

Evaluation of the impact of the Food Hygiene Rating Scheme and the Food Hygiene Information Scheme on food hygiene standards and food-borne illnesses

Final report

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3 March 2015

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Acknowledgements

The authors would like to thank Darren Holland, Joanna Disson and Alexander Leudar, at the Food Standard Agency, for their guidance and support throughout the lifetime of the impact evaluation.

The report also benefitted from the comments of four anonymous referees. A debt of gratitude goes to Prof. Jeffrey Smith (University of Michigan), who provided statistical advice in quality of consultant.

Finally, Sandra Vegeris, at the Policy Studies Institute (University of Westminster), contributed valuable insights to the analysis and helped to integrate findings from the process evaluation into this study.

Glossary

Premises A business can have one or more premises, where a premise is an establishment (or plant) with a specific location. For the sake of brevity, the term 'premises' will be used throughout the report and in this glossary to mean 'business premises.'

Statistical significance It is the probability that an observed research result is occurring because of chance, and therefore provides a measure of the extent to which that result is likely to be true. The lower the statistical significance of a result, the higher the likelihood that the result observed is true. Generally, empirical researchers expect a result to be true if its statistical significance is less than 0.05 (5%). For example, an FHRs/FHIS impact estimate which is found to be statistically significant at the 5% (1%) level means a high (very high) probability that the estimate provides a true measure of the effect of the schemes. Essentially, an FHRs/FHIS impact estimate statistically significant at the 5% (1%) level means that if a random sample of treated and untreated Local Authorities were to be drawn 100 times and, each time, the FHRs/FHIS impact was estimated, we would expect the true value of the impact to fall within a defined range (estimated impact plus/minus twice its standard error) 95 (99) out of 100 times.

Percentage point (ppt) The unit used to measure the difference between two percentages (either percentages in two different time periods or for two different groups). The impact of the FHRs/FHIS on food hygiene standards is measured in ppts. For example, if the average percentage of broadly compliant premises for treated Local Authorities after the FHRs/FHIS rollout is 85% and the average percentage of broadly compliant premises which would be observed, after the FHRs/FHIS rollout, had the same Local Authorities not been treated (the counterfactual) is estimated at 80%, then we will say that the FHRs/FHIS increased the percentage of broadly compliant premises by 5ppts.

Compliance levels Compliance with the requirements of food hygiene law is determined in accordance with the Food Law Codes of Practice used by local authority food safety officers when undertaking inspections of food premises. Three criteria are assessed and assigned a numerical value which indicates how well the requirements are met – the compliance level. The criteria are: compliance with food safety and hygiene procedures; compliance with structural requirements; and confidence in management and control procedures. For FHRs, the numerical scores are converted into a single rating.

Poorly compliant 'Poorly compliant' premises are defined as those with compliance levels at the time of the last inspection equivalent to an FHRs rating of either 0 or 1.

Broadly compliant 'Broadly compliant' premises are defined as those with compliance levels at the time of the last inspection equivalent to an FHRs rating of 3, 4 or 5.

Fully compliant 'Fully compliant' premises are defined as those with compliance levels at the time of the last inspection equivalent to an FHRs rating of 5. Therefore, fully compliant premises are included in the 'broadly compliant' category.

FHRS equivalent rating As FHRS ratings (ranging from 0 at the bottom to 5 at the top) are determined on the basis of compliance levels at the time of the last inspection, equivalent ratings can be calculated for all inspected premises, regardless of whether the FHRS was rolled out in the Local Authority in which the premise is located. An FHRS equivalent rating can also be calculated for premises in Scotland (where the FHIS rather than the FHRS operates).

Treatment The policy or intervention which is the subject of the impact evaluation. Here the treatment is the rollout of the FHRS/FHIS by Local Authorities.

Counterfactual The outcome which would be observed in the absence of treatment. Here the counterfactual is the outcome which Local Authorities would have, on average, experienced had they not rolled out the FHRS/FHIS. It is estimated as the average post-FHRS/FHIS outcome observed for the untreated group after having controlled for the effect of other variables on the outcome (or, which is the same, as the average post-FHRS/FHIS outcome observed for the treated group minus the estimated impact.)

Dependent variable In regression analysis, a variable which is believed to be predicted by other variables (independent variables). In impact regressions using the DID method, the dependent variable is the before-after change in the outcome considered, and the independent variables are other determinants of the outcome.

Independent variable Also called regressor, control or contextual variable. In regression analysis, a variable which can, to some extent, influence or predict the dependent variable. For example, premise density (the number of premises per hectare) is a proxy for local competition, which is likely to affect premises' compliance with food hygiene law requirements within a Local Authority.

Dummy variable A variable with only two possible values, to show where a condition exists or not. For example, the treatment status of a Local Authority can be either 'treated' (coded as 1) or 'untreated' (coded as 0), depending on whether they received the treatment.

Difference-in-differences (DID) The difference in the change in the outcome for the treatment group compared to the change in the outcome for the untreated group. The change in the outcome for both groups is observed between two time periods, one before and one after the treatment.

Impact A measure of how the treatment alters the outcome for the beneficiary population (i.e. the treated group).

Impact evaluation A study which attributes the change in the outcome of interest to the treatment. Here, the study attributes the change in food hygiene standards and the incidence of food-borne illnesses within a Local Authority to the FHRS/FHIS rollout.

Outcome A variable which is affected, among other variables, by the treatment. Here the outcomes considered are food hygiene standards of premises and the

incidence of food-borne illnesses. The outcomes are measured at the level of the Local Authority.

Regression Analysis A statistical method which determines the association between the dependent variable and one or more independent variables.

Treated group The group of units which received the intervention. Here the treated group is made up of those Local Authorities which rolled out the FHRS/FHIS.

Untreated group The group of units which did not receive the intervention. Here the untreated group is made up of those Local Authorities which did not roll out the FHRS/FHIS.

1 Executive summary

This report presents findings from the impact evaluation of the Food Hygiene Rating Scheme (FHRS), operating in England, Wales and Northern Ireland, and the Food Hygiene Information Scheme (FHIS), running in Scotland. The FHRS and FHIS provide information about hygiene standards at food outlets to enable consumers to make informed choices about where to buy food and where to eat away from home. The schemes aim to improve food hygiene standards among food businesses, which are expected to respond to public demand for higher standards, and their overarching goal is to reduce the incidence of food-borne illnesses in the UK population.

The evaluation was conducted to gauge evidence of the impact of the FHRS and FHIS on hygiene standards of food premises (from now on, for the sake of brevity, the term 'premises' will be used to mean 'business premises') and the incidence of food-borne illnesses in those Local Authorities (LAs) where the schemes were introduced. Impact estimates could be provided only for a subset of early adopter LAs, namely those which rolled out the schemes in the financial year 2010/11.

1.1 Background

- The FHRS and FHIS are run by LAs in partnership with the Food Standard Agency (FSA). They are based around the statutory programme of inspections carried out by LA food safety teams to ensure that food businesses comply with food hygiene law. The hygiene standards of food premises, determined by the inspections, are reflected in an FHRS rating, ranging from 0 (urgent improvement necessary) to 5 (very good hygiene standards), or an FHIS inspection result ('Improvement required' or 'Pass').
- The schemes are intended to provide consumers with information about the hygiene standards of food premises so that they can make informed decisions about where to buy food and eat away from home. With this aim, businesses are provided with stickers showing their FHRS ratings or FHIS results, which they can voluntarily display at their premises. Ratings and results for all premises are published online and are also available through mobile smartphone applications. Food hygiene is expected to improve as businesses respond to public demand for higher standards by competing with each other on food hygiene. This improvement would in turn lead to a reduction in the incidence of food-borne illnesses among the UK population.

1.2 Impact evaluation focus and methods

- The chief aim of the evaluation was to assess whether the introduction of the FHRS and FHIS resulted in the outcomes postulated by the theory of change

developed for these schemes (Husain and Morris, 2011). According to this theory, the FHRS and FHIS improve hygiene standards among food premises (intermediate outcome) because of customers avoiding poor hygiene outlets. Essentially, the schemes would stir competition on food hygiene among businesses, thereby increasing the proportion of premises complying with food hygiene law requirements. Higher food hygiene standards would in turn result in a reduction in the incidence of food-borne illnesses among the UK population (final outcome).

- To empirically assess whether these intermediate and final outcomes were achieved, the evaluation estimated the overall impact of the FHRS and FHIS on six outcomes measured at the LA level. Three outcomes related to businesses' food hygiene standards (the proportions of food premises - among restaurants, caterers and retailers - that were 'poorly compliant', 'broadly compliant' and 'fully compliant' with food hygiene requirements), and three food-borne illness related outcomes (the numbers of formally notified food-poisoning reports, confirmed *Campylobacter* laboratory reports and confirmed *Salmonella* laboratory reports - all per million population).¹
- The overall impact of the FHRS and FHIS was calculated as the difference between outcomes for those LAs that introduced the schemes in the financial year 2010/11 ('treated' LAs) and outcomes for LAs where the schemes had not yet been rolled out over the same period ('untreated' LAs). The latter outcomes provided proxy measures for the counterfactuals, that is, the outcomes that treated LAs would have experienced had they not been treated. Impacts were observed in the first and second year following the rollout of the schemes (financial years 2011/12 and 2012/13, respectively).² Estimates of the impact of the FHRS and FHIS were obtained using the

¹ The level of compliance for each of the premises is determined using numerical scores for three of eight criteria set out by the Food Law Code of Practice that local authorities follow when undertaking inspections. The three criteria are: compliance with food safety and hygiene procedures (including food handling practices and temperature control), structure of the establishment (e.g. cleanliness, layout, condition of the structure, lighting, ventilation and facilities), and confidence in management and control procedures (including the likelihood that satisfactory compliance will be maintained in the future). The mapping of numerical scores to the six food-hygiene ratings (which range from '0' at the bottom to '5' at the top) is explained at page 38 of The Food Hygiene Rating Scheme: Guidance for local authorities on implementation and operation the 'Brand Standard,' available at <http://www.food.gov.uk/sites/default/files/multimedia/pdfs/enforcement/fhrsguidance.pdf>. As explained in the glossary, premises with standards equivalent to an FHRS rating of 5 are considered to be 'fully compliant,' those with ratings of 3, 4 or 5 to be 'broadly compliant or better' and those with ratings of 0 or 1 to be 'poorly compliant.' These three compliance-related outcomes based on FHRS equivalent ratings were created for convenience to provide an indication of the impact of both the FHRS and FHIS. These measures are indeed equally applicable to the FHIS, where 'Pass' and 'Improvement required' cannot be calculated from compliance scores and therefore could not be used as outcomes. The 'broadly compliant or better' outcome is expected to be largely comparable to a pass outcome under the FHIS.

² Impact estimates which were statistically significant at either the 1 or 5% level are flagged in the report (see the glossary for a definition of statistical significance). The findings exposed in the executive summary relate only to impact estimates statistically significant at these levels.

difference-in-differences (DID) methodology (see section 3), which accounted for the fact that treated and untreated LAs differed with respect to the outcomes explored and other characteristics prior to the introduction of the schemes.

- A subgroup analysis was also conducted to explore whether having previously run a local food hygiene scheme altered the impact of the FHRs and FHIS. In general, evidence suggested that having previously run a local scheme made no difference to the impact of the FHRs and FHIS. However, data limitations on local schemes cast doubts on the validity of the subgroup impact estimates. Therefore, the main conclusions on the effects of the FHRs and FHIS were drawn based on overall impact estimates.
- Due to the progressive rollout of the FHRs and FHIS across all LAs to achieve national coverage, impact estimates based on the DID approach could be provided only for LAs which introduced the schemes in the financial year 2010/11 (this is the first year of operation of the FHRs, whereas the FHIS was piloted in Scotland four years earlier).
- The impact of the FHRs on food hygiene standards of premises was estimated using data on LAs in all countries covered by the scheme (England, Wales and Northern Ireland) and, separately, only for LAs in England. Estimates of the impact of the FHIS (using LAs in Scotland), and of the FHRs and FHIS, jointly considered (LAs in England, Wales, Northern Ireland and Scotland were included), were also provided. The impact of the FHRs on food-borne illnesses could be estimated only for England and Wales, and, separately, for England.
- Impact estimates for the outcomes of interest could not be provided for Northern Ireland and Wales separately, as the number of LAs available for analysis was too small to produce impact estimates of statistical validity. Furthermore, for Northern Ireland and Wales nearly all LAs took up the scheme in the same year, making it difficult to have untreated LAs to be used in the analysis. Therefore, it was possible to analyse different combinations of countries as a group but, other than in England and Scotland, country-level analyses were not possible.

1.3 Findings

Overall impact of the FHRs and FHIS on food hygiene standards

The analysis of the FHRs (which used LAs in England, Wales and Northern Ireland) found evidence suggesting that introducing the FHRs had a positive impact on (i.e. improved) premises' compliance with food hygiene law requirements within an LA. Specifically, findings indicated that:

- **Poor compliance** - One year after the introduction of the FHRs, the scheme reduced the proportion of poorly compliant premises by 1.9 percentage points (ppts).³ This means that, in the financial year 2011/12, the proportion of poorly compliant premises in LAs where the FHRs was rolled out was 1.9ppts lower than it would have been had the scheme not been introduced in these areas. Two years after its rollout (financial year 2012/13) the FHRs reduced the proportion of poorly compliant premises by 1.7ppts. The impact of the FHRs in England only was slightly smaller (by 0.2ppts) than that found for all countries covered by the scheme (England, Wales and Northern Ireland) both one and two years after its rollout.
- **Broad compliance** - One year after the FHRs was introduced, the scheme was found to have increased the proportion of broadly compliant premises by 2.0ppts. Therefore, in those LAs where the FHRs was rolled out the proportion of broadly compliant premises was 2.0ppts higher than it would have been had the scheme not been introduced. The impact of the FHRs in England only (estimated at 1.8ppts) was slightly smaller than that found for all countries covered by the scheme.
- **Full compliance** - Two years after its rollout, the FHRs increased the proportion of fully compliant premises by 3.3ppts. This means that in LAs where the scheme was rolled out the proportion of fully compliant premises was 3.3ppts higher than it would have been had the schemes not been introduced. The impact in England only (3.4ppts) was slightly higher than that found for England, Wales and Northern Ireland jointly considered.

The analysis of the FHIS (which used only Scottish LAs) found insufficient evidence to suggest that rolling out the scheme in Scotland improved premises' compliance with food hygiene law requirements: The impacts estimated for this country indicated that the effect exerted by the FHIS was in the same direction as the FHRs, but the estimates were not found to be statistically significant. Nevertheless, assuming that the FHIS had an impact of the same magnitude as the FHRs, a larger sample than that observed here may be required to detect its statistical significance.

Overall impact of the FHRs on food-borne illnesses

- A number of data issues undermined the validity of the estimates of the overall impact of the FHRs on food-borne illness outcomes. Differences in reporting practices and access to health care across LAs mean that food-borne illness data for different LAs may not be fully comparable. Available records may not reflect the true incidence of food-borne illnesses in a given LA for a number of reasons (e.g. illnesses might have been contracted in a different LA to where they were

³ See the glossary for a definition of percentage points (ppts).

reported). Most importantly, food-borne illness cases are known to suffer from serious under-reporting and information about the location where the diseases were contracted, particularly in terms of whether it was in the UK or abroad, is not available for the majority of reported cases.

- In spite of these limitations, the analysis attempted to provide estimates of the impact of the FHRs on the incidence of food-borne illnesses in England and Wales, and in England only. Data were adjusted to account for the fact that information about whether the diseases were contracted in Great Britain was not available for most records. Findings suggested that one year after the FHRs was rolled out, the scheme reduced the incidence of food poisoning in the population of England and Wales (when jointly considered), and in England only (when considered separately), while there was no evidence suggesting that the scheme reduced the incidence of either Salmonella or Campylobacter. However, considering the data shortcomings on food-borne illnesses, these results may not reflect the true impact of the FHRs and should therefore be considered with caution.

Subgroup impact analysis of the FHRs and FHIS

In general, the subgroup analysis found no evidence indicating that having run a food hygiene local scheme prior to introducing the FHRs/FHIS altered the impact of the latter schemes on the outcomes explored. However, a notable exception was England: two years after the FHRs was introduced, the impact of the scheme on premises' full compliance was found to be 4.4ppts lower in LAs which previously ran a local scheme compared to LAs where a local scheme did not precede the rollout of the FHRs. This finding may reflect the fact that in the former LAs the local schemes had already exerted a positive impact on business compliance, leaving less scope for the FHRs impact.

1.4 Main messages

- The evaluation suggested that, in those LAs where the FHRs was introduced, food premises' compliance with food hygiene law requirements improved as a result of rolling out the schemes. Whereas this finding relates to a specific sample of early adopter LAs (which rolled out the FHRs in the financial year 2010/11), it is plausible to assume that those LAs which introduced the FHRs later in time benefited from a similar positive impact.
- This evaluation found that the FHRs improved premises' compliance with hygiene law requirements both one and two years after its introduction (i.e. it increased the proportion of broadly and fully compliant premises, respectively). However, using data aggregated at the level of the LA meant that final conclusions about the dynamics of this process on individual premises could not

be drawn. For example, the analysis was not able to confirm whether premises improved their compliance gradually over time (initially becoming broadly compliant and later on fully compliant), which may reflect initial challenges in addressing food hygiene law requirements. Neither it was able to ensure that the same premises were observed over the entire inspection cycle. If such analysis was required, these research gaps could possibly be filled using premise-level panel data available to the FSA, as information about each premise's compliance would be observed over time.

- It is also important to note that the impact detected here was the result of the voluntarily display of ratings/results by food businesses and the publication of premises' ratings/results on the FSA website. A mandatory scheme will increase the proportion of premises (among those whose ratings/results are already available online) that display their ratings/results, and is therefore expected to result in a larger impact compared to the one found here. As complete information will be available to food customers to select the most hygienic outlets where to buy food or eat away from home, businesses will have to be more attentive to food hygiene matters in order to get a high rating/result to display at their premises and successfully compete with other outlets.
- Potentially, future research could assess whether the impact of the FHRS on food hygiene standards of food premises in Wales is higher than that observed under the voluntary scheme. Premise-level data for all Welsh LAs could be used to enhance this comparison and shed light on the dynamics of premises' compliance with food hygiene law requirements, provided that enough variation in exposure to the new mandatory scheme across premises is observed (that is, a sample of premises which are exposed to the mandatory scheme and a sample of premises which are not (or where exposure is delayed) can be observed over the same time period so that the difference in compliance levels between the two samples can be assessed).

2 Introduction to the FHRs and FHIS

This report presents findings from the impact evaluation of the FHRs and FHIS. The FHRs were progressively rolled out in England, Wales and Northern Ireland starting from November 2010. A similar scheme, the FHIS, was piloted in Scotland from November 2006 and its full rollout began in January 2009.⁴ The FHRs and FHIS provide information about hygiene standards at food outlets to enable consumers to make informed decisions about where to buy food and eat away from home. In doing so, they aim to improve hygiene standards among food businesses, ultimately reducing the incidence of food-borne diseases among the UK population.

The FHRs and FHIS are run by LAs in partnership with the FSA, and provide consumers with information about the standards of hygiene achieved at businesses that supply food directly to them (retailers, restaurants and caterers). LA food safety officers carry out inspections in these businesses' premises to check compliance with food hygiene law. The results of the assessments are summarised by a single rating or result, which reflects the inspection findings. In England, Wales and Northern Ireland, food premises are given an FHRs rating on a 6-point scale representing the level of compliance with food hygiene law, where '0' means urgent improvement necessary and '5' means very good compliance. In Scotland, the FHRs inspection result is either 'Improvement required' or 'Pass.'

Businesses are provided with stickers showing their FHRs rating or FHIS result, which they can display at their premises in such a way they are visible to the public. At the time of this study, display was voluntary in all countries, though display was made mandatory in Wales from the end of November 2013 through the introduction of the Food Hygiene Rating (Wales) Act 2013.⁵ Ratings/results for all premises are

⁴ More details on these two schemes are available at <http://www.food.gov.uk/business-industry/caterers/hygieneratings>. See also the FHRs/FHIS process evaluation report (Vegeris and Smeaton, 2014) and the FHRs/FHIS evaluation design (Husain and Morris, 2011).

⁵ From November 2013, businesses in Wales are required by law to display their FHRs rating. There is an 18-month transition period to move from the previous voluntary scheme to the new statutory scheme. Whereas the mandatory FHRs in Wales was still to take place at the time this evaluation was conducted, we acknowledge the possibility that the results presented here could be affected by anticipatory effects of the mandatory display. Welsh businesses could have been aware of this forthcoming policy change, and they might have decided to improve their compliance with food hygiene regulations earlier than they would have done otherwise. This would result in treated LAs in Wales having higher broad compliance in the post-treatment period compared to other countries where the FHRs was not mandatory. Put simply, anticipating the mandatory FHRs in Wales could have possibly resulted in an overestimation of the impact of the voluntary FHRs scheme. There is also now a move towards the introduction of mandatory display of FHRs ratings in Northern Ireland, but, given the later timing of this, anticipatory effects in this country are less likely to have affected the results of the analysis.

published on the FSA's website at food.gov.uk/ratings and are also available through mobile smartphone applications. This allows the public to make informed decisions about where to buy or eat food away from home.

According to the programme theory of change (Husain and Morris, 2011), customers will decide to eat in food premises that have higher FHRS/FHIS ratings or results, and food hygiene standards will improve as food businesses respond to public demand for higher hygiene standards. Essentially, this means that the proportion of premises which are compliant with food hygiene law requirements will increase over time as a consequence of the competition among food outlets on hygiene standards spurred by the introduction of the FHRS/FHIS. Improvements in food hygiene standards (the intermediate outcome) will in turn contribute to the reduction of the incidence of food-borne illnesses in the UK population (the ultimate outcome).

3 Methodology

This evaluation used a DID methodology in order to estimate the impact (or causal effect) of the FHRS/FHIS on food hygiene and food-borne illness related outcomes in those LAs where the schemes were introduced. This chapter first provides a working definition of ‘impact,’ and then briefly explains how the DID approach is used to obtain impact estimates.

3.1 Definition of impact

Following the evaluation literature (see Blundell and Costa Dias, 2000), the impact of the schemes on the outcome of interest is defined as the difference between the average outcome observed for *treated* LAs (i.e. those LAs where the schemes were rolled out) and the average outcome that the same LAs would have experienced had they not been treated. However, the latter outcome (known in the evaluation literature as the ‘counterfactual’) is a hypothetical outcome because it cannot be observed in reality. The average outcome observed for *untreated* LAs is used as an estimate of (or proxy for) the counterfactual. The impact (or average effect) of the FHRS/FHIS on treated LAs can therefore be calculated as

$$\text{Impact (Post-rollout)} = Y_{\text{Post-rollout}}^{\text{TREATED}} - Y_{\text{Post-rollout}}^{\text{UNTREATED}}$$

where Y indicates the specific outcome under investigation.

At the time the analysis was conducted, the rollout of the FHRS and FHIS had covered almost all LAs in the UK.⁶ Therefore, very few LAs could be classified as untreated. However, by exploiting the different timing of the rollout across LAs, this evaluation was able to identify a group of LAs that were either treated or untreated at a particular point in time. Specifically, the evaluation estimated the impact of the FHRS/FHIS for a subgroup of ‘early adopters,’ namely those LAs that introduced the schemes in the financial year 2010/11, and defined the latter as the FHRS/FHIS (or treatment) year. LAs that introduced the FHRS/FHIS in the financial years 2012/13 or 2013/14, and LAs where the schemes had not yet been rolled out at the time of this evaluation, were defined as untreated.

⁶ At present, all 22 LAs in Wales, all 26 LAs in Northern Ireland and 325 (out of 326) LAs in England are running the FHRS. In Scotland, all 32 LAs are running FHIS.

3.2 The DID estimation approach

The DID methodology estimates the FHRS/FHIS impact, accounting for the fact that treated and untreated LAs started with different outcome levels. For example, if prior to the FHRS/FHIS rollout, premises in treated LAs were, on average, more (or less) compliant with food hygiene regulations than premises in untreated LAs, calculating the FHRS/FHIS impact as a simple post-rollout difference in outcomes (as explained in the previous subsection) will be misleading because the initial difference in outcomes between treated and untreated LAs will not have been considered.⁷ The DID approach estimates the impact of the FHRS/FHIS on premises' compliance in the period following the rollout of the schemes discounting the initial advantage (or disadvantage) of treated LAs. To do so, impact estimates are calculated by also considering the initial difference in observed outcomes:

$$\text{Impact (Post-rollout)} = (Y_{\text{Post-rollout}}^{\text{TREATED}} - Y_{\text{Post-rollout}}^{\text{UNTREATED}}) - (Y_{\text{Pre-rollout}}^{\text{TREATED}} - Y_{\text{Pre-rollout}}^{\text{UNTREATED}})$$

The estimation of impacts based on the DID approach was conducted within a regression framework.⁸ This means that initial (i.e. pre-treatment) differences between treated and untreated LAs with respect to characteristics that could have potentially influenced the outcomes studied were also controlled for.⁹ For example, if premises in treated LAs were located in regions with higher compliance rates or received more resources (in the form of more staff dealing with food hygiene) than premises in untreated LAs, the estimated impact on broad compliance will be an overestimate of the true impact. To avoid this, the estimated impacts reported here

⁷ The validity of the DID approach adopted for this study is based on certain assumptions, mostly notably the 'parallel trend' assumption. This assumption postulates that the trend in outcomes between the periods before and after the introduction of the FHRS/FHIS was the same for treated and untreated LAs. Only under this assumption the outcome observed post-FHRS/FHIS rollout for untreated LAs provides a valid measure of the counterfactual. The parallel trend assumption can be tested by conducting pre-programme tests to check whether any statistically significant differences in trends between outcomes for the treated and untreated LAs occurred between two points in time prior to the introduction of the FHRS/FHIS. A separate study conducted by the Policy Studies Institute (unpublished) used the same data employed in this evaluation to explore whether such assumption was likely to hold, and found that this was indeed the case. This evaluation proceeded on the basis that the DID estimator is a valid approach to estimating the impacts of the FHRS/FHIS.

⁸ Alternatively, the DID method could have been implemented in tandem with a propensity score matching estimation approach, whereby the probability of LAs being treated (the propensity score) would have been estimated and a comparison group would have been selected among all untreated LAs based on the estimated propensity scores. Whereas this approach uses a more flexible (non-parametric) specification of the outcome regressions, the DID within a regression framework has been preferred because it facilitated the study of interactions between the impact of the FHRS/FHIS and previous local schemes.

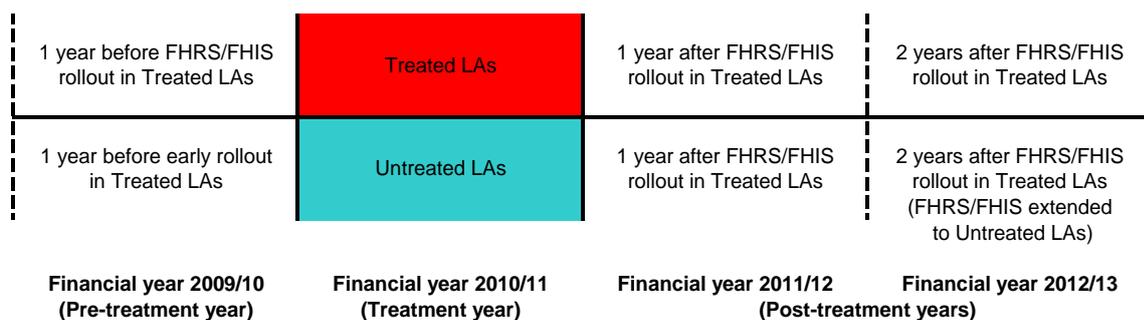
⁹ See the Appendix for more details on the DID estimation methodology within a regression framework.

accounted for the effect of possible LA-level determinants of the outcomes observed prior to the rollout of the FHRs/FHIS. The variables whose effect on the outcomes of interest is accounted for in the impact estimations will be called ‘control variables’ throughout this report.

As LAs defined as untreated did not experience the FHRs/FHIS over the financial year 2011/12, it was possible to estimate the impact of the FHRs/FHIS in this year (i.e. one year after the treatment year) using the DID approach. Estimates of the impact of the FHRs/FHIS in the second year after treatment (i.e. financial year 2012/13) were also provided. However, it is important to note that these estimates are valid only under the main assumption that the FHRs/FHIS impact experienced by untreated LAs in 2012/13 is either similar or smaller in size (because of shorter exposure to treatment) than the impact observed one year after in treated areas.¹⁰

The setup of the DID impact analysis is illustrated in Figure 3.1 below.

Figure 3.1 Setup of the DID impact analysis



¹⁰ The plausibility of this assumption (which was not tested by this evaluation) could in theory be assessed by exploring whether LAs where the FHRs/FHIS were introduced in the financial year 2010/11 and LAs where the FHRs/FHIS were rolled out in the financial year 2012/13 were similar with respect to their food business structure and contextual economic and policy environment.

4 Data

This chapter provides an overview of the data used in the impact evaluation of the FHRs/FHIS. It also exposes issues around sample sizes and discusses their implication for the analysis. Finally, the treated and untreated samples of LAs used to estimate impacts are profiled with respect to the outcome variables and other observed characteristics, and relevant differences between the two samples are highlighted.

4.1 Overview of the data

The data used to obtain impact estimates based on the DID methodology outlined in Chapter 3 were provided by the FSA and come from different sources. The outcome and control variables were constructed based on the recommendations of the FHRs/FHIS impact feasibility report and the findings of the FHRs/FHIS process evaluation.

Some English local government authorities underwent a reorganisation process in 2009, which resulted in the merging of some District Councils to form new Unitary Authorities. The analysis was conducted at the level of the lower-tier local authorities (e.g. District Councils or Unitary Authorities), which are more generally called LAs throughout this report.¹¹ All variables have been calculated per financial year, where a financial year starts on the 1st of April of a given calendar year and ends on the 31st of March of the next calendar year. Finally, the premises considered in the calculation of total numbers and proportions are those classified as either 'Restaurants and caterers' or 'Retailers' in the LAEMs data. This is because these premise types are those that fall within the scope of the FHRs and FHIS. Only premises that were still trading at the end of the financial year were included in the counts.

The impact evaluation examined the impact of the FHRs/FHIS on three food hygiene standards related outcomes:

- The proportion of premises that were 'poorly compliant' with food hygiene law requirements (i.e. compliance equivalent to FHRs ratings of either 0 or 1);
- The proportion of premises that were 'broadly compliant' with food hygiene law requirements (i.e. compliance equivalent to FHRs ratings of either 3, 4 or 5);

¹¹ When data from earlier years were available for those District Councils which underwent the reorganisation process in 2009, they were aggregated to obtain figures at the new Unitary Authority level to allow for comparisons of figures over time. The analysis used data on 325 (rather than 326) LAs in England as Durham was excluded from the analysis. This was because its post-2009 arrangement is not a straightforward merger of previously existing District Councils, and the combined nature of the returns from the latter made it impossible to clearly attribute figures to well-defined LAs.

- The proportion of premises that were ‘fully compliant’ with food hygiene law requirements (i.e. compliance equivalent to FHRs rating of 5).

The impact of the FHRs on the following three food-borne illnesses related outcomes was also explored:

- The number of formally notified food poisoning reports per million population. The original source of these statistics is the Notifications of Infectious Diseases (NOIDS);¹²
- The number of confirmed Salmonella laboratory reports per million population. These data are sourced from the National Surveillance bodies.¹³ The basis of the LA name is either GP or patient postcode.
- The number of confirmed Campylobacter laboratory reports per million population. Also these data are sourced from the National Surveillance bodies, and the basis of the LA name is either GP or patient postcode.

As reports used in the counts should refer to cases contracted in the UK (where the FHRs and FHIS operate), only reports relating to cases contracted by people who did not recently travel abroad were included in the counts for Salmonella and Campylobacter, while only reports relating to cases contracted in Great Britain were used for Food poisoning. However, information about where the food-borne illnesses were contracted (or whether the individual recently travelled abroad) was not available for the majority of reports. To account for this under-reporting issue, reports for which it was not known where the cases were contracted were added to reports for which it was known that the cases were contracted in Great Britain in proportion to the share of reports relating to cases contracted abroad over reports for which it was known where the cases were contracted.¹⁴

As explained in Chapter 3, LA characteristics that were thought to be potential determinants of the outcomes investigated were controlled for in the analysis to ensure that the estimated impacts reflected the effect of the FHRs/FHIS *per se* rather than other pre-treatment differences between treated and untreated LAs. The DID regression analysis used the following control variables to capture LA

¹² See

<http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/NotificationsOfInfectiousDiseases>.

¹³ Laboratories report positive findings to the bodies that co-ordinate the national surveillance system in each UK country: Health Protection Agency (collects data for England and Wales), Public Health Agency in Northern Ireland and Health Protection Scotland (see Food Standards Agency 2011).

¹⁴ As a fictional example, if for an LA in a particular year 160 reports were coded as ‘Contracted in Great Britain,’ 40 were coded as ‘Contracted abroad’ and 100 were coded as ‘Not known,’ then the count of reports relating to cases contracted in Great Britain for this LA in this year would be 240 (i.e. $160 + 100 * (160 / (160 + 40))$).

characteristics observed in the pre-FHRS/FHIS rollout period (financial year 2009/10):¹⁵

- Whether the LA ran any local food hygiene rating scheme.¹⁶
- The number of premises per hectare (premise density);
- The number of LA administrative staff dealing with food hygiene (expressed in full-time equivalents);¹⁷
- The number of LA professional staff dealing with food hygiene (expressed in full-time equivalents);
- The number of people in the population (in thousands) per premise;
- The proportion of the population aged 0 to 14.
- The region to which the LA belonged (the 13 regions are London, East, East Midlands, East of England, North East, North West, South East, South West, West Midlands, Yorkshire & Humber, Scotland, Wales and Northern Ireland).

The rationale for including some variables as controls in the impact regressions is straightforward. For example, the number of LA administrative and professional staff dealing with food hygiene is likely to reflect resources available to the LAs to carry out inspections and provide training on food hygiene. This means that LAs with higher observed values on these variables are more likely to exhibit higher levels of

¹⁵ Some variables initially considered were in the end excluded from the analysis. For example, the variable 'approach to launch,' indicating whether the FHRS and FHIS were introduced in the LA using a critical mass approach (food premises were given an FHRS/FHIS rating based on their most recent inspection data at the time the LA implemented FHRS/FHIS, and therefore it was possible to provide ratings faster for more premises) or gradual approach (where enforcement officers would issue FHRS/FHIS ratings based upon the results of inspections that took place following the launch of the FHRS/FHIS, which happened gradually over time across the UK) was initially included in the DID regressions used to estimate the FHRS/FHIS impacts. However, a high number of observations were missing for this variable and introducing it in the analysis reduced the sample size by one third. Therefore, we decided not to include the variable in the analysis. A variable indicating whether the LA received an SFBB grant was not used as there were concerns about the grant being given in anticipation of the FHRS/FHIS (however, regression results obtained including this variable were not different from those presented here). Neither was the LA unemployment rate used. This is because the measure of unemployment rate for Northern Ireland was not directly comparable with measures obtained for other countries (data were obtained from the ONS). Finally, other variables such as that capturing the ethnic composition of the LA (proportion of non-white population) and population density were not used because a preliminary analysis of the correlation between pre-treatment LA characteristics showed that they were correlated with other covariates (which were instead included in the DID regressions).

¹⁶ As only local schemes' start dates were available, an LA was considered as having a local scheme in place during the pre-treatment year if they started any local scheme in the financial year 2009/10 or earlier. None of the LAs used in this analysis started a local scheme in/after the financial year 2010/11.

¹⁷ As for this variable a breakdown of the data by premise type was not available, the premises used in the calculation of LA-based figures included all premise types, i.e. not only 'Restaurants and caterers' and 'Retailers' but also 'Manufacturers and Packers,' 'Distributors/Transporters,' etc. The same applies to the variable 'Number of LA professional staff dealing with food hygiene.'

compliance among premises compared to LAs with lower values. Similarly, in LAs where premises have, on average, larger market sizes (proxied by higher population per premise), higher levels of compliance with food hygiene standards may be expected compared to LAs where premises deal with a lower pool of customers. Due to 'reputation' effects, premises in the former LAs may in fact feel more under scrutiny than premises in the latter LAs.

Other variables were controlled for in the attempt to capture demographic differences across LAs (the proportion of the population aged 0 to 14) and the effect of local competition (premise density). The influence of these variables on the outcomes of interest is less clear-cut and there are no prior expectations on how these may affect the outcomes investigated (i.e. higher values of these variables may be related to either higher or lower values of the outcomes).

4.2 Sample sizes

The sample sizes available for the impact estimation were determined by the number of LAs that took up the schemes in the treatment or later years, and for which observations on all the outcome and control variables were available for analysis.

The LAs that took up the FHRs/FHIS in each financial year were identified using records of premises participating in the schemes published by the FSA. These records include the total number of premises that started the FHRs/FHIS in any week between December 2010 and November 2013. An LA was considered as having taken up the FHRs/FHIS if premises were included in the records for any of the weeks belonging to that specific financial year. Table 4.1 shows the breakdown of the number of LAs that took up the scheme in each financial year, by country.

Table 4.1 Number of LAs taking up the FHRs and FHIS, by country and financial year

Financial year of take up	Country				Total
	England	Northern Ireland	Wales	Scotland	
2010/11	49	1	21	17	88
2011/12	119	16	1	3	139
2012/13	142	8	0	4	154
2013/14*	11	1	0	5	17
FHRs/FHIS not rolled out yet	4	0	0	3	7
Total	325	26	22	32	405

* Figures for the financial year 2013/14 include only LAs which rolled out the schemes between 1 April 2013 and October 2013; the five Scottish LAs where the FHIS was piloted in 2006 were excluded from the analysis.

As explained in Chapter 3, the financial year 2010/11 was defined as the treatment year, i.e. the period in which the treatment of interest (early adoption of the FHRs/FHIS) happened. As shown in Table 4.1, in this financial year 88 LAs took up the schemes. This is the potential sample size of treated LAs available for the joint

analysis of the impact of the FHRS and FHIS. Of these 88 treated LAs, 49 were in England, one in Northern Ireland, 21 in Wales and 17 in Scotland, and these are the sample sizes initially available for potential impact analyses to be conducted separately for each of the countries considered. The sum of sample sizes for England, Wales and Northern Ireland (71 LAs) provides the overall sample size of treated LAs potentially available for the analysis of the FHRS impact.

Table 4.1 also shows that 154 LAs (142 in England, eight in Northern Ireland, none in Wales and four in Scotland) took up the FHRS/FHIS schemes in the financial year 2012/13, whereas 17 LAs (11 in England, one in Northern Ireland, none in Wales and five in Scotland) introduced the schemes in the financial year 2013/14. Finally, seven LAs (four in England and three in Scotland, none in Wales or Northern Ireland) had not yet rolled out the schemes at the time of the take-up data collection. Therefore, 178 is the potential sample size for untreated LAs available for the joint FHRS/FHIS impact analysis (178 is the sum of the number of LAs which took up the scheme either in the financial year 2012/13 (154 LAs) or 2013/14 (17 LAs), or had not yet taken up the scheme at the time of data receipt (seven LAs)).

When any of the outcome or control variables used in the impact estimation was not available (i.e. there was no record of it) for a particular LA, that LA had to be excluded from the analysis. This means that the number of LAs used in the impact evaluation was smaller than figures in Table 4.1 indicate. Table 4.2 sets out the number of LAs actually used in the analysis (i.e. the final sample size), by country.

Table 4.2 Sample sizes available for the analysis, by country and treatment group

Treatment group	Country				Total
	England	Northern Ireland	Wales	Scotland	
Treated LAs (FHRS/FHIS take up in financial year 2010/11)	46	1	20	14	81
Untreated LAs (FHRS/FHIS take up in financial year 2012/13 or later)	139	9	0	11	159
Total	185	10	20	25	240

NOTE: Sample sizes shown are those available after retaining only non-missing observations for all variables used in the DID regressions for poor, broad and full compliance outcomes. Sample sizes achieved when food-borne illness outcomes are included in the regressions are the following: food poisoning (131 untreated and 45 treated LAs in England, and 18 treated LAs in Wales); Campylobacter (138 untreated and 46 treated LAs in England, and 20 treated LAs in Wales); Salmonella (134 untreated and 42 treated LAs in England, and 20 treated LAs in Wales).

As shown in the table, in England 46 LAs were considered treated for the purpose of this evaluation, while 139 LAs were defined as untreated. In Northern Ireland, one treated LA and nine untreated LAs were available for the analysis. In Wales, no treated LA is observed (among LAs that took up the FHRS all but one was introduced the FHRS in the treatment year). Finally, for Scotland 14 treated and 11 untreated LAs are observed.

Unfortunately, due to small sample sizes, it was decided not to proceed to separate estimation of the impacts of the FHRS in Wales and Northern Ireland. Small sample sizes meant that too few observations were available to implement the DID estimation approach within a regression framework.

4.3 Description of the treated and untreated samples

This section profiles the samples of treated and untreated LAs with respect to the outcome variables, observed before and after the introduction of FHRS/FHIS, and the pre-treatment characteristics described in the previous section. The descriptive statistics reported in this chapter are calculated for the joint sample of LAs in the four countries where the FHRS and FHIS were rolled out (i.e. England, Wales, Northern Ireland and Scotland).¹⁸

Table 4.3 profiles treated and untreated LAs in England, Wales, Northern Ireland and Scotland with respect to the outcome variables under investigation.

Table 4.3 Descriptive statistics on outcome variables for treated and untreated LAs

	Pre-treatment year	One year after FHRS/FHIS rollout	Two years after FHRS/FHIS rollout
Treated LAs *			
Poorly compliant premises (%)	8.6	6.0	5.1
Broadly compliant premises (%)	86.2	90.3	91.2
Fully compliant premises (%)	39.5	47.0	51.5
Food poisoning (n. of reports per million population)	469.6	349.3	322.3
Salmonella (n. of reports per million population)	38.9	46.6	43.4
Campylobacter (n. of reports per million population)	309.7	415.7	430.7
Untreated LAs **			
Poorly compliant premises (%)	7.2	6.1	5.4
Broadly compliant premises (%)	88.2	90.3	91.0
Fully compliant premises (%)	45.7	52.4	54.5
Food poisoning (n. of reports per million population)	487.2	347.8	221.5
Salmonella (n. of reports per million population)	36.3	44.2	38.6
Campylobacter (n. of reports per million population)	433.9	549.9	501.9

Number of observations (pre-treatment year): 81 treated LAs and 159 untreated LAs.

* Number of observations (one year after the rollout): 81, 81, 81, 65, 64 and 66 LAs for the Poorly compliant, Broadly compliant, Fully compliant, food poisoning, Salmonella and Campylobacter outcomes, respectively. Number of observations (two years after the rollout): 82, 82, 82, 64, 65 and 67 LAs for the Poorly compliant, Broadly compliant, Fully compliant, food poisoning, Salmonella and Campylobacter outcomes, respectively.

** Number of observations (one year after the rollout): 159, 159, 159, 134, 134 and 138 LAs for the Poorly compliant, Broadly compliant, Fully compliant, Food poisoning, Salmonella and Campylobacter outcomes, respectively. Number of observations (two years after the rollout): 156, 156, 156, 128, 130 and 136 LAs for the Poorly compliant, Broadly compliant, Fully compliant, food poisoning, Salmonella and Campylobacter outcomes, respectively.

The results show that, before the FHRS and FHIS were rolled out (i.e. in pre-treatment year), premises in treated LAs showed, on average, lower compliance than premises in untreated LAs. The proportion of poorly compliant premises was in

¹⁸ Descriptive statistics were also obtained separately for each of these four countries (see Tables A.1 to A.7 in the appendix).

fact higher in treated LAs (8.6%) compared to untreated LAs (7.2%), and the proportion of broadly compliant premises was lower in treated LAs (86.2%) compared to untreated LAs (88.2%). Treated and untreated LAs differed more markedly in the proportion of fully compliant premises, which was 39.5% in treated LAs and 45.7% in untreated LAs.

In spite of the fact that in the pre-treatment year premises' compliance was lower in treated LAs than in untreated LAs, the former areas showed better improvement compared to the latter in the period following the FHRS/FHIS rollout. One year after the schemes were introduced the level of broad compliance among premises was exactly the same in treated and untreated LAs (90.3%). The level of poor compliance was very similar between the two groups of areas (around 6%). This means that between the pre-treatment year and the first year following the FHRS/FHIS rollout compliance was achieved faster (i.e. improved more) in treated LAs than in untreated LAs. In addition, over the same time period full compliance grew faster in treated LAs than in untreated LAs.

Figures also show that the further improvement in compliance achieved by treated areas between one and two years after the FHRS/FHIS rollout was higher than that experienced by untreated areas. Over this period, the proportion of poorly compliant premises went down from 6 to 5.1% in treated LAs whereas it showed a smaller decrease (from 6.1 to 5.4%) in untreated areas. The proportion of broadly compliant premises increased from 90.3 to 91.2% in treated LAs while a smaller increase, from 90.3 to 91%, was observed in untreated LAs. Also the proportion of premises fully compliant increased more in treated LAs (from 47% one year after the FHRS/FHIS rollout to 51.5% two years after) than in untreated LAs (from 52.4 to 54.5% over the same period).

The summary statistics for the food-borne illness related outcomes shown in Table 4.3 (where the number of reports for each disease is expressed per million population to recognise the differences between treated and untreated LAs) indicate that in the pre-treatment year the incidence of food poisoning and Campylobacter was higher in untreated LAs (487 and 434 reports per million population, respectively) than in treated LAs (470 and 310 reports per million population, respectively). In the same year, the incidence of Salmonella was instead higher in treated LAs (39 reports per million population) compared to untreated LAs (36 reports per million population). In the two years following the introduction of the FHRS/FHIS, the incidence of Salmonella remained higher in treated LAs than untreated LAs, and the incidence of Campylobacter remained higher in the latter compared to the former LAs. After the introduction of the FHRS/FHIS, the incidence of food poisoning became higher in treated LAs than in untreated LAs.

The statistics for the food hygiene standard related outcomes presented above suggest that the faster growth rate of compliance among food premises observed in treated LAs compared to untreated LAs may be attributable to a positive impact of the FHRS/FHIS, which were rolled out immediately after the pre-treatment year.

However, other LA characteristics might have, partly or entirely, contributed to the better performance of treated compared to untreated LAs. In order to explore this, Table 4.4 profiles treated and untreated LAs with respect to the characteristics considered, and highlights where statistically significant differences in any of these characteristics between the two groups of LAs were found.

Table 4.4 Pre-treatment characteristics for treated and untreated LAs

	Treated LAs	Untreated LAs	Significance level
Previous local food hygiene scheme (%)	44.4	71.1	***
Number of LA administrative staff (FTE) per 1,000 premises	1.1	0.8	**
Number of LA professional staff (FTE) per 1,000 premises	4.5	3.8	***
Premise density	0.1	0.2	**
Population (000s) per premise	0.1	0.1	
Proportion of the population aged 0-14 (%)	17.2	17.4	
London region (%)	1.2	15.1	***
East region (%)	13.6	10.1	
East Midlands region (%)	17.3	8.8	
East of England region (%)	0.0	3.1	
North East region (%)	0.0	3.8	
North West region (%)	4.9	5.7	
Scotland region (%)	17.3	6.9	**
South East region (%)	3.7	15.7	***
South West region (%)	13.6	5.7	**
Wales region (%)	24.7	0.0	***
West Midlands region (%)	1.2	11.3	***
Yorkshire & Humber region (%)	1.2	8.2	**
Northern Ireland region (%)	1.2	5.7	

Number of observations: 81 treated LAs and 159 untreated LAs.

*** and ** denote statistically significant differences at the 1 and 5% level, respectively.

Table 4.4 highlights some differences between treated and untreated areas. For example, local schemes were more frequently run in untreated rather than treated LAs, and that a higher proportion of untreated LAs were located in certain regions (e.g. London and South East regions) compared to treated LAs. On the other hand, treated LAs seem to have benefitted from the presence of more administrative and managerial staff dealing with food hygiene compared to untreated LAs. The differences observed between treated and untreated LAs across the aforementioned characteristics are statistically significant. As mentioned earlier, differences at the baseline between treated and untreated LAs could be responsible for the different outcomes observed in subsequent years. For this reason, these potential confounders of the FHRS/FHIS impact were controlled for in the DID regression analysis. This gave some confidence that estimated impacts of the FHRS/FHIS reflected the effect of the schemes on the outcomes of interest rather than that of other LA characteristics.

5 Impact of the FHRs and FHIS on food hygiene standards

This chapter presents the main findings from the impact evaluation of the FHRs and FHIS on food hygiene standard related outcomes. Section 5.1 shows and discusses the estimates of the overall impact of the FHRs and FHIS, i.e. the effect that the schemes had, on average, in treated areas. Section 5.2 summarises the results of the subgroup impact analysis, which was aimed at assessing whether having run a local food hygiene scheme prior to introducing the FHRs and FHIS altered the impact of the latter schemes on the outcome of interest.

5.1 Overall impact of the FHRs and FHIS

This section reports the estimates of the impact of the FHRs and FHIS on three food hygiene standard related outcomes, namely the proportions of premises that were poorly compliant, broadly compliant and fully compliant with food hygiene requirements.¹⁹ The estimates reported here refer to the ‘overall’ impact of the scheme to distinguish them from the subgroup impact estimates (reported in the next section). The overall impact is the effect that the FHRs and FHIS had, on average, in treated LAs, and therefore was calculated using information on all LAs where the schemes were rolled out in the financial year 2010/11. A subgroup impact estimate refers instead to the impact of the FHRs/FHIS for a specific subset of treated LAs (either those that previously ran a local scheme or those that did not do so). The next four subsections present, separately and in the following order, estimates of the impact of the FHRs in England, Wales and Northern Ireland, the impact of FHRs only in England, the impact of FHIS (in Scotland) and the joint impact of the FHRs and FHIS (England, Wales, Northern Ireland and Scotland). Results are presented in this order because the FHRs and FHIS are different schemes and therefore we analysed each scheme separately first. The FHRs and FHIS were then brought together to assess their joint impact.

5.1.1 Overall impact of the FHRs in England, Wales and Northern Ireland

The impact of the FHRs on the proportions of poorly compliant, broadly compliant and fully compliant premises was estimated for those LAs that introduced the schemes in England, Wales and Northern Ireland. This means that all treated and

¹⁹ More detailed regression results for the estimation of the overall FHRs/FHIS impact on premises’ poor, broad and full compliance are reported in the appendix (see Tables A.8 to A.13). The impact evaluation also explored whether the FHRs/FHIS had an impact on other food hygiene related outcomes, namely the number of complaint-related investigations per premise, the number of inspections per premise and the number of prosecutions per premise. There was no evidence indicating that the FHRs/FHIS had an impact on any of these outcomes (regression results for these outcomes are reported in the appendix – see Tables A.14 to A.19).

untreated LAs in these three countries were used in the analysis, provided all data required were available for them. The results of the estimations are reported in Table 5.1.

Table 5.1 Impact of the FHRs (England, Wales and Northern Ireland) on food hygiene standards

	Impact of FHRs on the proportion of poorly compliant premises (ppts)	Impact of FHRs on the proportion of broadly compliant premises (ppts)	Impact of FHRs on the proportion of fully compliant premises (ppts)
One year after the rollout (Counterfactual)	-1.9*** (7.7)	2.0*** (89.0)	1.8 (47.8)
Two years after the rollout (Counterfactual)	-1.7** (6.4)	1.5 (90.6)	3.3** (51.4)

*** and ** denote statistical significance at the 1 and 5% level, respectively;

Sample sizes: The number of LAs for the impact one year after the FHRs rollout is 215 for all outcomes; The number of LAs for the impact two years after the FHRs rollout is 213 for all outcomes.

The findings suggest that one year after its rollout the FHRs reduced the proportion of poorly compliant premises by 1.9ppts (this impact estimate being statistically significant). This means that in financial year 2011/12 the proportion of poorly compliant premises in LAs where the scheme was introduced was 1.9ppts lower compared to what it would have been had the FHRs not been rolled out in these areas (this hypothetical proportion, which is the estimated counterfactual, is 7.7%, as indicated in the table).²⁰ Two years after its rollout (i.e. in the financial year 2012/13), the FHRs was found to have reduced the proportion of poorly compliant premises, the impact being statistically significant but slightly smaller, in absolute value (-1.7ppts), than the one found one year after the scheme was rollout.

One year after its rollout the FHRs was found to have had a positive impact on the proportion of broadly compliant premises: this proportion increased by 2.0ppts as a result of the rolling out of the scheme. This means that the proportion of broadly compliant premises observed in treated LAs was 2.0ppts higher compared to what it would have been had the FHRs not been introduced in these areas (the estimated counterfactual is 89%). This impact estimate is statistically significant. Findings show that two years after its rollout the FHRs had a positive impact on the proportion of broadly compliant premises. This positive impact (1.5ppts) is slightly smaller than the one found one year after the FHRs rollout, and the estimate is not statistically significant.

²⁰ The counterfactual, i.e. the outcome which would have been observed in treated LAs had the FHRs not been introduced, is obtained by subtracting the estimated impact for the specific post-rollout period from the outcome observed in the correspondent period for treated LAs. One year after the rollout of the FHRs in England, Wales and Northern Ireland, the proportion of poorly compliant premises was 5.8%. The counterfactual of 7.7% is obtained subtracting the estimated impact (-1.9ppts) from this figure.

Table 5.1 also shows that, one year after its rollout, the FHRIS was found to have had a positive impact on the proportion of fully compliant premises. In the financial year 2011/12, rolling out the FHRIS increased the proportion of fully compliant premises in treated LAs by 1.8ppts. Therefore, the proportion of fully compliant premises observed in these areas was 1.8ppts higher than it would have been had the FHRIS not been introduced (the estimated counterfactual is 47.8%). However, this impact estimate is not statistically significant. Findings also show that, two years after its rollout, the FHRIS had a positive impact on the proportion of fully compliant premises as this proportion increased by 3.3ppts as a result of the scheme (in the absence of the FHRIS, the estimated proportion of fully compliant premises in treated LAs is 47.8%). This impact estimate is statistically significant.

The findings reported above are consistent with and provide support to the theory of change developed for the FHRIS/FHIS. This theory suggests that improvements in businesses' compliance with food hygiene law requirements are to be expected following the introduction of these schemes. This is because if inspection ratings/results are publicly available, and customers decide where to buy food and eat away from home based on them (among other considerations), they will tend to choose the highest rated premises, which are more compliant than those with low ratings. Competition among food businesses on hygiene standards would then result in an increase in the proportion of food premises compliant with hygiene law requirements.

Considering the statistically significant impact estimates for the broadly and fully compliant outcomes, the picture emerging from Table 5.1 suggests that the impact of the FHRIS on broad compliance happened earlier whilst the impact on full compliance took longer to achieve. This could be due to the fact that those premises which were required to address their lack of compliance with food hygiene regulations had to deal with some initial challenges, and therefore improvements in compliance levels might have happened gradually over time (and this would be reflected in movements from an FHRIS equivalent rating of either 3 or 4 one year after the FHRIS rollout to a rating of 5 two years after). An alternative explanation could be that as premises inspected every two years were more likely to be fully compliant with hygiene requirements (the frequency of the inspections depends on the risk of compliance among other risk factors, with higher risk premises inspected every six months and lower risk premises inspected every three years), one needs to wait until the inspection cycle is completed for these premises to empirically capture this aspect.²¹ If this was the case, the impact estimates to be considered as more accurate would be those observed two years after the FHRIS rollout.

The data used for the analysis were at the aggregated level (i.e. counts of premises within each LA and in a particular year), which meant that individual premises and

²¹ Inspection frequency can actually be more than three years, but such premises are unlikely to be covered by the FHRIS/FHIS schemes.

their levels of compliance could not be observed over time. Therefore, the explanations provided above were not tested. Premise-level panel data would provide information about compliance over time for each of the premises, and could therefore help draw final conclusions on the dynamics followed by food outlets as a result of the FHRs/FHIS.

5.1.2 Overall impact of the FHRs in England

The overall impact of the FHRs on the proportions of poorly compliant, broadly compliant and fully compliant premises was estimated separately for England. This means that only treated and untreated English LAs were used to produce impact estimates. Estimation results are reported in Table 5.2.

Table 5.2 Impact of the FHRs (England only) on food hygiene standards

	Impact of FHRs on the proportion of poorly compliant premises (ppts)	Impact of FHRs on the proportion of broadly compliant premises (ppts)	Impact of FHRs on the proportion of fully compliant premises (ppts)
One year after the rollout (Counterfactual)	-1.7*** (6.3)	1.8*** (90.9)	2.0 (56.3)
Two years after the rollout (Counterfactual)	-1.5** (5.5)	1.2 (92.2)	3.4*** (62.4)

*** and ** denote statistical significance at the 1 and 5% level, respectively.

Sample sizes: The number of LAs for the impact one year after the FHRs rollout is 185 for all outcomes. The number of LAs for the impact two years after the FHRs rollout is 183 for all outcomes.

One year after its rollout in England, the FHRs reduced the proportion of poorly compliant premises by 1.7ppts, and this impact estimate is statistically significant. This means that in treated LAs the proportion of poorly compliant premises was 1.7ppts lower compared to what it would have been had the FHRs not been rolled out (the estimated counterfactual is 6.3%). Two years after its rollout, the FHRs was found to have reduced the proportion of poorly compliant premises by 1.5ppts. This impact estimate, which is statistically significant, is slightly smaller than that found one year after the FHRs rollout.

One year after its rollout in England, the FHRs was found to have had a positive impact on the proportion of broadly compliant premises, which increased by 1.8ppts following the rollout of the scheme. This impact estimate is statistically significant. Two years after its rollout, the FHRs had a positive impact on the proportion of broadly compliant premises. This impact estimate (1.2ppts) is smaller than that found one year after the FHRs rollout and, furthermore, is not statistically significant.

Findings also show that, one year after its rollout, the FHRs had a positive impact on the proportion of fully compliant premises as the scheme increased this proportion by

2.0ppts. However, this impact estimate is not statistically significant. Two years after its rollout, the FHRs had a positive effect on the proportion of fully compliant premises (the impact being 3.4ppts), and this impact estimate is statistically significant.

In conclusion, results for English LAs indicate that the FHRs improved premises' compliance with food hygiene law requirements in the time period following its introduction, which is in line with the expectations of the theory of change. All the other considerations made for the impact of the FHRs in England, Wales and Northern Ireland also apply to England.

5.1.3 Overall impact of the FHIS in Scotland

The impact of the FHIS on the proportions of poorly compliant, broadly compliant and fully compliant premises was also explored. This means that only Scottish LAs were used to produce impact estimates. Whereas in reality the FHIS rating can be either 'Pass' or 'Improvement required,' an FHRs equivalent rating was created also for Scottish premises based on LAEMS data on compliance scores (see footnote 1). The results of the impact analysis for Scotland are reported in Table 5.3.

Table 5.3 Impact of the FHIS (Scotland) on food hygiene standards

	Impact of FHIS on the proportion of poorly compliant premises (ppts)	Impact of FHIS on the proportion of broadly compliant premises (ppts)	Impact of FHIS on the proportion of fully compliant premises (ppts)
One year after the rollout (Counterfactual)	-1.2 (8.2)	0.8 (86.0)	1.9 (32.7)
Two years after the rollout (Counterfactual)	-0.5 (7.6)	0.2 (86.2)	3.4 (32.6)

Sample sizes: The number of LAs for the impact one and two years after the FHIS rollout is 25 for all outcomes.

As shown in the table, the estimated impacts of the FHIS followed the same trend as the FHRs impacts: the reduction in the poorly compliant outcome and the increase in the broadly compliant outcome are greater one year after the rollout of the scheme compared to two years after, and the increase in the fully compliant outcome is greater two years after compared to one year after). However, none of the impacts explored were found to be statistically significant. The lack of statistically significant findings for Scotland means that this evaluation found no conclusive evidence that the FHIS improved compliance with food hygiene law requirements. However, this does not necessarily exclude the possibility that the FHIS did exert a positive impact on food hygiene standards in this country. It is possible that a larger sample than that observed here is required to detect a statistically significant impact of the FHIS in

Scotland (assuming the magnitude of this impact is the same as that found for the FHRS).

5.1.4 Overall joint impact of the FHRS and FHIS in England, Wales, Northern Ireland and Scotland

The overall joint impact of the FHRS and FHIS is the impact experienced, on average, by LAs that introduced either the FHRS or the FHIS. All treated and untreated LAs in England, Wales, Northern Ireland and Scotland were used to produce impact estimates. Once again, the outcomes explored include the proportions of poorly compliant, broadly compliant and fully compliant premises. FHRS equivalent ratings were used also for food premises in Scottish LAs where the FHIS was rolled out in financial year 2010/11. Using an FHRS equivalent rating for Scottish premises based on LAEMS data on the compliance scores permitted the increase of the sample size used in the joint estimation of the FHRS/FHIS impacts. In this way, an overall impact of the FHRS and FHIS could be estimated. Combining the FHRS and FHIS to perform a joined impact analysis relies on the assumption that the two schemes are broadly comparable in the way they interact with and impact on consumers and food businesses. Table 5.4 summarises the findings from the analysis of the joint impact of the FHRS and FHIS.

Table 5.4 Impact of the FHRS and FHIS (England, Wales, Northern Ireland and Scotland) on food hygiene standards

	Impact of FHRS/FHIS on the proportion of poorly compliant premises (ppts)	Impact of FHRS/FHIS on the proportion of broadly compliant premises (ppts)	Impact of FHRS/FHIS on the proportion of fully compliant premises (ppts)
One year after the rollout (Counterfactual)	-1.5*** (7.5)	1.6** (88.7)	1.7 (45.3)
Two years after the rollout (Counterfactual)	-1.2 (6.3)	1.1 (90.1)	3.1*** (48.4)

*** and ** denote statistical significance at the 1 and 5% level, respectively.

Sample sizes: The number of LAs for the impact one year after the FHRS/FHIS rollout is 240 for all outcomes. The number of LAs for the impact two years after the FHRS/FHIS rollout is 238 for all outcomes.

The table shows that, one year after an LA rolled out either the FHRS or FHIS, the same LA experienced a reduction in the proportion of poorly compliant premises estimated at 1.5ppts (this impact estimate being statistically significant). This means that in LAs where either the FHRS or FHIS was introduced the proportion of poorly compliant premises was 1.5ppts lower compared to what it would have been had neither scheme been rolled out (the estimated counterfactual is 7.5%). Two years after their rollout, the schemes reduced the proportion of poorly compliant premises.

However, the impact estimate is smaller (1.2ppts) than the one found one year after the FHRS/FHIS rollout and, furthermore, is not statistically significant.

One year after their rollout, the FHRS/FHIS were found to have had a positive impact on the proportion of broadly compliant premises within an LA, which increased by 1.6ppts following the rollout of either scheme. This impact estimate is statistically significant. Two years after their rollout, the FHRS/FHIS had a positive impact on the proportion of broadly compliant premises, the impact being 1.1ppts. However, this impact estimate is not statistically significant.

As we can see from Table 5.4, one year after their rollout the FHRS/FHIS had a positive impact on the proportion of fully compliant premises, which increased by 1.7ppts. However, this impact estimate is not statistically significant. Two years after their rollout, the FHRS/FHIS had a positive impact on the proportion of fully compliant premises (3.1ppts), and this estimate is statistically significant.

Overall, the results for the impact of the joint FHRS and FHIS are similar to those obtained for the impact of the FHRS alone, in the sense that in both cases the scheme/s considered reduced premises' poor compliance in the immediate post-rollout year and improved broad and full compliance (one and two years after the rollout, respectively). Adding Scottish LAs in the estimation resulted in statistically significant impact estimates being slightly lower.

5.2 Subgroup analysis of the impact of the FHRS and FHIS

This section summarises the main findings from the subgroup impact analysis, which explored whether having run a local food hygiene scheme prior to introducing the FHRS and FHIS altered the impact of the latter schemes on the food hygiene standards of premises with an LA. Two subgroup impacts were estimated: one was the impact of the FHRS/FHIS in LAs where a local food hygiene scheme was in place prior to the rollout of the schemes and the other was the impact of the FHRS/FHIS in LAs where no local scheme was previously in place. The focus of the subgroup impact analysis was testing whether these two impact estimates were statistically significantly different from each other. The finding of statistically significantly different subgroup estimates would suggest that having previously run a local food hygiene scheme altered the impact of the FHRS on the outcome of interest (regardless of whether any of the two subgroup estimates is statistically significant - this is the reason that statistical significance of the separate estimates is not provided here). Subgroup estimates for the impact of the FHRS in England, Wales and Northern Ireland, the impact of FHRS only in England, the impact of the

FHIS (Scotland) and the joint impact of the FHRs and FHIS (England, Wales, Northern Ireland and Scotland) are again presented in four separate subsections.²²

5.2.1 Subgroup analysis of the impact of the FHRs in England, Wales and Northern Ireland

Estimates of the impact of the FHRs on the proportions of poorly compliant, broadly compliant and fully compliant premises in England, Wales and Northern Ireland were produced separately for the two subgroups of interest (i.e. LAs that ran a local scheme prior to introducing the FHRs and LAs that did not run a local scheme prior to the FHRs rollout). Tests were then conducted to assess whether these two estimates were statistically significantly different from each other. The results of the subgroup analysis of the impact of the FHRs are reported in Table 5.5.

Table 5.5 Subgroup impacts of the FHRs (England, Wales and Northern Ireland) on food hygiene standards

	Impact of FHRs on the proportion of poorly compliant premises (ppts)	Impact of FHRs on the proportion of broadly compliant premises (ppts)	Impact of FHRs on the proportion of fully compliant premises (ppts)
One year after the rollout			
No previous local scheme	-1.9	1.4	2.3
Previous local scheme	-1.9	2.4	1.5
Are subgroup impacts statistically significantly different from each other?	No	No	No
Two years after the rollout			
No previous local scheme	-1.6	0.4	3.3
Previous local scheme	-1.8	2.4	3.3
Are subgroup impacts statistically significantly different from each other?	No	No	No

Sample sizes: The number of LAs for the impact one year after the FHRs/FHIS rollout is 215 for all outcomes. The number of LAs for the impact two years after the FHRs/FHIS rollout is 213 for all outcomes.

As indicated in the table, one year after its rollout the FHRs was found to have decreased poor compliance by 1.9ppts both in LAs where a local scheme was previously in place and in LAs where no local scheme was run prior to the FHRs rollout. The two subgroup impact estimates were not found to be statistically significantly different from each other. This means the analysis found no evidence that the existence of previous local schemes altered the impact of the FHRs on the proportion of poorly compliant premises within an LA. In the same period, the FHRs was found to have increased broad compliance by 2.4ppts in LAs where a local

²² More detailed regression results for the estimation of the subgroup FHRs/FHIS impacts on all food hygiene standard related outcomes are reported in the appendix (see Tables A.20 to A.31).

scheme was previously in place whereas the FHRs impact found in LAs where no local scheme was run prior to the FHRs rollout was much lower (1.4ppts). However, in spite of the fact that these two subgroup impacts were very different in magnitude, they were not found to be statistically significantly different from each other. This means that no statistical evidence was found that the existence of previous local schemes altered the impact of the FHRs on the broad compliance outcome. Similarly, the analysis did not find evidence that having previously rolled out a local scheme altered the impact of the FHRs on full compliance one year after the scheme was rolled out.

The subgroup analysis of the FHRs impact two years after the rollout of the scheme found similar results to those obtained for the analysis one year after: no statistically significant difference was found between the subgroup impact estimates for any of the outcomes considered.

In conclusion, the subgroup analysis of the FHRs impact in England, Wales and Northern Ireland found no evidence that having previously run a local scheme altered the impact of the FHRs on food hygiene standards of businesses within an LA.

5.2.2 Subgroup analysis of the impact of the FHRs in England

Table 5.6 shows the results of the subgroup analysis of the impact of the FHRs on the proportions of poorly compliant, broadly compliant and fully compliant premises in England only.

Table 5.6 Subgroup impacts of the FHRs (England only) on food hygiene standards

	Impact of FHRs on the proportion of poorly compliant premises (ppts)	Impact of FHRs on the proportion of broadly compliant premises (ppts)	Impact of FHRs on the proportion of fully compliant premises (ppts)
One year after the rollout			
No previous local scheme	-2.4	1.8	4.6
Previous local scheme	-1.1	1.7	0.2
Are subgroup impacts statistically significantly different from each other?	No	No	Yes
Two years after the rollout			
No previous local scheme	-2.2	0.6	5.7
Previous local scheme	-1.0	1.7	1.8
Are subgroup impacts statistically significantly different from each other?	No	No	No

Sample sizes: The number of LAs for the impact one year after the FHRs rollout is 185 for all outcomes. The number of LAs for the impact two years after the FHRs rollout is 183 for all outcomes.

Overall, the subgroup analysis of the FHRS impact in England found similar results to those obtained for England, Wales and Northern Ireland as no general evidence was found that having previously run a local scheme altered the impact of the FHRS on the food hygiene standards outcomes considered. However, one exception to this overall finding related to the fully compliant outcome one year after the FHRS rollout: the estimate of the FHRS impact in English LAs where a previous local hygiene scheme was not in place (4.6ppts) and the estimate of the FHRS impact in English LAs where a local scheme was previously run (0.2ppts) were found to be statistically significantly different from each other. This suggests that the impact of the FHRS was lower (by 4.4ppts) in LAs where a previous local scheme was in place compared to LAs where a local scheme was not run. This finding is not surprising, considering that food hygiene local schemes were similar to the national scheme introduced afterwards and whose impact is the focus of this evaluation. The lower impact observed for LAs that previously ran a local scheme could be due to the fact that the local scheme had already exerted a positive impact on food hygiene standards of premises within the LA before the national FHRS was rolled out, leaving less room for the national scheme to improve compliance in subsequent years. The general perception that local FHRS worked well in England supports this interpretation.²³

5.2.3 Subgroup analysis of the impact of the FHIS in Scotland

Table 5.7 shows the results of the subgroup analysis of the impact of the FHIS on the proportions of poorly compliant, broadly compliant and fully compliant premises. Only Scottish LAs were included in the impact analysis.

As the table shows, the analysis found no statistically significant differences between the impact estimates for treated LAs with and without a previous local scheme either one or two years after the rollout of the FHIS. Once again, this result suggests that the impact of the FHIS on premises' compliance was not altered by previous local schemes.

²³ See Section 1.2 of the synthesis report (Vegeris, 2014) for evidence of the effectiveness of local schemes.

Table 5.7 Subgroup impacts of the FHIS (Scotland) on food hygiene standards

	Impact of FHIS on the proportion of poorly compliant premises (ppts)	Impact of FHIS on the proportion of broadly compliant premises (ppts)	Impact of FHIS on the proportion of fully compliant premises (ppts)
One year after the rollout			
No previous local scheme	-1.0	1.6	1.8
Previous local scheme	-1.9	-1.3	2.1
Are subgroup impacts statistically significantly different from each other?	No	No	No
Two years after the rollout			
No previous local scheme	-0.3	1.5	3.7
Previous local scheme	-1.3	-3.2	2.6
Are subgroup impacts statistically significantly different from each other?	No	No	No

Sample sizes: The number of LAs for the impact one and two years after the FHRs rollout is 25 for all outcomes.

5.2.4 Subgroup analysis of the joint impact of the FHRs and FHIS in England, Wales, Northern Ireland and Scotland

The subgroup estimates of the joint impact of the FHRs and FHIS on the proportions of poorly compliant, broadly compliant and fully compliant premises in England, Wales, Northern Ireland and Scotland are reported in Table 5.8.

Table 5.8 Subgroup impacts of the FHRs and FHIS (England, Wales, Northern Ireland and Scotland) on food hygiene standards

	Impact of FHRs/FHIS on the proportion of poorly compliant premises (ppts)	Impact of FHRs/FHIS on the proportion of broadly compliant premises (ppts)	Impact of FHRs/FHIS on the proportion of fully compliant premises (ppts)
One year after the rollout			
No previous local scheme	-1.3	1.2	1.8
Previous local scheme	-1.7	2.1	1.6
Are subgroup impacts statistically significantly different from each other?	No	No	No
Two years after the rollout			
No previous local scheme	-0.9	0.1	2.8
Previous local scheme	-1.6	2.0	3.4
Are subgroup impacts statistically significantly different from each other?	No	No	No

Sample sizes: The number of LAs for the impact one year after the FHRs/FHIS rollout is 240 for all outcomes. The number of LAs for the impact two years after the FHRs/FHIS rollout is 238 for all outcomes.

As the table shows, the analysis found no statistically significant differences between the impact estimates for treated LAs with and without a previous local scheme either one or two years after the LAs rolled out either the FHRs or FHIS, and this result

applied to all food hygiene standards outcomes considered. This suggests that the impact of the FHRS or FHIS on premises' compliance did not vary depending on whether a local scheme was previously run.

6 Impact of the FHRs on food-borne illnesses

This chapter reports the main findings from the analysis of the overall and subgroup impacts of the FHRs on food-borne illness related outcomes. The three outcomes considered are the number of formally notified food poisoning reports, the number of confirmed Salmonella laboratory reports and the number of confirmed Campylobacter laboratory reports (all outcomes are expressed in million population). Findings are reported for the impact of the FHRs in England and Wales, and for the impact of the FHRs in England only.²⁴ Although data on food-borne illnesses are available for both England and Wales, obtaining separate impact estimates for Wales was not possible due to the extremely small sample size for this country, as explained in Section 4.

It is important to note that the analysis of the impact of the FHRs on food-borne illnesses was only tentative, as data on food poisoning, Salmonella and Campylobacter suffer from a number of limitations which undermine the validity of impact estimates. Under-reporting of cases is a major problem: GP consultations have declined substantially since the 1990s and most cases of infectious intestinal diseases (which include Campylobacter) are not reported to national surveillance systems (Clarence *et al.*, 2011). Problems also exist among reported cases. Illnesses might have been contracted in a different LA to where they were reported. Campylobacter and Salmonella reports also include cases acquired at home or from non-food related sources (e.g. the transmission of Campylobacter is possible through contaminated water and contact with infected animals or individuals), both of which are unaffected by FHRs and would be excluded from the counts were the information about the source of the disease and whether it was contracted at home available. Furthermore, and most importantly, information about where the disease was contracted was not available for the majority of records. Impact estimates presented here resulted from figures (number of reports) adjusted to account for the fact that for many notifications and lab reports no record is made of whether the patient has recently travelled abroad or not. The adjustment relies on the assumption that the proportion of reports relating to cases contracted in Great Britain among reports for which the information was not available would have been the same as the proportion of reports relating to cases contracted in Great Britain among reports for which the information was instead available.²⁵

²⁴ Data on food-borne illnesses at the LA level were not available for Northern Ireland and Scotland.

²⁵ More detailed regression results for the estimation of the overall FHRs/FHIS impact on food-borne illness related outcomes based on adjusted data are reported in the appendix (see Tables A.32 to A.37). Regression results obtained using original data (no adjustment) and results obtained using a different adjustment (all reports where it was not known where the cases was contracted were considered as contracted in Great Britain) are reported in the appendix (see Tables A.38 to A.49). The detailed regression results for the subgroup impact estimates of the FHRs/FHIS obtained using adjusted data, original data (no adjustment) and data with the alternative adjustment are reported in Tables A.50 to A.67.

6.1 Overall impact of the FHRs

This section reports the estimates of the overall impact of the FHRs on the three food-borne illness related outcomes considered, namely the number of formally notified food poisoning reports, the number of confirmed Salmonella laboratory reports and the number of confirmed Campylobacter laboratory reports.²⁶ All outcomes are expressed in million population. The estimated impacts of the FHRs on food-borne illnesses in England and Wales, and in England only, are reported in two distinct subsections.

6.1.1 Impact of the FHRs in England and Wales

The results of the estimation of the overall impact of the FHRs on food-borne illness related outcomes in England and Wales are summarised in Table 6.1.

Table 6.1 Impact of the FHRs (England and Wales) on food-borne illnesses

	Impact of FHRs on the number of formally notified food poisoning reports (per million population)	Impact of FHRs on the number of confirmed Salmonella laboratory reports (per million population)	Impact of FHRs on the number of confirmed Campylobacter laboratory reports (per million population)
One year after the rollout (Counterfactual)	-267** (616)	2 (46)	-99 (515)
Two years after the rollout (Counterfactual)	89 (233)	2 (43)	82 (349)

** denotes statistical significance at the 5% level.

Sample sizes: The number of LAs for the impact one year after the FHRs rollout is 199, 198 and 204 for the food poisoning, Salmonella and Campylobacter outcomes, respectively. The number of LAs for the impact two years after the FHRs rollout is 192, 195 and 203 for the food poisoning, Salmonella and Campylobacter outcomes, respectively.

As shown in the table, the only impact estimate which is statistically significant is that relating to the food poisoning outcome one year after the introduction of the FHRs. In this period, the FHRs was found to have reduced the incidence of food poisoning in English and Welsh LAs. In these areas, the number of formally notified food poisoning reports was lower, by 267 units every million people, compared to what it would have been had the scheme not been rolled out (as the table shows, this hypothetical figure was estimated at 616 reports every million people).

The above finding, indicating that the FHRs reduced the incidence of food poisoning in the population of England and Wales, is consistent with the expectations of the theory of change developed for the FHRs, which suggests that improvements in

²⁶ Detailed regression results for the estimation of the overall FHRs/FHIS impact on food-borne illness related outcomes are reported in the appendix (see Tables A.20 to A.25).

businesses' compliance with food hygiene law requirements should result in a reduction in the incidence of food-borne illnesses. The rationale is that if businesses improve their compliance with food hygiene law requirements the likelihood that customers contract food-related diseases will be reduced. However, the data limitations exposed at the beginning of this chapter undermine the validity of the estimates of the impact of the FHRs on food-borne illnesses, and therefore the analysis cannot confidently claim to have achieved empirical evidence of the validity of this theory.

6.1.2 Impact of the FHRs in England

The results of the estimation of the FHRs impact on food-borne illness related outcomes in England only are summarised in Table 6.2.

Table 6.2 Impact of the FHRs (England only) on food-borne illnesses

	Impact of FHRs on the number of formally notified food poisoning reports (per million population)	Impact of FHRs on the number of confirmed Salmonella laboratory reports (per million population)	Impact of FHRs on the number of confirmed Campylobacter laboratory reports (per million population)
One year after the rollout (Counterfactual)	-269** (612)	3 (50)	-109 (571)
Two years after the rollout (Counterfactual)	91 (201)	2 (43)	77 (455)

** denotes statistical significance at the 5% level.

Sample sizes: The number of LAs for the impact one year after the FHRs rollout is 180, 178 and 184 for the food poisoning, Salmonella and Campylobacter outcomes, respectively. The number of LAs for the impact two years after the FHRs rollout is 175, 175 and 183 for the food poisoning, Salmonella and Campylobacter outcomes, respectively.

As the table shows, the findings obtained for this country are very similar to those obtained for England and Wales, jointly considered, in that the analysis detected a statistically significant estimate of the impact of the FHRs on the incidence of food poisoning one year after the scheme was rolled out. In the financial year 2011/12, the FHRs was found to have reduced the incidence of food poisoning in English LAs which adopted the scheme: the number of food poisoning reports was 269 units (every million people) lower compared to what it would have been had the FHRs not been rolled out in these LAs (the estimated counterfactual is 612 reports every million people). The same concerns about data limitations exposed in the previous subsection apply also to the English case.

6.2 Subgroup analysis of the impact of the FHRs

This section summarises the results of the subgroup impact analysis of the FHRs on the three food-borne illness related outcomes considered. Estimated subgroup impacts of the FHRs in England and Wales, and in England only, are reported in two

different subsections. It is important to note that also the validity of the subgroup analysis was compromised by the data limitations on food-borne illness data.

6.2.1 Subgroup analysis of the impact of the FHRS in England and Wales

The subgroup estimates of the impact of the FHRS on food-borne illness related outcomes in England and Wales are summarised in Table 6.3.

Table 6.3 Subgroup impacts of the FHRS (England and Wales) on food-borne illnesses

	Impact of FHRS on the number of formally notified food poisoning reports (per million population)	Impact of FHRS on the number of confirmed Salmonella laboratory reports (per million population)	Impact of FHRS on the number of confirmed Campylobacter laboratory reports (per million population)
One year after the rollout			
No previous local scheme	-167	1	16
Previous local scheme	-335	3	-171
Are subgroup impacts statistically significantly different from each other?	No	No	No
Two years after the rollout			
No previous local scheme	163	1	111
Previous local scheme	36	1	62
Are subgroup impacts statistically significantly different from each other?	No	No	No

Sample sizes: The number of LAs for the impact one year after the FHRS rollout is 199, 198 and 204 for the food poisoning, Salmonella and Campylobacter outcomes, respectively. The number of LAs for the impact two years after the FHRS rollout is 192, 195 and 203 for the food poisoning, Salmonella and Campylobacter outcomes, respectively.

As we can see from the table, the estimate of the FHRS impact in LAs where a previous local hygiene scheme was not in place and the estimate of the FHRS impact in LAs where a local scheme was previously run were not found to be statistically significantly different from each other for any of the outcomes considered either one and two years after the FHRS rollout. Therefore, the subgroup analysis found no evidence that having previously run a local scheme altered the impact of the FHRS on food-borne illnesses in England and Wales.

6.2.2 Subgroup analysis of the impact of the FHRS in England

Table 6.4 summarises the results of the subgroup estimates of the FHRS impact on food-borne illness outcomes in England only.

Table 6.4 Subgroup impacts of the FHRS (England only) on food-borne illnesses

	Impact of FHRS on the number of formally notified food poisoning reports (per million population)	Impact of FHRS on the number of confirmed Salmonella laboratory reports (per million population)	Impact of FHRS on the number of confirmed Campylobacter laboratory reports (per million population)
One year after the rollout			
No previous local scheme	-111	-2	9
Previous local scheme	-381	6	-188
Are subgroup impacts statistically significantly different from each other?	No	No	No
Two years after the rollout			
No previous local scheme	153	-1	122
Previous local scheme	47	4	44
Are subgroup impacts statistically significantly different from each other?	No	No	No

Sample sizes: The number of LAs for the impact one year after the FHRS rollout is 199, 198 and 204 for the food poisoning, Salmonella and Campylobacter outcomes, respectively. The number of LAs for the impact two years after the FHRS rollout is 192, 195 and 203 for the food poisoning, Salmonella and Campylobacter outcomes, respectively.

Also in the case of England, the analysis found no evidence that having previously run a local scheme altered the impact of the FHRS on the incidence of food-borne illnesses.

7 Conclusions

This evaluation assessed the impact of the FHRs and FHIS on premises' compliance with food hygiene standards and the incidence of food-borne illnesses. Whereas the impact of the schemes varied by group of countries, excessively small sample sizes for Wales and Northern Ireland prevented us from using the DID methodology within a regression framework to make inference about country-specific impacts other than for England and Scotland. This final chapter summarises the main findings from the evaluation separately for food hygiene standard and food-borne illness related outcomes. Implications of the findings and recommendations for future research are also provided.

7.1 Impact of the FHRs/FHIS on food hygiene standards

Whereas the evaluation of the joint impact of the FHRs and FHIS (using LAs in England, Wales, Northern Ireland and Scotland) showed that rolling out either the FHRs or FHIS had a positive impact on (i.e. improved) premises' compliance with food hygiene requirements within an LA, separate analysis of the two schemes resulted in this positive impact being detected for the FHRs (LAs in England, Wales and Northern Ireland) but not for the FHIS in Scotland. The estimated FHIS impacts followed the same patterns found for the FHRs but the estimates were not statistically significant. The lack of statistically significant findings for Scotland does not necessarily exclude the possibility that the FHIS exerted a positive impact on food hygiene standards in this country. However, a larger sample than that observed here may be required to detect a statistically significant impact of the FHIS in Scotland (assuming that the magnitude of this impact is the same as that found for the FHRs). Therefore, less interpretive weight should be placed upon FHIS than FHRs estimates, as the latter could be estimated more precisely than the former. In what follows, only the FHRs impact estimates are discussed.

In the first year following its introduction, the FHRs (England, Wales and Northern Ireland) was found to have reduced the proportion of poorly compliant premises within an LA by 1.9ppts, while also having increased the proportion of broadly compliant premises by 2.0ppts. Evidence also showed that two years after its rollout, the FHRs exerted a positive impact on premises' full compliance, as the proportion of fully compliant premises increased by 3.3ppts following the rollout of the scheme. In England, the positive impact of the FHRs on poor and broad compliance was slightly smaller (by 2ppts) than that detected for all countries covered by the scheme, while the impact on full compliance was slightly higher (by 1ppt).

The finding of a positive impact of the FHRs on premises' broad compliance one year after the rollout of the scheme and of a positive impact on full compliance two years after may indicate that premises have improved their compliance gradually over time (that is, moving to an FHRs equivalent rating of either 3 or 4 first and to a

rating of 5 later on), perhaps due to the initial challenges in addressing their lack of compliance with food hygiene regulations. Alternatively, they may suggest that one needs to wait until the inspection cycle is completed to empirically capture the real impact of the schemes. Premises inspected every two years were more likely to be fully compliant with hygiene requirements (the frequency of inspections depends on a number of risk factors, including compliance with food hygiene law. Higher risk premises are inspected more frequently than lower risk premises). If this is the case, the impact estimates observed two years after the FHRS rollout would reflect the effect of the scheme more accurately than impact estimates one year after. However, interpreting the findings was very difficult in the light of available data, which were aggregated at the level of the LA. Future research could use premise-level panel data (available from the FSA), where individual premises are tracked over time, to shed light on the dynamics of premises in improving their compliance with food hygiene regulations and provide a clear interpretation of the findings reported in this evaluation.

Assuming that in the financial year 2012/13, when they were exposed to the treatment, later adopter LAs experienced an impact which was either similar or smaller in size (because of shorter exposure to treatment) than that observed one year after in treated areas, the estimated impact of the FHRS two years after its rollout is only a conservative estimate of (i.e. it underestimates) the true impact experienced by early adopters. Whereas this is a plausible assumption, further research is needed to assess the similarity of early and later adopting LAs at the time the schemes were introduced.

Overall, the subgroup analysis found no evidence suggesting that the impact of the FHRS and FHIS varied depending on whether LAs ran a local food hygiene scheme prior to introducing the national schemes. However, there was one exception to this general finding: one year after the FHRS was rolled out, the impact of the scheme on premises' full compliance was found to be 4.4ppts lower in English LAs which previously ran a local scheme compared to English LAs where a previous local scheme was not in place. This finding is consistent with the hypothesis that local schemes had already exerted a positive impact on business compliance, leaving less scope for the FHRS impact.

7.2 Impact of the FHRS on food-borne illnesses

The evaluation found some evidence suggesting that, one year after it was rolled out, the FHRS reduced the incidence of food poisoning in the population of England and in that of England and Wales jointly considered (in LAs where the FHRS was introduced, the number of formally notified food poisoning reports was lower, by some 270 reports, than it would have been had the FHRS not been implemented), while there was no evidence indicating that the FHRS had any impact on the incidence of Salmonella and Campylobacter either one or two years after its rollout.

However, a number of data limitations cast doubts about the validity of these results. A serious data issue is the under-reporting of food-borne illness related cases. Clarence *et al.* (2011) suggested that GP consultations have declined substantially since the 1990s, and that most cases of infectious intestinal diseases are not reported to national surveillance systems (including Campylobacter; FSA indicated that Campylobacter laboratory reports have an estimated under-reporting rate of 9.3%). It is also suggested that unreported cases are not a random subset of all cases because seeking healthcare is related to greater severity of the disease, having recently travelled abroad and lower socioeconomic status (Tam *et al.* 2011).²⁷ This means that the under-reporting rates are higher for LAs with specific characteristics (unobserved in this evaluation), and therefore having compared figures across LAs is likely to have resulted in spurious findings. The comparability of FRS data across LAs is also compromised by differences in reporting practices and access to health care across areas. Another problem is that Campylobacter and Salmonella reports are issued for both cases contracted at home and cases contracted at food premises. Improvements in premises' hygiene standards are expected to be reflected in a reduction of the incidence of food-borne illnesses in the UK population, but capturing this by means of an impact analysis would require relying only on reports of cases contracted at food premises. Campylobacter and Salmonella may be contracted also from non-food related sources (e.g. the transmission of Campylobacter is possible through contaminated water and contact with infected animals or individuals). Non-food related cases are unaffected by FRS and should therefore be excluded from the analysis. Unfortunately, information about the source of the disease and whether it was contracted at home or at food premises is not available.

The reporting of cases in a different LA to where the illness was contracted is another reason of concern for food-borne illness data, and estimating separate FRS impacts for Campylobacter and Salmonella may not be appropriate as some Campylobacter cases are food-related (FSA indicated that the proportion of Campylobacter due to food is between 30 and 80%). Finally, and most importantly, information about the location where the disease was contracted was not available for the majority of records. Impact estimates presented here resulted from figures (number of reports) adjusted to account for the fact that for many notifications and lab reports no record is made of whether the patient has recently travelled abroad. They are the result of an attempt to evaluate the impact of the FRS on food-borne illnesses using existing data, and therefore they may not provide reliable measures of the impact of the scheme.

²⁷ Among reported cases of Food poisoning, Salmonella and Campylobacter, information about whether the disease was contracted in the UK or whether the person recently travelled abroad is not available for most of the records provided for analysis. Another piece of information that is sometimes missing from laboratory reports is the LA where the case was reported, and the extent of this problem varies over time. FSA suggested that in the financial year 2009/10 82% of laboratory reports had information about the LA where the illness was contracted, and that this proportion had risen to 91% in financial year 2012/13. As this evaluation used food-borne illness data for different years, this might have affected the results.

Finally, the subgroup impact analysis found no evidence that the impact of the FHRS on food-borne illnesses was altered by the existence of previous local schemes. However, the aforementioned concerns about food-borne illness data meant that the subgroup impact results should also be considered with caution.

7.3 Implications

The main finding of this impact evaluation is that the FHRS had a positive impact in early adopter LAs, that is, those which introduced the scheme in the financial year 2010/11. In these areas the FHRS was found to have improved premises' compliance with food hygiene law requirements. This finding is consistent with the theory of change developed for the FHRS and FHIS, which suggests that the higher demand on hygiene standards caused by the information made available to food customers through the schemes leads businesses to compete with each other to improve their rating/results, resulting in a general improvement in food hygiene standards. Whereas it is plausible to assume that the impact of the FHRS in later adopting LAs was similar to the one detected by this evaluation, further research is needed to explore whether the results reported here apply to LAs other than early adopters.

Nonetheless, the findings suggest that potential benefits could be achieved by extending the scope of the FHRS impact through a mandatory scheme. This new approach to implementing the scheme is likely to raise awareness of the rating system among food customers (as all food businesses, not only some among those whose ratings/results are currently available on the FSA website, will have to display the outcome of the inspections), thus creating the potential for increased competition on hygiene standards. This hypothesis could be tested by estimating the differential impact between the voluntary and mandatory FHRS in Wales using premise-level panel data, provided that enough variation in exposure to the new mandatory scheme across premises is observed. Essentially, this would entail observing a sample of premises which are exposed to the mandatory scheme and a sample of premises which are not (or where exposure is delayed) over the same time period in order to assess the difference in compliance levels between the two samples.

Appendix

Appendix

DID approach within a regression framework

The DID estimation approach was implemented within a regression framework, which made it possible to control for possible differences among LAs in terms of pre-determined characteristics (observed before the national FHRS and FHIS were rolled out in the financial year 2010/11) affecting food hygiene standard and food-borne illness related outcomes. The DID regression used to estimate the overall impact of the national FHRS/FHIS one year after their rollout is given by:

$$Y_{i,2011/12} - Y_{i,2009/10} = \delta + \alpha \cdot D_i + \pi \cdot X_{i,2009/10} + (\varepsilon_{i,2011/12} - \varepsilon_{i,2009/10})$$

where Y is the specific outcome measure for which the impact is being assessed (e.g. proportion of poorly compliant premises), i indexes the LA, D_i is a dummy variable indicating whether the LA is in the treated group (i.e. rolled out the national FHRS/FHIS in the financial year 2010/11), X_i is the set of pre-determined covariates (observed in the financial year 2009/10) and π the corresponding set of coefficients; δ is the constant term and ε_i the error term. The estimate of the coefficient for the treatment dummy D_i , α , represents the overall impact of the national FHRS/FHIS. Similarly, the DID estimate for the overall impact of FHRS/FHIS two years after their rollout is given by:

$$Y_{i,2012/13} - Y_{i,2009/10} = \delta + \alpha \cdot D_i + \pi \cdot X_{i,2009/10} + (\varepsilon_{i,2012/13} - \varepsilon_{i,2009/10})$$

A subgroup impact analysis was also conducted to assess whether the impact of the national FHRS/FHIS for LAs that previously ran a local food hygiene scheme was statistically significantly different from the impact of the FHRS/FHIS for LAs that did not run a previous local scheme. To this aim, the dummy variable L_i , indicating whether the LA ran a local scheme in the financial year 2009/10 or earlier, and the interaction term $D_i \cdot L_i$ were added to the regression models:

$$Y_{i,2011/12} - Y_{i,2009/10} = \delta + \alpha \cdot D_i + \pi \cdot X_{i,2009/10} + \lambda \cdot D_i \cdot L_{i,2009/10} + \gamma \cdot L_{i,2009/10} + (\varepsilon_{i,2011/12} - \varepsilon_{i,2009/10})$$

$$Y_{i,2012/13} - Y_{i,2009/10} = \delta + \alpha \cdot D_i + \pi \cdot X_{i,2009/10} + \lambda \cdot D_i \cdot L_{i,2009/10} + \gamma \cdot L_{i,2009/10} + (\varepsilon_{i,2012/13} - \varepsilon_{i,2009/10})$$

In the subgroup analysis X_i is the set of all pre-determined covariates excluding L_i , which is now included separately in the regression model. The estimated coefficient α represents the impact of the national FHRS/FHIS for treated LAs that did not run a local scheme prior to introducing the national schemes. The sum of the estimated coefficients α and λ represents the impact of the national FHRS/FHIS for treated LAs which did run a previous local scheme. Standard errors for the latter impact were calculated using the formula for the sum of regression coefficients.

Descriptive statistics, by country

Table A.1 Pre-treatment characteristics for treated and untreated LAs (England)

	Treated LAs	Untreated LAs	Significance Level
Previous local food hygiene scheme (%)	63.0	77.7	**
Number of LA administrative staff (FTE) per 1,000 premise	0.9	0.7	
Number of LA professional staff (FTE) per 1,000 premises	3.6	3.6	
Premise density	0.1	0.2	
Population (000s) per premise	0.1	0.1	
Proportion of the population aged 0-14 (%)	17.4	17.3	
Region 1 (London)	2.2	17.3	***
Region 2 (East)	23.9	11.5	**
Region 3 (East Midlands)	30.4	10.1	***
Region 4 (East of England)	0.0	3.6	
Region 5 (North East)	0.0	4.3	
Region 6 (North West)	8.7	6.5	
Region 8 (South East)	6.5	18.0	
Region 9 (South West)	23.9	6.5	***
Region 11 (West Midlands)	2.2	12.9	**
Region 12 (Yorkshire & Humber)	2.2	9.4	

Number of observations: 46 treated and 139 untreated LAs.

*** and **: difference in means statistically significant at the 1 and 5% level, respectively.

Table A.2 Descriptive statistics on outcome variables for treated and untreated LAs (England)

	Pre-treatment year	One year after FHRS rollout	Two years after FHRS rollout
Treated LAs *			
Poorly compliant premises (%)	7.0	4.6	4.0
Broadly compliant premises (%)	89.1	92.7	93.4
Fully compliant premises (%)	46.2	54.3	59.0
Food poisoning (n. of reports per million population)	454.9	342.6	291.7
Salmonella (n. of reports per million population)	40.6	52.9	44.5
Campylobacter (n. of reports per million population)	391.8	461.9	531.8
Untreated LAs **			
Poorly compliant premises (%)	7.0	6.0	5.4
Broadly compliant premises (%)	88.4	90.5	91.2
Fully compliant premises (%)	47.1	53.6	55.7
Food poisoning (n. of reports per million population)	487.2	347.8	221.5
Salmonella (n. of reports per million population)	36.3	44.2	38.6
Campylobacter (n. of reports per million population)	433.9	549.9	501.9

Number of observations (pre-treatment year): 81 treated LAs and 159 untreated LAs.

* Number of observations (one year after the rollout): 46, 46, 46, 44 and 46 LAs for the Poorly compliant, Broadly compliant, Fully compliant, Food poisoning, Salmonella and Campylobacter outcomes, respectively.

Number of observations (two years after the rollout): 47, 47, 47, 47, 45 and 47 LAs for the Poorly compliant, Broadly compliant, Fully compliant, Food poisoning, Salmonella and Campylobacter outcomes, respectively.

** Number of observations (one year after the rollout): 139, 139, 139, 134, 134 and 138 LAs for the Poorly compliant, Broadly compliant, Fully compliant, Food poisoning, Salmonella and Campylobacter outcomes, respectively.

Number of observations (two years after the rollout): 136, 136, 136, 128, 128, 130 and 136 LAs for the Poorly compliant, Broadly compliant, Fully compliant, Food poisoning, Salmonella and Campylobacter outcomes, respectively.

Table A.3 Pre-treatment characteristics and outcome variables for treated LAs (Wales)

	Pre-treatment year	One year after FHRS rollout	Two years after FHRS rollout
LA characteristics *			
Previous local food hygiene scheme (%)	15.00		
Number of LA administrative staff (FTE) per 1,000 premise	1.1		
Number of LA professional staff (FTE) per 1,000 premises	5.6		
Premise density	0.0		
Population (000s) per premise	0.1		
Proportion of population aged 0-14 (%)	17.2		
Outcome variables **			
Poorly compliant (%)	11.9	8.5	6.6
Broadly compliant (%)	81.6	87.0	88.9
Fully compliant (%)	31.6	39.9	45.5
Food poisoning (n. of reports per million population)	505.3	365.5	406.9
Salmonella (n. of reports per million population)	34.9	32.6	40.9
Campylobacter (n. of reports per million population)	120.7	309.6	193.2

* Number of observations (pre-treatment year): 20 LAs.

** Number of observations (one year after the rollout): 20, 20, 20, 19, 20 and 20 LAs for the Poorly compliant, Broadly compliant, Fully compliant, Food poisoning, Salmonella and Campylobacter outcomes, respectively. Number of observations (two years after the rollout): 20, 20, 20, 17, 20 and 20 LAs for the Poorly compliant, Broadly compliant, Fully compliant, Food poisoning, Salmonella and Campylobacter outcomes, respectively.

Table A.4 Pre-treatment characteristics for treated and untreated LAs (Northern Ireland)

	Treated LAs	Untreated LAs
Previous local food hygiene scheme (%)	0.0	33.3
Number of LA administrative staff (FTE) per 1,000 premise	1.3	1.4
Number of LA professional staff (FTE) per 1,000 premises	5.3	4.3
Premise density	0.0	0.0
Population (000s) per premise	0.1	0.1
Proportion of the population aged 0-14 (%)	19.9	20.0

Number of observations: 1 treated and 9 untreated LAs.

None of the differences is statistically significant.

Table A.5 Descriptive statistics on outcome variables for treated and untreated LAs (Northern Ireland)

	Pre-treatment year	One year after FHRS rollout	Two years after FHRS rollout
Treated LAs *			
Poorly compliant premises (%)	14.1	2.9	0.8
Broadly compliant premises (%)	79.8	92.8	97.1
Fully compliant premises (%)	17.9	30.5	36.8
Untreated LAs **			
Poorly compliant premises (%)	8.3	6.6	4.5
Broadly compliant premises (%)	88.1	89.9	91.8
Fully compliant premises (%)	35.5	48.6	52.3

Number of observations (pre-treatment year): 81 treated LAs and 159 untreated LAs.

* Number of observations (one year after the rollout): 1, 1 and 1 LAs for the Poorly compliant, Broadly compliant and Fully compliant outcomes, respectively.

Number of observations (two years after the rollout): 1, 1 and 1 LAs for the Poorly compliant, Broadly compliant and Fully compliant outcomes, respectively.

** Number of observations (one year after the rollout): 9, 9 and 9 LAs for the Poorly compliant, Broadly compliant and Fully compliant outcomes, respectively.

Number of observations (two years after the rollout): 9, 9 and 9 LAs for the Poorly compliant, Broadly compliant and Fully compliant outcomes, respectively.

Table A.6 Pre-treatment characteristics for treated and untreated LAs (Scotland)

	Treated LAs	Untreated LAs
Previous local food hygiene scheme (%)	28.6	18.2
Number of LA administrative staff (FTE) per 1,000 premise	1.6	1.4
Number of LA professional staff (FTE) per 1,000 premises	5.9	5.4
Premise density	0.0	0.0
Population (000s) per premise	0.1	0.1
Proportion of the population aged 0-14 (%)	16.6	17.1

Number of observations: 14 treated and 11 untreated LAs.
None of the differences is statistically significant.

Table A.7 Descriptive statistics on outcome variables for treated and untreated LAs (Scotland)

	Pre-treatment year	One year after FHIS rollout	Two years after FHIS rollout
Treated LAs *			
Poorly compliant premises (%)	8.9	7.0	7.1
Broadly compliant premises (%)	83.8	86.8	86.4
Fully compliant premises (%)	30.6	34.6	36.0
Untreated LAs **			
Poorly compliant premises (%)	9.2	7.4	6.6
Broadly compliant premises (%)	85.7	88.4	89.2
Fully compliant premises (%)	36.5	39.9	40.5

Number of observations (pre-treatment year): 81 treated LAs and 159 untreated LAs.

* Number of observations (one year after the rollout): 14, 14 and 14 LAs for the Poorly compliant, Broadly compliant and Fully compliant outcomes, respectively.

Number of observations (two years after the rollout): 14, 14 and 14 LAs for the Poorly compliant, Broadly compliant and Fully compliant outcomes, respectively.

** Number of observations (one year after the rollout): 11, 11 and 11 LAs for the Poorly compliant, Broadly compliant and Fully compliant outcomes, respectively.

Number of observations (two years after the rollout): 11, 11 and 11 LAs for the Poorly compliant, Broadly compliant and Fully compliant outcomes, respectively.

Food hygiene standard related outcomes (overall impact estimates)

Table A.8 DID regressions for the impact of the FHRS and FHIS on the proportion of poorly compliant premises (one year after the rollout)

Outcome: Proportion of poorly compliant premises among rated premises (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.015	0.007	-0.019	0.003	-0.017	0.003	-0.012	0.331
Local scheme (dummy)	0.012	0.023	0.010	0.084	0.011	0.037	0.030	0.052
Region 2 (East)	0.000	0.963	0.001	0.914	0.003	0.743		
Region 3 (East Midlands)	0.008	0.474	0.010	0.376	0.012	0.207		
Region 4 (East of England)	-0.028	0.102	-0.027	0.117	-0.023	0.128		
Region 5 (North East)	-0.007	0.672	-0.006	0.711	-0.003	0.852		
Region 6 (North West)	0.000	0.981	0.001	0.956	0.004	0.693		
Region 7 (Scotland)	0.012	0.314						
Region 8 (South East)	-0.002	0.844	-0.002	0.821	0.000	0.959		
Region 9 (South West)	0.009	0.442	0.011	0.352	0.015	0.175		
Region 10 (Wales)	0.001	0.930	0.005	0.705				
Region 11 (West Midlands)	-0.001	0.944	0.000	0.998	0.002	0.808		
Region 12 (Yorkshire & Humber)	-0.007	0.585	-0.007	0.586	-0.002	0.869		
Region 13 (Northern Ireland)	-0.004	0.758	-0.005	0.705				
Proportion of population aged 0-14	-0.032	0.849	0.020	0.908	0.170	0.286	-0.495	0.492
Admin FTE per 1,000 premises	-0.006	0.032	-0.007	0.038	-0.005	0.079	0.000	0.960
Prof FTE per 1,000 premises	-0.001	0.532	-0.002	0.276	-0.001	0.679	0.001	0.893
Premise density	-0.005	0.499	-0.004	0.571	0.000	0.991	0.191	0.236
Population (000s) per premise	-0.051	0.545	-0.066	0.470	-0.049	0.557	0.024	0.919
Constant	0.003	0.934	0.001	0.980	-0.038	0.210	0.051	0.644
Adjusted R-square		0.069		0.082		0.069		0.046
Number of observations		240		215		185		25

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.9 DID regressions for the impact of the FHRS and FHIS on the proportion of poorly compliant premises (two years after the rollout)

Outcome: Proportion of poorly compliant premises among rated premises (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.012	0.052	-0.017	0.016	-0.015	0.022	-0.005	0.739
Local scheme (dummy)	0.018	0.003	0.016	0.009	0.017	0.006	0.028	0.152
Region 2 (East)	0.004	0.713	0.006	0.611	0.008	0.487		
Region 3 (East Midlands)	0.006	0.597	0.009	0.450	0.011	0.339		
Region 4 (East of England)	-0.025	0.242	-0.024	0.265	-0.020	0.305		
Region 5 (North East)	-0.005	0.786	-0.004	0.804	-0.003	0.872		
Region 6 (North West)	0.005	0.743	0.007	0.641	0.009	0.501		
Region 7 (Scotland)	0.021	0.136						
Region 8 (South East)	-0.003	0.808	-0.003	0.813	-0.001	0.942		
Region 9 (South West)	0.015	0.273	0.019	0.177	0.022	0.092		
Region 10 (Wales)	-0.007	0.664	0.000	0.988				
Region 11 (West Midlands)	-0.002	0.856	-0.001	0.925	0.001	0.942		
Region 12 (Yorkshire & Humber)	-0.001	0.963	0.000	0.975	0.003	0.799		
Region 13 (Northern Ireland)	-0.011	0.478	-0.011	0.505				
Proportion of population aged 0-14	-0.077	0.692	-0.026	0.896	0.076	0.689	-0.004	0.997
Admin FTE per 1,000 premises	-0.007	0.034	-0.009	0.023	-0.009	0.016	0.007	0.528
Prof FTE per 1,000 premises	-0.002	0.427	-0.003	0.197	-0.001	0.597	-0.001	0.909
Premise density	-0.003	0.740	-0.002	0.810	0.001	0.919	0.412	0.056
Population (000s) per premise	-0.007	0.941	-0.009	0.931	0.007	0.946	-0.097	0.751
Constant	-0.005	0.878	-0.008	0.825	-0.037	0.305	-0.032	0.820
Adjusted R-square	0.103		0.132		0.076		0.049	
Number of observations	238		213		183		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.10 DID regressions for the impact of the FHRS and FHIS on the proportion of broadly compliant premises (one year after the rollout)

Outcome: Proportion of broadly compliant premises among rated premises (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.016	0.013	0.020	0.007	0.018	0.009	0.008	0.623
Local scheme (dummy)	-0.014	0.022	-0.013	0.054	-0.013	0.041	-0.021	0.305
Region 2 (East)	0.006	0.607	0.005	0.668	0.004	0.695		
Region 3 (East Midlands)	-0.003	0.816	-0.005	0.696	-0.006	0.591		
Region 4 (East of England)	0.045	0.027	0.044	0.031	0.041	0.026		
Region 5 (North East)	0.008	0.660	0.007	0.696	0.005	0.764		
Region 6 (North West)	0.013	0.398	0.011	0.457	0.009	0.485		
Region 7 (Scotland)	-0.015	0.285						
Region 8 (South East)	0.008	0.489	0.008	0.495	0.007	0.546		
Region 9 (South West)	-0.005	0.744	-0.007	0.640	-0.008	0.519		
Region 10 (Wales)	0.005	0.778	0.000	0.995				
Region 11 (West Midlands)	0.002	0.851	0.002	0.896	0.001	0.919		
Region 12 (Yorkshire & Humber)	0.014	0.330	0.014	0.345	0.010	0.455		
Region 13 (Northern Ireland)	-0.002	0.909	-0.001	0.954				
Proportion of population aged 0-14	0.056	0.777	0.008	0.971	-0.167	0.386	0.586	0.552
Admin FTE per 1,000 premises	0.005	0.128	0.005	0.173	0.004	0.241	0.006	0.616
Prof FTE per 1,000 premises	0.005	0.022	0.006	0.013	0.002	0.277	0.001	0.918
Premise density	0.004	0.650	0.003	0.721	0.000	0.981	-0.045	0.835
Population (000s) per premise	0.016	0.873	0.029	0.791	0.051	0.614	-0.028	0.930
Constant	-0.008	0.828	-0.005	0.898	0.037	0.309	-0.077	0.608
Adjusted R-square	0.108		0.119		0.070		-0.205	
Number of observations	240		215		185		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.11 DID regressions for the impact of the FHRS and FHIS on the proportion of broadly compliant premises (two years after the rollout)

Outcome: Proportion of broadly compliant premises among rated premises (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.011	0.151	0.015	0.065	0.012	0.114	0.002	0.920
Local scheme (dummy)	-0.021	0.002	-0.021	0.004	-0.021	0.004	-0.016	0.553
Region 2 (East)	0.008	0.549	0.007	0.634	0.007	0.567		
Region 3 (East Midlands)	0.005	0.720	0.002	0.877	0.004	0.783		
Region 4 (East of England)	0.044	0.080	0.043	0.086	0.042	0.067		
Region 5 (North East)	0.009	0.662	0.008	0.689	0.009	0.656		
Region 6 (North West)	0.010	0.541	0.008	0.638	0.010	0.536		
Region 7 (Scotland)	-0.027	0.105						
Region 8 (South East)	0.013	0.362	0.012	0.372	0.012	0.324		
Region 9 (South West)	-0.011	0.519	-0.014	0.393	-0.013	0.398		
Region 10 (Wales)	0.014	0.461	0.005	0.788				
Region 11 (West Midlands)	0.007	0.674	0.005	0.726	0.006	0.669		
Region 12 (Yorkshire & Humber)	0.009	0.575	0.009	0.580	0.008	0.600		
Region 13 (Northern Ireland)	0.004	0.824	0.003	0.867				
Proportion of population aged 0-14	0.104	0.649	0.048	0.838	-0.061	0.784	0.372	0.775
Admin FTE per 1,000 premises	0.009	0.030	0.009	0.034	0.010	0.022	0.007	0.658
Prof FTE per 1,000 premises	0.005	0.029	0.007	0.006	0.004	0.188	-0.004	0.699
Premise density	-0.003	0.775	-0.004	0.702	-0.004	0.658	-0.250	0.387
Population (000s) per premise	-0.042	0.723	-0.035	0.779	0.014	0.907	0.090	0.833
Constant	-0.001	0.984	0.001	0.974	0.027	0.516	-0.023	0.909
Adjusted R-square	0.145		0.180		0.108		-0.182	
Number of observations	238		213		183		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.12 DID regressions for the impact of the FHRS and FHIS on the proportion of fully compliant premises (one year after the rollout)

Outcome: Proportion of fully compliant premises among rated premises (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.017	0.103	0.018	0.115	0.020	0.061	0.019	0.505
Local scheme (dummy)	-0.031	0.001	-0.032	0.002	-0.029	0.004	-0.034	0.322
Region 2 (East)	0.008	0.684	0.005	0.784	0.005	0.758		
Region 3 (East Midlands)	0.006	0.757	0.004	0.844	0.002	0.934		
Region 4 (East of England)	0.088	0.005	0.085	0.007	0.083	0.004		
Region 5 (North East)	0.021	0.468	0.020	0.480	0.017	0.523		
Region 6 (North West)	0.041	0.081	0.039	0.101	0.037	0.084		
Region 7 (Scotland)	-0.034	0.129						
Region 8 (South East)	0.031	0.103	0.029	0.124	0.029	0.089		
Region 9 (South West)	0.013	0.556	0.009	0.685	0.008	0.702		
Region 10 (Wales)	0.000	0.990	-0.002	0.947				
Region 11 (West Midlands)	0.023	0.269	0.022	0.296	0.021	0.272		
Region 12 (Yorkshire & Humber)	0.036	0.115	0.033	0.148	0.033	0.123		
Region 13 (Northern Ireland)	0.051	0.047	0.052	0.048				
Proportion of population aged 0-14	0.614	0.047	0.506	0.114	0.261	0.395	2.028	0.227
Admin FTE per 1,000 premises	0.003	0.576	0.004	0.484	0.003	0.602	-0.011	0.573
Prof FTE per 1,000 premises	0.001	0.650	0.000	0.969	0.000	0.905	0.013	0.296
Premise density	0.008	0.542	0.007	0.626	0.004	0.763	-0.090	0.803
Population (000s) per premise	-0.052	0.740	-0.050	0.766	0.062	0.700	-0.332	0.541
Constant	-0.040	0.481	-0.014	0.818	0.011	0.842	-0.318	0.217
Adjusted R-square	0.117		0.098		0.079		-0.115	
Number of observations	240		215		185		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.13 DID regressions for the impact of the FHRS and FHIS on the proportion of fully compliant premises (two years after the rollout)

Outcome: Proportion of fully compliant premises among rated premises (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.031	0.010	0.033	0.014	0.034	0.006	0.034	0.292
Local scheme (dummy)	-0.055	0.000	-0.058	0.000	-0.055	0.000	-0.050	0.210
Region 2 (East)	0.015	0.510	0.012	0.608	0.014	0.504		
Region 3 (East Midlands)	0.029	0.199	0.026	0.259	0.027	0.204		
Region 4 (East of England)	0.111	0.005	0.107	0.008	0.107	0.004		
Region 5 (North East)	0.029	0.394	0.027	0.420	0.027	0.387		
Region 6 (North West)	0.065	0.016	0.061	0.025	0.065	0.010		
Region 7 (Scotland)	-0.057	0.031						
Region 8 (South East)	0.042	0.054	0.040	0.070	0.043	0.033		
Region 9 (South West)	0.011	0.668	0.007	0.805	0.010	0.687		
Region 10 (Wales)	0.016	0.577	0.013	0.658	0.000			
Region 11 (West Midlands)	0.036	0.142	0.035	0.166	0.037	0.106		
Region 12 (Yorkshire & Humber)	0.040	0.129	0.037	0.171	0.041	0.099		
Region 13 (Northern Ireland)	0.061	0.042	0.062	0.041				
Proportion of population aged 0-14	0.755	0.037	0.602	0.108	0.385	0.283	2.587	0.176
Admin FTE per 1,000 premises	0.005	0.422	0.005	0.457	0.006	0.393	-0.002	0.912
Prof FTE per 1,000 premises	0.001	0.833	-0.001	0.873	0.000	0.961	0.009	0.498
Premise density	0.006	0.720	0.004	0.828	0.004	0.776	-0.165	0.688
Population (000s) per premise	-0.011	0.954	-0.005	0.981	0.186	0.325	-0.254	0.680
Constant	-0.038	0.570	-0.003	0.970	0.004	0.951	-0.407	0.166
Adjusted R-square		0.238		0.214		0.214		-0.044
Number of observations		238		213		183		25

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.14 DID regressions for the impact of the FHRS and FHIS on the number of inspections per premise (one year after the rollout)

Outcome: Number of inspections per rated premise (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.022	0.499	-0.019	0.613	-0.025	0.517	-0.006	0.941
Local scheme (dummy)	-0.042	0.162	-0.027	0.407	-0.050	0.167	-0.182	0.068
Region 2 (East)	-0.022	0.715	-0.020	0.752	-0.018	0.781		
Region 3 (East Midlands)	-0.030	0.636	-0.034	0.603	-0.020	0.764		
Region 4 (East of England)	-0.052	0.606	-0.053	0.603	-0.039	0.715		
Region 5 (North East)	-0.138	0.135	-0.143	0.128	-0.130	0.183		
Region 6 (North West)	0.070	0.346	0.067	0.380	0.079	0.323		
Region 7 (Scotland)	0.032	0.654						
Region 8 (South East)	0.008	0.895	0.009	0.884	0.011	0.860		
Region 9 (South West)	0.057	0.422	0.054	0.460	0.070	0.360		
Region 10 (Wales)	0.010	0.905	0.014	0.871				
Region 11 (West Midlands)	-0.007	0.915	-0.009	0.891	0.002	0.978		
Region 12 (Yorkshire & Humber)	0.019	0.792	0.015	0.840	0.028	0.720		
Region 13 (Northern Ireland)	0.056	0.492	0.065	0.440				
Proportion of population aged 0-14	0.604	0.539	0.533	0.606	1.027	0.363	2.038	0.655
Admin FTE per 1,000 premises	0.027	0.131	0.023	0.232	0.024	0.256	0.024	0.648
Prof FTE per 1,000 premises	-0.023	0.022	-0.024	0.035	-0.025	0.061	-0.016	0.635
Premise density	0.033	0.449	0.028	0.537	0.044	0.358	-0.132	0.895
Population (000s) per premise	-0.109	0.828	-0.186	0.733	-0.100	0.866	0.053	0.972
Constant	-0.031	0.865	-0.016	0.933	-0.101	0.635	-0.271	0.698
Adjusted R-square		0.013		0.004		0.000		-0.041
Number of observations		240		215		185		25

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.15 DID regressions for the impact of the FHRS and FHIS on the number of inspections per premise (two years after the rollout)

Outcome: Number of inspections per rated premise (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.025	0.467	0.041	0.284	0.035	0.390	0.009	0.934
Local scheme (dummy)	-0.013	0.685	0.012	0.724	-0.009	0.808	-0.245	0.068
Region 2 (East)	-0.045	0.488	-0.043	0.503	-0.045	0.508		
Region 3 (East Midlands)	-0.131	0.053	-0.138	0.041	-0.129	0.071		
Region 4 (East of England)	-0.146	0.211	-0.146	0.208	-0.136	0.263		
Region 5 (North East)	-0.240	0.015	-0.245	0.013	-0.231	0.025		
Region 6 (North West)	-0.073	0.355	-0.074	0.344	-0.067	0.416		
Region 7 (Scotland)	-0.085	0.267						
Region 8 (South East)	-0.055	0.384	-0.051	0.419	-0.051	0.441		
Region 9 (South West)	-0.065	0.388	-0.071	0.350	-0.065	0.420		
Region 10 (Wales)	-0.133	0.122	-0.131	0.134				
Region 11 (West Midlands)	-0.117	0.106	-0.118	0.103	-0.114	0.132		
Region 12 (Yorkshire & Humber)	-0.113	0.149	-0.114	0.143	-0.105	0.200		
Region 13 (Northern Ireland)	-0.068	0.436	-0.053	0.547				
Proportion of population aged 0-14	-0.477	0.651	-0.618	0.567	-0.033	0.978	0.978	0.874
Admin FTE per 1,000 premises	-0.008	0.658	-0.008	0.681	-0.002	0.927	-0.060	0.406
Prof FTE per 1,000 premises	-0.008	0.475	-0.009	0.461	-0.008	0.567	0.027	0.542
Premise density	0.006	0.892	0.002	0.962	0.015	0.774	-0.502	0.712
Population (000s) per premise	-0.433	0.423	-0.423	0.458	-0.518	0.410	-1.215	0.551
Constant	0.192	0.327	0.198	0.327	0.113	0.615	-0.085	0.928
Adjusted R-square		-0.007		-0.002		-0.010		-0.122
Number of observations		238		213		183		25

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.16 DID regressions for the impact of the FHRS and FHIS on the number of complaint-related investigations per premise (one year after the rollout)

Outcome: Number of complaint-related investigations per rated premise (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.024	0.150	0.017	0.365	0.016	0.427	0.025	0.476
Local scheme (dummy)	-0.008	0.607	-0.014	0.400	-0.021	0.272	0.054	0.216
Region 2 (East)	-0.075	0.015	-0.073	0.022	-0.075	0.028		
Region 3 (East Midlands)	-0.034	0.283	-0.028	0.393	-0.028	0.422		
Region 4 (East of England)	-0.044	0.372	-0.040	0.429	-0.041	0.457		
Region 5 (North East)	-0.053	0.247	-0.049	0.292	-0.049	0.331		
Region 6 (North West)	-0.023	0.539	-0.019	0.626	-0.021	0.614		
Region 7 (Scotland)	-0.057	0.116						
Region 8 (South East)	-0.010	0.732	-0.009	0.757	-0.012	0.721		
Region 9 (South West)	-0.057	0.106	-0.050	0.170	-0.051	0.194		
Region 10 (Wales)	-0.050	0.214	-0.044	0.296				
Region 11 (West Midlands)	-0.029	0.374	-0.026	0.435	-0.028	0.444		
Region 12 (Yorkshire & Humber)	-0.023	0.534	-0.019	0.606	-0.020	0.616		
Region 13 (Northern Ireland)	-0.002	0.951	-0.007	0.863				
Proportion of population aged 0-14	-1.010	0.039	-0.819	0.113	-0.747	0.202	-4.471	0.041
Admin FTE per 1,000 premises	0.003	0.747	0.003	0.766	0.002	0.836	0.008	0.724
Prof FTE per 1,000 premises	0.000	0.956	0.000	0.996	0.002	0.804	0.000	0.999
Premise density	-0.037	0.096	-0.032	0.156	-0.032	0.195	-0.184	0.685
Population (000s) per premise	-0.096	0.701	-0.108	0.690	-0.163	0.595	0.359	0.596
Constant	0.204	0.025	0.176	0.070	0.171	0.121	0.657	0.049
Adjusted R-square		-0.008		-0.020		-0.022		0.088
Number of observations		240		215		185		25

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.17 DID regressions for the impact of the FHRS and FHIS on the number of complaint-related investigations per premise (two years after the rollout)

Outcome: Number of complaint-related investigations per rated premise (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.039	0.073	0.014	0.451	0.013	0.507	0.066	0.573
Local scheme (dummy)	0.003	0.889	-0.014	0.385	-0.019	0.308	0.177	0.218
Region 2 (East)	-0.100	0.013	-0.086	0.007	-0.087	0.010		
Region 3 (East Midlands)	-0.056	0.178	-0.031	0.349	-0.031	0.375		
Region 4 (East of England)	-0.066	0.355	-0.046	0.410	-0.047	0.435		
Region 5 (North East)	-0.080	0.188	-0.066	0.161	-0.067	0.188		
Region 6 (North West)	-0.026	0.591	-0.005	0.892	-0.007	0.859		
Region 7 (Scotland)	-0.118	0.013						
Region 8 (South East)	-0.021	0.596	-0.014	0.654	-0.015	0.640		
Region 9 (South West)	-0.075	0.110	-0.043	0.240	-0.044	0.268		
Region 10 (Wales)	-0.075	0.154	-0.046	0.276				
Region 11 (West Midlands)	-0.039	0.383	-0.025	0.469	-0.026	0.484		
Region 12 (Yorkshire & Humber)	-0.038	0.430	-0.021	0.580	-0.021	0.601		
Region 13 (Northern Ireland)	-0.003	0.957	-0.011	0.793				
Proportion of population aged 0-14	-1.489	0.022	-0.819	0.118	-0.789	0.183	-14.441	0.045
Admin FTE per 1,000 premises	0.008	0.490	0.005	0.596	0.004	0.707	0.026	0.742
Prof FTE per 1,000 premises	0.000	0.980	0.000	0.981	0.002	0.773	0.004	0.928
Premise density	-0.043	0.139	-0.025	0.282	-0.025	0.317	-1.095	0.467
Population (000s) per premise	-0.033	0.921	0.022	0.937	-0.002	0.994	1.006	0.653
Constant	0.285	0.019	0.164	0.094	0.160	0.151	2.146	0.051
Adjusted R-square	0.006		-0.005		-0.005		0.044	
Number of observations	238		213		183		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.18 DID regressions for the impact of the FHRS and FHIS on the number of prosecutions per premise (one year after the rollout)

Outcome: Number of prosecutions per rated premise (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.002	0.148	0.003	0.097	0.003	0.095	0.000	0.116
Local scheme (dummy)	0.002	0.204	0.002	0.188	0.002	0.151	0.000	0.186
Region 2 (East)	-0.002	0.509	-0.002	0.456	-0.002	0.444		
Region 3 (East Midlands)	-0.003	0.315	-0.003	0.257	-0.004	0.223		
Region 4 (East of England)	-0.003	0.458	-0.003	0.440	-0.004	0.406		
Region 5 (North East)	0.000	0.944	0.000	0.909	-0.001	0.836		
Region 6 (North West)	-0.002	0.408	-0.003	0.362	-0.003	0.327		
Region 7 (Scotland)	-0.002	0.401						
Region 8 (South East)	-0.001	0.643	-0.001	0.619	-0.001	0.595		
Region 9 (South West)	0.002	0.491	0.001	0.672	0.001	0.842		
Region 10 (Wales)	-0.003	0.316	-0.004	0.263				
Region 11 (West Midlands)	-0.002	0.495	-0.002	0.468	-0.002	0.429		
Region 12 (Yorkshire & Humber)	-0.002	0.435	-0.003	0.398	-0.003	0.347		
Region 13 (Northern Ireland)	0.000	0.987	0.000	0.968				
Proportion of population aged 0-14	-0.074	0.061	-0.083	0.054	-0.101	0.040	0.032	0.015
Admin FTE per 1,000 premises	0.000	0.628	0.000	0.666	0.000	0.749	0.000	0.269
Prof FTE per 1,000 premises	0.000	0.770	0.000	0.723	0.000	0.698	0.000	0.303
Premise density	-0.003	0.129	-0.003	0.115	-0.004	0.089	0.003	0.243
Population (000s) per premise	-0.023	0.258	-0.026	0.249	-0.029	0.253	-0.012	0.005
Constant	0.017	0.024	0.019	0.021	0.022	0.015	-0.004	0.027
Adjusted R-square	0.010		0.013		0.020		0.454	
Number of observations	240		215		185		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.19 DID regressions for the impact of the FHRS and FHIS on the number of prosecutions per premise (two years after the rollout)

Outcome: Number of prosecutions per rated premise (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.000	0.556	0.000	0.465	0.000	0.554	0.000	0.991
Local scheme (dummy)	0.000	0.508	0.000	0.485	0.000	0.545	0.000	0.326
Region 2 (East)	0.000	0.756	0.000	0.784	0.000	0.842		
Region 3 (East Midlands)	0.001	0.030	0.001	0.039	0.001	0.052		
Region 4 (East of England)	0.000	0.957	0.000	0.943	0.000	0.886		
Region 5 (North East)	0.002	0.002	0.002	0.003	0.002	0.004		
Region 6 (North West)	0.001	0.181	0.001	0.205	0.001	0.253		
Region 7 (Scotland)	0.001	0.223						
Region 8 (South East)	0.001	0.287	0.001	0.334	0.000	0.367		
Region 9 (South West)	0.000	0.510	0.000	0.555	0.000	0.649		
Region 10 (Wales)	0.001	0.166	0.001	0.170				
Region 11 (West Midlands)	0.000	0.738	0.000	0.782	0.000	0.840		
Region 12 (Yorkshire & Humber)	0.001	0.150	0.001	0.191	0.001	0.228		
Region 13 (Northern Ireland)	0.000	0.925	0.000	1.000				
Proportion of population aged 0-14	0.004	0.657	0.005	0.606	0.003	0.767	-0.002	0.793
Admin FTE per 1,000 premises	0.000	0.053	0.000	0.056	0.000	0.091	0.000	0.184
Prof FTE per 1,000 premises	0.000	0.123	0.000	0.095	0.000	0.181	0.000	0.819
Premise density	0.000	0.479	0.000	0.514	0.000	0.632	0.002	0.253
Population (000s) per premise	-0.004	0.310	-0.005	0.265	-0.006	0.240	-0.001	0.793
Constant	0.000	0.815	0.000	0.872	0.000	0.944	0.000	0.885
Adjusted R-square	0.019		0.020		0.026		0.107	
Number of observations	238		213		183		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Food hygiene standard related outcomes (subgroup impact estimates)

Table A.20 DID regressions for the impact of the FHRs and FHIS on the proportion of poorly compliant premises (one year after the rollout)

Outcome: Proportion of poorly compliant premises among rated premises (after-before difference)	Joint FHRs and FHIS (England, Wales, Northern Ireland and Scotland)		FHRs (England, Wales and Northern Ireland)		FHRs (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.013	0.097	-0.019	0.047	-0.024	0.006	-0.010	0.521
Local scheme (dummy)	0.013	0.036	0.010	0.155	0.007	0.244	0.036	0.144
National scheme x local scheme (dummy)	-0.004	0.686	0.000	0.987	0.013	0.273	-0.009	0.750
Region 2 (East)	0.001	0.956	0.001	0.914	0.003	0.719		
Region 3 (East Midlands)	0.009	0.432	0.010	0.386	0.010	0.324		
Region 4 (East of England)	-0.028	0.105	-0.027	0.118	-0.023	0.120		
Region 5 (North East)	-0.007	0.666	-0.006	0.712	-0.002	0.876		
Region 6 (North West)	0.000	0.999	0.001	0.955	0.004	0.729		
Region 7 (Scotland)	0.013	0.298						
Region 8 (South East)	-0.002	0.858	-0.002	0.822	0.000	0.983		
Region 9 (South West)	0.010	0.398	0.011	0.367	0.011	0.302		
Region 10 (Wales)	0.001	0.951	0.005	0.710				
Region 11 (West Midlands)	-0.001	0.944	0.000	0.998	0.002	0.803		
Region 12 (Yorkshire & Humber)	-0.007	0.588	-0.007	0.587	-0.002	0.865		
Region 13 (Northern Ireland)	-0.004	0.797	-0.005	0.710				
Proportion of population aged 0-14	-0.031	0.855	0.020	0.909	0.170	0.284	-0.450	0.550
Admin FTE per 1,000 premises	-0.006	0.032	-0.007	0.039	-0.005	0.079	0.001	0.937
Prof FTE per 1,000 premises	-0.001	0.519	-0.002	0.277	-0.001	0.698	0.000	0.932
Premise density	-0.005	0.504	-0.004	0.573	0.000	0.970	0.190	0.250
Population (000s) per premise	-0.048	0.570	-0.066	0.477	-0.059	0.482	0.010	0.966
Constant	0.001	0.980	0.001	0.982	-0.033	0.270	0.045	0.698
Adjusted R-square	0.066		0.078		0.070		-0.007	
Number of observations	240		215		185		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.21 DID regressions for the impact of the FHRS and FHIS on the proportion of poorly compliant premises (two years after the rollout)

Outcome: Proportion of poorly compliant premises among rated premises (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.009	0.330	-0.016	0.120	-0.022	0.031	-0.003	0.889
Local scheme (dummy)	0.020	0.006	0.017	0.029	0.013	0.074	0.035	0.277
National scheme x local scheme (dummy)	-0.008	0.527	-0.002	0.891	0.012	0.373	-0.010	0.797
Region 2 (East)	0.005	0.697	0.006	0.611	0.008	0.481		
Region 3 (East Midlands)	0.008	0.516	0.010	0.444	0.009	0.457		
Region 4 (East of England)	-0.024	0.252	-0.024	0.269	-0.020	0.290		
Region 5 (North East)	-0.005	0.775	-0.005	0.802	-0.002	0.890		
Region 6 (North West)	0.005	0.717	0.007	0.638	0.008	0.519		
Region 7 (Scotland)	0.022	0.121						
Region 8 (South East)	-0.002	0.833	-0.003	0.819	-0.001	0.915		
Region 9 (South West)	0.017	0.224	0.019	0.180	0.019	0.160		
Region 10 (Wales)	-0.007	0.643	0.000	0.999				
Region 11 (West Midlands)	-0.002	0.858	-0.001	0.925	0.001	0.940		
Region 12 (Yorkshire & Humber)	-0.001	0.970	0.000	0.977	0.003	0.806		
Region 13 (Northern Ireland)	-0.010	0.532	-0.010	0.523				
Proportion of population aged 0-14	-0.074	0.702	-0.027	0.893	0.076	0.690	0.044	0.964
Admin FTE per 1,000 premises	-0.007	0.035	-0.009	0.023	-0.009	0.015	0.007	0.527
Prof FTE per 1,000 premises	-0.002	0.409	-0.003	0.196	-0.001	0.611	-0.001	0.883
Premise density	-0.003	0.749	-0.002	0.813	0.001	0.935	0.412	0.064
Population (000s) per premise	-0.003	0.979	-0.007	0.946	-0.002	0.986	-0.111	0.728
Constant	-0.009	0.809	-0.009	0.814	-0.032	0.370	-0.039	0.794
Adjusted R-square		0.100		0.128		0.075		-0.007
Number of observations		238		213		183		25

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.22 DID regressions for the impact of the FHRS and FHIS on the proportion of broadly compliant premises (one year after the rollout)

Outcome: Proportion of broadly compliant premises among rated premises (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.012	0.207	0.014	0.201	0.018	0.092	0.016	0.430
Local scheme (dummy)	-0.017	0.022	-0.016	0.048	-0.013	0.091	-0.003	0.931
National scheme x local scheme (dummy)	0.009	0.466	0.010	0.482	-0.001	0.957	-0.029	0.470
Region 2 (East)	0.006	0.620	0.005	0.667	0.004	0.697		
Region 3 (East Midlands)	-0.005	0.701	-0.007	0.596	-0.006	0.610		
Region 4 (East of England)	0.044	0.028	0.044	0.033	0.041	0.026		
Region 5 (North East)	0.008	0.647	0.008	0.682	0.005	0.766		
Region 6 (North West)	0.012	0.425	0.011	0.481	0.009	0.486		
Region 7 (Scotland)	-0.016	0.256						
Region 8 (South East)	0.008	0.510	0.008	0.515	0.007	0.547		
Region 9 (South West)	-0.007	0.618	-0.009	0.530	-0.008	0.544		
Region 10 (Wales)	0.005	0.744	0.002	0.924				
Region 11 (West Midlands)	0.002	0.852	0.002	0.897	0.001	0.920		
Region 12 (Yorkshire & Humber)	0.014	0.335	0.014	0.350	0.010	0.457		
Region 13 (Northern Ireland)	-0.003	0.841	-0.003	0.876				
Proportion of population aged 0-14	0.053	0.786	0.013	0.950	-0.167	0.388	0.725	0.477
Admin FTE per 1,000 premises	0.005	0.129	0.005	0.175	0.004	0.242	0.006	0.576
Prof FTE per 1,000 premises	0.005	0.020	0.006	0.012	0.002	0.279	0.000	0.998
Premise density	0.004	0.660	0.003	0.733	0.000	0.980	-0.046	0.833
Population (000s) per premise	0.010	0.922	0.017	0.873	0.052	0.613	-0.070	0.833
Constant	-0.004	0.909	-0.002	0.965	0.037	0.318	-0.097	0.534
Adjusted R-square	0.106		0.117		0.065		-0.238	
Number of observations	240		215		185		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.23 DID regressions for the impact of the FHRS and FHIS on the proportion of broadly compliant premises (two years after the rollout)

Outcome: Proportion of broadly compliant premises among rated premises (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.001	0.906	0.004	0.745	0.006	0.615	0.015	0.579
Local scheme (dummy)	-0.028	0.001	-0.028	0.002	-0.024	0.005	0.014	0.751
National scheme x local scheme (dummy)	0.019	0.181	0.020	0.195	0.011	0.495	-0.047	0.377
Region 2 (East)	0.008	0.579	0.006	0.644	0.007	0.563		
Region 3 (East Midlands)	0.001	0.946	-0.002	0.909	0.002	0.903		
Region 4 (East of England)	0.043	0.088	0.042	0.095	0.041	0.072		
Region 5 (North East)	0.010	0.639	0.009	0.664	0.009	0.645		
Region 6 (North West)	0.009	0.590	0.007	0.677	0.009	0.551		
Region 7 (Scotland)	-0.030	0.078						
Region 8 (South East)	0.012	0.398	0.011	0.407	0.012	0.338		
Region 9 (South West)	-0.016	0.338	-0.020	0.250	-0.015	0.322		
Region 10 (Wales)	0.015	0.423	0.008	0.688				
Region 11 (West Midlands)	0.007	0.678	0.005	0.731	0.006	0.668		
Region 12 (Yorkshire & Humber)	0.009	0.586	0.009	0.594	0.008	0.605		
Region 13 (Northern Ireland)	0.001	0.957	0.000	0.984				
Proportion of population aged 0-14	0.098	0.668	0.057	0.808	-0.061	0.783	0.597	0.654
Admin FTE per 1,000 premises	0.009	0.031	0.009	0.035	0.010	0.022	0.008	0.602
Prof FTE per 1,000 premises	0.006	0.025	0.007	0.005	0.004	0.184	-0.005	0.613
Premise density	-0.003	0.756	-0.004	0.681	-0.004	0.648	-0.252	0.387
Population (000s) per premise	-0.053	0.649	-0.056	0.652	0.006	0.960	0.022	0.960
Constant	0.007	0.864	0.008	0.847	0.031	0.463	-0.054	0.790
Adjusted R-square	0.148		0.183		0.105		-0.194	
Number of observations	238		213		183		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.24 DID regressions for the impact of the FHRS and FHIS on the proportion of fully compliant premises (one year after the rollout)

Outcome: Proportion of fully compliant premises among rated premises (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.018	0.213	0.023	0.181	0.046	0.007	0.018	0.600
Local scheme (dummy)	-0.030	0.011	-0.030	0.017	-0.016	0.166	-0.036	0.517
National scheme x local scheme (dummy)	-0.002	0.905	-0.008	0.700	-0.043	0.050	0.003	0.963
Region 2 (East)	0.008	0.682	0.005	0.785	0.004	0.800		
Region 3 (East Midlands)	0.007	0.743	0.006	0.784	0.010	0.601		
Region 4 (East of England)	0.088	0.005	0.085	0.007	0.085	0.004		
Region 5 (North East)	0.021	0.471	0.020	0.488	0.016	0.555		
Region 6 (North West)	0.041	0.081	0.039	0.098	0.039	0.068		
Region 7 (Scotland)	-0.034	0.135						
Region 8 (South East)	0.031	0.103	0.029	0.121	0.030	0.077		
Region 9 (South West)	0.014	0.550	0.011	0.626	0.019	0.380		
Region 10 (Wales)	-0.001	0.984	-0.003	0.909				
Region 11 (West Midlands)	0.023	0.270	0.022	0.297	0.021	0.273		
Region 12 (Yorkshire & Humber)	0.036	0.116	0.034	0.147	0.033	0.117		
Region 13 (Northern Ireland)	0.052	0.048	0.053	0.044				
Proportion of population aged 0-14	0.615	0.047	0.501	0.118	0.259	0.395	2.013	0.253
Admin FTE per 1,000 premises	0.003	0.576	0.004	0.485	0.003	0.597	-0.011	0.583
Prof FTE per 1,000 premises	0.001	0.656	0.000	0.955	0.000	0.940	0.013	0.313
Premise density	0.008	0.542	0.007	0.620	0.005	0.725	-0.090	0.809
Population (000s) per premise	-0.051	0.749	-0.040	0.812	0.097	0.548	-0.328	0.565
Constant	-0.041	0.475	-0.016	0.784	-0.003	0.954	-0.316	0.241
Adjusted R-square	0.113		0.094		0.094		-0.185	
Number of observations	240		215		185		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.25 DID regressions for the impact of the FHRS and FHIS on the proportion of fully compliant premises (two years after the rollout)

Outcome: Proportion of fully compliant premises among rated premises (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.028	0.088	0.033	0.092	0.057	0.003	0.037	0.346
Local scheme (dummy)	-0.057	0.000	-0.058	0.000	-0.043	0.002	-0.043	0.500
National scheme x local scheme (dummy)	0.005	0.806	0.000	0.993	-0.039	0.117	-0.011	0.888
Region 2 (East)	0.014	0.517	0.012	0.609	0.013	0.513		
Region 3 (East Midlands)	0.028	0.230	0.026	0.270	0.035	0.114		
Region 4 (East of England)	0.111	0.006	0.107	0.008	0.109	0.003		
Region 5 (North East)	0.029	0.392	0.027	0.422	0.025	0.407		
Region 6 (North West)	0.064	0.017	0.061	0.025	0.066	0.009		
Region 7 (Scotland)	-0.058	0.031						
Region 8 (South East)	0.042	0.056	0.040	0.071	0.044	0.028		
Region 9 (South West)	0.009	0.724	0.007	0.810	0.020	0.429		
Region 10 (Wales)	0.017	0.571	0.013	0.661				
Region 11 (West Midlands)	0.036	0.143	0.035	0.167	0.037	0.105		
Region 12 (Yorkshire & Humber)	0.040	0.131	0.037	0.172	0.041	0.094		
Region 13 (Northern Ireland)	0.060	0.048	0.062	0.044				
Proportion of population aged 0-14	0.753	0.038	0.602	0.109	0.386	0.280	2.639	0.189
Admin FTE per 1,000 premises	0.005	0.425	0.005	0.458	0.006	0.382	-0.002	0.925
Prof FTE per 1,000 premises	0.001	0.824	-0.001	0.873	0.000	0.934	0.009	0.528
Premise density	0.006	0.724	0.004	0.829	0.005	0.748	-0.166	0.696
Population (000s) per premise	-0.014	0.940	-0.004	0.982	0.214	0.256	-0.270	0.675
Constant	-0.036	0.599	-0.003	0.969	-0.010	0.880	-0.414	0.178
Adjusted R-square	0.235		0.210		0.221		-0.107	
Number of observations	238		213		183		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.26 DID regressions for the impact of the FHRS and FHIS on the number of inspections per premise (one year after the rollout)

Outcome: Number of inspections per rated premise (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.038	0.408	-0.029	0.604	-0.037	0.551	-0.100	0.239
Local scheme (dummy)	-0.053	0.154	-0.033	0.414	-0.056	0.197	-0.406	0.008
National scheme x local scheme (dummy)	0.030	0.622	0.017	0.807	0.020	0.806	0.357	0.045
Region 2 (East)	-0.023	0.707	-0.020	0.754	-0.018	0.787		
Region 3 (East Midlands)	-0.037	0.570	-0.038	0.576	-0.024	0.729		
Region 4 (East of England)	-0.053	0.598	-0.054	0.599	-0.040	0.710		
Region 5 (North East)	-0.137	0.139	-0.143	0.131	-0.129	0.186		
Region 6 (North West)	0.068	0.364	0.066	0.389	0.078	0.330		
Region 7 (Scotland)	0.029	0.693						
Region 8 (South East)	0.007	0.912	0.008	0.892	0.011	0.866		
Region 9 (South West)	0.048	0.514	0.049	0.514	0.065	0.413		
Region 10 (Wales)	0.012	0.881	0.016	0.848				
Region 11 (West Midlands)	-0.007	0.915	-0.009	0.891	0.002	0.977		
Region 12 (Yorkshire & Humber)	0.019	0.796	0.015	0.842	0.028	0.722		
Region 13 (Northern Ireland)	0.052	0.534	0.062	0.467				
Proportion of population aged 0-14	0.596	0.545	0.542	0.601	1.029	0.364	0.328	0.938
Admin FTE per 1,000 premises	0.027	0.132	0.023	0.234	0.024	0.258	0.015	0.761
Prof FTE per 1,000 premises	-0.023	0.024	-0.023	0.036	-0.025	0.062	-0.006	0.828
Premise density	0.033	0.455	0.028	0.542	0.044	0.363	-0.118	0.897
Population (000s) per premise	-0.130	0.797	-0.205	0.710	-0.116	0.846	0.566	0.682
Constant	-0.018	0.921	-0.011	0.956	-0.094	0.662	-0.033	0.959
Adjusted R-square		0.009		-0.001		-0.005		0.147
Number of observations		240		215		185		25

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.27 DID regressions for the impact of the FHRS and FHIS on the number of inspections per premise (two years after the rollout)

Outcome: Number of inspections per rated premise (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.000	1.000	0.011	0.842	0.001	0.986	-0.054	0.666
Local scheme (dummy)	-0.031	0.437	-0.006	0.885	-0.027	0.552	-0.394	0.065
National scheme x local scheme (dummy)	0.050	0.445	0.053	0.462	0.059	0.480	0.237	0.349
Region 2 (East)	-0.047	0.472	-0.044	0.498	-0.045	0.514		
Region 3 (East Midlands)	-0.142	0.040	-0.149	0.032	-0.140	0.056		
Region 4 (East of England)	-0.149	0.202	-0.149	0.200	-0.139	0.253		
Region 5 (North East)	-0.239	0.016	-0.243	0.014	-0.230	0.026		
Region 6 (North West)	-0.076	0.335	-0.077	0.329	-0.069	0.405		
Region 7 (Scotland)	-0.092	0.235						
Region 8 (South East)	-0.058	0.365	-0.053	0.399	-0.053	0.426		
Region 9 (South West)	-0.080	0.306	-0.086	0.277	-0.080	0.338		
Region 10 (Wales)	-0.130	0.132	-0.124	0.158				
Region 11 (West Midlands)	-0.118	0.106	-0.118	0.103	-0.114	0.133		
Region 12 (Yorkshire & Humber)	-0.113	0.146	-0.115	0.140	-0.106	0.198		
Region 13 (Northern Ireland)	-0.077	0.386	-0.062	0.483				
Proportion of population aged 0-14	-0.493	0.641	-0.595	0.582	-0.035	0.977	-0.154	0.980
Admin FTE per 1,000 premises	-0.009	0.652	-0.009	0.676	-0.002	0.921	-0.066	0.363
Prof FTE per 1,000 premises	-0.008	0.500	-0.008	0.480	-0.008	0.578	0.033	0.463
Premise density	0.006	0.903	0.002	0.975	0.014	0.787	-0.492	0.718
Population (000s) per premise	-0.464	0.392	-0.479	0.405	-0.561	0.375	-0.875	0.672
Constant	0.214	0.281	0.216	0.288	0.134	0.553	0.072	0.940
Adjusted R-square	-0.009		-0.004		-0.013		-0.127	
Number of observations	238		213		183		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.28 DID regressions for the impact of the FHRS and FHIS on the number of complaint-related investigations per premise (one year after the rollout)

Outcome: Number of complaint-related investigations per rated premise (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.018	0.429	0.005	0.866	0.011	0.737	0.033	0.441
Local scheme (dummy)	-0.011	0.539	-0.020	0.305	-0.023	0.303	0.073	0.301
National scheme x local scheme (dummy)	0.010	0.736	0.021	0.557	0.009	0.837	-0.030	0.727
Region 2 (East)	-0.075	0.015	-0.073	0.022	-0.075	0.029		
Region 3 (East Midlands)	-0.036	0.263	-0.032	0.338	-0.030	0.408		
Region 4 (East of England)	-0.045	0.369	-0.041	0.421	-0.041	0.455		
Region 5 (North East)	-0.053	0.252	-0.049	0.301	-0.049	0.336		
Region 6 (North West)	-0.023	0.527	-0.020	0.605	-0.021	0.609		
Region 7 (Scotland)	-0.058	0.110						
Region 8 (South East)	-0.011	0.722	-0.010	0.739	-0.012	0.717		
Region 9 (South West)	-0.060	0.100	-0.055	0.141	-0.054	0.192		
Region 10 (Wales)	-0.049	0.223	-0.041	0.336				
Region 11 (West Midlands)	-0.029	0.375	-0.026	0.435	-0.028	0.446		
Region 12 (Yorkshire & Humber)	-0.023	0.532	-0.020	0.601	-0.020	0.616		
Region 13 (Northern Ireland)	-0.004	0.919	-0.011	0.800				
Proportion of population aged 0-14	-1.013	0.039	-0.808	0.119	-0.746	0.204	-4.329	0.057
Admin FTE per 1,000 premises	0.003	0.748	0.003	0.768	0.002	0.837	0.009	0.708
Prof FTE per 1,000 premises	0.000	0.942	0.000	0.974	0.002	0.801	-0.001	0.961
Premise density	-0.037	0.095	-0.033	0.153	-0.032	0.195	-0.185	0.691
Population (000s) per premise	-0.103	0.682	-0.132	0.632	-0.170	0.582	0.317	0.654
Constant	0.208	0.024	0.182	0.062	0.174	0.119	0.638	0.066
Adjusted R-square		-0.012		-0.023		-0.028		0.039
Number of observations		240		215		185		25

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.29 DID regressions for the impact of the FHRS and FHIS on the number of complaint-related investigations per premise (two years after the rollout)

Outcome: Number of complaint-related investigations per rated premise (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.040	0.178	0.000	0.989	0.002	0.945	0.094	0.504
Local scheme (dummy)	0.004	0.875	-0.023	0.260	-0.025	0.268	0.245	0.289
National scheme x local scheme (dummy)	-0.003	0.940	0.025	0.468	0.020	0.637	-0.109	0.698
Region 2 (East)	-0.100	0.014	-0.086	0.007	-0.087	0.011		
Region 3 (East Midlands)	-0.055	0.195	-0.036	0.287	-0.035	0.335		
Region 4 (East of England)	-0.066	0.358	-0.048	0.396	-0.048	0.426		
Region 5 (North East)	-0.080	0.189	-0.065	0.168	-0.066	0.194		
Region 6 (North West)	-0.026	0.595	-0.006	0.869	-0.008	0.849		
Region 7 (Scotland)	-0.118	0.014						
Region 8 (South East)	-0.021	0.600	-0.015	0.629	-0.016	0.628		
Region 9 (South West)	-0.074	0.127	-0.050	0.188	-0.049	0.235		
Region 10 (Wales)	-0.075	0.155	-0.043	0.314				
Region 11 (West Midlands)	-0.039	0.385	-0.025	0.467	-0.026	0.486		
Region 12 (Yorkshire & Humber)	-0.038	0.432	-0.021	0.573	-0.021	0.599		
Region 13 (Northern Ireland)	-0.002	0.964	-0.016	0.715				
Proportion of population aged 0-14	-1.488	0.023	-0.808	0.124	-0.790	0.184	-13.920	0.063
Admin FTE per 1,000 premises	0.008	0.490	0.005	0.601	0.004	0.712	0.029	0.722
Prof FTE per 1,000 premises	0.000	0.977	0.000	0.995	0.002	0.766	0.002	0.975
Premise density	-0.043	0.140	-0.025	0.275	-0.026	0.314	-1.099	0.477
Population (000s) per premise	-0.031	0.926	-0.005	0.985	-0.016	0.958	0.850	0.715
Constant	0.284	0.021	0.173	0.080	0.167	0.139	2.073	0.069
Adjusted R-square		0.001		-0.007		-0.010		-0.006
Number of observations		238		213		183		25

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.30 DID regressions for the impact of the FHRS and FHIS on the number of prosecutions per premise (one year after the rollout)

Outcome: Number of prosecutions per rated premise (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.000	0.830	0.001	0.772	0.000	0.944	0.000	0.322
Local scheme (dummy)	0.001	0.716	0.001	0.656	0.001	0.596	0.000	0.746
National scheme x local scheme (dummy)	0.003	0.242	0.003	0.267	0.004	0.210	0.000	0.504
Region 2 (East)	-0.002	0.491	-0.002	0.459	-0.002	0.465		
Region 3 (East Midlands)	-0.003	0.217	-0.004	0.179	-0.004	0.141		
Region 4 (East of England)	-0.003	0.439	-0.003	0.422	-0.004	0.385		
Region 5 (North East)	0.000	0.968	0.000	0.934	-0.001	0.863		
Region 6 (North West)	-0.003	0.368	-0.003	0.332	-0.004	0.300		
Region 7 (Scotland)	-0.003	0.339						
Region 8 (South East)	-0.001	0.608	-0.001	0.588	-0.002	0.570		
Region 9 (South West)	0.001	0.708	0.000	0.894	0.000	0.896		
Region 10 (Wales)	-0.003	0.354	-0.003	0.332				
Region 11 (West Midlands)	-0.002	0.494	-0.002	0.467	-0.002	0.433		
Region 12 (Yorkshire & Humber)	-0.002	0.427	-0.003	0.390	-0.003	0.344		
Region 13 (Northern Ireland)	0.000	0.900	0.000	0.907				
Proportion of population aged 0-14	-0.075	0.058	-0.082	0.059	-0.101	0.040	0.033	0.014
Admin FTE per 1,000 premises	0.000	0.632	0.000	0.668	0.000	0.751	0.000	0.253
Prof FTE per 1,000 premises	0.000	0.819	0.000	0.762	0.000	0.720	0.000	0.363
Premise density	-0.003	0.124	-0.003	0.109	-0.004	0.083	0.003	0.253
Population (000s) per premise	-0.025	0.220	-0.030	0.192	-0.033	0.202	-0.013	0.005
Constant	0.018	0.017	0.020	0.015	0.024	0.010	-0.005	0.026
Adjusted R-square	0.011		0.014		0.023		0.436	
Number of observations	240		215		185		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Table A.31 DID regressions for the impact of the FHRS and FHIS on the number of prosecutions per premise (two years after the rollout)

Outcome: Number of prosecutions per rated premise (after-before difference)	Joint FHRS and FHIS (England, Wales, Northern Ireland and Scotland)		FHRS (England, Wales and Northern Ireland)		FHRS (England only)		FHIS (Scotland)	
	Coef.	P> t	Coef.	P> t	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.000	0.988	0.000	0.831	0.000	0.919	0.000	0.520
Local scheme (dummy)	0.000	0.873	0.000	0.737	0.000	0.767	0.000	0.770
National scheme x local scheme (dummy)	0.000	0.522	0.000	0.695	0.000	0.713	0.000	0.238
Region 2 (East)	0.000	0.740	0.000	0.781	0.000	0.845		
Region 3 (East Midlands)	0.001	0.024	0.001	0.036	0.001	0.049		
Region 4 (East of England)	0.000	0.976	0.000	0.954	0.000	0.898		
Region 5 (North East)	0.002	0.002	0.002	0.004	0.002	0.004		
Region 6 (North West)	0.001	0.171	0.001	0.201	0.001	0.250		
Region 7 (Scotland)	0.001	0.200						
Region 8 (South East)	0.001	0.275	0.001	0.326	0.000	0.362		
Region 9 (South West)	0.000	0.426	0.000	0.504	0.000	0.594		
Region 10 (Wales)	0.001	0.176	0.001	0.187				
Region 11 (West Midlands)	0.000	0.736	0.000	0.781	0.000	0.841		
Region 12 (Yorkshire & Humber)	0.001	0.149	0.001	0.190	0.001	0.228		
Region 13 (Northern Ireland)	0.000	0.863	0.000	0.955				
Proportion of population aged 0-14	0.004	0.648	0.005	0.615	0.003	0.767	0.000	0.974
Admin FTE per 1,000 premises	0.000	0.052	0.000	0.057	0.000	0.091	0.000	0.149
Prof FTE per 1,000 premises	0.000	0.116	0.000	0.093	0.000	0.180	0.000	0.953
Premise density	0.000	0.473	0.000	0.510	0.000	0.627	0.002	0.250
Population (000s) per premise	-0.004	0.335	-0.005	0.293	-0.006	0.258	-0.001	0.639
Constant	-0.001	0.747	0.000	0.835	0.000	0.984	0.000	0.949
Adjusted R-square	0.016		0.015		0.020		0.133	
Number of observations	238		213		183		25	

NOTE: In all regressions but that for the FHIS (Scotland), the omitted region (Region 1) is London.

Food-borne illness related outcomes (overall impact estimates) – Adjusted figures

Table A.32 DID regressions for the impact of the FHRS on the number of food poisoning reports per 1,000 population (one year after the rollout)

Outcome: Number of food poisoning reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.267	0.017	-0.269	0.021
Local scheme (dummy)	-0.141	0.153	-0.159	0.140
Region 2 (East)	0.433	0.022	0.420	0.035
Region 3 (East Midlands)	0.856	0.000	0.849	0.000
Region 4 (East of England)	-0.325	0.281	-0.341	0.280
Region 5 (North East)	0.268	0.333	0.270	0.352
Region 6 (North West)	-0.141	0.535	-0.148	0.534
Region 8 (South East)	0.084	0.654	0.074	0.705
Region 9 (South West)	0.456	0.041	0.438	0.061
Region 10 (Wales)	0.426	0.097	0.000	
Region 11 (West Midlands)	0.057	0.777	0.046	0.826
Region 12 (Yorkshire & Humber)	0.345	0.122	0.338	0.149
Proportion of population aged 0-14	2.522	0.426	2.396	0.480
Admin FTE per 1,000 premises	0.216	0.000	0.229	0.000
Prof FTE per 1,000 premises	-0.023	0.505	-0.022	0.589
Premise density	0.254	0.061	0.248	0.083
Population (000s) per premise	0.913	0.576	0.844	0.632
Constant	-0.915	0.122	-0.875	0.173
Adjusted R-square		0.199		0.204
Number of observations		199		180

NOTE: The omitted region (Region 1) is London.

Table A.33 DID regressions for the impact of the FHRS on the number of food poisoning reports per 1,000 population (two years after the rollout)

Outcome: Number of food poisoning reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.089	0.330	0.091	0.333
Local scheme (dummy)	0.031	0.699	0.047	0.591
Region 2 (East)	0.495	0.004	0.501	0.004
Region 3 (East Midlands)	0.147	0.403	0.151	0.406
Region 4 (East of England)	0.211	0.444	0.212	0.457
Region 5 (North East)	0.365	0.123	0.370	0.129
Region 6 (North West)	-0.093	0.636	-0.083	0.684
Region 8 (South East)	0.192	0.246	0.200	0.243
Region 9 (South West)	0.392	0.048	0.396	0.054
Region 10 (Wales)	0.375	0.095	0.000	
Region 11 (West Midlands)	0.257	0.162	0.263	0.168
Region 12 (Yorkshire & Humber)	0.266	0.179	0.270	0.187
Proportion of population aged 0-14	-1.105	0.691	-1.520	0.606
Admin FTE per 1,000 premises	0.010	0.865	0.018	0.776
Prof FTE per 1,000 premises	-0.027	0.354	-0.037	0.272
Premise density	0.326	0.104	0.329	0.113
Population (000s) per premise	3.124	0.027	3.345	0.026
Constant	-0.653	0.198	-0.596	0.270
Adjusted R-square		0.068		0.072
Number of observations		192		175

NOTE: The omitted region (Region 1) is London.

Table A.34 DID regressions for the impact of the FHRS on the number of Salmonella reports per 1,000 population (one year after the rollout)

Outcome: Number of Salmonella reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.002	0.766	0.003	0.747
Local scheme (dummy)	0.010	0.159	0.012	0.110
Region 2 (East)	0.018	0.196	0.016	0.256
Region 3 (East Midlands)	0.027	0.066	0.024	0.109
Region 4 (East of England)	0.018	0.453	0.013	0.571
Region 5 (North East)	-0.043	0.033	-0.046	0.024
Region 6 (North West)	0.010	0.555	0.006	0.703
Region 8 (South East)	0.000	0.991	-0.002	0.887
Region 9 (South West)	-0.005	0.756	-0.010	0.551
Region 10 (Wales)	-0.004	0.821	0.000	
Region 11 (West Midlands)	0.031	0.043	0.027	0.074
Region 12 (Yorkshire & Humber)	0.025	0.136	0.021	0.215
Proportion of population aged 0-14	-0.369	0.096	-0.465	0.041
Admin FTE per 1,000 premises	-0.009	0.100	-0.008	0.162
Prof FTE per 1,000 premises	0.004	0.106	0.004	0.168
Premise density	-0.012	0.462	-0.017	0.309
Population (000s) per premise	-0.077	0.512	-0.112	0.355
Constant	0.058	0.166	0.081	0.063
Adjusted R-square	0.120		0.139	
Number of observations	198		178	

NOTE: The omitted region (Region 1) is London.

Table A.35 DID regressions for the impact of the FHRS on the number of Salmonella reports per 1,000 population (two years after the rollout)

Outcome: Number of Salmonella reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.002	0.856	0.002	0.842
Local scheme (dummy)	-0.002	0.750	-0.001	0.896
Region 2 (East)	0.020	0.182	0.020	0.173
Region 3 (East Midlands)	0.022	0.167	0.021	0.173
Region 4 (East of England)	0.015	0.597	0.014	0.606
Region 5 (North East)	0.010	0.623	0.010	0.643
Region 6 (North West)	0.018	0.301	0.018	0.309
Region 8 (South East)	0.001	0.956	0.001	0.950
Region 9 (South West)	0.011	0.504	0.011	0.527
Region 10 (Wales)	0.018	0.356	0.000	
Region 11 (West Midlands)	0.027	0.096	0.027	0.099
Region 12 (Yorkshire & Humber)	0.041	0.022	0.040	0.022
Proportion of population aged 0-14	0.077	0.745	0.034	0.887
Admin FTE per 1,000 premises	-0.007	0.221	-0.007	0.255
Prof FTE per 1,000 premises	0.000	0.929	0.001	0.779
Premise density	0.004	0.828	0.003	0.857
Population (000s) per premise	-0.049	0.698	-0.046	0.716
Constant	-0.015	0.733	-0.011	0.810
Adjusted R-square	-0.008		-0.004	
Number of observations	195		175	

NOTE: The omitted region (Region 1) is London.

Table A.36 DID regressions for the impact of the FHRS on the number of Campylobacter reports per 1,000 population (one year after the rollout)

Outcome: Number of Campylobacter reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.099	0.271	-0.109	0.181
Local scheme (dummy)	-0.078	0.329	-0.080	0.292
Region 2 (East)	0.132	0.373	0.165	0.221
Region 3 (East Midlands)	0.042	0.786	0.094	0.504
Region 4 (East of England)	-0.123	0.609	-0.073	0.741
Region 5 (North East)	0.397	0.073	0.443	0.028
Region 6 (North West)	0.139	0.437	0.207	0.205
Region 8 (South East)	0.137	0.339	0.178	0.174
Region 9 (South West)	0.310	0.072	0.379	0.016
Region 10 (Wales)	0.253	0.206	0.000	
Region 11 (West Midlands)	-0.019	0.905	0.023	0.876
Region 12 (Yorkshire & Humber)	0.333	0.059	0.407	0.012
Proportion of population aged 0-14	4.192	0.093	5.276	0.024
Admin FTE per 1,000 premises	0.085	0.127	0.113	0.032
Prof FTE per 1,000 premises	-0.003	0.902	0.003	0.901
Premise density	0.127	0.240	0.188	0.058
Population (000s) per premise	1.011	0.448	1.960	0.118
Constant	-0.861	0.064	-1.262	0.004
Adjusted R-square	0.013		0.074	
Number of observations	204		184	

NOTE: The omitted region (Region 1) is London.

Table A.37 DID regressions for the impact of the FHRS on the number of Campylobacter reports per 1,000 population (two years after the rollout)

Outcome: Number of Campylobacter reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.082	0.432	0.077	0.453
Local scheme (dummy)	-0.117	0.208	-0.124	0.195
Region 2 (East)	-0.130	0.452	-0.107	0.535
Region 3 (East Midlands)	-0.285	0.116	-0.250	0.165
Region 4 (East of England)	-0.354	0.251	-0.317	0.301
Region 5 (North East)	-0.039	0.881	-0.012	0.964
Region 6 (North West)	-0.200	0.341	-0.155	0.459
Region 8 (South East)	0.061	0.717	0.088	0.598
Region 9 (South West)	0.255	0.212	0.305	0.135
Region 10 (Wales)	-0.240	0.309	0.000	
Region 11 (West Midlands)	-0.216	0.263	-0.183	0.339
Region 12 (Yorkshire & Humber)	0.199	0.338	0.247	0.233
Proportion of population aged 0-14	-1.074	0.717	-0.843	0.780
Admin FTE per 1,000 premises	-0.037	0.518	-0.030	0.606
Prof FTE per 1,000 premises	0.030	0.356	0.029	0.426
Premise density	-0.032	0.806	0.008	0.950
Population (000s) per premise	0.627	0.686	1.500	0.344
Constant	0.234	0.672	0.051	0.928
Adjusted R-square	0.031		0.045	
Number of observations	203		183	

NOTE: The omitted region (Region 1) is London.

Food-borne illness related outcomes (overall impact estimates) – Unadjusted figures

Table A.38 DID regressions for the impact of the FHRS on the number of food poisoning reports per 1,000 population (one year after the rollout)

Outcome: Number of food poisoning reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.160	0.073	-0.160	0.085
Local scheme (dummy)	-0.084	0.284	-0.086	0.313
Region 2 (East)	0.349	0.036	0.349	0.045
Region 3 (East Midlands)	0.472	0.007	0.470	0.011
Region 4 (East of England)	-0.338	0.177	-0.344	0.187
Region 5 (North East)	0.260	0.259	0.259	0.279
Region 6 (North West)	0.208	0.285	0.207	0.309
Region 8 (South East)	0.177	0.284	0.179	0.301
Region 9 (South West)	0.310	0.107	0.303	0.132
Region 10 (Wales)	0.286	0.192	0.000	
Region 11 (West Midlands)	0.114	0.513	0.108	0.553
Region 12 (Yorkshire & Humber)	0.249	0.201	0.251	0.217
Proportion of population aged 0-14	1.507	0.548	1.347	0.615
Admin FTE per 1,000 premises	0.068	0.146	0.074	0.137
Prof FTE per 1,000 premises	0.013	0.648	0.021	0.525
Premise density	0.347	0.070	0.353	0.080
Population (000s) per premise	1.638	0.210	1.641	0.242
Constant	-0.867	0.072	-0.872	0.094
Adjusted R-square		0.046		0.045
Number of observations		194		176

NOTE: The omitted region (Region 1) is London.

Table A.39 DID regressions for the impact of the FHRS on the number of food poisoning reports per 1,000 population (two years after the rollout)

Outcome: Number of food poisoning reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.064	0.408	-0.066	0.407
Local scheme (dummy)	0.022	0.746	0.034	0.641
Region 2 (East)	0.257	0.071	0.265	0.068
Region 3 (East Midlands)	0.170	0.254	0.176	0.248
Region 4 (East of England)	-0.068	0.769	-0.067	0.777
Region 5 (North East)	0.308	0.121	0.312	0.123
Region 6 (North West)	0.144	0.386	0.153	0.367
Region 8 (South East)	0.154	0.267	0.164	0.249
Region 9 (South West)	0.287	0.086	0.292	0.087
Region 10 (Wales)	0.248	0.193	0.000	
Region 11 (West Midlands)	0.180	0.243	0.182	0.249
Region 12 (Yorkshire & Humber)	0.160	0.338	0.170	0.319
Proportion of population aged 0-14	1.458	0.533	1.269	0.604
Admin FTE per 1,000 premises	0.038	0.441	0.049	0.342
Prof FTE per 1,000 premises	0.011	0.645	0.018	0.524
Premise density	0.222	0.187	0.230	0.182
Population (000s) per premise	1.964	0.097	2.092	0.093
Constant	-0.922	0.032	-0.952	0.036
Adjusted R-square		-0.018		-0.011
Number of observations		191		174

NOTE: The omitted region (Region 1) is London.

Table A.40 DID regressions for the impact of the FHRS on the number of Salmonella reports per 1,000 population (one year after the rollout)

Outcome: Number of Salmonella reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.000	0.928	0.000	0.921
Local scheme (dummy)	0.006	0.165	0.006	0.165
Region 2 (East)	0.010	0.224	0.009	0.279
Region 3 (East Midlands)	0.015	0.074	0.014	0.113
Region 4 (East of England)	0.001	0.934	0.000	0.992
Region 5 (North East)	-0.026	0.022	-0.027	0.022
Region 6 (North West)	0.004	0.670	0.003	0.778
Region 8 (South East)	-0.002	0.777	-0.003	0.713
Region 9 (South West)	-0.013	0.158	-0.014	0.131
Region 10 (Wales)	-0.006	0.550	0.000	
Region 11 (West Midlands)	0.009	0.272	0.008	0.358
Region 12 (Yorkshire & Humber)	0.005	0.610	0.003	0.729
Proportion of population aged 0-14	-0.112	0.368	-0.136	0.308
Admin FTE per 1,000 premises	-0.003	0.251	-0.003	0.300
Prof FTE per 1,000 premises	0.002	0.202	0.002	0.261
Premise density	-0.011	0.249	-0.012	0.207
Population (000s) per premise	-0.123	0.066	-0.139	0.053
Constant	0.035	0.133	0.042	0.098
Adjusted R-square	0.130		0.133	
Number of observations	196		176	

NOTE: The omitted region (Region 1) is London.

Table A.41 DID regressions for the impact of the FHRS on the number of Salmonella reports per 1,000 population (two years after the rollout)

Outcome: Number of Salmonella reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.003	0.602	-0.003	0.578
Local scheme (dummy)	0.000	0.965	0.001	0.875
Region 2 (East)	0.011	0.224	0.012	0.136
Region 3 (East Midlands)	0.015	0.117	0.016	0.069
Region 4 (East of England)	0.006	0.701	0.008	0.619
Region 5 (North East)	-0.002	0.871	-0.002	0.881
Region 6 (North West)	0.009	0.375	0.010	0.284
Region 8 (South East)	-0.001	0.908	0.000	0.975
Region 9 (South West)	0.003	0.751	0.005	0.622
Region 10 (Wales)	0.018	0.122	0.000	
Region 11 (West Midlands)	0.014	0.164	0.014	0.112
Region 12 (Yorkshire & Humber)	0.020	0.055	0.022	0.024
Proportion of population aged 0-14	0.054	0.705	0.050	0.710
Admin FTE per 1,000 premises	-0.004	0.237	-0.004	0.227
Prof FTE per 1,000 premises	0.001	0.583	0.002	0.172
Premise density	0.002	0.846	0.004	0.726
Population (000s) per premise	-0.013	0.863	0.004	0.952
Constant	-0.010	0.698	-0.019	0.463
Adjusted R-square	-0.002		0.014	
Number of observations	193		173	

NOTE: The omitted region (Region 1) is London.

Table A.42 DID regressions for the impact of the FHRS on the number of Campylobacter reports per 1,000 population (one year after the rollout)

Outcome: Number of Campylobacter reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.039	0.030	0.039	0.042
Local scheme (dummy)	-0.003	0.868	-0.003	0.884
Region 2 (East)	-0.039	0.182	-0.039	0.217
Region 3 (East Midlands)	-0.056	0.069	-0.055	0.092
Region 4 (East of England)	0.002	0.963	0.003	0.954
Region 5 (North East)	0.125	0.005	0.126	0.007
Region 6 (North West)	-0.015	0.670	-0.014	0.717
Region 8 (South East)	-0.006	0.838	-0.005	0.873
Region 9 (South West)	-0.009	0.787	-0.008	0.833
Region 10 (Wales)	-0.043	0.284	0.000	
Region 11 (West Midlands)	-0.016	0.614	-0.015	0.645
Region 12 (Yorkshire & Humber)	0.040	0.255	0.042	0.260
Proportion of population aged 0-14	-0.177	0.722	-0.167	0.757
Admin FTE per 1,000 premises	0.008	0.472	0.009	0.459
Prof FTE per 1,000 premises	0.000	0.974	0.001	0.922
Premise density	0.005	0.819	0.006	0.790
Population (000s) per premise	0.376	0.158	0.407	0.161
Constant	-0.012	0.895	-0.022	0.824
Adjusted R-square		0.057		0.055
Number of observations		204		184

NOTE: The omitted region (Region 1) is London.

Table A.43 DID regressions for the impact of the FHRS on the number of Campylobacter reports per 1,000 population (two years after the rollout)

Outcome: Number of Campylobacter reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.069	0.009	0.069	0.014
Local scheme (dummy)	-0.007	0.755	-0.007	0.773
Region 2 (East)	-0.032	0.459	-0.033	0.482
Region 3 (East Midlands)	-0.127	0.006	-0.127	0.009
Region 4 (East of England)	-0.022	0.773	-0.023	0.782
Region 5 (North East)	0.132	0.046	0.132	0.059
Region 6 (North West)	-0.024	0.648	-0.024	0.669
Region 8 (South East)	0.021	0.617	0.021	0.636
Region 9 (South West)	-0.023	0.650	-0.024	0.666
Region 10 (Wales)	-0.071	0.233	0.000	
Region 11 (West Midlands)	0.007	0.889	0.007	0.898
Region 12 (Yorkshire & Humber)	-0.084	0.112	-0.083	0.135
Proportion of population aged 0-14	-0.545	0.467	-0.566	0.486
Admin FTE per 1,000 premises	0.008	0.586	0.009	0.586
Prof FTE per 1,000 premises	-0.002	0.783	-0.002	0.813
Premise density	-0.007	0.840	-0.007	0.849
Population (000s) per premise	0.234	0.550	0.248	0.562
Constant	0.075	0.592	0.077	0.615
Adjusted R-square		0.072		0.068
Number of observations		203		183

NOTE: The omitted region (Region 1) is London.

Food-borne illness related outcomes (overall impact estimates) – Alternative adjustment

Table A.44 DID regressions for the impact of the FHRS on the number of food poisoning reports per 1,000 population (one year after the rollout)

Outcome: Number of food poisoning reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.204	0.072	-0.206	0.084
Local scheme (dummy)	-0.096	0.343	-0.109	0.324
Region 2 (East)	0.450	0.021	0.438	0.032
Region 3 (East Midlands)	1.374	0.000	1.366	0.000
Region 4 (East of England)	-0.245	0.427	-0.261	0.420
Region 5 (North East)	0.376	0.186	0.375	0.207
Region 6 (North West)	0.064	0.782	0.056	0.817
Region 8 (South East)	0.114	0.551	0.105	0.600
Region 9 (South West)	-0.079	0.727	-0.097	0.685
Region 10 (Wales)	0.509	0.053	0.000	
Region 11 (West Midlands)	0.119	0.565	0.108	0.618
Region 12 (Yorkshire & Humber)	0.539	0.019	0.532	0.028
Proportion of population aged 0-14	0.122	0.970	-0.093	0.979
Admin FTE per 1,000 premises	0.145	0.018	0.156	0.017
Prof FTE per 1,000 premises	-0.006	0.856	-0.006	0.892
Premise density	0.221	0.111	0.214	0.145
Population (000s) per premise	1.273	0.447	1.219	0.500
Constant	-0.716	0.237	-0.664	0.313
Adjusted R-square		0.341		0.343
Number of observations		199		180

NOTE: The omitted region (Region 1) is London.

Table A.45 DID regressions for the impact of the FHRS on the number of food poisoning reports per 1,000 population (two years after the rollout)

Outcome: Number of food poisoning reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.008	0.939	-0.007	0.949
Local scheme (dummy)	-0.004	0.961	0.006	0.955
Region 2 (East)	0.530	0.006	0.535	0.008
Region 3 (East Midlands)	0.297	0.140	0.300	0.151
Region 4 (East of England)	0.160	0.612	0.159	0.626
Region 5 (North East)	0.372	0.167	0.375	0.179
Region 6 (North West)	0.098	0.662	0.105	0.654
Region 8 (South East)	0.189	0.315	0.195	0.319
Region 9 (South West)	-0.127	0.573	-0.124	0.595
Region 10 (Wales)	0.490	0.056	0.000	
Region 11 (West Midlands)	0.260	0.215	0.263	0.228
Region 12 (Yorkshire & Humber)	0.548	0.016	0.552	0.019
Proportion of population aged 0-14	-1.625	0.609	-1.913	0.571
Admin FTE per 1,000 premises	-0.047	0.484	-0.041	0.569
Prof FTE per 1,000 premises	0.005	0.882	0.001	0.970
Premise density	0.320	0.162	0.323	0.175
Population (000s) per premise	2.653	0.097	2.783	0.104
Constant	-0.640	0.269	-0.610	0.325
Adjusted R-square		0.073		0.066
Number of observations		192		175

NOTE: The omitted region (Region 1) is London.

Table A.46 DID regressions for the impact of the FHRS on the number of Salmonella reports per 1,000 population (one year after the rollout)

Outcome: Number of Salmonella reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.003	0.717	0.003	0.707
Local scheme (dummy)	0.005	0.491	0.008	0.329
Region 2 (East)	0.015	0.323	0.014	0.377
Region 3 (East Midlands)	0.026	0.122	0.023	0.163
Region 4 (East of England)	0.011	0.680	0.007	0.803
Region 5 (North East)	-0.028	0.215	-0.029	0.190
Region 6 (North West)	-0.003	0.873	-0.005	0.796
Region 8 (South East)	0.002	0.896	0.001	0.962
Region 9 (South West)	-0.004	0.825	-0.007	0.677
Region 10 (Wales)	-0.016	0.424	0.000	
Region 11 (West Midlands)	0.019	0.249	0.017	0.317
Region 12 (Yorkshire & Humber)	0.031	0.096	0.028	0.132
Proportion of population aged 0-14	-0.288	0.241	-0.363	0.149
Admin FTE per 1,000 premises	0.000	0.959	0.003	0.673
Prof FTE per 1,000 premises	0.002	0.346	0.001	0.609
Premise density	0.003	0.877	-0.001	0.960
Population (000s) per premise	0.014	0.917	0.001	0.996
Constant	0.030	0.518	0.047	0.328
Adjusted R-square		0.042		0.034
Number of observations		198		178

NOTE: The omitted region (Region 1) is London.

Table A.47 DID regressions for the impact of the FHRS on the number of Salmonella reports per 1,000 population (two years after the rollout)

Outcome: Number of Salmonella reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.009	0.322	0.009	0.307
Local scheme (dummy)	-0.005	0.492	-0.004	0.594
Region 2 (East)	0.011	0.499	0.011	0.460
Region 3 (East Midlands)	-0.005	0.766	-0.004	0.803
Region 4 (East of England)	0.016	0.599	0.016	0.583
Region 5 (North East)	0.040	0.084	0.041	0.065
Region 6 (North West)	-0.003	0.885	-0.001	0.956
Region 8 (South East)	-0.015	0.350	-0.014	0.369
Region 9 (South West)	-0.004	0.846	-0.003	0.881
Region 10 (Wales)	-0.016	0.449	0.000	
Region 11 (West Midlands)	0.008	0.655	0.008	0.621
Region 12 (Yorkshire & Humber)	0.029	0.123	0.030	0.099
Proportion of population aged 0-14	0.193	0.446	0.207	0.413
Admin FTE per 1,000 premises	0.003	0.679	0.004	0.510
Prof FTE per 1,000 premises	-0.003	0.348	-0.003	0.259
Premise density	0.006	0.773	0.007	0.726
Population (000s) per premise	-0.031	0.815	-0.014	0.914
Constant	-0.025	0.604	-0.029	0.542
Adjusted R-square		0.009		0.015
Number of observations		195		175

NOTE: The omitted region (Region 1) is London.

Table A.48 DID regressions for the impact of the FHRS on the number of Campylobacter reports per 1,000 population (one year after the rollout)

Outcome: Number of Campylobacter reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.035	0.560	-0.030	0.602
Local scheme (dummy)	0.039	0.460	0.060	0.261
Region 2 (East)	0.187	0.059	0.186	0.054
Region 3 (East Midlands)	-0.149	0.148	-0.156	0.119
Region 4 (East of England)	-0.013	0.934	-0.026	0.865
Region 5 (North East)	0.073	0.620	0.069	0.629
Region 6 (North West)	0.209	0.082	0.210	0.072
Region 8 (South East)	-0.056	0.561	-0.054	0.559
Region 9 (South West)	0.044	0.701	0.032	0.776
Region 10 (Wales)	0.154	0.250	0.000	
Region 11 (West Midlands)	-0.229	0.032	-0.227	0.029
Region 12 (Yorkshire & Humber)	0.074	0.529	0.064	0.575
Proportion of population aged 0-14	0.620	0.709	-0.263	0.873
Admin FTE per 1,000 premises	-0.008	0.822	-0.001	0.980
Prof FTE per 1,000 premises	0.030	0.094	0.011	0.553
Premise density	-0.040	0.574	-0.049	0.487
Population (000s) per premise	-0.510	0.567	-0.226	0.799
Constant	-0.038	0.902	0.128	0.681
Adjusted R-square	0.117		0.110	
Number of observations	204		184	

NOTE: The omitted region (Region 1) is London.

Table A.49 DID regressions for the impact of the FHRS on the number of Campylobacter reports per 1,000 population (two years after the rollout)

Outcome: Number of Campylobacter reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.079	0.257	0.083	0.233
Local scheme (dummy)	0.038	0.536	0.049	0.443
Region 2 (East)	0.297	0.011	0.292	0.012
Region 3 (East Midlands)	-0.197	0.105	-0.203	0.093
Region 4 (East of England)	0.034	0.869	0.020	0.922
Region 5 (North East)	0.101	0.563	0.099	0.567
Region 6 (North West)	0.183	0.195	0.183	0.193
Region 8 (South East)	-0.004	0.971	-0.005	0.964
Region 9 (South West)	0.086	0.532	0.076	0.579
Region 10 (Wales)	0.109	0.492	0.000	
Region 11 (West Midlands)	-0.077	0.549	-0.078	0.541
Region 12 (Yorkshire & Humber)	0.079	0.571	0.066	0.633
Proportion of population aged 0-14	-0.544	0.784	-1.445	0.475
Admin FTE per 1,000 premises	-0.068	0.076	-0.062	0.111
Prof FTE per 1,000 premises	0.017	0.441	-0.006	0.811
Premise density	-0.023	0.789	-0.030	0.731
Population (000s) per premise	-0.027	0.979	0.241	0.821
Constant	0.170	0.646	0.366	0.336
Adjusted R-square	0.089		0.098	
Number of observations	203		183	

NOTE: The omitted region (Region 1) is London.

Food-borne illness related outcomes (subgroup impact estimates) – Adjusted figures

Table A.50 DID regressions for the impact of the FHRS on the number of food poisoning reports per 1,000 population (one year after the rollout)

Outcome: Number of food poisoning reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.167	0.322	-0.111	0.547
Local scheme (dummy)	-0.083	0.501	-0.080	0.532
National scheme x local scheme (dummy)	-0.169	0.429	-0.270	0.266
Region 2 (East)	0.433	0.023	0.415	0.037
Region 3 (East Midlands)	0.889	0.000	0.902	0.000
Region 4 (East of England)	-0.318	0.292	-0.330	0.296
Region 5 (North East)	0.261	0.347	0.261	0.367
Region 6 (North West)	-0.131	0.565	-0.135	0.570
Region 8 (South East)	0.092	0.625	0.082	0.675
Region 9 (South West)	0.503	0.029	0.510	0.036
Region 10 (Wales)	0.402	0.119	0.000	
Region 11 (West Midlands)	0.057	0.776	0.046	0.829
Region 12 (Yorkshire & Humber)	0.347	0.121	0.339	0.147
Proportion of population aged 0-14	2.423	0.445	2.392	0.481
Admin FTE per 1,000 premises	0.216	0.000	0.229	0.000
Prof FTE per 1,000 premises	-0.024	0.479	-0.023	0.565
Premise density	0.257	0.059	0.254	0.076
Population (000s) per premise	1.103	0.505	1.075	0.544
Constant	-0.971	0.104	-0.971	0.134
Adjusted R-square		0.198		0.205
Number of observations		199		180

NOTE: The omitted region (Region 1) is London.

Table A.51 DID regressions for the impact of the FHRS on the number of food poisoning reports per 1,000 population (two years after the rollout)

Outcome: Number of food poisoning reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.163	0.232	0.153	0.294
Local scheme (dummy)	0.078	0.450	0.081	0.449
National scheme x local scheme (dummy)	-0.127	0.462	-0.106	0.578
Region 2 (East)	0.498	0.003	0.501	0.004
Region 3 (East Midlands)	0.172	0.339	0.172	0.357
Region 4 (East of England)	0.220	0.427	0.218	0.445
Region 5 (North East)	0.360	0.129	0.366	0.134
Region 6 (North West)	-0.087	0.659	-0.079	0.699
Region 8 (South East)	0.197	0.235	0.202	0.238
Region 9 (South West)	0.428	0.036	0.425	0.046
Region 10 (Wales)	0.364	0.107	0.000	
Region 11 (West Midlands)	0.259	0.160	0.263	0.168
Region 12 (Yorkshire & Humber)	0.268	0.175	0.271	0.186
Proportion of population aged 0-14	-1.188	0.670	-1.519	0.607
Admin FTE per 1,000 premises	0.009	0.879	0.017	0.782
Prof FTE per 1,000 premises	-0.028	0.335	-0.038	0.263
Premise density	0.328	0.102	0.332	0.111
Population (000s) per premise	3.282	0.022	3.442	0.023
Constant	-0.698	0.173	-0.637	0.244
Adjusted R-square		0.066		0.068
Number of observations		192		175

NOTE: The omitted region (Region 1) is London.

Table A.52 DID regressions for the impact of the FHRS on the number of Salmonella reports per 1,000 population (one year after the rollout)

Outcome: Number of Salmonella reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.001	0.920	-0.002	0.870
Local scheme (dummy)	0.009	0.285	0.010	0.266
National scheme x local scheme (dummy)	0.002	0.906	0.008	0.647
Region 2 (East)	0.018	0.197	0.016	0.254
Region 3 (East Midlands)	0.027	0.075	0.022	0.141
Region 4 (East of England)	0.018	0.457	0.013	0.586
Region 5 (North East)	-0.043	0.034	-0.045	0.025
Region 6 (North West)	0.010	0.561	0.006	0.720
Region 8 (South East)	0.000	0.997	-0.002	0.868
Region 9 (South West)	-0.005	0.742	-0.011	0.493
Region 10 (Wales)	-0.004	0.836	0.000	
Region 11 (West Midlands)	0.031	0.044	0.027	0.076
Region 12 (Yorkshire & Humber)	0.025	0.138	0.021	0.219
Proportion of population aged 0-14	-0.368	0.099	-0.463	0.043
Admin FTE per 1,000 premises	-0.009	0.101	-0.008	0.164
Prof FTE per 1,000 premises	0.004	0.106	0.004	0.165
Premise density	-0.012	0.462	-0.017	0.304
Population (000s) per premise	-0.079	0.507	-0.120	0.327
Constant	0.059	0.166	0.084	0.058
Adjusted R-square		0.115		0.135
Number of observations		198		178

NOTE: The omitted region (Region 1) is London.

Table A.53 DID regressions for the impact of the FHRS on the number of Salmonella reports per 1,000 population (two years after the rollout)

Outcome: Number of Salmonella reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.001	0.907	-0.001	0.933
Local scheme (dummy)	-0.002	0.797	-0.002	0.796
National scheme x local scheme (dummy)	0.000	0.997	0.005	0.784
Region 2 (East)	0.020	0.184	0.020	0.174
Region 3 (East Midlands)	0.022	0.175	0.020	0.201
Region 4 (East of England)	0.015	0.599	0.014	0.617
Region 5 (North East)	0.010	0.624	0.010	0.640
Region 6 (North West)	0.018	0.303	0.017	0.314
Region 8 (South East)	0.001	0.956	0.001	0.963
Region 9 (South West)	0.011	0.517	0.010	0.583
Region 10 (Wales)	0.018	0.360	0.000	
Region 11 (West Midlands)	0.027	0.097	0.026	0.101
Region 12 (Yorkshire & Humber)	0.041	0.022	0.040	0.022
Proportion of population aged 0-14	0.077	0.746	0.035	0.884
Admin FTE per 1,000 premises	-0.007	0.222	-0.007	0.256
Prof FTE per 1,000 premises	0.000	0.930	0.001	0.773
Premise density	0.004	0.828	0.003	0.863
Population (000s) per premise	-0.049	0.703	-0.051	0.692
Constant	-0.015	0.736	-0.009	0.840
Adjusted R-square		-0.013		-0.010
Number of observations		195		175

NOTE: The omitted region (Region 1) is London.

Table A.54 DID regressions for the impact of the FHRS on the number of Campylobacter reports per 1,000 population (one year after the rollout)

Outcome: Number of Campylobacter reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.016	0.909	0.009	0.945
Local scheme (dummy)	-0.012	0.900	-0.022	0.805
National scheme x local scheme (dummy)	-0.187	0.271	-0.197	0.241
Region 2 (East)	0.131	0.374	0.162	0.231
Region 3 (East Midlands)	0.077	0.622	0.132	0.360
Region 4 (East of England)	-0.114	0.635	-0.063	0.772
Region 5 (North East)	0.388	0.079	0.436	0.030
Region 6 (North West)	0.149	0.406	0.216	0.187
Region 8 (South East)	0.144	0.314	0.183	0.163
Region 9 (South West)	0.356	0.045	0.428	0.009
Region 10 (Wales)	0.224	0.266	0.000	
Region 11 (West Midlands)	-0.018	0.910	0.023	0.875
Region 12 (Yorkshire & Humber)	0.335	0.057	0.409	0.011
Proportion of population aged 0-14	4.051	0.105	5.254	0.024
Admin FTE per 1,000 premises	0.083	0.139	0.111	0.035
Prof FTE per 1,000 premises	-0.005	0.861	0.002	0.927
Premise density	0.128	0.234	0.191	0.054
Population (000s) per premise	1.237	0.359	2.138	0.090
Constant	-0.918	0.050	-1.330	0.003
Adjusted R-square		0.014		0.076
Number of observations		204		184

NOTE: The omitted region (Region 1) is London.

Table A.55 DID regressions for the impact of the FHRS on the number of Campylobacter reports per 1,000 population (two years after the rollout)

Outcome: Number of Campylobacter reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.111	0.477	0.122	0.444
Local scheme (dummy)	-0.099	0.394	-0.101	0.384
National scheme x local scheme (dummy)	-0.049	0.802	-0.078	0.712
Region 2 (East)	-0.130	0.454	-0.107	0.533
Region 3 (East Midlands)	-0.276	0.137	-0.236	0.202
Region 4 (East of England)	-0.352	0.256	-0.313	0.309
Region 5 (North East)	-0.041	0.875	-0.014	0.957
Region 6 (North West)	-0.198	0.348	-0.152	0.467
Region 8 (South East)	0.063	0.708	0.091	0.590
Region 9 (South West)	0.268	0.205	0.325	0.125
Region 10 (Wales)	-0.246	0.300	0.000	
Region 11 (West Midlands)	-0.215	0.264	-0.183	0.340
Region 12 (Yorkshire & Humber)	0.199	0.338	0.248	0.233
Proportion of population aged 0-14	-1.103	0.710	-0.841	0.781
Admin FTE per 1,000 premises	-0.037	0.520	-0.030	0.610
Prof FTE per 1,000 premises	0.030	0.364	0.029	0.432
Premise density	-0.031	0.809	0.009	0.944
Population (000s) per premise	0.675	0.666	1.556	0.330
Constant	0.218	0.696	0.023	0.968
Adjusted R-square		0.026		0.040
Number of observations		203		183

NOTE: The omitted region (Region 1) is London.

Food-borne illness related outcomes (subgroup impact estimates) – Unadjusted figures

Table A.56 DID regressions for the impact of the FHRS on the number of food poisoning reports per 1,000 population (one year after the rollout)

Outcome: Number of food poisoning reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.026	0.848	0.063	0.665
Local scheme (dummy)	0.020	0.837	0.020	0.843
National scheme x local scheme (dummy)	-0.308	0.068	-0.373	0.051
Region 2 (East)	0.347	0.036	0.339	0.049
Region 3 (East Midlands)	0.530	0.003	0.541	0.004
Region 4 (East of England)	-0.326	0.190	-0.330	0.202
Region 5 (North East)	0.247	0.280	0.247	0.299
Region 6 (North West)	0.224	0.248	0.221	0.273
Region 8 (South East)	0.190	0.248	0.187	0.273
Region 9 (South West)	0.393	0.046	0.400	0.052
Region 10 (Wales)	0.239	0.276	0.000	
Region 11 (West Midlands)	0.114	0.511	0.106	0.559
Region 12 (Yorkshire & Humber)	0.257	0.183	0.260	0.197
Proportion of population aged 0-14	1.311	0.599	1.313	0.620
Admin FTE per 1,000 premises	0.068	0.147	0.073	0.138
Prof FTE per 1,000 premises	0.010	0.708	0.019	0.555
Premise density	0.354	0.063	0.361	0.070
Population (000s) per premise	1.955	0.136	1.920	0.170
Constant	-0.960	0.047	-0.992	0.057
Adjusted R-square		0.058		0.062
Number of observations		194		176

NOTE: The omitted region (Region 1) is London.

Table A.57 DID regressions for the impact of the FHRS on the number of food poisoning reports per 1,000 population (two years after the rollout)

Outcome: Number of food poisoning reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.025	0.833	0.009	0.943
Local scheme (dummy)	0.076	0.377	0.073	0.406
National scheme x local scheme (dummy)	-0.149	0.303	-0.127	0.425
Region 2 (East)	0.258	0.069	0.263	0.070
Region 3 (East Midlands)	0.197	0.192	0.199	0.200
Region 4 (East of England)	-0.059	0.799	-0.060	0.800
Region 5 (North East)	0.301	0.129	0.308	0.129
Region 6 (North West)	0.150	0.366	0.156	0.358
Region 8 (South East)	0.160	0.250	0.166	0.243
Region 9 (South West)	0.327	0.057	0.326	0.065
Region 10 (Wales)	0.232	0.225	0.000	
Region 11 (West Midlands)	0.182	0.239	0.182	0.250
Region 12 (Yorkshire & Humber)	0.165	0.323	0.173	0.310
Proportion of population aged 0-14	1.350	0.564	1.260	0.607
Admin FTE per 1,000 premises	0.037	0.459	0.049	0.351
Prof FTE per 1,000 premises	0.010	0.685	0.017	0.545
Premise density	0.225	0.182	0.233	0.178
Population (000s) per premise	2.138	0.074	2.196	0.080
Constant	-0.970	0.025	-0.996	0.029
Adjusted R-square		-0.017		-0.013
Number of observations		191		174

NOTE: The omitted region (Region 1) is London.

Table A.58 DID regressions for the impact of the FHRS on the number of Salmonella reports per 1,000 population (one year after the rollout)

Outcome: Number of Salmonella reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.005	0.478	0.005	0.514
Local scheme (dummy)	0.008	0.104	0.008	0.115
National scheme x local scheme (dummy)	-0.007	0.391	-0.007	0.450
Region 2 (East)	0.010	0.230	0.009	0.294
Region 3 (East Midlands)	0.016	0.056	0.015	0.090
Region 4 (East of England)	0.002	0.908	0.000	0.989
Region 5 (North East)	-0.026	0.020	-0.027	0.021
Region 6 (North West)	0.004	0.643	0.003	0.755
Region 8 (South East)	-0.002	0.816	-0.003	0.739
Region 9 (South West)	-0.011	0.235	-0.012	0.199
Region 10 (Wales)	-0.007	0.477	0.000	
Region 11 (West Midlands)	0.009	0.272	0.008	0.360
Region 12 (Yorkshire & Humber)	0.005	0.606	0.003	0.726
Proportion of population aged 0-14	-0.119	0.341	-0.137	0.304
Admin FTE per 1,000 premises	-0.003	0.244	-0.003	0.302
Prof FTE per 1,000 premises	0.002	0.222	0.002	0.276
Premise density	-0.011	0.251	-0.012	0.210
Population (000s) per premise	-0.112	0.097	-0.131	0.071
Constant	0.033	0.160	0.039	0.123
Adjusted R-square		0.128		0.131
Number of observations		196		176

NOTE: The omitted region (Region 1) is London.

Table A.59 DID regressions for the impact of the FHRS on the number of Salmonella reports per 1,000 population (two years after the rollout)

Outcome: Number of Salmonella reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.003	0.695	0.002	0.828
Local scheme (dummy)	0.003	0.577	0.003	0.589
National scheme x local scheme (dummy)	-0.009	0.317	-0.007	0.448
Region 2 (East)	0.011	0.226	0.012	0.142
Region 3 (East Midlands)	0.016	0.087	0.017	0.054
Region 4 (East of England)	0.007	0.668	0.008	0.598
Region 5 (North East)	-0.002	0.845	-0.002	0.867
Region 6 (North West)	0.010	0.359	0.011	0.276
Region 8 (South East)	0.000	0.960	0.001	0.945
Region 9 (South West)	0.006	0.595	0.006	0.511
Region 10 (Wales)	0.017	0.155	0.000	
Region 11 (West Midlands)	0.014	0.163	0.014	0.113
Region 12 (Yorkshire & Humber)	0.020	0.054	0.022	0.024
Proportion of population aged 0-14	0.046	0.747	0.049	0.714
Admin FTE per 1,000 premises	-0.004	0.233	-0.004	0.233
Prof FTE per 1,000 premises	0.001	0.623	0.002	0.183
Premise density	0.002	0.844	0.004	0.723
Population (000s) per premise	-0.001	0.990	0.011	0.878
Constant	-0.013	0.623	-0.021	0.409
Adjusted R-square		-0.002		0.011
Number of observations		193		173

NOTE: The omitted region (Region 1) is London.

Table A.60 DID regressions for the impact of the FHRS on the number of Campylobacter reports per 1,000 population (one year after the rollout)

Outcome: Number of Campylobacter reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.057	0.039	0.058	0.053
Local scheme (dummy)	0.007	0.705	0.007	0.732
National scheme x local scheme (dummy)	-0.029	0.391	-0.033	0.395
Region 2 (East)	-0.039	0.182	-0.039	0.210
Region 3 (East Midlands)	-0.051	0.108	-0.049	0.146
Region 4 (East of England)	0.004	0.940	0.004	0.930
Region 5 (North East)	0.124	0.005	0.125	0.008
Region 6 (North West)	-0.014	0.701	-0.012	0.747
Region 8 (South East)	-0.005	0.869	-0.004	0.894
Region 9 (South West)	-0.002	0.954	0.001	0.989
Region 10 (Wales)	-0.047	0.241	0.000	
Region 11 (West Midlands)	-0.016	0.617	-0.015	0.645
Region 12 (Yorkshire & Humber)	0.040	0.252	0.042	0.258
Proportion of population aged 0-14	-0.199	0.689	-0.170	0.751
Admin FTE per 1,000 premises	0.008	0.497	0.009	0.476
Prof FTE per 1,000 premises	0.000	0.942	0.000	0.940
Premise density	0.005	0.810	0.007	0.773
Population (000s) per premise	0.411	0.128	0.437	0.136
Constant	-0.021	0.821	-0.034	0.740
Adjusted R-square		0.056		0.054
Number of observations		204		184

NOTE: The omitted region (Region 1) is London.

Table A.61 DID regressions for the impact of the FHRS on the number of Campylobacter reports per 1,000 population (two years after the rollout)

Outcome: Number of Campylobacter reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.039	0.315	0.035	0.411
Local scheme (dummy)	-0.025	0.388	-0.025	0.417
National scheme x local scheme (dummy)	0.051	0.309	0.058	0.305
Region 2 (East)	-0.033	0.454	-0.032	0.488
Region 3 (East Midlands)	-0.137	0.004	-0.138	0.006
Region 4 (East of England)	-0.025	0.747	-0.026	0.752
Region 5 (North East)	0.134	0.043	0.134	0.056
Region 6 (North West)	-0.026	0.622	-0.026	0.647
Region 8 (South East)	0.019	0.654	0.020	0.664
Region 9 (South West)	-0.037	0.492	-0.039	0.497
Region 10 (Wales)	-0.064	0.284	0.000	
Region 11 (West Midlands)	0.007	0.890	0.007	0.895
Region 12 (Yorkshire & Humber)	-0.084	0.110	-0.084	0.133
Proportion of population aged 0-14	-0.515	0.492	-0.568	0.485
Admin FTE per 1,000 premises	0.008	0.593	0.008	0.593
Prof FTE per 1,000 premises	-0.002	0.818	-0.002	0.830
Premise density	-0.007	0.832	-0.007	0.832
Population (000s) per premise	0.184	0.640	0.206	0.632
Constant	0.091	0.516	0.098	0.525
Adjusted R-square		0.072		0.069
Number of observations		203		183

NOTE: The omitted region (Region 1) is London.

Food-borne illness related outcomes (subgroup impact estimates) – Alternative adjustment

Table A.62 DID regressions for the impact of the FHRs on the number of food poisoning reports per 1,000 population (one year after the rollout)

Outcome: Number of food poisoning reports per 1,000 population (after-before difference)	FHRs (England & Wales)		FHRs (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	-0.219	0.205	-0.192	0.310
Local scheme (dummy)	-0.105	0.408	-0.102	0.441
National scheme x local scheme (dummy)	0.025	0.908	-0.023	0.926
Region 2 (East)	0.450	0.021	0.437	0.033
Region 3 (East Midlands)	1.369	0.000	1.371	0.000
Region 4 (East of England)	-0.246	0.426	-0.260	0.423
Region 5 (North East)	0.377	0.186	0.374	0.209
Region 6 (North West)	0.063	0.788	0.057	0.815
Region 8 (South East)	0.113	0.557	0.106	0.599
Region 9 (South West)	-0.086	0.714	-0.091	0.715
Region 10 (Wales)	0.513	0.053	0.000	
Region 11 (West Midlands)	0.119	0.566	0.108	0.620
Region 12 (Yorkshire & Humber)	0.539	0.019	0.532	0.028
Proportion of population aged 0-14	0.137	0.966	-0.093	0.979
Admin FTE per 1,000 premises	0.145	0.018	0.156	0.017
Prof FTE per 1,000 premises	-0.006	0.861	-0.006	0.890
Premise density	0.221	0.113	0.214	0.146
Population (000s) per premise	1.245	0.463	1.239	0.497
Constant	-0.708	0.247	-0.672	0.313
Adjusted R-square		0.337		0.339
Number of observations		199		180

NOTE: The omitted region (Region 1) is London.

Table A.63 DID regressions for the impact of the FHRs on the number of food poisoning reports per 1,000 population (two years after the rollout)

Outcome: Number of food poisoning reports per 1,000 population (after-before difference)	FHRs (England & Wales)		FHRs (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.042	0.788	0.033	0.844
Local scheme (dummy)	0.027	0.821	0.027	0.823
National scheme x local scheme (dummy)	-0.085	0.666	-0.069	0.754
Region 2 (East)	0.531	0.006	0.534	0.008
Region 3 (East Midlands)	0.314	0.127	0.314	0.143
Region 4 (East of England)	0.165	0.601	0.163	0.618
Region 5 (North East)	0.369	0.172	0.373	0.183
Region 6 (North West)	0.102	0.649	0.107	0.647
Region 8 (South East)	0.193	0.308	0.197	0.316
Region 9 (South West)	-0.103	0.657	-0.106	0.663
Region 10 (Wales)	0.482	0.062	0.000	
Region 11 (West Midlands)	0.261	0.214	0.263	0.229
Region 12 (Yorkshire & Humber)	0.550	0.015	0.553	0.020
Proportion of population aged 0-14	-1.680	0.598	-1.913	0.572
Admin FTE per 1,000 premises	-0.048	0.479	-0.041	0.567
Prof FTE per 1,000 premises	0.004	0.901	0.001	0.981
Premise density	0.321	0.160	0.325	0.174
Population (000s) per premise	2.758	0.089	2.846	0.100
Constant	-0.669	0.252	-0.637	0.310
Adjusted R-square		0.069		0.061
Number of observations		192		175

NOTE: The omitted region (Region 1) is London.

Table A.64 DID regressions for the impact of the FHRS on the number of Salmonella reports per 1,000 population (one year after the rollout)

Outcome: Number of Salmonella reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.000	0.973	-0.006	0.664
Local scheme (dummy)	0.003	0.724	0.004	0.704
National scheme x local scheme (dummy)	0.006	0.729	0.015	0.400
Region 2 (East)	0.015	0.325	0.014	0.371
Region 3 (East Midlands)	0.024	0.146	0.020	0.233
Region 4 (East of England)	0.010	0.693	0.006	0.831
Region 5 (North East)	-0.027	0.220	-0.029	0.196
Region 6 (North West)	-0.003	0.860	-0.005	0.767
Region 8 (South East)	0.002	0.915	0.000	1.000
Region 9 (South West)	-0.005	0.770	-0.011	0.545
Region 10 (Wales)	-0.015	0.458	0.000	
Region 11 (West Midlands)	0.019	0.251	0.017	0.320
Region 12 (Yorkshire & Humber)	0.031	0.098	0.028	0.135
Proportion of population aged 0-14	-0.283	0.252	-0.359	0.155
Admin FTE per 1,000 premises	0.000	0.952	0.003	0.671
Prof FTE per 1,000 premises	0.002	0.338	0.002	0.589
Premise density	0.003	0.882	-0.001	0.942
Population (000s) per premise	0.005	0.967	-0.016	0.903
Constant	0.032	0.498	0.052	0.281
Adjusted R-square		0.037		0.032
Number of observations		198		178

NOTE: The omitted region (Region 1) is London.

Table A.65 DID regressions for the impact of the FHRS on the number of Salmonella reports per 1,000 population (two years after the rollout)

Outcome: Number of Salmonella reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.006	0.659	0.003	0.840
Local scheme (dummy)	-0.007	0.474	-0.007	0.446
National scheme x local scheme (dummy)	0.005	0.779	0.010	0.561
Region 2 (East)	0.011	0.504	0.011	0.461
Region 3 (East Midlands)	-0.006	0.732	-0.006	0.721
Region 4 (East of England)	0.015	0.611	0.015	0.604
Region 5 (North East)	0.040	0.083	0.041	0.064
Region 6 (North West)	-0.003	0.878	-0.001	0.942
Region 8 (South East)	-0.015	0.342	-0.014	0.352
Region 9 (South West)	-0.005	0.802	-0.005	0.778
Region 10 (Wales)	-0.015	0.472	0.000	
Region 11 (West Midlands)	0.008	0.659	0.008	0.624
Region 12 (Yorkshire & Humber)	0.029	0.125	0.030	0.102
Proportion of population aged 0-14	0.198	0.438	0.209	0.409
Admin FTE per 1,000 premises	0.003	0.676	0.004	0.513
Prof FTE per 1,000 premises	-0.003	0.358	-0.003	0.268
Premise density	0.006	0.777	0.006	0.738
Population (000s) per premise	-0.038	0.783	-0.025	0.855
Constant	-0.023	0.628	-0.026	0.598
Adjusted R-square		0.004		0.010
Number of observations		195		175

NOTE: The omitted region (Region 1) is London.

Table A.66 DID regressions for the impact of the FHRS on the number of Campylobacter reports per 1,000 population (one year after the rollout)

Outcome: Number of Campylobacter reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.050	0.586	0.040	0.661
Local scheme (dummy)	0.087	0.186	0.095	0.140
National scheme x local scheme (dummy)	-0.139	0.222	-0.118	0.325
Region 2 (East)	0.187	0.059	0.183	0.057
Region 3 (East Midlands)	-0.122	0.244	-0.133	0.194
Region 4 (East of England)	-0.007	0.967	-0.021	0.893
Region 5 (North East)	0.066	0.651	0.064	0.650
Region 6 (North West)	0.216	0.072	0.215	0.065
Region 8 (South East)	-0.050	0.599	-0.051	0.580
Region 9 (South West)	0.078	0.506	0.061	0.598
Region 10 (Wales)	0.132	0.325	0.000	
Region 11 (West Midlands)	-0.229	0.032	-0.227	0.029
Region 12 (Yorkshire & Humber)	0.075	0.520	0.065	0.570
Proportion of population aged 0-14	0.515	0.757	-0.276	0.867
Admin FTE per 1,000 premises	-0.010	0.781	-0.002	0.955
Prof FTE per 1,000 premises	0.029	0.106	0.011	0.572
Premise density	-0.039	0.585	-0.047	0.504
Population (000s) per premise	-0.342	0.704	-0.120	0.893
Constant	-0.080	0.796	0.087	0.780
Adjusted R-square		0.120		0.109
Number of observations		204		184

NOTE: The omitted region (Region 1) is London.

Table A.67 DID regressions for the impact of the FHRS on the number of Campylobacter reports per 1,000 population (two years after the rollout)

Outcome: Number of Campylobacter reports per 1,000 population (after-before difference)	FHRS (England & Wales)		FHRS (England only)	
	Coef.	P> t	Coef.	P> t
National scheme (dummy)	0.101	0.334	0.101	0.349
Local scheme (dummy)	0.052	0.509	0.059	0.449
National scheme x local scheme (dummy)	-0.037	0.780	-0.031	0.827
Region 2 (East)	0.297	0.011	0.292	0.012
Region 3 (East Midlands)	-0.190	0.126	-0.197	0.112
Region 4 (East of England)	0.036	0.862	0.022	0.916
Region 5 (North East)	0.100	0.570	0.098	0.572
Region 6 (North West)	0.184	0.193	0.184	0.192
Region 8 (South East)	-0.002	0.983	-0.004	0.970
Region 9 (South West)	0.095	0.502	0.084	0.555
Region 10 (Wales)	0.104	0.516	0.000	
Region 11 (West Midlands)	-0.077	0.550	-0.078	0.542
Region 12 (Yorkshire & Humber)	0.079	0.570	0.067	0.632
Proportion of population aged 0-14	-0.566	0.776	-1.444	0.477
Admin FTE per 1,000 premises	-0.068	0.077	-0.062	0.112
Prof FTE per 1,000 premises	0.017	0.449	-0.006	0.808
Premise density	-0.023	0.792	-0.029	0.736
Population (000s) per premise	0.009	0.993	0.263	0.806
Constant	0.158	0.672	0.355	0.357
Adjusted R-square		0.085		0.093
Number of observations		203		183

NOTE: The omitted region (Region 1) is London.