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The impact of benefit sanctioning on food insecurity: a dynamic cross-area study of food bank usage in the UK.

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Abstract

Household food security, which may be compromised by short-term income shocks, is a key determinant of health. Since 2012, the UK witnessed marked increases in the rate of ‘sanctions’ applied to unemployment insurance claimants, which stop payments to claimants for a minimum of four weeks. In 2013, over 1 million sanctions were applied, potentially leaving people facing economic hardship and driving them to use food banks. Here we test this hypothesis by linking data from the Trussell Trust Foodbank Network with records on sanctioning rates across 259 local authorities in the UK. After accounting for local authority differences and time trends, as the rate of sanctioning increased by 10 per 100,000 adults, the rate of adults fed by foodbanks by an additional 3.36 adults per 100,000 (95% CI: 1.71 to 5.01). The availability of food distribution sites affected how tightly sanctioning and food bank usage were associated ($p < 0.001$ for interaction term), such that in areas with few distribution sites, rising sanctions led to smaller increases in Trussell Trust food bank usage. Sanctioning appears to be closely linked with rising need for emergency food assistance, but the impact of sanctioning on food insecurity is likely not fully reflected in available data. There is a need to monitor household food insecurity in the UK to fully understand the impact of government policies on this outcome.

Keywords: food bank, social security, benefit sanctions, household food insecurity

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Introduction

Household food security—that is, secure access to adequate food at all times—is a crucial determinant of population health (Seligman and Schillinger, 2010). Health outcomes associated with experiences of insecure access to food include poor nutritional status, depression and anxiety, and the inability to manage diet-related disease conditions, among others (Heflin et al., 2005; Kirkpatrick and Tarasuk, 2008; Seligman et al., 2010; Tarasuk et al., 2015).

Insufficient and insecure household incomes, particularly short-term income losses, put households at risk of food insecurity (Loopstra and Tarasuk, 2013; Leete and Bania, 2010). A growing body of evidence shows how government policies can either increase or reduce secure access to food by changing access to social security income (Loopstra et al., 2015a; Ionescu-Ittu et al., 2015; McIntyre et al., 2016). Here, we examine one aspect of social security policy, the practice of ‘sanctioning’, which abrogates financial support to unemployed persons if they fail to meet criteria for seeking work. We ask, does temporarily stopping people’s social security payments drive them to food banks?

Internationally, there has been increasing experimentation with using punitive measures to incentivise changes in behaviour among social security recipients. Sanctioning policies vary across countries, but generally, governments use the threat of sanctioning (and the sanctions themselves) to incentivise unemployed persons to seek employment and reduce potential gaming behaviour (Watts et al., 2014; Venn, 2012). The reasons for receiving a sanction include showing up late to meetings with work coaches, missing job interviews, failing to participate in prescribed work programmes or training, and failing to show adequate evidence of job search activity, among others. Sanctioning penalties also vary widely, with some resulting in a reduced income payment for only 1-2 weeks, while in other countries, such as the UK, payments are cut-off altogether for a minimum of 4 weeks (Venn, 2012).

The outcomes of sanctioning policies have been widely debated (Watts et al., 2014). Some argue the threat of sanctions motivate people return to work and increase chances of finding new employment. Yet, quantitative studies examining employment outcomes have found mixed results, potentially because they increase the quantity not the quality of the job search (Arni et al., 2013; Webster, 2016; Boockmann et al., 2014; Lalive et al., 2005; van der Klaauw and Van Ours, 2013). Others have questioned the fairness of the practice, given evidence that disadvantaged groups, such as those with disabilities, are more likely to be sanctioned than others (Work and Pensions Committee, 2015).

Little research has been done on the health and social consequences of sanctioning, and in particular, on whether or not sanctioning increases risk of household food insecurity. Some studies on sanctioning practices and welfare reform in the US have suggested that benefit recipients who experienced sanctions were more likely to experience food insecurity, among other hardships (Reichman et al., 2005), but comparable studies in Europe have not been conducted. Given that sanctioning is now considered integral to many Western nations’ social security approaches, it is critical to understand how this practice impacts access to food.

Here we take advantage of the introduction of policy changes to sanctioning and welfare conditionality in the UK to test the hypothesis that sanctioning increases risks of hunger, as reflected in rates of people seeking emergency food assistance.

Sanctioning and the rise of food banks in the UK

As a result of the 2012 Welfare Reform Act, over 2012 and 2013, the UK Coalition government tightened the criteria for receipt of Jobseeker's Allowance (the main UK unemployment insurance programme) as well as the consequences for failing to fulfil them (sanctioning). When people fail to meet the criteria, sanctioning occurs, which means claimants have their benefit payments stopped, with immediate effect, for a minimum of 4 weeks. For more serious offences, in 2013, penalty periods were extended to 13 weeks, or 26 weeks and 156 weeks for second and third failures, respectively (Department of Work and Pensions, 2013).

Reflecting these changes, the monthly rates of sanctions applied to claimants nearly doubled between 2009 and 2013, with about 3% of claimants sanctioned each month in 2009 to over 6% of claimants sanctioned every month in 2013 (Figure 1). In 2013, over 1 million sanctions were applied.

[Figure 1 here]

In parallel with rising sanctions, the UK experienced a dramatic rise in food bank usage. In 2011, the Trussell Trust Foodbank Network, the largest food bank network in the UK, reported about 129,000 users. By 2014/15, the number had climbed to almost 1.1 million (The Trussell Trust, 2015). An All-Party Parliamentary Inquiry conducted during 2014 found that many frontline emergency food providers reported sanctioning to be a major reason why people seek emergency food assistance (Forsey, 2014), and further investigation among food bank users found that sanctioning had affected 20-30% of people seeking emergency food assistance (Perry et al., 2014).

Yet, this evidence is contested. In a House of Commons debate in 2015, the previous Minister for Employment, Priti Patel, stated that “there is no robust evidence that directly links sanctions and food bank use” because the “reasons for food bank use are complex and overlapping” (HC Debate 22 June 2015 vol 595 c608). Previous studies and evidence reviews, which rely on cross-sectional and anecdotal data, have been unable to disentangle whether there is a dynamic and systematic relationship between sanctioning rates and food bank usage (Forsey, 2014; Loopstra et al., 2015b; Perry et al., 2014). Without longitudinal data, this debate is difficult to resolve.

Hence, in this paper we test the hypothesis that sanctioning rates and food bank usage in the UK are dynamically related. To fill this critical gap in the evidence base, we compiled a novel database linking quarterly sanctioning rates in local authorities to area-level food bank usage data from the Trussell Trust Network over fiscal years 2012 to 2015. We additionally incorporated data on Network characteristics to understand how the provision of food assistance influences the sanctioning-food bank usage relationship. We draw on these data to ask, how do rates of sanctioning vary with rates of food bank usage? We also explore if declines in number of sanctions have meant fewer people needing food assistance. Lastly, we examine how the availability of Trussell Trust assistance affects the relationship between sanctioning and food bank usage. Specifically, we investigate whether the impact of

sanctioning on food insecurity may not be reflected in Trussell Trust food bank usage figures where their food banks are less available, thereby providing evidence that the true impact of sanctioning on hunger is potentially obscured by the data available.

Methods

Source of Data

We collected data on food bank usage from the Trussell Trust Foodbank Network, an umbrella organisation for 424 member food banks in the UK, comprised of over 2000 distribution sites in churches or community centres (The Trussell Trust, 2016). While there are numerous food banks that operate independently in the UK, the Trussell Trust is the only franchise model, creating a source of comparative and harmonised data. Each member food bank is responsible for obtaining referrals from local social service agencies. Referred persons receive a food parcel meant to provide three days' worth of food for all household members.

Data from referral vouchers are entered into the central Trussell Trust database. We received access to aggregated data from each food bank in the network, collated on a quarterly basis for fiscal years 2012/13 to 2015/16. These data provide the number of instances adults and children received food parcels, reflecting usage volume rather than number of individuals served. The number of unique individuals helped by Trussell Trust food banks has not been tracked. We use the number of adults fed scaled relative to the size of local adult population, but these numbers cannot be interpreted as a quarterly prevalence rate, as some individuals may have received food parcels on more than one occasion in the same quarter.

We also obtained information on food bank postcodes, the year food banks were initiated, the number of distribution sites affiliated with the food bank, and the hours of operation at each distribution site from the Trussell Trust to enable description of area-level food bank operations.

Sanctioning and Unemployment Data

We obtained government data for local authorities in the UK on the number of people claiming Jobseeker's Allowance, the number of sanctions applied to Jobseeker's Allowance claimants, unemployment and employment rates, deprivation ranking (England only), rural-urban classification (England only) and population size from Nomis, Stat Xplore, and UK Government Statistics databases. Sanction data are the number of sanctions applied to claimants, summed over the months in each quarter, which were available up to the second quarter of 2015/16. Similar to food bank data, these do not pertain to individuals, so the same claimant could have received more than one sanction in the same quarter. Monthly claimant data were averaged over the quarter to provide an estimate of the quarterly claimant count. Unemployment and employment data are aggregated data from the Annual Population Survey. At the local authority level, Nomis provides data for 12-month periods beginning every quarter.

Analytic sample

We restricted our sample to local authorities in Scotland, Wales, and England, as sanctioning data were unavailable for Northern Ireland. We excluded five local authorities with small population sizes (City of London, Isles of Scilly, Orkney Islands, Shetland Islands, and

Eilean Siar). Food bank postcodes were used to link food banks to their respective local authority areas, resulting in a sum of the total number fed, sum of distribution sites operating, and sum of total operating hours for the local authority that varied across quarters. We excluded food banks and corresponding local authorities which did not consistently collect data each quarter over 2012/13 until the end of 2015/16 (n= 15) and also those authorities in which Trussell Trust food banks do not operate (n= 101). This yielded a final analytical dataset of 259 local authorities spanning 16 quarters (Web Figure A2). Descriptive statistics showing rates of feeding and the number of food banks operating for local authorities over time are shown in Web Table A1 and in Web Figure A3.

Statistical Analysis

First, we examined how the rate of sanctions applied in local authority populations relates to food parcel distribution. We use a fixed effects model to control for unobserved differences across local authorities and time, asking if the instances of adults receiving food assistance is dynamically related to the number of sanctions applied in the population, as follows:

$$\text{Fed}_{it} = \beta_0 + \beta_1 \text{Sanctions}_{it} + \beta_2 \text{Claimants}_{it} + \beta_3 \text{Season} + \beta_4 \text{First} + \beta_5 \text{Distribution}_{it} + \beta_6 \text{Hours}_{it} + \mu_i + \varepsilon_{it}$$

Here, i denotes the local authority and t denotes the time point. Fed is the quarterly number of instances adults received food parcels per 100,000 adults in the population. Sanctions is the number of sanctions applied per 100,000 adults, and Claimants is the number of Jobseeker's Allowance claimants per 100,000 working age adults. Season is a dummy variable for first, second, third, and fourth quarters to account for seasonal trends in food parcel distribution. First is a dummy variable denoting the first quarter a food bank opened in local authorities if they opened after April 2012. Distribution is the number of food bank distribution sites operating in local authority. Hours is the total number of hours food banks open per week. μ_i denotes local-authority fixed effects and ε_{it} is the random error term. In subsequent models, we include an adjustment for linear and quadratic time trends to account for secular trends in the numbers fed, sanctions applied, and Jobseeker's Allowance claimants across the UK over this time period.

Next, using a first difference model, we unpacked whether increasing sanctions from the previous quarter is associated with an increase in adult food bank usage, and in turn, whether a decline in the number of sanctions is associated with a decline in adult food bank usage, thus testing the acute dynamic relationship from quarter to quarter in numbers fed in relation to number of sanctions applied. To do this, we created two time-varying measures of sanctions: one capturing increases from the previous quarter and the other decreases. For each, changes in the opposite directions were coded as zero.

Lastly, we explored the potential problem of hidden hunger, whereby, for a given increase in the number of sanctions applied, the extent to which this may lead to food insecurity is not fully reflected in food bank usage. In places where sanctions have increased, people who experience food insecurity as a result may not be able to reach food banks where food banks are less available; this would temper an observed relationship between sanctions and food bank usage, resulting in a downward bias in our estimate of the impact of sanctions. To investigate this, we examined the interaction between change in the number of sanctions

applied, with the level of food bank operations in a given local authority-year, namely the number of distribution sites and the number of operating hours.

Results

Figure 2 shows the correlation between the rate of sanctions applied in local authorities and the rate of adults fed for one quarter, January to March 2014. Here, we see evidence that in places where the rate of sanctioning was higher, the rate of adult food bank usage was also higher ($r=0.26$; $p<0.0001$).

[Figure 2 here]

In Table 1, we show how quarterly rates of food bank usage among adults related to the number of sanctions applied in the population each quarter over 2012 to 2015, after accounting for local authority differences. We found that for every 10 sanctions applied per 100,000 in the population, the rate of adult food bank users was 6.44 per 100,000 adults higher (95% CI: 4.72 to 8.15). This association remained robust after adjusting for the scale of food bank operations and how long food banks had been operating (Table 1, Model 2). Lastly, we adjusted for linear and quadratic time trends. Though attenuated, the relationship between sanctioning and food bank use remained strong: for every 10 additional sanctions applied, the rate of food bank users per 100,000 was about 3.36 higher (95% CI: 1.71 to 5.01).

[Table 1 here]

To put these figures in context, rates of sanctioning applied in local populations rose from a mean of 302 per 100,000 adults over the April to June quarter of 2012/13 to 340 per 100,000 over the July to September quarter of 2013/14. Our model predicts this increase in JSA sanctioning would account for about 5-10% of the increase in the rate of food bank usage observed over this period.

When we delineated the effects of acute increases in sanctions applied from the previous quarter from acute declines (Table 2), we observed that for increases in sanctions, specifically, every 10 more sanctions applied was associated with about 5 more adults fed in food banks (95% CI: 3.00 to 7.40). A decline of 10 sanctions from the previous quarter was associated with a decline of about 2 adults fed (95% CI: -3.23 to -0.34).

[Table 2 here]

Lastly, we examined how the dynamic relationship between change in sanctions applied and change in the number of adults fed was affected by the scale of food bank operations in local authorities (Web Table A2). The number of distribution sites available in local authorities significantly modified the observed relationship between the change in sanctions and the change in numbers fed. This is illustrated in Figure 3. In local authorities with few distribution sites per capita (< 1 per 100,000), if the number of sanctions increased by 20 per 100,000, there was not a corresponding significant increase in the number of adult food bank users. But for local authorities with 5 distribution sites or more operating per 100,000, an increase in 20 sanctions per 100,000 related to an estimated increase of about 10 more adult food bank users.

Sensitivity Analyses

We performed a series of sensitivity analyses to assess the robustness of our models to alternate specifications. To test the possibility that the association between sanctions and food bank use was spurious, driven by higher rates of unemployment, we additionally adjusted our models for employment and unemployment rates and found our results unchanged (Web Table A4). We also checked for outliers (i.e. observations with residuals $> |2SD|$) and extreme observations to ensure our estimates were not being driven by these observations. No observations met our criteria of outliers. After removing observations with extreme quarterly changes in rates of feeding (i.e. $>$ the 99th percentile), our results were unchanged (Web Table A5). We also re-ran our models using a random effects framework and adjusting for time-invariant characteristics, specifically Index of Multiple Deprivation and rural-urban classification. Due to these variables only being available for England, these models were only conducted among local authorities from these areas (Web Table A6). We found that results from these models were consistent with our fixed-effect models.

Discussion

Our findings suggest a strong, dynamic relationship exists between the number of sanctions applied in local authorities and the number of adults receiving emergency food parcels. As the quarterly rate of sanctioning rose in local authorities, the rate of adult food bank users also rose. We observed that a quarter-to-quarter increase of 10 sanctions per 100,000 was associated with about 5 more instances of adults needing food, while a decline in 10 sanctions applied was associated with about 2 fewer instances of adults needing food. We also observed that the extent to which sanctioning is reflected in demand for food assistance from the Trussell Trust depends on availability of distribution sites in a given area. Where distribution sites were not widely available to the population to use (as measured by distribution sites per capita), there was not a corresponding increase in the numbers fed, even if more people were sanctioned.

Our study uses the best current data available to examine the relationship between sanctioning and food bank usage. The findings were robust to a number of alternate model specifications, providing clear evidence of a link between area-level sanctioning rates and food bank usage. We were limited to using data at the area level, however, so our results could be vulnerable to ecological fallacy, where rates of sanctioning correlate with food bank usage, but do not mean that the people sanctioned are the same individuals who show up in food banks. Our area level findings are consistent with those observed among individuals in reports from frontline food assistance providers and qualitative studies, however (Forsey, 2014; Perry et al., 2014).

Sanction data are limited by how they are recorded. While the government provides information on claims where adverse and non-adverse decisions were made and whether the decision was based on an original decision, mandatory reconsideration, or appeal, they do not provide information on the total number of original adverse decisions. These data would be important for tracking the impact of sanctions in a given quarter because during the reconsideration and appeals process, claimants have their benefit payments stopped; the month that an appeals decision is recorded could be one or two months after a claimant first had his/her payments stopped. We based our data on original adverse decisions because we could not know with certainty that claimants had sanctions applied in these months, but using only these figures mean our estimates have likely underestimated the impact of sanctioning

on food bank usage. Data on the number of people receiving Universal Credit, a new benefit in the UK subject to conditionality, are also not available, which also means the full impact of sanctioning practices on food bank usage cannot be charted.

Despite these data limitations, this study significantly builds upon previous studies to fill a critical gap in the literature. The positive relationship we observed between sanctioning rates and food bank use is consistent with previous work examining annual rates of sanctioning and foodbank use, but extends beyond this work by using robust models to provide evidence of a strong and consistent relationship over time that is consistent with (but does not necessarily establish) a causal explanation. In addition, while other studies conducted among food bank users have highlighted that there is a high prevalence of sanctioning among them, our study takes a systematic approach and considers the counterfactual: are there also places where there are high rates of sanctioning, but no food bank usage? Our models suggested that this might be the case where food aid distribution is limited, highlighting the possibility of hidden hunger, namely people who lack both access to food financially and who cannot access emergency food assistance.

Our results intervene in the ongoing debate about the drivers of rising food bank usage. Government officials have suggested sanctions have no impact on food bank use according to the evidence available (HC Debate 22 June 2015 vol 595 c608). Here, we have shown a robust link between sanctioning and food bank usage. Our findings are consistent with the evidence gathered through the All-Party Parliamentary Group Inquiry into Hunger and Food Bank Usage that sanctioning is resulting in individuals not having enough money for basic necessities, such as food (Forsey, 2014; All-Party Parliamentary Inquiry into Hunger and Food Poverty, 2014).

This has important policy implications. The recent decline in sanctioning is a positive sign, and has likely contributed to the decline in the numbers of people using food banks within local authorities in 2015/16. Yet, in 2015, there were still about 358,000 sanctions applied to JSA claimants. We also observed that declines in sanctioning were not as strongly linked to declines in food bank usage, explaining why the decline in food bank usage has not been as fast as the decline in sanctions. This could be because experiences of sanctions trigger longer-term financial crises, such as debt accumulation. A recent report from one Trussell Trust Foodbank (West Cheshire) found that people who received food bank referrals for the reason of being sanctioned were more likely to have crises that lasted for 3 months or more (Garratt et al., 2016). These findings support recommendations for the government to consider whether stopping basic income payments for vulnerable, out-of-work groups is a fair penalty, or whether the long-shadow of the harms associated with this practice (e.g. food insecurity) outweigh any positive outcome of sanctioning. With the introduction of in-work conditionality for Universal Credit claimants, there is also concern that more people will be exposed to sanctions, making these findings highly relevant to an increasing number of benefit claimants in the UK (Welfare Conditionality, 2016).

Our results also have relevance for the providers of charitable food assistance and the wider problem of food insecurity in the UK. Trussell Trust data likely only capture a proportion of people who experience food insecurity; our results suggest there could be hidden hunger due to sanctioning in places where Trussell Trust food banks are not available. People in these areas may instead seek help from other agencies or non-Trussell Trust food banks, but these

numbers are not reflected in Trussell Trust data, currently the only indicator of hunger in the UK, despite known limitations of this measure (Loopstra and Tarasuk, 2015). A recent Gallup World Poll conducted in the UK indicated that up to 8.5 million people experienced food insecurity in 2014 (Taylor and Loopstra, 2016). In contrast, Trussell Trust estimated that 500,000 individuals were using their food banks in the same year, potentially underestimating the problem of food insecurity by about 17 times. This disconnect highlights how important it is for the UK to implement household food insecurity monitoring. Such monitoring is vital to understand how changes to income support, employment, and other macroeconomic trends impact on vulnerability to hunger

Our findings also highlight the limitations of any charitable food support network's ability to eradicate food insecurity. These networks are increasingly relied upon to fill in the gaps in welfare support but, by relying on volunteers and donated food and space to operate, they will vary in their capacity to address hunger in their area. As such, they are not equipped to address these gaps in every part of the country and are less able to respond quickly to changes in need. Food banks are not an adequate solution to the problem of hunger, and they should not become an informal substitution for the social safety net.

These observations point to several directions for future research. The incorporation of household food insecurity and food bank usage monitoring into routine surveys conducted in the UK would enable individual analyses of the causes and consequences of these experiences. There is also a need for harmonised data collection across short-term providers of emergency assistance to enable better identification of where there may be gaps in the provision of emergency support and to enable evaluation of this support on the wider problem of food insecurity. Lastly, food bank usage is one possible harm associated with sanctioning, but other potential outcomes include declines in mental health, debt, and even death (Gentleman, 2014). Longitudinal studies of benefit claimants would enable better understanding of how prevalent sanctioning is and what types of outcomes are associated with this practice.

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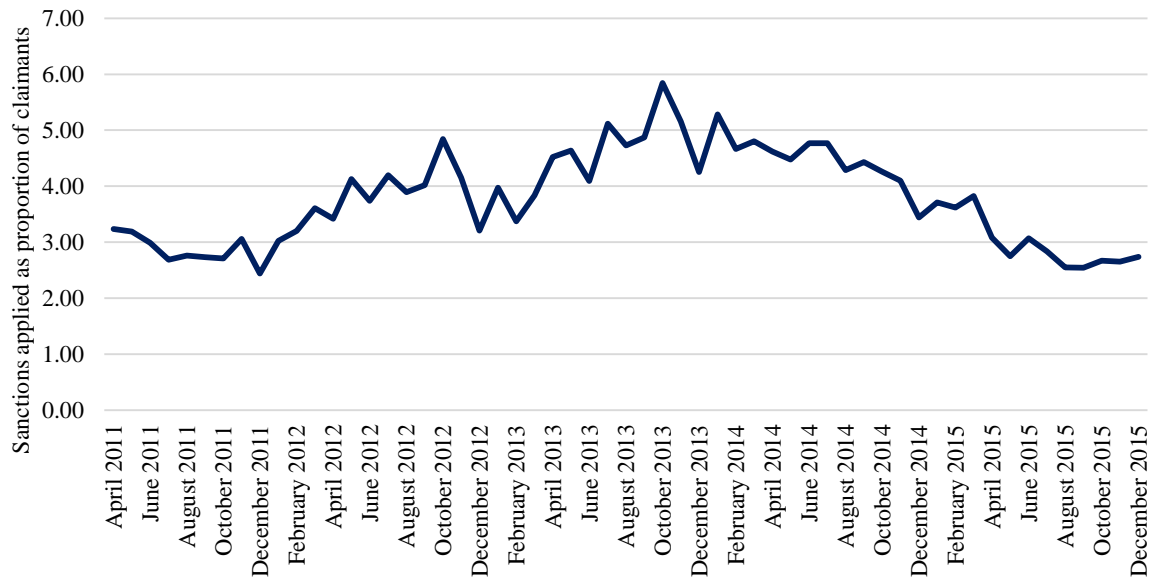
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Notes: Graph shows number of original sanction decisions resulting in a sanction as proportion of number of people claiming Jobseeker’s Allowance in England, Scotland, and Wales. Sources: Stat Xplore and Nomis.

Figure 2 Relationship between sanctions applied and numbers of adult food bank users across local authorities with food banks, Jan-Mar 2014.

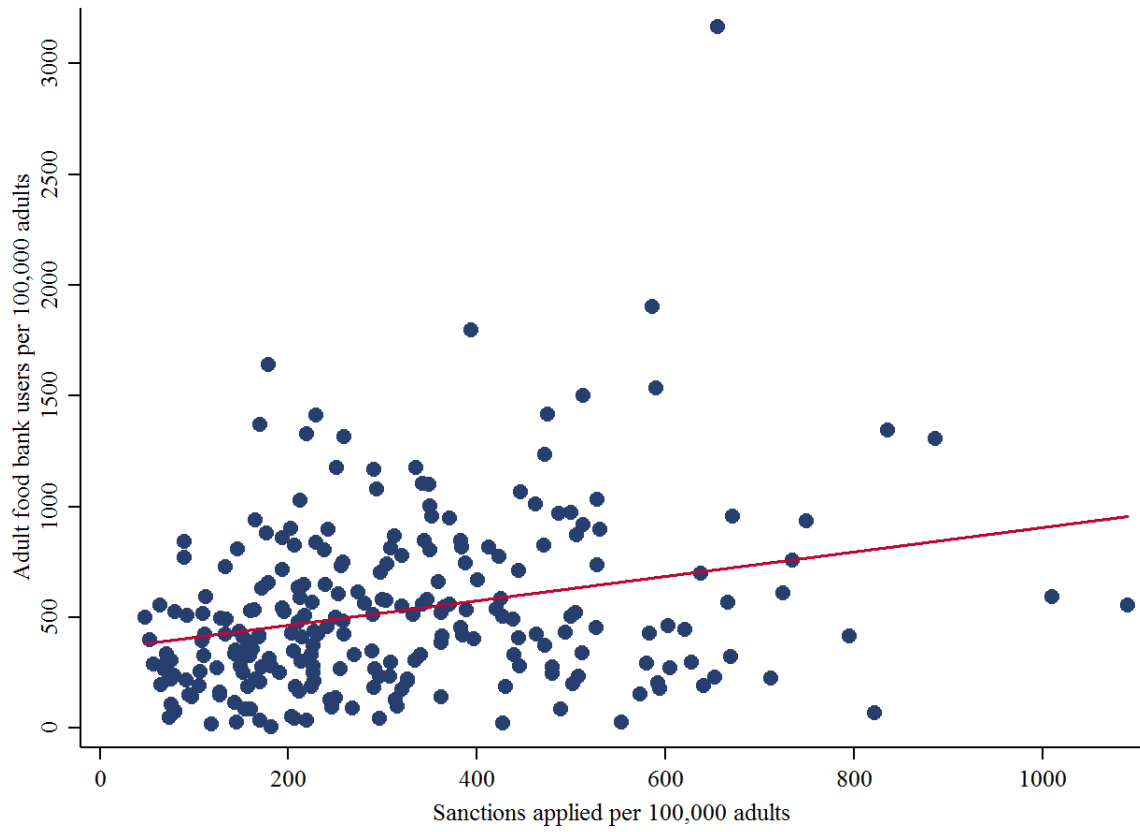
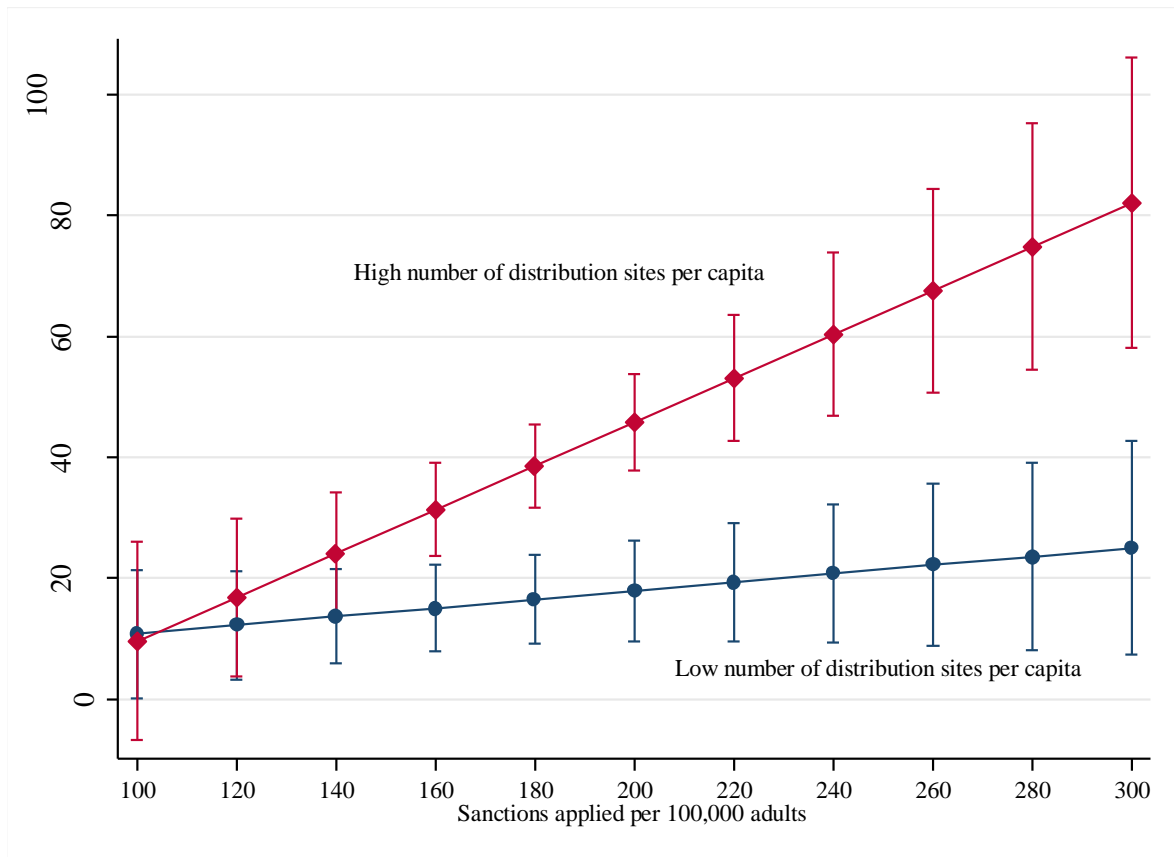


Figure 3 Relationship between sanctioning and adult food bank usage by concentration of food bank distribution centres in local authorities.



Notes: Graph illustrates decrease and increase from mean sanction rate of 200 applied per 100,000. High number of distribution sites refers to areas with 5 or more sites per 100,000 and low number of distribution sites refers to areas with <1 site per 100,000 in areas with food banks present. P value for interaction of change in sanctions with high distribution sites vs. low = 0.011. For full model see Web Table A3.

Table 1 Relationship between sanctions applied and number of adult food bank users in local authorities with food banks, 2012-2015.

	Adult food bank users each quarter per 100,000 adults		
	(1)	(2)	(3)
Per 10 additional sanctions per 100,000 adults	6.44 ^{***} (0.87)	6.35 ^{***} (0.87)	3.36 ^{***} (0.84)
Per 10 additional JSA claimants per 100,000 adults	-1.81 ^{***} (0.20)	-1.73 ^{***} (0.20)	-0.76 ^{**} (0.24)
Distribution sites per 100,000 persons	---	43.9 ^{***} (12.5)	33.6 ^{**} (12.3)
Weekly hours of operation per 100,000 persons	---	-5.22 (3.17)	-4.46 (3.11)
Linear and quadratic time trends	No	No	Yes
Local authority-quarters	3041	3041	3041

Notes: Robust standard errors in brackets. Models include dummy variable for season, dummy variable for first quarter a food bank operated, and local authority fixed effects. Constant not shown. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2 Dynamic relationship between the change in number of sanctions applied from quarter-to-quarter and change in numbers using food banks.

	Change in number of adult food bank users from previous quarter	
	(1)	(2)
Per 10 additional sanctions applied from previous quarter	5.20 ^{***} (1.12)	---
Per 10 fewer sanctions applied from previous quarter	---	-1.79* (0.73)
Per 10 additional JSA claimants from previous quarter	0.11 (0.28)	-0.038 (0.28)
Per 1 additional distribution site per 100,000 from previous quarter	6.72* (3.28)	6.28 (3.24)
Per 1 additional hour open per week per 100,000 from previous quarter	-0.33 (0.43)	-0.32 (0.44)
Local authority-quarters	2918	2918

Notes: Robust standard errors in brackets. Models include linear and quadratic time trends, and dummy variables for season and first quarter a food bank operated.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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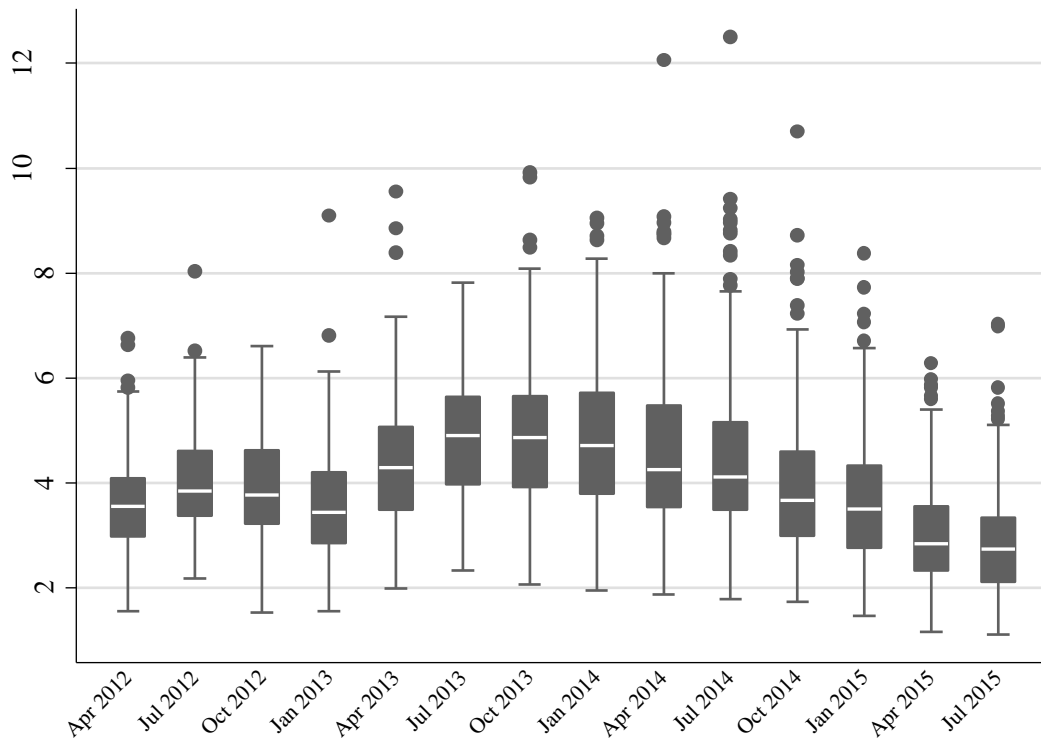
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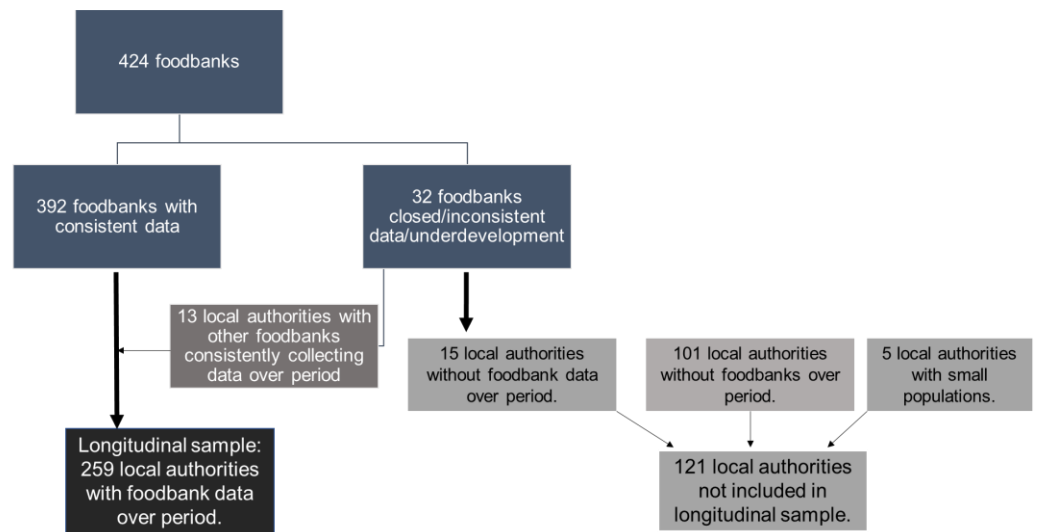
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Web Figure A1 Monthly average rate of sanctions applied to claimants over quarter as a proportion of total Jobseeker's Allowance claimants.

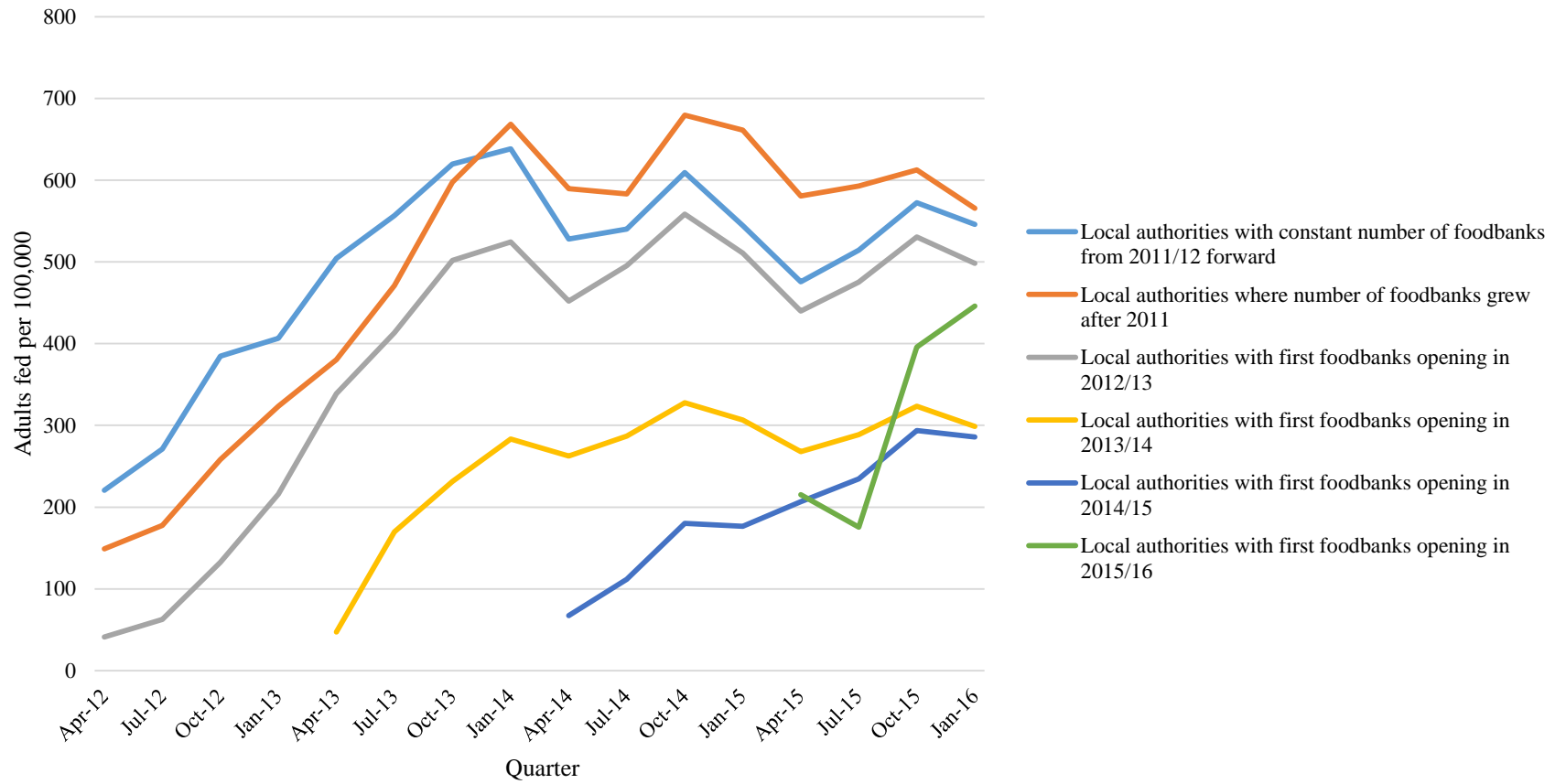


Source: DWP Stat-Xplore and Nomis.web. Figures show number of original decisions resulting in a sanction applied as a proportion of people claiming Jobseeker's Allowance each month. Monthly rates averaged over quarters.

Web Figure A2 Relationship between Trussell Trust foodbanks and local authorities in Scotland, England, and Wales included in analytic longitudinal sample of local authorities.



Web Figure A3 Rates of adult food bank usage by when food banks established in local authorities and subsequent growth in Trussell Trust Foodbank Network.



Web Table A1 The expansion of food banks and feeding in local authorities across UK, 2012/13 to 2015/16.

Quarter beginning:	Number of local authorities	Number of food banks	Number of food banks per local authority		Number of food banks per 100,000 in local population		People fed each quarter as proportion of local population	
			Mean	SD	Mean	SD	Mean	SD
Apr 2012	114	138	1.21	0.87	0.74	0.37	0.24	0.22
Jul 2012	136	165	1.21	0.90	0.76	0.38	0.26	0.25
Oct 2012	178	221	1.24	0.83	0.80	0.42	0.34	0.31
Jan 2013	191	240	1.26	0.85	0.81	0.42	0.39	0.32
Apr 2013	214	278	1.30	0.86	0.86	0.47	0.46	0.37
Jul 2013	225	301	1.34	0.88	0.90	0.49	0.54	0.40
Oct 2013	239	336	1.41	0.96	0.92	0.52	0.65	0.48
Jan 2014	244	350	1.43	1.02	0.93	0.53	0.66	0.53
Apr 2014	250	361	1.44	1.04	0.94	0.53	0.55	0.43
Jul 2014	254	372	1.46	1.05	0.95	0.54	0.59	0.48
Oct 2014	255	379	1.49	1.08	0.96	0.55	0.69	0.55
Jan 2015	256	385	1.50	1.08	0.97	0.54	0.61	0.49
Apr 2015	258	388	1.50	1.08	0.97	0.54	0.53	0.42
Jul 2015	259	390	1.51	1.10	0.98	0.54	0.58	0.43
Oct 2015	259	392	1.51	1.10	0.98	0.54	0.66	0.44
Jan 2016	259	392	1.51	1.10	0.98	0.54	0.60	0.40

SD, standard deviation.

Web Table A2 Interactions between level of food bank operations in local authorities and change in sanctions applied in relation to change in number of adult food bank users.

	Change in number of adult food bank users from previous quarter		
	(1)	(2)	(3)
Per 10 additional sanctions applied from previous quarter	2.40 ^{***} (0.51)	1.56 [*] (0.64)	2.16 ^{***} (0.55)
Per 10 additional JSA claimants from previous quarter	-0.050 (0.28)	-0.038 (0.28)	-0.045 (0.28)
Distribution sites per 100,000	1.78 ^{***} (0.50)	2.21 ^{***} (0.58)	1.78 ^{***} (0.52)
Weekly hours of operation per 100,000	-0.10 (0.11)	-0.11 (0.11)	-0.082 (0.11)
Change in sanctions* Distribution sites	---	0.20 [*] (0.096)	---
Change in sanctions * Weekly hours of operation	---	---	0.012 (0.0075)
Local authority-quarters	2918	2918	2918

Notes: Robust standard errors in brackets. Models include dummy variables for season and first quarter a food bank operated, and for the number of months food banks were operating.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Web Table A3 Model matching Figure 3 interaction model using categorical number of distribution sites.

		Change in number of adult food bank users from previous quarter
Per 10 sanctions applied per 100,000 adults		0.46*
		(0.23)
Per 10 additional sanctions applied from previous quarter		0.71
		(0.61)
Distribution sites per 100,000 persons		
	<1	Referent
	1-<3	13.1*
		(5.93)
	3-<5	21.2***
		(6.25)
	5+	27.9***
		(5.66)
Interaction term sanctions*distribution sites per 100,000 persons		
	<1	Referent
	1-<3	1.18
		(1.17)
	3-<5	1.51
		(1.08)
	5+	2.91**
		(1.06)
Per 10 additional JSA claimants from previous quarter		0.15
		(0.33)
Weekly hours of operation per 100,000		-0.0069
		(0.069)
Local authority-quarters		2918

Notes: Robust standard errors in brackets. Models include dummy variables for season and first quarter a food bank operated.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Web Table A4 Sensitivity analysis: relationship between sanctions applied and number of adult food bank users in local authorities with food banks after adjustment for employment and unemployment.

	Number of adult food bank users each quarter per 100,000		
	(1)	(2)	(3)
Per 10 additional sanctions per 100,000	2.92 ^{***} (0.80)	2.90 ^{***} (0.80)	2.93 ^{***} (0.80)
Per 10 additional JSA claimants per 100,000 adults	-0.54 [*] (0.23)	-0.56 [*] (0.24)	-0.53 [*] (0.23)
Per 10 additional unemployed adults per 100,000	---	0.026 (0.029)	---
Per 10 additional employed adults per 100,000 adults in labour market	---	---	0.013 (0.020)
Local authority-quarters	2690	2690	2690

Notes: Robust standard errors in brackets. Models include dummy variable for season, dummy variable for first quarter a food bank operated, number of distribution sites per capita, hours of operation per capita, linear and quadratic time trends, and local authority fixed effects. Constant not shown.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Web Table A5 Dynamic relationship between numbers of sanctions applied from quarter-to-quarter and change in numbers using food banks excluding extreme observations.

	Change in number of adult food bank users from previous quarter			
	(1)	(2)	(3)	(4)
Per 10 additional sanctions applied from previous quarter	5.20*** (1.12)	4.35** (1.45)	---	---
Per 10 fewer sanctions applied from previous quarter	---	---	-1.79* (0.73)	-2.42*** (0.61)
Extreme observations removed	No	Yes	No	Yes
Local authority-quarters	2918	2887	2918	2886

Notes: Robust standard errors in brackets. Extreme observations denotes those with quarterly changes of values > 99th percentile. Models include dummy variables for season and first quarter a food bank operated, change in number of distribution sites, change in hours of operation, and change in number of claimants not shown. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Web Table A6 Relationship between sanctions applied and number of adult food bank users in English local authorities with food banks using random effects framework and accounting for Index of Multiple Deprivation and rural-urban classification, 2012-2015.

	Number of adult food bank users each quarter per 100,000			
	(1)	(2)	(3)	(4)
Per 10 additional sanctions per 100,000 adults	2.92** (0.95)	2.88** (0.94)	2.87** (0.95)	2.27* (0.98)
Per 10 additional JSA claimants per 100,000 adults	-0.40 (0.21)	-0.59* (0.25)	-0.57* (0.26)	-0.57* (0.27)
Distribution sites per 100,000	26.2** (8.19)	25.8** (8.12)	26.0** (7.97)	26.1** (8.11)
Weekly hours of operation per 100,000	-0.93 (1.90)	-0.79 (1.96)	-0.78 (1.90)	-0.77 (1.90)
Months with food banks operating	3.55** (1.28)	3.61** (1.18)	3.41** (1.06)	3.42** (1.07)
Deprivation rank (326=most deprived)	---	1.31** (0.48)	1.23* (0.49)	1.33** (0.49)
<i>Rural classification</i>				
Mainly Rural	---	---	Referent	Referent
Largely Rural	---	---	-63.3 (58.2)	-62.7 (58.5)
Urban with Significant Rural	---	---	48.7 (63.3)	51.6 (63.6)
Urban with City and Town	---	---	100.9 (71.1)	103.8 (71.5)
Urban with Minor Conurbation	---	---	-73.2 (92.3)	-66.8 (92.4)
Urban with Major Conurbation	---	---	-25.5 (66.9)	-21.4 (67.3)
Linear and quadratic time trends	Yes	Yes	Yes	No
Dummy variable for time	No	No	No	Yes
Local authority-quarters	2502	2502	2502	2502

Notes: Robust standard errors in brackets. Models include dummy variable for season, dummy variable for first quarter a food bank operated, linear and quadratic time trends. Constant not shown. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$