

QUALITY OF LIFE AND DEREGULATION IN THE ITALIAN LABOUR MARKET: THE EFFECTS OF TEMPORARY EMPLOYMENT ON HEALTH

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SUMMARY

A growing body of scientific literature highlights the negative consequences of occupational insecurity in several domains of life. The present research project focuses on the social context of Italy, examining the relationship between precarious work and health. In particular, the study aims to improve understanding of the phenomenon by investigating the impact on perceived health by exploring gender differences and the role of the economic situation of the respondents.

This study focuses on the Italian adult population. It employs a longitudinal panel approach, based on a sample of women and men aged 16-64 from the Italian Survey on Income and Living Conditions from European Union Statistics (2012-2015). We use the method of fixed and random effects models to estimate the causal effect of temporary work on self-rated health, taking into account selection effects.

The study demonstrates that fixed-term contracts are negatively associated with perceived health, and that results from a statistical causal effect in the work-to-health direction. Secondly, we find that this causal relationship between men and women is similar in the case of part-time contracts, and is stronger between women with full-time contracts. Finally, among those on very high incomes, there are differences in perceived health between precarious and stable workers.

As in some previous studies, the negative link between temporary employment and health is more strongly evident for Italian women than men, and this result requires an in-depth study.

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1. Introduction

In recent decades, Western economies have undergone social, economic, and legislative changes that have had a substantial impact on the organisation of the labour market. Modifications in employment law since the 1970s have brought essential adjustments in contractual arrangements and job security for many workers. Job insecurity has increased both because of the higher risks of unemployment and the spread of what is called atypical or flexible work. Compared to conventional forms of employment, these new labour law agreements are associated with greater insecurity, worse working conditions, lower pay, and less social protection (Barbieri & Scherer, 2009; Esping-Andersen & Regini, 2000).

A growing literature in the social and health sciences has focused on the negative consequences of precarious jobs on workers' wellbeing and health. Existing studies tend to focus on the risk of unemployment or the experience of job loss (McKee-Ryan et al., 2005; Paul & Moser, 2009). The negative effect of unemployment on mental health is most influential in countries with low levels of economic development, unequal income distribution, or weak unemployment protection.

Increasing risks of unemployment and changes in working conditions have progressively increased job insecurity in Italy. The new "atypical" forms of work, which in most cases provide for contracts of limited duration, have become increasingly widespread, especially among the younger generations (Kretsos, 2010). While they have contributed to reducing the levels of unemployment achieved during the previous recessionary period, they have also been victims of this process, which has provided changing work processes, increasing the sense of insecurity resulting from these new forms of bargaining (Patterson, 2001; Quinlan & Bohle, 2009; Smith, 1997).

Benach and Muntaner (2007, p. 9) noted that "*new types of work arrangements can be as dangerous as traditional unemployment for workers' health*". Other scholars have expressed similar views (Quinlan et al., 2001; P. Virtanen et al., 2005), including a shift from comparing people's health based on whether they are employed or unemployed, to comparing people's health based on whether they have a stable job, are unemployed or underemployed.

Research into the health consequences of temporary work is, in fact, relatively new. However, the number of studies on this subject has increased steadily over the last two decades due to growing concerns about the economic and social consequences of the spread of precariousness and other forms of non-standard work. The meta-analysis of 27 studies by Virtanen et al. (2005) found an association between temporary work and mental health risks, although the magnitude of the impact depended on the duration of job instability and its context. More recent studies have also shown that temporary contracts have been associated with negative psychological health, even after taking into account potential selection effects (Caroli & Godard, 2016; Pirani, 2017; Quesnel-Vallée et al., 2010).

Eurostat data³ for 2016 show that the percentage of employees with fixed-term contracts in the EU-28, aged 15-74, is 14.2 %. According to more recent data, levels of mental health and psychological wellbeing of the Italian population deteriorated between 2005 and 2013, with economic status, social exclusion and precariousness in the labour market being among the main causes (Alleva, 2017).

The consequences of these changes on the general wellbeing of workers and their health are increasingly crucial in the investigative process. Most scholars agree that flexible working arrangements imply unfavourable conditions for both career prospects and private life, including health status, mainly due to increased insecurity and worsened working conditions. Moreover, this negative association is reinforced by the fact that in contemporary societies this form of employment is increasingly becoming a necessity (Benach et al., 2004; László et al., 2010; Rodriguez, 2002; Rugulies et al., 2008; M. Virtanen et al., 2003).

We aim to assess whether temporary work has negative effects on the perceived health of Italians, taking into account potential selection effects. Specifically, we have set out to investigate the function covered by fixed-term employment contracts - in conjunction with the presence of other covariates - in modelling individual trends in perceived health over time (Singer & Willett, 2003).

³ Source: www.ec.europa.eu/eurostat/statistics-explained/index.php?title=Employment_statistics/it

We use panel modelling with both fixed and random effects, applied to data from the Istat Living Conditions Survey “EU-SILC”, covering the period from 2012 to 2015. Through the use of fixed effect models, we can keep unobservable heterogeneity under control, cancelling out that which is constant over time. Several studies suggest that in this area, the individual heterogeneity due to unobserved factors is not negligible (Kivimäki et al., 2003; Pirani & Salvini, 2015). Using properly transversal data, we are not able to exclude the possible presence of selection effects, according to which people with health problems are likely to have unstable employment at the same time. Those who are hired on a fixed-term basis may have systematically different characteristics than those in permanent employment as regards motivation, productivity or pre-existing health conditions; in other words, it is not possible to control the unobserved heterogeneity through the usual traditional OLS estimates, which presuppose the use of cross-sectional data. Therefore, we will carry out longitudinal analyses in order to verify the role played by precarious employment status starting from the trajectories of the subjects over time, thus keeping possible distortions in the results under control.

2. The theoretical context

In recent decades, the substantial changes in the labour market have led to an increasing decline in the long-term relationship between employers and employees (Cappelli et al., 1997). The labour market has undergone dramatic changes in all European countries. Alongside the standard labour force, a wide variety of new contractual forms have been introduced to create more opportunities for labour market outsiders - i.e. the unemployed, young people and women (Ferrie et al., 2008; P. Virtanen et al., 2003).

These new forms of contracts have been generally labelled as atypical work (Benach & Muntaner, 2007), meaning something limited to a minority of the workforce, marked by different contract duration, working hours, job characteristics and above all, the system of rights, obligations and guarantees of the worker. More recently, the term “precariousness” has begun to spread concerning these new forms of contracts, to highlight both their growing popularity and the consequences in terms of workers’ welfare (Benach et al., 2014).

Precariousness, in other words, puts workers at a disadvantage for various aspects such as low wages, temporary contracts, reduced social rights and poor working conditions (Benach & Muntaner, 2007; Guest, 2004; M. Virtanen et al., 2005)

The crucial point is that precarious working conditions call into question the possibility of guaranteeing individual wellbeing, security through income and self-realisation of workers. Such conditions amplify the risk of job loss, which is inherent in the short-term nature of fixed-term contracts, and make it much more difficult for workers to plan their future private and professional lives (Gash et al., 2007; Vives et al., 2011).

In general, empirical research has shown a negative association between atypical work and health, but there are substantial variations between countries due to differences in national economic contexts, labour market policies or social protection (Benach et al., 2014; M. Virtanen et al., 2005).

Studies on factory closures since the 1970s have shown that health begins to be affected when workers, while continuing to work, perceive a situation of uncertainty due to possible closure or downsizing of the company (Bohle et al., 2001; Kivimäki et al., 2000). The threat of job losses would significantly contribute to a worsening of health, mainly due to mental and psychological disorders and consequently an increased need for medical interventions and treatment. In several longitudinal studies, people exposed to persistent and chronic job insecurity have shown a substantial deterioration in both mental and perceived health, fuelling a state of chronic stress (Ferrie et al., 2002).

In the United States, studies have shown the presence of more pronounced depressive symptoms in workers exposed to temporary work in the previous two years (Quesnel-Vallée et al., 2010) and the negative impact of job insecurity on perceived health and the presence of cardiovascular disease (Burgard et al., 2009; Slopen et al., 2012). In Europe, for example, in terms of health consequences, many studies have shown that precarious work increases the risks of mental, psychological, depression or life satisfaction-related disorders (Callea et al., 2012; Quesnel-Vallée et al., 2010; Scherer, 2009). On the contrary, P. Virtanen et al. (2003) did not find a significant relationship between work and health in Finns. In another Finnish study, the authors point out that compared to permanent employees, men and women on fixed-term contracts have a better health assessment,

and the association between perceived safety and psychological distress is significantly stronger in permanent employees than with fixed-term employees (Virtanen et al., 2002). An increased risk of negative health outcomes is present in some southern European countries, especially among women in precarious work (Pirani & Salvini, 2015; Vives et al., 2011).

Few studies have attempted to assess the statistical impact of the report. For example, Kim et al. (2008) and Gebel et al. (2014) carried out an analysis using the Propensity Score on data from South Korea and Germany respectively, Caroli and Godard (2013) and Ehlert and Schaffner (2011) analysed the causal relationship between temporary work and health, using fixed effect models. All the authors showed the existence of a significant health gap to the detriment of temporary employees.

In Italy, according to ISTAT, the Italian Institute of Statistics, the increase in employment in 2014 is due in particular to the increase in atypical forms of employment and part-time work, particularly non-voluntary. The rate of atypical workers overall is around 11.9% with over 5 million workers on fixed-term contracts. Atypical work is prevalent among young people aged 15-34, for whom just over one in four people are employed in a temporary job or a collaboration. However, this form of work also affects older workers (8.8% in the 35-49 age group) and people with family responsibilities: in 2014, 42.3% of women in atypical work are mothers (Istat, 2015).

The management of flexibility in Italy - regulated by the new labour legislation, the Treu law, from the end of the 1990s onwards, in which both less productive workers (with health problems and low motivation) and motivated workers with high levels of productivity, who are hired on fixed-term contracts at the beginning of their careers - has significantly strengthened the dualism between a central and a marginal labour force (Micheli, 2006). The initial aim of these measures was not only to counteract the growth in unemployment but also to encourage the entry into the labour market of those social groups whose participation in Italy had traditionally been unusually low, particularly women and low-skilled individuals. However, the results of various studies show that deregulation, though on the one hand, has acted as a “springboard” and promoted the entry of categories otherwise previously excluded, on the other hand, has encouraged the emergence of risks related to stability and job security (Barbieri & Scherer, 2009; Bozzon, 2008)

Interest in this issue in Italy has only recently emerged, in the light of the drastic changes in working conditions, in which permanent full-time employment - characterised by job security and a stable salary - has been increasingly replaced both in Italy and in the rest of Europe by temporary jobs, apprenticeship contracts, atypical and part-time jobs.

In this regard, Pirani and Salvini (2015) investigate whether Italian temporary workers suffer more from health problems than permanent workers. The results firstly highlight the presence of a negative causal effect of precarious work on self-perceived health, dichotomised in two categories. Atypical work then has a particularly negative impact when it continues over time. Finally, if gender differences are taken into account, this association is particularly negative for women, while for men, the association is weak and not very significant. At the same time, other research shows that the likelihood of prescription of psychotropic drugs is higher for workers on fixed-term contracts. Also, the transition from permanent to fixed-term employment significantly increases the risk of mental illness and, symmetrically, the transition to stable employment tends to reduce this risk (Moscone et al., 2016). Finally, a study of the young adult workforce has shown a strong association between employment status and mental health. Specifically, the association between job insecurity and mental health is the net of other variables, more significant and negative in men than in women. Furthermore, compared to long-term contracts, workers in all other categories are significantly more likely to be in poor mental condition; in particular, unemployed people with previous work experience reported the worst level (Fiori et al., 2016).

3 Data and Methodology

3.1 Sample selection

The database on which the following empirical analysis is based is represented by the Eu-Silc (Statistics on Income and Living Condition Survey) consisting of longitudinal data for the years 2012/2015 of the Italian component.

This survey - carried out by the National Italian Institute of Statistics (ISTAT) - collects detailed information on individuals and households at random and representative samples on a national level for all European countries (Arora et al., 2015). The interviewees are followed for four years, with a particular focus on their employment history and socio-demographic characteristics. In our case we will analyse the impact of fixed-term contracts on perceived health, considering a sample of women and men aged between 16 and 64 in 2012, the reference year, taking into account both transitions towards stable employment and those towards precarious employment.

Our dependent variable is the self-perceived health of individuals, according to the question suggested by the World Health Organization: "How is your health in general?"; the answers are on a scale of 1 (very good) to 5 (very bad).

Overall, this indicator - composed of 5 categories - provides a comprehensive, complete and reliable overview of the individual's general state of health and wellbeing, proving to be a valid substitute in the absence of other more specific dimensions related to employment conditions, such as mental health, depression or stress (Virtanen et al., 2002).

In the past, researchers who have dealt with health inequalities have often used this type of categorical, ordinal indicator, turning it into a dichotomous variable (good/bad health), or treating it as continuous. In the first case, according to a number of scholars, the disadvantages deriving from the dichotomisation are evident, as not all the health variations contained in the variable are used to compare the inequalities over time and the choice of the breakpoint, inevitably arbitrary, leads to different results depending on the direction of the categories used for the binary transformation (Kunst et al., 1995; Van Doorslaer & Jones, 2003). An alternative is to assume that at the base of the categorical variable relating to self-perceived health, there is a sort of continuous latent factor underlying it. The weakness of this approach lies in the fact that it excludes any kind of asymmetry in the distribution of the continuous latent variable, an essential element that must be taken into account. Moreover, this procedure is not considered appropriate due to violation of assumptions of independence and identical distribution of errors. Specifically, observations with combinations of x in y expected values falling outside the possible y levels would have a different error distribution than those of y expected to fall within the possible y levels (Wagstaff & Van Doorslaer, 1994).

In our case, there is an asymmetric distribution, as a large proportion of the sample claims to be in good health and only a minority suffer from serious health problems, as typically happens in most welfare measures. A possible solution to this problem is to use a log-normal standard distribution rather than a normal standard distribution. In this case, we consider that $z = \ln [-y^*]$ has a standard normal distribution; in other words, we assume that $y^* = -e^z$, so the result will always be positive (Kunst et al., 1995; Wagstaff & Van Doorslaer, 1994).

Given the categorical nature of the variable, the most suitable alternative is to implement an ordinal logistic model, which is the most appropriate alternative in the case of ordered categorical variables. In this case - concerning the implementation of a linear model (OLS) - the extent to which the results differ depends fundamentally on the level at which the OLS assumptions are severely violated (Winship & Mare, 1984).

If we compare an ordinary logistic model and the traditional OLS, the discrepancy in outcomes will largely depend on the underlying data distribution, which must be verified on a case-by-case basis. If the variable is composed of at least five categories and is characterised by an almost normal distribution, the OLS model will likely give more or less the same results as the ordinary logistic model (the same levels of significance as the independent variables and the same expected results). If, on the contrary, the distribution is strongly distorted, then the ordinal logistic model should be used, especially if the comparison leads to widely divergent results.

In order to unequivocally and precisely identify the type of contract, we have included all workers with an employment contract in the analysis and removed the self-employed. This exclusion was also carried out in

previous studies (Artazcoz et al., 2005; P. Virtanen et al., 2005) because self-employed workers have individual characteristics and attitudes that differentiate them significantly from employees; moreover, the very nature of self-employment is profoundly different from that of fixed-term contracts stipulated with an employee (Bardasi & Francesconi, 2004; P. Virtanen et al., 2003).

Marital status is a health-related element, even if the evidence is not clear; in our case, we have distinguished between single, married and separated people.

We introduce the area of residence as a covariate, distinguishing between north, centre and south. We have divided the educational conditions into primary, secondary and tertiary education. At the same time, the assessment of the economic and financial situation refers both to the interviewees' opinion on the overall economic conditions of the household in the last 12 months (good or bad) and to the average annual income received.

Occupations have been classified into three groups, following Isco-88 standard guidelines: primary and elementary occupations (machine operators, fitters, artisans, agricultural and fishing workers), occupations with a medium level of skills (technicians, associate professionals and employees), and occupations involving higher levels of skills (legislators, senior officials, managers and professionals).

Finally, let us consider two confounding factors that account for the state of health. The first indicates the presence/absence of a long-term chronic disease (hypertension, diabetes, heart disease, arthrosis); the second indicates the presence of severe limitation and disability in daily activities. The table below shows the variables that will be used in the following analyses (Tab. 1).

Table 1 List of variables

Variable	Description	Source
Perceived health	1 (very good) - 5 (very bad)	Eu-Silc 2012-15
Gender	Dummy: 1 = female	
Age	Age of respondent in years	
Area of residence	3 categories: north, centre, south	
Family status	3 categories: single, married, separated	
Education	3 categories: primary, secondary, tertiary	
Employment status	2 categories: long-term contracts, fixed-term contracts	
Family resources	2 categories: good, bad	
Income	4 categories: 0-25°, 25°-50°, 50°-75°, 75°-100° percentile	
Chronic Diseases	Dummy: 1 = yes	
Limitations and disabilities	Dummy: 1 = yes	
Occupations (Isco 88)	3 categories: elementary, medium, high	

Source: Our elaboration from the EU-SILC longitudinal living conditions survey (Istat, 2012-2015).

3.2 Fixed-effect and random-effect ordinary logistic models

In the case where the response variable is composed of orderable categories, we can estimate through the method of the maximum likelihood a longitudinal model with random effects, adapting it to the following formula:

$$\Pr(y_{it} > k | \kappa, x_{it}, v_i) = H(x_{it}\beta + v_i - \kappa_k) \quad (1)$$

For $i = 1, \dots, n$, $t = 1, \dots, n_i$ (survey waves), v_i are independent and distributed identically with $N(0, \sigma_v^2)$; κ represents the number of ordered categories of the dependent variable, where k is the number of possible results; finally, $H(\cdot)$ expresses the function of the cumulative logistic distribution.

From the formula (1) we can derive the probability from observing a k result for the response variable y_{it} as:

$$\Pr(y_{it} = k | \kappa, x_{it}, v_i) = \frac{1}{1 + \exp(-\kappa_k + x_{it}\beta + v_i)} - \frac{1}{1 + \exp(-\kappa_{k-1} + x_{it}\beta + v_i)} \quad (2)$$

where κ_0 is taken as $-\infty$ and κ_k as $+\infty$; moreover x_{it} does not contain a basic term of reference, as this effect is absorbed within the different intercepts present in this model (Skrondal & Rabe-Hesketh, 2004).

If we consider fixed-effect models, in the case of a categorical variable y_{it} - such as perceived health, composed of 5 progressively increasing categories - the most suitable model is the ordinal logistic model with fixed effects.

If in the case of cross-sectional data, this type of parametric modelling is easier to estimate using the maximum likelihood method, the use of longitudinal data makes things much more complicated.

In our case, we apply a fixed-effect ordinal logistic model, using the so-called “*Blow and Cluster Estimator*” (BUC) proposed by Baetschmann and colleagues (2011). Using this technique, it is possible to jointly estimate the values for the dichotomisation of all cut points, resulting in a fixed effect model consisting of a unique probability function. In this way, we use all available information in the dependent variable to evaluate the causal estimates over time.

The ordinal logistic model with fixed effects connects the latent variable y_{it}^* for the individual i to time t with a linear index of observable x_{it} and non-observable characteristics such as α_i and ε_{it} :

$$y_{it}^* = x_{it}'\beta + \alpha_i + \varepsilon_{it} \quad (3)$$

Where $i = 1 \dots N$; $t = 1 \dots T$.

The latent variable is related to the ordered (observed) variable y_{it} :

$$y_{it} = k \text{ if } \tau_k < y_{it}^* \leq \tau_{k+1}, k = 1, \dots, K \quad (4)$$

and assume there is an increase from $\tau_1 = -\infty$ to $\tau_{K+1} = +\infty$

The assumption related to the distribution of the ordinal logistic model with fixed effects is:

$$F(\varepsilon_{it} | x_{it}, \alpha_i) = F(\varepsilon_{it}) = \frac{1}{1 + \exp(-\varepsilon_{it})} = \Lambda(\varepsilon_{it}) \quad (5)$$

Therefore, the probability of observing the k outcome for the individual i at time t is:

$$\Pr(y_{it} = k | x_{it}, \alpha_i) = \Lambda(\tau_{k+1} - x_{it}'\beta - \alpha_i) - \Lambda(\tau_k - x_{it}'\beta - \alpha_i) \quad (6)$$

which depends not only on β e x_{it} , but also on α_i , τ_k , τ_{k+1} (Ferrer-i-Carbonell & Frijters, 2004)

Chamberlain (1980) shows that the maximisation of conditional probability is given as follows:

$$\log \mathcal{L}^k(b) = \sum_{i=1}^N \log P_i^k(b) \quad (7)$$

However, this estimator of β , said in this case $\hat{\beta}^k$, does not use all possible variations in y_{it} .

The alternative we propose consists of estimating all possible dichotomisations together using the estimator of the variance of each cluster (Baetschmann et al., 2011):

$$\widehat{Var}(\hat{\beta}) = (\sum_{i=1}^N \hat{h}_i)^{-1} (\sum_{i=1}^N \hat{s}_i \hat{s}_i')^{-1} (\sum_{i=1}^N \hat{h}_i)^{-1} \quad (8)$$

where \hat{s}_i represents the health score for each individual rated on $\hat{\beta}$, $\hat{s}_i = (\hat{s}_i^2, \dots, \hat{s}_i^k)'$, and \hat{h}_i represents the matrix of derivatives of s_i with respect to β , and rated on $\hat{\beta}$. Ultimately this technique forms the basis of the BUC estimator⁴.

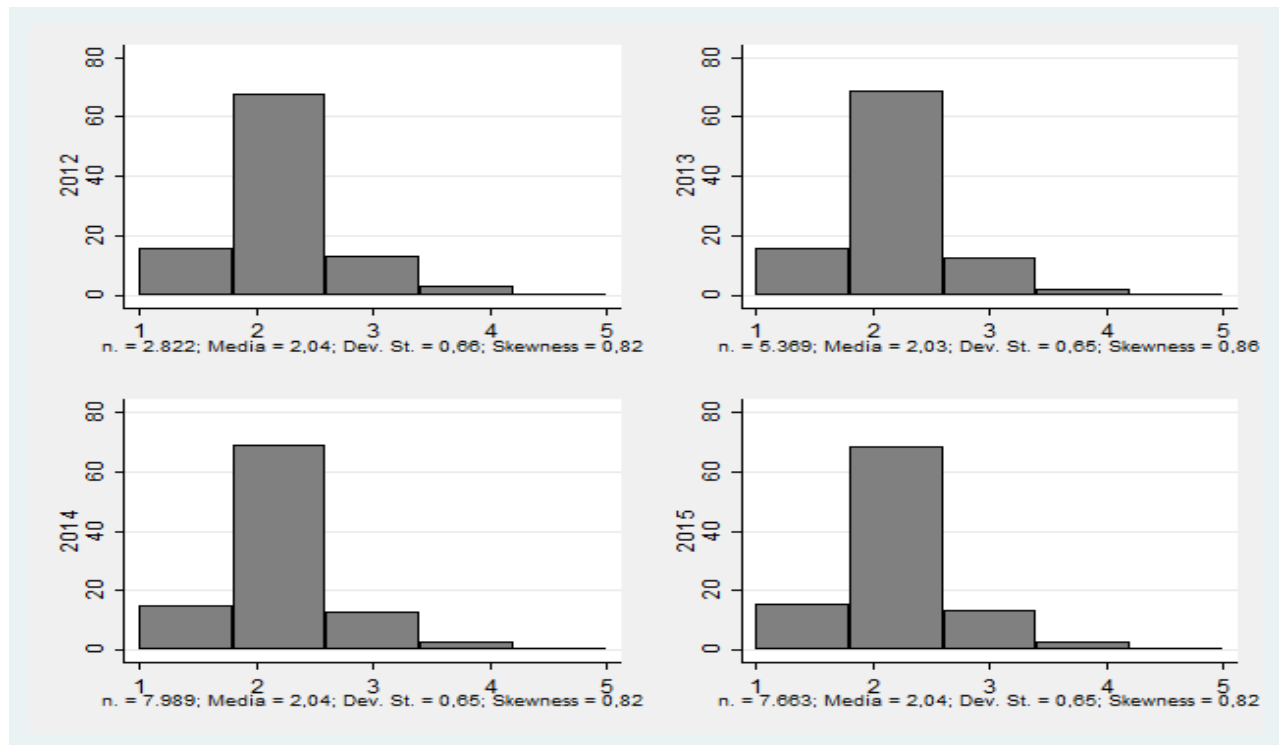
4 Empirical results

4.1 Preliminary descriptive data and analysis

Before answering the questions, it is necessary to give a brief description of the *Dataset* and the variables we are going to analyse.

For this study, women and men aged between 16 and 64 were selected during the first wave in 2012. The sample thus obtained is composed of a total of 23,843 individuals, divided into four waves, from 2012 to 2015. We can observe that the distribution of the perceived health index (Fig. 1) has an average of 2.0 in all the waves and is positive asymmetric (skewness = 0.8).

Figure 1 Distribution of perceived health index in Italy (period: 2012-2015)



Source: Our analysis from the EU-SILC Living Conditions Survey (Istat, 2012-2015)

⁴ For more information: Baetschmann et al. (2011)

Again, as regards our *outcome* variable, we note that the variance between subjects ($0.54*0.54$) is higher than that *within* ($0.37*0.37$)⁵.

Table 2 Decomposition of perceived health indicator variance

Variable	Variance	Media	St. Dev.	Min*	Max*	Individuals
Perceived health	<i>Total</i>	2.04	0.65	1	5	N = 23,843
	<i>between</i>		0.54	1	5	n = 9,047
	<i>within</i>		0.37	0.04	4.54	T-bar = 2.63

* Within values are calculated around the average of individuals \bar{x}_i .

Source: Our analysis from the EU-SILC Living Conditions Survey (Istat, 2012-2015)

In Table 3, we observe that almost 85% of the individuals declared at least once perceived good health, while a minimum percentage (5.85) had bad health. Overall, the total exceeds the percentage value of 100, as a subject can be counted more than once. Observing the “within” frequencies, it can be seen that 58.6% of those who show at least once perceiving very good health always declare excellent health, on the contrary, 44.6% of people who have had very bad health maintain it over time.

These results reflect the nature of the phenomenon, as it is likely that those who suffer from chronic illnesses or severe limitations at some time will continue to do so at a later date.

Table 3 Descriptive analysis of the perceived health indicator

	Total		Between		Within
Health	Frequency	%	Frequency	%	%
Very good	3,691	15.48	2,390	26.42	58.61
Good	16,283	68.29	7,686	84.96	80.28
Fair	3,123	13.10	2,182	24.12	54.59
Bad	675	2.83	529	5.85	48.77
Very bad	71	0.30	60	0.66	44.58
Total	23,843	100.00	12,847	142.00	70.42

Source: Our analysis from the EU-SILC Living Conditions Survey (Istat, 2012-2015)

Also interesting is the evaluation of the possibility of transition from one category of the outcome variable to another. If this indicator were constant over time, the result would be 100 along the main diagonal and 0 on the opposite one (Tab. 4).

Table 4 Probability of transition from one state to another at t+1 (the rows represent the initial condition, while in the column we have the arrival condition)

Perceived health	1	2	3	4	5	Total
1 (Very Good)	49.89	45.24	4.21	0.62	0.04	100
2 (Good)	10.55	79.07	8.96	1.31	0.11	100
3 (Fair)	5.18	46.60	40.49	7.10	0.62	100
4 (Bad)	3.72	35.35	30.23	28.84	1.86	100
5 (Very bad)	2.38	26.19	16.67	33.33	21.43	100
Total	15.63	68.25	12.98	2.85	0.28	100

Source: Our analysis from the EU-SILC Living Conditions Survey (Istat, 2012-2015)

The data confirm a dependence of the results at the time t_0 compared to the state at the time t_{-1} . Each year, for example, 79% of those who report good health continue to report the same result the following year. Likewise, almost 29% of those who report bad health at one point in time report bad health again the following year.

⁵ It should be noted that if in the column of the variance within the value was zero, then the variable would be constant over time.

If we consider employment status, we find that every year 97.4% of those who declare they have a stable contract continue to declare the same result the following year. Similarly, more than 75% of those who declare having a fixed-term contract (FTC) in a certain period declare it again the following year (Tab. 5).

Table 5 Probability of transition from one state to another at $t+1$ (the rows represent the initial condition, while in the column we have the arrival condition)

Employment status	0	1	Total
0 (Long-term contracts)	97.43	2.57	100
1 (FTC)	24.15	75.85	100
Total	90.48	9.52	100

Source: Our analysis from the EU-SILC Living Conditions Survey (Istat, 2012-2015)

Before moving on to the panel models, we see some preliminary results that summarise the average value of perceived health within the categories of indicators that we are going to insert as control variables and predictors (Tab. 6). These results refer to the data relative to the last *wave* (2015)⁶. We can observe at first glance that there are no substantial differences between men and women, while the declared perceived health of those who have an FTC is worse than that of permanent workers.

Table 6 Average perceived health values according to different predictors and control variables for the last wave (2015)

	Media	St. Err.		Media	St. Err.
Employment status			Genre		
Long-term contracts	2.05	0.65	Men	2.02	0.68
FTC	1.98	0.64	Women	2.04	0.63
Age			Income		
16-25 years	1.68	0.53	First quartile	2.04	0.66
26-35 years	1.83	0.57	Second quartile	2.03	0.67
36-45 years	1.95	0.62	Third quartile	2.06	0.65
46-67 years	2.20	0.66	Fourth quartile	2.02	0.60
Education			Area of residence		
Primary school	2.18	0.71	Northern Italy	2.07	0.66
Secondary school	2.01	0.63	Central Italy	2.02	0.59
Tertiary school	1.96	0.59	South Italy	1.98	0.69
Family status			Professions (Isco-88)		
Single	1.94	0.62	Low level	2.12	0.68
Married	2.06	0.64	Medium level	2.01	0.64
Separate	2.25	0.71	High level	1.99	0.61
Perceived economic resources			Chronic Diseases		
Good	1.99	0.58	No	1.92	0.54
Bad	2.08	0.68	Yes	2.72	0.81

Source: Our analysis from the EU-SILC Living Conditions Survey (Istat, 2012-2015)

As far as family status is concerned, we find significant differences between single or married people compared to widows, although it is easy to assume that age has a non weight in this type of outcome. As can be expected, there are differences in perceived health between age groups: younger people report better health than older people (1.68 compared to 2.20). In the south, on average, health is declared slightly better than in the north. We can also observe that the educational qualification is significantly related to perceived wellbeing: those who declare having achieved secondary or tertiary education show overall better health.

Finally, we find that those who claim to experience overall good economic conditions and to have no chronic illnesses report better scores than those who experience poor economic conditions or severe conditions due to long-term chronic illnesses.

⁶ We treat our variable here as if it were quasi-cardinal.

4.2 Results of multivariate analysis

Let us try to focus on the fixed effect model to confirm the hypothesis of the causal impact of precarious work on perceived health. Assuming that the variable related to perceived health is composed of 5 categories and is not normally distributed, it is not possible to guarantee the respect of all the assumptions required in the case of traditional linear models. Therefore, we carry out a further analysis using the BUC technique for ordinary categorical variables as described in the previous paragraph.

In the first model we insert - in addition to control variables such as education, age and family status - the employment level of the interviewees, according to Isco-88 types, the income divided into four groups of percentiles (0-25°, 25°-50°, 50°-75°, 75°-100°) and the evaluation of the economic situation. In the second model, we include, in addition to the variables listed, the presence of severe health limitations and chronic diseases, to particularly keep critical health situations under control, which could otherwise lead to a distortion in the results of the analysis (Tab. 7).

Table 7 Ordinary logistic regression with fixed effects: estimation of perceived health impact⁷

	Coeff.	Model 1 Std. Err.	Sig.	Coeff.	Model 2 Std. Err.	Sig.
Occupation						
Long-term contracts	0	-		0	-	
Fixed-term contracts	0.337	0.125	**	0.266	0.131	*
Income						
I quartile	0	-		0	-	
II quartile	0.147	0.111		0.163	0.120	
III quartile	-0.037	0.139		-0.074	0.150	
IV quartile	-0.058	0.168		-0.047	0.177	
Economic resources						
Good	0	-		0	-	
Bad	-0.179	0.091	+	-0.193	0.097	*
Health limitations						
No				0	-	
Yes				1.350	0.091	***
Chronic Diseases						
No				0	-	
Yes				1.353	0.101	***
Number of observations	11,987			11,987		
Pseudo R ²	0.039			0.126		
Prob. > who ²	0.014			0.000		

Source: Our analysis from the EU-SILC Living Conditions Survey (Istat, 2012-2015);
(+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001)

The results of both models confirm the presence of a causal trend. We find that keeping variables under control such as income (objective measure) and the economic conditions perceived by individuals (subjective measure), in the first model precarious work produces a negative and significant impact on the perceived health of Italians. This trend also remains unchanged in the second model, in which we keep the health conditions of who are particularly serious under control.

If we examine men and women separately - taking into account a further differentiation in fixed-term employment contracts between full-time and part-time contracts - we can find the presence of gender differences (Table 8).

In the case of precarious part-time contracts, the negative impact on perceived health is less influential in both men and women (the probability is less than 10%).

With regard to *full-time* fixed-term contracts, there is no change in men compared to permanent employment, while in women we can see a negative causal impact.

Ultimately, we can conclude that, although the overall causal incidence of FTCs in our reference sample has been established, gender differences are still significantly marked: women - unlike men - experience worse perceived health conditions, especially when it comes to full-time FTCs.

⁷ Models adjusted for: age, education, family status and employment level (Isco-88). The complete models can be found in the appendix.

Table 8 Ordinary logistic regression with fixed effects: estimation of perceived health impact; differences between men and women⁸

	Men			Women		
	Coeff.	Std. Err.	Sig.	Coeff.	Std. Err.	Sig.
Occupation						
Long-term contracts-Full time	0	-		0	-	
Long-term contracts-Part time	0.353	0.254		0.175	0.163	
Fixed-term contracts-Full time	0.094	0.194		0.488	0.233	*
Fixed-term contracts-Part time	0.866	0.487	+	0.475	0.254	+
Number of observations	6,662			5,325		
Pseudo R ²	0.131			0.130		
Prob. > who ²	0.000			0.000		

Source: Our analysis from the EU-SILC Living Conditions Survey (Istat, 2012-2015);

(+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001)

In the last part, we focus on some random effect ordinary logistic models, to highlight - more than a casual reading of the impact of fixed-term contracts on health status, carried out through the fixed effect models seen previously - the main determinants of the trend, through the inclusion of variables that do not vary over time and therefore remained excluded from the previous longitudinal analysis.

In Table 9, we present three different models in which, by progressively and differently inserting the independent variables, we analyse the role played by FTCs on perceived health.

In the first model, the net of the controls entered, the results corroborate the negative impact of the FTC on the *outcome* variable. At the same time, we observe that the presence of chronic diseases, severe health limitations, occupational type (Isco-88) or negative evaluation of the family's financial situation generate a significantly negative outcome on the perceived health.

In the second case (model 2) the perceived health indicator is regressed, net of the previous variables, on the birth cohort of individuals and the period. The inclusion of additional controls such as cohort and period - typical in the case of longitudinal models - does not lead to substantial changes, leaving the values of the FTCs and other variables present unchanged (model 2).

Finally, in the third model, we try to verify whether the impact of income varies within the category of precarious individuals compared to those in stable employment.

We can firstly note that the effect of FTCs on perceived health continues to be negative and significant, while income affects positively and those who receive a total family income higher than the total median income declare better perceived health. In contrast, the interaction between FTCs and income leads to a negative influence on health in the case of higher incomes (IV quartile), indicating that the positive effect is reduced within the category of people in precarious jobs. In general, FTCs have a significantly different impact on perceived health than permanent contracts for the same income.

⁸ Models are adjusted for: age, educational level, family status, employment level (Isco-88), income, economic resources, health limitations and chronic diseases. The complete models are available in the appendix.

Table 9 Ordinary logistic regression to random effects: estimation of perceived health impact⁹

	Model 1			Model 2			Model 3		
	Coeff.	Std. Err.	Sig.	Coeff.	Std. Err.	Sig.	Coeff.	Std. Err.	Sig.
Occupation									
Long-term contracts	0	-		0	-		0	-	
Fixed-term contracts	0.191	0.073	**	0.214	0.074	**	0.230	0.096	*
Occupation (Isco-88)									
Low level	0	-		0	-				
Medium level	-0.256	0.061	***	-0.252	0.061	***			
High level	-0.382	0.083	***	-0.386	0.083	***			
Economic resources									
Good	0	-		0	-				
Bad	0.217	0.048	***	0.217	0.048	***			
Health limitations									
No	0	-		0	-				
Yes	2.099	0.065	***	2.096	0.065	***			
Chronic Diseases									
No	0	-		0	-				
Yes	1.953	0.067	***	1.953	0.067	***			
Cohort									
50s				0	-				
60s				0.048	0.102				
70s				0.105	0.172				
80s				0.268	0.253				
90s				-0.012	0.342				
Period									
2012				0	-				
2013				-0.141	0.060	*			
2014				-0.145	0.060	*			
2015				-0.263	0.063	***			
Income									
I quartile	0	-		0	-		0	-	
II quartile	0.027	0.061		0.018	0.062		0.024	0.071	
III quartile	-0.137	0.067	*	-0.147	0.068	*	-0.213	0.075	**
IV quartile	-0.143	0.076	+	-0.151	0.076	*	-0.385	0.083	***
Occupation # income									
Fixed-term # income (1)							0	-	
Fixed-term # income (2)							-0.204	0.171	
Fixed-term # income (3)							0.188	0.254	
Fixed-term # income (4)							0.695	0.338	*
Intercept/Cut1	0.206	0.137		0.474	0.493		0.204	0.143	
Intercept/Cut2	5.934	0.151	***	6.211	0.497	***	5.793	0.155	***
Intercept/Cut3	9.043	0.168	***	9.323	0.503	***	8.387	0.167	***
Intercept/Cut4	12.14	0.217	***	12.42	0.521	***	11.24	0.213	***
Number of observations	23,843			23,843			23,843		
Variance (μ)/St.Dev.(μ)	2.575	0.106		2.586	0.106		3.893	0.137	
Wald Chi ²	4,091.72			4,093.05			1,197.34		
Prob. > Who ²	0.000			0.000			0.000		

Source: Our analysis from the EU-SILC Living Conditions Survey (Istat, 2012-2015);

(+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001)

⁹ The models are adjusted for: age, gender, area of residence, level of education and family status. The complete models can be found in the appendix.

5. Empirical results

In today's labour market, inequalities in wellbeing and health no longer only concern the traditional division between the employed and the unemployed but follow a more complex occupational stratification (Benach et al., 2000).

Precariousness is one of the most decisive challenges of the new millennium, starting with the changes in employment law which since the 1970s - through changes and adjustments in contractual labour agreements - have produced significant structural adjustments in public and private sectors (Lewchuk et al., 2008; Quinlan & Bohle, 2009).

The increase in the number of temporary workers has been constant over the last three decades, although it has occurred at different rates in industrialised countries, thus raising the question of the hidden costs of labour market flexibility: the experience of persistent precariousness can produce a process of accumulation of health risks and leads to a deterioration in health, mainly due to mental and psychological disorders (Bauer & Truxillo, 2000; Burchell, 1999)

Also concerning employment flexibility, since the 1970s a number of studies have shown that people exposed to a persistent and chronic state of job insecurity - due to a possible closure of the company, its downsizing or the threat of job loss - has shown a sharp deterioration in both mental and perceived health, fuelling a state of chronic stress (Bohle et al., 2001; Ferrie et al., 2002; Kivimäki et al., 2000).

The introduction of temporary contracts in Italian labour market reforms has often been justified by the need to make the labour market more flexible, to facilitate the participation of younger cohorts. However, in Italy, as in other European countries, the abuse of temporary contracts is increasing the sense of insecurity in precarious workers (Campos-Serna et al., 2013). This condition implies the need for continuous adaptation to working conditions, contexts and expectations, also fuelling precariousness in other areas of life, including health. These consequences entail very high social and economic costs. The workers in deteriorated health conditions suffer more from illnesses that limit their ability to work and lead to inferior work performance. These negative health consequences have a more significant impact on the public health system.

This work focused on the relationship between health and precariousness, more precisely on self-perceived health. Through a longitudinal analysis and an ordinary logistic panel model with fixed effects, we have corroborated the hypothesis that FTCs have a negative causal impact on perceived health, modelling individual trajectories. This relationship also appears much more influential among women than men, especially in the case of precarious full-time contracts. Finally, the random effect panel analysis shows that among FTCs the transition to a higher overall household income (the last quartile) leads - contrary to expectations - to a deterioration in the overall perceived health score. It confirms that the impact of CTDs has a global weight independent of the socio-economic status of the subjects, as evidenced by the significant divergence in results between stable and precarious workers, on equal terms. Among those in stable employment, it can be observed, on the contrary, that the transition to a higher overall household income implies an improvement in the perceived health conditions declared by the subjects. This fact is an important result that certainly needs further study.

As far as perceived health is concerned, this indicator precludes to some extent the possibility of capturing most facets of the concept of health, the main disadvantage being that it precludes the possibility of understanding the specific health components involved. In the field of sociology it is one of the most widely used health indicators and this subjective measure, according to numerous surveys, is strongly correlated with objective health indicators (Cislaghi & Cislaghi, 2019; Jylhä, 2009). In this respect, the association between mortality and perceived health appears very strong and graduated, as those who claim to have poor health are more likely to die than those who claim to have good health (Benamins et al., 2004; Benyamini & Idler, 1999; Jylhä, 2009). The relationship between health and mortality also differs according to the cause of death. Deaths caused by diabetes, infectious or respiratory diseases are strongly related to self-perceived health. There is a moderate association with deaths due to heart attack, stroke or cancer.

Conversely, perceived health is weakly correlated with deaths from accidents, murder or suicide (Benamins et al., 2004). The main criticism of this subjective measure is that there are distortions in the responses depending on the community or specific personality characteristics of the subjects (Jylhä, 2009; Manderbacka et al., 2003). Despite these limitations, we can attribute a positive judgement to self-perceived health, because due to its generality, it is a simple, reliable and valid indicator. It is also useful in cases such

as this where there are no specific health indicators such as mental or psychological health in the available database.

Due to the unequal distribution of working conditions and risks between men and women, precarious work can be related to several negative health effects with different patterns depending on gender. Therefore, the analysis of other health outcomes, including mental or psychological distress, specific illnesses and physical pain, would be appropriate, through separate gender analysis. Besides, the identification of specific health dimensions could suggest more targeted intervention policies. However, it must be considered that a higher number of retrospective, pre-treatment and contextual variables would surely have favoured a greater identification and control of the unobserved heterogeneity in the case of longitudinal analysis. The availability of a more extensive data panel offers the possibility of obtaining a more extended sequence of temporary contracts and thus a better analysis of the persistent effects of precariousness.

It should be noted that the limits of the time window at our disposal, in which individuals were observed, allowed us to detect the effects within a short period. For this reason, we believe that it is desirable to integrate the results achieved with data concerning the Italian context, which take into account a longitudinal approach that is more extensive and rich in retrospective indicators. Further theoretical and empirical insights are therefore indispensable, to refine the proposed model and conduct complementary analyses that weigh up relevant factors and elements, which we have only partially taken into account here.

Appendix

Table 10 Ordinary logistic regression with fixed effects: estimation of perceived health impact

	Model 1			Model 2		
	Coeff.	Std. Err.	Sig.	Coeff.	Std. Err.	Sig.
Occupation						
Long-term contracts	0	-		0	-	
Fixed-term contracts	0.337	0.125	**	0.266	0.131	*
Age	-0.032	0.019	+	-0.025	0.020	
Education						
Low	0	-		0	-	
Media	-0.165	0.176		0.153	0.175	
High	-0.024	0.226		0.242	0.228	
Family status						
Single	0	-		0	-	
Married	0.395	0.314		0.437	0.336	
Separate	0.393	0.386		0.392	0.415	
Occupations Isco-88						
Low level	0	-		0	-	
Medium level	-0.646	0.320	*	-0.703	0.337	*
High level	-0.727	0.412	+	-0.967	0.460	*
Income						
I quartile	0	-		0	-	
II quartile	0.147	0.111		0.163	0.120	
III quartile	-0.037	0.139		-0.074	0.150	
IV quartile	-0.058	0.168		-0.047	0.177	
Economic resources						
Good	0	-		0	-	
Bad	-0.179	0.091	+	-0.193	0.097	*
Health limitations						
No				0	-	
Yes				1.350	0.091	***
Chronic Diseases						
No				0	-	
Yes				1.353	0.101	***
Number of observations	11,987			11,987		
Pseudo R ²	0.039			0.126		
Prob. > who ²	0.014			0.000		

Source: Our analysis from the EU-SILC Living Conditions Survey (Istat, 2012-2015);
 (+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001)

Table 11 Ordinary logistic regression with fixed effects: estimation of perceived health impact; differences between men and women

	Men			Women		
	Coeff.	Std. Err.	Sig.	Coeff.	Std. Err.	Sig.
Occupation						
Long-term contracts-Full time	0	-		0	-	
Long-term contracts-Part time	0.353	0.254		0.175	0.163	
Fixed-term contracts-Full time	0.094	0.194		0.488	0.233	*
Fixed-term contracts-Part time	0.866	0.487	+	0.475	0.254	+
Age	-0.039	0.027		-0.008	0.030	
Education						
Low	0	-		0	-	
Media	0.055	0.219		0.282	0.292	
High	0.514	0.294	+	-0.133	0.367	
Family status						
Single	0	-		0	-	
Married	0.747	0.396		0.172	0.526	
Separate	-0.612	0.550		0.857	0.592	
Occupations Isco-88						
Low level	0	-		0	-	
Medium level	-1.135	0.451	*	-0.092	0.482	
High level	-1.160	0.675	+	-0.654	0.605	
Income						
I quartile	0	-		0	-	
II quartile	0.328	0.169	+	-0.0082	0.178	
III quartile	0.032	0.200		-0.161	0.235	
IV quartile	0.197	0.232		-0.373	0.278	
Economic resources						
Good	0	-		0	-	
Bad	-0.163	0.136		-0.246	0.137	+
Health limitations						
No	0	-		0	-	
Yes	1.413	0.126	***	1.292	0.131	***
Chronic Diseases						
No	0	-		0	-	
Yes	1.322	0.139	***	1.396	0.152	***
Number of observations	6,662			5,325		
Pseudo R ²	0.131			0.130		
Prob. > who ²	0.000			0.000		

Source: Our analysis from the EU-SILC Living Conditions Survey (Istat, 2012-2015);

(+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001)

Table 12 Ordinary logistic regression to random effects: estimation of perceived health impact

	Model 1			Model 2			Model 3		
	Coeff.	Std. Err.	Sig.	Coeff.	Std. Err.	Sig.	Coeff.	Std. Err.	Sig.
Occupation									
Long-term contracts	0	-		0	-		0	-	
Fixed-term contracts	0.191	0.073	**	0.214	0.074	**	0.230	0.096	*
Occupation (Isco-88)									
Low level	0	-		0	-				
Medium level	-0.256	0.061	***	-0.252	0.061	***			
High level	-0.382	0.083	***	-0.386	0.083	***			
Economic resources									
Good	0	-		0	-				
Bad	0.217	0.048	***	0.217	0.048	***			
Health limitations									
No	0	-		0	-				
Yes	2.099	0.065	***	2.096	0.065	***			
Chronic Diseases									
No	0	-		0	-				
Yes	1.953	0.067	***	1.953	0.067	***			
Cohort									
50s				0	-				
60s				0.048	0.102				
70s				0.105	0.172				
80s				0.268	0.253				
90s				-0.012	0.342				
Period									
2012				0	-				
2013				-0.141	0.060	*			
2014				-0.145	0.060	*			
2015				-0.263	0.063	***			
Income									
I Quartile	0	-		0	-		0	-	
II quartile	0.027	0.061		0.018	0.062		0.024	0.071	
III quartile	-0.137	0.067	*	-0.147	0.068	*	-0.213	0.075	**
IV quartile	-0.143	0.076	+	-0.151	0.076	*	-0.385	0.083	***
Occupation # income									
Fixed-term # income(1)							0	-	
Fixed-term # income(2)							-0.204	0.171	
Fixed-term # income(3)							0.188	0.254	
Fixed-term # income(4)							0.695	0.338	*
Age	0.065	0.003	***	0.073	0.008	***	0.085	0.003	***
Gender									
Male	0	-		0	-		0	-	
Female	0.195	0.053	***	0.191	0.053	***	0.136	0.056	*
Area of residence									
North	0	-		0	-		0	-	
Center	-0.144	0.058	*	-0.150	0.058	*	-0.282	0.065	***
South	-0.451	0.062	***	-0.458	0.062	***	-0.659	0.069	***
Education									
Low	0	-		0	-		0	-	
Media	-0.333	0.060	***	-0.330	0.061	***	-0.574	0.064	***
High	-0.373	0.076	***	-0.374	0.077	***	-0.719	0.076	***
Family status									
Single	0	-		0	-		0	-	
Married	-0.042	0.058		-0.055	0.059		-0.092	0.064	
Separate	0.238	0.094	*	0.225	0.095	*	0.354	0.104	***
Intercept/Cut1	0.206	0.137		0.474	0.493		0.204	0.143	
Intercept/Cut2	5.934	0.151	***	6.211	0.497	***	5.793	0.155	***
Intercept/Cut3	9.043	0.168	***	9.323	0.503	***	8.387	0.167	***
Intercept/Cut4	12.14	0.217	***	12.42	0.521	***	11.24	0.213	***
Number of observations	23.843			23.843			23.843		
Variance(μ)/St.Dev.(μ)	2.575	0.106		2.586	0.106		3.893	0.137	
Wald Chi ²	4,091.72			4,093.05			1,197.34		
Prob. > Who ²	0.000			0.000			0.000		

Source: Our analysis from the EU-SILC Living Conditions Survey (Istat, 2012-2015);

(+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001)

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