 + \varepsilon_1; \varepsilon_1 = \alpha_1 \cdot U + V_1 \quad (4)$$

$$Y_2 = X'\beta_2 + \varepsilon_2; \varepsilon_2 = \alpha_2 \cdot U + V_2 \quad (5)$$

where Y_1 is financial dissatisfaction, Y_2 is the use of online social networks, U depicts unobserved individual characteristics and V_1 and V_2 are idiosyncratic errors. Lewbel (2012) showed that if there exists a vector Z of observed exogenous variables such that:

$$\begin{aligned} E(Z'\varepsilon) &= 0 \\ Cov(Z, \varepsilon_2^2) &\neq 0 \\ Cov(Z, \varepsilon_1\varepsilon_2) &= 0 \end{aligned}$$

then $[Z - E(Z)] \cdot \varepsilon_2$ can be used as valid instruments.

For comparative purposes, we apply Lewbel's method to test for endogeneity also to the Italian MHS data. Results are provided in Table 5 on page 28.

4 Results

We first present results obtained investigating the relationship between SNS use and financial dissatisfaction in Italy, using MHS data (Section 4.1). Subsequently, we check the generality of our findings by testing the same relationship in the Eurobarometer dataset (Section 4.2).

4.1 Results from the Multipurpose Household Survey

Table 3 presents the estimates from equation 1. In the Italian sample, online networking is significantly and positively correlated with financial dissatisfaction, thereby suggesting that, ceteris paribus, people who use SNS tend to be more dissatisfied with their income. Additionally, the results show that the higher is the frequency of meetings with friends, the lower is the respondent's financial dissatisfaction. This suggests that face-to-face and web-mediated interactions might exert different effects on people's attitude to make social comparisons. This might be related to the fact that, while SNS allow users to come into contact with distant others, such as acquaintances, past friends, or friends of friends, face-to-face interactions generally take place with close friends. Close friends are likely to be similar along several issues of potential comparison. In addition, they may prefer to avoid upward and downward comparisons for a matter of tact and delicacy, in that they are likely to be concerned with the negative feelings that might be associated with comparisons (Brickman and Bulman, 1977).

Consistently with Bruni and Stanca (2006), financial dissatisfaction is also significantly and positively associated with the amount of time spent watching TV. Broadband Internet is not significant, though positively associated with financial dissatisfaction. This suggests that the significant and positive relation between fast Internet use and measures of social comparisons found by Clark and Senik (2010) and Lohmann (2015) may be due to the role of online social networks in providing information on alternative lifestyles to their users. All the other control variables have the expected signs. Financial dissatisfaction is significantly higher for people with poor health and for people living in large households. On the other hand, married people and higher educated ones tend to compare less with others. The coefficients of age and age squared document the existence of a U-shaped relationship between age and financial dissatisfaction. Finally, we found that regional GDP per capita and internet penetration among families by region are negatively correlated with financial dissatisfaction.

TABLE 3 APPROXIMATELY HERE

Table 4 reports the marginal effects of the use of SNS on the probability of being financially dissatisfied after ordered probit. The coefficients are increasingly positive and significant for the categories "quite" and "a lot" which suggests that the use of SNS increases the probability that people report to be at least quite financially dissatisfied. Similarly, the second coefficient suggests that using SNS strongly reduces the probability to be "a bit" financially dissatisfied. The last coefficient, corresponding to the category "not at all", shows that using SNS slightly reduces the probability of declaring to be financially satisfied: the coefficient is negative, but close to zero. In sum, marginal effects document an increasingly positive effect of using SNS on the probability of being very financially dissatisfied.

TABLE 4 APPROXIMATELY HERE

Table 5 reports results of the 2SLS estimates we employed to address endogeneity. Our two instruments are significantly and positively associated with the endogenous variable in the first stage. Additionally, the tests of weak instruments, and of underidentification suggest that the instruments are valid: the F-test of weak instruments is 12.64 significant at 1% and it indicates that the instruments are not weak; the Kleibergen-Paap statistic is 25.26 significant at 1% and it allows us to reject the null that the matrix of reduced form coefficients is underidentified.

The coefficient of the use of SNS is positive and significant, thus supporting the hypothesis that SNS use increases people's propensity to compare themselves to others. The Hansen J statistic test of overidentifying restrictions is 2.48 and not significant, which suggests that we cannot reject the null that the instruments are valid, i.e. they are uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation. The Kleibergen-Paap test statistic is 25.26 and significant at 1% which allows

us to reject the null hypothesis that the equation is underidentified. The remaining coefficients confirm results from the ordered probit model (see table 3). Overall, in addition to supporting the claims that television watching raises material aspirations, our results support the hypothesis that SNS play a pivotal role in shaping people's comparisons to others, making them less satisfied with their incomes.

These results are consistent with those from Lewbel's generated instruments method (see columns four and five of table 5). In column four we report the coefficients from a model using only generated instruments: the coefficient of online networking is 0.11 and significant at 1%. This is very close to the coefficient resulting from the model using generated and existing instruments (see column five) in which the use of online social networks is associated to an increase by 0.11 points in financial dissatisfaction (significant at 1%). In both cases the diagnostic tests confirm the robustness of the instrumenting strategy: the Hansen J statistic are large and not significant which indicates that the instruments are valid, whereas the Kleibergen-Paap test statistics suggest that the models are correctly identified.

TABLE 5 APPROXIMATELY HERE

To check the generality of our findings, we turn to the analysis of the relationship between SNS use and financial dissatisfaction using the Eurobarometer.

4.2 Results from Eurobarometer

The results from the ordered probit regressions are reported in table 6. The coefficient of SNS use is positive and significant, thus supporting the claim that the use of SNS boosts people's financial dissatisfaction. The other coefficients indicate that women tend to be more dissatisfied with their financial situation than men; age shows a U-shaped relationship with dissatisfaction; divorced people are more dissatisfied than single ones; richer and highly educated people tend to be more dissatisfied than poorer ones; TV watching has no significant association with financial dissatisfaction, while the higher the Gross Domestic Product per capita the higher the financial dissatisfaction.

TABLE 6 APPROXIMATELY HERE

Table 7 shows the average marginal effects of the use of SNS on the probability of being very satisfied, satisfied, dissatisfied and very dissatisfied with own financial situation in the Eurobarometer. Results show that the use of SNS reduces the probability of being satisfied with own financial situation and it increases the probability of being dissatisfied.

TABLE 7 APPROXIMATELY HERE

Available results document that the partial correlation between the use of SNS and financial dissatisfaction is positive. To check whether this finding is

robust to possible endogeneity, we run the model of equation 4 in which we use the method of generated instruments. Results are reported in table 8. The coefficients of the use of SNS confirm the signs and significance of the ordered probit: the use of SNS increases financial dissatisfaction. All other variables do not change their association with the dependent variable. The coefficient and the p-value of the Hansen J statistic support the hypothesis that the instruments are valid, and the Kleibergen-Paap test statistic allows us to exclude the hypothesis that the equation is underidentified.

TABLE 8 APPROXIMATELY HERE

Summarising, the evidence from Eurobarometer data supports two conclusions: first, the use of SNS increases financial dissatisfaction; second, this relationship is robust to possible endogeneity issues.

5 Conclusion

Previous studies have highlighted the role of information in shaping positional concerns. In particular, TV watching emerged as a vehicle of information about alternative lifestyles that stimulates social comparisons, which, in turn, can be a cause of individuals' dissatisfaction with their life.

Our results, based on the analysis of the Italian Multipurpose Household Survey (MHS) and of the Eurobarometer, contribute to this literature showing that also online social networks are powerful sources of social comparisons. Social Networking Sites (SNS) provide users with a volume of personal information that would have been unimaginable before the advent of platforms such as Facebook, Twitter, and alike. The power of SNS in prompting comparisons is due to a number of factors. SNS allow users to monitor the activities and lifestyles not only of numerous friends, but also of distant others, such as friends of friends, latent friends, or public figures, whose information would not be accessible without SNS. This information is strongly positively skewed because SNS users tend to over-share their positive life events and emotions and to allow unrestricted viewing of their posts – at least when it comes to positive ones. As a result, the news feed of platforms like Facebook provides an onslaught of idealized existences that can boost upward comparisons.

Our results from two different datasets indicate that the use of SNS is associated to a higher probability to be financially dissatisfied in Italy and in a sample of European countries. Moreover, we run 2SLS estimates on MHS and Eurobarometer data using both traditional and generated instruments. Results show that our finding is robust to possible endogeneity bias.

There are several reasons to treat our findings with prudence. For instance, both Eurobarometer and MHS data do not allow to distinguish between Facebook and Twitter, and do not contain information about the activities that users actually perform on social networks. It is plausible that different activities exert different effects on people's propensity to compare to others. Moreover, Eurobarometer and the MHS lack information about how much time users spend on SNS. It seems reasonable to argue that the more time people spend on platforms like Facebook, the more they assimilate news feed that provide updates, photos, and videos forming the bases for social comparisons. Most importantly, even if we are confident in the validity of our identification strategies, longitudinal data would help to more reliably identifying the effect of online social networks on social comparisons.

Despite these limitations, this study provides an empirical investigation into the possible role of online social networks in social comparisons. Overall, our findings suggest that online social networks are an integral part of the social environment that embeds the economic action of individuals and play a vital role in determining people's satisfaction with their financial situation. Understanding how important economic decisions are made – for example regarding consumption behavior and investments in human capital – requires to deepen our knowledge of the impact of online social networks on people's behaviors.

A Average levels of financial dissatisfaction and use of SNS in Italy.

Table 1: Average levels of dissatisfaction with the economic situation and of SNS use in Italy in 2010, 2011 and 2012.

	2010		2011		2012	
Region	Financial Dissatisfaction	Use of SNS	Financial Dissatisfaction	Use of SNS	Financial Dissatisfaction	Use of SNS
Abruzzo	0.507	0.462	0.498	0.526	0.570	0.603
Basilicata	0.545	0.463	0.593	0.439	0.635	0.543
Calabria	0.591	0.480	0.636	0.503	0.674	0.670
Campania	0.602	0.545	0.599	0.538	0.682	0.554
Emilia Romagna	0.433	0.357	0.424	0.441	0.515	0.504
Friuli Venezia Giulia	0.431	0.372	0.405	0.423	0.490	0.497
Lazio	0.496	0.472	0.507	0.525	0.560	0.460
Liguria	0.444	0.383	0.461	0.431	0.492	0.464
Lombardia	0.430	0.423	0.422	0.438	0.502	0.511
Marche	0.478	0.476	0.465	0.507	0.536	0.556
Molise	0.514	0.466	0.535	0.508	0.540	0.582
Piemonte-Valle d'Aosta	0.458	0.395	0.436	0.453	0.507	0.451
Puglia	0.608	0.509	0.653	0.494	0.690	0.511
Sardegna	0.634	0.492	0.645	0.506	0.679	0.613
Sicilia	0.681	0.453	0.673	0.525	0.713	0.577
Toscana	0.521	0.436	0.469	0.460	0.549	0.546
Trentino Alto Adige	0.268	0.346	0.253	0.377	0.311	0.489
Umbria	0.481	0.412	0.492	0.511	0.543	0.492
Veneto	0.448	0.408	0.470	0.410	0.490	0.558

B Orography and broadband in Italy

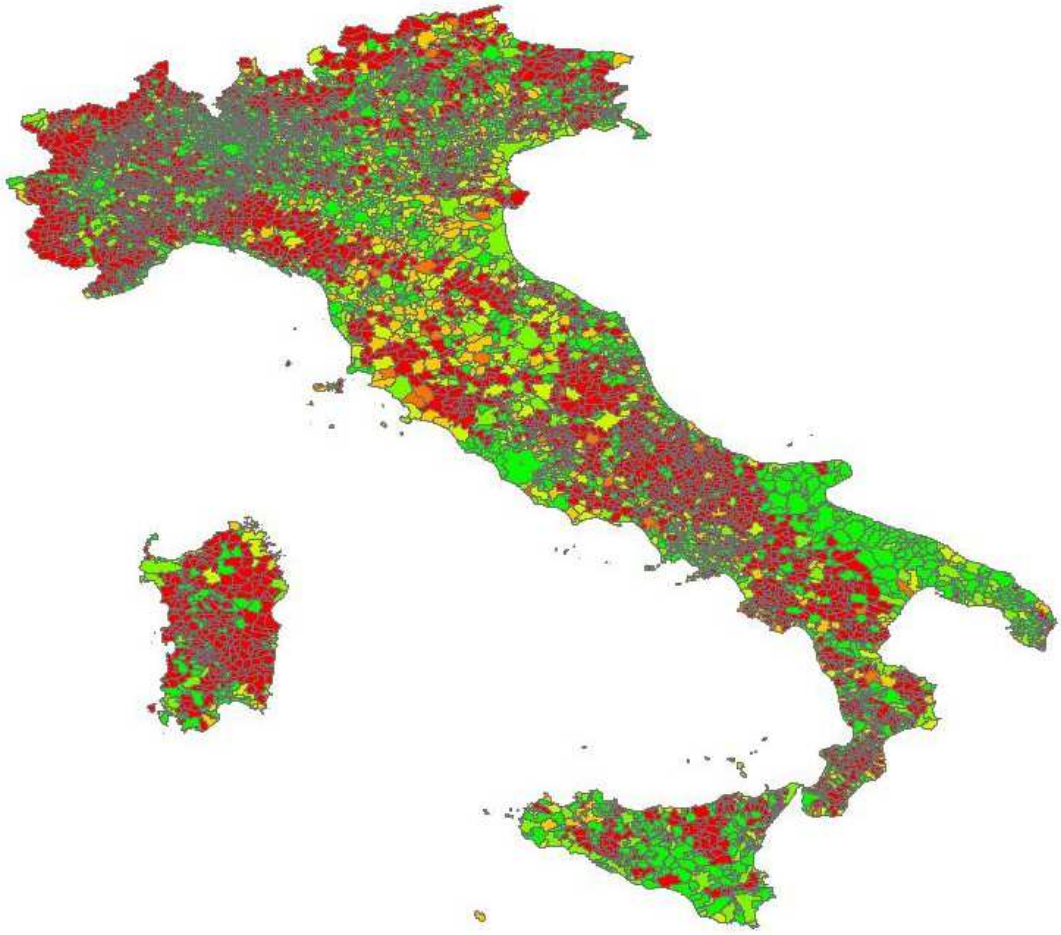

Figure 1: Percentage of the population covered by broadband in Italy.
Source: Between (2006), p. 17. Darker areas are those with the worst coverage. Green areas have the best coverage.

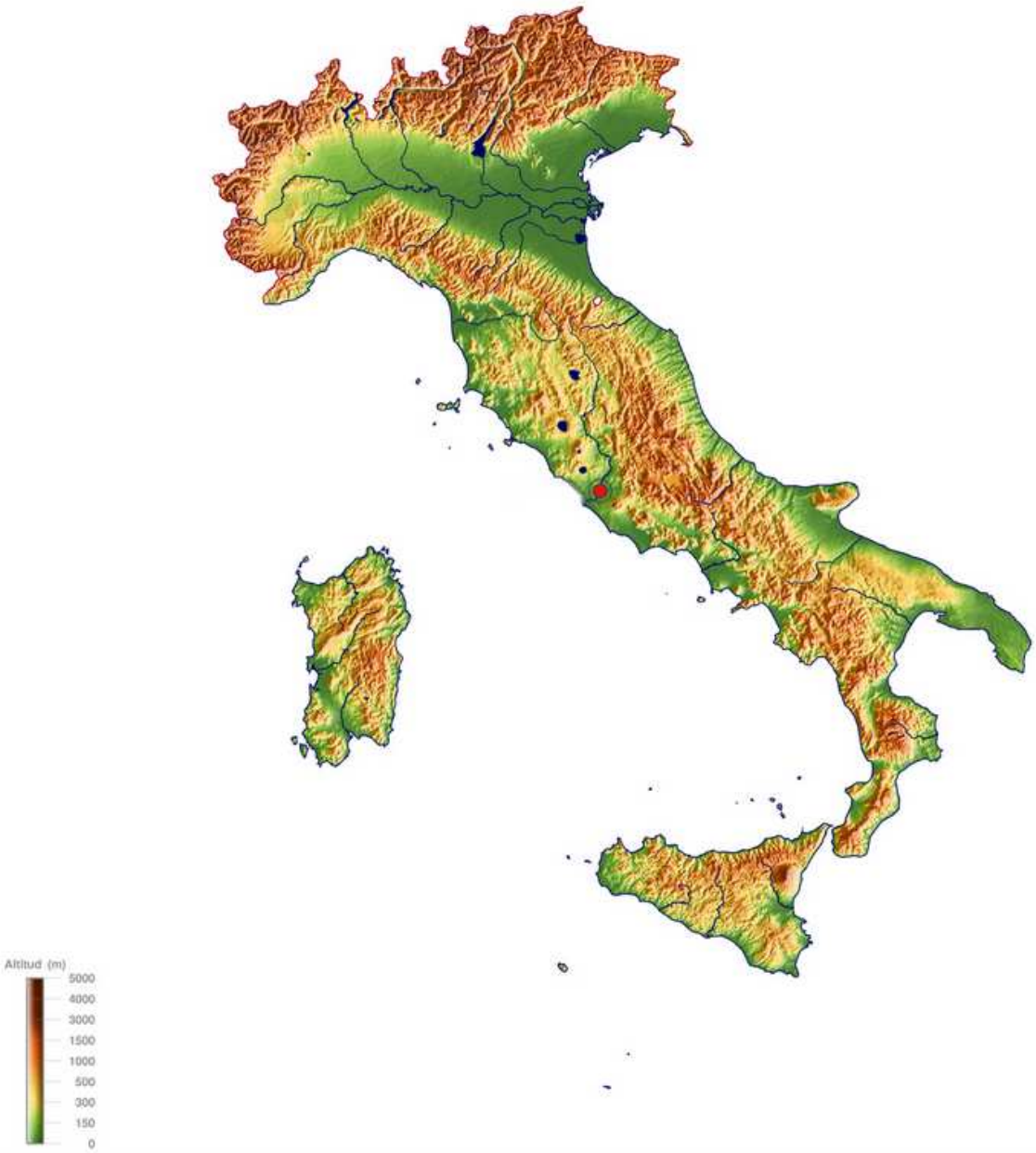

Figure 2: Topographic map of Italy.

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Tables

Table 1: Descriptive statistics of variables in the Multipurpose Household Survey.

Variable	mean	sd	min	max	obs
financial dissatisfaction	2.529	0.751	1	4	38812
online networking	0.460	0.498	0	1	38812
optic fiber (%)	91.52	7.202	73.01	99.64	38812
broadband coverage	89.07	6.102	68.60	97.30	38812
women	0.453	0.498	0	1	38812
age	38.98	13.24	18	89	38812
age squared/100	16.94	11.15	3.240	79.21	38812
frequency of meetings with friends	5.378	1.248	1	7	38661
minutes spent watching TV	4.895	0.550	2.303	6.802	29466
marital status	1.660	0.672	1	4	38812
educational status	2.990	0.711	1	5	38812
occupational status	1.932	1.539	1	7	38812
number of children	1.278	0.980	0	7	38812
modem	0.0903	0.287	0	1	33220
DSL	0.590	0.492	0	1	33220
fiber	0.0161	0.126	0	1	33220
satellite	0.0823	0.275	0	1	33220
3G	0.0267	0.161	0	1	33220
USB	0.175	0.380	0	1	33220
mobile	0.0198	0.139	0	1	33220
fast internet connection	0.606	0.489	0	1	33220
real GDP per capita (thousands €2005)	23.65	5.591	14.58	30.77	38812
internet penetration among families	53.40	4.978	44.09	61.83	38812
region	–	–	10	200	38812
year	–	–	2010	2012	38812

Table 2: Descriptive statistics of variables in the Eurobarometer.

variable	mean	sd	min	max	obs
financial dissatisfaction	2.374	0.756	1	4	94859
use of online social networks	3.178	2.216	1	6	83749
woman	0.536	0.499	0	1	96169
age	47.93	17.60	15	98	96169
age squared/100	26.07	17.47	2.250	96.04	96169
married	0.648	0.478	0	1	96801
divorced	0.0736	0.261	0	1	96801
widow	0.0846	0.278	0	1	96801
household income scale	5.476	1.662	1	10	94156
media use index	1.905	0.897	1	4	96149
secondary education	0.146	0.354	0	1	94478
tertiary education	0.101	0.301	0	1	94478
in education	0.0286	0.167	0	1	94478
no full-time education	0.00382	0.0617	0	1	94478
employed	0.438	0.496	0	1	96801
not working	0.488	0.500	0	1	96801
household size	2.576	1.084	1	4	96801
small or middle sized town	0.320	0.467	0	1	96491
large town	0.334	0.471	0	1	96491
log of GDP per capita	10.29	0.368	9.339	11.42	95900
year	–	–	2011	2013	95900
country	–	–	1	43	96823

Table 3: Ordered probit regressions of SNS use on financial dissatisfaction using MHS data. Control variables are included step-wise.

	(1)		(2)		(3)	
women	-0.0441^{**}	(-2.92)	-0.0343^{*}	(-2.26)	-0.0317^{*}	(-2.09)
age	0.0288^{***}	(6.93)	0.0278^{***}	(6.67)	0.0300^{***}	(7.18)
age squared/100	-0.0369^{***}	(-7.83)	-0.0358^{***}	(-7.60)	-0.0368^{***}	(-7.81)
good health	0.277	(1.35)	0.240	(1.16)	0.237	(1.15)
neither good nor bad health	-0.0567	(-0.29)	-0.0821	(-0.41)	-0.0862	(-0.43)
bad health	-0.347^{*}	(-1.77)	-0.369^{*}	(-1.86)	-0.371^{*}	(-1.88)
very bad health	-0.514^{**}	(-2.61)	-0.541^{**}	(-2.72)	-0.545^{**}	(-2.75)
married	-0.210^{***}	(-9.91)	-0.225^{***}	(-10.56)	-0.215^{***}	(-10.10)
separated or divorced	0.0262	(0.82)	0.0176	(0.55)	0.0188	(0.58)
widow	-0.0859	(-1.28)	-0.0992	(-1.47)	-0.0936	(-1.38)
vocational education	-0.199	(-0.93)	-0.234	(-1.10)	-0.266	(-1.22)
lower secondary education	-0.340	(-1.60)	-0.391^{*}	(-1.84)	-0.424^{*}	(-1.96)
secondary education	-0.520^{*}	(-2.44)	-0.584^{**}	(-2.74)	-0.618^{**}	(-2.85)
tertiary education	-0.648^{**}	(-2.95)	-0.718^{**}	(-3.25)	-0.750^{***}	(-3.35)
unemployed	0.765^{***}	(28.53)	0.700^{***}	(25.67)	0.700^{***}	(25.68)
housewife	0.137^{***}	(4.14)	0.113^{***}	(3.40)	0.114^{***}	(3.45)
student	0.0581^{*}	(1.85)	0.0204	(0.65)	0.0180	(0.57)
disabled	0.321^{*}	(2.43)	0.288^{*}	(2.18)	0.291^{*}	(2.21)
retired	-0.00854	(-0.23)	-0.00157	(-0.04)	-0.00331	(-0.09)
other work condition	0.363^{***}	(4.95)	0.344^{***}	(4.70)	0.345^{***}	(4.73)
number of children	0.0671^{***}	(8.42)	0.0517^{***}	(6.43)	0.0532^{***}	(6.62)
frequency of meetings with friends	-0.0319^{***}	(-4.99)	-0.0424^{***}	(-6.60)	-0.0453^{***}	(-7.03)
minutes spent watching TV	0.0875^{***}	(6.34)	0.0703^{***}	(5.07)	0.0679^{***}	(4.90)
year 2010	-0.0341	(-1.29)	-0.0194	(-0.69)	-0.0206	(-0.73)
year 2011	-0.0301	(-1.14)	-0.0240	(-0.90)	-0.0279	(-1.05)
fast internet connection	0.0154	(0.62)	0.0347	(1.38)	0.0239	(0.95)
mobile	-0.0500	(-0.84)	-0.0313	(-0.52)	-0.0486	(-0.81)
USB	0.0604^{*}	(2.09)	0.0639^{*}	(2.20)	0.0568^{*}	(1.95)
3G	-0.0789	(-1.58)	-0.0655	(-1.31)	-0.0788	(-1.57)
satellite	-0.0553	(-1.61)	-0.0321	(-0.93)	-0.0437	(-1.26)
real GDP per capita (thousands €2005)			-0.0242^{***}	(-11.06)	-0.0237^{***}	(-10.81)
internet penetration among families			0.00561^{*}	(2.22)	0.00517^{*}	(2.05)
online networking					0.107^{***}	(6.70)
cut1	-1.719^{***}	(-5.51)	-2.261^{***}	(-6.80)	-2.219^{***}	(-6.64)
cut2	0.295	(0.95)	-0.234	(-0.71)	-0.190	(-0.57)
cut3	1.418^{***}	(4.56)	0.894^{**}	(2.70)	0.939^{**}	(2.82)
Observations	25379		25379		25379	
Pseudo R^2	0.044		0.048		0.049	

t statistics in parentheses
* $p < 0.1$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Average marginal effects of the use of SNS on the probability of being dissatisfied with own income using Italian Multipurpose Household Survey data.

	Financial dissatisfaction		
Pr(dissatisfaction)	dy/dx	Std. Err.	P-values
a lot	0.019***	0.003	0.000
quite	0.020***	0.002	0.000
a bit	-0.031***	0.004	0.000
not at all	-0.008***	0.001	0.000

Table 5: Financial dissatisfaction and use of SNS: instrumented estimates using traditional 2SLS estimates, generated instruments, and external and generated instruments.

dependent variable:	First stage online networking	Second Stage financial dissatisfaction	Generated Instruments financial dissatisfaction	Existing and generated instruments financial dissatisfaction
online networking		0.862*	0.1083***	0.115***
		(2.42)	(0.0411)	(0.041)
women	-0.0276***	0.00454	-0.01633	-0.01615
	(-4.00)	(0.29)	(0.0109)	(0.0109)
age	-0.0196***	0.0347***	0.01989***	0.02002***
	(-11.31)	(4.48)	(0.00305)	(0.00305)
age squared /100	0.00768***	-0.0296***	-0.02373***	-0.02378***
	(4.05)	(-6.43)	(0.0033)	(0.0033)
good health	0.0650	0.171	0.2175*	0.2171*
	(0.84)	(1.26)	(0.129)	(0.129)
neither good nor bad health	0.0675	-0.0700	-0.02217	-0.0226
	(0.92)	(-0.55)	(0.122)	(0.122)
bad health	0.053	(0.234)	-0.1977	-0.198
	(0.720)	(-1.85)	(0.121)	(0.121)
very bad health	0.0701	-0.342**	-0.2916	-0.292**
	(0.95)	(-2.66)	(0.122)	(0.122)
married	-0.0866***	-0.0706*	-0.1362***	-0.1356***
	(-8.39)	(-2.00)	(0.0158)	(0.0158)
separated or divorced	-0.0120	0.000480	-0.008412	-0.008333
	(-0.77)	(0.02)	(0.0232)	(0.0232)
widow	-0.0303	-0.0250	-0.04855	-0.04834
	(-1.04)	(-0.50)	(0.0447)	(0.0447)
vocational education	0.312***	-0.337	-0.09951	-0.1016
	(6.09)	(-1.77)	(0.129)	(0.129)
lower secondary education	0.318***	-0.457*	-0.2143*	-0.2165*
	(6.24)	(-2.38)	(0.129)	(0.129)
secondary education	0.329***	-0.588**	-0.3356***	-0.3378***
	(6.42)	(-3.02)	(0.129)	(0.13)
tertiary education	0.312***	-0.632**	-0.3923***	-0.3945***
	(5.53)	(-3.24)	(0.135)	(0.135)
unemployed	0.0147	0.474***	0.4859***	0.4858***
	(1.21)	(20.71)	(0.0201)	(0.0201)
housewife	-0.00493	0.0730**	0.07045***	0.07047***
	(-0.32)	(2.66)	(0.0244)	(0.0244)
student	0.0307*	-0.0294	-0.005609	-0.005821
	(2.42)	(-1.07)	(0.023)	(0.023)
disabled	-0.0398	0.231*	0.201**	0.2013**
	(-0.82)	(2.24)	(0.098)	(0.098)
retired	0.0121	-0.00557	0.002817	0.002742
	(0.79)	(-0.20)	(0.0255)	(0.0255)
other work condition	0.0144	0.221***	0.2322***	0.2321***
	(0.46)	(3.69)	(0.0552)	(0.0552)
number of children	-0.0170***	0.0497***	0.03715***	0.03726***
	(-4.58)	(5.59)	(0.00584)	(0.00584)
frequency of meetings with friends	0.0273***	-0.0491***	-0.02849***	-0.02868***
	(9.33)	(-4.41)	(0.00483)	(0.00483)
minutes spent watching TV	0.0236***	0.0169	0.0353***	0.03514***
	(3.90)	(1.20)	(0.00998)	(0.00998)
year 2011	0.0139	-0.0408	-0.02586	-0.02599
	(1.07)	(-1.73)	(0.0202)	(0.0202)
year 2012	0.0399**	-0.0585*	-0.02676	-0.02704
	(3.28)	(-2.25)	(0.0192)	(0.0192)
fast internet access	0.103***	-0.0521	0.02452	0.02383
	(9.11)	(-1.26)	(0.0185)	(0.0185)
mobile connection	0.187***	-0.175*	-0.03424	-0.03549
	(7.54)	(-2.19)	(0.0409)	(0.0409)
USB connection	0.0712***	0.00243	0.05461***	0.05415**
	(5.34)	(0.07)	(0.021)	(0.021)
3G	0.138***	-0.141*	-0.03863	-0.03954
	(5.95)	(-2.22)	(0.0372)	(0.0372)
Satellite connection	0.111***	-0.0962*	-0.01337	-0.01411
	(7.22)	(-2.01)	(0.0248)	(0.0248)
regional real GDP per capita (thousands €2005)	-0.00347**	-0.00689**	-0.01076***	-0.01072***
	(-3.06)	(-2.83)	(0.00155)	(0.00155)
internet penetration among families	0.00344**	-0.00244	0.001313	0.00128
	(2.97)	(-0.95)	(0.0018)	(0.0018)
optic fiber (%)	0.00120*			
	(2.01)			
broadband coverage	0.00344***			
	(4.99)			
Constant	-0.0856	2.424***	2.639***	2.638***
	(-0.55)	(9.27)	(0.212)	(0.212)
Observations	25379	25379	25379	25379
RMSE		0.7899	0.702	0.703
Anderson-Rubin Wald test	5.29			
p-value	0.005			
Hansen J Statistic		2.48	36.2	36.1
p-value		0.11	0.24	0.24
Kleibergen-Paap statistic		25.26	767.45	779.71
p-value		0.000	0.000	0.000

Table 6: Ordered probit regressions of SNS use on financial dissatisfaction using Eurobarometer data.

	financial dissatisfaction	
use of online social networks	0.0400***	(5.20)
women	0.0345	(1.09)
age	0.0281***	(6.66)
age squared / 100	-0.0411***	(-8.91)
married	-0.0664*	(-1.84)
divorced	0.307***	(4.90)
widowed	0.00108	(0.02)
household income = 2	-0.130	(-0.86)
household income = 3	-0.451***	(-3.44)
household income = 4	-0.675***	(-5.14)
household income = 5	-1.017***	(-9.29)
household income = 6	-1.287***	(-10.54)
household income = 7	-1.552***	(-12.92)
household income = 8	-1.707***	(-14.56)
household income = 9	-1.876***	(-11.32)
secondary education	-0.105**	(-2.95)
tertiary education	-0.270***	(-9.11)
in education	-0.620***	(-7.90)
no full-time education	-0.0293	(-0.22)
household size = 2	-0.0931**	(-3.12)
household size = 3	-0.00654	(-0.21)
household size = 4 & more	0.0101	(0.32)
small or middle sized town	0.0194	(0.44)
large town	0.0373	(0.81)
real GDP per capita (U.S. $ 2011)	17.34***	(14.54)
media use index	0.161***	(6.17)
cut 1	183.6***	(14.45)
cut 2	185.7***	(14.55)
cut 3	187.0***	(14.65)
Observations	13170	
Pseudo R^2	0.201	

t statistics in parentheses

* $p < 0.1$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Average marginal effects after ordered probit estimates of the use of SNS on the probability of being dissatisfied with own income. Estimates use Eurobarometer data.

	Financial dissatisfaction		
Pr(dissatisfaction)	dy/dx	Std. Err.	P-values
a lot	0.004***	0.001	0.009
quite	0.006***	0.002	0.003
a bit	-0.005**	0.002	0.013
not at all	-0.005***	0.001	0.001

Table 8: Relationship between SNS and financial dissatisfaction in Europe: 2SLS with generated instruments.

	financial dissatisfaction	
use of online social networks	0.0196**	(3.13)
women	0.0399**	(2.61)
age	0.0178***	(6.00)
age squared / 100	-0.0246***	(-8.59)
married	-0.0435*	(-1.72)
divorced	0.163***	(4.36)
widowed	-0.00490	(-0.12)
household income = 1	1.062***	(7.28)
household income = 2	1.082***	(8.04)
household income = 3	0.753***	(6.34)
household income = 4	0.589***	(5.09)
household income = 5	0.382***	(3.36)
household income = 6	0.243*	(2.14)
household income = 7	0.122	(1.07)
household income = 8	0.0409	(0.36)
household income = 9	-0.0459	(-0.35)
secondary education	-0.0629*	(-2.54)
tertiary education	-0.132***	(-4.87)
in education	-0.333***	(-7.33)
no full-time education	0.0110	(0.11)
household size = 2	-0.0419	(-1.55)
household size = 3	0.00184	(0.06)
household size = 4	0.00979	(0.33)
small or middle sized town	0.0155	(0.87)
large town	0.0475*	(2.32)
real GDP per capita (U.S. $ 2011)	8.530***	(5.19)
media use index	0.104***	(7.04)
Constant	-89.81***	(-5.11)
N	13170	
RMSE	0.604	
Hansen J Statistic	52.90	
p-value	0.101	
Kleibergen-Paap statistic	3158.56	
p-value	0.000	

t statistics in parentheses

* $p < 0.1$, ** $p < 0.01$, *** $p < 0.001$