

# What do Italian consumers know about Economic Data? Evidence from the Istat Consumer Survey<sup>1</sup>

Enrico Giovannini<sup>2</sup>, Marco Malgarini<sup>3</sup>, Raffaella Sonogo<sup>4</sup>

## Abstract

*Standard theory describes economic decisions as result of optimising behaviour of well-informed agents. However, according to the “rational inattention” hypothesis, individuals may deliberately choose not to update their information set. The aim of our paper is study whether Italian consumers are adequately informed about economic data and to test if information is homogenously spread across the population. For this scope, we build a measure of knowledge of economic data at the individual level, and estimate a model relating knowledge to individual characteristics. Our main finding is that knowledge is relatively low and depends on the perceived costs and benefits of acquiring information. Results confirm one of the main postulates of the rational inattention hypothesis, i.e. that knowledge is highly differentiated across different population groups.*

**Keywords:** Rational inattention, Household information acquisition, information and knowledge, consumer confidence, statistical literacy, media exposure.

## 1. Introduction

Mainstream economic theory describes policy decisions as the result of optimising behaviour of rational agents; on similar grounds, according to the public choice school, voters are also supposed to be well informed agents who base their decisions on utility maximisation. More generally, mainstream macroeconomics assumes that economic agents rationally elaborate on their full information set in order to form their savings or consumption decisions<sup>5</sup>.

However, whether citizens are really well informed and rationally behaved is still highly disputed. Indeed, a number of studies have recently shown that agents are far from being fully informed about key economic variables; among them, Blinder and Kruger (2004) stressed the importance of determining *how* a society knows about statistics. They found that ideology is the strongest determinant in shaping public opinion: given the apparent inclination to use ideology, combined with the difficulty in building knowledge oneself, they find that US citizens tend to follow “ready-made” beliefs that society has chosen for

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<sup>2</sup> Università degli Studi di Roma “Tor Vergata”, e-mail: [enr.giovannini@gmail.com](mailto:enr.giovannini@gmail.com)

<sup>3</sup> ANVUR, Roma, e-mail: [malgarco@gmail.com](mailto:malgarco@gmail.com)

<sup>4</sup> ISTAT, e-mail: [rsonogo@istat.it](mailto:rsonogo@istat.it)

<sup>5</sup> See on this Blinder and Krueger (2004).

them. According to Curtin (2008) people may be interested in knowing about how inflation affects their shopping trolley, or the unemployment rate in their specific labour market, but are less interested in learning about the performance of the whole country or in aggregated macro indicators which are difficult to apply to their daily life. In such circumstances, private information derived from neighbourhoods or local communities may be better appreciated by some than public information stemming from official sources. Reis (2006, 2009) interprets this kind of finding arguing that costs associated with the acquisition and use of information may generate “rational inattention”, with widespread “knowledge inequalities” among the population.

In this respect, official statistics have an increasingly important role in the development of a common knowledge about the state and the evolution of a society: according to Giovannini et al. (2008) the value added of statistics critically depends on what people know about the world they live in<sup>6</sup>. Following this strand of literature, since 2007 the Italian Consumer survey<sup>7</sup> has incorporated once a year a number of questions on the degree of knowledge about economic data<sup>8</sup>. Questions concern knowledge about recent trends in GDP growth, inflation and the unemployment rate; consumers also have to report their opinions on the reliability of economic information and to indicate the main channels they use to acquire them. Finally, since 2009 they also have to report whether they use this kind of information in their decision process.

The aim of this paper is to analyse survey results in order to reach a better understanding of the level of knowledge of economic data and on if and how this knowledge is spread across the population. More specifically, we contribute to the existing literature testing on a brand new dataset the rational inattention hypothesis, checking if knowledge on economic data is homogeneously spread across the population or rather if it is more concentrated in some socio-economic groups, depending on individual characteristics of the respondents. After having briefly introduced the consumer survey in section 2, section 3 presents a first description of the results obtained at the aggregate level. Hence, in section 4 we develop a new indicator of individual knowledge, the knowledge score, aimed at measuring the overall level of economic knowledge of each consumer. In section 5 we then estimate a probit model in order to test whether the probability of replying to survey questions and the level of the knowledge score are influenced by socio-demographic factors such as the age, gender, area of residence, professional status and education of the respondent; moreover, we also consider the possible role of opinions on the importance of this kind of information and of desire to be informed about economic issues. Concluding remarks are presented in Section 6.

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<sup>6</sup> See also Giovannini (2013).

<sup>7</sup> The survey is part of the Harmonised Project of Business and Consumers survey coordinated by the European Commission; for details, see [http://ec.europa.eu/economy\\_finance/db\\_indicators/surveys/index\\_en.htm](http://ec.europa.eu/economy_finance/db_indicators/surveys/index_en.htm).

<sup>8</sup> See Fullone et alii (2008) and D’Urzo et alii (2009).

## 2. The ISTAT Consumer survey

### 2.1 The Sample and the questionnaire

The ISTAT Consumer survey consists of qualitative questions on the personal situation of the consumer and the country. It is conducted monthly with a Computer Assisted Telephone Interviewing (CATI) system, on the basis of a random sample of 2.000 Italian consumers, changing each month, without any panel dimension<sup>9</sup>. The sample is selected in two stages (subscriber to the telephone register, in the first stage; individual consumer within the household of the subscriber, in the second stage), being proportional to the population of reference, represented by the Italian adult (aged 18 or more) population (about 50 million statistical units). The survey is stratified by geographical partitions and demographic width of municipalities, for a total of 42 strata (see Table 1). The sampling list is represented by the public fixed telephone directory (containing about 18 million units)<sup>10</sup>; the sampling unit in the first stage is the subscriber to the fixed telephone directory, randomly selected within the stratum; the statistical unit is the individual consumer, intended as the adult person chosen within the household of the subscriber. Random selection is used in the first stage; in the second stage, quota selection according to gender applies (48,5% males, 51,5% females)<sup>11</sup>. The response rate of the survey ranges from 45 to 66%, depending whether we consider among the eligible cases all the potentially eligible contacts (i.e. including cases in which the telephone is busy or there is no answer), or only the effectively eligible cases (i.e. excluding the two cases reported above and hence including among the non responses only refusals, unreachable contacts and automatic repliers; see on this table 8, page 20 in Fullone, Martelli, 2008). A response rate falling in a range of about 60 to 65% is usually considered as acceptable in the literature concerning this kind of surveys<sup>12</sup>; appropriate CATI techniques (i.e., high number of contact attempts, personal call-backs) are currently used in order to minimize distortions. However, in the analysis of survey results reported in the paper the reader should be aware of possible bias arising from the non-negligible share of non responses. In order to take into account possible selection biases and changes over time in the households composition and age structure, in this paper we will use a system of probability and post-stratification weights, based on Fullone and Martelli (2008). According to official ISTAT figures available on the EU website, the sampling error of the estimates is equal on average to 0,7 percentage points: i.e., all the estimates reported below should be considered as comprised between a confidence interval equal to  $\pm 0,7\%$  with respect to the central estimate.

<sup>9</sup> As it is common in the EU-Harmonised Consumers' Opinion surveys; in the US experience, on the other hand, a fixed proportion of the sample is re-interviewed after six months (see on this Curtin, 2015).

<sup>10</sup> The use of fixed telephone directories as the sampling frame can generate an increasing bias, since their coverage of the reference population is diminishing over time; however, as already recognized by UN (2014), fixed telephone registers still represent the most used framing lists in this field. In fact, possible alternatives resorting to mobile phones or internet connections also rise relevant problems in terms of coverage and selection bias (see on this Curtin, 2003; 2015).

<sup>11</sup> See also ISTAT and EU metadata, respectively available at:  
<http://siqual.istat.it/SIQual/visualizza.do?id=8888944&refresh=true&language=IT>;  
[http://ec.europa.eu/economy\\_finance/db\\_indicators/surveys/metadata/index\\_en.htm](http://ec.europa.eu/economy_finance/db_indicators/surveys/metadata/index_en.htm).

<sup>12</sup> See on this McKenzie, 2005.

**Table 1 – The sample (number of units and percentage shares)**

GEOGRAPHICAL AREAS	SIZE OF MUNICIPALITIES (number of inhabitants)							Total
	up to 5,000	5,001 - 10,000	10,001 - 20,000	20,001 - 50,000	50,001 - 100,000	100,001 - 500,00	500,001 +	
North – West (number of units)	56	22	23	34	19	4	51	209
(percentage share)	2.8%	1.1%	1.2%	1.7%	1.0%	0.2%	2.6%	10.5%
North – Centre (number of units)	70	63	55	55	26	14	45	328
(percentage share)	3.5%	3.2%	2.8%	2.8%	1.3%	0.7%	2.3%	16.4%
North – East (number of units)	64	67	81	56	18	100	0	386
(percentage share)	3.2%	3.4%	4.1%	2.8%	0.9%	5.0%	0.0%	19.3%
Centre (number of units)	42	39	52	79	50	45	93	400
(percentage share)	2.1%	2.0%	2.6%	4.0%	2.5%	2.3%	4.7%	20.0%
South (number of units)	75	58	77	94	81	43	31	459
(percentage share)	3.8%	2.9%	3.9%	4.7%	4.1%	2.2%	1.6%	23.0%
Islands (number of units)	34	26	30	48	28	31	21	218
(percentage share)	1.7%	1.3%	1.5%	2.4%	1.4%	1.6%	1.1%	10.9%
Total (number of units)	341	275	318	366	222	237	241	2000
(percentage share)	17.1%	13.8%	15.9%	18.3%	11.1%	11.9%	12.1%	100%

Source: ISTAT

The first part of the questionnaire provides structural information about the consumer and her household, including age, gender, the area of residence, level of education and working status of the respondent (see Table 2); the second part gathers consumers opinions on the general economic situation of the country (including questions on unemployment and price dynamics) and on that of the economic conditions of the household and of the individual consumer. The survey also asks Italian consumers about their income; more precisely, the respondent is asked to assign family income to one out of 22 classes, rather than providing a precise estimate.

**Table 2 – Structural information about the individual and the household**

Information about the individual	Modalities of reply
Gender	Male; Female
Region of residence	20 Italian administrative regions
Size of the municipality of residence	7 classes, see table 1
Relationship with the head of the household	Head of the household; Husband, wife; Son, daughter; Grand Parent; Other relative; Other
Age	18-20 years; 21-29; 30-39; 40-49; 50-59; 60-64; >64
Occupation	Full time; part time; unemployed; Pensioner; Student; Renter; Other (housemaid)
Professional category	Independent worker; agricultural worker; White collar employee; Specialised blue collar; non-specialised blue collar
Open ended / permanent worker	Open ended contract; permanent contract
Education (completed)	University degree; Tertiary education; Secondary education; Primary education; no cycle completed
Information about the household	Modalities of reply
Number of people in the household	Number
Total monthly family income, net of taxes, including capital income and transfers	22 brackets, from <350 euros to >6.000 euros

Source: ISTAT

## 2.2 Questions about knowledge of economic data

The first survey on the knowledge of Italian consumers about economic data has been administered in 2007 in close collaboration with OECD Statistics Directorate; the survey has become yearly since 2009<sup>13</sup>. The main goal is to verify the degree of knowledge of Italian consumers about the recent developments – as registered by official statistics – of key economic variables such as GDP growth, inflation and the unemployment rate. Every question contains three core elements: a brief definition of the key statistical variable, a reference to the agency responsible for its publication and a question about the most recently published figure. Participants may choose to: 1) answer, 2) indicate that they do not know the exact figure, or 3) refuse to answer. Failure to report official data could imply that participants are not aware of the most recent figure or that they do not know it, possibly because they have not recently heard about it in the media. In this respect, a scarce knowledge of the most recent data associated with a general knowledge of the phenomenon may imply a process of “staggering updates”, in which people infrequently update their knowledge because of high costs and relatively low return. On the other hand, if the consumer has not recently heard about official data releases, he/she may well be considered

<sup>13</sup> The three questions read as follows:

Unemployment rate: As you may know, every quarter the Italian National Institute of Statistics publishes figures on the unemployment rate in Italy. In other words, every three months ISTAT officially reports the percentage of people unemployed with respect to the active population. Can you please tell us the most recent rate of unemployment published by ISTAT?

Inflation rate: Another important economic indicator that is published by ISTAT on a monthly basis is the consumer price index, commonly used to calculate the annual inflation rate. Can you please tell us the most recent rate of inflation published by ISTAT?

GDP growth: ISTAT has recently published figures on all final goods and services produced in Italy in 2008. This figure is known as the Gross Domestic Product (GDP) of the country. Can you please tell us the percentage of change of the Italian GDP recently published by ISTAT?

to be unaware of the existence of such data and of its use. Following Curtin (2008), in order to try to distinguish among these two cases, a follow-up question was introduced a first time in the 2009 and then regularly since 2012 for each of the previous questions, asking if the consumer has recently heard of a public announcement concerning official statistics on GDP, inflation and the unemployment rate.

The questionnaire also collects answers about the importance of being informed on such issues, asking about the desire to be more informed and the media channels used to acquire information (possible media considered in the question are the television; radio; internet; newspapers and magazines; scientific publications; contacts with friends and relatives, with experts and politicians). Two further questions ask for an assessment on the quality of economic information provided by the media and the quality and reliability of official statistics. Indeed, a previous study based on the Eurobarometer survey (Papacostas, 2008) has shown that there is a significant relationship between trust in official statistics and trust in the transparency of political decisions, confirming the important role of sound and accountable statistics in modern democracies. A final question asks the consumer if she uses information about GDP growth, inflation and the unemployment rate in her everyday life, in order to make strategic decisions about consumption and saving; in fact, as shown in Blinder and Kruger (2004) and Curtin (2009), people that make use of economic data in everyday life are expected to update more frequently their information set and hence to be better informed about those issues.

### 3. Aggregate results<sup>14</sup>

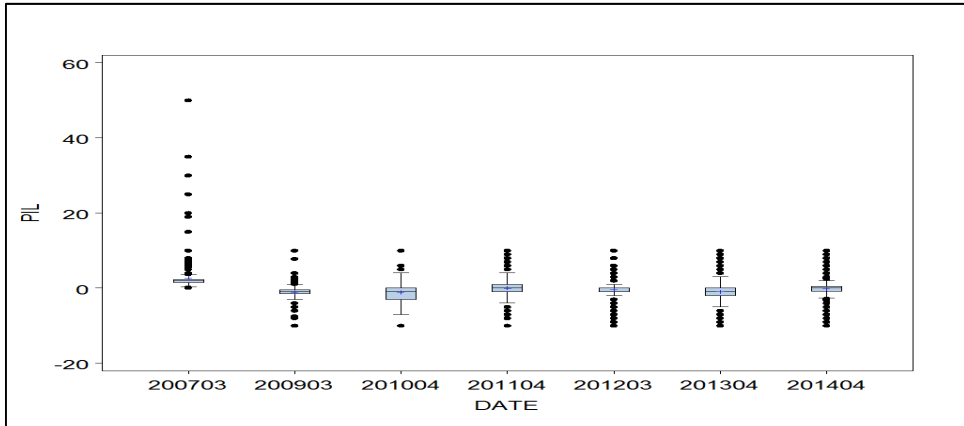
According to the "rational inattention" approach, citizens follow more closely available information when it is perceived to be particularly relevant; in this sense, it is possible to assume (Curtin, 2008) that the economic crisis started in 2008 may have generated an increased sensibility to economic data. This hypothesis seems to be broadly confirmed by aggregate survey results. Figure 1 presents the Box-plot distribution of quantitative replies about the subjective knowledge on the statistics of interest. The box represents the answers' distribution around the median value (continuous line within the box), distinguishing among the answers comprised between the 75<sup>th</sup> and 25<sup>th</sup> percentile (respectively, the upper and lower margin of the box), answers immediately below and above the threshold (answers comprised within the segments above and below the threshold) and outliers, represented as dots.

Number of outliers for consumers' knowledge about GDP and the unemployment rate decrease over the years; moreover, in the case of the answers about GDP growth, in the last two years the 25<sup>th</sup> and 75<sup>th</sup> percentiles are much closer to each other, a result that may be interpreted as a decrease in the level of uncertainty about this variable. On the other hand, public knowledge about inflation does not seem to have changed much: outliers remain much more frequent than for the other two variables and the inter-quartile difference remains broadly stable. Indeed, it may be considered that during the economic crisis attention of the media and the general public was rather focussed on growth and unemployment than on inflation, thus these results may be interpreted as preliminary evidence of a "rational inattentive" behaviour of Italian consumers over the last few years.

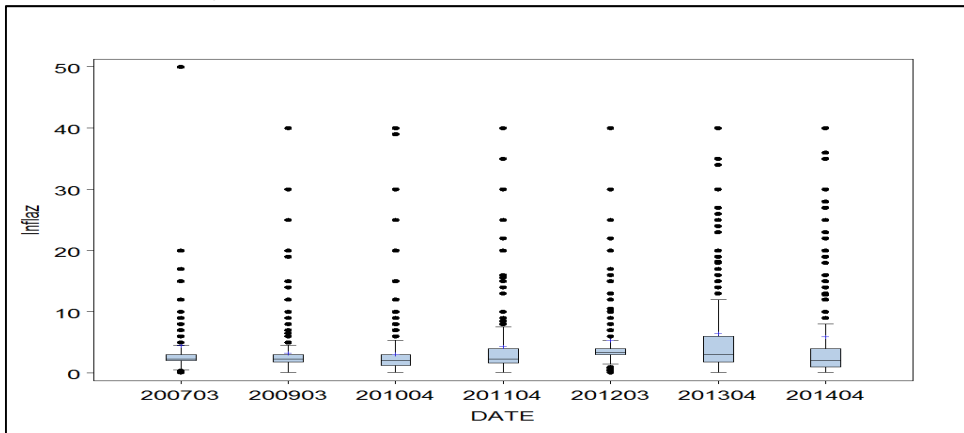
<sup>14</sup> This section is based on the data published each year by ISTAT (see <http://www.istat.it/it/archivio/164177>).

**Figure 1 – Distribution of the answers**

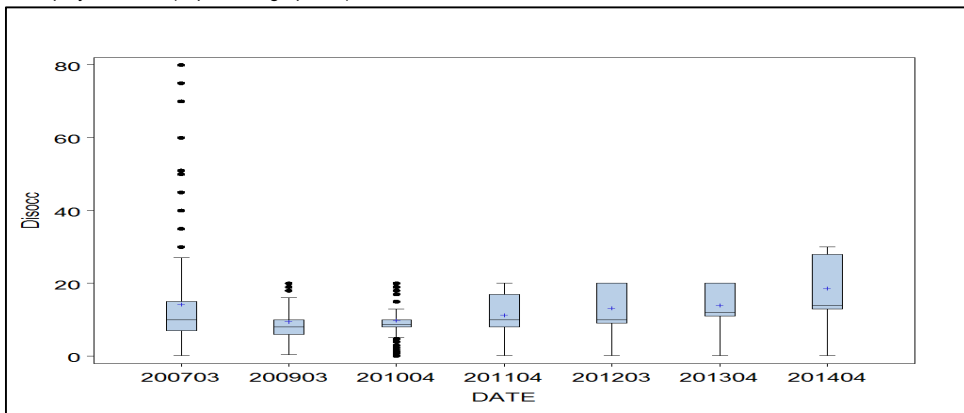
GDP growth (in percentage points)



Inflation rate (in percentage points)



Unemployment rate (in percentage points)



Source: Authors' elaboration on ISTAT data

Response rates vary between a minimum of 17% for the question about inflation in 2010 to a peak of 59% for the question about the unemployment rate in 2014 (Table 3). Among non-respondents, those appearing to be inattentive rather than completely unaware of economic data do prevail: the quote of those reporting to have heard about the data without being able to report the latest figure varies between 23% (question about GDP in 2014) and 51% (question about inflation in 2014), while the share of those not having heard at all about the data recently (i.e. those that we deem not having any knowledge of the statistic at hand) varies between a minimum of 7% for the unemployment rate in 2013 and 2014 and a peak of 28% for data about GDP growth in 2009.

As shown in Figure 1, the distribution of the replies is characterized by the presence of relevant outliers; more precisely, outliers are defined as the values lying above and below, respectively, the upper and lower whiskers of the box plots derived from the data<sup>15</sup>. On the basis of this evidence, median value may be considered as a more accurate measure of the distribution than the mean. Considering median values, Italian consumers are quite accurate regarding GDP developments for the years 2007, 2009 and 2012; on the other hand, they strongly underestimate the severity of recessions for the years 2010, 2013 and 2014, providing instead figures worse than the true ones for 2011. Median values for replies concerning the unemployment and the inflation rate are always well above actual values.

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<sup>15</sup> Denoting with Q1 and Q3, respectively, the first and third quartile of the distribution, the upper whisker of the box plot is equal to  $Q3+1.5*(Q3-Q1)$ , while the lower whisker is defined as  $Q1-1.5*(Q3-Q1)$ .



**Table 3 – Knowledge about GDP growth, the inflation rate and the unemployment rate**

GDP growth							
Percentage shares	2007	2009	2010	2011	2012	2013	2014
Consumers reporting a figure	26%	23%	20%	34%	34%	37%	56%
Consumers non reporting a figure	72%	73%	79%	64%	65%	62%	43%
Of which:							
- I have heard about it, but I do not remember the exact figure		44%			42%	45%	23%
- I have not heard about it recently		28%			22%	16%	19%
- Don't know		2%			1%	1%	1%
Refuse to answer	3%	4%	1%	3%	2%	1%	1%
(In percentage points)							
Average	2.7	-1.4	-1.0	0.1	-0.4	-1.0	-0.3
Median	2.0	-1.0	-1.0	0.0	0.0	-1.0	0.0
First quartile	1.5	-1.8	-3.0	-1.0	-1.0	-2.0	-0.8
Third quartile	2.4	-0.5	1.0	1.0	0.0	0.0	0.6
Standard deviation	3.7	2.2	3.2	3.0	3.1	3.2	3.7
Official data (a)	1.9	-1.0	-5	1,3	0,4	-2.4	-1.9
Inflation rate							
Percentage shares	2007	2009	2010	2011	2012	2013	2014
Consumers reporting a figure	32%	24%	17%	26%	29%	33%	26%
Consumers non reporting a figure	66%	74%	73%	62%	64%	58%	72%
Of which:							
- I have heard about it, but I do not remember the exact figure		49%			43%	47%	51%
- I have not heard about it recently		23%			20%	11%	20%
- Don't know		2%			1%	1%	1%
Refuse to answer	2%	3%	9%	12%	7%	9%	2%
(In percentage points)							
Average	4.7	3.2	3.5	4.7	5.6	7.3	7.7
Median	2.4	2.5	2.0	2.4	3.3	3	2.7
First quartile	2.0	1.8	1.2	1.8	3.0	2	1.2
Third quartile	3.0	3.0	3.0	4.0	4.5	10	10
Standard deviation	8.9	3.5	6.3	6.4	7.1	9	10.5
Official data (b)	1.8	1.6	1.4	2.4	3.3	1.7	0.4

**Table 3 segue – Knowledge about GDP growth, the inflation rate and the unemployment rate**

Unemployment rate							
Percentage shares	2007	2009	2010	2011	2012	2013	2014
Unemployment rate	31%	22%	27%	39%	44%	46%	59%
Consumers reporting a figure	66%	75%	66%	55%	53%	52%	40%
Consumers non reporting a figure							
Of which:							
- I have heard about it, but I do not remember the exact figure		50%			42%	44%	33%
- I have not heard about it recently		24%			11%	7%	7%
- Don't know		1%			1%	1%	0%
Refuse to answer	3%	3%	7%	6%	3%	3%	1%
(In percentage points)							
Average	14.6	10.0	10.2	11.8	13.4	14.1	19.9
Median	10.0	8.0	9.0	10.0	12.0	13.0	20.0
First quartile	7.0	6.0	8.0	8.0	9.0	11.0	13.0
Third quartile	18.0	12.0	11.0	20.0	20.0	20.0	30.0
Standard deviation	13.0	5.7	4.6	6.2	5.7	5.2	7.8
Official data (c)	6.8	6.7	8.2	8.6	9.3	11,6	13

Source: authors' elaboration on ISTAT data.

- Official data is the most recent release of the yearly GDP growth rates available at the time of the survey, referred to the year before with respect to the one in which the survey was realized.
- Official data is the most recent release of the monthly inflation rate available at the time of the survey, referred to the month before with respect to the one in which the survey was realized.
- For the period 2007-2009, the official data is the most recent quarterly release of the unemployment rate available at the time of the survey, referred to the third or fourth quarter of the year before the one in which the survey was realized; for the period 2010-2014, official data is the most recent monthly release of the unemployment rate, referred to the month of January of the year in which the survey was realized.

Tables 4 reports the opinions of respondents about the quality of the public debate about these data. The increase in knowledge that has emerged from the analysis of the replies goes together with better assessments about the quality of the public debate and of official statistics in general. However, the share of respondents deeming that the quality and reliability of information published by the media is “good” is still largely lower than that of those considering it as “bad”.

**Table 4 – Quality of economic information**

In your opinion, during the recent economic and financial crisis, the quality and reliability of the information on the economic situation published by the media and the public debate on these issues has been: Good/Sufficient/Bad?

Percentage share of respondents answering:	2010	2011	2012	2013	2014
Good	8.5	7.2	14.8	17.3	19.3
Sufficient	32.5	36.1	39.4	31.5	30.4
Bad	47.3	43.9	38.4	43.5	43.5
Don't know	11.0	10.2	6.5	6.9	6.7
Refuse to answer	0.7	2.6	0.8	0.8	0.1

Source: authors' elaboration on ISTAT data.

The survey also shows (see Table A in the Statistical Appendix) an increase over the years of the importance assigned by the respondents to economic data: the share of those deeming they are very or fairly important rose from 71% to 83%, with a larger gap between the share of those deeming that the data are “very important” and the share of those judging them as “fairly important”. Indeed, the increased importance of economic information also stimulated the desire to be more informed, expressed by almost half of the sample. Moreover, in the last two years the share of people using (“a lot” or “a bit”) this kind of information as a support for relevant decisions concerning consumption and savings behaviour has significantly risen from 7% to over 17% (see Table B in the Statistical Appendix). On the other hand, those not using at all economic information has fallen from 77% of the sample in 2010 to 63% in 2014. Overall, the data seem to suggest that during the economic crisis the increased importance of economic data has gone hand in hand with a better assessment on the quality of the information, an increased desire to be informed and a growing use of the information for strategic decisions.

Finally, the survey also provides information about the media mostly used to gather this kind of data; the inclusion of this question was suggested by the Blinder and Kruger (2004) paper, where the source used to acquire information had a significant influence on the overall level of knowledge of US consumers about economic phenomena. According to our results, similarly to the findings obtained in the US, television is by far the most important channel for Italian consumers, while the internet is now considered, together with newspapers and magazines, the second most important channel of information, followed by the radio. More “private” channels of information as the contacts with friends and relatives are much less important; a minority of respondents also uses scientific press in order to acquire information about economic data.

#### 4. The Knowledge Score

In order to assess the overall individual knowledge of economic data, we adopt the methodology already introduced in Fullone et al. (2008), D'Urzo et al. (2009) and Giovannini and Malgarini (2012). For each question we first calculate the absolute value of the relative error with respect to the official data available at the moment of the interview and then compute the Mean Absolute Relative Error (MARE) for the three questions, where

a higher score indicates a lower knowledge of economic data:

$$MARE_{i,t} = \frac{\sum_{j=1}^3 \left| \frac{R_{i,j,t} - ISTAT_{j,t}}{ISTAT_{j,t}} \right|}{3} \quad (4.1)$$

In (4.1)  $R_{i,j,t}$  is the reply of an individual consumer  $i$  to each question  $j$  for each time  $t$ ;  $ISTAT_{j,t}$  is the official data pertaining to question  $j$  for time  $t$ . Hence, we calculate two different raw scores for each survey: in order to fully exploit their information content, the first score is calculated by considering also the “*don’t know*” answers and excluding only those refusing to respond. To those answering “*don’t know*”, we impute a score equal to the maximum value reached by the score of those having answered the question in each wave, augmented by a unit. In other words, we “penalise” those answering of not knowing about the statistic under discussion assigning them the maximum error committed by those having indeed provided a reply, augmented by a unit; the respondent should have answered at least one question to be considered in the score<sup>16</sup>. In this case we have a total of 4.923 observations available for the analysis.

The second score is calculated using also the information provided in the follow-up question asking whether consumers have publicly heard of such official statistics; in this case, data are available for the year 2009 and then yearly since 2012. We interpret this evidence as a measure of “rational inattention”, i.e. we consider that those not being able to answer but having heard about the indicator of interest are subject to staggered updates, either because of the high cost or because of the low benefit of acquiring information. For this reason, we assign them a score equal to the maximum score available augmented by one; furthermore, we augment the maximum score by two units to those reporting that they have not heard recently about the data. Those refusing to answer are still excluded from the calculation, reducing the total availability to 4.492 observations. In the following, we shall use a linear transformation of individual MAREs, standardising them with respect to the mean and standard deviation of their distribution and calculating two z-scores, having the advantage of holding useful linear mathematical properties:

$$Z - score_{i,t} = \frac{MARE_{i,t} - Mean(Mare)}{Standard\ Deviation\ (Mare)} \quad (4.2)$$

<sup>16</sup> We experimented with different possible values to be assigned to the “don’t know” answers, e.g. assigning the maximum error committed from those having provided a reply; overall results are not influenced by the arbitrary choice concerning the quantification of the “don’t know” replies.

## 5. Statistical knowledge, socio-demographic factors, desire to be informed and the media

As already pointed out in section 1, according to Mankiw and Reis (2002) acquiring, absorbing and processing information is costly, and hence consumers may rationally choose to update their information set only sporadically; as a consequence, information propagates slowly through society, level of individual knowledge being greatly heterogeneous across demographic groups (Souleles, 2004). According to this view, the main sources of heterogeneity are the level of education (Reis, 2006) and individual economic conditions (Blinder and Kruger, 2004), followed by other socio-demographic factors including age, race and gender. In the ISTAT survey, this hypothesis may be tested using data concerning age (4 classes, from <30 years to 65+), gender and education attainments (3 possible outcomes, from lower intermediate to University level) of the respondent. The survey also comprises data regarding self-reported income levels (expressed in quartiles) and other possible proxies for the economic situation, including employment status (4 categories, employees, self-employed, unemployed and inactive people), zone of residence (North West, North East, Centre and South) and number of inhabitants of the city of the respondent (5 categories from small town with less than 5,000 inhabitants to big cities with more than 500,000 people). Blinder and Kruger (2004) also pointed out that the level of knowledge may be influenced by the desire to be informed on the issues at stake and by the channels used to acquire the information; in our case, those data are available at least for some of the waves. All those variables define a vector of possible correlates for the probability to reply and the level of the score, the vector being denoted as  $Z_{it}$ .

### 5.1. Probability of answering knowledge questions

We define an ordinal discrete categorical variable assuming values comprised between 0 and 3 on the basis of the number of replies to the survey questions,  $x \in \{0; 3\}$ ; we consider that the respondent is wishing to reply if she has indeed updated her information set, and hence we interpret this variable as a proxy of the frequency of updating. We assume that the probability of the number of replies being equal to  $x$  may be influenced by the vector of controls  $Z_{it}$ :

$$\Pr(q_{it} = x | Z_{it}) = F(\beta' Z_{it}) \quad (5.1)$$

In (5.1),  $F$  is the cumulative function of the normal distribution, and the model is estimated as an Ordered probit, an extension of the standard binary probit model used when the dependent variable takes the form of a ranked and multiple discrete variable. In  $Z_{i,t}$  we also add a set of time dummies in order to test for possible differences in knowledge among the various waves. Finally, we consider as individual weights the probability of inclusion for each respondent, calculated according to the methodology described in Fullone and Martelli (2008); unobserved error terms are assumed to be heteroscedastic and hence the model is estimated with robust methods.

Estimation results for model (5.1) are presented in Table 5. The three columns respectively report the results for the whole sample, those obtained using also information

on quality and use of statistical information (available only since 2010) and those obtained taking into account also the importance and desire to be informed (available for the whole sample, but 2010). In the estimation, we normalise with respect to male respondents, being independent workers, in the first income quartile, under 30 years of age, living in the North West with the lowest education attainment, deeming (when these opinions are available) that economic information is not important, of bad quality, not used and with no desire to be more informed. Therefore, the statistical significance, sign and magnitude of estimated parameters have to be interpreted as differentials with respect to this control group.

Estimation results broadly confirm the main findings of the rational inattention literature; considering a confidence level of 5%, probability to reply to the knowledge questions is growing with level of education and economic conditions. In fact, those with an high school or University degree, lying in the top two quartiles of the income distribution, living in the areas with higher per capita income levels (the regions of the North) and being independent workers have an higher probability of answering the knowledge questions. We also found a statistically significant positive effect of the size of the city the respondent lives in, which may be interpreted as a further proxy for economic conditions, and possibly also as a proxy for accession to different information sources. Similarly to what has been previously found in other countries (see for instance Bryan and Venkatu, 2004) men are found to update their information set more frequently than women. The probability to reply is also found to be influenced by age, with those between 50 and 65 years being more able to reply to the survey questions.

Empirical results confirm another seminal intuition of the rational inattention literature, namely that the frequency of updating is higher when information is considered more important. In fact, the probability of giving an higher number of replies is higher for those deeming that those information are important, which use these information in their decision making process and which are willing to be more informed on these issues. Information channels also matter, with those using other media on top of TV being more willing to reply to the survey questions. Finally, willingness to reply also grows during the time span of the survey: the latter result is also consistent with the rational inattention hypothesis, since economic information is usually considered to be more important in difficult times like those of the period 2009-2014. It should also be considered that in the period under examination, and especially since 2010, the Italian National Institute of Statistics has dramatically renewed its communication strategies, with an increase in the amount of information made available to the public trough press releases, the publication of a new open online database (<http://dati.istat.it/>) and a renewed website ([www.istat.it](http://www.istat.it)). These initiatives led to a remarkable increase in the media coverage of Italian statistics. On the other hand, no effect is found for the opinion on the quality of the public debate on the media about economic information.

**Table 5 – Ordered Probit model on the probability of replying to the questions about GDP growth, the inflation rate and the unemployment rate**

Independent variables (value of the coefficient and statistical significance) (a)	Estimation period		
	Whole sample	2010-2014	Whole sample, except 2010
<i>Socio-demographic variables</i>			
<i>Professional category (control group: independent workers)</i>			
Dependent workers	-0.271***	-0.262***	-0.291***
Unemployed	-0.253*	-0.255	-0.292**
Inactives	-0.297***	-0.332***	-0.302***
<i>Age (control group: 18-29 years)</i>			
30-49 years	0.089	0.084	0.163**
50-65 years	0.313***	0.332***	0.372***
>65 years	0.075	0.177*	0.163**
<i>Gender (control group: men)</i>			
Women	-0.530***	-0.537***	-0.531***
<i>Area of residence (control group: North West)</i>			
North East	-0.051	-0.049	-0.042
Center	-0.151***	-0.130**	-0.156***
South and Islands	-0.187***	-0.191***	-0.204***
<i>Number of inhabitants (control group: &lt;5000 inhabitants)</i>			
From 5.001 to 20000	0.120**	0.114*	0.129**
From 20001 to 100000	0.167***	0.182***	0.173***
From 100001 to 500000	0.190***	0.180**	0.202***
Over 500000	0.192***	0.180**	0.187***
<i>Education attainment (control group: primary school)</i>			
Secondary school	0.321***	0.245***	0.274***
University	0.562***	0.484***	0.503***
<i>Income (control group: first quartile)</i>			
II Quartile	0.096*	0.030	0.066
III Quartile	0.204***	0.158**	0.165***
IV Quartile	0.224***	0.169**	0.203***
<i>Information channels</i>			
Tv Only	-0.039	0.054	-0.035
Radio	0.112**	0.137**	0.069
Newspapers	0.345***	0.307***	0.311***
Internet	0.287***	0.266***	0.265***
Political leaders	0.408***	0.357***	0.340***
Friends and relatives	0.150***	0.172**	0.115*
<i>Reliability and use of information</i>			
<i>Quality of information (control group: bad)</i>			
Good		-0.016	
Sufficient		0.000	
<i>Use of information (control group: no use)</i>			
Use		0.422***	
<i>Importance of information (control group: not important)</i>			
Important			0.415***
<i>Desire to be informed (control group: no desire)</i>			
Desire			0.325***
<i>Time control (control group: 2007)</i>			
2009	-0.200***		0.159
2010	-0.302***		
2011	0.257***	0.477***	0.629***
2012	0.415***	0.608***	0.755***
2013	0.570***	0.788***	0.918***
2014	0.648***	0.901***	1.005***
Number of observations	9,594	6,342	8,268

\*\*\* p&lt;0.001; \*\* p&lt;0.05; \* p&lt;0.1

Source: authors' elaborations on ISTAT data

## 5.2. Estimation results: the knowledge score

In this section we turn to the analysis of the possible relationship among the level of knowledge as measured by the two alternative definitions of the z-score reported in section 4 and the same vector  $Z_{it}$  of possible correlates as in section 5.1. The estimated model is the following:

$$K_{i,t} = f(Z_{i,t}) + u_{i,t} \quad (5.2)$$

where  $K_{it}$  is the individual knowledge score in each time  $t$ . We estimated the model with OLS, considering probabilities of inclusion as individual weights and accounting for possible heteroscedasticity in the unobserved error term with robust methods. Table 6 reports the results obtained; similarly to table 3, the first three columns respectively report the results for the whole sample, those obtained using also information on quality and use of statistical information (available only since 2010) and those obtained taking into account also the importance and desire to be informed (available for the whole sample, but in 2010). The fourth column reports the results obtained using the alternative definition of the knowledge score described in session 4, in which we include also the replies to the follow up question, administered only in the 2009 and 2012-2014 waves. As already stated in section 4, in this case we explicitly consider the possibility that the respondent has indeed heard about the data, but has decided not to update her information according to the “rational” inattention hypothesis. Once estimating the model for the whole sample, and hence without considering the follow up questions available only in 2009 and 2012-2014, the number of available observations vary between 4.923 and 3.659, depending on the availability of the controls used in the analysis. We use the same normalisations adopted in table 5: therefore, the constant term may be interpreted as the average z-score for the control group, the coefficients of the various dummies representing – if significant – the increase/decrease in knowledge associated with the specific characteristic at hand.

Also in this case, results are broadly supportive of the theoretical framework we have adopted for the analysis, even if some differences do emerge with respect to the estimation of model (5.1). In particular, higher education attainments looks correlated not only with a higher frequency of updating, but also with a higher level of knowledge (i.e., with a lower z-score). On the other hand, the effect of economic conditions on the z-score is limited or absent, with only a mildly significant negative effect for those living in the South, characterised by lower average income levels. No effect is found for self-reported income levels and the size of the municipality the respondent lives in. A strong effect of age emerges, with the level of knowledge steadily growing as the respondents gets older. This is a relatively new finding in this kind of literature, since both Blinder and Kruger (2004) and Curtin (2008) found only a small effect of age, respectively, on the desire of being informed and on the probability of replying to a knowledge question similar to the ones used in this study. Moreover, those using newspapers and the internet have a higher knowledge score; likewise, those willing to be more informed about these issues, deeming that economic information is important and using this kind of information in their decision-making process have a better knowledge than the control group. No significant differences in the level of knowledge are found according to the opinions on the quality of the media debate. Overall, the regression explains over 50% of the total individual variability of knowledge levels and results seem to be quite robust across different specification of the control variables and over time. Similar results are found if we also consider the follow up question.



**Table 6 – The level of knowledge on economic data and its possible determinants**

Independent variables (value of the coefficient and statistical significance) (a)	Estimation period			
	Whole sample	2010-2014	Whole sample, except 2010	2009; 2012-2014
<i>Socio-demographic variables</i>				
<i>Professional category (control group: independent workers)</i>				
Dependent workers	0.053	0.029	0.052	0.050
Unemployed	-0.099	-0.171	-0.111	-0.107
Inactives	0.049	0.037	0.040	0.046
<i>Age (control group: 18-29 years)</i>				
30-49 years	-0.129**	-0.140*	-0.150**	-0.151**
50-65 years	-0.245***	-0.239***	-0.260***	-0.270***
>65 years	-0.286***	-0.330***	-0.312***	-0.332***
<i>Gender (control group: men)</i>				
Women	0.253***	0.263***	0.272***	0.273***
<i>Area of residence (control group: North West)</i>				
North East	-0.043	-0.056	-0.060	-0.060
Center	-0.002	-0.030	-0.006	-0.007
South and Islands	0.071*	0.074	0.067	0.069*
<i>Number of inhabitants (control group: &lt;5000 inhabitants)</i>				
From 5.001 to 20000	-0.043	-0.069	-0.053	-0.051
From 20001 to 100000	-0.056	-0.096	-0.066	-0.064
From 100001 to 500000	0.0072	0.012	-0.001	0.009
Over 500000	-0.070	-0.058	-0.078	-0.080
<i>Education attainment (control group: primary school)</i>				
Secondary school	-0.110***	-0.086*	-0.094**	-0.094**
University	-0.248***	-0.276***	-0.232***	-0.232***
<i>Income (control group: first quartile)</i>				
II Quartile	-0.033	-0.048	-0.030	-0.026
III Quartile	-0.073	-0.071	-0.072	-0.070
IV Quartile	-0.081	-0.105	-0.088	-0.085
<i>Information channels</i>				
Tv Only	-0.028	-0.069	-0.031	-0.028
Radio	-0.016	-0.000	0.0032	-0.007
Newspapers	-0.107***	-0.098**	-0.101***	-0.107***
Internet	-0.138***	-0.131***	-0.142***	-0.158***
Political leaders	-0.042	-0.006	-0.031	-0.03
Friends and relatives	-0.023	-0.037	-0.019	-0.028
<i>Reliability and use of information</i>				
<i>Quality of information (control group: bad)</i>				
Good		0.043		
Sufficient		0.015		
<i>Use of information (control group: no use)</i>				
Use		-0.125***		

**Table 6 – The level of knowledge on economic data and its possible determinants**

Importance of information (control group: not important)				
Important			-0.154*	0.332***
Desire to be informed (control group: no desire)				
Desire			-0.073**	-0.090***
Time control (control group: 2007)				
2009	-0.292***		-0.435***	
2010	-0.247***			
2011	-0.423***	-0.151***	-0.563***	
2012	-0.245***	0.024	-0.380***	0.081***
2013	-0.414***	-0.149***	-0.549***	-0.090***
2014	1.364***	1.612***	1.222***	1.681***
Constant	0.306***	0.165	0.502***	0.050
Number of observations	4,923	3,659	4,492	
R <sup>2</sup>	0.508	0.531	0.512	0.502

\*\*\* p<0.001; \*\* p<0.05; \* p<0.1

Source: authors' elaborations on ISTAT data

## 6. Conclusions

Surveys conducted since 2007 indicate that the level of knowledge of economic data of Italian consumers is relatively low: response rates are most of the times below the 50% threshold and accuracy of response is seldom assured. Results available from similar surveys (see for instance Curtin, 2008; 2009, and Papacostas, 2008) show that these findings are similar to those emerging on average in EU and the US. The analysis performed in this paper suggests, however, a high variability of the level of individual knowledge: this finding may be interpreted as a confirmation of the rational inattention hypothesis of Mankiw and Reis (2002) and Reis (2006), according to which information is costly and hence agents may rationally choose to update it only sporadically, the frequency of updating and the level of individual knowledge depending on the interactions with various factors, including the level of education, economic conditions, the importance assigned to information and the media used to acquire it. Econometric findings show that the frequency of updating and the level of individual knowledge grow with the level of education, the importance assigned to statistical information and the use of newspapers and the internet. On the other hand, no evidence of the importance of private channel of information (contacts with friends and relatives) emerge from the analysis. Knowledge also increases with age and is higher for men than for women, while economic conditions seem to have a significant effect on the frequency of updating, but not on the level of knowledge itself. No effect is found for opinions on the quality of the statistical and economic debate on the media.

These results have interesting implications for economic theory, policy makers and statistical producers alike. From a theoretical point of view, the data support the “rational inattention” hypothesis, providing evidence of deviation from the standard approach of full rationality. If agents are not always fully rational, possible delays in information acquisition patterns have to be taken into account by policy makers in designing appropriate

interventions, for example using appropriate communication tool to inform citizens about important policy economic decisions or taking into account the lack of knowledge of statistical data when estimating expected result from them. Results provide also very interesting evidence for official statistical agencies: first of all, it clearly emerges that an increase in the media exposure (as it was the case in the aftermath of the economic crisis) favours an increase in individual knowledge of the data. Moreover, in order to ensure a better translation of information available in effective knowledge statistical education programmes should be promoted at all school levels, but especially in the elementary school. Finally, statistical agencies should largely use innovative visualisation tools, in order to help the users to understand the “message” emerging from data without being obliged to go through complex and dense statistical tables.

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## Statistical Appendix

**Table A – Importance and desire of being informed**

Importance of being informed						
Percentage share of respondents answering:	2007	2009	2011	2012	2013	2014
Very important	Na	23.0	30.4	34.0	37.4	42.8
Fairly important	Na	48.2	39.4	40.1	39.7	40.2
Not important, nor unimportant	Na	17.7	14.7	14.8	9.7	6.7
Relatively not important	Na	4.7	5.0	4.8	6.9	4.9
Not important at all	Na	5.3	5.6	4.7	4.2	4.0
Don't know/no opinion	Na	0.9	4.8	1.6	2.1	1.4
Desire of being more informed						
Yes	51.5	40.7	40.6	46.6	43.4	48.7
No	43.8	55.6	52.5	51.2	53.5	46.9
Don't know	4.7	3.7	6.9	2.1	3.2	4.4

Source: authors' elaborations on ISTAT data.

**Table B – Use of information for strategic decisions**

In your private life, do you use the information we have talked about for your economic decisions about financial investments, relevant purchases and others?						
Percentage share of respondents answering:	2010	2011	2012	2013	2014	
A lot	0.9	1.0	2.1	2.0	4.7	
A bit	6.0	14.8	13.2	14.3	12.6	
Not much	10.4	20.2	21.2	18.2	17.3	
Not at all	76.9	56.9	61.1	62.0	62.6	
Don't know	4.6	4.3	1.9	2.8	2.5	
Refuse to answer	1.0	2.7	0.5	0.7	0.3	

Source: authors' elaborations on ISTAT data.

**Table C – Information channels**

Percentage share of respondents answering:	2007	2009	2010	2011	2012	2013	2014
Television	82.7	91.2	86.9	84.9	87.9	86.9	82.7
Radio	17.2	17.7	16.4	17.2	16.6	14.0	20.6
Newspapers, magazines	49.4	49.1	47.6	44.2	39.6	33.9	44.2
Internet	20.6	24.8	31.0	35.9	30.9	35.5	43.4
Political and opinion leaders	8.2	4.3	5.3	4.5	3.5	5.2	5.2
Friends and relatives	9.9	7.5	11.1	10.8	9.9	10.1	14.2
Scientific publications	nd	nd	nd	3.4	1.9	0.6	5.5
Dont'know	3.1	1.0	4.0	1.0	0.7	0.4	1.3
Refuse to answer	2.0	0.2	0.8	2.4	0.2	0.3	0.5

Source: authors' elaborations on ISTAT data.