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Food insecurity and social protection in Europe: Quasi-natural experiment of Europe's great recessions 2004–2012

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ABSTRACT

Food insecurity rose sharply in Europe after 2009, but marked variation exists across countries and over time. We test whether social protection programs protected people from food insecurity arising from economic hardship across Europe. Data on household food insecurity covering 21 EU countries from 2004 to 2012 were taken from Eurostat 2015 edition and the Organisation for Economic Cooperation and Development. Cross-national first difference models were used to evaluate how rising unemployment and declining wages related to changes in the prevalence of food insecurity and the role of social protection expenditure in modifying observed effects. Economic hardship was strongly associated with greater food insecurity. Each 1 percentage point rise in unemployment rates was associated with an estimated 0.29 percentage point rise in food insecurity (95% CI: 0.10 to 0.49). Similarly, each \$1000 decreases in annual average wages was associated with a 0.62 percentage point increase in food insecurity (95% CI: 0.27 to 0.97). Greater social protection spending mitigated these risks. Each \$1000 spent per capita reduced the associations of rising unemployment and declining wages with food insecurity by 0.05 percentage points (95% CI: -0.10 to -0.0007) and 0.10 (95% CI: -0.18 to -0.006), respectively. The estimated effects of economic hardship on food insecurity became insignificant when countries spent more than \$10,000 per capita on social protection. Rising unemployment and falling wages are strong statistical determinants of increasing food insecurity, but at high levels of social protection, these associations could be prevented. © 2016 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY license

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1. Introduction

The Great Recessions across Europe have been accompanied by growing concern about food insecurity (García, 2013; RFI, 2014; Smith. 2013: Taylor-Robinson et al., 2013a). Household food insecurity is broadly defined as "the limited or uncertain availability of nutritionally adequate and safe food, or having to acquire foods in socially unacceptable ways" (Anderson, 1990). Across Europe, the number of people reporting being unable to afford a meal with a protein source every other day, the only surveillance measure of food insecurity in Europe, was declining over 2005 to 2009, falling from 12% of the EU-27 population to 8.7%. But in 2010, this trend reversed, with food insecurity rising to 10.9% in 2012 and remaining elevated in 2013. After 2010, on average, an estimated total of 13.5 million additional people were food insecure over 2011 to 2013 over and above the historical trend (Loopstra et al., 2015a). Given evidence that food insecurity places adults and children at elevated risk of eating diets of poor quality (Kirkpatrick and Tarasuk, 2008), with long term implications for health including diet-related chronic conditions, such as dyslipidemia and

* Corresponding author. *E-mail address:* rachel.loopstra@sociology.ox.ac.uk (R. Loopstra). inflammation (Parker et al., 2010; Seligman et al., 2010; Shin et al., 2015; Tayie and Zizza, 2009), as well as more immediate risks such as nutrient inadequacy and iron deficiency (Skalicky et al., 2006), there is considerable cause for concern. Referring to the UK situation, the UK Faculty of Public Health argued that recent evidence of increasing malnutrition and hunger constituted a "public health emergency" (UK Faculty of Public Health, 2014).

Because there has been significant variation in the extent to which countries have been affected by the recent economic crisis and in how they have responded (Reeves et al., 2013; Reeves et al., 2014), Europe provides a quasi-experimental setting to study macroeconomic drivers of food insecurity and potential mitigating factors. Cross-state analyses in North America have shown increasing unemployment and poverty rates to be associated with rising food insecurity (Gundersen et al., 2014; Sriram and Tarasuk, 2015; Tapogna et al., 2004), but to our knowledge, these factors have not been examined across Europe. One potentially important preventive factor is the strength of social protection programs. These have been shown to help mitigate, for example, the impact of job loss on suicide (Stuckler and Basu, 2013), but have not been examined in relation to food insecurity in the European context. However, studies of various types of social protection programs, such as income benefits, from Canada and the United States, suggest

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that enhancements to elements of social security are associated with reduced food insecurity (Emery et al., 2013; Loopstra et al., 2015b). One recent example, from Ionescu-Ittu and colleagues, found that the introduction of a new child benefit in Canada was associated with a decline in food insecurity among eligible families, particularly those most vulnerable (Ionescu-Ittu et al., 2015).

Here, we test the hypothesis that rising economic hardship – particularly unemployment and wage declines – are associated with increased risk of food insecurity in Europe. Then, we evaluate whether differing types and degree of social security spending helped buffer populations facing these hardships from food insecurity.

2. Methods

2.1. Food insecurity data

To obtain country-level data on the prevalence of food insecurity, we used the indicator available in the Eurostat database (Eurostat, 2015a). These data are collected in the material deprivation module in the Survey of Income and Living Conditions (EU-SILC). Specifically, in this survey, the household reference person is asked "Can your household afford a meal with meat, chicken, fish (or vegetarian equivalent) every second day?" This indicator is used to capture food poverty in Ireland (Carney and Maitre, 2012) and to denote food-related material deprivation in the EU (Eurostat, 2015b). As food-based dietary guidelines across European countries recommend at least 1-2 servings of meat, chicken or fish (or alternative protein sources) every day (European Food Information Council, 2015) and the measure indicates a lack of financial resources to acquire one essential component of a nutritionally adequate diet, this indicator is aligned with the definition of household food insecurity (Anderson, 1990). Of note is that it does not specify duration of exposure nor capture multiple dimensions of food insecurity, such as hunger or insecure access to sufficient quantities of food captured, as are captured by the Household Food Security Survey Module (Tarasuk et al., 2014), but to our knowledge it is the only available annual comparative indicator of food insecurity across EU countries.

2.2. Economic hardship data

We collected available data on GDP per capita and unemployment rates on 21 countries, covering years 2004–2012, from Eurostat (Eurostat, 2015a). These were linked to data on real wages from OECD (OECD, 2015). All macroeconomic data were denominated in constant standard international dollars per capita adjusted for purchasing power parity (PPP).

2.3. Social protection data

Data on spending on social protection were collected from Eurostat (Eurostat, 2015a). These cover spending on a range of welfare programs, involving both cash-transfers and in-kind support. These were unemployment insurance, income support for people with disabilities, spending on sickness, child benefit payments and paternity coverage, and public pensions and income support in old age. Box 1 further describes these categories.

2.4. Statistical analysis

First, we examined the association of changes in food insecurity with changes in unemployment and real wages using a first-difference model, which eliminates time-invariant characteristics which may differ across countries. Our model is as follows:

$$\begin{array}{l} \Delta \text{ Food Insecurity}_{it} = \beta_1 \Delta \text{Unemployment}_{it} + \beta_2 \Delta \text{Wages}_{it} + \beta_3 \Delta \text{Year}_t \\ + \epsilon_{it} \end{array}$$

Here, *i* is country and *t* is year. Δ denotes the annual percentage point change for unemployment and food insecurity, and the real change in annual average wages within countries. ε is the error term. In a subsequent model we adjust for the annual real change in GDP per capita.

Next, moving to our second hypothesis, we assess whether and to what extent social security spending modified the relationship between food insecurity and these indicators of economic hardship. To do so, we first examine the interaction terms for total social protection spending with the change in unemployment rates and change in annual wages, as follows:

 $\begin{array}{l} \Delta \mbox{ Food Insecurity}_{it} = \beta_4 \Delta \mbox{Unemployment}_{it} + \beta_5 \Delta \mbox{Wages}_{it} + \beta_6 \Delta \mbox{Yeart} \\ + \beta_7 \mbox{Social Protection} + \beta_8 \Delta \mbox{Unemployment} \\ \times \mbox{ Social Protection}_{it} + \beta_9 \mbox{D} \mbox{Wages} \\ \times \mbox{ Social Protection}_{it} + \epsilon_{it} \end{array}$

To illustrate how different country levels of spending impacted the associations of unemployment and wages with food insecurity, we used margins plots to plot the estimates for a 1 percentage point change in unemployment and a \$1000 decline in annual wages across the range of social protection spending values observed in our sample.

Next, we conduct an exploratory analysis to observe which of alternative social protection programs are protective or whether effect modification is observed across all forms of social protection spending. To do so, in separate models, we examine the magnitude of the modifying effect of each category of social protection spending. For each category of social protection spending, a variable capturing the residual spending on social protection outside of the category of interest was calculated and included in the model to adjust for potential confounding due to spending in other areas. We examine if social protection spending on old-age benefits also has a modifying effect as a specificity check. We would expect spending in this category to have no effect on the relationships between unemployment and wages with food insecurity because this spending does not go directly toward the working-age population.

All models were estimated using STATA v13.0, and robust standard errors adjusted for clustering effects of countries are reported.

3. Results

3.1. Prevalence of food insecurity

As highlighted, Fig. 1 shows the variation in food insecurity both across EU countries and over time between 2009 and 2012, the period when food insecurity began to rise in the EU as a whole (Loopstra et al., 2015a). A handful of countries, such as Austria and Poland, experienced a decline in food insecurity over this period, but large rises in food insecurity were observed for the UK, Hungary, Green and Italy. There was no apparent patterning in the magnitude of change over this period by the level of food insecurity in countries in 2009.

3.2. Food insecurity and economic shocks

Table 1 shows the results of our cross-national statistical models quantifying the association of economic hardship with food insecurity. Each percentage point increase in unemployment is associated with an increase in food insecurity of 0.29 percentage points (95% CI: 0.10 to 0.49). Similarly, we observed that each \$1000 decreases in annual wages was associated with a 0.62 percentage point increase in food insecurity (95% CI: 0.27 to 0.97). Adjusting for the change in GDP per capita strengthened the association between unemployment and food insecurity ($\beta = 0.37$; 95% CI: 0.14–0.60), but there was no residual association of GDP and incidence of food insecurity after adjusting for unemployment and wages (p = 0.10).

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