

# rivista di statistica ufficiale

REVIEW OF OFFICIAL STATISTICS

**In this issue:**

n. 2-3  
2018

The Impact of Spatial Separation  
on Married Migrants' Health in Italy

*Maria Carella, Thais García-Pereiro, Roberta Pace*

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- Households' changing structure and consumption:  
the effect of the economic crisis during the period 2008-2013  
*Carlo Maccheroni, Raffaella Piccarreta* 37
- An application of calibration estimator in the Italian  
consumer survey  
*Luciana Crosilla, Maria Rita Ippoliti, Raffaella Sonego* 77

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## Editorial Preface

In this double issue, the *Rivista di statistica ufficiale* presents three extended original articles based on surveys carried out by the Italian National Institute of Statistics - Istat.

The first paper is authored by Maria Carella, Thaís García-Pereiro and Roberta Pace.

Starting from the data of the survey on *Social condition and integration of foreign citizens*, it evaluates the effects of spatial separation on the health conditions of married migrants living in Italy. For this purpose, self-reported information on migrants' health is processed and analysed. Moreover, specific situations that can be involved in health disadvantages are also examined.

With the aim of making a contribution to research, this work investigates the factors affecting the health status of married migrants in Italy, highlighting the differences between those who live with their spouses and those who live apart together across borders.

Due to their role in the worsening of migrants' health status, interaction effects between the transnational conjugality and socioeconomic aspects are also faced and deepened.

The second article refers to the Istat Household Budget Survey and is written by Carlo Maccheroni and Raffaella Piccarreta. The authors focus on the relation between households' composition and private consumptions, and on its evolution during the financial and economic crisis started in 2007-2008, that undermined the fundamental role of the household as a social safety net.

Changes in consumers' behaviours can reflect changes in available resources as well as socio demographic and cultural developments, thus influencing the composition and the role of households, and consequently of their networks in society.

More specifically, variations in consumption expenditures during the recession period are analysed and related to those occurred in the household structure, emphasising the differences in their temporal patterns in the Italian geographical areas.

For this purpose, per capita average expenditures by different types of households are calculated and studied in depth. This approach contributes to explore the impact of socio-demographic dynamics on consumption expenditures.

Such impact is clearly more relevant in those Italian geographical areas, where social changes are more pronounced, *i.e.* the Centre and the South and Islands.

Finally, in the third paper, Luciana Crosilla, Maria Rita Ippoliti and Raffaella Sonogo deal with the *European Union harmonised consumer survey for Italy*, illustrating its changes due to the calibration system and the related estimator adopted in its data processing phase.

This work aims at presenting the outcomes of this renewed data processing, analysing the differences between calibrated and unweighted Consumer Confidence Indicator, as well as between its balance composing series. If, on the one hand, the calibrated estimates result very similar to the unweighted ones, on the other hand, statistically significant differences emerge, proving the validity of this calibration system. In addition, both calibrated and unweighted Consumer Confidence Indicator shows an equal short-term volatility and similar features in tracking Italian private consumption.

Nadia Mignolli

*Coordinator of the Editorial board*







# The Impact of Spatial Separation on Married Migrants' Health in Italy

Maria Carella <sup>1</sup>, Thaís García-Pereiro <sup>2</sup>, Roberta Pace <sup>3</sup>

## Abstract

*Family separation due to migration is a life-changing event that can completely transform family structure and dynamics. Studies have mainly focussed on the emotional and psychological consequences of long-distance parenthood within transnational practices, while empirical evidence on the effects of transnational conjugality is still lacking. Based on data from the Social Condition and Integration of Foreign Citizens (SCIF) survey conducted by the Italian National Institute of Statistics - Istat, we studied the role of transnational conjugality on the self-reported health of married immigrants living in Italy. In addition, we examined specific situations that can lead to deeper health disadvantages for married immigrants living in transnational conjugality. Our results show that the negative effect on health of living a transnational parenthood is stronger for those immigrants that are not only living apart from their children but also are geographically separated from their spouses. Moreover, the effect of not living with a partner in Italy on self-perceived health is negative for immigrants who were not working, which seems to indicate a greater health disadvantage that is activated when immigrants are not able to economically achieve the goals of the migratory project.*

**Keywords:** Transnational conjugality, self-reported health, Italy, ordinal regression models, migration strategies.

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## 1. Introduction

The migratory experience produces important changes within the family, often altering the equilibrium of individuals and threatening family cohesion (Boyle *et al.* 2008; Bryceson 2019). Generally, the departure from the country of origin affects previously established family dynamics, especially when it implies the spatial separation of the family (Parrenas 2010; Baldassar and Merla 2013). Indeed, migration also concerns individuals who have left their children or spouses behind (in the country of origin). This phenomenon is not yet quantifiable due to the lack of available statistical data to measure it (IOM 2020). However, given the growing diffusion of transnational families, most studies on this subject have used surveys that collect information on family members living in the countries of origin (Mazzucato and Dito 2018).

In the context of migration, family separation is often an overwhelming event that can transform the family environment, generating tension and emotional stress that can sometimes side-line authority and parenting skills (Ariza 2014), whilst children and adolescents can lose their affective references and their fundamental support while growing older (Lam and Yeoh 2019). The implications of this geographical distance can be equally significant when it occurs between parents and infants and when it implies marital separation. Several studies have suggested that the fragmentation of the family due to migration can cause strong effects for individuals, disrupting their physical and mental health (Mazzucato and Schans 2011; Nielsen and Krasnik 2010).

The main aim of this study is to examine the impact of marriage separation due to international migration on the health of married migrants living in Italy. For this purpose, we compared married immigrants living together with their spouses with their counterparts Living Apart Together Across Borders (LATAB) (Beauchemin *et al.* 2015; Mazzucato, Schans, *et al.* 2015) to better evaluate whether and how spatial marital separation influences immigrants' subjective health.

Studies on family migration and health have mainly focussed on the emotional and psychological strains that long-distance parenthood within transnational practices can produce on migrant parents (Fresnoza-Flot 2009; Dito *et al.* 2017) and on children who were left in the country of origin (Fan *et al.* 2012; Mazzucato, Cebotari, *et al.* 2015). Conversely, the transnational

conjugalità – concepita come una strategia di separazione della coppia mirata a soddisfare le esigenze della famiglia attraverso i benefici economici della migrazione – è stata trascurata.

Il nostro studio tenta di colmare questa lacuna e contribuire alla letteratura sul tema in due modi differenti: primo, integrando gli studi sul matrimonio e la migrazione sottolineando l'importanza sia della salute fisica che psicologica, misurando quest'ultima attraverso lo stato di salute auto-riferito dei coniugati immigrati in Italia. Secondo, indagando gli effetti di interazione che possono determinare un maggiore svantaggio sanitario per i coniugati immigrati che vivono in transnazionalità.

Il documento è strutturato come segue: nella prossima sezione, forniamo un sommario delle precedenti ricerche empiriche sui principali determinanti della salute e, più specificamente, sulla relazione tra famiglie transnazionali e salute; nella Sezione 3, presentiamo dati, metodi e statistiche descrittive sui coniugati immigrati che vivono in Italia e il loro stato di salute auto-riferito; nella Sezione 4, discutiamo i risultati dei modelli di regressione ordinale stimati; e nella finale Sezione, concludiamo con i nostri principali risultati.

## **2. Theoretical background**

### **2.1 Migration and Health**

Numerose ricerche focalizzate sul benessere degli immigrati hanno documentato un'ampia gamma di fattori micro- e macro-leva che influenzano lo stato di salute (Acevedo García *et al.* 2012; Zimmerman *et al.* 2011). Sia le evidenze teoriche che empiriche hanno mostrato che la salute degli immigrati è influenzata da caratteristiche demografiche, come genere, etnia e livello di istruzione (Malmusi *et al.* 2010; Wiking 2004), così come dal loro status socioeconomico (condizioni di vita e lavoro, incertezze economiche legate alla povertà materiale) (Borrell *et al.* 2008; Loi and Hale 2019). Inoltre, alcune caratteristiche personali e relazionali (ad esempio, identità culturale, sostegno sociale) legate alle fasi della migrazione possono svolgere un ruolo importante nel benessere fisico e mentale degli immigrati (Bhugra and Jones 2001). In generale, la prima fase (pre-migrazione) e la seconda fase

of migration (period of physical transition from one country to another) induce psychological disorders that can differ or even disappear in the third stage (post-migration), depending on the influence of relational factors such as social context and network support.

Findings concerning the impact of gender and ethnicity on self-perceived health have been mixed. Some studies have found that immigrant women tend to report a worse health status than men seemingly for biological reasons (women live longer but less healthily than men) or due to their position in the labour market of the host country (Dzurova and Drbohla 2014). Females in migration are often employed in manual and difficult jobs which tend to favour discrimination (Pascoe and Smart Richman 2009; Borrell *et al.* 2008). This condition implies a feeling of frustration that may negatively affect their health status (Lynam and Cowley 2007).

In this regard, women are more likely than men to seek treatment. They frequently use medical services, facing difficulties related to language barriers or administrative procedures more easily than men. Greater attention to care may, in turn, lead them to declare a better health status than that reported by men (Rosano *et al.* 2017; Carella, Bellis and Rosano 2020).

The relationship between ethnicity and health is complex and varies over time and across countries. It is evident that migrants belong to heterogeneous groups with a specific identity, history, language and culture that may shape practices regarding health. Additionally, other factors related to the migratory project (forced or voluntary) or to the integration process (social isolation, loss of self-esteem due to economic conditions and job uncertainty) may impact on ethnic group differences in self-reported health (Chandola 2001; Nielsen and Krasnik 2010). Wiking *et al.* (2004) found that the association between ethnicity and poor self-reported health is mediated by socioeconomic status, poor acculturation and discrimination. Other scholars have documented that the differences among ethnic groups in reporting their health status are reduced when immigrants appear more integrated and receive greater social support in the host country and when their economic conditions improve (Lindstrom *et al.* 2001).

Less educated migrants have a higher probability of reporting a poorer general health. It has been suggested that more educated migrants have better skills and expertise to obtain better-paid jobs (Chiswick *et al.* 2008). As a

result, they may have a higher income which allows them to invest more easily in preventive medicine and specialist health services as primary care to prevent diseases (Rosano *et al.* 2017).

Migration experiences have often been related to unstable working conditions which, in turn, have been typically associated with lower self-rated health and higher risks of poor mental health, such as anxiety and depression (Borrell *et al.* 2008; Berkman *et al.* 2014; Benach *et al.* 2011).

Regarding characteristics associated with the migratory project, the literature has made a distinction between voluntary and involuntary migration. Usually, economic immigrants voluntarily leave their country of origin to improve their quality of life, and they are more likely motivated to integrate and eventually remain in the receiving country (Caarls and Mazzucato 2016; Barbiano di Belgiojoso and Terzera 2018). Moreover, a migratory project shared in post-migration experiences with spouses, dependents and relatives tends to facilitate social integration (Hou *et al.* 2018). All these factors lead to positive effects on perceived health status.

Regarding the Italian case, Carella, García-Pereiro and Pace (2020) showed that self-declared health status is positively associated with the sense of belonging as one of the components of married immigrants' subjective well-being. Indeed, authors have stated that a positive change in the health status (passing from a poorer to a better health category) increases the feeling of acceptance in the city where married immigrants live (i.e., moving from accepted to very accepted).

The duration of the stay in the receiving country also plays an important role on health status. Migrants have better health than their native counterparts upon arrival as a result of the 'healthy immigrant effect' which refers to the selective nature of the migration event (HIE) (Jasso *et al.* 2004). Their health status tends to decrease as the years of permanence in the host country increase, converging to the level of natives' health (Antecol and Bedard 2006; Loi and Hale 2019). This deterioration of the health status – associated with a longer duration of stay – has been explained by immigrant's poorer socioeconomic conditions, social exclusion, low acculturation and/or the adoption of negative health behaviours (Jasso *et al.* 2004; Wiking *et al.* 2004).

Regarding integration experiences, receptivity attitudes held by natives towards migrants can favour their identification and acceptance with the host society (Hou *et al.* 2018). A strong sense of belonging relates to significant interactions with other people, cultural characteristics and social trust; all these act together to improve integration processes and hence facilitate access to health care. Thus, immigrants who manifest the feeling of not being sufficiently accepted seem to be more vulnerable, especially with regard to their health.

Similarly, difficulties in accessing medical services are aggravated by a poor knowledge of the host country, which may be relevant to explaining the negative influence of immigrants' health status on access to health care and increased risk of poorer health (Carella, García-Pereiro and Pace 2020; Scheppers 2006).

## 2.2 Transnational families and health

A strand of literature that has examined the role of marital status and household characteristics on the living conditions of immigrants suggests that conjugality and family dynamics may strongly influence quality of life in the receiving countries (Frisbie *et al.* 2001; Caarls and Mazzucato 2016).

In general, a positive migration experience is associated with living as a couple or with the children, while separation from the members of the family represents a psychological stressor for the immigrants that could lead to a health decline (White *et al.* 2019; Mazzucato and Schans, 2011). In particular, the literature on transnational families has highlighted the negative effects of parent–child separation on migrant parents (Mazzucato *et al.* 2016; Dito *et al.* 2017; Haagsman *et al.* 2015) and on children left in the country of origin (Schmalzbauer, 2004; Donato and Duncan 2011; Mazzucato *et al.* 2014), often neglecting the consequences of transnational conjugality for married couples.

A transnational family, in which the members live in different nation-states and spend more time apart than together (Bryceson and Vuorela 2002), is a peculiar feature of the post-modern context characterised by important changes in demographic and socioeconomic behaviours that have led to a diversification of family patterns that includes migration (Cooke 2008). Empirical analyses based on the Italian case have distinguished among three

types of transnational families (Ambrosini 2008). These typologies differ from each other in the nationality of the migrants involved in the forms of transnationality, the frequency of their returns to the country of origin and for the migration project. In Italy, transnationalism generally concerns women who are separated in migration from other family members (Grillo 2007; Carella, García-Pereiro and Pace 2020).

When analysing this family model, most scholars have focussed on long-distance parenthood as the consequence of a parental decision to migrate and leave children behind in order to fulfil their needs and to guarantee them better opportunities (Parrenas 2001; Zontini 2004; White *et al.* 2019). In this sense, several authors have documented that ‘transnational mothering’ can be the source of psychological distress for migrant mothers as well as of emotional and behavioural problems in children who are left behind (Hondagneu-Sotelo and Avila 1997; Parreñas 2005a). The practice of at-distance-mothering – due to international migration – implies the delegation of child care to other relatives or caregivers (Fresnoza-Flot 2009; Parrenas 2010). Thus, the roles of family members are redefined and, quite often, grandmothers take charge of new childcare responsibilities in the country of origin while migrant mothers participate in the upbringing and education of their children across international borders (Parreñas 2001; Nobles 2011).

In some cases, the limited physical interaction that results from the geographical distance in transitional families is somehow compensated by the preservation of tight intrafamily relationships with members back home or living in other places (Le Gall 2005; Parreñas 2005b). The strength of these ties may have a positive impact on migrants’ well-being, generating the feeling of union across borders based on reciprocity and solidarity. Nevertheless, many studies have found that separation from children due to migration hinders migrant mothers from fulfilling the role of the main caregiver, favouring the feeling of guilt and a sense of frustration (Schen 2005; Horton 2009). These studies have also suggested that long-distance parenthood more negatively affects mothers’ health status than fathers’ because of traditional gender norms associated with care (Parreñas 2001; Bernhard *et al.* 2009).

A strand of literature on transnational practices has also emphasised the effects that parental migration has had on educational and health outcomes of children who have been left behind. The prolonged separation from the



parents and the loss of close relationships with them can cause emotional and behavioural problems in these children despite the economic benefits of migration (Dreby 2007; Nobles, 2011). However, some authors have argued that the perception of the quality of the long-distance parenthood may also vary according to the age of the child (Graham and Jordan 2012). Younger children tend to experience the feeling of abandonment, suffering more from the geographic distance from their parents than their older counterparts. Moreover, children who have been left in the country of origin are more emotionally distressed by separation from their mother than their father. Fathers are commonly seen as breadwinners and primary providers of the financial needs of the family (Aranda 2003; Fan *et al.* 2012; Mazzucato and Schans 2011), needs that can be satisfied through the remittances and that, simultaneously, justify migration.

Both mothers and fathers deal with the consequences of several material and emotive sacrifices for the purpose of improving family income and quality of life.

At the same time, both married men and women geographically separated from their spouses and their children experience extreme loneliness and sharper health deficits (Ariza 2014). Indeed, transnational conjugality derails the normal functioning of the couple given that the spatial separation from all family members implies high emotional costs for both migrant parents or spouses and their children left behind (Bryceson 2019).

Transnational conjugality in family and health migration has been understudied. This might be due to the widely shared idea that the spousal absence is temporary, awaiting couple reunification in the receiving country. However, it has been shown that not all couples spatially dispersed experience reunification (Beauchemin *et al.* 2015). The original migratory project often turns into a prolonged family separation that does not necessarily lead to either reunification or to marital or family disruption. Transnational conjugality practices are usually assumed within a couple strategy finalised to ensure better opportunities for all members through migration (Olwig 2002; González-Ferrer *et al.* 2012). Undoubtedly, the consequences of separation caused by divorce or by migration are distinct because these situations are experienced from different root causes. In the second case, an increase in the time spent separated and the geographical



distance tend to decrease well-being, increasing the risk of union dissolution (Boyle *et al.* 2008).

These disadvantages are more harmful to an individual's health when two or more factors interplay in the migration experience: the separation from the children who remained in the country of origin and the employment uncertainty due to a lack of work.

Job insecurity has severe consequences on overall health and triggers psychological distress because it undermines well-being and challenges the migratory project of migrant workers and their families (Haour-Knipe 2013). In particular, a large body of sociological and economic literature has documented that transnational migrants accept the emotional costs related to this type of migration by balancing it with the consequent economic benefits (Goldin and Reinert 2012). Improving the financial situation of the family through a stable job plays a central role in family decision making and on migration strategies (Schmalzbauer L. 2004; Ryan *et al.* 2009). Therefore, unemployment hits the strategic goal of the migration project and it loses its meaning. In this case, the price of the family separation might be too high by the loss of its economic compensation. Interestingly, the interaction between these factors induces a major risk of poor mental health, such as chronic stress and depression (Borrell *et al.* 2008).

Dito *et al.* (2017) examined the perceived health status and subjective well-being of Ghanaian transnational parents in the Netherlands and found that their health status was negatively associated with socioeconomic conditions and undocumented status. The authors argued that parent–children separation due to migration was not the main determinant that negatively influenced the well-being of transnational migrants. In this case, the determinant of migrant parents' frustration was the failure of their migration project, which meant an inability to economically support children and family members left behind.

This is the background supporting our research questions:

*RQ1: How and to what extent does spatial marriage separation affect married migrants' health in Italy?*

*RQ2: Is the relationship between transnational conjugality and immigrants' self-reported health status dependent on the additional stress generated by also being a transnational parent?*

*RQ3: What role might be played by the accomplishment and/or the fulfilment of the economic needs of the family in the relationship between marriage separation due to migration and the self-declared state of health of immigrants in the host country?*

### **3. Data source and methodology**

For the analysis of the self-perceived health of married immigrants in Italy, data was drawn from the first national survey on Social Condition and Integration of Foreign Citizens (SCIF) carried out in 2011–2012 by the Italian National Institute of Statistics - Istat.

The survey included 9,553 households that included at least one foreign citizen, providing information on 25,326 individuals. The main purpose of the survey was to provide a detailed portrait of several aspects of life and the integration process of foreigners living in Italy. The units of analysis were private households with at least one foreign-born member that were randomly selected from the Population Register. All members of selected households were included in the sample. Individuals under the age of 14 were interviewed through a parent or an adult family member. The family questionnaire was completed by the head of the household holding foreign nationality. The sample design followed a two-stage process in which municipalities were the first-level units and households the second-level units.

As the central aim of this paper is to test whether and how a living arrangement as a transnational partnership and/or parenthood influences immigrants' self-declared health status, we applied some important restrictions to the sample: 1) it includes only individuals classified as foreigners<sup>4</sup> at the time of the survey; 2) it excludes mixed marriages; and 3) it consists of married immigrants in two diverse conditions: a) living together in Italy or b) living apart together across borders (LATAB) – one living in Italy while the other was living abroad. Once these filters were applied, the final sample included 6,019 married immigrants.

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<sup>4</sup> This classification included all individuals with foreign citizenship at the time of the survey, those foreign born, and those with foreign citizenship (since birth).

Following the quantitative scale nature of the dependent variable, the role of independent variables was tested using ordered logistic regression models (ordinal)<sup>5</sup>. As shown in Table 3.1, independent variables included in model specifications were clustered in four groups: individual characteristics, features of respondent's migratory project, living in transnational families and subjective social integration.

**Table 3.1 - Definition of dependent and independent variables**

Variable	Definition and categories
<b>Dependent variable</b>	
Self-declared health status	Scale. Ranging from 1-poor- to 5 -excellent.
<b>Independent variables</b>	
<i>Individual characteristics</i>	
Female	Dummy. Coded 1 if respondent is female and 0 if male.
Working	Dummy. Coded 1 if respondent is working at the time of the survey and 0 otherwise.
Low educational level	Dummy. Coded 1 if respondent achieved a low educational level and 0 if achieved higher levels.
Macro-area of citizenship	Categorical. Coded 1 if respondent's citizenship is new EU countries, 2 for EU, 3 for North Africa, 4 for rest of Africa, 5 for Asia, 6 for rest of Asia and 7 grouping other countries of origin (this is the reference category).
Macro-area of citizenship	Categorical. Coded 1 if the respondent was living in the regions of the Northwest, 2 for Central regions, 3 for Northeast regions and 4 for those residing in the South (this is the reference category).
<i>Migratory projects</i>	
Agreed with migration	Dummy. Pre-migration. Coded 1 if the partner and offspring agreed with the decision to migrate, 0 otherwise.
Age at arrival	Quantitative. Immigration timing, measures individual's age at migration.
Years since arrival	Quantitative. Immigration timing, measures years passed since migration.
Intend to remain	Dummy. Coded 1 if the respondent declared an intention to remain in Italy, 0 otherwise.
<i>Social integration</i>	
Do you feel accepted?	Scale. 'Do you feel accepted in the city where you live?' ranging from 1 -not accepted at all to 4 -very accepted-.
Not able to interact	Dummy. Coded 1 if the respondent declared not been able to interact in Italian and 0 otherwise.
<i>Transnational families</i>	
Partner living abroad	Dummy. Coded 1 if the partner of the respondent lives abroad and 0 if both are living together in Italy. Having non-coresident children (23.50%) has been included as a proxy for transnational parenthood.
Transnational parenthood	Categorical. Coded 1 if the respondent has non-coresident children, 2 if the respondent does not have children and 3 if the respondent has children and they live in the same household (this is the reference category).

Source: Authors' elaboration based on SCIF

<sup>5</sup> Models run estimate the ordered log-odds regression coefficients (logit function) independent variables while holding constant the rest of the variables included in the models. The goodness of fit of the models was assessed using three different measures: pseudo R<sup>2</sup>, Log pseudolikelihood and AIC. The results of Brand tests performed showed that the parallel regression assumptions (proportional odds) of the ordinal logistic regression model have not been violated.

We used hierarchical regression analysis as a method for model comparison. This is particularly helpful to disentangle the specific contributions of certain predictors (predictors of interest) following a sequential order after controlling for other variables. By examining changes in adjusted  $R^2$  between model specifications, it is possible to determine the contribution of added variables of interest to the improvement, if any, on the proportion of variance explained by the model (Henderson and Velleman 1981).

Each group of independent variables was analysed separately and variables that were not significant were removed from partial models.

The first model (Model 1) includes individual characteristics of married immigrants living in Italy, such as gender, working status, level of education, area of citizenship and place of residence. In the next steps, (Model 2 adding migratory projects and Model 3 adding self-perceived social integration), we added variables that previous research has found to be important determinants of immigrant's subjective health status (Bhugra and Jones 2001; Lindstrom *et al.* 2001; Wiking *et al.* 2004). In the following step (Model 4), we introduced our variables of interest to test the effect of living in a transnational partnership or parenthood arrangement on immigrants' subjective health.

Estimations 5 to 7 included interaction terms aimed at identifying which effects on married immigrants' self-declared health status, if any, differed in certain situations. We introduced interaction effects to assess if there are some mediator variables influencing the relationship between living as transnational families and the self-declared state of health of married immigrants in Italy. More specifically, we have hypothesised two situations – that we interpreted as potential causes of the greatest health disadvantages – in which the relationship between subjective health status of married immigrants and Living Apart Together Across Borders (LATAB) will probably depend on: a) having non coresident children (*RQ2*) and b) not working (*RQ3*). As suggested by Harrell (2015), we included in model estimations all the variables that were utilised to compute interaction effects, even if they were not statistically significant (alone).

Descriptive statistics of married immigrants according to variables included in ordinal regression models are displayed in Table 3.2. Regarding the individual characteristics of married immigrants included in our sample, 51.01% were female, 67.31% declared themselves to be working and 17.35%

have a low educational level. When classified according to the macro-area of citizenship, slightly more than 55% of married immigrants were citizens of UE countries (23.8% from new UE countries) and 17.47% were citizens of Northern African countries. Almost 42% were residing in Northern regions of Italy.

**Table 3.2 - Descriptive statistics of variables included in empirical analyses**

	Mean %	Std. Dev.	Min	Max
<b>Individual characteristics</b>				
Female	51.01			
Working	67.31			
Low educational level	17.35			
<i>Country of citizenship</i>				
New EU countries	23.80			
UE countries	31.26			
North Africa	17.47			
Other African countries	6.36			
East Asia	7.19			
Other Asian countries	10.57			
<i>Macro-area of residence</i>				
Northwest	21.35			
Centre	17.95			
Northeast	20.15			
<b>Migratory projects</b>				
Partner/offspring agreed with migration	70.58			
Intend to remain in Italy	66.05			
Years passed since arrival	10.79	6.43	0.1	64
Age at arrival	30.12	9.90	1.0	75
<b>Transnational families</b>				
Partner living abroad	16.54			
Non coresident children	23.50			
Without children	14.85			
<b>Social integration</b>				
Do you feel accepted in the city where living?	3.30	0.62	1.0	4
Not able to interact in Italian	17.41			
<b>Dependent variable</b>				
Self-declared health status	4.09	0.80	1.0	5
<b>N</b>	<b>6,506</b>			

Source: Authors' elaboration based on SCIF microdata 2011-2012

Models also control for the characteristics of the migratory projects of respondents. In this regard, 70.58% of married immigrants' partners and offspring agreed with the decision to migrate and 66.05% declared their intention to remain in Italy at the time of the survey. The number of years passed since migration and age at arrival were 10.79 and 30.12 (mean values), respectively.

Transnational marriages are those partnerships in which the respondent (immigrant) is living in Italy while the partner (spouse) is living abroad. This category represents 16.54% of our sample of married immigrants. Transnational parenthood is identified by children who are not living with the respondent in Italy (23.50%).

Subjective social integration effects on self-declared health of married immigrants in Italy were approached by the question 'Do you feel accepted in the city where you live?', with a mean value of 3.30, as well as by language proficiency, with 17.41% declaring difficulties when interacting in Italian.

## 4. Results

Which individual characteristics are related to the self-declared health status of married immigrants living in Italy? Females and respondents who were working declared having lower levels of health in comparison to males and respondents who were not working or in another situation (Table 4.1). These findings support gender differentials in self-reported health that favour men, as found in recent studies on gender, health and ethnicity (Lynam and Cowley 2007; Borrell *et al.* 2008; Dzurova and Drbohla 2014). There is also a net effect of the educational level: those who have a low educational level have lower ordered logs of self-declared health than those who have achieved higher levels. The protective effect of the level of education for migrants' health might also be related to a higher likelihood of having better working conditions and higher income levels (Chiswick *et al.* 2008; Borrell *et al.* 2008; Benach *et al.* 2011; Berkman *et al.* 2014). The place of residence also influences self-declared health status of married immigrants. Results show higher ordered logits of a better health status for immigrants living in the North as compared to those living in Southern regions.

The addition of variables accounting for immigrants' migratory projects significantly improved the fit of the model (Table 4.1, Model 2). This is in line with previous studies in which variables accounting for the migratory history affect immigrants' health status in the host country (Hou et al. 2018). Regarding pre-migration, the ordered logit of better health for those sharing migration decisions is higher than for those who did not (log-odds = 0.187\*\*\*). The intention to remain in Italy, reflecting future migratory plans, is also positive related to the health status (log-odds = 0.329\*\*\*).

Results support those of the literature on the relationship between timing of immigration and health (Jasso *et al.* 2004; Wiking *et al.* 2004; Antecol and Bedard 2006; Loi and Hale 2019). The log-odds for declaring a higher level of health diminishes as both years passed since arrival and age at arrival increase. Thus, for one year of increase in the timing since the arrival to Italy, we expect a 0.0472 decrease in the log-odds of feeling healthier. This effect is larger when analysing the phase of the life course that signed the arrival – measured through the age of immigrants (log-odds = -0.0493\*\*\*).

In the next step, two variables intended to approximate the degree of subjective social integration were added (Table 4.1, Model 3). This addition not only improved model fit but also the proportion of variance explained. A one unit increase in the answer to the question 'Do you feel accepted in the city where you live?' (i.e., from accepted to very accepted) would result in an increase in the ordered logit of better health status (log-odds = 0.663\*\*\*). Especially important is the role played by language proficiency, which is negatively related to immigrants' health. Literature on this subject has stated that difficulty in interacting in the language of the host country is negatively associated with health care access, thus increasing the risk of a poorer health status (Krieger 2000; Scheppers 2006; Carella, Bellis and Rosano 2020).

What about immigrants who are living in transnational family relationships? Log-odds of ordinal models show that married immigrants with non-coresident children have a worse health status than those without children (Model 4), confirming the negative effects that parent-child separation has on migrant parents (Haagsman *et al.* 2015; Mazzucato *et al.* 2016; Dito *et al.* 2017). No significant results were found for either those with coresident children or for those involved in LATABs. However, as stated previously (see section Transnational families and health), health consequences of transnational

conjugality have often been neglected because the relationship linking both could be contingent on other conditions and added together, might generate a sort of cumulative disadvantage negatively impacting the health status of immigrants.

In fact, one of the most interesting findings, as initially hypothesised, is the moderator effects of having a partner living abroad (Table 4.1, Models 5 and 7). In the first place, the ordered log-odds linking having coresident children to the auto-perceived health status turn negative and highly significant for immigrants whose spouse is living abroad. Moreover, the negative effect of living a transnational parenthood – already found in Model 4 – gets even deeper among those involved in LATAB marriages. This might indicate that the greatest health disadvantage is for those immigrants that are not only living apart from their spouses but also a) have children for whom they provide care or b) are also living apart from their children.

Finally, there seems to be a substantial work-related gradient on the association between living in Italy without a spouse and self-reporting a worse health status. Model 6 displayed in Table 4,1 includes an interaction term between LATAB and working status. As can be observed, the effect of not living with a partner in Italy on self-perceived health is negative for immigrants who are not working. This result seems to point to a situation in which the migratory project has lost its sense (essence or main motivation). In most families, migration has been enacted with the intention to improve family wellness (Parrenas 2001; Zontini 2004; White *et al.* 2019). Migratory biographies are extraordinarily complex. In some cases, moving together is not a possibility, leading to the geographical separation of the family (being forced to leave the partner and/or the children in the country of origin). Living the migration experience far from the family might have profound negative consequences, such as favouring negative emotional states and rising psychological distress (Schen 2005; Horton 2009; Mazzucato and Schans 2011; Haagsman *et al.* 2015; Mazzucato *et al.* 2016; Dito *et al.* 2017; White *et al.* 2019), but somehow these effects might be moderated by the feeling that the main purpose of the whole migration experience is being accomplished. Immigrants who are working in the host country give sense to the migratory project of the family, which tends to compensate for the geographical separation caused by migration. On the other hand, not working



means, among other things, the loss of the economic advantage of migration, a situation that might deepen the distress already being lived while apart from a spouse. In this situation, the ‘costs’ of migration might be too high to be dealt with (Ariza 2014), heavily impacting health.

**Table 4.1 - Results of ordinal regression models (log-odds) on the determinants of immigrants’ self-perceived health status**

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
<b>Individual characteristics</b>							
Female	-0.0623 (0.0543)	0.0868 (0.0552)	0.141** (0.0553)	0.137** (0.0557)	0.142** (0.0558)	0.151*** (0.0562)	0.157*** (0.0563)
Working	0.172*** (0.0617)	0.239*** (0.0625)	0.171*** (0.0634)	0.170*** (0.0644)	0.169*** (0.0644)	0.122* (0.0689)	0.119* (0.0689)
Low educational level	-0.564*** (0.0705)	-0.389*** (0.0705)	-0.302*** (0.0706)	-0.300*** (0.0707)	-0.299*** (0.0708)	-0.299*** (0.0707)	-0.298*** (0.0708)
<i>Macro-area of citizenship</i>							
New EU countries	0.0891 (0.0643)	0.203*** (0.0662)	0.226*** (0.0667)	0.217*** (0.0668)	0.221*** (0.0669)	0.211*** (0.0669)	0.215*** (0.0669)
EU	0.328*** (0.0817)	0.362*** (0.0852)	0.431*** (0.0862)	0.411*** (0.0865)	0.417*** (0.0866)	0.403*** (0.0866)	0.409*** (0.0868)
North Africa	0.294*** (0.108)	0.388*** (0.114)	0.523*** (0.115)	0.523*** (0.116)	0.527*** (0.116)	0.512*** (0.116)	0.516*** (0.116)
Africa (elsewhere)	0.208** (0.0965)	0.307*** (0.101)	0.518*** (0.106)	0.502*** (0.106)	0.502*** (0.106)	0.503*** (0.106)	0.503*** (0.106)
East Asia	0.134 (0.0866)	0.139 (0.0877)	0.265*** (0.0901)	0.255*** (0.0907)	0.259*** (0.0907)	0.243*** (0.0908)	0.247*** (0.0909)
Asia (elsewhere)	-0.151 (0.143)	0.0563 (0.144)	0.0371 (0.143)	0.0368 (0.143)	0.0316 (0.143)	0.0445 (0.143)	0.0395 (0.144)
<i>Macro-area of residence</i>							
Northwest	0.377*** (0.0647)	0.328*** (0.0656)	0.290*** (0.0657)	0.292*** (0.0660)	0.296*** (0.0660)	0.294*** (0.0660)	0.297*** (0.0660)
Centre	-0.0239 (0.0659)	0.00584 (0.0672)	-0.00868 (0.0676)	-0.0194 (0.0680)	-0.0167 (0.0681)	-0.0220 (0.0681)	-0.0191 (0.0682)
Northeast	0.220*** (0.0655)	0.194*** (0.0659)	0.181*** (0.0661)	0.180*** (0.0666)	0.181*** (0.0667)	0.181*** (0.0666)	0.182*** (0.0666)

Source: Authors’ elaboration based on SCIF

**Table 4.1** continued - **Results of ordinal regression models (log-odds) on the determinants of immigrants' self-perceived health status**

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
<b>Migratory projects</b>							
Intend to remain	-	0.329*** (0.0511)	0.239*** (0.0514)	0.227*** (0.0531)	0.225*** (0.0532)	0.230*** (0.0531)	0.228*** (0.0531)
Agree with migration	-	0.187*** (0.0539)	0.169*** (0.0540)	0.182*** (0.0550)	0.181*** (0.0551)	0.178*** (0.0550)	0.177*** (0.0551)
Years since arrival	-	-0.0472*** (0.00440)	-0.0580*** (0.00444)	-0.0549*** (0.00453)	-0.0552*** (0.00454)	-0.0541*** (0.00453)	-0.0544*** (0.00454)
Age at arrival	-	-0.0493*** (0.00260)	-0.0507*** (0.00261)	-0.0466*** (0.00295)	-0.0469*** (0.00297)	-0.0461*** (0.00297)	-0.0463*** (0.00299)
<b>Social integration</b>							
Do you feel accepted?	-	-	0.663*** (0.0446)	0.668*** (0.0447)	0.668*** (0.0447)	0.669*** (0.0446)	0.669*** (0.0446)
Not able to interact	-	-	-0.132* (0.0724)	-0.123* (0.0725)	-0.129* (0.0726)	-0.125* (0.0725)	-0.130* (0.0725)
<b>Transnational families</b>							
Partner living abroad	-	-	-	0.120 (0.0777)	0.471 (0.217)	0.189 (0.0821)	0.563 (0.224)
Non coresident children	-	-	-	-0.259*** (0.0738)	-0.230*** (0.0825)	-0.267*** (0.0740)	-0.239*** (0.0826)
Without children	-	-	-	0.0349 (0.0755)	0.0640 (0.0854)	0.0344 (0.0755)	0.0674 (0.0854)
<b>Interactions</b>							
With children*Partner living abroad	-	-	-	-	-0.393* (0.238)	-	-0.410* (0.241)
Non coresident children*Partner living abroad	-	-	-	-	-0.419* (0.254)	-	-0.449* (0.257)
Partner living abroad*Not working	-	-	-	-	-	-0.377** (0.185)	-0.390** (0.185)
Log pseudolikelihood	-7262,8	-7022,1	-6881,9	-6874,1	-6872,5	-6871,7	-6869,9
Pseudo R <sup>2</sup>	0,01	0,043	0,062	0,063	0,063	0,063	0,063
AIC	14557,6	14084,2	13807,9	13798,1	13798,9	13795,3	13795,8
Observations	6,506	6,506	6,506	6,506	6,506	6,506	6,506

Source: Authors' elaboration based on SCIF

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

## 5. Conclusions

Previous studies on migrants' health in Italy have found that immigrants tend to report good health conditions which are generally better than those of natives (Petrelli *et al.* 2017). Other studies have suggested the need to enact adequate policies aimed at preserving such health heritage related to the 'healthy migrant effect' and prevent the worsening of immigrant's epidemiological conditions by facilitating their access to healthcare services (Carella, Bellis and Rosano 2020; Rosano *et al.* 2017).

In this context, we have attempted to contribute to research on this topic by investigating the factors that impact the health status of married immigrants in Italy, highlighting differences between those who live with their spouses and those who live apart together across borders. In doing so, we have also investigated interactions effects between the transnational conjugality and familial and socioeconomics characteristics that play a role in the worsening of immigrants' health status among those experiencing marriage separation due to migration.

In line with the exiting literature, our findings indicate that married migrants who are less educated, unemployed and with a longer stay are more likely to report a poor self-health status. In addition, a low language proficiency seems to be one of the major barriers in accessing healthcare. It has been documented that immigrants who are unable to interact tend to use medical services less frequently than natives and often receive low-quality health care (Antecol *et al.* 2006).

The first question in this study sought to determine if spatial marriage separation affects the self-reported health of married migrants in Italy (*RQ1: How and to what extend does spatial marriage separation affect married migrants' health in Italy?*). In this sense, our results point to a worse health status of married immigrants with non-coresident children as compared to those without children.

Concerning immigrants who live in Italy without their spouses, our analyses reveal that this marital situation interacts with separation from children and the working condition, contributing to further explain migrants' self-perceived health status.

In general, marriage has been understood as a protective factor in migration by providing social support. Thus, it has been positively associated with better health: married immigrants have a significantly higher health score than singles, divorced and widowed immigrants (Newbold 2005).

Nevertheless, ordered regression models in our study show that in Italy, the greatest health disadvantage is among married immigrants living with the absence of both their spouse and children (*RQ2: Is the relationship between transnational conjugality and immigrants' self-reported health status dependent on the additional stress generated by also being a transnational parent?*). These results lead us to believe that in transnational living arrangements, even if the migration project is mostly voluntary and shared with the whole family, the emotional costs produced by the spatial separation from family members are strongly harmful to an individual's health.

Likewise, when transnational conjugality and job insecurity – induced by the unemployment status – interplay with each other, immigrants' vulnerability related to health condition increases (*RQ3: What role might be played by the accomplishment and/or the fulfilment of the economic needs of the family in the relationship between marriage separation due to migration and the self-declared state of health of immigrants in the host country?*). In this case, in line with Gonzalez-Ferrer *et al.* (2012) and Dito and Mazzucato (2017), we may assume that being unemployed invalidates the reasons that should have compensated the feeling of guilt and helplessness produced by transnational conjugality. In other words, by failing the meaning of the migration strategy, married immigrants lose the main motivation that induced them to live separate from their family. As a result, their feelings of loneliness might intensify and increase their risk of experiencing physical and psychological problems.

In conclusion, our findings provide additional support for studies on transnational families in Italy and offer relevant empirical evidence that might be useful for future research on the subject.

Indeed, we believe that, besides a solid migration project, the interrelations between conjugality and other family dynamics are crucial to a better understanding of practices that regulate long-distance familial relationships.

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## References

Acevedo-Garcia, D., E.V. Sanchez-Vaznaugh, E.A. Viruell-Fuentes, and J. Almeida. 2012. “Integrating Social Epidemiology into Immigrant Health Research: A Cross-National Framework”. *Social Science & Medicine*, 75(12): 2060–2068.

Ambrosini, M. 2020. *Sociologia delle migrazioni* (Terza edizione). Bologna: il Mulino.

Antecol, H., and K. Bedard. 2006. “Unhealthy assimilation: Why do immigrants converge to American health status levels?”. *Demography*, 43(2): 337–360.

Aranda, E. M. 2003. “Global Care Work and Gendered Constraints: The Case of Puerto Rican Transmigrants”. *Gender & Society*, 17(4): 609–626.

Ariza, M. 2014. “Care Circulation, Absence and Affect in Transnational Mothering”. In *Transnational Families, Migration and the Circulation of Care: Understanding Mobility and Absence in Family Life*, edited by L. Baldassar and L. Merla, 94–114. New York, NY, U.S.: Routledge.

Baldassar, L., and L. Merla. 2013. *Transnational Families, Migration and the Circulation of Care: Understanding Mobility and Absence in Family Life*. New York, NY, U.S.: Routledge.

Barbiano di Belgiojoso, E., and L. Terzera. 2018. “Family Reunification - Who, When, and How? Family Trajectories among Migrants in Italy”. *Demographic Research*, 38(28): 737–772.

Beauchemin, C., J. Nappa, B. Schoumaker, P. Baizan, A. González-Ferrer, K. Caarls., and V. Mazzucato. 2015. “Reunifying versus Living Apart Together Across Borders: A Comparative Analysis of Sub-Saharan Migration to Europe”. *International Migration Review*, 49(1): 173–199.

Benach, J., C. Muntaner, C. Delclos, M. Menendez, and C. Ronquillo. 2011. “Migration and ‘Low-Skilled’ Workers in Destination Countries”. *PLoS Med*, 8(6): e1001043.

Berkman, L., I. Kawachi, and M. Glymour. 2014. *Social Epidemiology*. Oxford, UK: Oxford University Press.

Bernhard, J.K., P. Landolt, and L. Goldring. 2008. "Transnationalizing Families: Canadian Immigration Policy and the Spatial Fragmentation of Care-Giving Among Latin American Newcomers", *International Migration*, 47: 3–31.

Bhugra, D., and P. Jones. 2001. "Migration and Mental Illness". *Advances in Psychiatric Treatment*, 7: 216–223.

Borrell, C., C. Muntaner, J. Solà, L. Artazcoz, R. Puigpinós, J. Benach, and S. Noh. 2008. "Immigration and Self-Reported Health Status by Social Class and Gender: The Importance of Material Deprivation, Work Organisation and Household Labour". *Journal of Epidemiology and Community Health*, 62: e7.

Boyle, P.J., H. Kulu, T.J. Cooke, V. Gayle, and C. Mulder. 2008. "Moving and Union Dissolution." *Demography*, 45(1): 209–222.

Bryceson, D.F. 2019. "Transnational Families Negotiating Migration and Care Life Cycles Across Nation-State Borders". *Journal of Ethnic and Migration Studies*, 45(16): 3042–3064.

Bryceson, D., and U. Vuorela. 2002. *The Transnational Family: New European Frontiers and Global Networks*. Oxford, UK: Berg Press.

Caarls, K., and V. Mazzucato. 2016. "Transnational Relationships and Reunification". *Demographic Research*, 34: 587–614.

Carella, M., G. Bellis, and A. Rosano. 2020. "Populations migrantes et santé: inégalités d'accès à l'offre de soins en Italie". In *Población y territorio. España tras la crisis*, edited by J. D. Sempere Souvannavong, C. Cortés Samper, E. Cutillas Orgilés, and J. R. Valero Escandell, 67-82. Granada, Spain: Comares.

Carella, M., T. García-Pereiro, and R. Pace. 2020. "Subjective Well-Being, Transnational Families and Social Integration of Married Immigrants in Italy". *Social Indicators Research*: 1–32.

Chandola, T. 2001. "Ethnic and Class Differences in Health in Relation to British South Asians: Using the New National Statistics Socio-Economic Classification". *Social Science & Medicine*, 52(8): 1285–1296.

Chiswick, B., Y.L. Lee, and P. W. Miller. 2008. "Immigration Selection Systems and Immigrant Health". *Contemporary Economic Policy*, 26(4): 555–578.

Cooke, T. 2008. "Migration in a Family Way". *Population Space Place*, 14: 255–265.

Dito, B., V. Mazzucato, and D. Schans. 2017. "The Effects of Transnational Parenting on the Subjective Health and Well-Being of Ghanaian Migrants in the Netherlands". *Population, Space and Place*, 23(3): e2006.

Donato, K., and E. Duncan. 2011. "Migration, Social Networks, and Child Health in Mexican Families". *Journal of Marriage and Family*, 73(4): 713–728.

Dreby, J. 2007. "Children and Power in Mexican Transnational Families". *Journal of Marriage and Family*, 69: 1050–1064.

Dzúrová, D., and D. Drbohlav. 2014. "Gender Inequalities in the Health of Immigrants and Workplace Discrimination in Czechia". *Biomed Research International*, (1): 480–425.

Fan, F., L. Su, M.K. Gill, and B. Birmaher. 2012. "Emotional and Behavioral Problems of Chinese Left-Behind Children: A Preliminary Study". *Social Psychiatry and Psychiatric Epidemiology*, 45: 655–64.

Fresnoza-Flot, A. 2009. "Migration Status and Transnational Mothering: The Case of Filipino Migrants in France". *Global Networks*, 9(2): 252–270.

Frisbie, W.P., C. Youngtae, and R.A. Hummer. 2001. "Immigration and the health of Asian and Pacific Islander adults in the United States". *American Journal of Epidemiology*, 153: 372–380.

Graham, E., and L. P. Jordan. 2011. "Migrant Parents and the Psychological Well-Being of Left-Behind Children in Southeast Asia". *Journal of Marriage and the Family*, 73(4): 763–787.

Grillo, R. 2007. "Betwixt and between: Trajectories and Projects of Transmigration". *Journal of Ethnic and Migration Studies*, 33(2): 199–217.

González-Ferrer, A., P. Baizán, and C. Beauchemin. 2012. "Child-Parent Separations among Senegalese Migrants to Europe: Migration Strategies or Cultural Arrangements?". *The Annals of the American Academy of Political and Social Science*, 643(1): 106–133.

Haagsman, K. and V. Mazzucato. 2014. "The Quality of Parent–Child Relationships in Transnational Families: Angolan and Nigerian Migrant Parents in The Netherlands". *Journal of Ethnic and Migration Studies*, 40(11): 1677–1696.

Haour-Knipe, M. 2013. "Context and Perspectives: who Migrates and what are the Risks?". *Migration, Health and Inequality*, edited by F. Thomas and J. Gideon. London/New York: Zed Books.

Harrell, F.E., Jr. 2015. *Regression Modelling Strategies: with Applications to Linear Models, Logistic And Ordinal Regression, and Survival Analysis*. New York, NY, U.S.: Springer-Verlag.

Henderson, H.V., and P.F. Velleman. 1981. "Building multiple regression models interactively". *Biometrics*, 37: 391–411.

Hondagneu-Sotelo, P., and E. Avila. 1997. "I'm Here, but I'm There: the Meanings of Latina Transnational Motherhood". *Gender and Society*, 11(5): 548–571.

Horton, S. 2009. "A Mother's Heart Is Weighed Down with Stones: A Phenomenological Approach to the Experience of Transnational Motherhood". *Culture Medicine and Psychiatry*, 33(1): 21–40.

Hou, F., G. Schellenberg, and J. Berry. 2018. "Patterns and Determinants of Immigrants' Sense of Belonging to Canada and their Source Country". *Ethnic and Racial Studies*, 41(9): 1612–1631.

International Organization for Migration. 2020. "Family Migration". *Migration Data Portal* <https://gmdac.iom.int/migration-data-portal>

Jasso, G., D.S. Massey, M.R. Rosenzweig, and J. P. Smith. 2004. "Immigrant Health: Selectivity and Acculturation". In *Critical Perspectives on Racial and Ethnic Differences in Health and Late Life*, edited by N. B. Anderson, R. A. Bulatao, and B. Cohen: 227–266. Washington, D.C., U.S.: National Research Council.

Krieger, N. 2000. "Discrimination and Health". In *Social Epidemiology*, edited by L. F. Berkman and I. Kawachi: 36–67. Oxford: Oxford University Press.



Lam, T., and B.S.A. Yeoh. 2019. "Parental Migration and Disruptions in Everyday Life: Reactions of Left-Behind Children in Southeast Asia". *Journal of Ethnic and Migration Studies*, 45(16): 3085–3104.

Leao, T.S., J. Sundquist, S.E. Johansson, and K. Sundquist. 2009. "The Influence of Age at Migration and Length of Residence on Self-Rated Health Among Swedish Immigrants: A Cross-Sectional Study". *Ethnic Health*, 14(1): 93–105.

Le Gall, J. 2005. "Familles transnationales: Bilan des recherches et nouvelles perspectives". *Les Cahiers du Gres*, 5(1): 29–42.

Lindstrom, M., J. Sundquist, and P. O. Ostergren. 2001. "Ethnic Differences in Self-Reported Health in Malmo in Southern Sweden". *Journal of Epidemiology and Community Health - JECH*, 55(2): 97–103.

Loi, S., and J. Mhairi Hale. 2019. "Migrant Health Convergence and the Role of Material Deprivation". *Demographic Research*, 40(32): 933–962.

Lynam, M. J., and S. Cowley. 2007. "Understanding Marginalization as a Social Determinant of Health". *Critical Public Health*, 17(2): 137–149.

Malmusi, D., C. Borrell, and J. Benach. 2010. "Migration-Related Health Inequalities: Showing the Complex Interactions between Gender, Social Class and Place of Origin". *Social Science and Medicine Journal*, 71(9): 1610–1619.

Mazzucato, V., V. Cebotari, A. Veale, A. White, M. Grassi, and J. Vivet. 2015. "International Parental Migration and the Psychological Well-Being of Children in Ghana, Nigeria, and Angola". *Social Science and Medicine Journal*, 132: 215–224.

Mazzucato, V., and B.B. Dito. 2018. "Transnational Families: Cross-Country Comparative Perspectives". *Population, Space and Place*, 24(7).

Mazzucato, V., B.B. Dito, M. Grassi, and J. Vivet. 2016. "Transnational Parenting and the Well-Being of Angolan Migrant Parents in Europe". *Global Networks*, 17: 89–110.

Mazzucato, V., and D. Schans. 2011. "Transnational Families and the Well-Being of Children: Conceptual and Methodological Challenges". *Journal of Marriage and Family*, 73: 704–712.

Mazzucato, V., D. Schans, K. Caarls, and C. Beauchemin. 2015. "Transnational Families between Africa and Europe". *International Migration Review*, 49(1): 142–172.

Newbold, K.B. 2005. "Self-rated Health within the Canadian Immigrant Population: Risk and the Healthy Immigrant Effect". *Social Science and Medicine Journal*, 60: 1359–1370.

Nielsen, S.S., and A. Krasnik. 2010. "Poorer Self-Perceived Health among Migrants and Ethnic Minorities Versus the Majority Population in Europe: a Systematic Review". *International Journal of Public Health*, 55(5): 357–371.

Nobles, J. 2011. "Parenting from Abroad: Migration, Non Resident Father Involvement, and Children's Education in Mexico". *Journal of Marriage and Family*, 73: 729–746.

Olwig, K.F. 2002. "A Respectable Livelihood: Mobility and Identity in a Caribbean Family". In *Work and migration: Life and livelihoods in a globalizing world*, edited by N. N. Sorenson and K. F. Olwig: 85–105. New York, NY, U.S.: Routledge.

Parreñas, R.S. 2001. "Mothering from a Distance: Emotions, Gender, and Intergenerational Relations in Filipino Transnational Families". *Feminist Studies*, 27(2): 361–390.

Parreñas, R.S. 2005a. *Children of Global Migration: Transnational Families and Gendered Woes*. Stanford, CA, U.S.: Stanford University Press.

Parreñas, R.S. 2005b. "Long Distance Intimacy: Class, Gender and Intergenerational Relations between Mothers and Children in Filipino Transnational Families". *Global Networks*, 5(4): 317–336.

Parreñas, R.S. 2010. "Transnational Mothering: a Source of Gender Conflicts in The Family". *University of North Carolina Law Review*, 88(5): 1825–1856.

Pascoe, E.A., and L. Smart Richman. 2009. "Perceived Discrimination and Health: A Meta-Analytic Review". *Psychological Bulletin*, 135(4): 531–554.

Petrelli, A., A. Di Napoli, M. Perez, and L. Gargiulo. 2017. "Lo stato di salute della popolazione immigrata in Italia". *Epidemiologia & Prevenzione*, 41 (3–4).

Rosano, A., M. Dauvrin, S.C. Buttigie, E. Ronda, J. Tafforeau, and S. Dias. 2017. "Migrant's Access to Preventive Health Services in Five EU Countries". *BMC Health Services Research*, 17(588): 2–11.

Ryan, L., R. Sales, R. M. Tilki, and B. Siara. 2009. "Family Strategies and Transnational Migration: Recent Polish Migrants in London". *Journal of Ethnic and Migration Studies*, 35 (1): 61–77.

Schen, C.R. 2005. "Perspectives: When Mothers Leave their Children Behind". *Harvard Review of Psychiatry*, 13(4): 233–243.

Scheppers, E., E. van Dongen, Jos Dekker, J. Geertzen, and Joost Dekker. 2006. "Potential Barriers to the use of Health Services among Ethnic Minorities: A Review". *Family Practice*, 23(3): 325–348.

Schmalzbauer, L. 2004. "Searching for Wages and Mothering from Afar: the Case of Honduran Transnational families". *Journal of Marriage and Family*, 66: 1317–1331.

White, A., B.B. Dito, A. Veale, and V. Mazzucato. 2019. "Transnational Migration, Health and Well-Being: Nigerian Parents in Ireland and the Netherlands". *Comparative Migration Studies*, 7(44).

Wiking, E., S.-E. Johansson, and J. Sundquist. 2004. "Ethnicity, Acculturation, and Self-Reported Health. A Population Based Study among Immigrants from Poland, Turkey, and Iran in Sweden" *Journal of Epidemiology and Community Health*, 58(7): 574–582.

Zimmerman, C., L. Kiss, and M. Hossain. 2011. "Migration and Health: A Framework for 21st Century Policy-Making". *PLoS Medicine*, 8(5): e1001034.

Zontini, E. 2004. "Immigrant Women in Barcelona: Coping with the Consequences of Transnational Lives". *Journal of Ethnic and Migration Studies*, 30(6): 1113–1144.



# Households' changing structure and consumption: the effect of the economic crisis during the period 2008-2013

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## Abstract

*Between 2007 and 2013, the structure of Italian households was changing, particularly in the central and southern areas of the country. Focussing on this observation, we are interested in studying whether the variations in consumptions expenditures during the 2008-2013 recession related not only to variations in households' propensity to spend but also to changes in households' composition. For this purpose, we refer to average per capita expenditures of different types of households, each weighted by its frequency. We gathered data on expenditures by two categories of consumption goods, namely "Food and Beverages" and "Non-food"; in addition, we used data on the relevance of the household type of the Household Budget Survey carried out by Istat. Our results confirm the difference between the southern areas of the country compared to the others, as well as the relevance of changes in the households' structure consequent to the crisis, particularly in the south of Italy.*

**Keywords:** Household Budget Survey (HBS), per-capita expenditure, economic crisis, households' structure.

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## 1. Introduction

Changes in consumers' behaviours can reflect changes in available resources as well as socio-demographic and cultural developments influencing the structure and the role of households, and consequently of their networks, in society. In this work we focus on the relation between households' structure and private consumptions and on its evolution during the financial and economic crisis started in 2007-2008 that undermined the fundamental role of the households as a social safety net.

Typically, attention is focussed more on the economic disparities across Italian geographical areas, and less on the differences in their socio-demographic indicators and in particular on their households' characteristics. Indeed, the households' dimension shows geographical patterns opposed to those characterising income and GDP, with southern and northwestern areas historically characterised by the highest and the lowest average number of households' members respectively. In the years of the economic crisis, the size of households tended to decrease and converge in all the Italian regions. In addition, the structural characteristics of the households changed. Our goal in this work is to relate the variation in consumption expenses to the variation in the structure of Italian households, emphasising the differences in their temporal patterns in different geographical areas.

For this purpose, we use data arising from the monthly Household Budget Survey (HBS) on current consumption expenditures run by the Italian National Institute of Statistics - Istat between 2007 – the year preceding the economic crisis – and 2013. We consider average monthly households' expenditures, both at the national level and broken down by geographical area. More specifically, we focus on the evolution of per capita average expenditures, calculated accounting for the different types of households – in terms of size and composition – and for their weight (over all households). Indeed, the households' structure and their geographical location – typically reflecting different attitudes and preferences – are both factors possibly influencing consumption behaviours.

The number and the role of household's members is particularly relevant because the expenditures' size and composition depend both on the household's budget and on its characteristics. For example, expenditures on education typically depend on the number of children per household. In addition, household size influences both the expenditures amount and the budget allocation: the average level of expenditures will indeed increase less than proportionally because of economies of scale.

The analysis of consumptions broken down by geographical area allows accounting for cultural differences that are still present despite globalisation and, even more importantly, for the well-known economic differences across Italian regions and areas.

In our analysis, we distinguish between two categories of consumption goods, namely "Food and Beverages" and "Non-food". On the one hand, the considered consumption categories are those more influenced by the households' characteristics. On the other hand, the disaggregation by households' structure and geographic dispersion might lead to less reliable estimates when further detailing the "Non-food" category, because of lower sample sizes and consequent higher standard errors.

Our goal is to study the evolution of per capita average monthly expenditures. To do so, we refer to the weighted average of expenditures by household type (possibly broken down by geographical area and consumption category). This indicator is particularly convenient because it allows decomposing the temporal variations into two main components, one related to changes in household types, one related to changes in the levels and/or in the propensity to consume. A third component, related to the interaction between the two variations is far less relevant compared to the others.

Our approach allows highlighting whether and to what extent changes in the structure of Italian households contributed to the evolution of consumptions across the considered years.

The specific contents of the present paper are organised as follows.

In Section 2 we describe the data. In Section 3 we discuss about the evolution of households' types over time. Section 4 introduces our indicator and its properties. In Section 5 we discuss some insights about consumptions expenditures based on our indicator. In Section 6 we illustrate the effects

of changes of the households' structure on consumption expenditures, and their differences across Italian geographical areas. Section 7 summarises and concludes.

## **2. Data on households and consumptions between 2007 and 2013**

The Household Budget Survey (HBS) carried out by Istat since 1968 aims at providing information on the expenditures incurred by resident households to purchase goods and services exclusively devoted to household and consumption. The survey is based on the classification developed by the United Nations Statistics Division (U.N. 2008) to classify individual consumption expenditures according to their purpose (Classification of Individual COnsumption by Purpose – COICOP). Since 2014, the HBS has been deeply redesigned and replaced by a new version. Among the several radical changes it underwent (Freguja and Romano, 2015; Istat, 2015), it is worth mentioning the different definition of the survey units (households) and the change of the data collection technique from the traditional Paper-and-Pencil Interviewing (PAPI) to the Computer-Assisted Personal Interviewing (CAPI). Furthermore, the classification of consumption expenditures changed from COICOP 2009 to the more detailed COICOP 2013 (Eurostat, 2013); in addition also information about places and times of expenses started to be tracked.

To harmonise data before and after the substantial changes that have been introduced in every stage of the survey production process since 2014, Istat has proceeded to reconstruct the time series of the main expenditure aggregates since 1997. However, aggregates broken down by geographical area are not available. As discussed in the introductory Section, this does not allow accounting for the well-known territorial differences characterising Italy. For this reason, we decided to limit our analysis to data arising from surveys carried out before 2014. Being interested in the evolution of consumptions in the years subsequent to the economic crisis of 2008, we analysed the years from 2007 – preceding the crisis – to 2013, this latter year coinciding with the end of the most critical phase of the crisis.



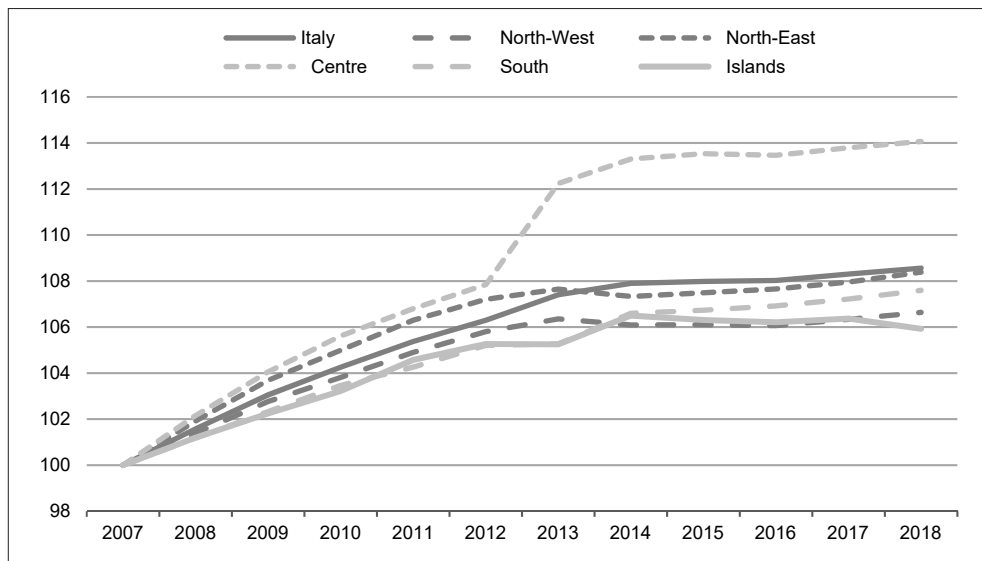
### 3. Households by structure and their evolution over time

The number (in thousands) of Italian households between 2007 and 2013 increased by 7.4%, moving from 23,881 to 25,650. The growth rate slowed down in the following years, and the number (in thousands) of households in 2018 was 25,926, thus increasing only by 8.6% from 2007 (see Figure 3.1). In the same years, the average household size decreased from 2.46 in 2007 to 2.35 in 2013, and remained almost stable afterwards (2.32 in 2018).

Notably, there are some relevant differences across geographical areas. As shown in Figure 3.1, the temporal patterns of the number of households and of their average size in the five Italian areas are similar until 2012. However, for the Centre these figures show a very distinctive behaviour between 2012 and 2014: a substantive increase in the number of households corresponding to a decrease in their average size. More precisely, the percentage increase of the number of households in the Centre from 2007 to 2013 was about 12.2%, much larger than the increase registered in the North-East (7.4%, aligned with the increase registered at the national level), in the North-West (6.4%) and – even more – in the South and in Islands (about 5.3%). Correspondingly, the decrease in the average household size was higher and faster in the Centre (–6.4%) compared to the other areas. A lower decrease was observed in the South and Islands (–4.5%), characterised nonetheless by higher averages in 2007. As a matter of fact, the decrease was much lower in the North-West and in the North-East (about –2.5%), characterised by the lowest average sizes in 2007.

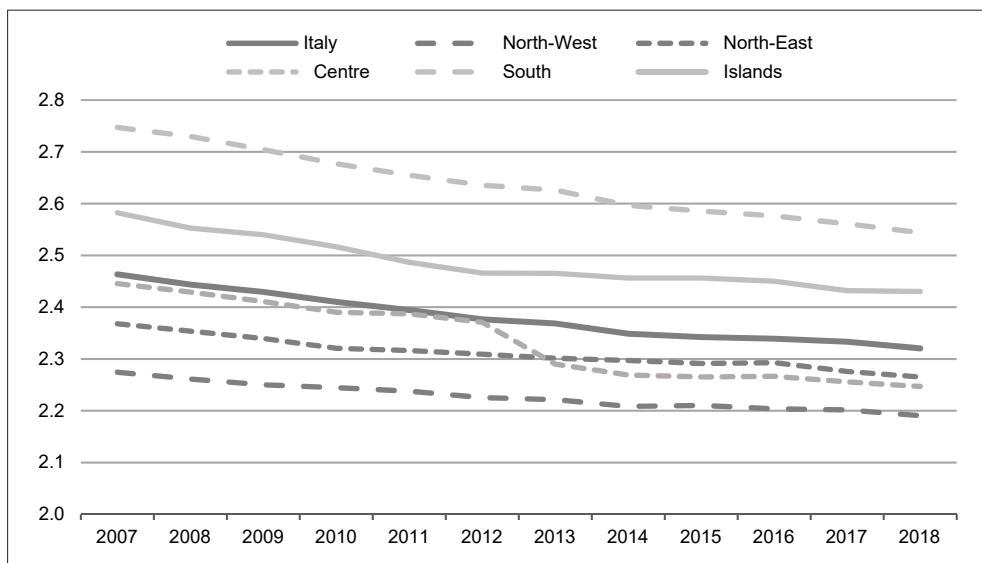
The difference between the Centre and the other areas might be attributed to adjustments and revisions due to the comparisons between the results of the Italian General Population and Housing Census and the Population Registers, used to review the Population Registers within each Municipality. Indeed, after 2014 the temporal evolution of the considered indicators in the different areas is rather homogeneous.

**Figure 3.1.A - Number of households (Index number, base: 2007=100)**



Source: Authors' calculation on HBS data

**Figure 3.1.B - Average household size between 2007 and 2018**



Source: Authors' calculation on HBS data

A number of demographic and socio-economic factors underlying the changes in the structure of Italian households were identified (see, among others, Malagoli Togliatti and Lubrano Lavadera, 2002; Zanatta, 2008; Ghigi and Impicciatore, 2015). One of the most important is surely the overall decrease in the fertility rate that, together with the increase in the average age at childbirth, led to a decrease of the number of households with children. In addition, more recently, there has been an increase in the levels of inward and outward mobility, possibly triggered by the crisis (Pace and Mignolli, 2016).

This implied, particularly in the southern areas (*Mezzogiorno*), a further decrease of the number of youths in the country, with a consequent decrease of the average household size, despite the Italian youngsters' relevant delay in home leaving. The population ageing (De Rose and Strozza, 2015) has resulted in a substantial increase in the relative size of the elderly population – with a high percentage of women because of the gender differential in mortality – often living alone, also because of widowhood (Maccheroni, 2014). In such context, the increasing marital instability (Vignoli *et al.*, 2011) led to an increase both in the number of one-person households, and in the number of other types of households, with a consequent increase of the number of households and of their variety.

All the mentioned changes reflect a cultural process resulting in convergence trends of the socio-demographic behaviour. This is evident in the narrowing range of the average household sizes in the Italian areas (between 2.2 in North-West and 2.6 in the South in 2013) despite the long lasting socio-economic differences.

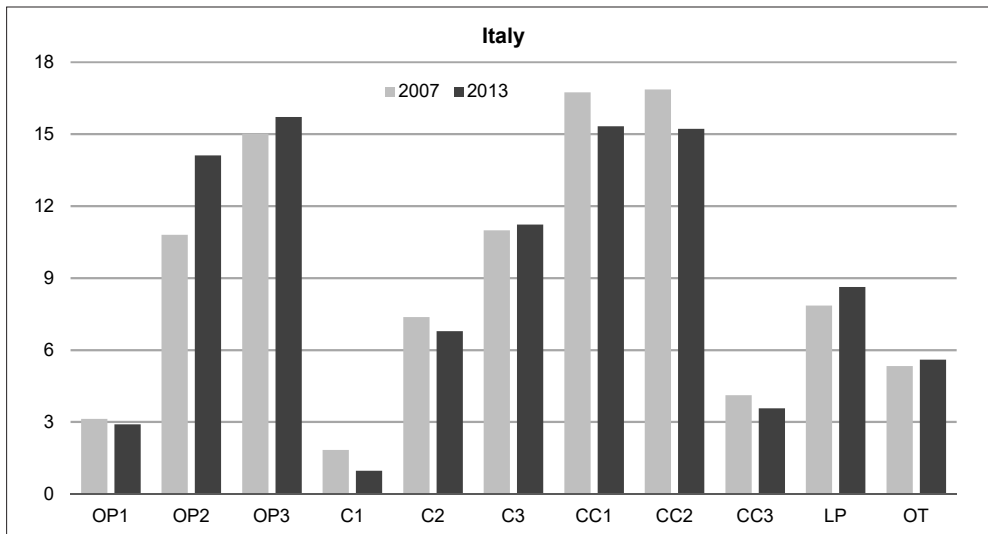
Figure 3.2 compares the distribution of the types of households in 2007 and 2013. In particular, we rely on the following categorisation (Budano and Demofonti, 2010):

- Single-person households with household reference person (HRP) aged less than 35 (OP1);
- Single-person households with HRP aged 35-64 (OP2);
- Single-person households with HRP aged 65 or more (OP3);
- Couple without children, with HRP aged less than 35 (C1);

- Couple without children, with HRP aged 35-64 (C2);
- Couple without children, with HRP aged 65 or more (C3);
- Couple with 1 child (CC1);
- Couple with 2 children (CC2);
- Couple with 3 children or more (CC3);
- Single-parent households (LP);
- Other types of households (OT) (including households whose members are not related by marriage, union, birth, or adoption, extended families, and households with more than one family nucleus).

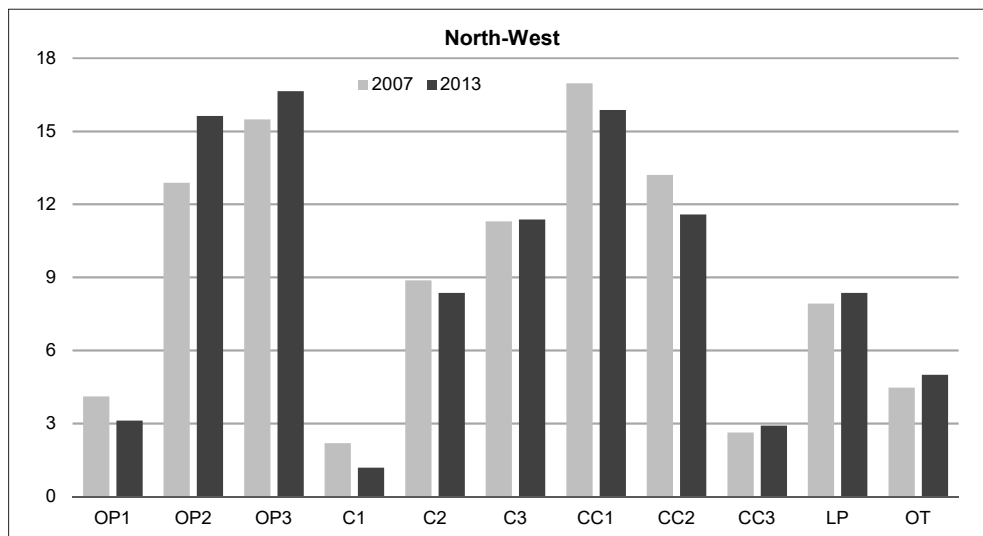
The considered characterisation combines the household's structure with the age of the reference person, thus allowing a transversal overview (Rosina and De Rose, 2017) of the stages of the family life cycle. As mentioned before, the different types of households taken into account are expectably characterised by different consumption habits, volumes and expenditures.

**Figure 3.2 - Distribution of households' types in 2007 and in 2013, at the national level and by geographical areas. Italy**



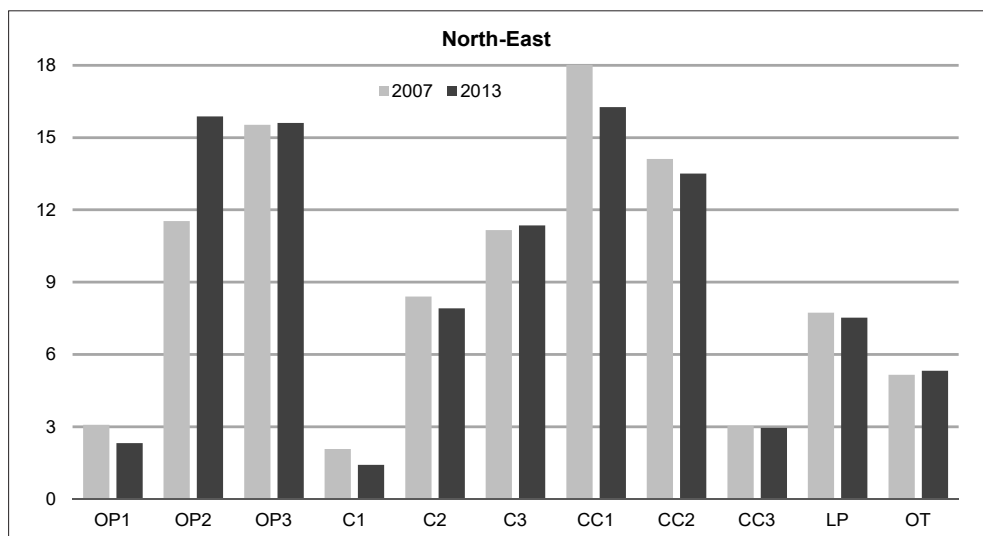
Source: Authors' calculation on HBS data

**Figure 3.2 continued - Distribution of households' types in 2007 and in 2013, at the national level and by geographical areas. North-West**



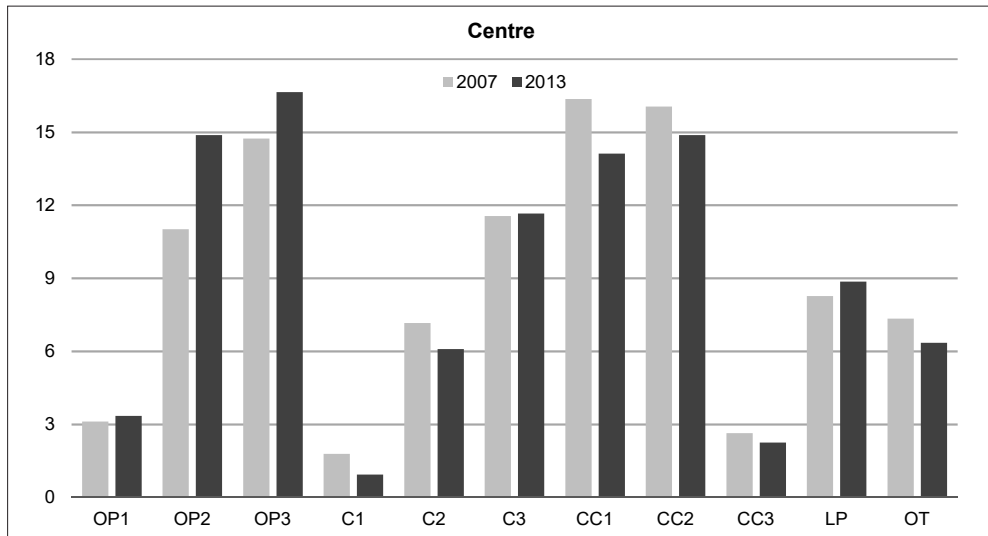
Source: Authors' calculation on HBS data

**Figure 3.2 continued - Distribution of households' types in 2007 and in 2013, at the national level and by geographical areas. North-East**



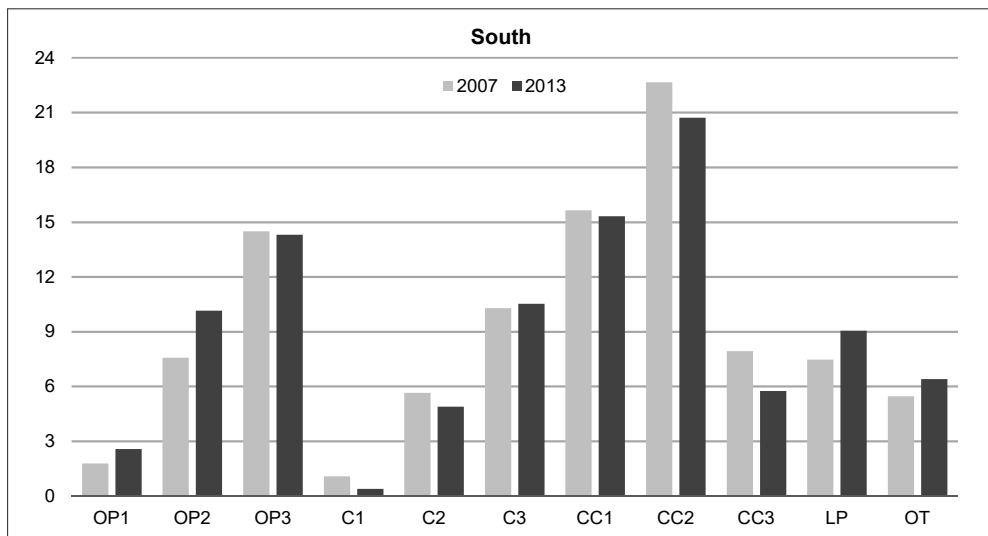
Source: Authors' calculation on HBS data

**Figure 3.2 continued - Distribution of households' types in 2007 and in 2013, at the national level and by geographical areas. Centre**

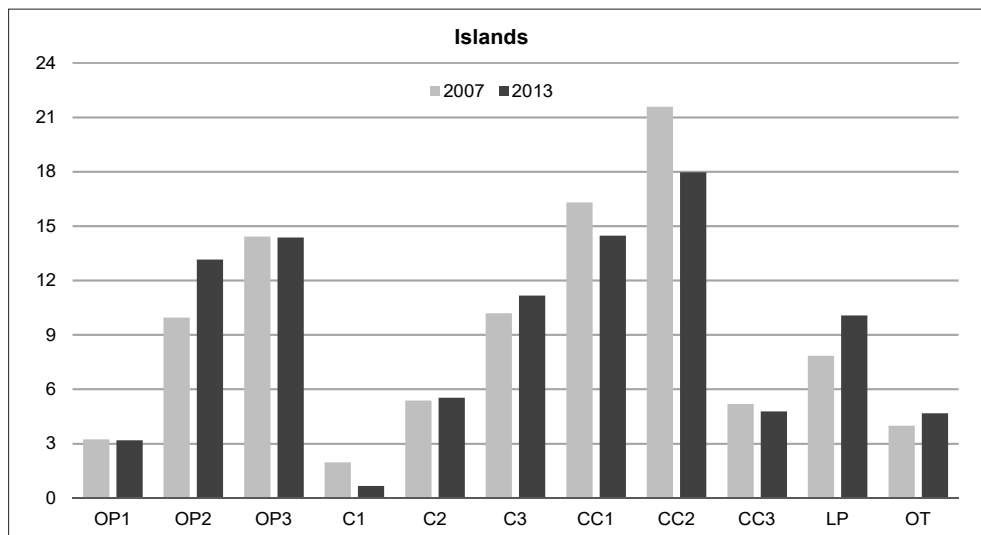


Source: Authors' calculation on HBS data

**Figure 3.2 continued - Distribution of households' types in 2007 and in 2013, at the national level and by geographical areas. South**



Source: Authors' calculation on HBS data

**Figure 3.2 continued - Distribution of households' types in 2007 and in 2013, at the national level and by geographical areas. Islands**

Source: Authors' calculation on HBS data

Between 2007 and 2018 there were five types of households prevailing in each geographical area, accounting together for nearly 70% of all households. More precisely, their relevance slightly increased between 2007 and 2013 to settle at the initial levels in 2018.

The most relevant types were those with one single person aged 35-64 or 65 and more, prevailing respectively in metropolitan areas and in smaller municipalities. Indeed one-person households constituted at least 30% of the overall household types (Figure 3.2). The next most relevant types were couples (with HRP of any age) living with one or two children, even if their relevance steady declined over time, suggesting that in Italy households with children were becoming less and less dominant. The last most relevant type were households with couples with HRP aged 65 or more, living without children. Since 2014, this was the most frequent type of household in northern and central Italy, whereas in the South the modal type was the couple with two children. In this framework, it is also worth highlighting the relatively higher frequency of single-parent households in the South and Island.

Indeed, possibly because of the crisis, these areas showed a higher tendency of children to return home and live with their lone parent, with a consequent increase of this type of households. The crisis could also have been responsible of the slight increase of the relevance of other types of households over time (Figure 3.2).

The trends described above, notwithstanding their convergence, had different impacts in the different Italian areas, and implied different variations in the structure of their households (Figure 3.2). In the next sections, we will focus specifically on the different effects of such variations on the temporal evolution of per capita expenditures.

The Household Budget Survey (HBS) conducted by Istat provides information for the different types of households about their number and the total amount spent in each of the considered consumption categories. For those households types with a varying number of components (for example, couples with 3 or more children) the average number of components is available. Based on such information it is therefore possible to evaluate average per capita expenditures for each type of household, and as well as their weighted average.

#### 4. Defining an indicator of per capita expenditures: our approach

The household's consumption expenditure reflects the related family care for its members. Under this perspective, the average per capita expenditures of household members is often employed as an indicator of absolute and relative poverty (see, among others, Carbonaro, 2002).

Per capita expenditures ( $PE$ ) at time  $t$  are expressed by the ratio between households' total expenditures and the total number of individuals living in households. Such quantity can also be regarded as the average of per capita expenditures of each type of household,  $a_i^{(t)}$ , weighted by the proportion of individuals living in each type of household (among those living in households),  $c_i^{(t)}$  :

$$PE^{(t)} = \sum_{i=1}^n a_i^{(t)} c_i^{(t)} \quad (4.1)$$



where  $n$  is the number of households types and  $\sum_{i=1}^n c_i^{(t)} = 1$ .

Nonetheless, our goal is to identify what are the consequences of the changes in households' structures on consumption expenditures. Actually, as discussed before, households' structure varied much more than the number of households' members. In summary, the number of households increased by 7.4% between 2007 and 2013, whereas the number of persons living in households increased by only 1.03%.

Based on these considerations, we introduce here a summary index,  $\bar{E}_{PC,W}^{(t)}$  (weighted per capita average expenditure), based both on the socio-demographic characteristics of households and on their level of expenditures,  $a_i^{(t)}$ . More precisely,  $\bar{E}_{PC,W}^{(t)}$  is the average of per capita expenditures of each type of household,  $a_i^{(t)}$ , weighted by the frequency of type of household,  $f_i^{(t)}$  in a given area:

$$\bar{E}_{PC,W}^{(t)} = \sum_{i=1}^n a_i^{(t)} f_i^{(t)} \quad (4.2)$$

where  $\sum_{i=1}^n f_i^{(t)} = 1$ .

As we will show in the following, the analysis of the temporal evolution of  $\bar{E}_{PC,W}^{(t)}$  (with  $t = 2007, 2008, \dots, 2013$ ) allows a deeper evaluation of the consumption dynamics compared to the properly said per capita expenditure, which corresponds to the expenditures of a generic household with an average number of members.

Turning again attention to equation (4.2), we highlight that  $\bar{E}_{PC,W}^{(t)}$  can be regarded as a "crude rate" whose sequence of variations over time can be studied referring to an additive decomposition model. Such model emphasises the role played by the variations in the propensity to consume, by the variation in the households' structure and by the interaction of such variations (Oaxaca, 1973; Biewen, 2012; Maccheroni, 2018).

Specifically, it considers the values of the indicator at time 0 and at time  $k$ ,  $\bar{E}_{PC,W}^{(0)}$  and  $\bar{E}_{PC,W}^{(k)}$  (where  $k$  is a positive integer), calculated for a certain population. The variation of the index between the two periods (in temporal sequence) can be expressed as:

$$\Delta \bar{E}_{PC,W}^{(k)} = \bar{E}_{PC,W}^{(k)} - \bar{E}_{PC,W}^{(0)} = \sum_{i=1}^n f_i^{(0)} [a_i^{(k)} - a_i^{(0)}] \quad (4.3)$$

$$= \sum_{i=1}^n a_i^{(0)} [f_i^{(k)} - f_i^{(0)}] \quad (4.4)$$

$$= \sum_{i=1}^n [f_i^{(k)} - f_i^{(0)}] [a_i^{(k)} - a_i^{(0)}] \quad (4.5)$$

The three terms above decompose the change in the indicator by identifying three sources of variation. The first term (4.3) summarises the impact of variations in the households' average per capita expenditures from 0 to  $k$ . Such difference reflects changes in consumption spending behaviour or in the propensity to spend for consumption that would be observed *if* the structure of the households remained unchanged from one period to another. In other terms, it is the difference between two “ $\bar{E}_{PC,W}$  standardised rates”, calculated using the same weighting system, and as such it is not affected by changes in the households' structures.

The second term (4.4) summarises the impact of changes occurred in the households' structure between the periods 0 to  $k$  in the case when average per capita expenditures remain constant and equal to the levels at time 0. It is again the difference between two “ $\bar{E}_{PC,W}$  standardised rates” calculated in the two considered periods, assuming that average per capita expenditures remain unchanged over time.

The last term (4.5) accounts for the interaction between the variations in the relevance of households' types and in their propensity to consume.

To better appreciate the role of each element in the model, the variation [ $\bar{E}_{PC,W}^{(k)} - \bar{E}_{PC,W}^{(0)}$ ] as well as its three components (4.3), (4.4), and (4.5) can be evaluated both in absolute terms and relative to  $\bar{E}_{PC,W}^{(0)}$ .

It is worth underlining that there is a significant positive relation between the variation of average expenditures and the variation of our indicator. Thus, our indicator offers an interesting and more articulated perspective on the evolution of consumption expenditures without losing substantive information on the more traditional indicator of average monthly expenditure.

## 5. Some preliminary considerations on consumptions expenditures between 2007 and 2013

Istat regularly produces reports containing detailed analytic information on the temporal evolution of consumptions expenditures in Italy<sup>3</sup>. As an introduction to our analyses, we offer an overview of the results obtained both at the national level and by geographical area.

**Table 5.1 - Average monthly consumption expenditures by geographical area between 2007-2013 (Index number, base: 2007=100)**

	2007	2008	2009	2010	2011	2012	2013
Total							
Italy	100.0	100.2	98.5	98.9	100.3	97.5	95.1
North-West	100.0	100.2	100.0	100.0	103.7	98.9	96.7
North-East	100.0	100.8	97.5	99.9	98.9	98.5	95.8
Centre	100.0	100.7	99.3	100.0	101.5	98.9	95.9
South	100.0	98.6	96.5	96.3	97.4	94.1	92.1
Islands	100.0	99.8	96.2	94.0	93.4	92.5	89.6
Food and beverages							
Italy	100.0	101.9	98.9	100.1	102.3	100.4	98.8
North-West	100.0	103.7	101.9	102.0	105.0	102.0	101.4
North-East	100.0	102.5	100.5	103.9	105.7	104.7	102.7
Centre	100.0	101.4	97.3	97.3	97.7	99.8	98.4
South	100.0	99.9	97.0	98.6	100.4	96.1	93.9
Islands	100.0	101.3	95.0	96.8	102.3	99.5	96.2
Non-food							
Italy	100.0	99.8	98.4	98.7	99.9	96.9	94.3
North-West	100.0	99.5	99.7	99.6	103.4	98.3	95.8
North-East	100.0	100.5	97.0	99.2	97.6	97.3	94.6
Centre	100.0	100.6	99.8	100.6	102.4	98.7	95.4
South	100.0	98.2	96.3	95.5	96.5	93.5	91.5
Islands	100.0	99.4	96.6	93.1	90.6	90.3	87.5

Source: Authors' calculation on HBS data

As mentioned before, our analysis starts in 2007, the year before the crisis, when a financial crisis started in the USA and subsequently spread towards Europe and became an economic and budgetary crisis.

<sup>3</sup> Please refer to [www.istat.it](http://www.istat.it) for details. Information on consumptions can also be gathered from the survey on Household Income and Wealth carried out by Bank of Italy (<https://www.bancaditalia.it/publicazioni/indagine-famiglie/index.html>). Nonetheless, results from this survey are more aggregated compared to those made available by Istat.

A number of countries, among which Italy, with a less economically sound basis and with a high level of public debt, were hardly affected by the crisis (Brandolini, 2014).

At the national level, the crisis had a relevant impact on consumptions, particularly between the end of 2008 and the beginning of 2009, because of the fall in the purchasing power and due to the loss of income first and later, between 2011 and 2013, because of inflation. *Confcommercio* (the Italian General Confederation of Enterprises, Professions and Self-Employment) declared that 2012 was in fact the darkest year for consumptions<sup>4</sup>, and Istat (2014) registered a further increase of absolute poverty compared to 2011, a year already characterised by a significant deterioration of the economic situation.

Eventually, 2013 recorded the minimum average monthly expenses, with an increasing decline moving from the North-West to the Islands (Table 5.1).

Within this context, the crisis affected the expenses in food and beverages to a lesser extent, because goods for primary needs are typically difficult to reduce. Indeed, in some geographical areas, such as the Islands and the North-East, the share of expenses for this category of products slightly increased compared to other areas. During the considered period, the percentage of expenses in food and beverages ranged between 16% and 19% in northern and central Italy, and peaked to 25% in the South and to 27% in the Islands.

Since the variation of the share of expenses in food and beverages is inversely proportional to the income level, geographical areas with different (average) income levels - notably northern-central versus southern areas - were characterised by different levels and composition of consumption expenses and, therefore, of material living conditions (Table 5.1).

The highest share of household consumption expenditures is usually spent in non-food goods, whose level of consumption varies more along the life course.

Since this kind of goods is also more affected by the economic cycle compared to the other type, non-food products turned out to be the category most affected by the crisis, particularly in the South and in the Islands (Table 5.1).

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4 See <https://www.confcommercio.it/-/2012-l-annus-horribilis-dei-consumi>, and the results of the survey carried out by Censis (2012).

Table 5.1 highlights the geographical differences in the expenses in food and non-food products, with a particularly high decrease over time registered in the southern regions. Even so, some common traits in the expenses by type of household are worth being pointed out (see Table 5.2).

As already mentioned in Section 3, the first eight household types -from OP1 to CC3 - have a specific number of members, whereas for the other three types (namely couples with 3 or more children, single-parent and other types of household) the number of members is registered. Based on information about the average size of such types of households, it is therefore possible to determine per capita average expenses of all types of households. To evaluate the variation in the level of expenses from one year to another, we refer to an average annual rate of variation (for years between 2007 and 2013), namely the geometric mean (see Table 5.2).

Such rate coincides with the rate of variation of per capita expenses for household types from OP1 to CC2.

This does not hold perfectly for the last three types of households, even if the rates and the slopes of the linear trend have the same sign. Indeed, between 2007 and 2013 the average monthly expenses showed a decreasing linear pattern – particularly in the South and in the Islands (Table 5.1).

Nonetheless, even if 2013 registered the minimum level of average expenses in all the geographical areas, some household types, namely OP3 and C3, experienced instead an increase in the expenditures, whereas others, specifically OP1, showed a very unstable trend (Table 5.2)<sup>5</sup>.

Combining the results in Table 5.1 with those in Table 5.2, it is possible to conclude that the most penalised households were those with the youngest reference persons (C1) living in the South and in the Islands, where the expenditures in “non-food” products decreased at an annual rate of 6.48% and 4.61% respectively.

Similar considerations hold for larger households (CC3) and for the other types of households (OT), particularly in the Islands (with an annual rate of decrease equal to 5.46%).

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5 In this case, the average rate is close to zero (Table 5.2).

**Table 5.2 - Average annual rate (%) of variation (\*) in the average monthly expenditures between 2007 and 2013 by type of household and by  $\bar{E}_{PC,W}$  for all the types**

TYPE OF HOUSEHOLD	Italy	North-West	North-East	Centre	South	
	Total					
OP1	-0.80	-0.15	-0.88	-0.10	-2.39	0.21
OP2	0.43	1.24	0.80	0.70	-1.71	-2.09
OP3	2.64	2.61	2.60	2.60	2.19	2.18
C1	-0.34	0.72	-3.16	0.56	-5.49	-3.96
C2	-1.41	-1.38	-0.17	-2.56	-2.76	-1.24
C3	1.18	1.93	1.62	0.22	0.30	1.28
CC1	-0.91	-0.51	-1.36	-1.11	-0.52	-1.42
CC2	-1.62	-1.86	-2.22	-0.45	-1.75	-2.78
CC3	-1.76	-2.86	-3.47	-1.02	-0.88	-4.15
LP	-1.32	-2.13	-0.48	0.48	-1.89	-1.11
OT	-1.64	-0.69	-1.19	-1.66	-1.52	-4.82
All types	-0.83	-0.55	-0.71	-0.69	-1.37	-1.81
$\bar{E}_{PC,W}$	0.56	0.61	0.75	1.06	-0.14	-0.32
	Food and beverages					
OP1	0.50	0.93	-1.07	0.76	-0.19	-0.69
OP2	0.70	0.90	1.57	1.09	-0.41	-0.64
OP3	2.39	2.54	3.15	2.54	1.65	0.89
C1	0.73	1.37	1.59	-0.89	-2.13	0.56
C2	-0.26	0.54	-0.38	-1.06	-1.67	1.70
C3	0.82	1.15	1.50	0.79	-0.64	1.38
CC1	-0.26	-0.39	0.22	0.04	-1.09	0.20
CC2	-0.64	0.07	-0.25	-0.63	-0.93	-1.94
CC3	-1.09	-2.37	-1.79	0.44	-0.74	-0.72
LP	-0.34	-0.47	0.71	-0.48	-1.45	0.79
OT	-0.33	0.57	0.98	-0.71	-0.52	-2.97
All types	-0.20	0.24	0.44	-0.28	-1.05	-0.64
$\bar{E}_{PC,W}$	1.01	1.16	1.58	1.40	0.14	0.49
	Non-food					
OP1	-1.05	-0.34	-0.85	-0.27	-2.93	0.46
OP2	0.38	1.30	0.68	0.62	-2.07	-2.49
OP3	2.71	2.62	2.48	2.61	2.39	2.65
C1	-0.52	0.63	-3.87	0.79	-6.48	-4.61
C2	-1.65	-1.73	-0.13	-2.90	-3.10	-2.11
C3	1.28	2.12	1.65	0.06	0.65	1.25
CC1	-1.05	-0.53	-1.64	-1.38	-0.34	-1.96
CC2	-1.85	-2.25	-2.57	-0.41	-2.01	-3.06
CC3	-1.94	-2.96	-3.80	-1.39	-0.93	-5.46
LP	-1.56	-2.49	-0.69	0.72	-2.04	-1.75
OT	-1.99	-0.98	-1.63	-1.92	-1.89	-5.46
All types	-0.98	-0.72	-0.92	-0.79	-1.47	-2.20
$\bar{E}_{PC,W}$	0.46	0.50	0.60	0.98	-0.23	-0.58

Source: Authors' calculation on HBS data  
(\*) Geometric mean.

It is nonetheless important to note that in the South and in the Islands the relative frequency of youngest couples without children (C1) is very low and decreased over time. This makes the estimates based on the survey less reliable.

Conversely, as noted before, there are some homogeneous behaviours across the geographical areas: the average annual variation of expenditures in non-food products by single-person households with older reference persons (OP3) is quite aligned for the different areas.

In addition, for this type of households, as well as for older couples without children, (C3) an increase in the level of expenditures can be noted. These results indicate that in Italy households with older members are protected more than those with younger ones are. Indeed, as underlined by Istat (2014), between 2007 and 2012 only the households with pensioners were able to maintain their level of monthly consumption, thanks to the financial security granted by the retirement income.

Thus, pension incomes contribute more than in the past to determine also the economic conditions of the other household members, impairing social mobility.

Finally, from results in Table 5.2 it can be noted that relevant differences exist between average expenses (All types), and per capita weighted average expenses  $\bar{E}_{PC,W}$ . Expenditures in food and beverages recorded an increasing pattern only in northern Italy when considering (All types), whereas  $\bar{E}_{PC,W}$  turned out to be increasing in the whole country. As for the other categories of goods (namely non-food and total), average expenditures decreased across all the geographical areas, whereas per-capita weighted average expenditures were decreasing only in the South and in the Islands.

## 6. The evolution of per capita average expenses and of its component between 2007 and 2013

As already remarked, in 2013 the current average expenses of Italian households was not back to the levels registered in 2007, despite the increasing patterns observed in some years, particularly in the North-West.

As previously anticipated, when attention is focussed on per capita average expenses, we find a better situation for the Centre-North area instead (Table 5.2). Under this perspective, the decomposition in Section 4 offers a detailed inspection and analysis of the temporal evolution of the expenses and of its three sources of variation (equations 4.3-4.5).

Focussing on per capita expenses is convenient because it highlights the peculiar situation of the expenses in food and beverages for the northeastern households.

In fact, as illustrated in Table 6.1, in this area the level of expenses is lower and for some types of households it is even lower than in the rest of Italy, Islands excluded. Conversely, the level of the expenditures in non-food goods is generally higher, particularly when compared with southern areas that show the lowest levels over the entire period of observation (and across all types of households).

Table 6.1 also emphasises relevant differences in the levels of per capita expenditures for different types of households, notably one-person households in the South, which are indeed at higher risk of poverty (Istat, 2014). To better assess and analyse such differences, in Table 6.2 we report the coefficients of variation, summarising the dispersion of per capita expenditures across the considered years and in the different areas<sup>6</sup>.

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<sup>6</sup> Please note that we use the coefficient of variation rather than the well-known standard deviation, because the latter has a unit of measurement and a value possibly depending on the average of the phenomenon of interest. This would impair the comparison of the levels of dispersion, because the levels of expenditures change consistently across types of household and geographical areas.



**Table 6.1 - Annual average (from 2007 to 2013) of per capita expenditures by type of household and geographical areas (index number, base: Italy=100)**

	OP1	OP2	OP3	C1	C2	C3	CC1	CC2	CC3	LP	OT
Total											
Italy	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
North-West	112.6	109.4	113.7	111.6	110.6	115.8	115.6	120.7	128.9	119.3	119.2
North-East	112.4	114.7	113.4	109.4	112.2	114.5	115.0	120.0	123.6	117.8	117.4
Centre	98.6	101.1	107.2	98.5	101.6	101.7	101.9	105.6	110.7	105.2	105.0
South	83.6	76.8	74.8	72.6	74.1	73.5	77.5	80.3	82.9	75.0	74.8
Islands	72.7	69.7	69.8	63.9	69.3	71.0	69.1	71.3	69.9	69.9	70.7
Food and beverages											
Italy	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
North-West	107.0	102.2	105.1	101.1	101.6	105.9	104.0	103.9	103.9	108.3	107.5
North-East	90.0	94.7	99.0	90.0	95.2	100.1	95.0	95.5	94.6	95.2	96.3
Centre	99.6	104.0	103.7	100.0	103.1	102.3	101.7	102.7	104.1	103.9	102.9
South	102.7	101.9	95.7	112.7	103.2	94.4	101.1	100.6	102.5	97.2	97.1
Islands	95.2	92.9	88.2	103.4	95.1	88.3	93.4	93.3	91.6	90.1	89.4
Non-food											
Italy	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
North-West	113.8	110.8	116.0	113.3	112.5	118.5	118.3	124.7	135.6	121.9	122.4
North-East	116.8	118.6	117.3	112.7	115.8	118.5	119.5	125.8	131.4	123.3	123.0
Centre	98.5	100.5	108.1	98.3	101.3	101.6	101.9	106.3	112.5	105.5	105.6
South	79.9	71.9	69.1	65.9	68.1	67.8	72.1	75.5	77.6	69.7	68.8
Islands	68.3	65.1	64.8	57.2	63.9	66.3	63.6	66.1	64.0	64.9	65.7

Source: Authors' calculation on HBS data

**Table 6.2 - Coefficients of variation (%) of per capita expenditures in the households' types (\*) by geographical areas. Years 2007-2013**

	2007	2008	2009	2010	2011	2012	2013
	Total						
Italy	32.92	33.72	34.23	34.58	35.00	35.53	37.62
North-West	26.84	29.46	30.62	30.99	32.11	31.50	32.78
North-East	30.42	30.96	32.52	33.10	32.12	32.61	37.22
Centre	32.14	32.77	32.20	33.11	33.79	36.24	36.02
South	35.51	34.25	32.75	35.84	34.43	37.78	36.43
Islands	37.41	35.86	35.31	32.86	32.34	35.48	40.20
	Food and beverages						
Italy	27.86	28.32	28.31	30.45	29.82	32.11	32.65
North-West	25.97	27.27	26.50	29.87	29.55	29.24	30.71
North-East	27.12	27.98	27.58	31.43	30.38	30.50	33.09
Centre	27.34	28.77	28.69	29.99	30.12	34.28	31.72
South	30.27	29.82	28.82	30.42	29.72	34.54	34.12
Islands	31.57	26.07	30.65	29.47	27.22	34.97	33.26
	Non-food						
Italy	34.68	35.65	36.15	36.08	36.72	36.69	39.22
North-West	27.67	30.77	32.03	31.88	33.25	32.30	33.63
North-East	31.99	32.11	34.04	34.14	33.18	33.48	38.89
Centre	33.66	34.24	33.57	34.17	34.92	37.02	37.40
South	37.94	36.49	34.81	38.25	36.56	39.15	37.54
Islands	39.78	39.77	37.21	34.34	34.57	35.89	42.73

Source: Authors' calculation on HBS data

(\*) See Table 6.1.

During the considered years, the recession and the economic crisis were accompanied by an increase in disparities in the income distribution (Istat 2013a, Ceccarelli et al, 2008) in every geographical area, with a consequent negative impact on consumption expenditures. This led to increasing differences in the socio-economic conditions across different types of households, particularly severe in the most disadvantaged areas and specifically in southern Italy. Indeed, the values of the coefficients of variation suggest that the differences observed in the levels of the indicator  $\bar{E}_{PC,W}$ , which reflect the different levels of disposable income, increased over time everywhere but particularly in the Islands (Table 6.2).

This is evident especially with respect to the expenditures in “non-food” goods, which are more influenced by the economic cycle. Notably, the maximum coefficient of variation is observed in this category of expenses, in the Islands in 2013 (Table 6.2).

Further interesting considerations arise from the analysis of the annual variation of the indicator  $\bar{E}_{PC,W}$  broken down by its components – reported in Figures 6.1.A, 6.1.B and 6.1.C at an aggregate level and by good category.

Focussing first on the geographical differences, they are mostly due to the first dramatic decrease of the expenditures in the northwestern area between 2011 and 2013, whereas in the previous years the other areas recorded the most pronounced drops, particularly the South and the Islands. Specifically, in the Islands the crisis was deeper and lasted longer compared to other areas, as one can appreciate from expenditures in “non-food” products (Figure 6.1.C).

Turning to the components of the variation of  $\bar{E}_{PC,W}$  from one year to another (equations 4.3, 4.4, and 4.5), it is first interesting to observe the low and almost stable relevance (in %) of the interaction between the component related to the changes in the propensity to spend, that is connected to the changes in the households composition.

As for the expenditures in “food and beverages” (Figure 6.1.B), in the central area, the profile of the expenditures variations dramatically differs from that characterising northern and southern areas, which are more similar.

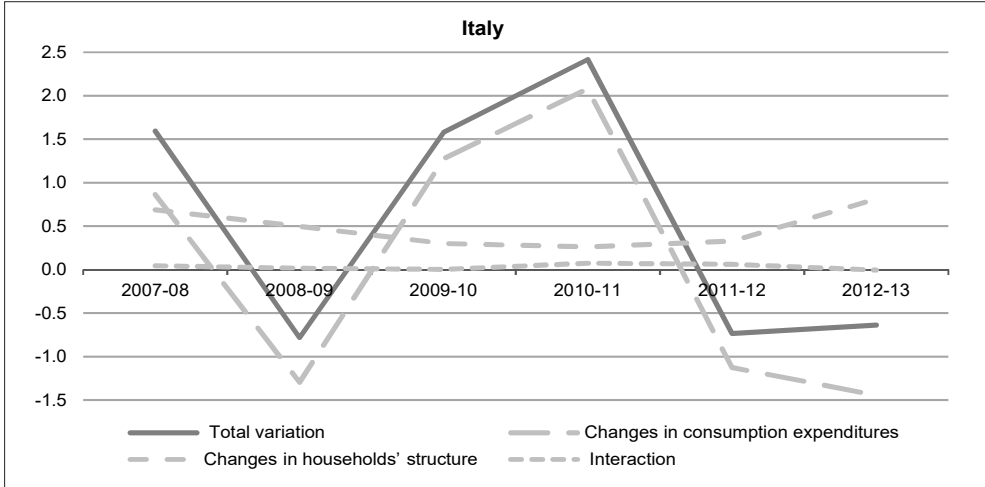
In general, the fluctuations between 2007 and 2013 relate only to the propensity to spend in northern Italy, and particularly in the North-West, with a distinctive decrease in these expenditures between 2008 and 2009. This is less evident in the rest of the country (Figure 6.1.B).

Different considerations hold for expenditures in “non-food” goods, which account for a relevant proportion of total expenditures (Figure 6.1.C). Again, notable differences can be appreciated at the geographical level.

Higher income areas with slight changes in the composition of households – such as the North-West – show variations highly determined by the changes in the propensity to spend, which follows the cyclical trend. On the contrary, the almost negligible role played by the variations in the households’ structure in this area acted as a brake to expenditures more than in other areas. Instead, moving from the North-East to the South and Islands, we find again that changes in the households’ structural characteristics increasingly contributed to mitigate the expenditures decrease during the crisis and to increase their level afterwards.

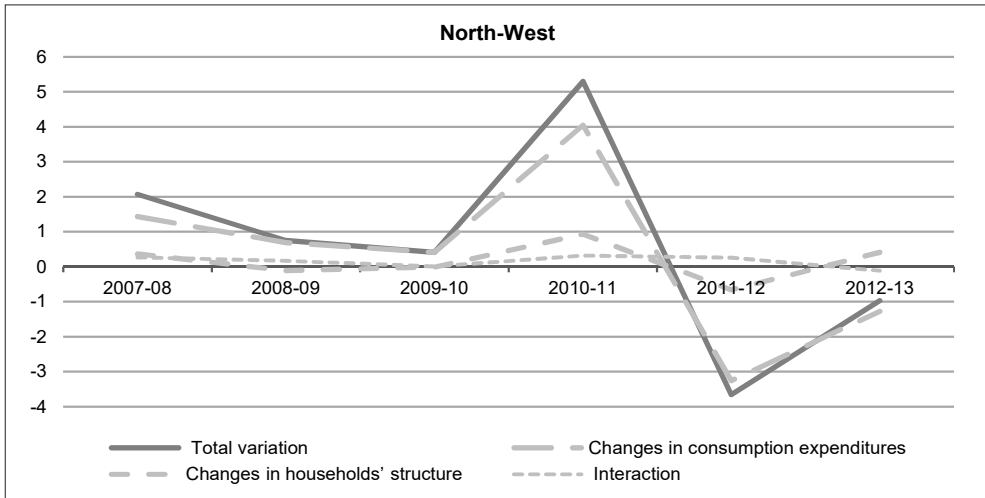
Actually, the most dramatic changes in the households’ structure occurred in the central and in the southern areas. The rapid increase of the number of households with an older reference person – where the retirement income granted financial security and offered protection from the impact of the crisis (Istat, 2014) – was accompanied by a decrease in the number of households with two or more children, who instead sharply reduced their expenditures.

**Figure 6.1.A - Relevance (%) of the three components of the annual variation of per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area. Total expenditures. Italy**



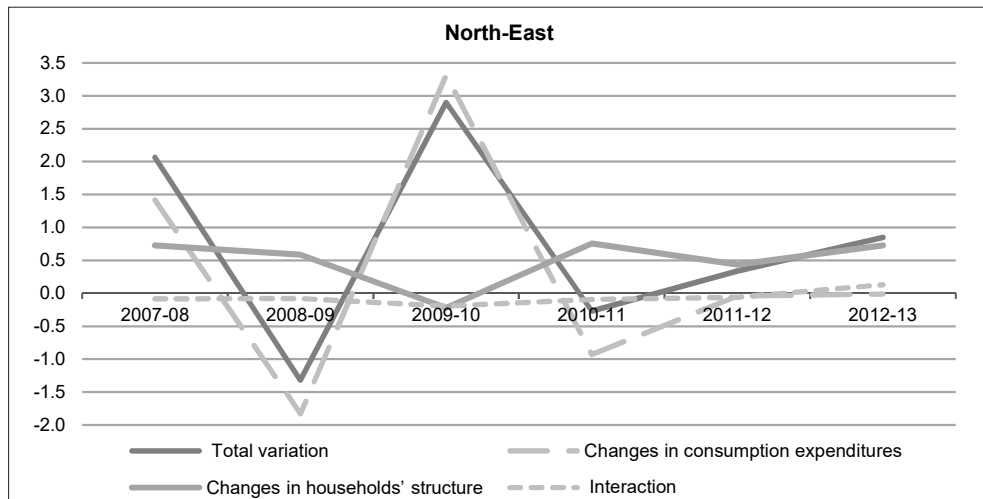
Source: Authors' calculation on HBS data

**Figure 6.1.A continued - Relevance (%) of the three components of the annual variation of per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area. Total expenditures. North-West**



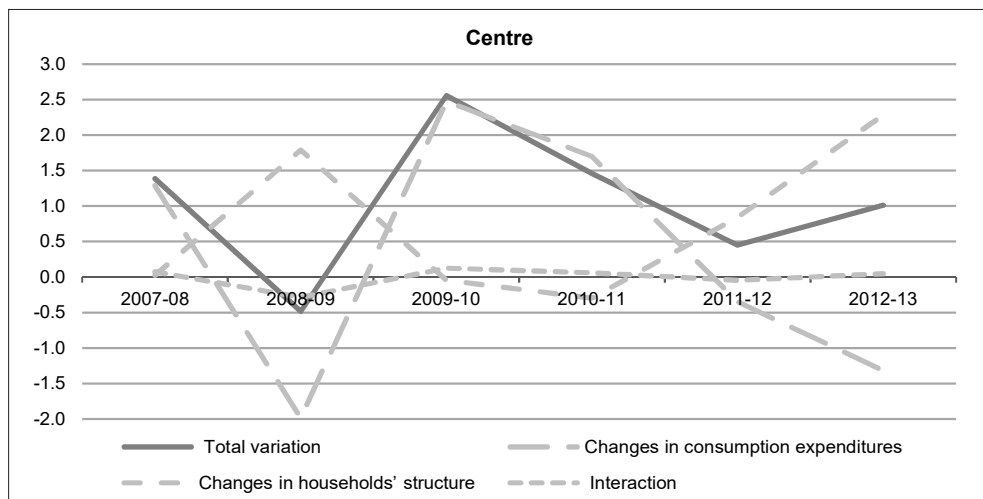
Source: Authors' calculation on HBS data

**Figure 6.1.A continued - Relevance (%) of the three components of the annual variation of per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area. Total expenditures. North-East**



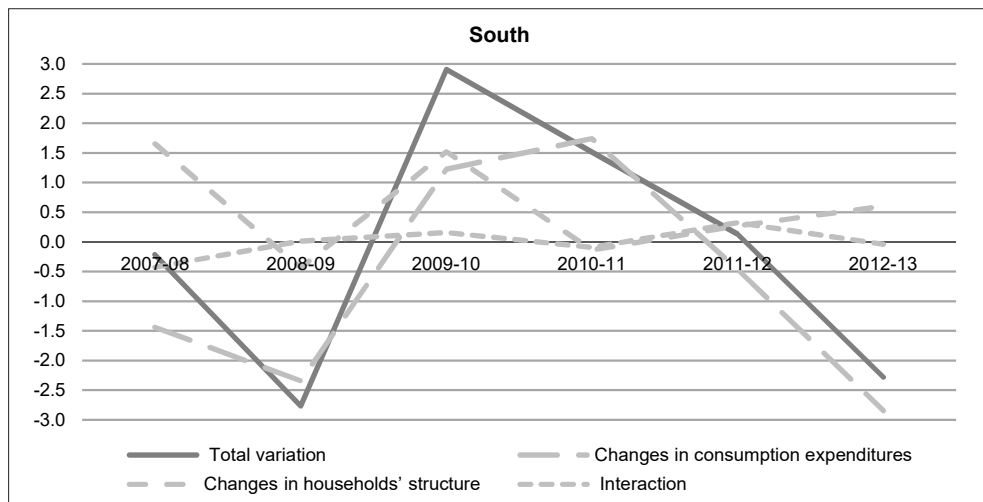
Source: Authors' calculation on HBS data

**Figure 6.1.A continued - Relevance (%) of the three components of the annual variation of per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area. Total expenditures. Centre**



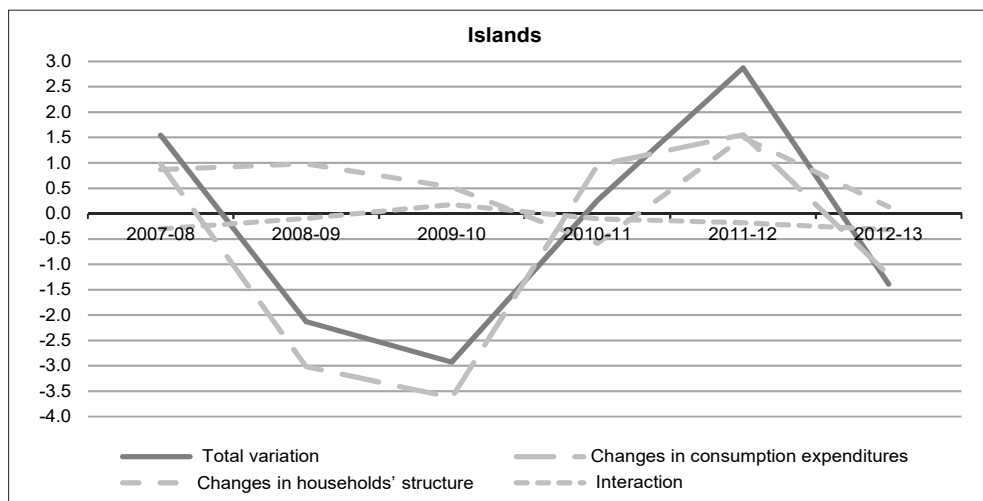
Source: Authors' calculation on HBS data

**Figure 6.1.A continued - Relevance (%) of the three components of the annual variation of per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area. Total expenditures. South**



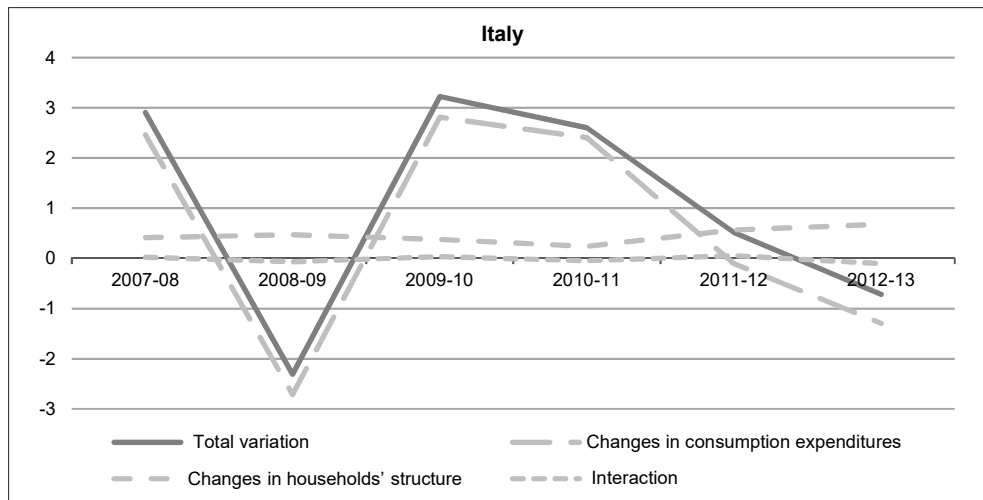
Source: Authors' calculation on HBS data

**Figure 6.1.A continued - Relevance (%) of the three components of the annual variation of per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area. Total expenditures. Islands**



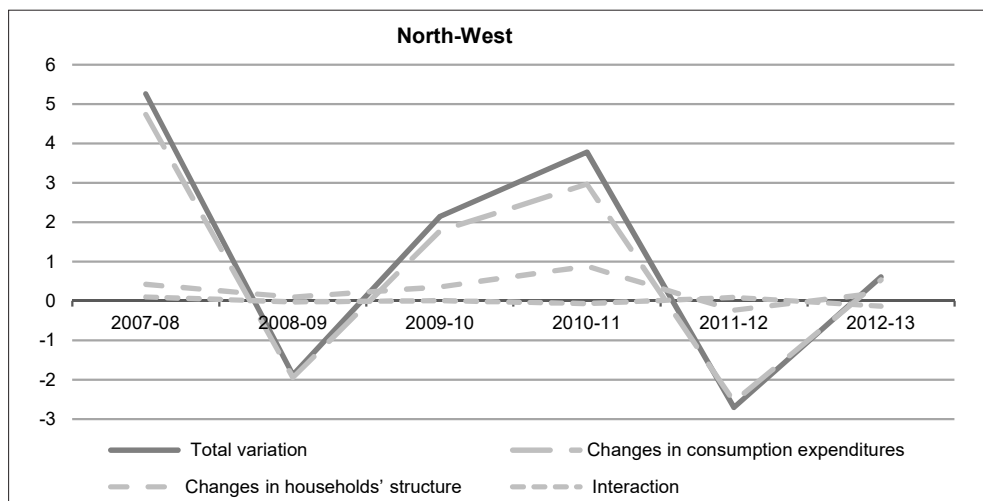
Source: Authors' calculation on HBS data

**Figure 6.1.B - Relevance (%) of the three components of the annual variation of the per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area. Food and beverages. Italy**



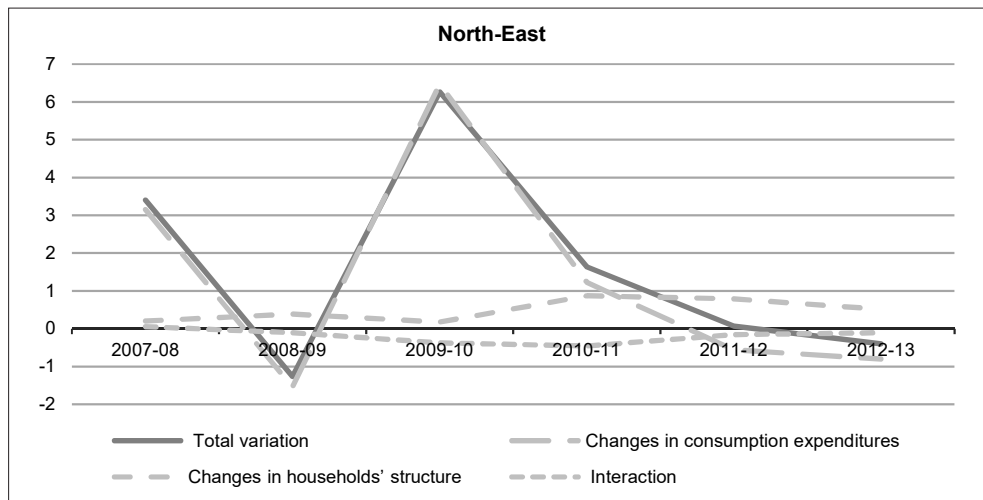
Source: Authors' calculation on HBS data

**Figure 6.1.B continued - Relevance (%) of the three components of the annual variation of the per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area. Food and beverages. North-West**



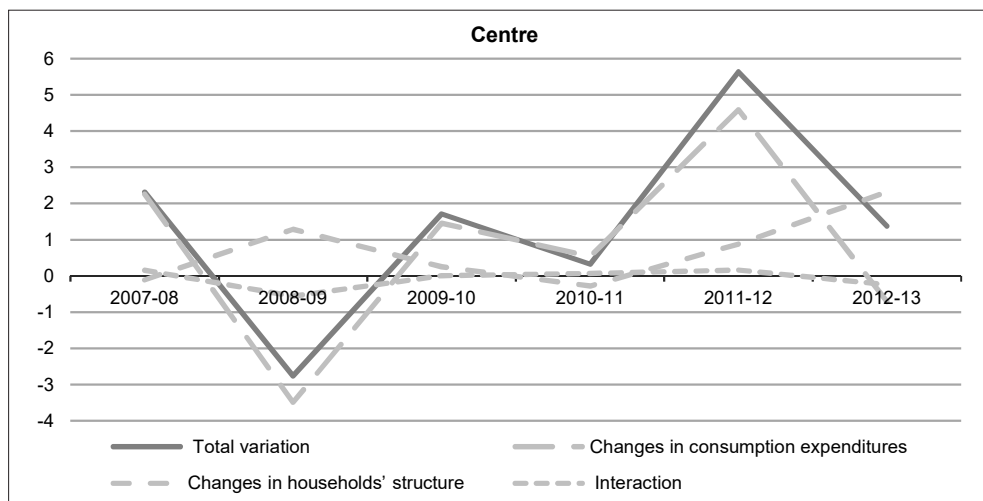
Source: Authors' calculation on HBS data

**Figure 6.1.B continued - Relevance (%) of the three components of the annual variation of the per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area. Food and beverages. North-East**



Source: Authors' calculation on HBS data

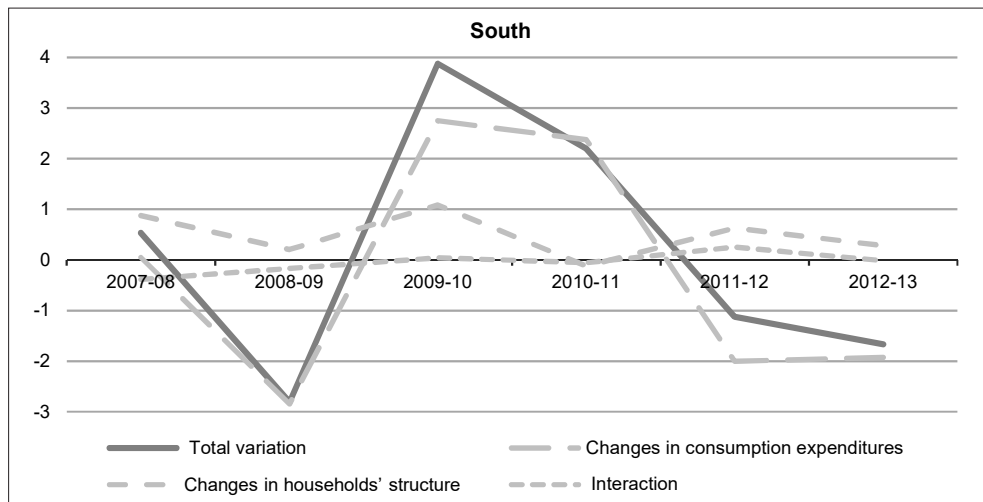
**Figure 6.1.B continued - Relevance (%) of the three components of the annual variation of the per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area. Food and beverages. Centre**



Source: Authors' calculation on HBS data

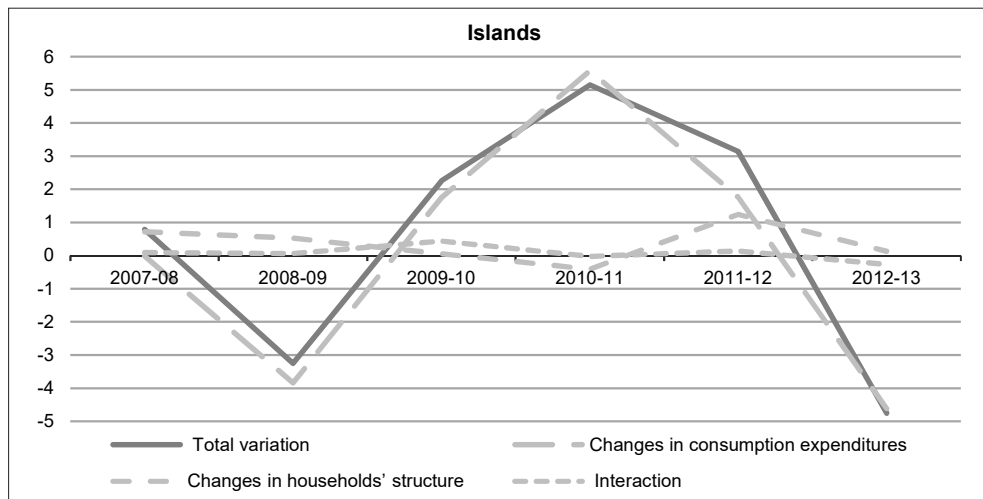


**Figure 6.1.B continued - Relevance (%) of the three components of the annual variation of the per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area. Food and beverages. South**



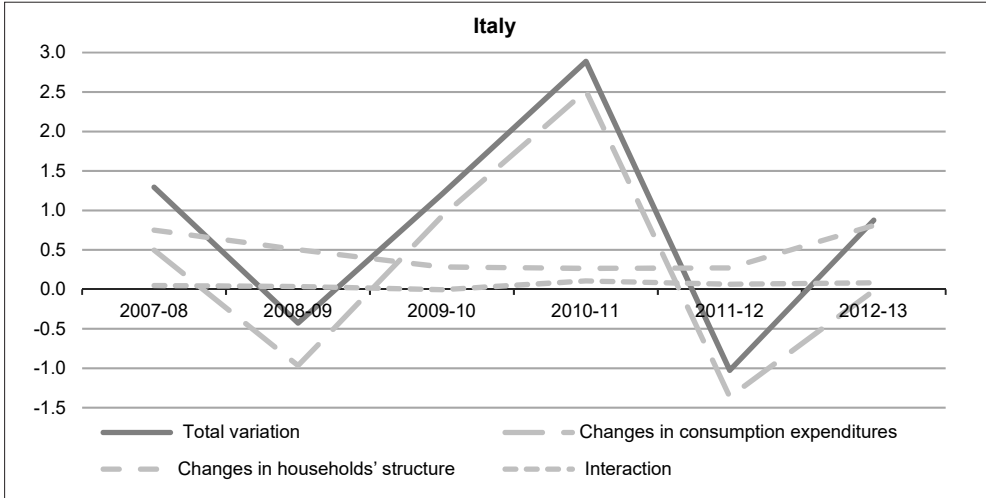
Source: Authors' calculation on HBS data

**Figure 6.1.B continued - Relevance (%) of the three components of the annual variation of the per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area. Food and beverages. Islands**



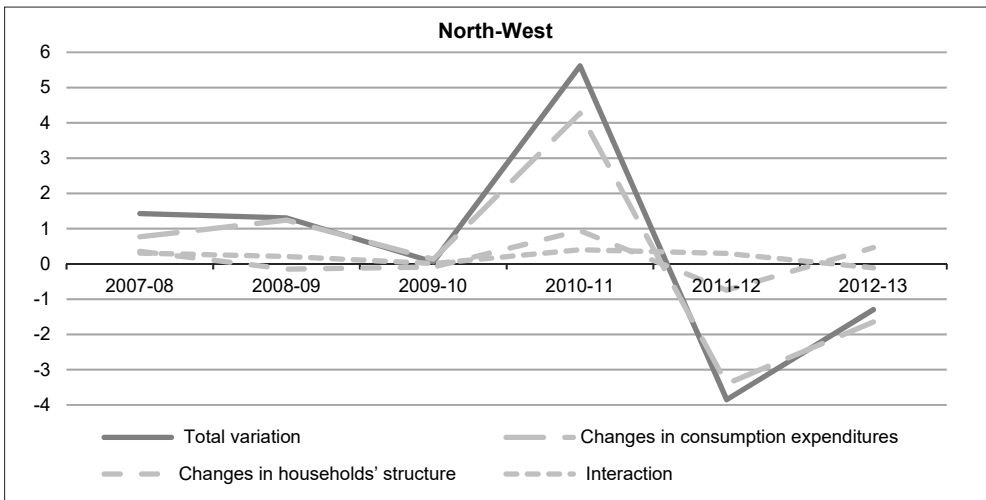
Source: Authors' calculation on HBS data

**Figure 6.1.C - Relevance (%) of the three components of the annual variation of the per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area: "Non-food". Italy**



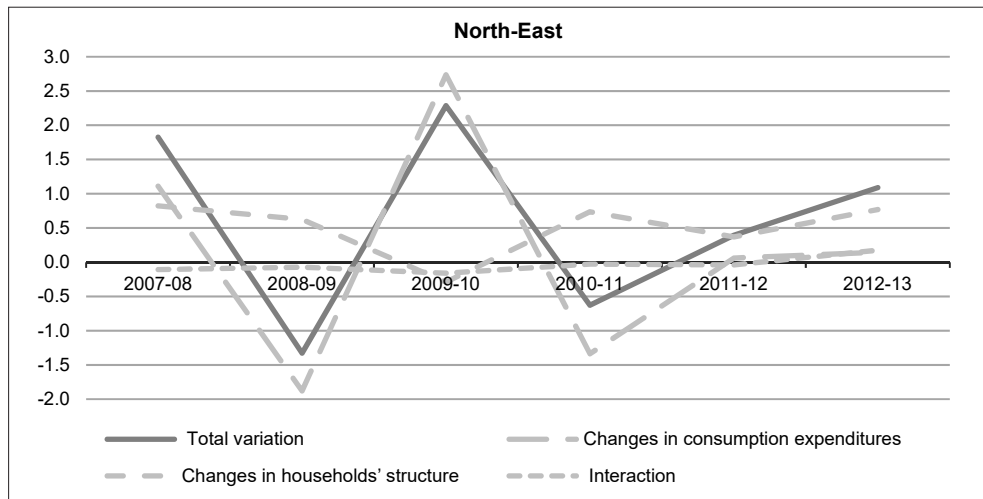
Source: Authors' calculation on HBS data

**Figure 6.1.C continued - Relevance (%) of the three components of the annual variation of the per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area: "Non-food". North-West**



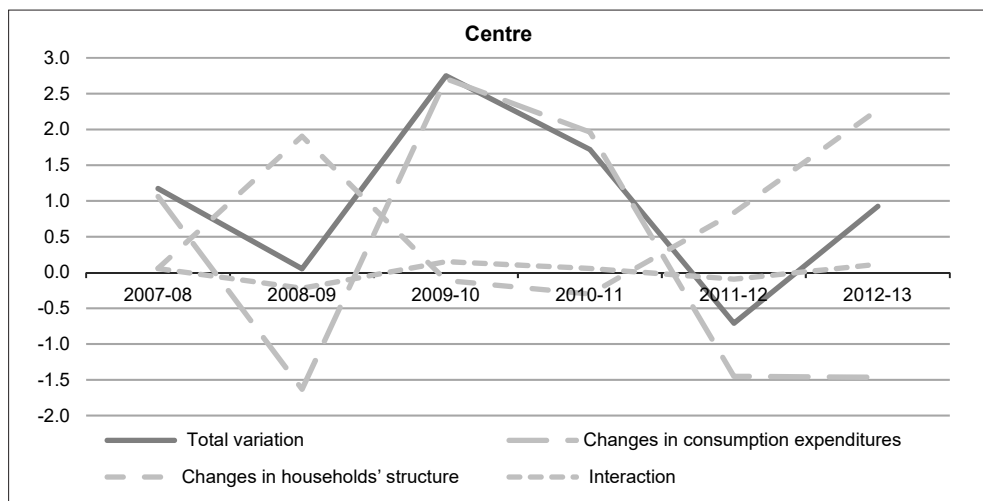
Source: Authors' calculation on HBS data

**Figure 6.1.C continued - Relevance (%) of the three components of the annual variation of the per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area: "Non-food". North-East**



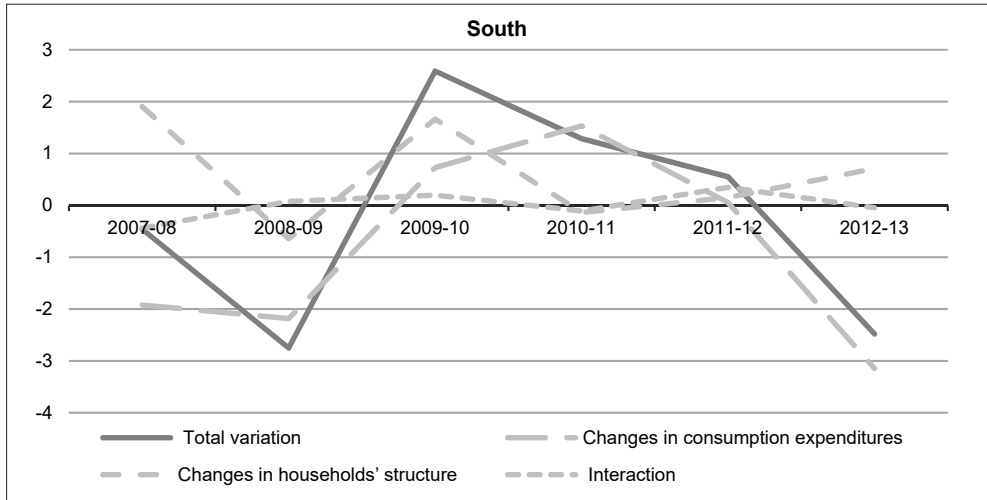
Source: Authors' calculation on HBS data

**Figure 6.1.C continued - Relevance (%) of the three components of the annual variation of the per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area: "Non-food". Centre**



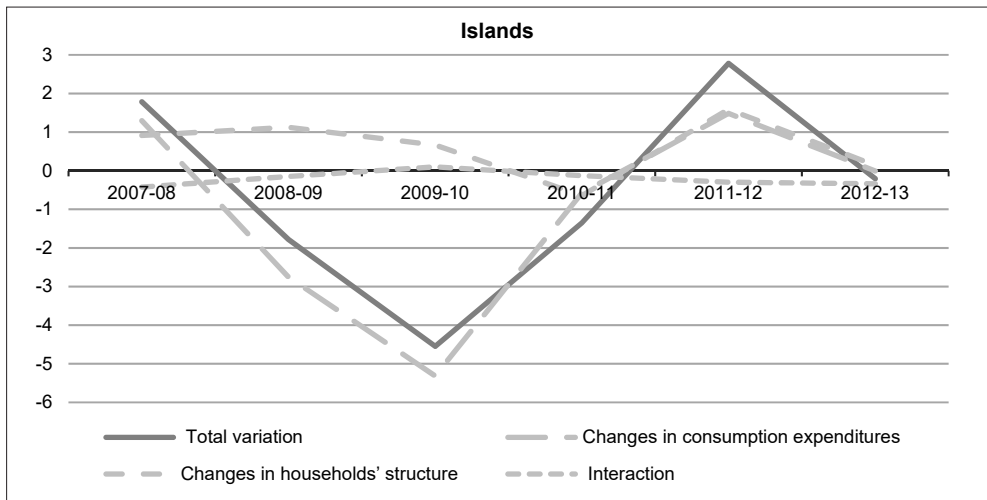
Source: Authors' calculation on HBS data

**Figure 6.1.C continued - Relevance (%) of the three components of the annual variation of the per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area: "Non-food". South**



Source: Authors' calculation on HBS data

**Figure 6.1.C continued - Relevance (%) of the three components of the annual variation of the per capita weighted average from 2008 to 2013: propensity to spend, household structure and their interaction by geographical area: "Non-food". Islands**



Source: Authors' calculation on HBS data

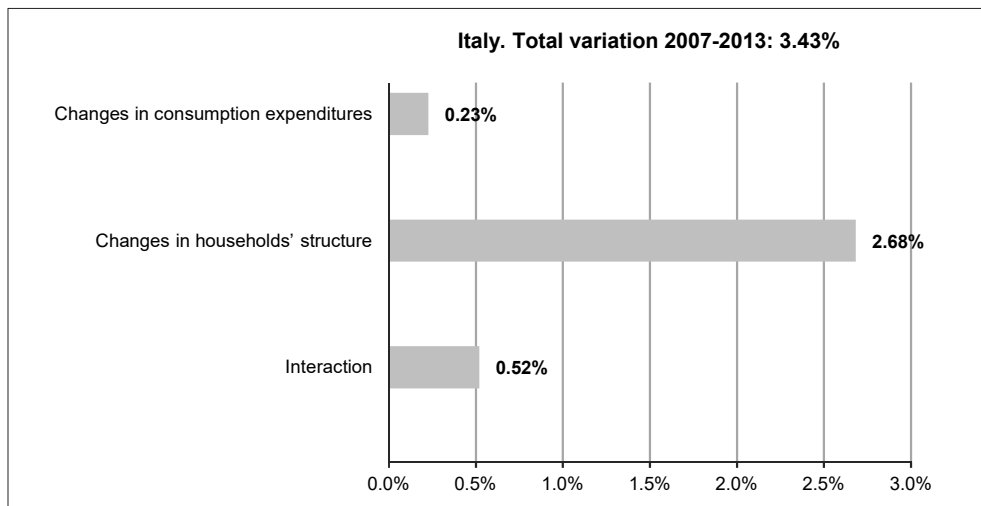
## 7. Conclusions

As discussed throughout the paper the socio-demographic factors responsible of the relevant changes in the universe of Italian households led to the increase of one-person households – also because of population ageing – and to the decrease of households' size.

Another aspect that surely deserves attention is the gradual integration of a multiethnic component, due to immigration (Bruzzone, Maccheroni, and Mignolli, 2008). Unfortunately, we could not account for the consequent changes in the population of Italian households based on the available data.

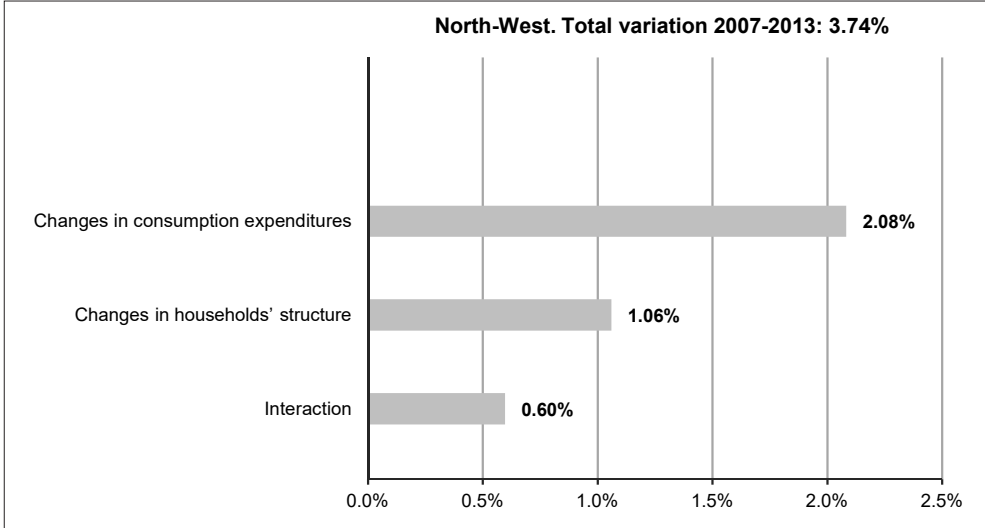
Our approach allowed exploring the impact of the socio-demographic dynamics on consumption expenditures. Such impact was clearly more relevant in those areas where social changes were more pronounced, namely the Centre, the South, and the Islands. This is evident in Figures 6.1.A, 6.1.B, and 6.1.C, as well as in Figure 7.1 that reports the relevance of the components responsible for the total variation registered for  $\bar{E}_{PC,W}$  from 2007 to 2013.

**Figure 7.1 - Components of the variation (%) of the the per capita weighted average,  $\bar{E}_{PC,W}$  from 2007 to 2013, by geographical areas: total consumption expenditures. Italy**



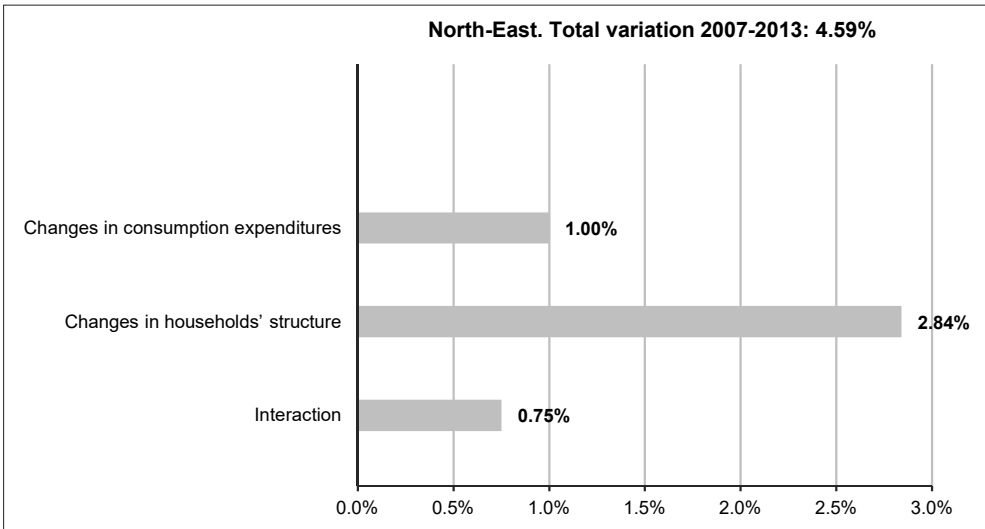
Source: Authors' calculation on HBS data

**Figure 7.1 continued - Components of the variation (%) of the the per capita weighted average,  $\bar{E}_{PC,W}$  from 2007 to 2013, by geographical areas: total consumption expenditures. North-West**



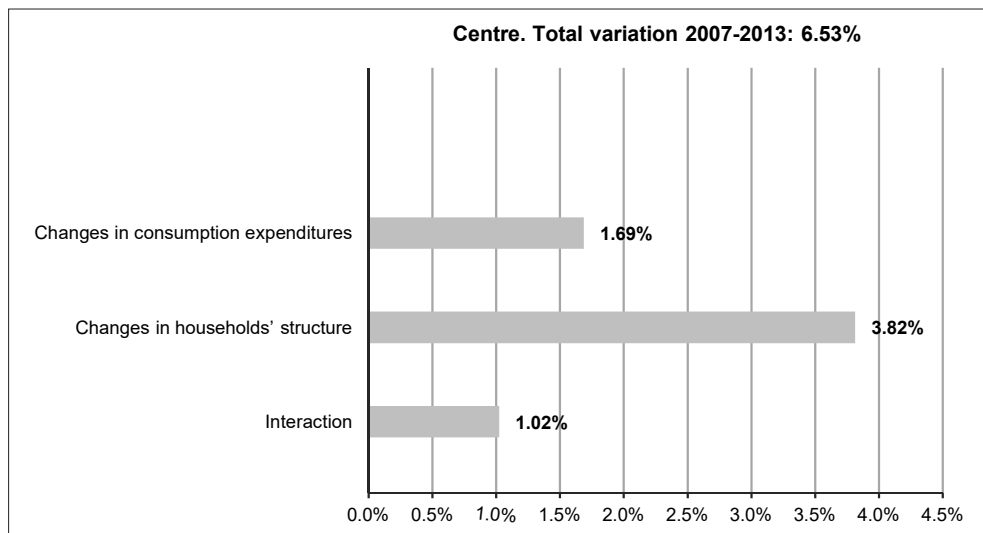
Source: Authors' calculation on HBS data

**Figure 7.1 continued - Components of the variation (%) of the the per capita weighted average,  $\bar{E}_{PC,W}$  from 2007 to 2013, by geographical areas: total consumption expenditures. North-East**



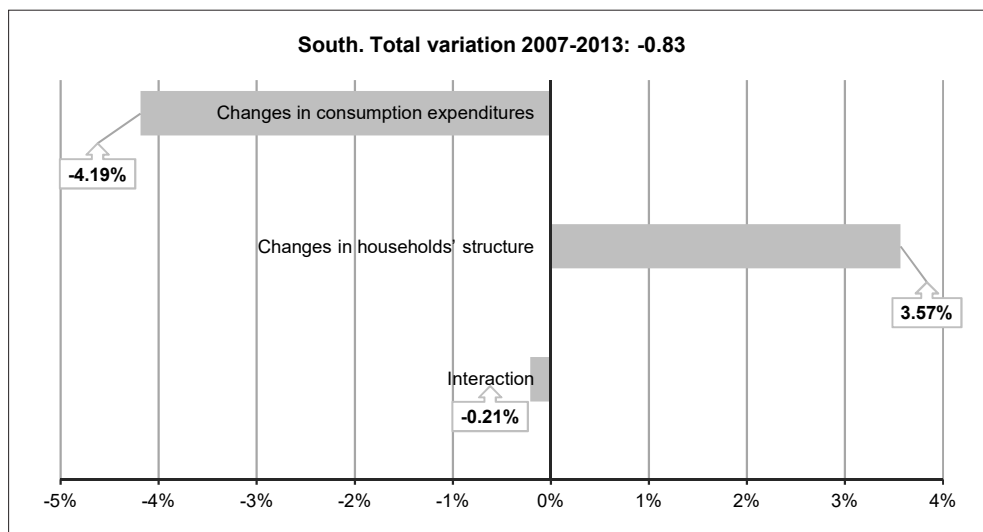
Source: Authors' calculation on HBS data

**Figure 7.1 continued - Components of the variation (%) of the the per capita weighted average,  $\bar{E}_{PC,W}$  from 2007 to 2013, by geographical areas: total consumption expenditures. Centre**



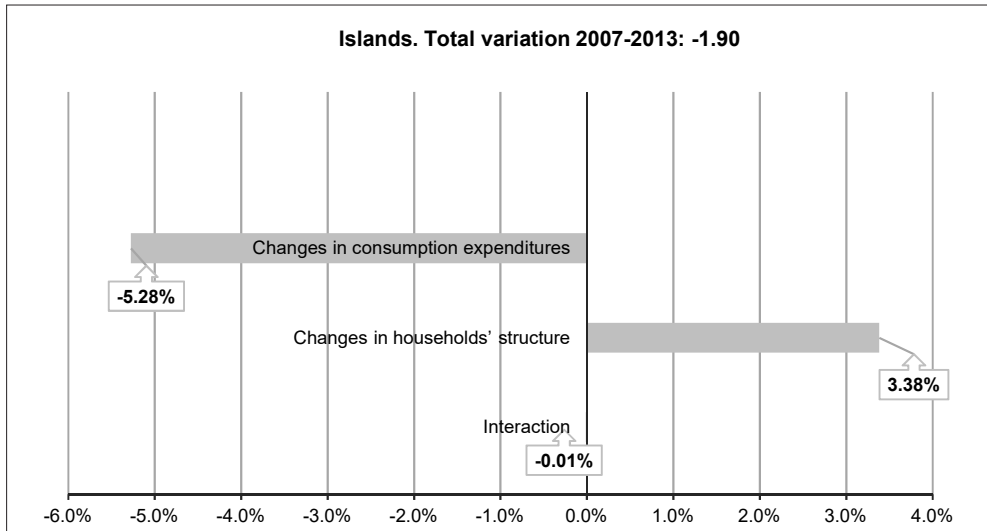
Source: Authors' calculation on HBS data

**Figure 7.1 continued - Components of the variation (%) of the the per capita weighted average,  $\bar{E}_{PC,W}$  from 2007 to 2013, by geographical areas: total consumption expenditures. South**



Source: Authors' calculation on HBS data

**Figure 7.1 continued - Components of the variation (%) of the the per capita weighted average,  $\bar{E}_{PC,W}$  from 2007 to 2013, by geographical areas: total consumption expenditures. Islands**



Source: Authors' calculation on HBS data

The positive variation of the per capita weighted average registered in the North and in the Centre of Italy was triggered by the increase in the propensity to spend, which played a fundamental role in the North-West but was less relevant in the North-East and in the Centre. In particular, the contribution due to changes in the households' structure reaches its maximum in the Centre (Figure 7.1). This is coherent with the evidence on the evolution of the households as discussed in Section 3. In the latter areas indeed, where the variation of the expenditures was negative, the important relevance of the variation of households' structure can be noted: in the South and in the Islands the significant reduction in the propensity to spend was offset – at least partially – by changes in the households' characteristics (Figure 7.1).

Actually, it is important to consider that the ageing of population characterising Italy as a whole was nonetheless more pronounced in the southern areas during the considered period. The increase in the relevance of the older population had necessarily economic effects, reflected also in the variations in consumption expenditures. Indeed, between 2007 and 2013 average monthly expenditures increased for households with an older



reference person (specifically, OP3 and C3; see Table 5.2). By focussing on per capita weighted average expenditures, instead, we found that it increased only in southern Italy for such households.

Southern Italy is also the area where the risk of depopulation was more pronounced, because of levels of fertility lower than in the other areas, as well as of youth emigration and of the more pronounced effects of the crisis on the levels of occupation. Consequently, the economic situation of the households worsened, and only households with older reference persons were able to maintain their purchasing power (Table 5.2). Thus, our results suggest that the redistributive role of the retirement income prevented a general decrease in the consumption expenses.

Particularly in southern areas, but also across the entire nation, there is still uncertainty about the economic prospects. Moreover, the socio-economic transformations occurred over the years might weaken the traditional intergenerational solidarity within the family environment. In addition, the decrease in the number of households' members and/or their distance from home because of migration can undermine the fundamental role of the family as a social safety net.

In this framework, a relevant and crucial role might be played by informal networks, which are larger than the parental ones and which can "integrate" the possibly weakened family solidarity. Nonetheless, such informal networks are lacking, particularly in southern Italy. This further aggravates the condition of this area, already disadvantaged because of the pronounced differences in the Italian welfare system (Istat, 2014) which penalise the southern regions with respect to the resources available for services and social assistance.

## References

Biewen, M. 2012. "Additive Decompositions with Interaction Effects". *IZA Discussion Papers* N. 6730. Bonn, Germany: Institute of Labour Economics (Institut zur Zukunft der Arbeit - IZA).

Brandolini, A. 2014. "I bilanci delle famiglie italiane dopo la Grande Recessione". In Fusaro, C., e A. Kreppel (a cura di). *Politica in Italia. I fatti dell'anno e le interpretazioni. Edizione 2014*. Bologna: il Mulino.

Bruzzone, S., C. Maccheroni, e N. Mignolli. 2008. "La mortalità degli stranieri in Italia: metodi di misura a confronto". In Di Comite, L., O. Garavello, e F. Galizia (a cura di). *Sviluppo demografico ed economico nel Mediterraneo*. Bari: Cacucci.

Budano, G., and S. Demofonti (eds.). 2010. "La misurazione delle tipologie familiari nelle indagini di popolazione". *Metodi e Norme* n. 46. Roma: Istat.

Carbonaro, G. (a cura di). 2002. *Studi sulla povertà: problemi di misura e analisi comparative*. Milano: Franco Angeli.

Ceccarelli, C., M. Di Marco, e C. Rinaldelli (a cura di). 2008. L'indagine europea sui redditi e le condizioni di vita delle famiglie (Eu-Silc). *Metodi e Norme* n. 37. Roma: Istat.

Centro Studi Investimenti Sociali – Censis. 2012. *46° Rapporto sulla situazione sociale del Paese/2012*. Roma: Censis.

Centro Studi Investimenti Sociali – Censis, e Confederazione Generale Italiana delle Imprese, delle Attività Professionali e del Lavoro Autonomo - Confcommercio. 2012. *L'anno orribilis dei consumi. L'outlook in sintesi*. Roma: Censis-Confcommercio.

D'Aurizio, L., D. Grassi, S. Macchia, A. Manzari, e N. Pannuzi. 1999. "Acquisizione e trattamento dei dati nella nuova indagine sui consumi". *Documenti Istat* n. 21. Roma: Istat.

De Rose, A., e S. Strozza (a cura di). 2015. *Rapporto sulla Popolazione. L'Italia nella crisi economica*. Bologna: il Mulino.

Eurostat, Unit B5 - Data and Metadata Services and Standards. 2013. *COICOP Five-Digit. Structure and Explanatory Notes*. Luxembourg: Eurostat.

Freguja, C., e M. C. Romano (a cura di). 2015. “La modernizzazione delle tecniche di rilevazione nelle indagini socioeconomiche sulle famiglie”. *Lecture Statistiche – Metodi*. Roma: Istat. <http://www.istat.it/it/archivio/145721>.

Ghigi, R., e R. Impicciatore (a cura di). 2015. *Famiglie flessibili. L'arte di arrangiarsi ai tempi della crisi*. Firenze: Associazione Neodemos.

Grassi, D., e N. Pannuzi (a cura di). 2015. “La nuova indagine sulle spese per consumi in Italia”. *Lecture Statistiche – Metodi*. Roma: Istat. <https://www.istat.it/it/archivio/182165>.

Grassi, D., e N. Pannuzi. 2005. “La misura della povertà: metodologie e aspetti critici”. *Rivista non profit*, Volume 10, n. 4: 835-865.

Istituto Nazionale di Statistica – Istat. 2018. *File ad uso pubblico mIcro. STAT. Indagine sulle spese delle famiglie. Periodo di riferimento: anno 2017. Aspetti metodologici dell'indagine*. Roma: Istat.

Istituto Nazionale di Statistica – Istat. 2014. *Rapporto Annuale 2014. La situazione del Paese*. Roma: Istat. <https://www.istat.it/it/archivio/120991>.

Istituto Nazionale di Statistica – Istat. 2013a. “Reddito e condizioni di vita. Anno 2012”. *Statistiche Report*. Roma: Istat. <https://www.istat.it/it/archivio/107289>.

Istituto Nazionale di Statistica - Istat. 2013b. *Indagine sui Consumi delle Famiglie*. Roma: Istat. <https://www.istat.it/it/archivio/193935>.

Maccheroni, C. 2018. *La standardizzazione dei tassi grezzi in campo demografico e degli indicatori delle condizioni di salute*. Torino: Pathos.

Maccheroni, C. 2014. “Diverging tendencies by age in sex differentials in Italy”. *South-East European Journal of Political Sciences*, Volume II, N. 3: 42-58.

Malagoli Togliatti, M., e A. Lubrano Lavadera. 2002. *Dinamiche relazionali e ciclo di vita della famiglia*. Bologna: il Mulino.

Oaxaca, R. 1973. “Male-Female Wage Differentials in Urban Labor Markets”. *International Economic Review*, Volume 14, N. 3: 693-709.

Pace R., and Mignolli N. 2016. “The Impact of Sub-National Demographic Transitions on Demographic Dividends, in Italy”. In Pace, R., and R. Ham-

Chande (eds.). *Demographic Dividends: Emerging Challenges and Policy Implications*: 135–174. Berlin, Germany: Springer.

Rosina, A., e A. De Rose. 2017. *Demografia*. Milano: Egea.

Santoro, M. 2012. *Le libere unioni in Italia. Matrimonio e nuove forme familiari*. Roma: Carocci.

United Nations, Statistical Office. 2000. “Classification of Expenditure According to Purpose: COFOG; COICOP; COPNI; COPP”. *Methodological publications in statistics*, Series M, N. 84. New York, NY, U.S.: United Nations.

Vignoli, D., G. Gabrielli, e G. Gualtieri. 2011. “Formazione e scioglimento delle unioni”. In Salvini, S., e A. De Rose (a cura di). *Rapporto sulla popolazione. L'Italia a 150 anni dall'Unità*. Bologna: il Mulino.

Zanatta, A.L. 2008. *Le nuove famiglie*. Bologna: il Mulino.

# An application of calibration estimator in the Italian consumer survey<sup>1</sup>

Luciana Crosilla, Maria Rita Ippoliti, Raffaella Sonego <sup>2</sup>

## Abstract

*The European Union Harmonised Consumer Survey for Italy, carried out by the Italian National Institute of Statistics - Istat, relies on an estimation process not exactly reflecting the current sampling design (weights are not currently used). In order to deal with this problem, Istat decided to introduce the calibration estimator in data processing. Frequency, balance and Consumer Confidence Indicator series were rebuilt with the calibration estimator for the period 1998-2018. The outcomes of the renewed data processing show that the calibrated estimates are very similar to the unweighted ones. Differences are however present and statistically significant, proving the efficacy of the introduced calibration system. Finally, the calibrated and unweighted Confidence Indicator exhibits equal short-term volatility and similar features in tracking Italian private consumption.*

**Keywords:** Auxiliary information, calibration, consumer confidence, weighting.

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*The views and opinions expressed are those of the authors and do not necessarily reflect the official policy or position of the Italian National Institute of Statistics - Istat.*

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## 1. Introduction

The European Union Harmonised Consumer Survey for Italy (CS), currently carried out by the Italian National Institute of Statistics - Istat, in various occasions was modified with reference both to the survey sample and data collection mode (Martelli, 1998). By contrast, the core of data processing has substantially remained unchanged mostly relying on an underlying stratified sample with a constant sampling fraction (that is equal probability selection method of the sampling units) that gives a self-weighting sample (in data processing weights are not used) (Cochran, 1977). This weighting system, not exactly reflecting the current sampling design, could lead to a not perfect inference for the estimates. This problem may be partially solved introducing the real inclusion probabilities in the estimation process. Indeed, using only the real inclusion probabilities may lead to biased estimates due to the data collection mode. As a matter of fact, although stratification of the current sample design ensures a relatively reliable sample, the use of CATI (Computer Assisted Telephone Interviewing) technique as data collection mode may introduce some biases: a bias mainly may arise regarding extreme age classes (young and elderly people), gender (women are easier to be contacted than men), occupation (working people are more eluding) (Martelli, 2008); another bias is introduced using a frame affected by under-coverage problems as the list of subscribers to landline employed in CS. To deal with these biases affecting the estimates of CS, Istat decided to fully reconsider the estimation process.

As a first step, Consumer Confidence Indicator (CCI) and balances were estimated both with the Horwitz-Thompson estimator (HT) (where sample weights are the inverse of real inclusion probability of the units) and the calibration estimator (Deville and Särndal, 1992; Särndal, 2007) where the sampling weights are adjusted to derive estimates consistent with known population totals, preventing the bias due to data collection mode. Initially, the study adopted a calibration estimator that takes into account 10 auxiliary totals, such as population by gender, 4 geographical areas (North-East, North-West, Centre, South) and 4 age classes (18-29, 30-49, 50-64, 65 and more) known from the population register. Other calibration systems were applied<sup>3</sup>

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<sup>3</sup> In addition, calibration systems with 24 (population for geographical areas and age classes and for geographical areas and gender) and 17 auxiliary totals (population by gender, geographical areas, age classes, occupation

and outcomes were compared. The system with 10 constraints resulted as the most appropriate system producing less variable weights and more reliable calibration domains (De Vitiis *et al.*, 2015). In a second phase of the study, due to a revision of the questionnaire in 2018<sup>4</sup> and in order to improve the calibration process for age classes, seven age classes were considered in the calibration system increasing the number of total constraints from 10 to 13. On the basis of the test done, validity of the calibration system with thirteen constraints was also confirmed<sup>5</sup>.

In a second step, outcomes (estimates for the total population and for sectoral breakdowns considered in dissemination of CS results by Istat, i.e. geographical areas, age classes, gender, education level and occupation) stemming from the implementation of the two estimators were compared. Estimates obtained with HT presented a sampling variance slightly slower but biased by age classes and gender. On the contrary, estimates stemming from calibration estimator were characterised by a slightly higher sampling variance and they were coherent with the population distribution by age classes and gender. This was interpreted as higher guarantee for the accuracy of the estimates. Generally, an increase in the variance of the estimator does not necessarily imply less accuracy, since the increase could be more than offset by a lesser bias of the estimator and, consequently, the total error could decrease. All these considerations led to choose the calibration estimator as the best estimator for the CS estimation process (Guandalini, 2019). Frequency and balance series were estimated again with the calibration estimator for the period 1998-2018. Consequently, the overall summary indicator of the results of the survey, the Consumer Confidence Indicator (CCI), was recalculated.

The aim of this work is to present the outcomes of the renewed CS data processing. The differences between Calibrated and Unweighted CCI as well as between its balance composing series are analysed. Furthermore, main

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and education) were evaluated too. The derived calibration systems pointed out problems of convergence of the algorithm. These outcomes led to discard the above-mentioned auxiliary totals.

- 4 In the questionnaire, interviewees are asked the age class to which they belong to. Until March 2018, the age classes included in the questionnaire were: 18-20, 21-29, 30-39, 40-49, 50-59, 60-64, 65 and more; in April 2018 the age classes considered in the questionnaire were modified as follow: 18-20, 21-29, 30-39, 40-49, 50-59, 60-64, 65-70, 71-75, 76 and more.
- 5 More specifically, in rebuilding the series with the calibration estimator, until March 2018 four age classes were considered (18-29, 30-49, 50-64, 65 and more) and starting from April 2018, seven age classes were adopted (18-29, 30-39, 40-49, 50-59, 60-64, 65-70, 71 and more) as constraints in the calibration system (constraints for gender and geographical areas were unchanged).

sectoral breakdowns of CCI (by occupation, education, and age) are presented. The performance of new CCI in tracking Italian private consumption growth is compared with that of the unweighted CCI. In terms of methodology, the performing relies on correlation analysis, in-sample and out-of-sample tests, ability to track directional change and a volatility analysis (European Commission, 2018). Including a calibration system in the estimation process of CS diminishes also the bias of the estimates due to the under-coverage of the frame used for the selection of the households that is the list of subscribers to landline. Nevertheless, the quality of the frame is however an important requirement of the survey: here we want to underline the difficulty in currently maintaining a reliable frame given the increasing of mobile phones, privacy constraints etc. This work does not deal with this aspect: the complexity of the problem deserves a deepened analysis in another paper.

The paper goes as follows: in Section 2 a brief description of Italian consumer survey is provided. Section 3 shows the calibration estimator used in data processing and Section 4 describes and remarks some main results. In Section 5 performance of calibrated CCI in tracking private consumption was evaluated and compared with that of the unweighted CCI. Finally, concluding remarks are in Section 6.

## **2. The Italian Consumer Survey**

The Consumer Survey started in Italy in 1973<sup>6</sup> within the Joint Harmonised European Union Programme of business and consumer surveys. The survey was carried out by the Institute for short term studies (ISCO) until 1998; starting from January 1999 the Institute for studies and economic analyses (ISAE) replaced ISCO in the management of the survey. Finally, Istat has conducted the survey since 2011. Up to 1981, the survey was carried out on a quarterly basis and subsequently on a monthly basis. The aim of the survey, which remained unchanged over time, is to collect information on households' spending and savings intentions and to assess their perception of the factors influencing these decisions.

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<sup>6</sup> More specifically, in 1972 a pilot survey was carried out on 5,000 respondents.



Until 1994, the sample was a clustered stratified random sample proportionally built to the households' universe. It was based on a multi-stage sampling design, stratified in the first stage by six geographical areas and seven sectors related to the demographic width of municipalities<sup>7</sup>. The sample size amounted to 2,090 households (interviews); the data collection mode was the face-to-face technique. In 1995 one important change was introduced in the sampling design: following the European Commission recommendation, the consumer<sup>8</sup> replaced the household as the sampling unit; at the same time the CATI technique was adopted as data collection mode. The sample maintained the multistage structure and another stage was added in order to select the consumer. The impact of CATI technique on the sampling design was significant and in the years 1995-1997 sampling design underwent revision. The revised sampling design was adopted starting from 1998 and it is currently applied. It is stratified into two stages, by geographical area and size of the municipality of residence. The stratification variables are still the original one: six geographical partitions (North west, North centre, North east, Centre, South and Islands) and seven classes of demographic width of municipalities (up to 5,000 inhabitants, 5,001-10,000, 10,001-20,000, 20,001-50,000, 50,001-100,000, 100,001-500,000, 500,001+).

Allocation of the units in the strata is proportional to the universe of the adult resident population of Italy (for the number of units within strata see Table 1). The list used for the extraction of the names is made of the list of subscribers to landline; the first stage unit is the subscriber, while the second stage unit is composed of the consumer. The selection technique of the units is systematic in the first stage, and by quotas according to gender in the second

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7 The first-stage primary sampling units were formed by the municipalities, selected within each stratum with probability proportional to the size. The determination of the first stage size had to take into account both the need to include as many primary sample units as possible and the quickly increasing costs of spreading face-to-face interviews over different municipalities. The municipalities with more than 500,000 inhabitants were all included in the sample. The other municipalities were updated yearly with a rotation criterion every other month. The households, corresponding to the voters, were randomly selected from the electoral rolls of the selected municipalities within each stratum. The head of the family was interviewed and he/she reported for the whole household. The number of households to be interviewed within each stratum was determined proportionally to the households' universe, so as to get an approximately constant sampling fraction and thus an EPSEM (Equal Probability of Selection Method) sample (for more details see Martelli, Fullone 2008).

8 The consumer is a full-aged person belonging to the household identified by the selected telephone number. The individual has to contribute, also in non-monetary terms, to the family income.

stage<sup>9</sup>. The sample size amounted to 2,000 units and the reference universe is represented by the full-aged (18 years and over) population. Even if stratification ensures a relatively reliable sample, introducing CATI technique as data collection mode and the consumer as sampling unit strongly weakened the aim of maintaining an EPSEM structure<sup>10</sup>. This implies that the currently used data processing (no weights in the estimation process) does not reflect the sample design structure: weights should be used in the estimation process. In the survey, non-response unit is handled by substitutions within the same stratum. In order to guarantee the monthly planned number of interviews (that is 2,000), a sample of substitute households equal to four times the base sample size, for a total of 10,000 units, the latter is selected by systematic sampling from the subscribers list of the telephone land-line<sup>11</sup>.

The implemented questionnaire includes both qualitative questions harmonised at European level<sup>12</sup> (characterised by three or five ordered reply options relating to the Italian economic situation and to the financial situation of the interviewed and of his family) and additional questions aimed at satisfying a need for information at national level.

Answers obtained from the survey are aggregated in the form of weighted balances calculated, for each question, as the difference between the percentages of respondents giving positive and negative responses. The weighted balances are aggregated to build the CCI, an overall summary indicator of the results of the survey aimed at evaluating the optimism/pessimism of Italian consumers. More specifically, the CCI in the Istat definition, is the average of nine balance series, namely: Q1 - Assessments on households' financial situation; Q2 - Expectations on households' financial situation; Q3 - Assessments on the general economic situation; Q4 -

9 Quota sampling does not allow to define exactly inclusion probability of an individual because of the selection process cannot be verified. This occurrence leads to lose the features of a random sample (sample error cannot be calculated). In the Italian survey, as the unit selection is performed according to random techniques (and not in an arbitrary way as it often happens with quota samples), calculation of inclusion probability with a good approximation is made possible and representativeness of data collected with purposive sampling holds. In Section 3 a brief description of the inclusion probability used in the calibration estimator is provided.

10 The consumers (sampling units) do not have equal inclusion probability because of their probability of inclusion depends on the probability to be selected within the household.

11 In this case, the (approximated) inclusion probability of the household  $i$  in the stratum  $h$  of the sample is calculated as  $f_h/F_h$ , where  $f_h$  is the number of households in the stratum  $h$  of the sample and  $F_h$  is the number of households in the stratum  $h$  of the population. This inclusion probability is used in the calibration estimator, as described in Section 3, footnote 14.

12 For more details see European Commission (2019).

Expectations on the general economic situation; Q7 - Expectations on unemployment (with inverted sign); Q8 -Assessments on purchases; Q10 - Assessments on saving; Q11 - Expectations on saving; Q12 - Current households' financial situation<sup>13</sup>.

**Table 1 - The sample**

Demographic width/ Geographical partitions	Up to 5,000 inhabitants	5,001- 10,000	10,001- 20,000	20,001- 50,000	50,001- 100,000	100,001- 500,000	500,001+	Total
North west	55	22	23	34	17	3	50	205
North centre	69	63	56	56	26	15	45	328
North east	62	68	82	56	19	96	0	384
Centre	41	38	53	82	51	41	95	401
South	75	58	78	97	78	44	31	460
Islands	34	25	30	51	27	32	22	222
Total	336	274	321	376	218	231	243	2,000

Source: Istat

### 3. The calibration estimator

The calibration estimator proposed by Deville and Särndal (1992) has been used to derive survey estimates for the Italian CS. The principle underlying the calibration method is to adjust samples through re-weighting individuals using auxiliary information, strongly correlated with study variables, for which population totals are available for instance from a register or administrative data. The main principles of calibration are here summarised.

Given a population  $U$  of  $N$  individuals from which a sample  $s$  of size  $n$  has been selected and being  $Y$  a variable of interest, for which we want to estimate the total in the population:  $Y = \sum_{k \in U} y_k$ . The usual Horvitz-Thompson estimator is:

$$\hat{Y}_{HT} = \sum_{k \in s} \left( \frac{1}{\pi_k} \right) y_k = \sum_{k \in s} d_k y_k$$

<sup>13</sup> The Q (n) refers to the numeration of the questions within the European Commission questionnaire (see European Commission, 2019).

where  $\pi_k$  represents the inclusion probability of unit  $k$ <sup>14</sup>. Let  $X_1, X_2, \dots, X_j \dots X_J$  be the  $J$  auxiliary variables, available in the sample for which the population values are known:  $X_j = \sum_{k \in U} x_{jk}$ .

The calibration weights  $w_k$ , as similar as possible to the original  $d_k$  weights, should verify the following calibration constrains:

$$\sum_{k \in s} w_k x_{jk} = X_j \quad \forall j = 1, \dots, J$$

on the basis of a selected distance function  $G$  as to:

$$\text{Min}_{w_k} \sum_{k \in s} d_k G(w_k / d_k)$$

The solution of this problem provides the calibrated weights used in the estimation process. The calibration estimator of the total for the variable of interest will then be<sup>15</sup>:

$$\hat{Y}_w = \sum_{k \in s} w_k y_k$$

In order to estimate data until March 2018, the calibration estimator used in CS takes into account 10 auxiliary totals, such as population by gender, 4 geographical areas (North-East, North-West, Centre, South) and 4 age classes (18-29, 30-49, 50-64, more than 65) known from the population register. Starting from April 2018<sup>16</sup>, the estimation process adopts 13 auxiliary totals: seven age classes (18-29, 30-39, 40-49, 50-59, 60-64, 65-70, 71 and more), gender and geographical areas unchanged with respect to the previous period<sup>17</sup>.

14 For CS, the inclusion probability of unit  $k$  ( $\pi_k$ ) was calculated according to the following formula:  $\pi_k = \pi_{kj}$ , where  $\pi_{kj} = f_h / F_h$  is the proportion of the sample households on the total of households in stratum  $h$  of the population. Since the number of households included in the list of subscribers to landline is not available and considering that the list is affected by under-coverage problems, the proportion is a proxy of the real probability of the household  $j$  to be selected from the frame in the stratum  $h$  to which the individual  $k$  belongs to.  $\pi_{kj} = 1 / (\text{no. family members} > 18 \text{ years})$  is the probability that individual  $k$  is interviewed, conditioned to the selection of the household  $j$ .

17 The calibration weights, sampling variance and confidence intervals of the estimates were calculated by ReGenesees (R Evolved Generalised Software for Sampling Estimates and Errors in Surveys), an R software for design-based and model-assisted analysis of complex sample surveys, developed in Istat (Zardetto, 2015).

## 4. Comparison of calibrated and unweighted CCI

Frequency and balance series were rebuilt with the calibration estimator for the period 1998-2018<sup>18</sup>. Consequently, CCI was recalculated. The calibrated estimates were recalculated for both the aggregate and the breakdowns disseminated.

This Section reports a comparison of calibrated and unweighted CCI, as well as of new and old composing series. Furthermore, the differences between the indicators are analysed. The results of the main sectoral breakdowns (by occupation, education, age) are also presented.

### 4.1 CCI and composing series

Starting from the CCI (for definition see Section 2), Figure 1 shows the calibrated series plotted against the unweighted one. A first graphical inspection highlights the two time series are likely to record very close monthly changes in both series. Peaks and troughs do not present shift and the  $R^2$  correlation coefficient is very high (see Table 2).

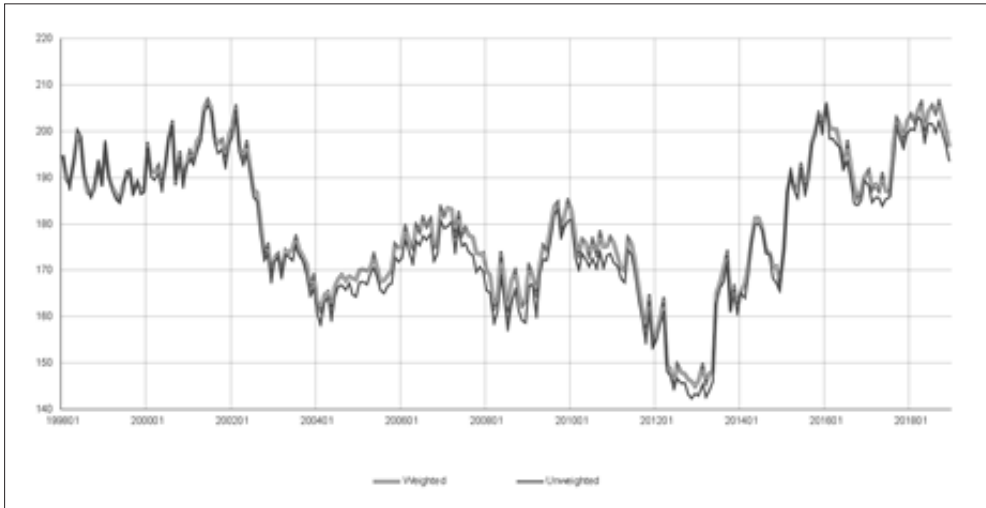
The weighted indicator presents, on the average, less variability than the current one, proved both by the standard deviation and the coefficient of variation (see Table 2). On the contrary, the mean is higher (-19.99 against -22.08) suggesting that the new CCI is, on average, always higher than the old one: calibration estimator generally produces more optimistic estimates.

This occurrence may be due to the correction by age classes introduced in the sample by the calibration estimator. Calibration indeed fixes the under-reporting of younger people, usually more optimistic, and the over reporting of elder people, with common negative opinions. Moving to CCI balance composing series, graphic inspection highlights very similar paths of calibrated and unweighted series:  $R^2$  values suggest a very close and widespread correspondence between the signals stemming from the calibrated and unweighted balance series (Table 2). This outcome can be considered as an indirect support for the sample quality which correctly reflects the universe

<sup>18</sup> This time span was chosen because throughout the years the sample design is consistent with the calibration estimator adopted.

structure. Moreover, for all the calibrated composing series the mean is higher than that of the unweighted series and variability is generally lower, as occurs for the CCI.

**Figure 1 - Consumer Confidence Indicator**



Source: Istat

Moving to analyse the differences between CCIs, Figure 2 shows that calibration had statistical effects on the estimates. More specifically, the calibration process introduced a systematic increase of the estimates (supported by the mean values that are always higher for the calibrated series). Moreover, differences exhibit an upward trend until 2008 and after 2015 onwards; in the 2009-2014 time span a downward trend was recorded.

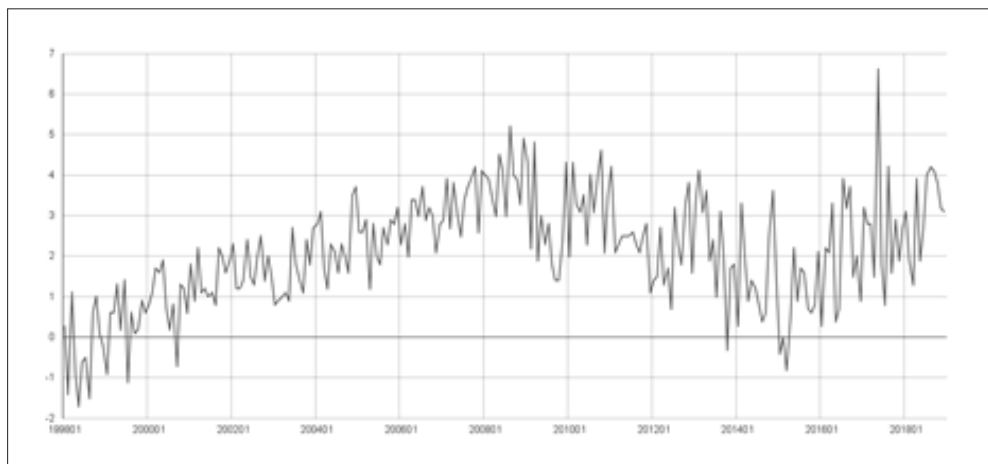
It seems that in a cyclical positive phase, calibration process produced higher estimates than the unweighted ones with growing differences between the two series while in a negative evolution of the economy it produced higher estimates with decreasing differences.

**Table 2 - CCI and balance composing series – Comparisons of calibrated and unweighted Series**

Series	Calibrated series			Unweighted series			Correlation between two series
	Mean	Standard deviation	Coefficient of variation	Mean	Standard deviation	Coefficient of variation	R <sup>2</sup>
CCI	-19.99	14.841	-0.742	-22.080	15.248	-0.691	0.996
Ass. on the general economic situation (Q3)	-78.327	33.804	-0.432	-80.015	33.961	-0.424	0.998
Exp. on the general economic situation (Q4)	-18.558	21.151	-1.14	-20.329	21.928	-1.079	0.996
Ass. on households' financial situation (Q1)	-37.480	16.170	-0.431	-39.029	16.589	-0.425	0.996
Exp. on households' financial situation (Q2)	-5.514	9.885	-1.793	-7.290	10.641	-1.460	0.993
Expectations on unemployment (Q7)	47.532	29.122	0.613	47.160	28.760	0.610	0.998
Current households' financial situation (Q12)	7.288	14.050	1.928	5.633	14.030	2.491	0.996
Expectations on saving (Q11)	-43.431	18.893	-0.435	-49.538	20.964	-0.423	0.987
Assessments on saving (Q10)	116.427	28.358	0.244	113.756	28.192	0.248	0.997
Assessments on purchases (Q8)	-72.773	23.044	-0.317	-74.737	23.365	-0.313	0.990

Source: Istat

Q(n) refers to the numeration used in the European Commission questionnaire (European Commission, 2019).

**Figure 2 - Consumer Confidence Indicator: differences between calibrated and unweighted series**

Source: Istat

In Table 3 some descriptive statistics of the differences are described. The average significantly differs from zero (value is 2.0897), skewness coefficient is very low and negative, indicating that data are slightly skewed left and a positive kurtosis coefficient points out a “heavy-tailed” distribution. The influence of the introduced weighting system is corroborated by the paired t-Student test analysis. We tested the null hypothesis whereby the differences between the calibrated and the unweighted series are negligible, that is  $H_0$ : mean (calibrated-unweighted) = 0. The outcome highlights the differences introduced by calibration are relevant. The p-value is markedly lower than 0.01, which suggests rejecting the hypothesis of irrelevance of differences at a 1% level of significance and assessing that calibration does influence the results. The non-parametric alternative given by the Wilcoxon signed rank test (which does not require assumptions about the form of distribution) provides analogous results.

Moving to the differences in composing series, looking at the graphs (Figures A.1 - A.9 in Appendix) the shape is similar to that of the CCI for all the series but for the unemployment expectations for which the upward trend until 2009 is not present. Instead, we find an upward trend in 2010-2016 and a downward trend from 2017 onwards. We underline that assessments and expectations on saving show mean higher values while unemployment expectations series exhibits a very high coefficient of variation (see Table 3). The results of t-test and Wilcoxon test show that differences are significant for all the series at 1% level except for unemployment expectations where the level is 10%.



**Table 3 - CCI and balance composing series - differences between calibrated and unweighted**

Series	N	Mean	Standard deviation	Coefficient of variation	Skewness	Kurtosis	t-Student test	p-value	S-Signed Rank test	p-value
CCI	252	2.0897	1.3458	0.6440	-0.0914	0.1133	24.65	<0.0001	15,313	<0.0001
Ass. on the general economic situation (Q3)	252	1.6877	1.8238	1.0806	0.5231	0.6834	14.69	<0.0001	13,112	<0.0001
Exp. on the general economic situation (Q4)	252	1.7702	1.9775	1.1170	0.1264	0.9456	14.21	<0.0001	12,508.5	<0.0001
Ass. on households' financial situation (Q1)	252	1.5492	1.6057	1.0364	0.524	0.6667	15.32	<0.0001	13,376.5	<0.0001
Exp. on households' financial situation (Q2)	252	1.7758	1.4549	0.8192	0.2335	1.2827	19.38	<0.0001	14,255	<0.0001
Expectations on unemployment (Q7)	252	0.3722	1.9081	5.1262	1.0688	1.6108	3.10	0.0022	1,946.5	0.0796
Current households' financial situation (Q12)	252	1.6556	1.2302	0.7430	-0.0686	0.0365	21.36	<0.0001	14,181	<0.0001
Expectations on saving (Q11)	252	6.1071	3.7889	0.6204	-0.0366	-0.1595	25.59	<0.0001	15,579.5	<0.0001
Assessments on saving (Q10)	252	2.671	2.3087	0.8643	0.4258	1.192	18.37	<0.0001	14,463	<0.0001
Assessments on purchases (Q8)	252	1.9635	3.3282	1.6950	-0.0904	0.392	9.37	<0.0001	9,629.5	<0.0001

Source: Istat

Q(n) refers to the numeration used in the European Commission questionnaire – period: 1998-2018.

## 4.2 CCI in the main sectoral breakdowns

Outcomes of the CCI main sectoral breakdowns are presented in this section. More specifically, we analyse differences between calibrated CCI and unweighted CCI by age, occupation and education namely the sectoral breakdowns with significant differences between the weighted and unweighted structure of the sample (see Table 4). With regard to breakdown by age, correlation between weighted and unweighted series is high and widespread (see Table A.1 in Appendix). Differences show similar shapes and different levels for the four age groups considered (see Figures A.10 - A.13 in Appendix). More specifically, differences are mostly negative for the 30-49

group and are positive for 18-29 class especially in the last years. In the first case, calibration introduced a decrease in the estimates while in the second group the weighting process causes an increase of the estimates. The results of pair t-test and Wilcoxon-test provide evidence to reject the null hypothesis at the 1% level for all the groups exception made for the 50-64 age class (Table A.1 in Appendix).

Moving to breakdown for education, we highlight that CCI differences in primary education show a very similar path in respect to the aggregate one; secondary education is affected by an increase in the estimates that has become more marked from 2012 onwards (Figures A.14 - A.16 in Appendix). “Further” category does not present trend and the average is close to zero. These outcomes suggest that calibration worked: education, for which constraints were applied, is indeed linked to age. For all the three categories  $R^2$  is high and parametric and non parametric tests provide evidence of effectiveness of calibration at the 1% level (Table A.2 in Appendix).

Finally, graphical inspection of differences by occupation (Figures A.17 - A.20 in Appendix) highlights the employed group’s increase in the calibrated estimates especially in some periods while the self-employed present an average close to zero. The unemployed and inactive categories exhibit a marked increase of the calibrated estimates as “indirect” effect of the constraints on the age classes (young people are often affected by the unemployment and elder people are commonly inactive). As for the other examined breakdowns,  $R^2$  is very high and statistical tests on the differences are significant at 1% level (Table A.3 in Appendix) for all the groups.

**Table 4 - Unweighted and weighted structure of the sample (%)**

Variables	Unweighted Sample* (%)	Weighted sample* (%)	Differences (Unweighted-Weighted)
Age			
18-29	8.6	16.7	-8.1
30-49	31.3	35.9	-4.6
50-64	30.0	23.2	6.8
65+	30.1	24.2	5.9
Total	100.0	100.0	
Gender			
Male	48.1	47.9	0.2
Female	51.9	52.1	-0.2
Total	100.0	100.0	
Geographical area			
North West	26.9	26.8	0.1
North East	19.3	19.2	0.1
Centre	19.8	19.7	0.1
South	34.0	34.3	-0.3
Total	100.0	100.0	
Occupation			
Self Employed	8.3	8.5	-0.2
Employed	32.8	35	-2.2
Unemployed	3.6	4.6	-1
Inactive	55.3	51.9	3.4
Total	100.0	100.0	
Education			
Primary	50.3	44.9	5.4
Secondary	38.0	42.5	-4.5
Further	11.7	12.6	-0.9
Total	100.0	100.0	

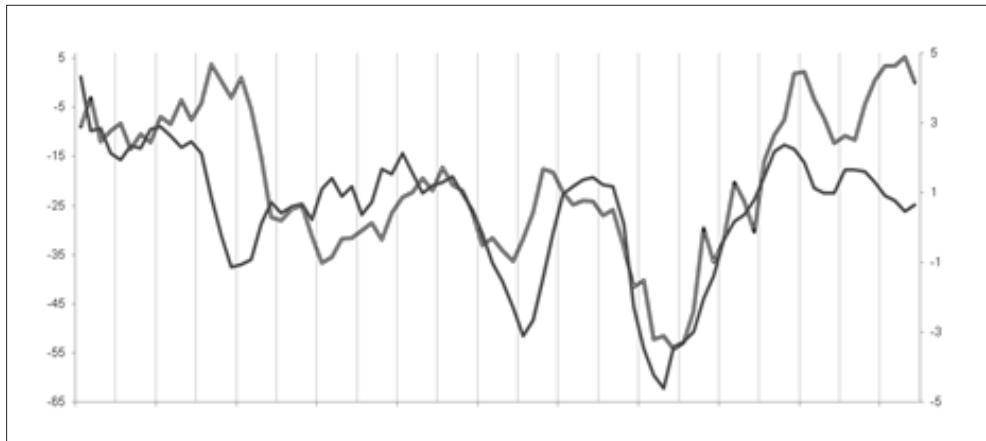
Source: Istat  
Mean over years 1998 – 2018.

## 5. Calibrated CCI: performance in tracking private consumption

In this section the performance of calibrated CCI in tracking the reference series, i.e. private consumption, was evaluated and compared with that of the unweighted CCI. First, the calibrated and unweighted indicators were compared with the quarterly seasonally adjusted quantitative reference series namely final consumption expenditure of households on the economic territory, generated by Istat within the National Accounts framework (chain linked-volumes, reference year 2015). Since the seasonality is very weak, CCIs were not seasonally adjusted. As the reference series is available with a quarterly frequency, the monthly CCIs became quarterly by calculating the average indicator of the three months in each quarter.

The reference series underwent a preliminary testing for the presence of unit roots (namely, the test confirming that the time series data are not stationary), using the Augmented Dickey-Fuller (ADF) test. On the basis of the results of the ADF test, the quantitative series was found to be non-stationary and was transformed into quarter-on-quarter changes. The calibrated and unweighted CCI, being the average of balances bounded by construction, are considered “stationary” by construction. On the basis of this last consideration, the indicators were not subject to any transformation. In terms of methodology, the performance is based on correlation analysis, ability to track directional changes, in-sample properties evaluated by the Granger test and an in-sample model, an out-of-sample forecasting exercise and a volatility analysis.

In Table 5 results of performance are shown. As regard to correlation analysis, both coincident and one quarter leading correlations have been calculated. The two indicators present very similar values of correlation both coincident and leading. In addition, two indicators exhibit an alike pattern also in the moving correlation analysis over a period of five years.

**Figure 3 - Calibrated CCI and Italian private consumption**

Source: Istat

**Table 5 - Performance in tracking private consumption of the unweighted and calibrated CCI**

CCI	Correlation analysis		Rate of correct indications of change of direction	Granger causality test		MCD
	Coincident correlation	Leading correlation (one quarter)		F-statistic	Probability	
Unweighted	0.64	0.60	0.48	3.16	0.0481	3
Weighted	0.63	0.58	0.47	2.71	0.0731	3
In sample and out of sample analysis						
$c_t = \alpha + \beta CCI_t + \varepsilon_t$						
	Adjusted R <sup>2</sup>		t-statistic		RMSE (Out-of-sample)	
Unweighted	0.41		7.51		0.33	
Weighted	0.39		7.30		0.40	

Source: Istat

Referring to the ability of tracking directional changes, the percentage of correct indications of changes was 0.47 for calibrated CCI and 0.48 for unweighted CCI.

Moving to the in-sample properties, the Granger test was applied using the regression model that includes the past values of both the dependent and independent variables. Given that the series were quarterly, a specific decision was made to insert up to 2 lags, thus giving rise to the following equation:

$$c_t = \alpha + \sum_{i=1}^l \beta_i c_{t-i} + \sum_{i=1}^l \gamma_i CCI_{t-i} + \varepsilon_t$$

where  $i$  indicates the delay,  $c_t$  the quarter-on-quarter changes of the reference series,  $\alpha$ , a constant,  $\beta_i$  and  $\gamma_i$ , respectively, regression coefficients for the past values of the dependent and independent variable CCI (confidence climate indicator), and lastly,  $\varepsilon_t$ , the error. We tested the null hypothesis whereby the reference series is not explained by the CCI past values, that is the coefficients  $\gamma_i$  are equal to zero for each  $i$ . The results indicate that both indicators are useful to predict the private consumption: the unweighted CCI at 5% level of significance and the calibrated CCI at 10% level.

In order to test the in sample and out of sample forecasting capability of the CCIs, the following model is run (European Commission, 2018):

$$c_t = \alpha + \beta CCI_t + \varepsilon_t \quad (1)$$

where  $c_t$  is the quarter-on-quarter change in private consumption,  $CCI_t$  is the quarterly value of the confidence indicator,  $\alpha$  is the constant and  $\varepsilon_t$  the error. The results of in-sample analysis were assessed by adjusted  $R^2$  values. The out of sample forecasting power was tested according to the following procedure. Firstly, estimation for the period 1998q1 – 2017q1 was made and the 2017q2 was forecasted. Then fixing the beginning of the estimation sample to 1998q1, a second estimation was made at 1998q1-2017q2, being 2017q2 the forecast value, and 2017q3 was forecasted. The out-of-sample performance was evaluated by Root Mean Squared Errors (RMSE). The two CCIs exhibit a very similar forecasting performance both in sample and out of sample. The out-of-sample performance is slightly better for the unweighted CCI (RMSE is lower).

Finally, to measure the short-term volatility of the series, Months for Cyclical Dominance (MCD) were calculated. Also in this case, the weighted CCI shows the same value of the unweighted CCI (equal 3) meaning that the calibration process did not change short-term volatility in the CCI series.

## 6. Final Remarks

The results show that, at aggregate level, the calibrated estimates are very similar to the unweighted ones, confirming the quality of the underlying sample design. Differences are however present and statistically significant, proving the efficacy of the introduced calibration system. We underline that calibrated estimates are in general increased (more optimistic) to the unweighted ones as a result of relevant changes introduced into age brackets; moreover the weighted series are typified by less variability on the average if compared to the unweighted ones.

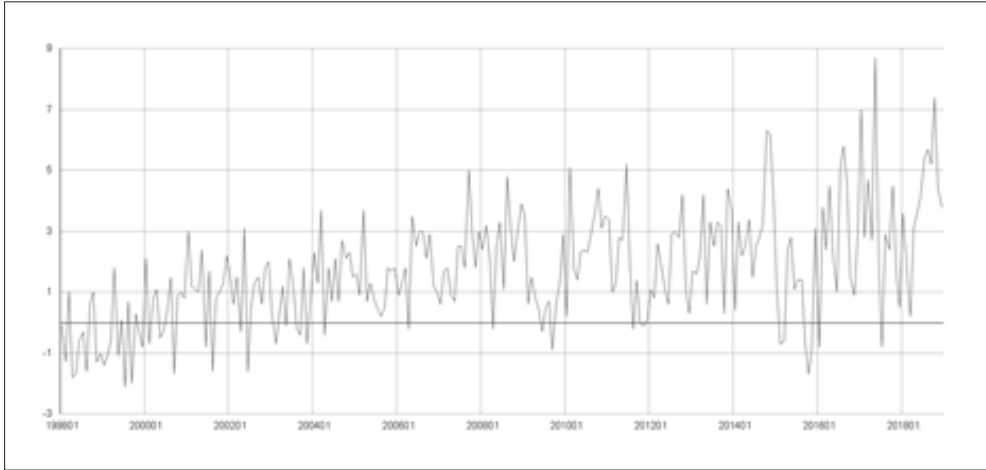
Referring to the various breakdowns, we underline that calibrated estimates of CCI generally show similar features to the aggregate ones (less variability on the average, increase of the estimates and very similar patterns with respect to the unweighted series) for all the sectoral breakdowns exception made for the 30-49 and 50-64 age brackets.

Regarding the relationship between CCI and the reference series, the calibrated and unweighted indicators exhibit equal short-term volatility and similar features in tracking private consumption proving calibration does not modify either the predictive capability of the CCI with respect to the private consumption or the short-term volatility of the series.

All in all, the results are satisfactory and Istat is planning to introduce the calibration estimator in the official data processing.

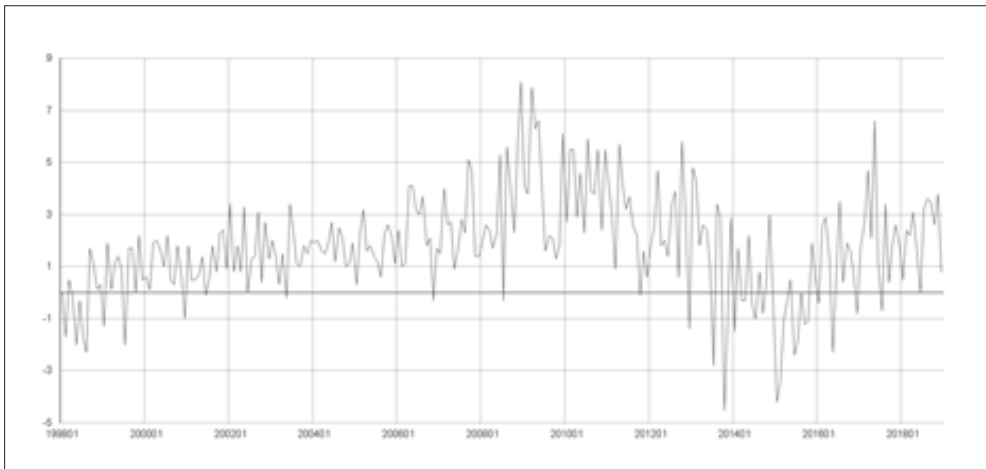
## Appendix

**Figure A.1 - Assessments on the general economic situation: differences between calibrated and unweighted series**



Source: Istat

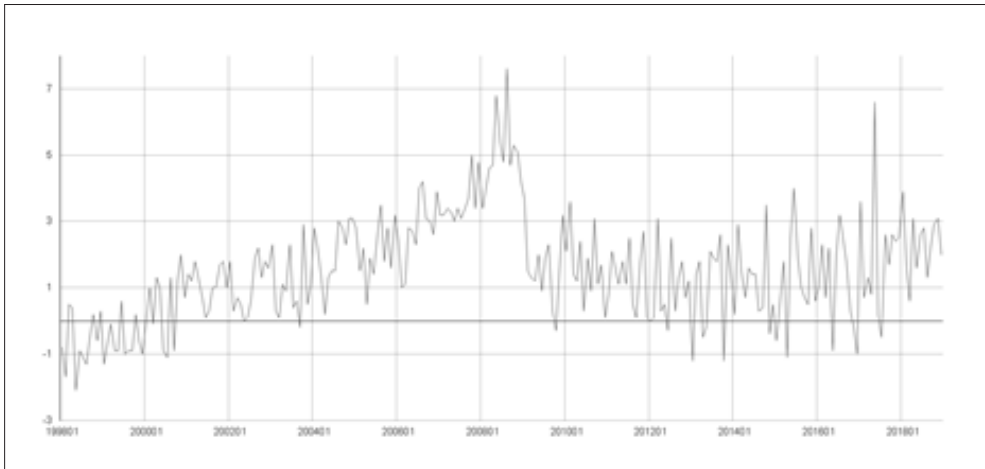
**Figure A.2 - Expectations on the general economic situation: differences between calibrated and unweighted series**



Source: Istat

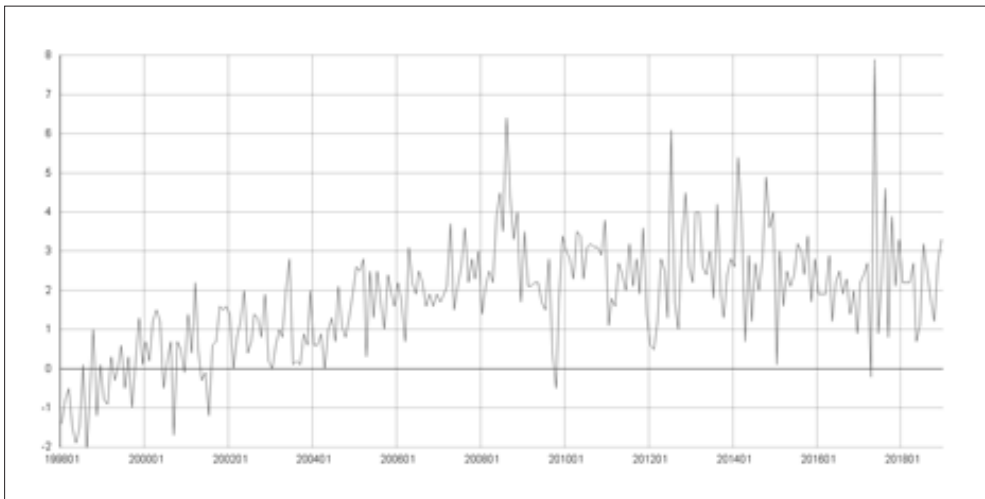


**Figure A.3 - Assessments on households' financial situation: differences between calibrated and unweighted series**



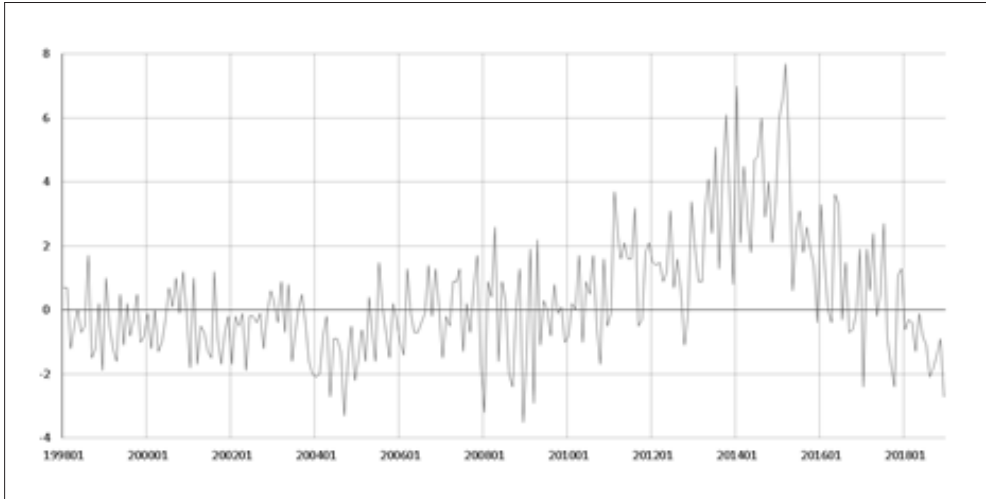
Source: Istat

**Figure A.4 - Expectations on households' financial situation: differences between calibrated and unweighted series**



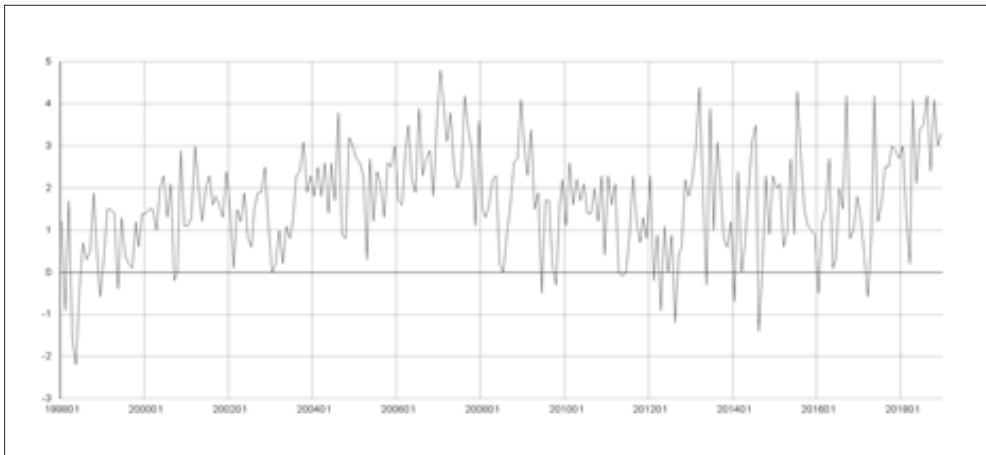
Source: Istat

**Figure A.5 - Expectations on unemployment: differences between calibrated and unweighted series**



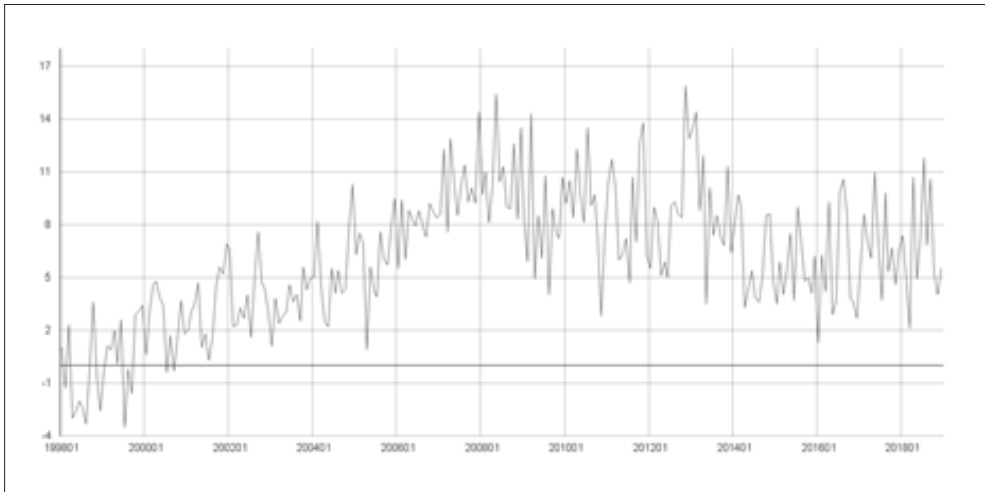
Source: Istat

**Figure A.6 - Current households' financial situation: differences between calibrated and unweighted series**



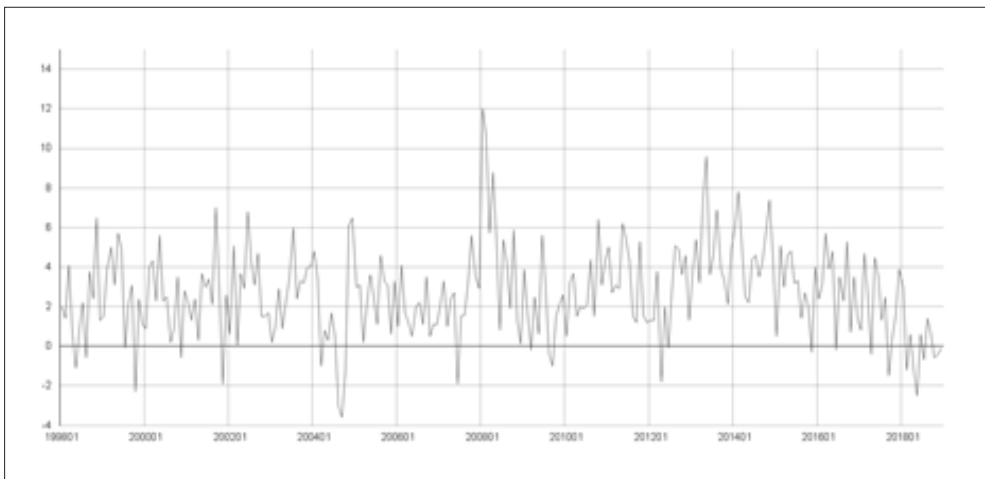
Source: Istat

**Figure A.7 - Expectations on saving: differences between calibrated and unweighted series**



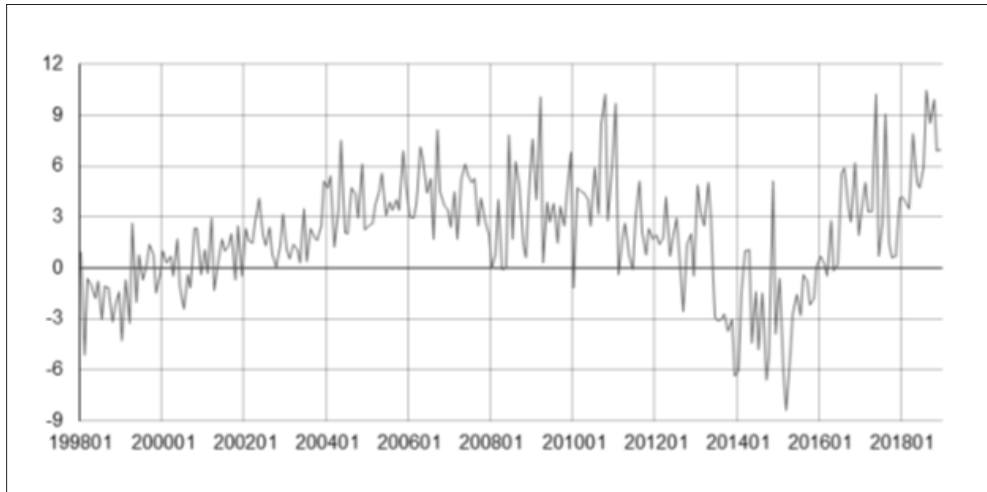
Source: Istat

**Figure A.8 - Assessments on saving: differences between calibrated and unweighted series**



Source: Istat

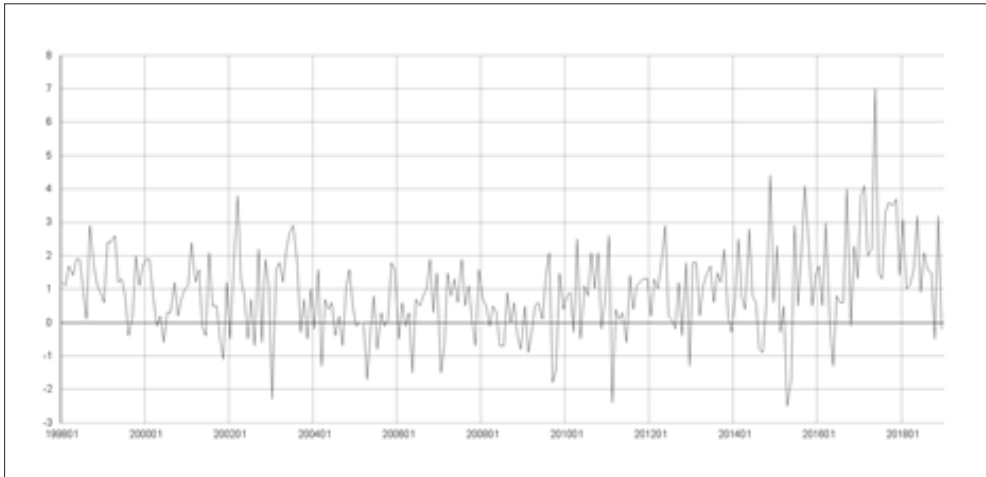
**Figure A.9 - Assessments on purchase: differences between calibrated and unweighted series**



Source: Istat

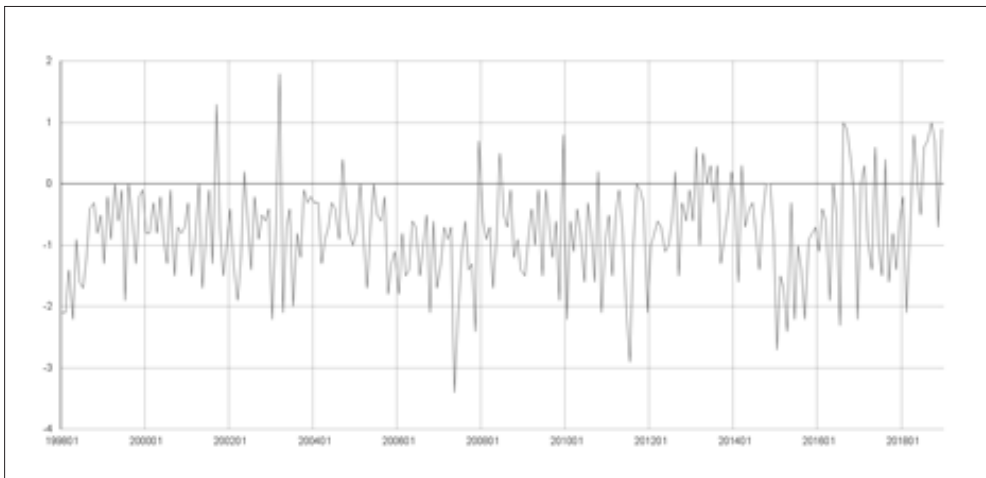
## Breakdown by Age Brackets

**Figure A.10 - 18-29 Age Bracket – Consumer Confidence Indicator – Differences between calibrated and unweighted series**



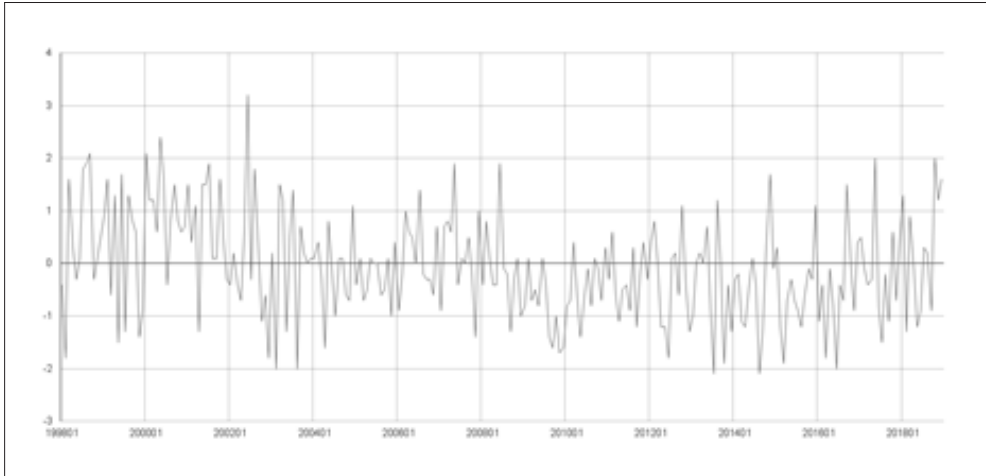
Source: Istat

**Figure A.11 - 30-49 Age Bracket – Consumer Confidence Indicator – Differences between calibrated and unweighted series**



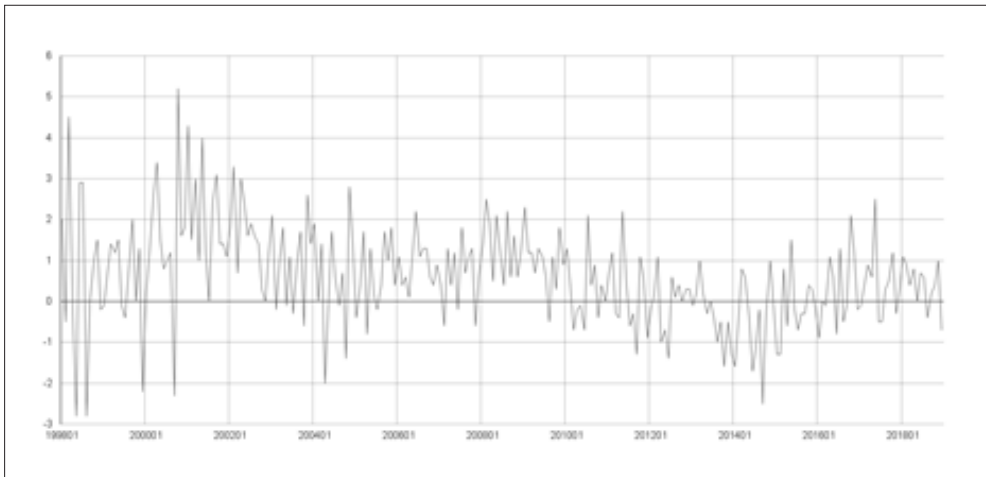
Source: Istat

**Figure A.12 - 50-64 Age Bracket – Consumer Confidence Indicator – Differences between calibrated and unweighted series**



Source: Istat

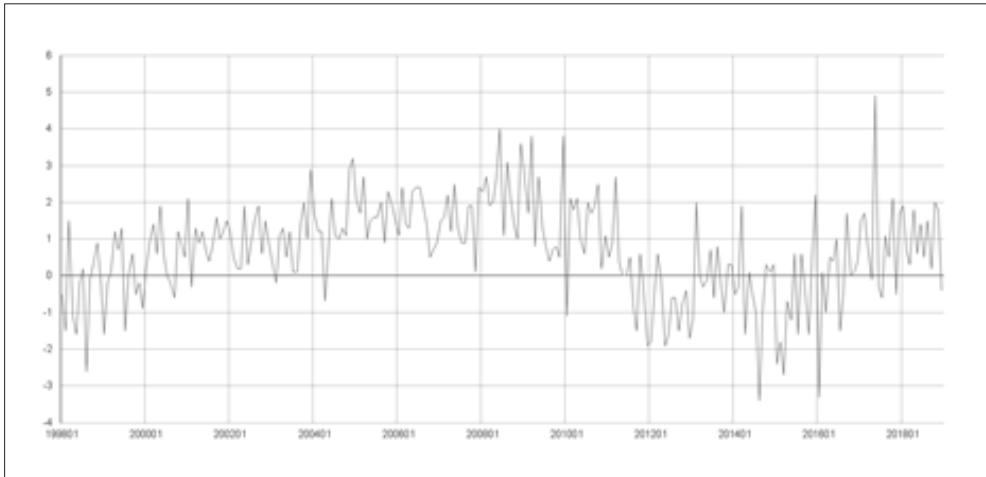
**Figure A.13 - 65+ Age Bracket – Consumer Confidence Indicator – Differences between calibrated and unweighted series**



Source: Istat

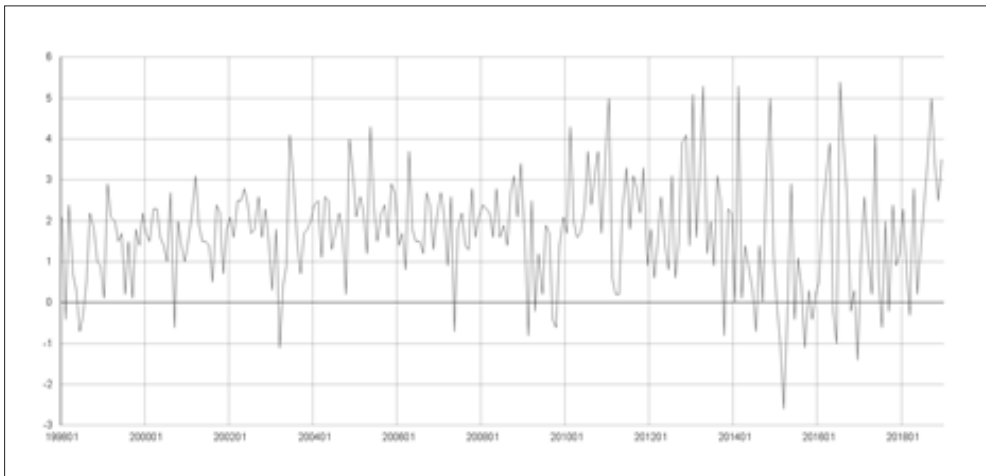
## Breakdown by Education

**Figure A.14 - Primary Education – Consumer Confidence Indicator – Differences between calibrated and unweighted series**



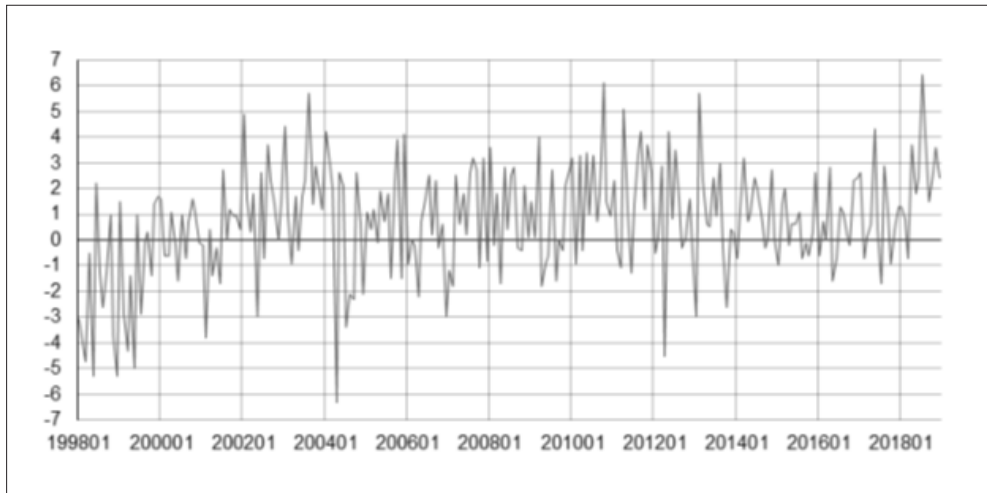
Source: Istat

**Figure A.15 - Secondary Education – Consumer Confidence Indicator – Differences between calibrated and unweighted series**



Source: Istat

**Figure A.16 - Further Education – Consumer Confidence Indicator – Differences between calibrated and unweighted series**

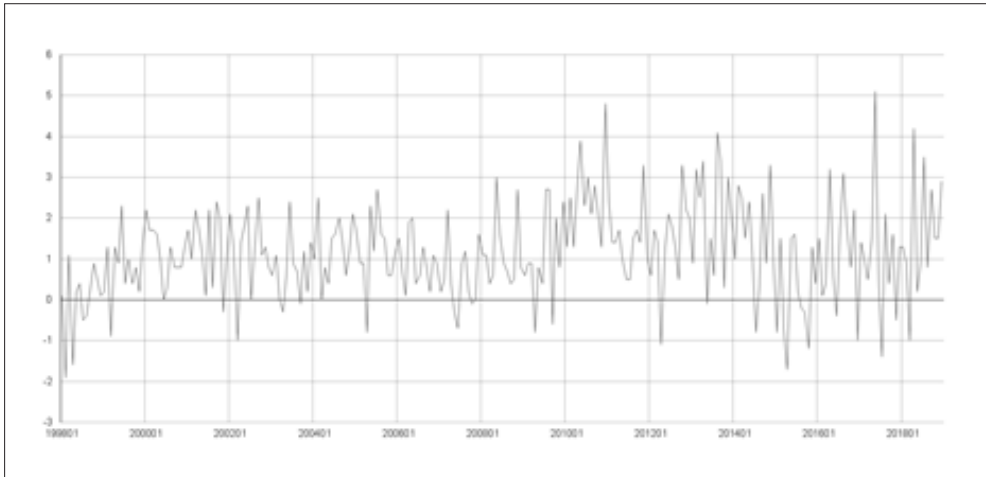


Source: Istat



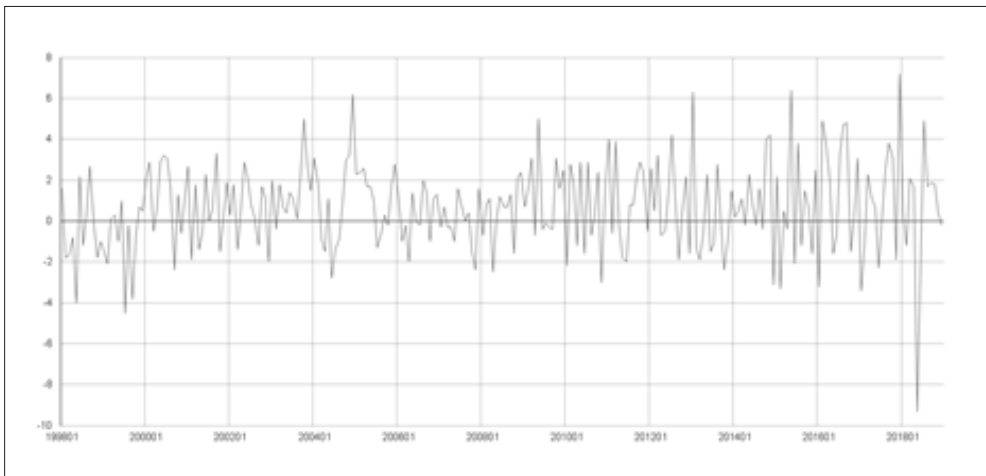
## Breakdown by Occupation

**Figure A.17 - Employed – Consumer Confidence Indicator – Differences between calibrated and unweighted series**



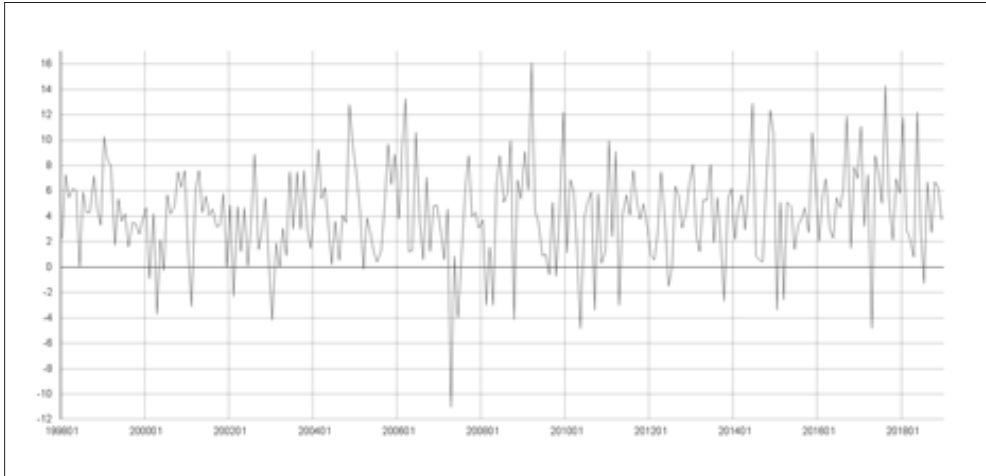
Source: Istat

**Figure A.18 - Self-employed – Consumer Confidence Indicator – Differences between calibrated and unweighted series**



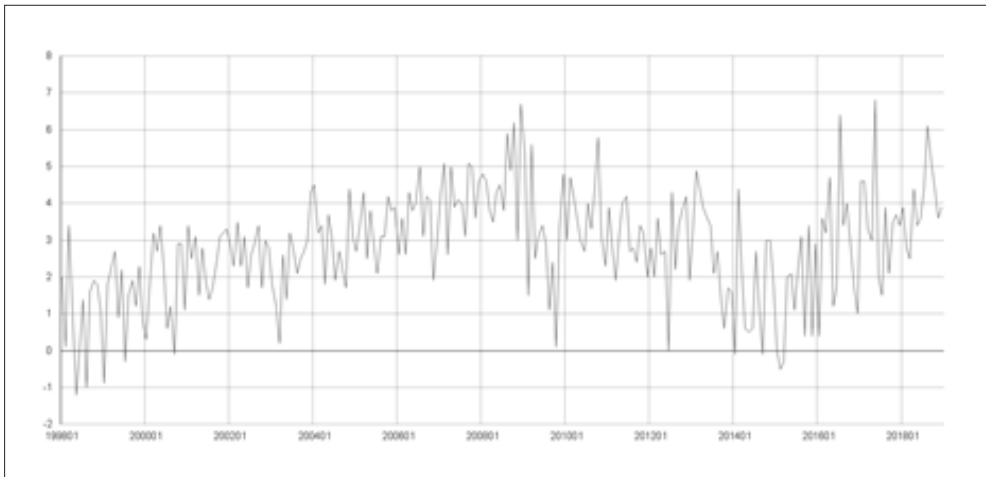
Source: Istat

**Figure A.19 - Unemployed – Consumer Confidence Indicator – Differences between calibrated and unweighted series**



Source: Istat

**Figure A.20 - Inactive – Consumer Confidence Indicator – Differences between calibrated and unweighted series**



Source: Istat

## Tables

**Table A.1 - Breakdown by Age Brackets – Correlation, Paired t-test and S-signed Rank test for the differences of CCIs**

Series	18-29 years					30-49 years				
	Differences (Calibrated - Unweighted)					Differences (Calibrated - Unweighted)				
	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value
CCI	0.99	11.09	<.0001	10910	<.0001	0.99	-15.43	<.0001	-12412.5	<.0001
	50-64 years					At least 65 years				
	Differences (Calibrated - Unweighted)					Differences (Calibrated - Unweighted)				
	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value
CCI	0.99	-1.00	0.3165	-1622.5	0.1369	0.99	8.11	<.0001	8333	<.0001

Source: Istat  
Period: 1998-2018.

**Table A.2 - Breakdown by Education – Correlation, Paired t-test and S-signed Rank test for the differences of CCIs**

Series	Primary				
	Differences (Calibrated – Unweighted)				
	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value
CCI	0.99	8.44	<.0001	8670	<.0001
	Secondary				
	Differences (Calibrated – Unweighted)				
	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value
CCI	0.99	20.33	<.0001	14606.5	<.0001
	Further				
	Differences (Calibrated – Unweighted)				
	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value
CCI	0.99	5.43	<.0001	6311.5	<.0001

Source: Istat  
Period: 1998-2018.

**Table A.3 - Breakdown by Occupation – Correlation, Paired t-test and S-signed Rank test for the differences of CCIs**

Series	Employed					Self employed				
	Differences (Calibrated – Unweighted)					Differences (Calibrated – Unweighted)				
	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value
CCI	0.99	16.00	<.0001	13221.5	<.0001	0.99	4.97	<.0001	5552	<.0001
	Unemployed					Inactive				
	Differences (Calibrated – Unweighted)					Differences (Calibrated – Unweighted)				
	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value
CCI	0.97	17.51	<.0001	13824.5	<.0001	0.99	30.62	<.0001	15564.5	<.0001

Source: Istat  
Period: 1998-2018.

**Table A.4 - Breakdown by Gender – Correlation, Paired t-test and S-signed Rank test for the differences of CCIs**

Series	Female					Male				
	Differences (Calibrated – Unweighted)					Differences (Calibrated – Unweighted)				
	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value
CCI	0.99	24.65	<.0001	15108	<.0001	0.99	20.31	<.0001	14323.5	<.0001

Source: Istat  
Period: 1998-2018.

**Table A.5 - Breakdown by Geographical Area – Correlation, Paired t-test and S-signed Rank test for the differences of CCIs**

Series	North West					North East				
	Differences (Calibrated – Unweighted)					Differences (Calibrated – Unweighted)				
	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value
CCI	0.99	18.14	<.0001	13823	<.0001	0.99	19.20	<.0001	14716.5	<.0001
	Centre					South				
	Differences (Calibrated – Unweighted)					Differences (Calibrated – Unweighted)				
	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value	R <sup>2</sup>	Paired t-test	p-value	S-signed Rank test	p-value
CCI	0.99	16.81	<.0001	13608	<.0001	0.99	23.28	<.0001	15095.5	<.0001

Source: Istat  
Period: 1998-2018.

## References

Cochran, W.G. 1977. *Sampling Techniques*. Hoboken, NJ, U.S.: John Wiley & Sons.

Deville, J.C., and C.E. Särndal. 1992. “Calibration estimators in survey sampling”. *Journal of the American statistical Association*, Volume 87, N. 418: 376 – 382.

De Vitiis, C., A. Guandalini, F. Inglese, e M.D. Terribili. 2015. “Fiducia dei consumatori – Confronto tra i sistemi di calibrazione”. *Mimeo*. Roma: Istituto Nazionale di Statistica - Istat.

European Commission, Directorate-General for Economic and Financial Affairs. 2018. *A revised consumer confidence indicator*. Brussels, Belgium: European Commission.

European Commission, Directorate-General for Economic and Financial Affairs. 2016. *The joint harmonised EU programme of business and consumer surveys. User guide*. Brussels, Belgium: European Commission.

Guandalini, A. 2019. “Inference for the consumer confidence index”. *Mimeo*. Roma: Istituto Nazionale di Statistica - Istat.

Martelli, B.M. 1998. “Le inchieste congiunturali dell’ISCO: aspetti metodologici”. *Rassegna di Lavori dell’ISCO*, Year XV, N. 3: 13-67.

Martelli, B.M., e F. Fullone. 2008. “Re-thinking the ISAE Consumer survey processing procedure”. *ISAE working paper series. Working Paper N. 92/2008*.

Särndal, C.-E. 2007. “The calibration approach in survey theory and practice”. *Survey Methodology*, Volume 33, N. 2: 99-119.

Zardetto, D. 2015. “ReGenesees: an Advanced R System for Calibration, Estimation and Sampling Error Assessment in Complex Sample Surveys”. *Journal of Official Statistics*, Volume 31, N. 2: 177-203.

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