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**Keeping up with the e-  
Joneses: Do Online Social  
Networks Raise Social  
Comparisons?**

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## Economic Theory

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#### Summary

Online social networks, such as Facebook, disclose an unprecedented volume of personal information amplifying the occasions for social comparisons, which can be a cause of frustration. We test the hypothesis that the use of social networking sites (SNS) increases social comparisons as proxied by people's dissatisfaction with their income and we compare the effect of SNS in Western and Eastern European countries. After controlling for the possibility of reverse causality, our results suggest that SNS users have a higher probability to compare their achievements with those of others. In Western countries, this leads individuals to a lower satisfaction with their economic conditions. The opposite holds in Eastern countries, where upward comparisons seemingly strengthen the hope that an improvement in individuals' economic conditions will occur (so called "tunnel effect"). We conclude that SNS can be a strong engine of frustration for their users depending on the institutional and economic circumstances.

**Keywords:** Social Networks, Social Networking Sites, Social Comparisons, Satisfaction with Income, Relative Deprivation

**JEL Classification:** D83, I31, O33, Z1, Z13

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# Keeping up with the e-Joneses: Do online social networks raise social comparisons?\*

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March 30, 2016

## Abstract

Online social networks, such as Facebook, disclose an unprecedented volume of personal information amplifying the occasions for social comparisons, which can be a cause of frustration. We test the hypothesis that the use of social networking sites (SNS) increases social comparisons as proxied by people's dissatisfaction with their income and we compare the effect of SNS in Western and Eastern European countries. After controlling for the possibility of reverse causality, our results suggest that SNS users have a higher probability to compare their achievements with those of others. In Western countries, this leads individuals to a lower satisfaction with their economic conditions. The opposite holds in Eastern countries, where upward comparisons seemingly strengthen the hope that an improvement in individuals' economic conditions will occur (so called "tunnel effect"). We conclude that SNS can be a strong engine of frustration for their users depending on the institutional and economic circumstances.

*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 fundamental determinant of life satisfaction (Clark and Oswald, 1996; Ferrer-i Carbonell, 2005; D’Ambrosio and Frick, 2007).

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). A few economic studies have analysed the ability of mass media to provide information on alternative lifestyles and, therefore, to stimulate social comparisons that may possibly undermine life satisfaction. For instance, Bruni and Stanca (2006) and Hyll and Schneider (2013) analysed the role of television. Clark and Senik (2010) were the first to incidentally 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.

Early studies on social comparisons have found that, on average, individuals 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 Facebook into users’ daily life. First, users are likely to experience an extension of their reference group. Most users have Facebook “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 Facebook 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 Facebook users allow all “friends” unrestricted viewing of their profiles (Pempek et al., 2009), individuals often have access to a large amount of information about even their most distant acquaintances. These posts may form the basis for numerous social comparisons.

Second, Facebook allows 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 even close friends on a daily basis, Facebook allows users to keep in touch with, and monitor the activities of, numerous friends multiple times a day, even when those friends are in different locations.

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 prevalently positive nature of information that people choose to display on Facebook. Psychological studies have shown that Facebook 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.

To our knowledge we are the first to test 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 including SNS users and non-users. We argue that online social networks disclose an unprecedented volume of personal information that might be a powerful source of social comparisons. Our contribution bridges two literatures. The first one was developed by economists who dealt with the roots of social comparisons (Stutzer, 2004; Bruni and Stanca, 2006; D’Ambrosio and Frick, 2007). We add to these works by conducting the first study of the role of online social networks. The second literature encompasses psychological studies that considered the extent to which using Facebook, and online social networks more in general, prompts feelings of frustration and dissatisfaction in small and limited samples of users, generally composed of undergraduate students attending specific colleges (de Vries and Kühne, 2015; Lim and Yang, 2015; Tandoc et al., 2015).

Our analysis uses two datasets that provide individual level information about the use of SNS. First, we investigate how online social networks relate to proxies of social comparisons using the 2011, 2012, and 2013 waves of the Eurobarometer survey. This dataset provides cross-country and nationally representative information about people’s use of SNS, their propensity to compare to others, and a set of control variables. In this dataset, we control for the potential endogeneity of SNS use through the identification strategy proposed by Lewbel (2012). This strategy 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.

The second dataset at hand is the Italian Multipurpose Household Survey (MHS) provided by the Italian National Institute of Statistics (Istat). The 2010, 2011, and 2012 waves allow to explore the association between the use of online social networks and social comparisons using a large and nationally represen-

tative number of observations. An important advantage of this dataset is that it allows to control for potential endogeneity in two different ways: in addition to using Lewbel’s (2012) method, we use a conventional instrumental variable approach exploiting the availability of fast Internet access across Italian regions as a source of exogenous variation. Territorial differences in broadband coverage basically 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.

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. A comparison between Eastern and Western European countries suggests that the effect of SNS varies depending on economic and institutional circumstances. In Eastern countries, social comparisons may strengthen the hope that an enhancement in the individual’s economic conditions will occur. In Western countries, on the other hand, comparisons may be a strong engine of dissatisfaction.

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). A few years later, Veblen (1899) introduced the concept of ‘conspicuous consumption’.

serving to impress other persons.

Nevertheless, the term social comparison was not introduced until the classic paper by Festinger (1954) 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. 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 way 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 stands to reason that online social networks, which allow interactive communication and provide an unprecedented volume of personal information, might affect income aspirations even more.

Surprisingly, the role of social media has never been analyzed before 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 stated material aspirations to be 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 comparison, 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, delimited and biased samples, in most cases composed of self-selected groups of undergraduate students attending specific colleges. Our study is the first to provide an assessment of the relationship between SNS use and social comparisons in large and representative samples.

### 3 Data and empirical strategy

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

The two datasets provide similar information about individuals' use of SNS along with their personal characteristics, perceptions, and behaviors. The Italian dataset, however, also allows to exploit the availability of broadband across regions as a potential source of exogenous variation to implement a standard IV estimation strategy. In addition, the MHS contains valuable information about how people connect to the Internet that is, unfortunately, not available in the Eurobarometer. Yet, 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 using the same dataset. In other words, MHS allows to check the validity of Lewbel's method, which proves to be valuable in settings with weak or non-existent instruments.

In both datasets we use a proxy capturing people's dissatisfaction with their income 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). 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 comparison. More recently, economic studies have ascertained that satisfaction with income 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; D’Ambrosio and Frick, 2007, 2012).

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’).

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 was measured in the Eurobarometer through the answers to the following question: “To what extent do you use online social networks?”. The answers range on a scale from 1 (‘everyday’) to 6 (‘never’).

In the MHS, the use of SNS was measured through a binary variable capturing respondents’ use of online social networks such as Facebook and Twitter. Unfortunately, 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.

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:

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

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.

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

$Y_i$  is financial dissatisfaction,  $fb_i$  is the use of SNS,  $\boldsymbol{\theta}$  is a vector of parameters for the vector of control variables  $\mathbf{X}_i$  and  $\varepsilon_i$  is a vector of normally distributed errors with mean equal to zero and standard deviation equal to one. In all our regressions we use robust standard errors.

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 further test the hypothesis that television raises material aspirations (Bruni and Stanca, 2006).
- The year in which data were collected.

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

- 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’).

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

- Fast Internet access, measured through the use of a broadband connection given by DSL or cable optical fibre. This control was included to test the hypothesis that broadband access raises material aspirations (Lohmann, 2015) and to obtain hints about whether this relationship may be driven by the use of online social networks.
- The frequency of meetings with friends, to check the possible relationship of face-to-face interactions with material aspirations (Stutzer, 2004).
- Macro-level controls including the real per capita GDP and the regional share of people active in volunteering activities. This variable was included to control for participation in associational activities that could provide people with opportunities of face-to-face interactions possibly capable of prompting social comparisons.

Descriptive statistics are reported in table 1 and 2.

### 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 dissatisfaction with income. Personal characteristics such as, for example, a tendency for depression, may be correlated with both the use of SNS and our dependent variable.

Table 1: Descriptive statistics of variables in the Eurobarometer.

variable	mean	sd	min	max	obs
financial dissatisfaction	2.374	0.756	1	4	94859
online networking	3.178	2.216	1	6	83749
woman	0.536	0.499	0	1	96169
age	47.93	17.60	15	98	96169
age2/100	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
middle education	0.146	0.354	0	1	94478
higher education	0.101	0.301	0	1	94478
student	0.0286	0.167	0	1	94478
no full-time education	0.00382	0.0617	0	1	94478
frequency of TV watching	5.792	0.730	1	6	95217
employed	0.438	0.496	0	1	96801
not working	0.488	0.500	0	1	96801
household size	–	–	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	27	96823

Table 2: Descriptive statistics of variables in the Multipurpose Household Survey.

variable	mean	sd	min	max	obs
financial dissatisfaction	2.612	0.750	1	4	81499
online networking	0.460	0.498	0	1	38941
women	0.514	0.500	0	1	83092
age	49.45	18.25	18	90	83092
age squared/100	27.79	18.99	3.240	81	83092
minutes spent watching TV	5.048	0.579	2.303	6.835	62602
marital status	1.954	0.842	1	4	83092
education	2.574	0.774	1	5	83092
occupational status	2.816	2.042	1	7	83092
number of children	1.023	1.009	0	7	83092
frequency of meeting friends	–	–	1	7	82633
modem	0.107	0.309	0	1	48031
DSL	0.581	0.493	0	1	48031
fiber	0.0149	0.121	0	1	48031
satellite	0.0755	0.264	0	1	48031
3G	0.0244	0.154	0	1	48031
USB	0.178	0.382	0	1	48031
mobile	0.0193	0.138	0	1	48031
fast internet connection	0.596	0.491	0	1	48031
real GDP per capita (thousands €2005)	22.95	5.730	14.58	30.77	83092
regional share of volunteers	0.104	0.0436	0.0537	0.231	83092
region	–	–	10	200	83092
year	–	–	2010	2012	83092

### 3.1.1 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 novel 2SLS identification strategy based on generated instruments: Lewbel (2012) showed that if the errors in the first-stage regression are heteroskedastic, and if a set of regressors that are not correlated with the product of the heteroskedastic errors is available, then it is possible to generate valid instrumental variables even when exclusion restrictions are weak or do not hold. Following Lewbel's notation, we run the following model:

$$Y_1 = X'\beta_1 + Y_2 \cdot \gamma_1 + \varepsilon_1; \varepsilon_1 = \alpha_1 \cdot U + V_1 \quad (2)$$

$$Y_2 = X'\beta_2 + \varepsilon_2; \varepsilon_2 = \alpha_2 \cdot U + V_2 \quad (3)$$

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:

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

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

### 3.1.2 Multipurpose Household Survey

In case of the Italian dataset, two different identification strategies are possible: one based on Lewbel's method, and one exploiting traditional instrumental variables based on the availability of fast Internet access across Italian regions as a source of exogenous variation (Sabatini and Sarracino, 2014, 2015). In particular, we identified two suitable 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 relevance 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).<sup>1</sup> 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.

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. Differently from DSL, 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. As for DSL, orographic differences between regions must be considered as a ‘natural’ cause of the variation in access to fibre across regions that is exogenous to people’s social interactions habits and cannot be driven by their preference for online networking.

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 effect, we included in regressions the regional level of per capita

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<sup>1</sup>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.

GDP and the regional share of volunteers. We also included regional fixed effects to account for unobserved regional heterogeneity.

We use the two instruments in a 2SLS model. The first step can be written as:

$$fb_i = \begin{cases} 0 & \text{if } y_i \leq 0, \\ 1 & \text{if } y_i > 0. \end{cases} \quad (4)$$

where  $fb_i = \pi_1 + \pi_2 \cdot z_1 + \pi_3 \cdot z_2 + \boldsymbol{\pi}_4 \cdot \mathbf{X}_i + \nu_i$ ,  $\nu_i \sim N(0, 1)$  and  $z_1$  and  $z_2$  are the two above-mentioned instruments.

The second step is as follows:

$$\text{financial dissatisfaction}_i = \begin{cases} 1 & \text{if } y_i \leq 0, \\ 2 & \text{if } 0 < y_i \leq c_1, \\ 3 & \text{if } c_1 < y_i \leq c_2, \\ 4 & \text{if } c_2 < y_i. \end{cases} \quad (5)$$

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

the index  $i$  stands for individuals;

$$Y_i = \alpha + \beta_1 \cdot \hat{fb}_i + \gamma_1 \cdot z_1 + \gamma_2 \cdot z_2 + \boldsymbol{\theta} \cdot \mathbf{X}_i + \epsilon_i, \epsilon_i \sim N(0, 1)$$

$\hat{fb}_i$  is the predicted probability of using SNS from the first step and  $c_1$ - $c_4$  are unknown parameters to be estimated.

As in model 1,  $\boldsymbol{\theta}$  is a vector of parameters of the control variables  $\mathbf{X}$ ;  $\beta_1$  is the coefficient of SNS use;  $\hat{fb}_i$  is the instrumented SNS use and  $\epsilon_i$  is the error term.

To perform these estimates we used a multi-equation conditional mixed-process (CMP) estimator, as implemented by Roodman (2011). This technique allows adopting a different specification of the model in each stage. In the first stage, where the dependent variable was the use of SNS, we used a probit model. In the second stage, the relation of SNS use with the indicator of financial dissatisfaction was estimated through an ordered probit model.

Finally, for comparative purposes, we test for possible endogeneity using also Lewbel's method.

## 4 Results

We first present results obtained investigating the relationship between SNS use and proxies for social comparisons in the Eurobarometer dataset (Section 4.1). Then, we explore the same relationship using Italian MHS data (Section 4.2).



## 4.1 Results from Eurobarometer

The results of the ordered probit are reported in table 6. The first column reports the coefficients for the whole sample available in the Eurobarometer, while columns 2 and 3 provide the results for the groups of Western and Eastern countries, respectively. This distinction allows us to account for the different role that social comparisons play in the two groups of countries. While the comparison of people’s achievements with those of their reference group frustrates people’s well-being in Western countries, it contributes to well-being in Eastern countries (Graham et al., 2004; Senik, 2005; Clark and Senik, 2010; Selezneva, 2015). In other words, Easteners do not get frustrated by others’ achievements because this may be the sign that the overall economic situation improves and soon everyone will be better off. This phenomenon is known as “tunnel effect” (Hirschman, 1973).

The first column shows that the use of SNS is negatively correlated with financial dissatisfaction, i.e. the more people use SNS the less they are dissatisfied with their financial situation. This observation is at odds with our expectations and the results from columns 2 and 3 help explaining it. Indeed, in the sample of Western countries the relationship between the use of SNS and financial dissatisfaction is positive and significant (column 2). On the contrary, the coefficient of the use of SNS is negative and significant in the sample of Eastern countries (column 3). This suggests that the result for the overall sample (column 1) comes from pooling together the two groups of countries. Yet, the relationship among variables changes between Western and Eastern countries: in the former group, the use of SNS boosts people’s possibilities to compare to others; in the second group, the comparison to others signals new possibilities that might, sooner or later, be available to everyone.

The other coefficients are quite consistent across models: women tend to be more dissatisfied with their financial situation than men, but this holds true only in Western countries; 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 4 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 three samples of the Eurobarometer. Results show that in Western countries, the use of SNS reduces the probability of being satisfied with own financial situation and it increases the probability of being dissatisfied. The results revert when considering Eastern countries and the whole sample.

Figure 1a shows the probability to be financially dissatisfied at various ages for users (on the right) and non-users (on the left) of SNS in Western countries. Figure 1b shows the same information but relative to financial satisfaction. The probabilities to be dissatisfied with own income for SNS users and non-users increase with age for both users and non-users, but in the latter case the probabilities are slightly lower. That is to say that, on average, SNS users in

Table 3: Ordered probit regressions of SNS use on financial dissatisfaction in 2011, 2012 and 2013 using Eurobarometer data.

	Whole sample		Western countries		Eastern countries	
online networking	-0.0111*	(-1.76)	0.0105*	(1.91)	-0.0384***	(-5.41)
women	0.0318*	(1.65)	0.0516*	(1.80)	0.00318	(0.14)
age	0.0332***	(9.24)	0.0256***	(6.62)	0.0363***	(5.39)
age squared/100	-0.0444***	(-11.75)	-0.0380***	(-9.35)	-0.0457***	(-6.11)
married	-0.0787**	(-2.96)	-0.0557	(-1.62)	-0.0974*	(-2.17)
divorced	0.261***	(6.58)	0.334***	(5.69)	0.185***	(3.96)
widowed	0.0475	(1.15)	0.0139	(0.23)	0.0425	(0.77)
household income = 2	-0.262***	(-3.31)	-0.158	(-1.12)	-0.353***	(-4.09)
household income = 3	-0.563***	(-7.45)	-0.470***	(-4.11)	-0.636***	(-6.08)
household income = 4	-0.877***	(-10.84)	-0.722***	(-6.19)	-0.983***	(-8.75)
household income = 5	-1.236***	(-15.63)	-1.059***	(-10.17)	-1.359***	(-12.07)
household income = 6	-1.481***	(-17.07)	-1.327***	(-11.59)	-1.565***	(-11.88)
household income = 7	-1.760***	(-21.08)	-1.602***	(-14.48)	-1.846***	(-14.65)
household income = 8	-1.913***	(-22.48)	-1.751***	(-16.24)	-2.005***	(-14.66)
household income = 9	-2.030***	(-17.53)	-1.931***	(-13.07)	-2.046***	(-10.71)
no full-time education	-0.125	(-1.14)	-0.00928	(-0.07)	-0.276*	(-1.67)
student	-0.607***	(-11.09)	-0.717***	(-9.68)	-0.541***	(-6.69)
secondary education	-0.121***	(-4.36)	-0.141***	(-3.90)	-0.141**	(-3.16)
tertiary education	-0.334***	(-13.66)	-0.331***	(-11.73)	-0.369***	(-7.53)
frequency of TV watching	-0.00249	(-0.25)	-0.0101	(-0.75)	0.00669	(0.45)
household size = 2	-0.0657*	(-2.39)	-0.0945**	(-3.07)	-0.0237	(-0.48)
household size = 3	-0.0175	(-0.61)	-0.0145	(-0.45)	-0.00992	(-0.19)
household size = 4 & more	0.0367	(1.30)	0.0242	(0.69)	0.0593	(1.13)
small or middle sized town	-0.000476	(-0.02)	0.0144	(0.35)	-0.0128	(-0.31)
large town	-0.0154	(-0.48)	0.0326	(0.79)	-0.0628	(-1.36)
real GDP p.c. (U.S.\$ 2011)	-0.963***	(-35.58)	-0.821***	(-8.86)	-2.583***	(-25.46)
cut1	-12.76***	(-38.74)	-11.28***	(-10.91)	-28.08***	(-30.27)
cut2	-10.64***	(-36.12)	-9.170***	(-9.25)	-25.91***	(-29.04)
cut3	-9.307***	(-34.24)	-7.891***	(-8.06)	-24.53***	(-27.85)
Observations	26679		14379		12300	
Pseudo $R^2$	0.186		0.193		0.135	

$t$  statistics in parentheses

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

Year and country fixed effects are omitted for brevity.

Table 4: Average marginal effects of the use of SNS on the probability of being dissatisfied with own income in Western, Eastern and in the whole sample of countries in the Eurobarometer.

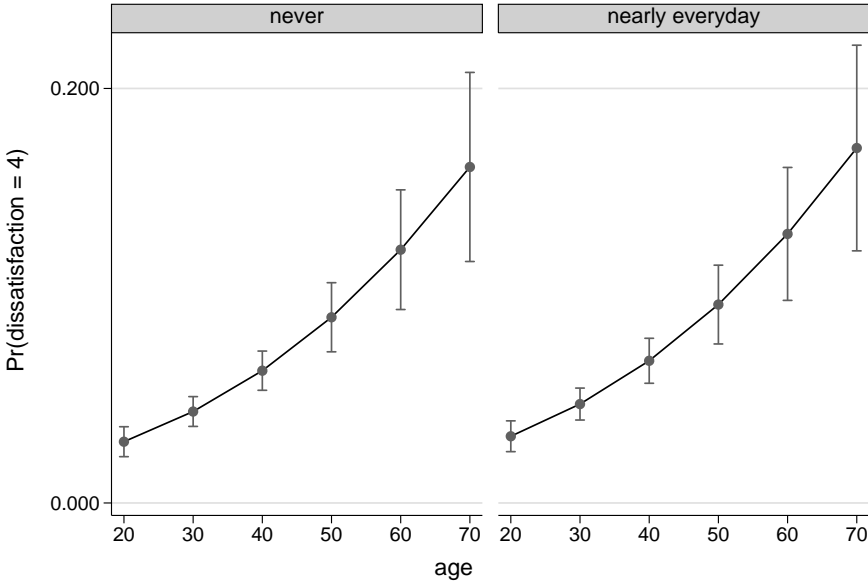
Pr(dissatisfaction)	Western countries			Eastern countries			All countries		
	dy/dx	Std. Err.	P-values	dy/dx	Std. Err.	P-values	dy/dx	Std. Err.	P-values
very good	-0.002*	0.001	0.063	0.002***	0.001	0.000	0.001*	0.001	0.075
good	-0.001*	0.001	0.055	0.010***	0.002	0.000	0.002*	0.001	0.080
bad	0.002*	0.001	0.059	-0.006***	0.001	0.000	-0.002*	0.001	0.077
very bad	0.001*	0.001	0.063	-0.006***	0.001	0.000	-0.001*	0.001	0.079

Western countries have slightly higher probabilities to be financially dissatisfied. Figure 1b provides complementary information: the probability to be financially satisfied decreases with age, and the probabilities are slightly smaller for SNS users.

The results change when we consider Eastern countries: figure 2a shows that SNS users in Eastern countries have slightly lower probabilities to be financially dissatisfied than non-users, although in both cases the probabilities increase with age. Similarly, the probability of being financially satisfied decreases with age, and it is lower for non-users (see figure 2b). In other words, in Eastern countries the use of SNS is associated with lower probabilities of being financially dissatisfied, while the contrary holds true in Western countries.

Figure 1: Probabilities of being very dissatisfied (upper charts) and very satisfied (lower charts) with own financial situation in Western countries by age and use of SNS. The curves on the left within each chart refer to people who do not use SNS, those on the right refer to social networks users.

**(a) Financial dissatisfaction**



**(b) Financial satisfaction**

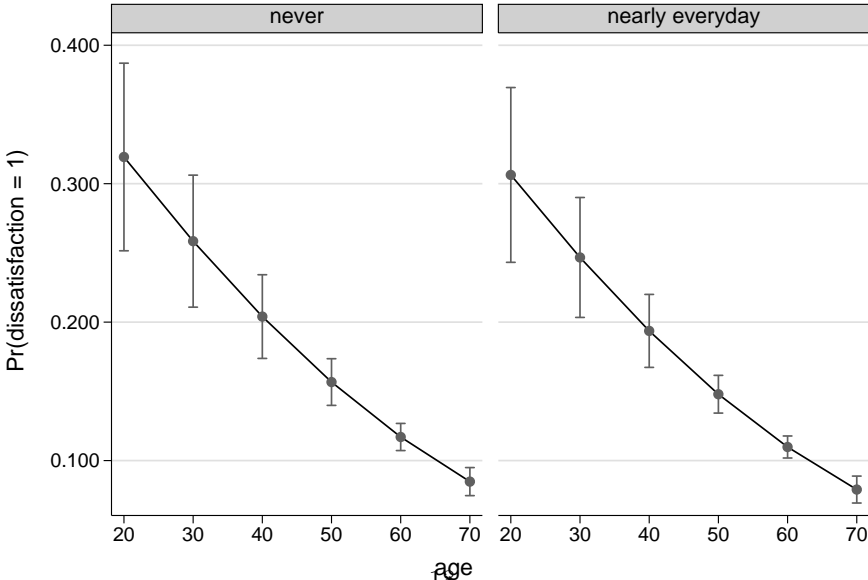
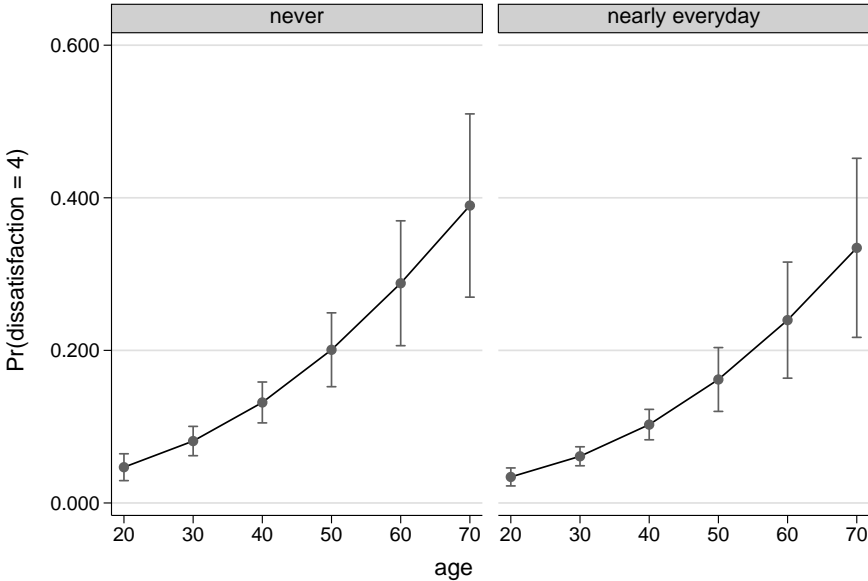
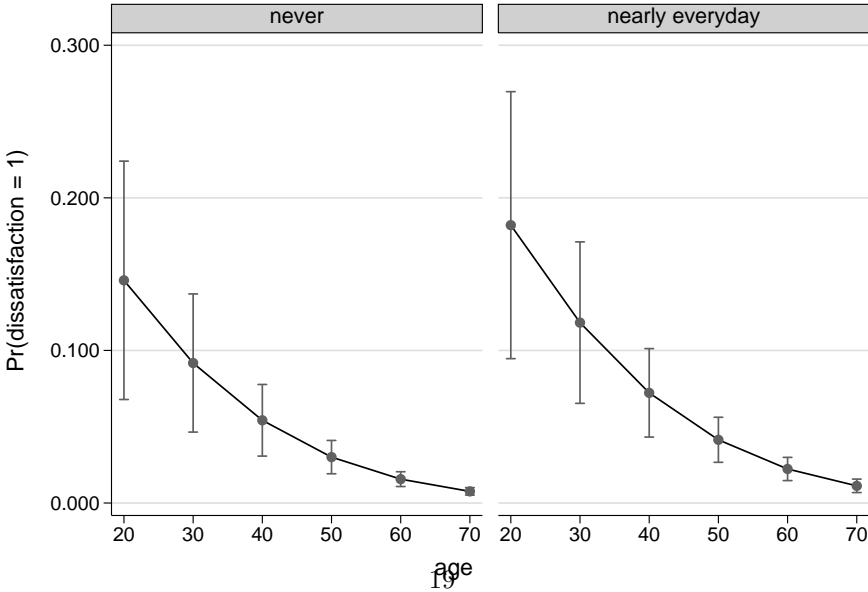


Figure 2: Probabilities of being very dissatisfied (upper charts) and very satisfied (lower charts) with own financial situation in Eastern countries by age and use of SNS. The curves on the left within each chart refer to people who do not use SNS, those on the right refer to social networks users.

**(a) Financial dissatisfaction**



**(b) Financial satisfaction**



Available results document that the partial correlation between the use of SNS and financial dissatisfaction is positive in Western countries and negative in Eastern ones. Yet, correlation does not imply causation. To check whether present results are robust to possible endogeneity, we run the model of equation 2. Results for the three samples of the Eurobarometer are reported in table 5. The coefficients of the use of SNS confirm the signs and significance of the ordered probit: the use of SNS increases financial dissatisfaction in Western countries, while the contrary holds true in Eastern ones. All other variables do not change their association with the dependent variable. The Sargan test, or test of overidentification, for each model provide large and significant coefficients, thus confirming the validity of our (generated) instruments.

Table 5: Relationship between SNS and financial dissatisfaction in Europe using Lewbel's method

	Whole sample		Western countries		Eastern countries	
online networking	-0.00598*	(-2.44)	0.00795*	(2.41)	-0.0205***	(-5.64)
women	0.0149*	(1.87)	0.0249*	(2.34)	-0.000339	(-0.03)
age	0.0189***	(12.08)	0.0144***	(6.98)	0.0212***	(8.66)
age squared/100	-0.0251***	(-16.14)	-0.0211***	(-10.52)	-0.0267***	(-10.66)
married	-0.0418***	(-3.30)	-0.0298*	(-1.72)	-0.0519**	(-2.77)
divorced	0.147***	(8.08)	0.182***	(7.62)	0.111***	(3.94)
widowed	0.0292	(1.43)	0.00419	(0.15)	0.0296	(0.98)
household income = 2	-0.145***	(-3.56)	-0.0971	(-1.55)	-0.186***	(-3.45)
household income = 3	-0.336***	(-9.42)	-0.306***	(-5.70)	-0.358***	(-7.45)
household income = 4	-0.538***	(-15.52)	-0.466***	(-9.00)	-0.578***	(-12.34)
household income = 5	-0.757***	(-22.42)	-0.670***	(-13.36)	-0.805***	(-17.58)
household income = 6	-0.893***	(-26.11)	-0.818***	(-16.16)	-0.920***	(-19.67)
household income = 7	-1.034***	(-29.92)	-0.953***	(-18.69)	-1.068***	(-22.45)
household income = 8	-1.108***	(-30.82)	-1.022***	(-19.50)	-1.148***	(-22.79)
household income = 9	-1.167***	(-25.89)	-1.109***	(-17.25)	-1.166***	(-18.25)
household income = 10	-1.151***	(-22.31)	-1.070***	(-15.22)	-1.176***	(-15.06)
no full-time education	-0.0695	(-1.43)	-0.00693	(-0.11)	-0.144*	(-1.91)
student	-0.354***	(-15.55)	-0.418***	(-13.45)	-0.318***	(-9.36)
secondary education	-0.0689***	(-5.28)	-0.0817***	(-4.92)	-0.0827***	(-3.87)
tertiary education	-0.186***	(-12.99)	-0.182***	(-10.11)	-0.211***	(-8.97)
frequency of TV watching	-0.00155	(-0.32)	-0.00520	(-0.81)	0.00255	(0.35)
household size = 2	-0.0347*	(-2.53)	-0.0475**	(-2.63)	-0.0184	(-0.86)
household size = 3	-0.00903	(-0.60)	-0.00456	(-0.22)	-0.0114	(-0.50)
household size = 4 & more	0.0222	(1.50)	0.0183	(0.92)	0.0275	(1.23)
small or middle sized town	-0.00119	(-0.13)	0.00715	(0.56)	-0.00772	(-0.54)
large town	-0.00975	(-0.95)	0.0182	(1.29)	-0.0358*	(-2.40)
real GDP p.c. (U.S.\$ 2011)	-0.539***	(-16.51)	-0.409**	(-3.23)	-1.437***	(-3.86)
Constant	8.607***	(26.33)	7.241***	(5.49)	17.05***	(4.83)
Sargan	38.43		42.45		43.94	
Jp	0.0552		0.0220		0.0153	

*t* statistics in parentheses

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

Summarising, the evidence from Eurobarometer data supports two conclusions: first, the use of SNS increases financial dissatisfaction in Western countries, while the contrary holds true in Eastern countries; second, this relationship

is robust to possible endogeneity issues. To further test the reliability of these conclusions, we turn to data from the Italian MHS which allows us to investigate the same issue using a larger sample and adopting two different techniques to account for endogeneity.

## 4.2 Results from the Multipurpose Household Survey

Table 6 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. An advantage of the MHS over Eurobarometer is that it allows to control also for the frequency of meeting friends, i.e. a measure of face-to-face social interactions. 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, as suggested by 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. As expected, 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 personal information 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 people living in richer regions tend to be less dissatisfied with their income, while we did not find any significant effect of the regional share of volunteers. These results hold after including regional fixed effects.

Table 7 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 test of over-identifying restrictions confirms the validity of our instruments: as the coefficient of the Sargan test is significant, we reject the null hypothesis that the over-identifying restrictions are not valid. The coefficient of online networking is positive and

Table 6: Relationship between SNS and social comparisons using instrumental variables on MHS data

	(1)		(2)		(3)		(4)	
women	-0.0409**	(-2.70)	-0.0306*	(-2.02)	-0.0283*	(-1.87)	-0.0323*	(-2.13)
age	0.0286***	(6.88)	0.0279***	(6.69)	0.0300***	(7.18)	0.0301***	(7.17)
age squared/100	-0.0366***	(-7.77)	-0.0360***	(-7.63)	-0.0369***	(-7.83)	-0.0371***	(-7.84)
good health	0.276	(1.36)	0.255	(1.24)	0.251	(1.22)	0.249	(1.20)
neither good nor bad health	-0.0627	(-0.32)	-0.0706	(-0.36)	-0.0754	(-0.38)	-0.0713	(-0.36)
bad health	-0.357*	(-1.83)	-0.360*	(-1.83)	-0.363*	(-1.85)	-0.355*	(-1.78)
very bad health	-0.525**	(-2.68)	-0.531**	(-2.69)	-0.536**	(-2.71)	-0.517**	(-2.58)
married	-0.208***	(-9.84)	-0.225***	(-10.56)	-0.216***	(-10.11)	-0.216***	(-10.10)
separated or divorced	0.0220	(0.69)	0.00945	(0.29)	0.0110	(0.34)	0.0196	(0.61)
widowed	-0.0824	(-1.23)	-0.0996	(-1.48)	-0.0941	(-1.39)	-0.100	(-1.48)
primary	-0.196	(-0.93)	-0.231	(-1.09)	-0.262	(-1.22)	-0.251	(-1.16)
secondary	-0.342	(-1.63)	-0.397*	(-1.88)	-0.429*	(-2.00)	-0.407*	(-1.88)
tertiary	-0.532*	(-2.53)	-0.602**	(-2.84)	-0.634**	(-2.95)	-0.607**	(-2.80)
PhD	-0.668**	(-3.06)	-0.745***	(-3.40)	-0.776***	(-3.48)	-0.741***	(-3.31)
unemployed	0.784***	(29.38)	0.708***	(26.08)	0.708***	(26.09)	0.694***	(25.45)
housewife	0.158***	(4.80)	0.125***	(3.79)	0.126***	(3.82)	0.111***	(3.33)
student	0.0614*	(1.96)	0.0158	(0.50)	0.0137	(0.44)	0.0116	(0.37)
disabled	0.349**	(2.64)	0.306*	(2.32)	0.309*	(2.35)	0.298*	(2.25)
retired	0.00930	(0.25)	0.0164	(0.45)	0.0141	(0.38)	0.00101	(0.03)
other work condition	0.375***	(5.12)	0.346***	(4.72)	0.347***	(4.74)	0.348***	(4.70)
number of children	0.0640***	(8.05)	0.0511***	(6.38)	0.0525***	(6.56)	0.0578***	(7.16)
frequency of meeting friends	-0.0304***	(-4.77)	-0.0414***	(-6.44)	-0.0442***	(-6.87)	-0.0433***	(-6.70)
year 2011	0.00374	(0.25)	0.00833	(0.56)	0.00478	(0.32)	0.0207	(1.23)
year 2012	0.0277	(1.05)	0.0433	(1.63)	0.0427	(1.61)	-0.0322	(-0.78)
fast internet connection	0.0122	(0.49)	0.0406	(1.62)	0.0297	(1.18)	0.0186	(0.74)
mobile	-0.0502	(-0.84)	-0.0276	(-0.46)	-0.0446	(-0.74)	-0.0669	(-1.11)
USB	0.0598*	(2.07)	0.0722*	(2.49)	0.0649*	(2.23)	0.0460	(1.57)
3G	-0.0802	(-1.61)	-0.0564	(-1.13)	-0.0698	(-1.39)	-0.0846*	(-1.69)
satellite	-0.0574*	(-1.67)	-0.0255	(-0.74)	-0.0372	(-1.07)	-0.0453	(-1.30)
real GDP per capita (thousands €2005)			-0.00818***	(-3.61)	-0.00859***	(-3.78)	-0.149*	(-2.33)
regional share of volunteers			-0.226***	(-7.07)	-0.214***	(-6.69)	4.130	(1.63)
online networking					0.104***	(6.51)	0.101***	(6.27)
minutes spent watching TV							0.0621***	(4.46)
cut1	-2.119***	(-6.98)	-1.963***	(-5.89)	-1.937***	(-5.78)	-14.39*	(-2.06)
cut2	-0.108	(-0.36)	0.0653	(0.20)	0.0926	(0.28)	-12.35*	(-1.77)
cut3	1.014***	(3.34)	1.194***	(3.59)	1.223***	(3.65)	-11.21	(-1.60)
Observations	25379		25379		25379		25379	
Pseudo R <sup>2</sup>	0.043		0.048		0.049		0.053	

*t* statistics in parentheses  
 \*  $p < 0.1$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$   
 Regional fixed effects omitted for brevity.



significant. This supports the hypothesis that the use of social networking sites increases people’s propensity to compare themselves to others. The remaining coefficients confirm results from the ordered probit model (see table 6). To the seek of robustness, we also address endogeneity by employing Lewbel’s method. Results are reported in table 9 in Appendix A. The sign and significance of coefficients confirm the results from the 2SLS method.

The upper right chart in figure 3 shows the probability to be financially dissatisfied for users and non-users of SNS by age. The chart on the upper left allows comparing the same information for people who do not use SNS. We notice a higher propensity to be dissatisfied with own income for older people. Yet, it is remarkable that, by each age, the probability of being very dissatisfied with own income is higher than the probability of non-users.

The charts in the lower part of figure 3 illustrate the probability of being very financially satisfied for users and non-users of SNS by age. The lines provide an information complementary to the one documented for financial dissatisfaction: the probability of being very satisfied with own financial situation decreases with age and the probabilities are larger for social networks’ users.

Table 8 reports the marginal effects of the use of SNS on the probability of being dissatisfied with own income after the instrumented estimates. 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 dissatisfied with their income. Similarly, the second coefficient suggests that using SNS strongly reduces the probability to be “a bit” dissatisfied with own income. The last coefficient, corresponding to the category “not at all”, shows that using SNS slightly reduces the probability of declaring to be satisfied with own income: 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 dissatisfied with own income.

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.

Table 7: Financial dissatisfaction and use of SNS: IV estimates using CMP on MHS data

	online networking		financial dissatisfaction	
optic fiber (%)	0.0853*	(1.76)	-0.0767	(-1.04)
broadband coverage	0.0595*	(1.83)	-0.0420	(-0.85)
women	-0.0760***	(-4.19)	-0.0137	(-0.88)
age	-0.0507***	(-9.30)	0.0426***	(8.83)
age squared/100	0.0158**	(2.48)	-0.0416***	(-8.80)
good health	0.0920	(0.35)	0.210	(1.04)
neither good nor bad health	0.125	(0.49)	-0.102	(-0.53)
bad health	0.0587	(0.23)	-0.360*	(-1.87)
very bad health	0.101	(0.40)	-0.524**	(-2.71)
married	-0.233***	(-9.47)	-0.147***	(-5.53)
separated or divorced	-0.0173	(-0.45)	0.0292	(0.91)
widowed	-0.147*	(-1.74)	-0.0558	(-0.83)
primary	1.346***	(3.84)	-0.434*	(-1.86)
secondary	1.359***	(3.88)	-0.589**	(-2.52)
tertiary	1.378***	(3.93)	-0.785***	(-3.36)
PhD	1.301***	(3.66)	-0.898***	(-3.76)
unemployed	0.0101	(0.33)	0.660***	(21.64)
housewife	-0.0345	(-0.86)	0.113***	(3.47)
student	0.123**	(3.25)	-0.00331	(-0.11)
disabled	-0.0996	(-0.66)	0.304**	(2.41)
retired	0.0450	(0.89)	-0.0113	(-0.31)
other work condition	-0.0380	(-0.46)	0.340***	(4.72)
number of children	-0.0341***	(-3.52)	0.0641***	(7.96)
frequency of meeting friends	0.0807***	(10.35)	-0.0590***	(-8.39)
year 2011	0.0863***	(4.14)	0.00114	(0.05)
year 2012	0.0847	(1.62)	-0.0495	(-0.71)
minutes spent watching TV	0.0624***	(3.85)	0.0462**	(3.23)
fast internet connection	0.328***	(10.35)	-0.0501*	(-1.72)
mobile	0.504***	(7.44)	-0.170**	(-2.72)
USB	0.233***	(6.45)	-0.00330	(-0.11)
3G	0.397***	(6.61)	-0.165**	(-3.14)
satellite	0.344***	(8.18)	-0.115**	(-3.08)
real GDP per capita (thousands €2005)	0.147*	(1.73)	-0.174	(-1.34)
regional share of volunteers	-2.308*	(-1.84)	2.333	(1.22)
online networking			0.754***	(5.57)
cut1			-21.54	(-1.17)
cut2			-19.59	(-1.06)
cut3			-18.50	(-1.00)
Observations	25379		25379	
Wald chi <sup>2</sup>			8774.6	
Sargan			7.34	
Jp			0.001	

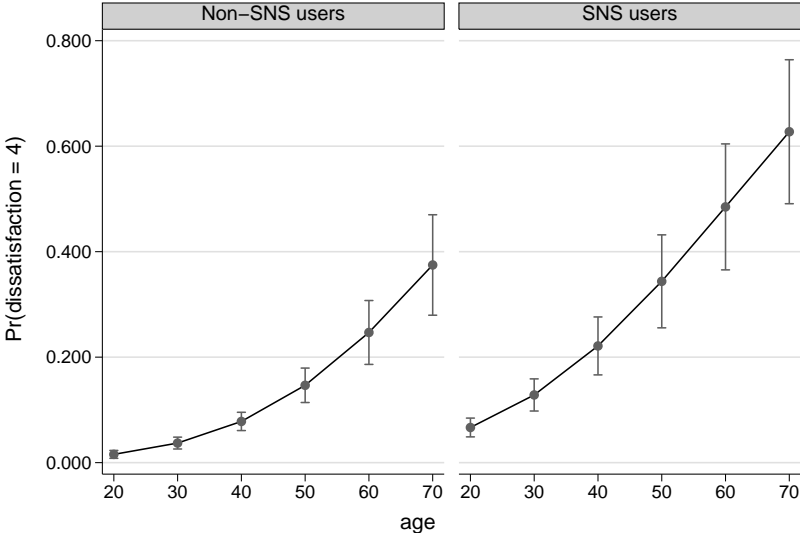
z statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.001$

Regional fixed effects omitted for brevity. Instrumental variables: optic fiber and broadband coverage.

Figure 3: Marginal effects of the use of SNS on the probability of being very dissatisfied (upper charts) and very satisfied (lower charts) with own income situation. The charts on the left refer to people who do not use SNS, those on the right refer to the users of social networks.

(a) financial dissatisfaction



(b) financial satisfaction

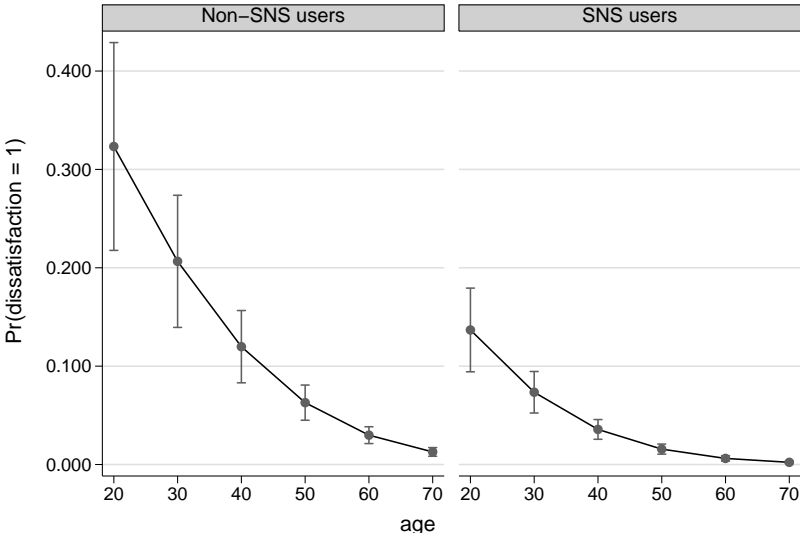


Table 8: Average marginal effects of the use of SNS on the probability of being dissatisfied with own income.

Pr(dissatisfaction)	dy/dx	Std. Err.	P-values
not at all	-0.03***	0.005	0.000
a bit	-0.24***	0.042	0.000
quite	0.08***	0.008	0.000
a lot	0.19***	0.049	0.000

## 5 Conclusion

Previous studies have highlighted the role of information in shaping positional concerns. In particular, TV watching has been found to be 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 Eurobarometer and the Italian Multipurpose Household Survey, suggest that online social networks are powerful sources of social comparisons. 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 online social networks 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.

The effect of online social networks is strong, although not homogeneous across age. Young people using SNS tend to have a lower probability to be satisfied with their financial situation than older people. Independently from age, present results from two different datasets document that the use of SNS is associated to a higher (lower) probability to be financially dissatisfied (satisfied).

There are several reasons to treat our findings with prudence. The cross-sectional nature of the data employed in the analysis suggests caution with any causal interpretation of the estimates. 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 the first 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. The differences between Eastern and Western European countries also suggest that the economic, social, and institutional context in which people use online social networks is of great importance. Upward comparisons, in fact, might sort different effects depending on the conditions of the society to which SNS users belong. People in transition

or fast growing countries may be more confident they will have the possibility to catch up with the standards of living of their online reference groups. In this case, the possibly negative effect of upward comparisons may be mitigated by the hope that an individual and a collective enhancement will occur. People living in developed countries with stagnating economy like Italy, on the other hand, may particularly suffer from the comparison processes related to social globalization. This prompts the need to deepen comparative cross-country research on the possible effects of SNS, possibly accounting for different cultural, economic and institutional factors in developed and developing countries.

## A Accounting for endogeneity using MHS data and Lewbel's method.

Table 9: Relationship between SNS and financial dissatisfaction in Italy. The first column reports the results for a model using only generated instruments. The second column shows the results when the generated instruments are used along with the two instruments presented in section 3.1.2.

	lewbel's Z		lewbel + original Z	
online networking	0.130*	(2.51)	0.137**	(2.66)
women	-0.0203*	(-2.11)	-0.0201*	(-2.09)
age	0.0197***	(7.04)	0.0199***	(7.10)
age squared/100	-0.0232***	(-7.77)	-0.0233***	(-7.79)
good health	0.156	(1.27)	0.156	(1.27)
neither good nor bad health	-0.0582	(-0.49)	-0.0586	(-0.50)
bad health	-0.243*	(-2.06)	-0.243*	(-2.06)
very bad health	-0.340**	(-2.88)	-0.341**	(-2.88)
married	-0.133***	(-9.45)	-0.133***	(-9.40)
separated or divorced	0.00619	(0.30)	0.00631	(0.31)
widow	-0.0533	(-1.28)	-0.0528	(-1.27)
middle-low education	-0.190	(-1.39)	-0.192	(-1.41)
middle education	-0.294*	(-2.15)	-0.296*	(-2.17)
middle-high education	-0.414**	(-3.03)	-0.417**	(-3.05)
high education	-0.486***	(-3.45)	-0.488***	(-3.47)
unemployed	0.475***	(29.18)	0.475***	(29.17)
housewife	0.0793***	(3.78)	0.0794***	(3.78)
student	0.0114	(0.61)	0.0112	(0.60)
disabled	0.196**	(2.60)	0.196**	(2.60)
retired	-0.00318	(-0.13)	-0.00333	(-0.14)
other work condition	0.229***	(5.13)	0.229***	(5.13)
number of children	0.0362***	(7.19)	0.0363***	(7.21)
frequency of meeting friends	-0.0309***	(-7.39)	-0.0311***	(-7.44)
minutes spent watching TV	0.0363***	(4.31)	0.0361***	(4.29)
fast internet connection	0.0142	(0.84)	0.0134	(0.79)
mobile	-0.0262	(-0.72)	-0.0274	(-0.76)
USB	0.0408*	(2.17)	0.0403*	(2.14)
3G	-0.0496	(-1.57)	-0.0506	(-1.60)
satellite	-0.0268	(-1.20)	-0.0277	(-1.24)
real GDP per capita (thousands €2005)	-0.00552***	(-3.85)	-0.00555***	(-3.87)
regional share of volunteers	-0.115***	(-5.55)	-0.114***	(-5.51)
Constant	2.440***	(11.61)	2.439***	(11.60)
Sargan	54.59		60.78	
Jp	0.000136		0.0000495	

$t$  statistics in parentheses

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

## B Orography and broadband in Italy

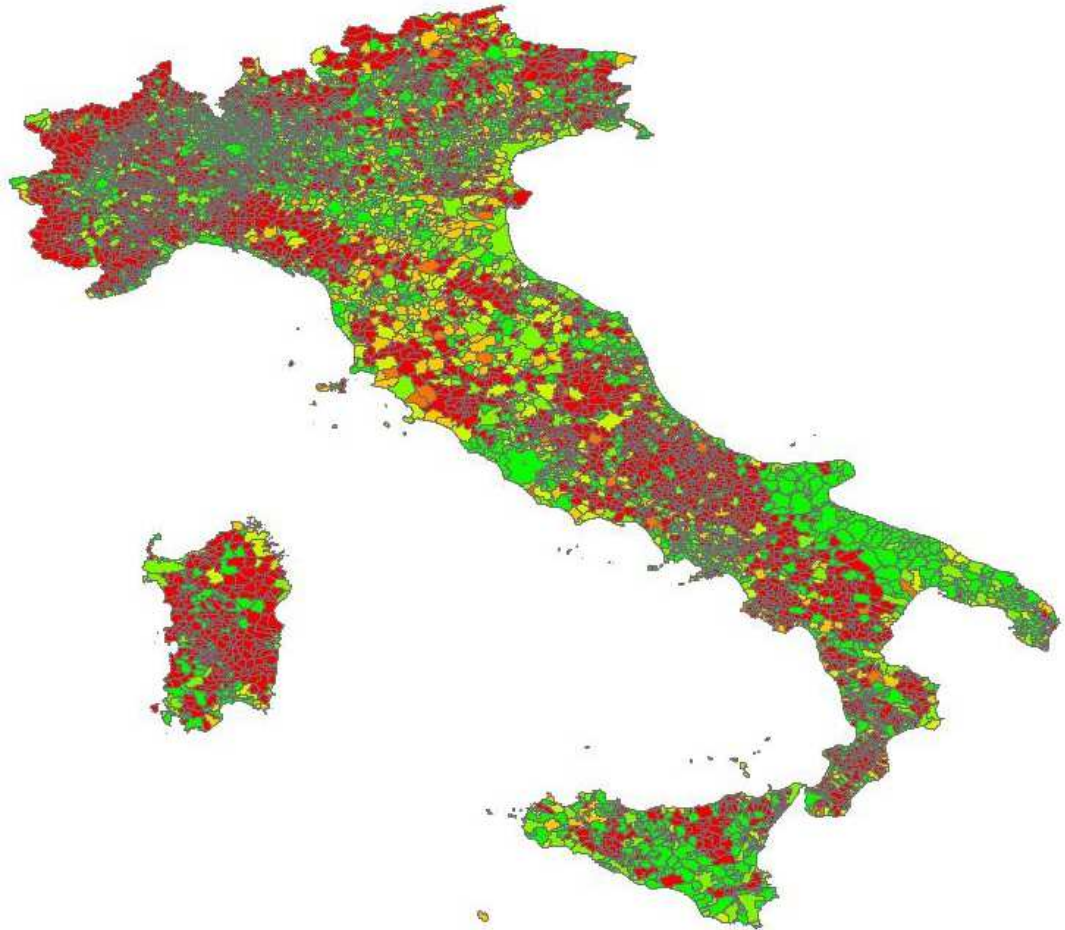


Figure 4: Percentage of the population covered by broadband in Italy.  
Source: Between (2006), p. 17. Darker areas are those with the worst coverage.  
Green areas have the best coverage.



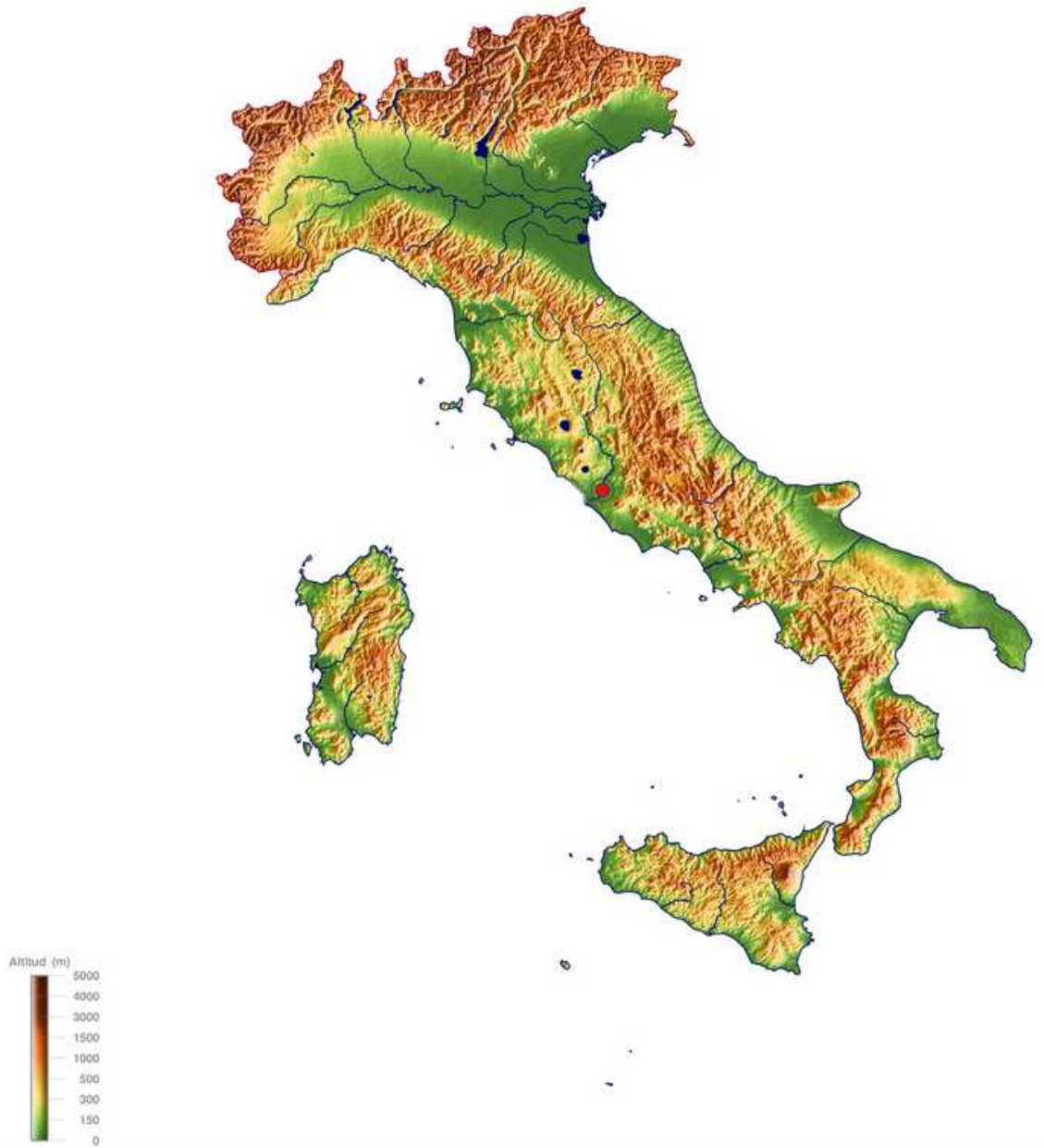


Figure 5: Topographic map of Italy.  
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