Economic crisis and the unemployment effect on household food expenditure: The case of Spain

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Economic crisis and the unemployment effect on household food expenditure: The case of Spain*

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Abstract

This paper examines the unemployment effect on food expenditure (UEFE) for Spanish households and quantifies its magnitude in boom and crisis periods. The results show that the UEFE was negative in both contexts but was reinforced during the economic crisis. Applying propensity score matching and difference-in-differences techniques to a sample of Spanish households for 2006 and 2013 (representative of a boom period and a crisis period, respectively), we found that the UEFE amounted to 2.9% in the boom period and to 4.5% in the crisis period. Quantile difference-in-differences estimates confirmed that the economic crisis enhanced the UEFE for Spanish households, with this effect decreasing continuously up to quantile 0.9. The UEFE was exacerbated mainly in those economically disadvantaged households.

Keywords: Unemployment; UEFE; boom periods, crisis periods; Spanish households, matching techniques; difference-in-differences methods

JEL Classification: C31; D12; E21; E24; J64

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1. Introduction

Unemployment is a key macroeconomic variable that has decisive implications for the economic, social and health status of households and individuals, in particular during economic downturns when the unemployment rate increases drastically. The negative impact of unemployment on household resources may, in fact, undermine consumption of goods and services (Aguiar and Hurst, 2005; Griffith et al., 2013) and may also affect investment and savings decisions (Arent, 2012). Food consumption in particular is a key driver for health, social insertion, productivity growth and family and social stability.[1] Thus, the impact of unemployment status on household food consumption — hereinafter, the unemployment effect on food expenditure (UEFE) — has ramifications for public policies and healthcare expenditure, among other issues. An assessment of the UEFE in both non-crisis and crisis periods is therefore necessary in order to rigorously evaluate the repercussions of an economic crisis beyond its more immediate impact on main indicators such as gross domestic product (GDP), unemployment rates, income distribution and deflation.

Our research was aimed at examining the UEFE in Spain, particularly in relation to two main questions: (1) what is the magnitude of the UEFE in Spanish households? (2) how does the UEFE differ in downturns with respect to boom periods? Both these questions are undoubtedly relevant from both the individual and social perspectives of a country, like Spain, that was severely affected by the economic crisis that started in 2008. In fact, Spain has experienced in recent years a severe economic downturn, reflected in a drastic fall in GDP and increased public debt, not to mention the high unemployment rate, which more than tripled between the last quarter of 2006 and the first quarter of 2013. As for average expenditure per family, this fell by 3.7% overall in 2013 compared to 2012;[2] all spending categories except education experienced a drop, including food consumption.

Previous empirical research for other countries confirms a drop in food expenditure by unemployed households. For instance, Aguiar and Hurst (2005) found that food expenditure fell by about 9% in US households in which the breadwinner became unemployed; Carroll et al. (2003) reported that food expenditure sensitivity to unemployment depended on the household's precautionary savings; and Stephens (2004) and Benito (2006), in examining how variations in subjective job-loss probabilities affected household consumption decisions, found that there was no impact on consumption by employed workers.

[1] See, e.gr., Ásgeirsdóttir et al. (2014).

[2] See http://www.ine.es/prensa/np848.pdf.

Another strand of the literature has examined how food expenditure distribution changes when people become unemployed. Browning and Crossley (2009) demonstrated that this distribution did, in fact, change and Griffith et al. (2013) confirmed this change for UK households during the recent economic recession; more specifically, households bought fewer and cheaper calories and thus reduced the nutritional quality of the foods they purchased. Other researchers have corroborated this finding of obesogenic and poorer quality diets in response to unemployment (Drewnowski, 2010; Monsivais et al., 2011, 2012; Liu et al., 2013). Finally, health researchers have also addressed the implications of unemployment for human health by assessing risk factors such as obesity (Darmon and Drewnowski, 2008), excessive alcohol consumption (Dee, 2001; Mossakowski, 2008), smoking habits (Fagan et al., 2007), medical care (World Bank, 2009), reduced physical activity in leisure time (Grayson, 1993) and mental health (Urbanos-Garrido and López-Valcárcel, 2015). Contradictory studies have, however, reported improved health (reduced obesity, increased physical activity and improved diet) in times of higher unemployment (Ruhm, 2000) and negative effects on physical health in times of economic crisis (Gerdtham and Ruhm, 2006).

This paper adds to the literature by reporting new evidence for the UEFE in Spain, firstly, by examining at which extent the link between unemployment and household food expenditure is maintained or enhanced in crisis periods compared to boom periods, and secondly, by examining whether the magnitude of the UEFE varies by food expenditure distributions and across food categories. Spain represents an ideal research arena, given that the Spanish economic recession (confirmed by the Bank of Spain in January 2009) led to a dramatic rise in unemployment rates: 8.4% in early 2007, 22.6% in the last quarter of 2011 and a peak of 26.9% in the first quarter of 2013. Furthermore, the fact that job losses mostly hit low-skilled workers may have specific implications for the consumption of certain food categories, given the relatively low precautionary savings and educational levels of this group of workers. Finally, to the best of our knowledge, the literature regarding the UEFE in Spain is very scarce. Two exceptions are Campos and Reggio (2014), who found that the consumption of employed workers fell by around 0.7% for each percentage point rise in unemployment, and Luengo-Prado and Sevilla (2013), who showed that food expenditure in Spain fell on retirement, a stylized fact that can be explained by a rise in home cooking. Our paper is an attempt to fill this research gap.

For our research, we used microdata for household food expenditure available from the *Encuesta de Presupuestos Familiares* (National Household Budget Survey, NHBS), taking 2006 as a year representative of the boom period and 2013 as a year representative of the crisis period. The NHBS, which accounts for about 87% of Spanish aggregate consumption, provides

detailed information on food expenditure in different categories and on unemployment, socioeconomic and demographic characteristics at the household level. We restricted the analysis to households where the active breadwinner (employed or unemployed) was aged over 16 years.[3] The size of the UEFE was empirically checked using matching methods, whereas the causal impact of the economic crisis on the magnitude of the UEFE was tested using a difference-in-differences (DiD) regression approach.

Our results suggest that the UEFE in Spain was negative in both crisis and boom periods. However, its magnitude was greater in the crisis period, especially for socioeconomically disadvantaged households where expenditure on food was lower. Before the outbreak of the economic crisis, food consumption in households whose main breadwinner was unemployed was 2.9% lower than in households whose main breadwinner was employed; during the economic crisis this gap widened to 4.5%. The DiD estimates confirmed the significant and intensified negative UEFE for all food categories except fats and sugars. Furthermore, the quantile DiD estimates indicated that the economic crisis enhanced this significant negative UEFE in 2013 up to quantile 0.9. In sum, our findings would suggest that the impact of an economic crisis on unemployment is not only quantitative in nature (i.e., unemployment grows), but also qualitative, as reflected in the more intensified UEFE. This qualitative impact of an economic crisis tends to be overlooked in favour of an exclusive focus on quantitative impacts. Our research can be viewed as an attempt to explore what these 'qualitative effects' could be.

From a policymaker perspective, our results offer several insights of significance. First, they indicate that food policies should be better designed to target more needy families. Second, the different magnitudes of the UEFE during boom and crisis periods would suggest that food policies should be adjusted to economic cycle phases, not only in absolute terms but also in marginal terms, as unemployed households need to be targeted more specifically in crisis periods. One possibility could be to subsidize healthy foods — so as to lower food expenditure for low-income and unemployed groups — and gradually increase subsidies as a crisis period unfolds so as to counteract the greater UEFE.

The remainder of the article is laid out as follows. Section 2 describes the theoretical framework behind the matching and DiD approaches to explaining the UEFE in crisis periods. Section 3 describes the data used for the empirical study. Section 4 presents and comments the results. Finally, Section 5 concludes the paper.

[3] Not considered in our sample were households in which the breadwinner was retired or inactive, since such households are not affected by unemployment.

2. Methods

Inspired by previous studies of the causal impacts of unemployment status on certain health variables (see, e.g., Böckerman and Ilmakunnas, 2009; Urbanos-Garrido and López-Valcárcel, 2015), we used matching techniques and DiD methods to measure the relationship between unemployment and household food consumption and to test how an economic crisis could change this relationship. These empirical methods are described in the next subsections.

2.1 Propensity score matching

Propensity score matching, as introduced by Rosenbaum and Rubin (1983), relies on matching rather than regression in order to reduce treatment-selection bias in estimating causal treatment effects when using observational data.

Let Y_1 (Y_0) be food expenditure of households whose main breadwinner is unemployed (employed) and let D be a binary 'treatment' indicator that takes the values 1 and 0 when the main breadwinner is unemployed and employed, respectively. The UEFE for household i is therefore measured as $Y_{i1} - Y_{i0}$. Our primary goal in this paper is to estimate the average treatment (unemployment) effect on the treated (ATT), that is, the average gain from treatment for those households that were actually treated. This can be written as:

$$\begin{aligned} ATT &= E(Y_1 - Y_0|D = 1) \\ &= E(Y_1|D = 1) - E(Y_0|D = 1), \end{aligned} \tag{1}$$

where the term $E(Y_0|D = 1)$ captures the average (unobservable) counterfactual; namely, what a household's food consumption would be if the main breadwinner was employed rather than unemployed.

To identify average unobservable counterfactuals, it is usually assumed that all differences between treated and non-treated households are reflected in a vector X of observable characteristics. Using logistic regression, we estimated the probability of unemployment (propensity score) for the main breadwinner of the household as a function of the observable characteristics in vector X. We imposed the common support condition on treated units (Heckman et al., 1999), that is, we did not consider treated households with a probability of being treated that was greater (less) than the highest (lowest) probability in the non-treated

group.

Although we used different kernel matching methods (Gaussian kernel, Epanechnikov kernel, nearest neighbour and radius matching) for robustness reasons, we only report evidence for matching with a Gaussian kernel.[4] We also estimated the ATT for different food categories and considering different interquantile ranges of food consumption distributions, namely, 0-0.05, 0.05-0.1, 0.1-0.25, 0.25-0.5, 0.5-0.75, 0.75-0.9, 0.9-0.95 and 0.95-1. We performed the empirical analysis for a sample of households during 2006 (representative of a boom period) and 2013 (representative of a crisis period).

2.2 Difference-in-differences framework

We used the DiD approach to account for the impact of the economic crisis on the UEFE for Spanish households. We considered a regression model for the pooled data of households for the boom and crisis periods, with different employment status and socioeconomic and demographic characteristics reflected in vector X in Eq. (2). The corresponding regression model is thus defined as:

$$Y_i = \alpha + \delta D_i + \lambda t_i + \gamma D_i t_i + X_i'\beta + \varepsilon_i, \quad (2)$$

where t is a binary time variable that takes the value 0 (1) if household i is observed in the boom (crisis) period, Y_i denotes the food expenditure of family i, parameter β measures the impact of the socioeconomic variables included in vector X that could affect food expenditure, and ε_i is a stochastic variable assumed to have zero mean and to be independent of regressors. The UEFE in the boom period is given by δ and in the downturn period by the sum $\delta + \gamma$. Therefore, the sign and significance of parameter γ, the DiD estimator, provides information on how the economic crisis affects the magnitude of the UEFE. DiD estimator assumes common trends; so, conditional on the observables X, controls evolve from a pre- to a post-program period as treatments would have evolved had they not been treated.

We estimated Eq. (2) using (a) a non-matched sample that included all observations in the boom and crisis periods for unemployed and employed households, and (b) a matched sample obtained from a kernel-based propensity score. In the latter case, given repeated cross-

[4] Results using different matching procedures are reported in the Appendix.

section data, we follow Blundell and Dias (2009) and estimate propensity scores as a function of observable characteristics in vector *X* using a logit model where the dependent variable is equal to 1 if the subject is unemployed in the crisis year and 0 otherwise. Estimated propensity scores are used to calculate three sets of kernel weights (for the employed group in the boom and crisis periods and for the unemployed group in the boom period). Then, with the matched sample we estimate Eq. (2) in order to obtain a matching-DiD estimate of the effect of the crisis on UEFE. We impose the common support condition, and restrict the analysis to the treated observations which have a counterfactual in each of the three control samples (Villa, 2016).[5]

2.3 Difference-in-differences framework via quantile regression

We also assessed whether the economic crisis affected the UEFE differently across food expenditure distribution quantiles. We estimated the DiD regression in Eq. (2) using a quantile regression technique (Koenker, 2005), considering that the conditional τ quantile of food expenditure $Q_{Y_i}(\tau|D_i, t_i, X_i)$ is given by:

$$Q_{Y_i}(\tau|D_i, t_i, X_i) = \alpha_\tau + \delta_\tau D_i + \lambda_\tau t_i + \gamma_\tau D_i t_i + X_i'\beta_\tau, \quad (3)$$

where, for quantile τ, δ_τ and $\delta_\tau + \gamma_\tau$ measure the UEFE during boom times and crisis times, respectively. All the parameters in Eq. (3) were estimated by minimizing the weighted absolute deviation as:

$$\text{argmin}_{\alpha_\tau,\delta_\tau,\lambda_\tau,\gamma_\tau,\beta_\tau} \sum_{i=1}^{N} \rho_\tau\left(Y_i - \alpha_\tau - \delta_\tau D_i - \lambda_\tau t_i - \gamma_\tau D_i t_i - X_i'\beta_\tau\right), \quad (4)$$

where $\rho_\tau(u) = u(\tau - I(u < 0))$, $0 < \tau < 1$, $I(\cdot)$ denotes the indication function and *N* is the number of households in the sample. We solved the problem stated in Eq. (4) using the linear programming algorithm proposed by Koenker and D'Orey (1987) and computed the standard error for the estimated parameters using the bootstrapping procedure proposed by Buchinsky (1995). As for the DiD, as outlined in Section 2.2 above, we estimated Eq. (3) using both a non-matched sample and a matched sample from propensity score matching.

[5] Results using different matching procedures are reported in the Appendix.

3. Data

The microdata on household food expenditure for 2006 and 2013 were sourced from the NHBS (conducted by the Spanish Statistics Institute, INE). Using stratified multistage sampling, this survey annually samples around 24,000 Spanish households and retrieves annual information on household consumption, distribution of expenditure among different food categories and the socioeconomic, geographic and demographic characteristics of the main breadwinner. Data on food expenditure by each household were collected for two weeks in 2006 and in 2013 and were expressed on an annual basis. In our research the sample was restricted to households with an active breadwinner (employed or unemployed) aged over 16 years, leaving us with 12,480 households in 2006 and 14,215 households in 2013, geographically located across all of Spain's autonomous regions.

For each household, we gathered information on the number of lunches/dinners prepared at home per fortnight (that is, meals prepared at home and consumed either at home or outside the home),[6] on aggregate food expenditure and on expenditure on eight different food categories. These categories were: (i) bread, cereals, rice and pasta; (ii) meat; (iii) fish; (iv) milk, cheese and eggs; (v) oils and fats; (vi) fruits; (vii) vegetables, pulses, potatoes and other root crops; and (viii) sugar, jam, honey, chocolate, sweets and ice-cream. Food expenditure data were expressed in 2013 prices. For the main breadwinner we collected demographic information (sex, age and marital status) and socioeconomic information, including employment status (employed or unemployed) and educational level (no education, primary, secondary or university). We also collected information on household size, home ownership, number of houses owned and residential area. The autonomous region where the household was located was also taken into account, as a variable that could reflect both job opportunities (see, e.g., Turner, 1995) and differences in regional social policies aimed at alleviating the adverse effects of unemployment/precarious employment on food expenditure and, consequently, on people's diets. Regional dummy variables were defined in order to account for differences in household socioeconomic status across Spanish regions (Urbanos-Garrido and Lopez-Valcárcel, 2015).

Table 1 reports descriptive statistics for our samples for 2006 and 2013.

[6] Food expenditure in the survey does not include expenditure on eating out at restaurants.

Table 1. Definition of variables and descriptive statistics for a boom year (2006) and a crisis year (2013).

Variable	Definition	2006 (n=12,480) Mean[a]	2013 (n=14,215) Mean[a]	
Labour status				
Unemployed	Dummy variable: 1, unemployed; 0, otherwise	0.0480	0.1545	(**)
Food expenditure				
Expend	Logarithm of food expenditure	8.4413	8.0602	(**)
Pasta	Logarithm of Pasta expenditure	6.5895	6.2845	(**)
Meat	Logarithm of meat expenditure	6.7808	6.4127	(**)
Fish	Logarithm of fish expenditure	5.6566	5.0475	(**)
Milk	Logarithm of milk expenditure	6.2578	5.9315	(**)
Fat	Logarithm of fat expenditure	3.3611	2.7879	(**)
Fruit	Logarithm of fruit expenditure	5.6781	5.2769	(**)
Vegetables	Logarithm of vegetables expenditure	5.7975	5.5035	(**)
Sugar	Logarithm of sugar expenditure	4.4644	4.2666	(**)
Socioeconomic status				
Age	Age in years	44.6046	45.6760	(**)
Male[b]	Dummy variable: 1, only male; 0, otherwise	0.8114	0.7046	(**)
Marital status	Dummy variable: 1, only not single; 0, otherwise	0.7373	0.7629	(**)
Household size	Number of individuals in the household	3.2164	3.0590	(**)
No education	Dummy variable: 1, no education; 0, otherwise	0.2161	0.0715	(**)
Primary education	Dummy variable: 1, only completed primary education; 0, otherwise	0.2878	0.3380	(**)
Secondary education	Dummy variable: 1, only completed secondary education; 0, otherwise	0.1889	0.2198	(**)
University education	Dummy variable: 1, only completed university education; 0, otherwise	0.3072	0.3706	(**)
Home ownership	Dummy variable: 1, only home ownership; 0, otherwise	0.8166	0.7792	(**)
Residential area	Dummy variable: 1, mid or high residential area; 0, otherwise	0.7696	0.8015	(**)
Other houses	Dummy variable: 1, other houses; 0, otherwise	0.1349	0.1610	(**)
Home-cooked meals	Number of home-cooked meals per fortnight	73.4264	70.7633	(**)
Region1	Dummy variable: 1, if resident in Andalusia; 0, otherwise	0.1063	0.1148	(**)
Region2	Dummy variable: 1, if resident in Aragon; 0, otherwise	0.0438	0.0449	
Region3	Dummy variable: 1, if resident in Asturias; 0, otherwise	0.0251	0.0288	
Region4	Dummy variable: 1, if resident in Balearic Islands; 0, otherwise	0.0465	0.0395	(**)
Region5	Dummy variable: 1, if resident in Canary Islands; 0, otherwise	0.0525	0.0518	
Region6	Dummy variable: 1, if resident in Cantabria; 0, otherwise	0.0244	0.0336	(**)
Region7	Dummy variable: 1, if resident in Castilla-Leon; 0, otherwise	0.0629	0.0597	
Region8	Dummy variable: 1, if resident in Castilla-La Mancha; 0, otherwise	0.0564	0.0547	
Region9	Dummy variable: 1, if resident in Catalonia; 0, otherwise	0.1046	0.0937	(**)
Region10	Dummy variable: 1, if resident in Valencia; 0, otherwise	0.0855	0.0796	
Region11	Dummy variable: 1, if resident in Extremadura; 0, otherwise	0.0434	0.0424	
Region12	Dummy variable: 1, if resident in Galicia; 0, otherwise	0.0629	0.0541	(**)
Region13	Dummy variable: 1, if resident in Madrid; 0, otherwise	0.0676	0.0778	(**)
Region14	Dummy variable: 1, if resident in Murcia; 0, otherwise	0.0446	0.0421	
Region15	Dummy variable: 1, if resident in Navarre; 0, otherwise	0.0338	0.0349	
Region16	Dummy variable: 1, if resident in the Basque Country; 0, otherwise	0.0975	0.1016	
Region17	Dummy variable: 1, if resident in Rioja; 0, otherwise	0.0317	0.0334	
Region18	Dummy variable: 1, if resident in Ceuta/Melilla; 0, otherwise	0.0105	0.0126	

Note: Sample of Spanish households from the INE's National Household Budget Survey (*Encuesta de Presupuestos Familiares*) in which the main breadwinner is employed or unemployed and aged over 16 years.
[a] Data are reported as percentages for the categorical variables and as means for the continuous variables.
[b] The male variable indicates a male head of household.
Double asterisk ** denotes significant differences in means or in categories between 2006 and 2013 according to the t-test (for continuous variables) or chi-square test (for categorical variables) at the 5% significance level.

Between 2006 and 2013 the unemployment rate for household main breadwinners went from 4.8% to 15.5% and home ownership dropped from 81.7% to 77.9%. Furthermore, male-dominated households went from a mean of 0.81 to a mean of 0.70; this fall is consistent with the fact that household size decreased, whereas the number of households with active breadwinners increased. Likewise, the logarithm of food expenditure fell from 8.4 to 8.1, a drop also reflected in the different food categories. The fact that the number of home-cooked meals also fell would account for the quantitative effect of unemployment status on food expenditure; there may also be a substitution effect (households substituting more with less expensive food). Finally, age and marital status remained quite similar in this period, whereas the percentage of main breadwinners with university education increased from 30.7% to 37.1%.

4. Results

Before reporting the results yielded by the matching and DiD approaches, we report results for significant differences between average food expenditure by unemployed and employed households in boom and crisis periods. Table 2 shows descriptive statistics for overall food expenditure and expenditure on different food categories.

Table 2. Household food expenditure (in logs) in relation to employment status for a boom year (2006) and a crisis year (2013).

	2006			2013		
	Employed	Unemployed		Employed	Unemployed	
Food	8.6651	8.4114	(**)	8.1172	7.7487	(**)
Pasta	6.8068	6.6570	(**)	6.3253	6.0609	(**)
Meat	6.9999	6.7062	(**)	6.4748	6.0725	(**)
Fish	5.8780	5.2625	(**)	5.1745	4.3525	(**)
Milk	6.4857	6.1460	(**)	5.9911	5.6057	(**)
Fat	3.5221	3.3921		2.7955	2.7464	(**)
Fruit	5.8946	5.6037	(**)	5.3724	4.7546	(**)
Vegetables	6.0112	5.8164	(**)	5.5612	5.1879	(**)
Sugar	4.6775	4.0786	(**)	4.3634	3.7368	(**)

Note: Double asterisk ** denotes significant differences in mean household food expenditure between employed and unemployed households according to the t-test at the 5% significance level for the years 2006 and 2013.

The t-test for differences in the mean confirmed significant differences between overall food expenditure by employed and unemployed households in boom and crisis periods. On average, the logarithm of food expenditure for 2006 for households whose main breadwinner was unemployed was 2.9% lower than for households whose main breadwinner was employed and, by 2013, this gap had increased to 4.5%. Similar results were obtained for each food category, except for fats in the boom period.

4.1 Results for the average treatment effect on the treated for 2006 and 2013

Table 3 reports empirical estimates for the ATT obtained using a Gaussian kernel for subsamples of employed (untreated) and unemployed (treated) main breadwinners for the boom and crisis periods. For 2006 and 2013, the first column reports results for the (log) food expenditure in unemployed households; the second column reports the results for the estimated counterfactual (food expenditure if the household breadwinner was employed); the third column, in reporting the difference between the first two columns, measures the rise or fall in (log) food expenditure explained by unemployment as an ATT value; finally, the last column reflects the statistical significance of the ATT estimates.

Table 3 also displays empirical ATT results as follows: for overall food expenditure (Panel A), for overall food expenditure by interquantile range (Panel B), and for different food expenditure categories (Panel C). The Panel A results indicate that when the main breadwinner of a household was unemployed, food expenditure significantly reduced both in boom and crisis times. Once the effect of different factors reflected in vector X were taken into account, the UEFE was greater in crisis times than in boom times. Specifically, unemployment reduced food expenditure by 0.21 in the boom period and by 0.28 in the crisis period, representing percentage reductions in (log) food expenditure of 2.5% and 3.5%, respectively.

Table 3. Estimates of the UEFE in a boom year (2006) and a crisis year (2013).

	2006				2013			
	Unemployed (average)[a] $E(Y_1 \mid D=1)$	Estimated counterfactual (average)[b] $E(Y_0 \mid D=1)$	Impact (average)[c] ATT	t-statistic	Unemployed (average)[a] $E(Y_1 \mid D=1)$	Estimated counterfactual (average)[b] $E(Y_0 \mid D=1)$	Impact (average)[c] ATT	t-statistic
Panel A. Overall food expenditure								
	8.1997	8.4128	-0.2131	-6.63*	7.7487	8.0321	-0.2835	-13.78*
Panel B. Food expenditure by interquantile range								
0-0.05	6.3620	6.4000	-0.0381	-0.26	5.9214	6.0309	-0.1095	-1.24
0.05-0.10	7.3667	7.3509	0.0158	0.89	6.9363	6.9386	-0.0022	-0.19
0.10-0.25	7.8205	7.8469	-0.0263	-1.74*	7.4299	7.4523	-0.0224	-2.49*
0.25-0.50	8.3192	8.3382	-0.0189	-1.73*	7.9439	7.9574	-0.0135	-2.04**
0.50-0.75	8.7294	8.7391	-0.0097	-0.99	8.3632	8.3733	-0.0101	-1.70*
0.75-0.90	9.0521	9.0766	-0.0245	-2.12**	8.7114	8.7125	-0.0011	-0.18
0.90-0.95	9.3405	9.3237	0.0167	1.61*	8.9509	8.9553	-0.0043	-0.50
0.95-1	9.6611	9.6363	0.0249	0.41	9.2207	9.2525	-0.0318	-0.94
Panel C. Food expenditure by category								
Pasta	6.4464	6.5529	-0.1065	-2.78**	6.0609	6.2671	-0.2062	-8.12**
Meat	6.5023	6.7401	-0.2378	-3.48**	6.0725	6.3891	-0.3166	-7.93**
Fish	5.0812	5.6215	-0.5403	-5.35**	4.3525	4.9812	-0.6287	-10.67**
Milk	5.9343	6.2188	-0.2845	-4.56**	5.6057	5.8913	-0.2856	-8.69**
Fat	3.2402	3.3440	-0.1039	-0.94	2.7464	2.8735	-0.1271	-2.14**
Fruit	5.4022	5.6327	-0.2305	-3.41**	4.7546	5.1876	-0.4330	-9.65*
Vegetables	5.6125	5.7623	-0.1498	-2.37**	5.1879	5.4512	-0.2632	-7.07**
Sugar	3.9079	4.3933	-0.4854	-5.38**	3.7368	4.2049	-0.4681	-9.31*

Notes: We used matching methods with propensity score and a Gaussian kernel for a sample size of 12,480 households in 2006 and 14,215 households in 2013.

Single asterisk * and double asterisk ** denote $p<0.10$ and $p<0.05$, respectively.

Control variables: age, sex, household size, marital status, education, home ownership, residential area, other houses, number of home-cooked meals, and region.

[a] Sample data corresponding to unemployed.

[b] Estimates for unemployed if they had been working (counterfactual).

[c] The average treatment effect (ATT) is given by column 2 minus column 3. Expressed as expenditure units, it measures the change in mean household food expenditure attributable to unemployment status.

The impact of unemployment on different food expenditure interquantile ranges (see Panel B in Table 3) was concentrated in the lower-median, median and upper-median interquantile ranges in boom times, but in the median and lower-median interquantile ranges in crisis times, leaving households in the lower and upper interquantile ranges unaffected by unemployment. This finding may be explained by the fact that the unemployment shock on permanent income during a boom is not symmetric across household income levels: the probability of a well-educated

unemployed person from a relatively high-income household finding a new job is not seriously affected, unlike that of other profiles (less well-educated persons from lower income households), so the result is a pass-through effect of the income shock to food expenditure.

However, with the advent of an economic crisis, the perceptions of an income shock due to unemployment change. Unemployment thus had a significant impact on food expenditure in lower-median and median interquantile households, but had a lesser impact on upper-median and upper interquantile households. For the lower interquantile households, unemployment led to a reduction in food expenditure to a lesser extent than the counterfactual. This may be explained by perceptions of the probability of finding a new job not being significantly affected for breadwinners in low-income households.

As for the eight different food expenditure categories considered, we found that, in the boom period, unemployment reduced food expenditure in all categories except fats, and primarily in the fish and sugar categories. In the crisis period, unemployment significantly and unambiguously reduced food expenditure in all food categories, with the main reductions occurring for fish, fruit, sugar and meat. Both the UEFE during boom times and the 'enhanced UEFE' during crisis times are consistent with quality deterioration in diet during downturns with respect to boom periods. Dave and Kelly (2012) confirmed this relationship for US adults, finding a relationship between unemployment status and reduced consumption of healthy foods like fruit and vegetables. Herzfeld et al. (2014) also reported the consumption of a less diversified diet by Russian households in regions with high unemployment rates.

4.2 Results for the difference-in-differences test for 2006 and 2013

DiD results for the UEFE as per Eq. (2) for the overall sample are reported in Table 4 for the non-matched sample and in Table 5 for the matched-sample (using Gaussian kernel matching for the refined control group).[7]

[7] Our empirical results as reported in Tables 4 and 5 are not sensitive to the inclusion of covariates. Results without considering covariates, similar to those reported there, are available from the authors on request.

Table 4. DiD estimates of the UEFE for a boom year (2006) and a crisis year (2013) using non-matched samples.

Parameter	All	Pasta	Meat	Fish	Milk	Fat	Fruit	Vegetables	Sugar
Constant (α)	6.558*** (143.46)	4.993*** (81.55)	3.928*** (39.13)	2.024*** (13.82)	4.271*** (49.66)	1.307*** (7.54)	2.646*** (24.85)	3.505*** (37.13)	1.764*** (13.34)
UE in boom times (δ)	-0.124*** (-4.60)	-0.010 (-0.28)	-0.116* (-1.94)	-0.402*** (-4.59)	-0.162*** (-3.16)	-0.111 (-1.07)	-0.097 (-1.52)	-0.057 (-1.01)	-0.316*** (-4.00)
Crisis effect (λ)	-0.367*** (-42.48)	-0.258*** (-21.99)	-0.347*** (-18.06)	-0.607*** (-21.67)	-0.317*** (-19.26)	-0.582*** (-17.54)	-0.427*** (-20.96)	-0.322*** (-17.80)	-0.159*** (-6.30)
Crisis impact/ UEFE (γ)	-0.145*** (-4.74)	-0.179*** (-4.32)	-0.176*** (-2.58)	-0.213*** (-2.14)	-0.097* (-1.66)	0.014 (0.12)	-0.321*** (-4.45)	-0.198*** (-3.09)	-0.113 (-1.26)
Control variables									
Age	0.016*** (37.78)	0.006*** (10.04)	0.020*** (20.86)	0.042*** (30.64)	0.010*** (12.35)	0.031*** (19.18)	0.033*** (32.88)	0.024*** (27.25)	0.009*** (7.36)
Sex	-0.021* (-2.07)	-0.017 (-1.26)	-0.013 (-0.57)	0.021 (0.64)	-0.068*** (-3.56)	-0.004 (-0.11)	-0.080*** (-3.36)	-0.092*** (-4.37)	-0.113*** (-3.83)
Household size	0.026*** (4.11)	0.089*** (10.17)	-0.005 (-0.33)	-0.095*** (-4.52)	0.043*** (3.50)	0.029 (1.16)	-0.037*** (-2.46)	-0.095*** (-7.03)	0.315*** (16.70)
Marital status	0.257*** (22.57)	0.257*** (16.68)	0.360*** (14.24)	0.519*** (14.06)	0.299*** (13.80)	0.145*** (3.31)	0.391*** (14.56)	0.347*** (14.58)	0.324*** (9.71)
Primary education	0.133*** (10.23)	0.073*** (4.12)	0.214*** (7.37)	0.251*** (5.93)	0.186*** (7.51)	0.149*** (2.99)	0.208*** (6.78)	0.166*** (6.08)	0.241*** (6.31)
Secondary education	0.156*** (10.92)	0.051*** (2.62)	0.209*** (6.55)	0.271*** (5.84)	0.218*** (8.01)	0.104* (1.89)	0.351*** (10.40)	0.285*** (9.53)	0.314*** (7.48)
University education	0.203*** (14.94)	0.064*** (3.46)	0.149*** (4.92)	0.420*** (9.52)	0.305*** (11.76)	0.091* (1.74)	0.521*** (16.24)	0.397*** (13.95)	0.372*** (9.36)
Home ownership	0.136*** (13.63)	0.117*** (8.44)	0.197*** (8.65)	0.479*** (14.42)	0.173*** (8.90)	-0.111*** (-2.82)	0.197*** (8.15)	0.050*** (2.36)	0.117*** (3.91)
Residential area	-0.000 (-0.04)	-0.017 (-1.26)	0.028 (1.25)	0.105*** (3.19)	0.083*** (4.27)	0.038 (0.98)	0.158*** (6.58)	0.070*** (3.30)	0.118*** (3.95)
Other houses	0.087*** (7.68)	0.055*** (3.54)	0.108*** (4.26)	0.261*** (7.06)	0.083*** (3.84)	0.005 (0.11)	0.142*** (5.29)	0.090*** (3.78)	0.059* (1.77)
Home-cooked meals	0.008*** (34.23)	0.008*** (27.20)	0.013*** (26.06)	0.014*** (19.97)	0.010*** (22.62)	0.014 (15.90)	0.010*** (19.90)	0.013*** (28.53)	0.005*** (7.45)
R^2	0.353	0.249	0.174	0.162	0.155	0.080	0.155	0.151	0.114

Notes: DiD model to estimate the impact of unemployment status on (log) food expenditure for a sample size of 26,695 households. Eq. (2) was estimated by controlling for the variables reported in the table and for regional effects (not reported in the table but available on request).

Single asterisk * and triple asterisk *** denote significance at the 10% and 1% level, respectively.

Table 5. DiD estimates with Gaussian kernel matching for the UEFE for a boom year (2006) and a crisis year (2013)

Parameter	All	Pasta	Meat	Fish	Milk	Fat	Fruit	Vegetables	Sugar
Constant (α)	6.613*** (158.65)	5.062*** (93.02)	4.026*** (44.30)	2.039*** (15.20)	4.203*** (55.00)	1.518*** (10.48)	2.446*** (24.46)	3.475*** (40.52)	1.602*** (13.58)
UEFE in boom times (δ)	-0.129*** (-7.07)	-0.029 (-1.24)	-0.133*** (-3.35)	-0.402*** (-6.85)	-0.180*** (-5.40)	-0.066 (-1.05)	-0.091** (-2.08)	-0.071* (-1.89)	-0.322*** (-6.24)
Crisis effect (λ)	-0.376*** (-25.67)	-0.266*** (-13.93)	-0.347*** (-10.87)	-0.649*** (-13.78)	-0.329*** (-12.23)	-0.520*** (-10.22)	-0.452*** (-12.87)	-0.345*** (-11.45)	-0.153*** (-3.68)
Crisis impact/ UEFE (γ)	-0.136*** (-6.63)	-0.164*** (-6.13)	-0.158*** (-3.55)	-0.192*** (-2.91)	-0.082** (-2.19)	-0.073 (-1.03)	-0.304*** (-6.20)	-0.173*** (-4.10)	-0.106* (-1.83)
Control variables									
Age	0.016*** (35.94)	0.005*** (8.70)	0.019*** (19.44)	0.041*** (29.09)	0.013*** (16.03)	0.029*** (18.94)	0.038*** (35.99)	0.026*** (28.76)	0.010*** (8.00)
Sex	-0.076*** (-7.12)	-0.077*** (-5.53)	-0.067*** (-2.88)	-0.072** (-2.11)	-0.163*** (-8.32)	-0.035 (-0.95)	-0.127*** (-4.98)	-0.145*** (-6.63)	-0.233*** (-7.75)
Household size	-0.008 (-1.06)	0.031*** (3.05)	-0.051*** (-3.03)	-0.096*** (-3.84)	-0.004 (-0.28)	-0.002 (-0.06)	-0.041** (-2.19)	-0.144*** (-9.08)	0.268*** (12.29)
Marital status	0.295*** (25.29)	0.283*** (18.56)	0.383*** (15.03)	0.567*** (15.09)	0.341*** (15.93)	0.121*** (2.98)	0.452*** (16.14)	0.377*** (15.70)	0.397*** (12.02)
Primary education	0.136*** (11.31)	0.076*** (4.83)	0.191*** (7.30)	0.335*** (8.66)	0.202*** (9.17)	0.120*** (2.88)	0.223*** (7.72)	0.180*** (7.28)	0.241*** (7.10)
Secondary education	0.160*** (11.06)	0.049*** (2.62)	0.178*** (5.65)	0.332*** (7.14)	0.254*** (9.60)	0.152*** (3.02)	0.431*** (12.44)	0.332*** (11.16)	0.348*** (8.51)
University education	0.199*** (13.60)	0.028 (1.47)	0.117*** (3.68)	0.494*** (10.51)	0.295*** (11.00)	0.024 (0.47)	0.576*** (16.43)	0.423*** (14.06)	0.378*** (9.13)
Home ownership	0.166*** (17.13)	0.160*** (12.67)	0.255*** (12.08)	0.494*** (15.87)	0.199*** (11.23)	-0.044 (-1.32)	0.221*** (9.51)	0.071*** (3.54)	0.137*** (5.01)
Residential area	-0.007 (-0.70)	-0.056*** (-4.21)	-0.001 (-0.03)	0.147*** (4.48)	0.113*** (6.05)	0.065* (1.83)	0.204*** (8.30)	0.074*** (3.53)	0.156*** (5.40)
Other houses	0.123*** (8.10)	0.117*** (5.89)	0.189*** (5.71)	0.322*** (6.59)	0.108*** (3.88)	-0.101* (-1.91)	0.118*** (3.23)	0.129*** (4.11)	0.091** (2.10)
Home-cooked meals	0.008*** (29.22)	0.009*** (24.89)	0.013*** (21.38)	0.013*** (15.07)	0.010*** (19.74)	0.014*** (14.97)	0.010*** (15.05)	0.014*** (25.55)	0.005*** (6.81)
R^2	0.34	0.25	0.16	0.16	0.16	0.09	0.16	0.15	0.12

Notes: DiD model to estimate the impact of unemployment status on (log) food expenditure using Gaussian kernel matching with a common support of 26,467 observations (the common support discarded 8 out of 2,795 unemployed households and 220 out of 23,900 employed households). Eq. (2) was estimated by controlling for the variables reported in the table and for regional effects (not reported in the table but available on request).

Single asterisk *, double asterisk ** and triple asterisk *** denote significance at the 10%, 5% and 1% level, respectively.

After taking the effects of different control variables into account and assuming invariant unobserved heterogeneity, our estimates for the parameter δ in Tables 4 and 5 show — consistent with the evidence reported in Table 3 — that unemployment had a negative causal impact on household food consumption. These estimates also indicate that food expenditure was reduced in the crisis period; furthermore, parameter γ estimates reveal that the crisis reinforced

the magnitude of UEFE. This may be explained by perceptions of unemployment in crisis times as non-transitory, thereby generating a medium-run or long-run negative shock on household income that induces adjustments in food expenditure. This finding corroborates that of Brinkman et al. (2009), who indicated that economic crises reduce both the quality and quantity of food consumed.

Regarding different food categories, our parameter estimates indicate that, in boom times, unemployment led to reduced expenditure on meat, fish, milk and sugar, but had no impact on the remaining food categories. For the matched sample, unemployment significantly reduced expenditure on all categories except fats and pasta. As for crisis times, unemployment significantly reduced expenditure on all groups of food with the exception of fats and sugar. Results for the matched sample showed similar results, even though there was no significant UEFE for fats. In their study of the economic transition in Bulgaria, Ivanova et al. (2006) reported a relatively greater decrease in the consumption of more expensive foods per unit of energy (-34% for animal products, -19% for visible fats, but only -10% for carbohydrates). Finally, the fact that households reduced food expenditure after the onset of the 2008 global economic and financial crisis was also confirmed by Azabagaoglu and Oraman (2011) for data referring to the Turkish cities of Istanbul, Ankara and Izmir.

4.3 Results for difference-in-differences via the quantile regression test for 2006 and 2013

Tables 6 and 7 report the results for the DiD quantile regression for the non-matched and matched samples (using Gaussian kernel matching for the refined control group), respectively, as per Eq. (3).[8]

[8] Our empirical results as reported in Tables 6 and 7 are not sensitive to the inclusion of covariates. Results without considering covariates, similar to those reported there, are available from the authors on request.

Table 6. Quantile DiD estimates of the UEFE for a boom year (2006) and a crisis year (2013) using non-matched samples.

Parameter	Q(0.05)	Q(0.10)	Q(0.25)	Q(0.50)	Q(0.75)	Q(0.90)	Q(0.95)
Constant (α)	4.519*** (30.18)	5.170*** (47.10)	6.038*** (74.13)	6.734*** (115.35)	7.334*** (126.11)	7.819*** (128.59)	7.984*** (115.82)
UEFE in boom times (δ)	-0.140* (-1.65)	-0.162*** (-3.35)	-0.153*** (-3.84)	-0.139*** (-5.23)	-0.121*** (-3.26)	-0.135*** (-3.83)	-0.152*** (-3.37)
Crisis effect (λ)	-0.332*** (-13.92)	-0.369*** (-21.60)	-0.372*** (-35.09)	-0.363*** (-45.88)	-0.367*** (-42.97)	-0.377*** (-35.29)	-0.377*** (-25.53)
Crisis impact/ UEFE (γ)	-0.271*** (-2.73)	-0.198*** (-3.46)	-0.138*** (-3.08)	-0.102*** (-3.39)	-0.084*** (-2.12)	-0.066* (-1.77)	-0.053 (-1.08)
Control variables							
Age	0.022*** (17.14)	0.019*** (20.68)	0.016*** (27.64)	0.015*** (34.30)	0.014*** (31.29)	0.014*** (25.71)	0.015*** (21.35)
Sex	-0.037 (-1.19)	-0.031 (-1.40)	-0.017 (-1.26)	-0.006 (-0.63)	-0.009 (-0.91)	-0.001 (-0.10)	-0.002 (-0.15)
Household size	-0.109*** (-4.96)	-0.057*** (-3.44)	0.026*** (2.76)	0.060*** (8.53)	0.085*** (11.71)	0.081*** (10.27)	0.090*** (9.26)
Marital status	0.501*** (13.75)	0.395*** (12.66)	0.315*** (18.68)	0.221*** (18.94)	0.177*** (12.47)	0.128*** (9.38)	0.122*** (7.07)
Primary education	0.195*** (4.96)	0.176*** (6.23)	0.160*** (9.35)	0.120*** (8.92)	0.092*** (6.86)	0.067*** (4.00)	0.053*** (2.34)
Secondary education	0.227*** (5.01)	0.224*** (6.71)	0.179*** (9.67)	0.144*** (10.43)	0.101*** (7.28)	0.095*** (5.63)	0.099*** (3.93)
University education	0.285*** (6.93)	0.282*** (9.58)	0.231*** (12.88)	0.188*** (14.33)	0.141*** (10.63)	0.117*** (7.17)	0.107*** (4.57)
Home ownership	0.217*** (6.38)	0.220*** (9.87)	0.165*** (10.59)	0.140*** (11.82)	0.114*** (10.43)	0.100*** (7.65)	0.088*** (4.75)
Residential area	0.073*** (2.44)	0.055*** (2.42)	0.033*** (2.45)	0.005 (0.42)	-0.026*** (-2.52)	-0.056*** (-4.35)	-0.061*** (-3.73)
Other houses	0.156*** (5.76)	0.124*** (6.20)	0.094*** (7.58)	0.078*** (7.55)	0.057*** (5.32)	0.051*** (4.30)	0.056*** (3.52)
Home-cooked meals	0.014*** (18.74)	0.012*** (19.51)	0.008*** (22.32)	0.006*** (23.06)	0.004*** (16.17)	0.004*** (12.33)	0.003*** (8.73)
R^2	0.236	0.233	0.229	0.217	0.200	0.184	0.172

Notes: Quantile DiD model of the UEFE during boom times for a sample size of 26,695 households. Eq. (3) was estimated by controlling for the variables reported in the table and for regional effects (not reported in the table but available on request).

Single asterisk * and triple asterisk *** denote significance at the 10% and 1% level, respectively.

Table 7. Quantile DiD estimates with Gaussian kernel matching for the UEFE for a boom year (2006) and a crisis year (2013).

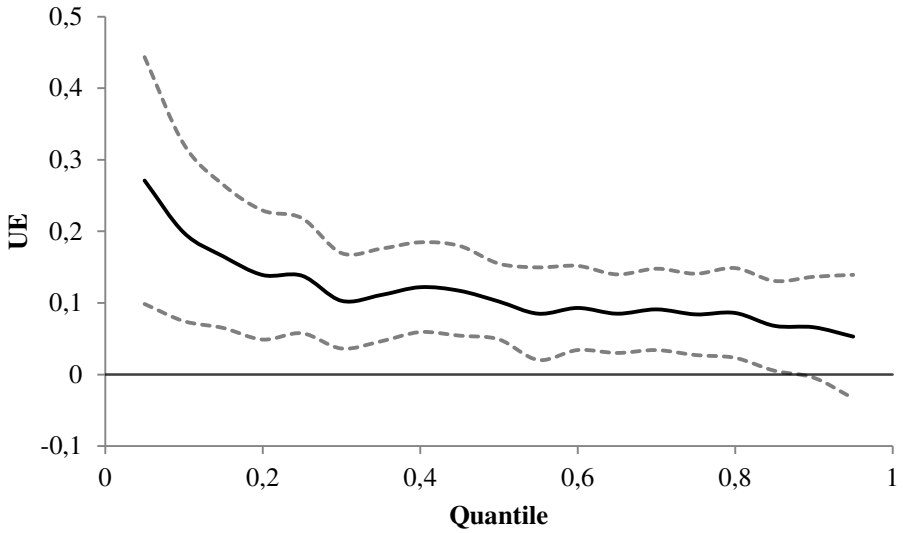
Parameter	$Q(0.05)$	$Q(0.10)$	$Q(0.25)$	$Q(0.50)$	$Q(0.75)$	$Q(0.90)$	$Q(0.95)$
Constant (α)	4.594*** (23.48)	5.157*** (38.33)	6.130*** (83.35)	6.809*** (124.62)	7.336*** (114.21)	7.793*** (127.07)	8.015*** (102.48)
UEFE in boom times (δ)	-0.173** (-2.31)	-0.165*** (-3.00)	-0.142*** (-4.72)	-0.132*** (-5.99)	-0.102*** (-3.98)	-0.135*** (-5.61)	-0.146*** (-4.84)
Crisis effect (λ)	-0.329*** (-11.17)	-0.356*** (-16.45)	-0.375*** (-32.20)	-0.372*** (-43.55)	-0.369*** (-36.95)	-0.379*** (-39.75)	-0.388*** (-32.71)
Crisis impact/UEFE (γ)	-0.218** (-2.54)	-0.197*** (-3.14)	-0.139*** (-4.06)	-0.095*** (-3.78)	-0.101*** (-3.46)	-0.053* (-1.92)	-0.052 (-1.51)
Control variables							
Age	0.023*** (11.45)	0.021*** (14.41)	0.016*** (19.95)	0.014*** (24.04)	0.014*** (19.89)	0.013*** (19.81)	0.014*** (16.14)
Sex	-0.057 (-1.09)	-0.029 (-0.79)	-0.045** (-2.31)	-0.062*** (-4.52)	-0.070*** (-4.42)	-0.048*** (-3.16)	-0.039** (-2.14)
Household size	-0.149*** (-4.21)	-0.095*** (-3.72)	0.006 (-0.41)	0.031*** (3.16)	0.067*** (6.18)	0.082*** (7.77)	0.091*** (7.75)
Marital status	0.454*** (8.30)	0.430*** (11.24)	0.340*** (16.31)	0.280*** (18.22)	0.233*** (12.99)	0.158*** (9.19)	0.147*** (6.94)
Primary education	0.136** (2.40)	0.160*** (3.85)	0.138*** (6.03)	0.127*** (7.51)	0.102*** (5.14)	0.071*** (3.75)	0.082*** (3.49)
Secondary education	0.231*** (3.58)	0.173*** (3.56)	0.155*** (5.90)	0.142*** (7.33)	0.105*** (4.64)	0.075*** (3.56)	0.105*** (4.12)
University education	0.289*** (4.66)	0.280*** (5.95)	0.192*** (7.40)	0.176*** (9.26)	0.131*** (5.88)	0.110*** (5.23)	0.116*** (4.46)
Home ownership	0.291*** (6.12)	0.236*** (6.86)	0.190*** (10.49)	0.177*** (13.56)	0.144*** (9.49)	0.130*** (8.93)	0.105*** (5.92)
Residential area	0.041 (0.86)	0.034 (1.56)	0.022 (1.18)	0.012 (0.88)	-0.029*** (-1.82)	-0.035** (-2.37)	-0.046** (-2.52)
Other houses	0.196*** (3.70)	0.156*** (3.80)	0.148*** (6.32)	0.114*** (6.31)	0.094*** (4.43)	0.055*** (2.82)	0.058** (2.53)
Home-cooked meals	0.014*** (9.83)	0.011*** (11.38)	0.008*** (15.07)	0.006*** (16.60)	0.004*** (11.18)	0.003*** (9.92)	0.003*** (6.85)
R^2	0.22	0.22	0.21	0.21	0.20	0.19	0.18

Notes: Quantile DiD model to estimate the impact of unemployment status on the quantile of (log) food expenditure in crisis times. We used Gaussian kernel matching with a common support of 26,467 observations (the common support discarded 8 out of 2,795 unemployed households and 220 out of 23,900 employed households). Eq. (3) was estimated by controlling for the variables reported in the table and for regional effects (not reported in the table but available on request).

Single asterisk *, double asterisk ** and triple asterisk *** denote significance at the 10%, 5% and 1% level, respectively.

Estimates for the δ_τ parameter confirmed that unemployment during boom periods had a significant negative impact on household food consumption for all food expenditure quantiles, and likewise for crisis periods, independently of whether we used the matched or non-matched samples. However, regarding the UEFE during downturns, we found no reinforcement for the upper quantiles, whereas the opposite held for the remaining quantiles. Strikingly, our γ_τ parameter estimates pointed to an inverse relationship with quantile size,[9] indicating that the UEFE was exacerbated in times of crisis and by a smaller quantile size, as depicted in Figure 1 for the non-matched sample. This evidence is consistent with the idea that an economic crisis leads to reduced food consumption, especially in those households with lower food expenditure, given that they have fewer financial resources. In contrast, the UEFE for higher-income households during boom times, although negative, was much more moderate.

Figure 1. Quantile DiD estimates of the UEFE.



5. Conclusions

We endeavoured to disentangle the impact of unemployment on household food expenditure (UEFE) in order to explore whether there was a significant difference between boom and crisis periods. We also explored whether the magnitude of the UEFE varied by food expenditure

[9]The quantile size refers to the quantile degree or quantile level τ, i.e., 0.05, 0.10, 0.25, and so on.

distributions and across food categories between boom and crisis periods. We performed this analysis for Spain since, compared to partner OECD countries, its main economic indicators varied greatly in the pre-2008 (boom) and post-2008 (crisis) periods, indicating it to be a suitable scenario for this research.

Our results point to significant differences in food consumption by employed and unemployed Spanish households in economic upturns and downturns. Unemployment status had a negative impact on Spanish household food consumption (negative UEFE) in both the boom and crisis periods. This negative UEFE, furthermore, was intensified in times of economic crisis, most especially in socioeconomically disadvantaged households where food consumption was lower. For 2006 (a representative boom year), food expenditure in households whose main breadwinner was unemployed was 2.9% lower than in households whose main breadwinner was employed, a gap that opened further to 4.5% for 2013 (a representative crisis year). It can be argued, consequently, that the consequences of an economic crisis on unemployment are not only quantitative or 'visible' (higher unemployment rates), but also qualitative or 'invisible' — and one such qualitative impact is an enhanced UEFE.

The DiD estimates indicated that unemployment status had a negative impact on Spanish household food consumption that was intensified in times of crisis and for most food categories. Interestingly, quantile DiD estimates corroborated a reinforcement of the significant negative UEFE up to quantile 0.9 in 2013. The negative UEFE was greater in magnitude in crisis times and especially for lower income quantiles. The fact that the impact of the economic crisis on the UEFE was very high in quantile 0.05 and then decreased steadily to quantile 0.90 would suggest that, in times of crisis, the UEFE is more pronounced in households with lower levels of food expenditure. These findings for Spain tend to corroborate those obtained by other authors, namely, Harttgen et al. (2015), who reported a strong effect on poor net food buyers in Malawi in crisis times, Vlontzos and Duquenne (2013), who reported a direct negative impact of the economic crisis on food consumption in Greece, and Rodríguez-Takeuchi and Imai (2011), who reported that the poorest and least educated Colombian households were most affected by price surges.

We suggest that some important implications for food and nutrition policy implementation may be drawn from our research. First, like Suhrcke and Stuckler (2012), we argue that food policies should focus on the more vulnerable social groups, namely, unemployed and poorer groups, in order to minimize the health risks arising from deficient nutrition. Second, food strategies aimed at targeted populations should ensure the intake of adequate quantities of healthy foods, especially in crisis periods, when the magnitude of the UEFE increases. In other words, food policies should be both targeted to vulnerable groups as

well as adapted to economic cycles, with an intensification of measures to minimize malnutrition during periods of crisis.

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Appendix

This appendix reports results yielded by different matching methods; namely, Epanechnikov kernel matching, nearest neighbour matching and radius matching.

Table A1. Estimates of the UEFE for a boom year (2006) and a crisis year (2013): Epanechnikov kernel matching.

	2006				2013			
	Unemployed (average)[a] $E(Y_1 \mid D=1)$	Estimated counterfactual (average)[b] $E(Y_0 \mid D=1)$	Impact (average)[c] ATT	t-statistic	Unemployed (average)[a] $E(Y_1 \mid D=1)$	Estimated counterfactual (average)[b] $E(Y_0 \mid D=1)$	Impact (average)[c] ATT	t-statistic
Panel A. Overall food expenditure								
	8.1997	8.3622	-0.1625	-5.00**	7.7487	8.0173	-0.2687	-12.83**
Panel B. Food expenditure by interquantile range								
0-0.05	6.3620	6.4226	-0.0606	-0.40	5.9248	6.0550	-0.1303	-1.41
0.05-0.10	7.3667	7.3569	0.0098	0.53	6.9380	6.9405	-0.0025	-0.20
0.10-0.25	7.8205	7.8447	-0.0242	-1.58	7.4299	7.4518	-0.0219	-2.38**
0.25-0.50	8.3192	8.3361	-0.0169	-1.52	7.9439	7.9577	-0.0139	-2.05**
0.50-0.75	8.7294	8.7367	-0.0072	-0.73	8.3632	8.3729	-0.0097	-1.60
0.75-0.90	9.0521	9.0768	-0.0248	-2.12**	8.7112	8.7134	-0.0022	-0.35
0.90-0.95	9.3405	9.3240	0.0165	1.46	8.9502	8.9572	-0.0070	-0.80
0.95-1	9.6468	9.6371	0.0096	0.16	9.2274	9.2628	-0.0354	-1.11
Panel C. Food expenditure by category								
Pasta	6.4464	6.4990	-0.0526	-1.36	6.0609	6.2581	-0.1972	-7.61**
Meat	6.5023	6.6732	-0.1710	-2.47**	6.0725	6.3758	-0.3033	-7.45**
Fish	5.0812	5.5456	-0.4644	-4.56**	4.3525	4.9478	-0.5952	-9.92**
Milk	5.9343	6.1472	-0.2128	-3.38**	5.6057	5.8724	-0.2666	-7.97**
Fat	3.2402	3.3190	-0.0788	-0.70	2.7464	2.8876	-0.1412	-2.32**
Fruit	5.4022	5.5612	-0.1590	-2.32**	4.7546	5.1523	-0.3977	-8.71**
Vegetables	5.6125	5.7050	-0.0925	-1.45	5.1879	5.4316	-0.2437	-6.43**
Sugar	3.9079	4.2769	-0.3689	-4.05**	3.7368	4.1791	-0.4423	-8.63**

Notes: We used matching methods with propensity score and an Epanechnikov kernel for a sample size of 12,480 households in 2006 and 14,215 households in 2013.

Double asterisk ** denotes $p<0.05$.

Control variables: age, sex, household size, marital status, education, home ownership, residential area, other houses, number of home-cooked meals, and region.

[a] Sample data corresponding to unemployed.

[b] Estimates for unemployed if they had been working (counterfactual).

[c] The average treatment effect (ATT) is given by column 2 minus column 3. Expressed as expenditure units, it measures the change in mean household food expenditure attributable to unemployment status.

Table A2. Estimates of the UEFE for a boom year (2006) and a crisis year (2013): nearest neighbour matching.

	2006				2013			
	Unemployed (average)[a] $E(Y_1 \mid D=1)$	Estimated counterfactual (average)[b] $E(Y_0 \mid D=1)$	Impact (average)[c] ATT	t-statistic	Unemployed (average)[a] $E(Y_1 \mid D=1)$	Estimated counterfactual (average)[b] $E(Y_0 \mid D=1)$	Impact (average)[c] ATT	t-statistic
Panel A. Overall food expenditure								
	8.1997	8.3555	-0.1558	-4.76**	7.7487	8.0310	-0.2823	-13.58**
Panel B. Food expenditure by interquantile range								
0-0.05	6.3620	6.3525	0.0095	0.07	5.9214	5.9692	-0.478	-0.62
0.05-0.10	7.3667	7.3463	0.0204	1.24	6.9363	6.9429	-0.0065	-0.65
0.10-0.25	7.8205	7.8489	-0.0284	-1.86*	7.4299	7.4462	-0.0162	-1.88*
0.25-0.50	8.3192	8.3354	-0.0162	-1.48	7.9439	7.9552	-0.0114	-1.75*
0.50-0.75	8.7294	8.7376	-0.0082	-0.83	8.3632	8.3731	-0.0099	-1.67*
0.75-0.90	9.0521	9.0755	-0.0234	-2.02**	8.7114	8.7113	-0.0001	0.01
0.90-0.95	9.3405	9.3237	0.0167	1.74*	8.9509	8.9516	-0.0006	-0.08
0.95-1	9.6611	9.6325	0.0286	0.51	9.2207	9.2709	-0.0502	-2.06**
Panel C. Food expenditure by category								
Pasta	6.4464	6.5026	-0.0563	-1.44	6.0609	6.2624	-0.2015	-7.84**
Meat	6.5023	6.6679	-0.1657	-2.38**	6.0725	6.3901	-0.3175	-7.86**
Fish	5.0812	5.5283	-0.4472	-4.36**	4.3525	4.9727	-0.6201	-10.41**
Milk	5.9343	6.1263	-0.1919	-3.03**	5.6057	5.8873	-0.2815	-8.48**
Fat	3.2402	3.3315	-0.0913	-0.81	2.7464	2.8859	-0.1395	-2.32**
Fruit	5.4022	5.5354	-0.1332	-1.93**	4.7546	5.1850	-0.4304	-9.50**
Vegetables	5.6125	5.6955	-0.0830	-1.29	5.1879	5.4458	-0.2579	-6.85**
Sugar	3.9079	4.2540	-0.3460	-3.78**	3.7368	4.2156	-0.4788	-9.41**

Notes: We used nearest neighbour matching method with propensity score for a sample size of 12,480 households in 2006 and 14,215 households in 2013.

Single asterisk * and double asterisk ** denote $p<0.10$ and $p<0.05$, respectively.

Control variables: age, sex, household size, marital status, education, home ownership, residential area, other houses, number of home-cooked meals, and region.

[a] Sample data corresponding to unemployed.

[b] Estimates for unemployed if they had been working (counterfactual).

[c] The average treatment effect (ATT) is given by column 2 minus column 3. Expressed as expenditure units, it measures the change in mean household food expenditure attributable to unemployment status.

Table A3. Estimates of the UEFE for a boom year (2006) and a crisis year (2013): radius matching.

	2006				2013			
	Unemployed (average)[a] $E(Y_1 \mid D=1)$	Estimated counterfactual (average)[b] $E(Y_0 \mid D=1)$	Impact (average)[c] ATT	t-statistic	Unemployed (average)[a] $E(Y_1 \mid D=1)$	Estimated counterfactual (average)[b] $E(Y_0 \mid D=1)$	Impact (average)[c] ATT	t-statistic
Panel A. Overall food expenditure								
	8.1997	8.4535	-0.2537	-7.92**	7.7487	8.1172	-0.3685	-8.88**
Panel B. Food expenditure by interquantile range								
0-0.05	6.3620	6.3525	0.0095	0.02	5.9214	5.9692	-0.0478	-0.42
0.05-0.10	7.3667	7.3463	0.0204	0.37	6.9363	6.9429	-0.0065	-0.41
0.10-0.25	7.8205	7.8482	-0.0276	-0.52	7.4299	7.4464	-0.0165	-1.06
0.25-0.50	8.3192	8.3403	-0.0211	-0.48	7.9439	7.9546	-0.0107	-0.76
0.50-0.75	8.7294	8.7406	-0.0112	-0.23	8.3632	8.3747	-0.0115	-0.74
0.75-0.90	9.0521	9.0768	-0.0247	-0.37	8.7114	8.7104	-0.0010	0.05
0.90-0.95	9.3405	9.3237	0.0167	0.47	8.9509	8.9516	-0.0006	-0.02
0.95-1	9.6611	9.6325	0.0286	0.19	9.2207	9.2709	-0.0502	-2.06**
Panel C. Food expenditure by category								
Pasta	6.4464	6.5967	-0.1504	-3.94**	6.0609	6.3253	-0.2644	-4.92**
Meat	6.5023	6.7948	-0.2926	-4.29**	6.0725	6.4748	-0.4023	-4.89**
Fish	5.0812	5.6856	-0.6044	-6.00**	4.3525	5.1745	-0.8220	-6.72**
Milk	5.9343	6.2741	-0.3398	-5.46**	5.6057	5.9911	-0.3853	-5.67**
Fat	3.2402	3.3672	-0.1270	-1.15	2.7464	2.7955	-0.0491	-0.37
Fruit	5.4022	5.6920	-0.2898	-4.29**	4.7546	5.3724	-0.6178	-6.90**
Vegetables	5.6125	5.8068	-0.1943	-3.08**	5.1879	5.5612	-0.3733	-4.88**
Sugar	3.9079	4.4925	-0.5846	-6.50**	3.7368	4.3634	-0.6267	-5.96**

Notes: We used the radius matching method with propensity score for a sample size of 12,480 households in 2006 and 14,215 households in 2013.

Double asterisk ** denotes $p<0.05$.

Control variables: age, sex, household size, marital status, education, home ownership, residential area, other houses, number of home-cooked meals, and region.

[a] Sample data corresponding to unemployed.

[b] Estimates for unemployed if they had been working (counterfactual).

[c] The average treatment effect (ATT) is given by column 2 minus column 3. Expressed as expenditure units, it measures the change in mean household food expenditure attributable to unemployment status.

Table A4. DiD estimates with Epanechnikov kernel matching for the UEFE for a boom year (2006) and a crisis year (2013).

Parameter	All	Pasta	Meat	Fish	Milk	Fat	Fruit	Vegetables	Sugar
Constant (α)	6.646*** (163.71)	5.118*** (96.58)	4.105*** (46.30)	2.117*** (16.21)	4.244*** (56.93)	1.527*** (10.88)	2.455*** (25.14)	3.503*** (41.82)	1.641*** (14.29)
UE in boom times (δ)	-0.126*** (-6.95)	-0.020 (-0.85)	-0.128*** (-3.21)	-0.403*** (-6.89)	-0.170*** (-5.10)	-0.044 (-0.70)	-0.094** (-2.16)	-0.056* (-1.49)	-0.302*** (-5.88)
Crisis effect (λ)	-0.375*** (-25.53)	-0.264*** (-13.74)	-0.343*** (-10.68)	-0.652*** (-13.78)	-0.321*** (-11.88)	-0.491*** (-9.66)	-0.460*** (-13.00)	-0.344*** (-11.33)	-0.134*** (-3.21)
Crisis impact/ UE (γ)	-0.138*** (-6.76)	-0.173*** (-6.46)	-0.166*** (-3.71)	-0.189*** (-2.87)	-0.092** (-2.46)	-0.101 (-1.42)	-0.301*** (-6.11)	-0.185*** (-4.37)	-0.130** (-2.24)
Control variables									
Age	0.015*** (35.24)	0.005*** (8.12)	0.018*** (18.92)	0.040*** (28.70)	0.013*** (15.70)	0.028*** (18.59)	0.038*** (35.95)	0.026*** (28.28)	0.010*** (7.66)
Sex	-0.079*** (-7.45)	-0.081*** (-5.85)	-0.078*** (-3.34)	-0.073** (-2.14)	-0.175*** (-8.92)	-0.034 (-0.92)	-0.134*** (-5.23)	-0.152*** (-6.92)	-0.252*** (-8.34)
Household size	-0.012 (-1.52)	0.024** (2.34)	-0.057*** (-3.28)	-0.098*** (-3.83)	-0.009 (-0.61)	-0.005 (-0.18)	-0.043** (-2.27)	-0.151*** (-9.23)	0.265*** (11.83)
Marital status	0.293*** (25.15)	0.281*** (18.46)	0.382*** (15.00)	0.556*** (14.83)	0.348*** (16.28)	0.120*** (2.97)	0.446*** (15.93)	0.369*** (15.37)	0.405*** (12.31)
Primary education	0.134*** (11.43)	0.074*** (4.83)	0.186*** (7.24)	0.336*** (8.88)	0.200*** (9.24)	0.122*** (3.00)	0.230*** (8.15)	0.182*** (7.65)	0.242*** (7.28)
Secondary education	0.157*** (10.93)	0.046** (2.48)	0.173*** (5.51)	0.326*** (7.07)	0.249*** (9.45)	0.154*** (3.09)	0.438*** (12.70)	0.335*** (11.30)	0.345*** (8.49)
University education	0.195*** (13.20)	0.020 (1.01)	0.107*** (3.33)	0.490*** (10.32)	0.289*** (10.65)	0.024 (0.46)	0.582*** (16.38)	0.426*** (13.99)	0.374*** (8.95)
Home ownership	0.168*** (17.58)	0.160*** (12.82)	0.257*** (12.26)	0.496*** (16.10)	0.200*** (11.35)	-0.035 (-1.04)	0.226*** (9.79)	0.075*** (3.79)	0.143*** (5.26)
Residential area	-0.009 (-0.86)	-0.057*** (-4.30)	-0.005 (-0.22)	0.141*** (4.32)	0.109*** (5.85)	0.064* (1.82)	0.211*** (8.60)	0.076*** (3.59)	0.155*** (5.38)
Other houses	0.129*** (8.16)	0.125*** (6.04)	0.196*** (5.64)	0.333*** (6.51)	0.115*** (3.93)	-0.103* (-1.88)	0.123*** (3.21)	0.143*** (4.36)	0.095** (2.11)
Home-cooked meals	0.008*** (28.91)	0.009*** (24.81)	0.013*** (21.03)	0.013*** (14.71)	0.001*** (19.35)	0.014*** (14.73)	0.010*** (14.91)	0.015*** (25.42)	0.005*** (6.66)
R^2	0.33	0.24	0.16	0.15	0.15	0.09	0.16	0.15	0.12

Notes: DiD model to estimate the impact of unemployment status on (log) food expenditure using Epanechnikov kernel matching with a common support of 26,467 observations (the common support discarded 8 out of 2,795 unemployed households and 220 out of 23,900 employed households). Eq. (2) was estimated by controlling for the variables reported in the table and for regional effects (not reported in the table but available on request).

Single asterisk * and triple asterisk *** denote significance at the 10% and 1% level, respectively.

Table A5. DiD estimates with nearest neighbour matching for the UEFE for a boom year (2006) and a crisis year (2013).

Parameter	All	Pasta	Meat	Fish	Milk	Fat	Fruit	Vegetables	Sugar
Constant (α)	6.771*** (76.47)	5.107*** (43.32)	4.553*** (24.00)	2.128*** (7.38)	4.370*** (26.53)	1.650*** (5.40)	2.542*** (11.94)	3.772*** (20.90)	1.974*** (7.79)
UE in boom times (δ)	-0.133*** (-3.38)	-0.014 (-0.27)	-0.120 (-1.43)	-0.363*** (-2.83)	-0.185*** (-2.53)	-0.125 (-0.92)	-0.040 (-0.43)	-0.063 (-0.78)	-0.276*** (-2.44)
Crisis effect (λ)	-0.375*** (11.72)	-0.241*** (5.65)	-0.278*** (-4.05)	-0.623*** (5.98)	-0.359*** (6.03)	-0.532*** (4.82)	-0.380*** (4.95)	-0.322*** (4.99)	-0.155* (1.69)
Crisis impact/ UE (γ)	-0.139*** (-3.13)	-0.196*** (-3.32)	-0.239*** (-2.51)	-0.214 (-1.48)	-0.068 (-0.82)	-0.034 (-0.22)	-0.370*** (-3.46)	-0.194*** (-2.14)	-0.109 (-0.86)
Control variables									
Age	0.015*** (15.84)	0.003*** (2.74)	0.016*** (8.02)	0.042*** (13.60)	0.013*** (7.38)	0.031*** (9.60)	0.036*** (15.95)	0.025*** (12.93)	0.009*** (3.13)
Sex	-0.104*** (-4.50)	-0.063*** (-2.03)	-0.121*** (-2.45)	-0.024 (-0.32)	-0.251*** (-5.83)	-0.120 (-1.51)	-0.088 (-1.59)	-0.140*** (-2.98)	-0.336*** (-5.07)
Household size	-0.027 (-1.59)	0.027 (1.17)	-0.105*** (-2.84)	-0.104* (-1.85)	-0.033 (-1.04)	-0.016 (-0.26)	-0.040 (-0.96)	-0.202*** (-5.74)	0.219*** (4.44)
Marital status	0.300*** (11.78)	0.248*** (7.32)	0.379*** (6.93)	0.518*** (6.24)	0.386*** (8.14)	0.235*** (2.68)	0.430*** (7.02)	0.372*** (7.16)	0.441*** (6.05)
Primary education	0.133*** (5.29)	0.101*** (3.02)	0.171*** (3.17)	0.346*** (4.21)	0.226*** (4.83)	0.189*** (2.17)	0.238*** (3.92)	0.152*** (2.95)	0.240*** (3.33)
Secondary education	0.147*** (4.71)	0.058 (1.39)	0.131*** (1.96)	0.380*** (3.73)	0.287*** (4.93)	0.221*** (2.05)	0.351*** (4.66)	0.306*** (4.80)	0.152* (1.69)
University education	0.173*** (5.40)	0.040 (0.93)	0.051 (0.74)	0.526*** (5.03)	0.300*** (5.03)	0.070 (0.63)	0.504*** (6.53)	0.333*** (5.09)	0.327*** (3.55)
Home ownership	0.188*** (9.13)	0.172*** (6.27)	0.264*** (5.99)	0.531*** (7.93)	0.206*** (5.39)	-0.044 (-0.63)	0.235*** (4.75)	0.106*** (2.53)	0.175*** (2.97)
Residential area	-0.001 (-0.06)	-0.041 (-1.39)	-0.023 (-0.48)	0.192*** (2.67)	0.098*** (2.39)	0.047 (0.62)	0.241*** (4.54)	0.040 (0.89)	0.184*** (2.90)
Other houses	0.116*** (3.25)	0.131*** (2.74)	0.141* (1.84)	0.326*** (2.80)	0.133*** (1.99)	-0.211 (-1.71)	0.126 (1.47)	0.133* (1.83)	0.126 (1.23)
Home-cooked meals	0.009*** (14.20)	0.009*** (11.70)	0.014*** (10.92)	0.014*** (7.10)	0.011*** (9.89)	0.015*** (6.95)	0.010*** (7.02)	0.016*** (12.88)	0.007*** (4.25)
R^2	0.333	0.240	0.162	0.151	0.158	0.100	0.162	0.152	0.123

Notes: DiD model to estimate the impact of unemployment status on (log) food expenditure using nearest neighbour matching with a common support of 5,590 observations (the common support included all the unemployed households and discarded 22,105 employed households). Nearest neighbour matching assigns weight 1 to the closest non-treated observations and 0 to the remaining non-treated observations. Eq. (2) was estimated by controlling for the variables reported in the table and for regional effects (not reported in the table but available on request).

Single asterisk * and triple asterisk *** denote significance at the 10% and 1% level, respectively.

Table A6. Quantile DiD estimates with Epanechnikov kernel matching for the UEFE for a boom year (2006) and a crisis year (2013).

Parameter	$Q(0.05)$	$Q(0.10)$	$Q(0.25)$	$Q(0.50)$	$Q(0.75)$	$Q(0.90)$	$Q(0.95)$
Constant (α)	4.511*** (25.89)	5.209*** (47.02)	6.161*** (82.95)	6.831*** (137.61)	7.370*** (115.15)	7.801*** (137.59)	8.021*** (108.85)
UE in boom times (δ)	-0.173** (-2.44)	-0.156*** (-3.38)	-0.137*** (-4.49)	-0.130*** (-6.48)	-0.095*** (-3.76)	-0.132*** (-5.73)	-0.152*** (-5.33)
Crisis effect (λ)	-0.315*** (-9.99)	-0.350*** (-17.01)	-0.372*** (-27.43)	-0.372*** (-41.84)	-0.370*** (-32.86)	-0.379*** (-37.27)	-0.392*** (-30.38)
Crisis impact/ UE (γ)	-0.231** (-2.83)	-0.201*** (-3.76)	-0.137*** (-3.90)	-0.096*** (-4.16)	-0.109*** (-3.72)	-0.056** (-2.13)	-0.048 (-1.43)
Control variables							
Age	0.022*** (11.29)	0.020*** (16.56)	0.015*** (18.81)	0.014*** (25.61)	0.013*** (19.57)	0.013*** (20.43)	0.013*** (16.57)
Sex	-0.062 (-1.23)	-0.030 (-0.96)	-0.049** (-2.44)	-0.066*** (-5.11)	-0.075*** (-4.69)	-0.050*** (-3.42)	-0.045** (-2.53)
Household size	-0.153*** (-4.42)	-0.102*** (-4.62)	-0.007 (-0.47)	0.030*** (3.22)	0.064*** (5.62)	0.080*** (7.50)	0.090*** (7.56)
Marital status	0.442*** (8.40)	0.421*** (12.98)	0.340*** (15.81)	0.278*** (19.57)	0.237*** (13.27)	0.161*** (9.79)	0.146*** (7.14)
Primary education	0.117** (2.27)	0.161*** (4.73)	0.134*** (5.80)	0.123*** (8.08)	0.104*** (5.37)	0.072*** (4.09)	0.079*** (3.55)
Secondary education	0.206*** (3.44)	0.160*** (3.95)	0.149*** (5.58)	0.138*** (7.82)	0.106*** (4.73)	0.077*** (3.88)	0.107*** (4.41)
University education	0.275*** (4.70)	0.277*** (6.98)	0.180*** (6.71)	0.172*** (9.70)	0.133*** (5.94)	0.108*** (5.33)	0.110*** (4.28)
Home ownership	0.296*** (6.63)	0.232*** (8.08)	0.193*** (10.49)	0.177*** (14.85)	0.144*** (9.64)	0.135*** (9.82)	0.110*** (6.49)
Residential area	0.046 (1.03)	0.057** (2.00)	0.019 (0.97)	0.011 (0.91)	-0.029* (-1.83)	-0.035** (-2.51)	-0.048*** (-2.69)
Other houses	0.206*** (3.86)	0.166*** (4.53)	0.156*** (6.05)	0.125*** (7.13)	0.099*** (4.42)	0.053*** (2.71)	0.059** (2.42)
Home-cooked meals	0.014*** (10.07)	0.012*** (13.42)	0.008*** (14.48)	0.006*** (17.44)	0.004*** (11.03)	0.004*** (9.93)	0.003*** (7.01)
R^2	0.22	0.21	0.21	0.21	0.19	0.18	0.18

Notes: Quantile DiD model to estimate the impact of unemployment status on the quantile of (log) food expenditure in crisis times. We used Epanechnikov kernel matching with a common support of 26,467 observations (the common support discarded 8 out of 2,795 unemployed households and 220 out of 23,900 employed households). Eq. (3) was estimated by controlling for the variables reported in the table and for regional effects (not reported in the table but available on request).

Single asterisk *, double asterisk ** and triple asterisk *** denote significance at the 10%, 5% and 1% level, respectively.

Table A7. Quantile DiD estimates with nearest neighbour matching for the UEFE for a boom year (2006) and a crisis year (2013).

Parameter	$Q(0.05)$	$Q(0.10)$	$Q(0.25)$	$Q(0.50)$	$Q(0.75)$	$Q(0.90)$	$Q(0.95)$
Constant (α)	4.519*** (30.18)	5.170*** (47.10)	6.038*** (74.13)	6.734*** (115.35)	7.334*** (126.11)	7.819*** (128.59)	7.984*** (115.82)
UEFE in boom times (δ)	-0.140* (-1.83)	-0.162*** (-2.94)	-0.153*** (-4.19)	-0.139*** (-5.91)	-0.121*** (-4.73)	-0.135*** (-4.31)	-0.152*** (-3.92)
Crisis effect (λ)	-0.332*** (-13.92)	-0.369*** (-21.60)	-0.372*** (-35.09)	-0.363*** (-45.88)	-0.367*** (-42.97)	-0.377*** (-35.29)	-0.377*** (-25.53)
Crisis impact/ UEFE (γ)	-0.271*** (-3.10)	-0.198*** (-3.16)	-0.138*** (-3.33)	-0.102*** (-3.83)	-0.084*** (-2.88)	-0.066* (-1.85)	-0.053 (-1.20)
Control variables							
Age	0.022*** (16.74)	0.019*** (21.04)	0.016*** (27.70)	0.015*** (41.14)	0.014*** (35.47)	0.014*** (27.48)	0.015*** (23.58)
Sex	-0.037 (-1.20)	-0.031 (-1.45)	-0.017 (-1.20)	-0.006 (-0.73)	-0.009 (-0.98)	-0.001 (-0.10)	-0.002 (-0.16)
Household size	-0.109*** (-5.72)	-0.057*** (-4.07)	0.026*** (2.81)	0.060*** (10.77)	0.085*** (14.19)	0.081*** (10.80)	0.090*** (9.77)
Marital status	0.501*** (14.93)	0.395*** (16.95)	0.315*** (20.64)	0.221*** (22.34)	0.177*** (16.02)	0.128*** (9.12)	0.122*** (6.96)
Primary education	0.195*** (5.27)	0.176*** (6.63)	0.160*** (9.11)	0.120*** (10.53)	0.092*** (7.39)	0.067*** (4.36)	0.053*** (2.79)
Secondary education	0.227*** (5.61)	0.224*** (6.68)	0.179*** (9.24)	0.144*** (11.53)	0.101*** (7.40)	0.095*** (5.66)	0.099*** (4.74)
University education	0.285*** (7.41)	0.282*** (10.20)	0.231*** (12.60)	0.188*** (15.86)	0.141*** (10.86)	0.117*** (7.29)	0.107*** (5.35)
Home ownership	0.217*** (7.33)	0.220*** (10.38)	0.165*** (11.79)	0.140*** (15.74)	0.114*** (11.71)	0.100*** (8.42)	0.088*** (5.94)
Residential area	0.073*** (2.49)	0.055*** (2.63)	0.033*** (2.37)	0.005 (0.51)	-0.026*** (-2.70)	-0.056*** (-4.77)	-0.061*** (-4.25)
Other houses	0.156*** (4.78)	0.124*** (5.36)	0.094*** (6.09)	0.078*** (7.91)	0.057*** (5.22)	0.051*** (3.84)	0.056*** (3.39)
Home-cooked meals	0.014*** (18.26)	0.012*** (21.71)	0.008*** (23.45)	0.006*** (28.65)	0.004*** (20.14)	0.004*** (13.90)	0.003*** (8.76)
R^2	0.24	0.23	0.23	0.22	0.20	0.18	0.17

Notes: Quantile DiD model to estimate the impact of unemployment status on the quantile of (log) food consumption in crisis times. We used nearest neighbour matching with a common support of 5,590 observations (the common support included all the unemployed households and discarded 22,105 employed households). Eq. (3) was estimated by controlling for the variables reported in the table and for regional effects (not reported in the table but available on request).

Single asterisk * and triple asterisk *** denote significance at the 10% and 1% level, respectively.