Peer Effects in Free School Meals: Information or Stigma?

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Abstract

This paper investigates peer effects in the take up of a welfare programme, free school meals, using the Pupil Level Annual School Census (PLASC) which collects data on every child attending school in England. To explore the nature of the peer effect, I examine two potential channels: stigma, and information. To disentangle these channels I first exploit the fact that in a number of schools cashless catering systems have been implemented which remove the stigma associated with claiming the benefit; to investigate the impact of this innovation, telephone interviews were conducted with over 400 schools to ascertain whether and when such systems had been introduced. Second, I test whether information plays a role by comparing the peer effect for those who have claimed in previous years with those who have not. The results suggest the presence of stigma dampens the peer effect and information makes it larger. Information is found to be a more important part of the peer effect for those living in areas of greater deprivation and stigma is more important for those in the least deprived regions. The policy implication of this is that in areas of greater deprivation information campaigns will have a greater marginal impact than those that attempt to remove visible stigma.

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1 Introduction

Many low income families in the UK forgo around £400 a year by not participating in the free school meals programme. Around 25% of those who are eligible do not take up their entitlement, affecting over 300,000 children.[1] Peers and social networks can contribute to participation in such welfare programmes; Bertrand et al (2000). While it is thought that information and stigma determine the magnitude of any peer effect, distinguishing between these two elements is typically difficult and also important as they have very different policy implications. In this paper I examine the role of peer effects in the enrolment decision of the UK's largest food based welfare programme.

Understanding the role peers play in the decision to register free school meal eligibility can shed light on non-take up of not only this benefit, but also social assistance in general, and helps in determining the barriers to participation. Typically cited reasons for not claiming are social in nature. In a survey about free school meals[2] 33% of pupils and 40% of parents cited embarrassment as a key driver for not taking a free school meal, and 11% of eligible parents had not claimed because they were not aware they were entitled or had insufficient information about the programme. Tackling these social barriers is important in trying to alleviate child poverty and inequality of provision in government services (Heckman and Smith (2004)). In other areas of related policy intervention such as those aimed at tackling obesity through food education and physical activity, it has been found that those from poorer backgrounds are less likely to respond (Summerbell et. al (2009)), if at all, exacerbating the problem of inequality of provision.

To test whether peers have an impact in free school meal enrolment I use a large administrative data set on English school children, the Pupil Level Annual School Census (PLASC). This records information on all children attending school and includes whether the pupil is registered for free school meals. The main advantage of this data is that I am able to directly observe all the pupils within the peer group. Second, I can identify individuals and their peers according to year group, school or small neighbourhood areas. To complement this data set I use the Longitudinal Survey of Young People in England (LSYPE) that has more detailed family background information. Finally, I use a completely unique data set compiled by a telephone survey that elicited whether schools use cashless catering systems or not. Over 400 secondary schools were contacted.

While Bertrand et al (2000), Aslund and Fredrickson (2009) focused just on establishing a network effect, increasingly the literature attempts to examine the nature of that effect. Typically, information is a prominent feature of most studies related to social networks.

[1] The School Food Trust

[2] Storey and Chamberlin (2001)

One way that has been investigated is through experiments. Duflo and Saez (2002) ran a randomised experiment giving information regarding retirement plans. Defining the peer groups as co-workers, they find small but significant effects of providing information through social interactions. In the absence of experimental methods other techniques are used to gauge what encompasses the peer effect. Aizer and Currie (2004) examine the use of pre-natal care in California. To test the importance of information, they compare the network effect between first and second time mothers. They conjecture that information should not be relevant for second time users of pre-natal care as they are already aware of the services that are available. Finding that the network effect for second births is of similar magnitude to first time births suggests that information is not an important factor. This is in contrast to Heckman and Smith (2004), who in examining a job training programme, decompose participation at different stages, and find that for non-whites involvement is primarily determined by knowledge of the programme.

Devillanova (2008) investigates the use of health care among undocumented immigrants in Italy and directly examines the information channel. He finds a large significant impact of information from friends and relatives, reducing the time to a health related visit by around 30%. This network effect is smaller for better educated individuals. The relative importance of information appears to differ according to the setting. The seeming puzzle for the lack of information playing a role found in Aizer and Currie (2004) could be due to stable conditions and information being relatively widespread, hence reducing the role that networks can facilitate in this area. This is not necessarily the case when the surveyed population are immigrants, particularly undocumented, where information from the peer group is more likely to have an impact. Figlio et al. (2011) test the role of information when the environment is not stable. The welfare reforms in the mid-1990's in the US, although not necessarily changing the eligibility criteria for programmes such as the Medicaid and WIC, did cause confusion particularly for immigrant groups. They call this an information shock and exploit it to test the role that networks play when there is a disruption to information. Interestingly, they find that in the short run networks have an impact at mitigating any reductions in information that there may have been.

Unusually, I can examine the peer effect in an environment where information and then stigma is not present for the same programme. The rich administrative, rather than more typically used survey data, allow for this to be examined in a national context covering all pupils in the country. The peer group is defined as those within the same ethnic and language group. The assumption made is that parents and children are more likely to interact with those of the same ethnic background and even more so if they share a common language. I use the spatial variation of these groups and the differences in national rates in participation in the free school meal programme to test for the presence of peer

effects. I am able to control for various omitted variables using this data including area fixed effects for areas that are typically much smaller in size than many other studies that use neighbourhoods to define peers, and also ethnic language fixed effects to account for differences in these groups.

The baseline results suggest that the presence of peers increases the effect of a hypothetical policy change by around 20%. I also examine how this varies according to whether the pupil speaks English as a first language or not. By matching in English test scores at various ages I find greater English proficiency is associated with a diminished peer effect, these results all suggest that information plays an important role. I rule out that what I find is driven by the presence of bilingual ethnic minority staff at school, or if the local authority provides application materials in other languages or translation help.

To test the contribution of information more directly I propose a test similar to Aizer and Currie (2004). If information makes up the peer effect then it should be smaller in magnitude for those who have previously claimed, I find this is the case. To examine the magnitude of the peer effect when stigma is removed I exploit a natural policy experiment. Many schools have been introducing cashless catering systems, similar to the electronic benefit transfer. These remove the visible stigma associated with the social assistance programme as they eradicate the differentiation between those students who pay and those who have a free school meal entitlement. Therefore the peer effect is examined when stigma is absent; when this is the case the estimated impact of hypothetical policy changes are greater. This implies that when visible stigma is present it has a negative effect, dampening enrolment. These effects are heterogeneous across levels of income and education deprivation. Information is found to be a more important part of the peer effect for those in areas of greater deprivation and stigma is more important for those in the least deprived. This has important policy implications, suggesting that campaigns aimed at improving information will have a greater marginal effect in more deprived areas. In contrast, efforts to remove the visible element of stigma have a greater marginal impact in the better off areas.

The paper proceeds as follows: the next section presents the background to the programme (section 2). Section 3 describes the data and descriptive statistics. Section 4 sets out the empirical strategy. Section 5 presents the results and section 6 concludes.

2 Background: History of Free School Meals

School meals were first introduced in 1906 as a result of the Education (Provision of Meals) Act. This gave Local Education Authorities (LEAs) the ability to provide food for mal-

nourished children whose education was suffering as a result[3][4] Prior to that there had been a number of local schemes in London and Manchester that had introduced meals at school for the very poorest, but the 1906 act was seen as the foundation for the current service. A moderate payment was expected for the meal, while free or reduced meals were only allowed for those deemed malnourished, Davies (2005). Where the 1906 act was moderate in only allowing the local authority to provide meals, the 1944 Education act was more radical in stipulating that LEAs make available school meals (and milk) in both primary and secondary schools, for the most deprived this was to be free where possible. The obligation to provide a school meal was removed by the 1980 Education Act, however the free school meal provision remained.

Changes to the programme over the last 25 years have been mainly concerned with the quality of the meal. The 1986 Education Act and 1986 Social Security Act saw further changes to the school meals service, they were put out to competitive tendering and the criteria for claiming the meal changed. Family Credit replaced the Family Income Supplement resulting in many children no longer being entitled to free school meals. The criteria have been based on claiming other benefits and an income threshold; the current criteria are discussed in section 4. The 1980 Act also saw the removal of the nutritional standards. Very basic food standards were introduced in 2001, however there was no monitoring process put in place. The decline in quality of the meals was highlighted when in 2004 celebrity chef Jamie Oliver went into the London borough of Greenwich and drastically reformed the school lunches, replacing junk food with healthy alternatives. This was broadcast in a documentary on a major UK TV station, Channel 4. Since then there has been an improvement in the quality of the meals across the country with nutritional standards being enforced by a non-governmental agency, The School Food Trust.

3 Data

The data for this study come from a number of sources. The Pupil Level Annual School Census (PLASC) contains information on all pupils in England and Wales, consisting of approximately seven million records per year. Three years of the school census, from 2007

[3]Curtis (1967)

[4]A further motivation for the introduction of such an arrangement came from the health of the army recruits for the Boer War which ended in 1902. The height requirement for entry was decreased as the working class men were failing to meet it, Davies (2005), (Colquhoun et al 2001). The meals were seen as a way to address this issue. Interestingly the National School Lunch Programme, which was established 40 years later in 1946 in the US, came about as a reaction to the health conditions, due to poor nutrition, of men drafted into the US army for the Second World War.

to 2009[5], are used in the baseline estimates. This data set has the advantage of including all those with whom a pupil interacts and therefore I am able to construct detailed accurate information on the peer group. I supplement this data with test scores from the National Pupil Database, which records all centrally organised key stage test results. The PLASC data includes the following characteristics: gender; ethnicity; age; month of birth; whether English is a first language; a special educational needs (SEN) indicator (including whether a statement[6] is issued; this measures some degree of learning difficulty); the mode of transport taken to get to school[7]; a number of location indicators including, lower layer super output area (LSOA) and middle layer super output area (MSOA), an income deprivation affecting children index (IDACI); school attended; and free school meal registration participation.

To supplement the PLASC data the Longitudinal Survey of Young People in England (LSYPE) is also used. The LSYPE began in 2004 with a sample of around 21,000 pupils and 15,000 households, in year 9 (aged 13 and 14, born between 1st September 1989 and 31st August 1990) and followed the students each year. The number of deprived schools was over-sampled by a factor of 1.5.[8] In addition there were sample boosts related to free school meals and ethnicity. Most importantly, the LSYPE can be linked to the PLASC data, therefore we are able to use the peer group that is constructed from the entire population, rather than just the LSYPE sample which could be quite a big problem, Micklewright, Schnepf and Silva (2010).

Moreover, I have an entirely unique dataset on the schools that operate a cashless catering system equivalent to the Electronic Benefit Transfer (EBT) systems that operate in the US Food Stamps programme, although not all operate through a strict card system[9]. By phone survey, 406 schools were contacted in order to collect data on whether they implement a cashless catering system and in which year this was introduced.

The PLASC data has a number of key features that generate the definition of peer group. This is composed of two main parts, the social reference group and a measure of proximity. For the reference group I use the child's ethnicity. Although the exact language that is spoken in the home is not known instead I do know whether the child speaks English

[5]Other specifications later in the paper use data from 2006-2009, for example in section 6.8 to test the role of stigma. The restriction of just three years in the baseline results is primarily for computational reasons, with relevant sample selections described in the main body of the text and including those three years results in approximately 3.8 million observations. The results are indifferent to which 3 years are chosen.

[6]A statement is issued after an assessment is made by the local authority, it describes the need that the pupil has and the help that they should receive. It is typically issued if the child needs a large amount of extra help or if they were not progressing under the lesser degrees of special need called school action and school action plus

[7]Available from 2007 onwards. This is an additional reason for restricting the sample from 2007 onwards to include as many controls as possible

[8]LSYPE user guide, page 6

[9]Section 6.8 examines the different types of system that are currently in use.

at home, or more precisely whether or not the language they were exposed to in early years at home was English or not.[10] Therefore using ethnic language group is defined as the interaction of ethnicity and whether the child's first language is English. Evidence suggests that race or ethnicity are strong predictors of social ties, Mayer and Puller (2008) have recently shown this using data from Facebook. Going beyond just using race or ethnicity as used by Borjas (1995). Language is arguably a better measure of social ties; although all teaching is carried out in English, it seems plausible that there will be greater social ties among those who are more likely to share a common language. Guiso, Sapienza and Zingales (2004) find that two countries who share a common language are more likely to trust each other.

The second part of the peer group is based on location. Being agnostic about the spread of peer groups, two broad distinctions of the location of peers are made. The first is at the school level, as we use data from the school census we know which school the pupil attended and in which year group within that school they are in. The second is based on area of residence, the area the child lives in is given in some detail. There are two super output areas (SOAs), geographical definitions of areas used for the main (not school) census, as my definition of a peer group at the regional level that defines the peer group. The smallest areas I have available are the Lower Layer SOAs (LSOA) of which there are 34,378 in England and Wales with an average population of 1,500. There are 7,193 Middle Layer SOAs (MSOA); these are therefore somewhat bigger with approximately 7,200 residents. The largest area used in the analysis is the Local Education Authority (LEA), where schools[11] are under the jurisdiction of one of the 150 LEAs. Figure 1 shows the percentage of free school meal eligibility in each MSOA (left) and LSOA (right) for just one local authority, Essex. The figure indicates variation of free school meal enrolment across the county. It also allows us to make a comparison between the size of MSOAs and LSOAs. As a further comparison, and to present the largest area available, Figure 2 shows the variation across the whole country at the Local Education Authority level.

Given that the vast majority of pupils are white and speak English as a first language, using ethnic language group for this section of the population would not necessarily be a good proxy for their peer group[12], therefore I exclude the white British and those from other white backgrounds from the analysis, in addition those with unknown ethnicities or those who refused to allow their ethnicity to be recorded are also dropped from the sample.

[10]The definition from the school census is the following: 'The language to which the child was exposed during early development and continues to use this language in the home or in the community. If a child acquires English subsequent to early development, then English is not their first language no matter how proficient in it they become."

[11]Not all schools are under direct control of the local authority, such as academies.

[12]In appendix section A4 I relax this assumption and include white British in the sample.

This leaves 32 ethnic language groups, with approximately 1,300,000 observations per year. In section 6.6 I examine the sensitivity of the results from the exclusion of these different classifications. The dependent variable throughout the paper is free school meal enrolment (the eligibility has been registered); this is recorded in the census as the following:

> *Pupils should be recorded as eligible (true) only if a claim for free school meals has been made by them or on their behalf by parents and either (a) the relevant authority has confirmed their eligibility and a free school meal is currently being provided for them, or (b) the school or the LEA have seen the necessary documentation (for example, an Income Support order book) that supports their eligibility, and the administration of the free meal is to follow as a matter of process. Conversely, if pupils are in receipt of a free meal but there is confirmation that they are no longer eligible and entitlement will be revoked false should be applied.*

Note that this does not require the child to consume the meal every day, or at all. This defines our dependent variable which is a dummy indicating whether their child's eligibility is recorded as true (1) or false(0).

The eligibility for Free School Meals is set nationally and administered by the local authority and the school. The criteria that was in place for claiming Free School Meals was as follows:

- Income Support
- Income-based Jobseeker's Allowance
- Support under part VI of the Immigration and Asylum Act 1999
- Child Tax Credit, provided they are not entitled to Working Tax Credit
- An annual income (as assessed by Her Majesty's Revenue and Customs) did not exceed: £13,910 in 2005, £14,155 in 2006, £14,495 in 2007, £15,575 in 2008, and £16,040 in 2009.
- The Guarantee element of State Pension Credit
- An income-related employment and support allowance (introduced in October 2008)

In order to be eligible at least one of these criteria has to be satisfied. Claims can be made to the local authority in charge of administering free school meals. A form[13] of

[13]An example of a form can be found at the following: http://www.essex.gov.uk/Education-Schools/Schools/Pupil-Parent-Support/Documents/FSM%20app%20form%20Sept%202010.pdf

around two to three pages, depending on the local authority, is required to be completed. There are also three sections: section 1 asks for parent and pupil details, section 2 asks for financial details, and section 3 is a declaration.

As mentioned, the advantage of using the PLASC data is that I have the entire population of the potential peers. Also, there are different layers of the peer group measure. All the potential contacts within a school are known, and further I know the area where someone lives as another potential avenue of social interaction. In section 3 I defined the broad peer group as those who share the same ethnicity and whether they speak English at home or not. In this section I set out in more detail the peer group measure considered. The baseline method is that of Bertrand et al (2000). This is defined using the interaction of "quantity" and "quality" of peers. This gives a measure of the degree of interaction that an individual has (quantity), and also the extent of the welfare use of those individuals (quality). I define quantity, capturing the strength of the peer measure, as contact availability (CA_{slt}) using the following:

$$ln\frac{C_{slt}/A_{st}}{L_{lt}/S_t}$$

where C_{slt} is the number of people in the school or area who belong to the ethnic language group l at time t, A_{st} is the total number of students in school s at time t; (therefore the numerator is the percentage in the location of the individuals in that ethnic language group); and L_{lt}/S_t, the denominator, is the share of the school population in schools of that ethnic language group at time t. The denominator serves as a normalisation which prevents less prevalent ethnic language groups from being under weighted.

Quality is measured through information and attitude of school welfare of those in the same ethnic language group within the same school or area. We proxy for this using $(\overline{FSM}_{(-i)lt} - \overline{FSM}_{(-i)t})$ the deviation from the global free school meal mean of the whole population from the mean free school meal use of the ethnic language group. This measure captures cultural differences towards welfare and to the free school meal programme in general. Groups with higher levels of free school meal eligibility will have more information about the system and are more likely to have information about the eligibility criteria. They are also less likely to exert negative social pressure such as stigma.

$$\text{Peer Measure}_{slt} = (\text{CA}_{slt}) \times (\overline{FSM}_{(-i)l(t)} - \overline{FSM}_{(-i)t})$$

The intuition behind the interaction term is that if you are part of an ethnic language group that is high welfare (FSM) using, or has a culture of welfare use, and if a peer effects exists you are more likely to adopt that welfare programme if you are surrounded by people

of your own ethnic language group. Therefore, if one lives in an ethnic language enclave and that ethnic language is a high welfare participating group then if peer effects exist then you are more likely to participate[14]

Table 1 presents the summary statistics for the main variables used in the analysis. For 2008 the percentage of free school meal pupils for the whole population is 15% compared to 25% in our sample. In addition to gender and age we also have indicators for special educational need, 77% of our sample not requiring any additional help, with 3% requiring a statement of special need. Also presented are the methods of travel to school, 40% walk to school. Table 1 also presents the contact availability measures.

Table 2 presents a summary of each of the ethnic language groups. The largest ethnic group in our sample is Pakistani; the majority do not speak English at home, and also have slightly above the sample average of free meals. Most striking is the African group. Whereas for the English-speaking Africans the free school meal split is similar to the overall sample mean, for the African non English speaking group the free school meal eligibility rates are very high at around 50%. The Chinese and Indian groups are the smallest welfare recipients. Typically those who do not speak English have higher welfare use than those who do. This can be seen in the bottom panel, there is a 7 percentage point difference in our sample between non-English speaking groups and English speaking groups. This can be seen within the ethnicities also, with only the Romany group having higher free school meal eligibility rates for the English speaking group.

4 Empirical Strategy

4.1 Identification Issues

Dealing with the identification issues associated with estimating peer effects involves taking into consideration the reflection problem, Manski (1993), Moffitt (2001), Brock and Durlauf (2001). It is difficult to disentangle the actions of the individual from the actions of the peer group. An association between the behaviour of a pupil and pupils in their peer group can be categorised into three main effects. The first classification is called the correlated effect, in which individuals have similar behaviour because they face the same constraints or because of their characteristics they self-select into a peer group. For example, a school could be reluctant to hand out forms to claim the benefit, or the support staff are not so aware of the how to claim, therefore few people in that school apply. On the other hand schools with many impoverished pupils have a greater incentive to get pupils claiming as they have to provide a certain number of meals. Additionally, having a common income level is a

[14]To simplify the notation, here onwards I will to the relative FSM measure just as the mean $\overline{FSM}_t$.

further example of a correlated effect. The next classification of effect is an exogenous or contextual effect, in which the behaviour varies according to the exogenous characteristics that define membership of that group. For example, for cultural or religious reasons some of the meals provided may not be suitable for their group, so this reduces take up.[15]. The perception that the meals do not take into account particular dietary requirements, and failure by the school to take this into account could result in not registering for the meal as the parents know the children will not eat it or as it does not conform to their particular needs.

The final classification is an endogenous effect, where the behaviour of an individual is causally influenced by the behaviour of the other members of the peer group, such that an individual decides to register for the free school meal because of the behaviour of their peers. I focus on two categories. Information is one type of endogenous effect, or indeed lack of information. There are different ways this could manifest. First, by informing others about the existence of the programme that free school meals exist; this could be relevant for newcomers to the country who are not aware of the welfare programmes that are available. Getting information about own eligibility or the eligibility criteria in general and also how to apply are all potential ways information can be part of an endogenous effect. For example, if a member of the peer's group informs their peers of the criteria and where to go for the forms, these would be examples of information sharing. Seeing those who claim the meal enjoy it and that they do not suffer negative social pressure, such as bullying, could also be an informational way through which conformity occurs. The second type of endogenous effect is stigma. This could prevent some people from adopting the free school meals, due to the visible nature of the child having to claim such a benefit on a daily basis. This is probably the most commonly cited reason for not claiming free school meals.[16] However, being surrounded by many of those also claiming may reduce the negative pressure of stigma as everybody else is engaging in similar behaviour therefore this reduces the embarrassment of receiving social assistance.

[15]Equality impact assessments require the evaluating of any policies or services (including school meals) and the impact that may have on people with respect to disability, gender and racial equality. For more detail on equality impact assessments: (http://www.dwp.gov.uk/publications/impact-assessments/equality-impact-assessments/ This suggests that schools should legally take into account any changes to the meals in relation to ethnicity reducing any potential contextual effect. An example of an equality impact assessment with an example related to school meals can be found here: http://www.newcastle.gov.uk/core.nsf/a/einaguidance7

[16]Two-fifths of parents identified embarrassment as a reason for not claiming free school meals (Storey and Chamberlain (2001).

4.2 Estimation

The baseline estimates are from the following:

$$FSM_{islt} = \beta(\text{CA}_{slt} * \overline{FSM}_{lt}) + \delta \text{CA}_{slt} + X_{islt} + G_{slt} + Z_{st} + V_{lt} + \epsilon_{islt} \quad (1)$$

where FSM is binary and equal to 1 indicating participation,[17] or enrolment, in the Free School Meal programme, and the subscripts i, s, l, t denote the individual, school (year group or area), ethnic language group, and time. CA as defined before is the Contact Availability measure.

I include a set of school, year group, or area, by year fixed effects Z_{st} and a set of ethnic language group by year fixed effects ,V_{lt}. Therefore any effects that I find will not be due to school (or output area) differences. This allows me to call the estimates I find peer as opposed to school or neighbourhood effects. In order for this to hold, we assume that unobserved school (output area) variables do not differ according to ethnic language group. The above equation (1) accounts for a number of omitted variables biases. The previously mentioned location fixed effects (school or area) eliminate any fixed differences in free school meal provision, including quality of the meal. Including ethnic language by year fixed effects accounts for any cultural differences in relation to the meals and to welfare use in general. CA_{slt} is included directly as a control, this controls for reasons why individuals choose to live in ethnic enclaves. The second part of the main peer measure interaction, $\overline{FSM}_{lt}$, subsumed into the ethnic language by year fixed effects.

One potential problem with the above specification could be differential selection. There may be additional omitted individual characteristics that are correlated with $\text{CA}_{slt} * \overline{FSM}_{lt}$ and hence may bias the estimates upwards. Including CA_{slt} in the model controls for self-selection that is fixed across ethnic language groups. However, self-selection into enclaves could differ according to different ethnic language groups and by the degree of free school meal enrolment. This could lead to finding peer effects where there are none. I explain this consequence using two hypothetical individuals. One individual who is from a high free school meal using group decides to live away from their own ethnic group and, maybe to signal success or due to differential cultural attitudes to welfare, decides not to enrol. A second individual from a low free school meal using group who lives away from their ethnic contacts may have a more relaxed attitude to welfare use, compared to their own group, and therefore enrols in the programme. Both of these cases would make it more likely to find effects that would not be explained by a social interactions.

To deal with differential selection I first adopt an instrumental variable approach. I demonstrate this approach the using an area level example. As in Dustmann et al (2011)

[17] Participation means that the benefit has been applied for and eligibility has been satisfied

and Bertrand et al (2000) I exploit the geographic hierarchy of the contact availability measures. For example, in the LSOA[18] level regressions, contact availability at the MSOA and the interaction of the MSOA contact availability with mean free school meal use of the ethnic language group are used as instruments for contact availability at the (smaller) LSOA and the interaction of the LSOA contact availability with mean free school meal use of the ethnic language group. I also repeat this exercise using the LEA level measures instead of the MSOA. The identification of the IV rests on the assumption that selection at the MOSA level is greater than the LSOA level. This makes sense intuitively as people may be forced to live in certain areas for work reasons. However, within that larger region they then select the local neighbourhood they are going to live in. Alternatively, it is easier to move within a MSOA (or LEA) than between MSOAs because the costs of doing are that much higher. Furthermore, there is correlation between LSOA and its corresponding MSOA in terms of the share of ethnic language groups, but if differential selection is the main driver of the estimates then OLS will overestimate the effect. Hence our IV estimates are only biased due to between MSOA selection whereas OLS may be biased due to both between and within, comparing the two estimates facilitates to check the degree of selection.

5 Results

5.1 Baseline Estimates

Table 3 presents results from the estimation of equation (1), in each case standard errors are clustered at the school or area level depending on the level of estimation. Panel A presents the results at the school and year group level. Each regression controls for school by year fixed effects and ethnic language by year fixed effects, also included as controls are age, age squared, month of birth, dummies for different levels of special educational need, and mode of travel to school. Although not reported in the tables each of the special educational need variables are positive and significant as we may expect, relative to no special need. There is a negative coefficient for those who travel to school by car relative to other forms of transport. Those who get the bus or walk to school are more likely to have registered their free school meal eligibility.

In each of the columns we find a positive and highly significant coefficient on the peer group measure, the interaction of contact availability and mean of free school meal eligibility of the ethnic language group. Therefore the probability to register for free school meals increases with the number of contacts in the pupil's school, if the mean of free school meal

[18]Recall that the smallest areas I have available in my data are the LSOAs. MSOAs are larger than LSOAs and LEAs are the largest.

eligibility of that group is high. Column 1 in panel A presents estimates for the peer group being defined at the school level. The coefficient of 0.106 is positive and significant but is not simple to interpret. The intuition behind the interpretation is to examine the effect of a hypothetical 'welfare shock' and examine the effect of that shock with the presence of peers and without.

To do this, following Bertrand et al (2000), I assume there is this exogenous policy shock, represented by α in equation (2):

$$FSM_{islt} = \alpha + \beta(\text{CA}_{slt} * \overline{FSM}_{lt}) + \delta\text{CA}_{slt} + X_{islt} + G_{slt} + Z_{st} + V_{lt} + \epsilon_{islt} \tag{2}$$

A 1 percentage point increase in α would exogenously increase free school meal enrolment, in the absence of any peer effect, by 1 percentage point. This increase in α has a direct effect through this upward shift of 1 percentage point but also and an indirect feedback effect through the peer group, specifically through $\overline{FSM}_{lt}$. In order to find the complete effect I take the mean of both sides of equation (2) with respect to the ethnic language group, l, and differentiate with respect to *alpha*. This is represented by:

$$\frac{d\overline{FSM}_l}{d\alpha} = 1 + \overline{CA_l} * \beta\frac{\overline{FSM}_l}{d\alpha} \tag{3}$$

This policy shock α results in an $1/(1 - \beta CA_{lt})$ effect. Where CA_{lt} is the weighted average over all ethnic language groups, I obtain the effect of the peer group by subtracting the direct effect (1 percentage point) such that the welfare shock is increased by $1/(1 - \beta CA_{lt}) - 1$ due to the presence of peers. These effects are shown in the bottom row of the panels. Taking the school level results in column 1 as an example, a policy shock that would have resulted in a 1 percentage point increase in free school meal eligibility in the absence of peers would be 22% higher in the presence of peers.

In columns 2, 3, and 5 the peer group measures are instrumented with the peer group measure and the contact availability at the larger geographical regions, the MSOA and Local Educational Authority. This is to take account of, and test for, the previously mentioned differential selection. For example, examining the area level results in panel B, if there is differential selection into areas then OLS estimates will be biased upwards due to selection from both within and between LSOAs however the IV estimates would only be biased due to between LSOA selection. This is the test used by Evans et al (1992) examining peer effects in teen pregnancy and school dropout rates. It is also used by Bertrand et al. (2000) and Deri (2005). The OLS and IV estimates do not point to differential selection. In panel B, columns 2, 3, and 5, the IV estimates larger than the OLS results suggesting that

the bias due to the self-selection is negative. Indeed comparing the IV and OLS estimates suggests that OLS understate the effect of peers. The first stage results are presented in table A1.

Before moving to further results, one concern could be that what are being estimated are correlations of poverty. First, including area or school by year level fixed effects should account for this problem, and that as such our estimates can be interpreted as a peer rather than neighbourhood effect. Second, although there is an obvious poverty aspect to free school meals, and indeed it is typically used as a proxy for poverty when a better one is not necessarily available, Hobbs and Vignoles (2007) show that free school meal status is an imperfect proxy for low income or unemployment, and that there is significant bias in using free school meals status as opposed to actual socioeconomic status.

Table 4 presents the peer group effect for the combined PLASC and LYSPE data. The purpose of this exercise is to first act as a robustness check on the baseline estimates. Second, it allows me to control for a range of family background indicators that are not available in the PLASC data. I focus only on the school level analysis and estimate the same equation for the PLASC data. The first column includes only the peer group and contact availability measure. The effect is similar to that in the baseline PLASC results. The second column adds in controls for other benefits that result in qualification of free school meals (as spelled out in section 3), a dummy for income greater than £15,500, and benefits that do not qualify for free school meal enrolment. These variables have the expected signs: having an income above the threshold reduces the probability of registering FSM eligibility, if the parent claims job seekers allowance, pension credit, or income support then there is a positive association with claiming free school meals. The coefficient on claiming tax credits is positive but insignificant in the second column, for subsequent columns this reverses but remains insignificant. The inclusion of these sets of controls increases the peer group coefficient.

Column 3 includes variables related to a conditional cash transfer related to the education programme, the educational maintenance allowance (EMA). Being aware of the scheme has no effect; however there is a positive effect of applying, or going to apply for EMA. Column 4 additionally includes three family status variables. Lone parents are more likely to register their eligibility, whereas this is negative for married parents. Having the internet at home could potentially be positive or negative; there is an income effect of having the internet which would reduce the probability of registering. However, the internet could potentially facilitate registration or gathering information about the eligibility criteria. The income effect appears to dominate. Also worth noting is that the inclusion of these controls results in a drop of the main peer group effect. Column 5 includes controls for bullying as reported by the parents; there is a negative effect, albeit imprecisely measured of being

threatened with violence. Column 5 also includes, unreported, ten dummies for the age of the mother and six education dummies for the mother. Finally, column 6 estimates the same instrumental variable strategy as in the baseline estimation. Similarly I find that the IV estimates are larger than the OLS, suggesting that there is not a problem of differential selection and the OLS estimates may be under-estimating the actual effect. With the combined PLASC/LSYPE data it is possible to condition directly on the eligibility criteria. I examine this in more detail in the appendix section A1.

5.2 Robustness & Alternative Explanations

Sample Selection & Heterogeneous Effects

The purpose of this section is twofold. First, the sample selections act as robustness checks to make sure it is not one group or another that is solely driving the effect. Second, they may indicate important heterogeneity of the impact.

Table 5 presents estimates for different samples. In the first panel I split the sample by various ages, below aged 8 and below aged 11 in order to capture effects at primary school, and above aged 11 and aged 14 to capture different effects at secondary school. The decision to register for free school meals would primarily be made by the parent for the younger children and as they become older the decision is more likely to be a joint decision. The estimates are all broadly similar to the baseline results. The peer effect for the oldest children aged fifteen and above is only slightly smaller than for the other ages. These suggest that peers have an impact over the entire distribution of ages.

Second, I again restrict the sample by age and also whether or not English is spoken as a first language. The effects here are stronger, suggesting that the peer effect is greater for those who do not speak English as a first language, this is tested in the next section. The results in this panel confirm the previous findings that the effects are present across the age spectrum, if only slightly weaker for the older children. The larger effects, albeit marginal, for the younger children, and also those non English speaking, could suggest a playground effect. Where parents of younger children collect their children in the playground they are then more likely to interact with those of the same ethnic language group.

Third, as table 2 showed that there is a wide variety of ethnicities present in the sample, and although one is not vastly bigger than the others, we may be concerned that one of these groups may be driving our results. Therefore the third panel excludes in turn Pakistani, African, amd Bangladeshi. Excluding the African ethnic group from the estimation has the most dramatic effect, the coefficient falls by around 40% in the school regression, and 35% in the area regressions. They do however remain highly significant and positive.

Next, I exclude groups with high free school meal eligibility, and again find positive

and significant results across the different regressions. The results from Africans who do not speak English as a first language are almost the same as to those in panel 3, where we exclude the whole African group, suggesting that it is this group that is driving that fall in the coefficient. When other high free school meal eligible groups are excluded from the estimation, the results are similar.

Bilingual Staff & Language Help

An alternative explanation for finding a positive effect could be that the presence of a significant proportion of ethnic minority students (or their parents) may or may not have English as a first language may motivate the school to hire bilingual staff, or may encourage the local authority to provide application material in alternative languages, or offer help such as translation services. These actions by the school or local authority would also predict a positive effect. To that end I estimate the peer effect for different samples of schools. First, the latest school census contains information about the staff at the school. Therefore I have information on whether the school employs any full time equivalent bilingual minority ethnic support staff, and I use this information to see whether the effect is through this bureaucratic channel (Bertrand et al (2000)) by comparing schools with and without bilingual support staff. Second, I have asked a number of local authorities[19] whether they provide translation services, or provide the free school meal application forms in different languages. By using this information I compare the peer effect in both cases and see whether the effect is driven through this channel.

Table 7 presents the results of this analysis. Panel A examines the impact of the presence of a bilingual ethnic minority member of staff. Column 1 presents the baseline estimate for the sample available. Column 2 presents the peer measure for schools with a bilingual staff member and column 3 for those without. The final column represents the p-value of a test for no difference. For both groups we find positive and significant effects, although the difference between them is statistically significant. However, for those schools with a bilingual member of staff the effect is present and still large, therefore, purely this channel cannot be driving the result that I find. Panels B and C examine providing support at the local authority level. Panel B splits the sample by local authorities who provide the application forms in different languages and those that do not; there is not a statistically significant difference between these two groups of local authorities. Panel C splits by local authorities who said they offer additional help. The difference is significant however, as

[19]Local authorities were specifically asked: 'Do you provide any forms or help for those claiming free school meals whose first language is not English. If so, when was this first implemented?' Virtually no local authority was able to provide info on when they first offered translated forms or translation services, therefore I use the latest year available of the PLASC data 2009 to make sure that it is close as possible to the data collected about the local authorities.

with the bilingual staff, there is still a positive and significant effect, therefore the local authorities' action cannot fully explain the effect I find.

English Proficiency

Table 7 examines how the peer effect differs according to how proficient one is at English. Firstly, I examine the impact on whether the pupil has stated that their first language is one other than English. The peer effect for this group is much larger, this is evidence that information is part of the peer effect. Those who speak a language other than English are probably more reliant on others, who share that language, for information about the relevant systems for claiming.

In panels B and C I examine how the actual proficiency of English has an impact on the strength of the peer effect. Proficiency is measured by the level achieved in government set tests at ages 11 (Key Stage 2) and 14 (Key Stage 3).[20] In addition to the peer group measure, panel 2 includes two interactions, one interacting the peer group with an indicator for achieving level 4 and above and one for level 5 and above, in order to test the impact of English proficiency. As the English level of the student improves the strength of the peer group is diminished. This also holds for the older children, using the key stage 3 measures in panel 4. The peer effect still remains for those who score well on the tests, but is weaker as the level improves.

Panels D and E examine how English proficiency of contacts has an impact on the peer effect. As Bertrand et al (2000) mention, there are two opposite drivers of this effect. Increased English proficiency could imply that those contacts have more information about the system, and can help in navigating the bureaucracy of benefits, implying a positive effect. Conversely, areas with high English proficiency may be more attached to the labour market and less reliant on benefits so know less about the system. This second effect suggests a negative impact of English proficiency of the peer group. The interacted terms of the peer group and the percentage in the school or area with level 4 and 5 and above is negative, most strongly for the higher level 5 at key stage 2. The key stage 3 results tell a similar story, the effect is weaker in areas with higher percentages of those achieving level 5 and 6.

Additional Results and Robustness Checks

In the appendix I examine a range of different specifications, including using ex-ante peer characteristics (see table A3), I estimate logit, probit and use different definitions of peers in table A4. Section A5 examines potential non-linearities and section A6 presents a robustness analyisis with a focus on the regional variation.

[20] Level 4 is the expected level set by the government for Key Stage 2 and level 5 for Key Stage 3.

5.3 Understanding the Peer Effect

This section tries to uncover the nature of the peer effect in more detail. The question I ask in this section is: How does the peer effect vary in the presence (or absence) of stigma or information? Previous sections have established the presence of a peer effect in free school meal enrolment, and also examined how the effect differs for different groups. In particular the effect is greater for those whose first language is not English. Next I try to uncover the nature of the peer effect in a more direct way. There are two main components I examine here; the first is related to stigma (a psychological cost associated with the welfare benefit), the second I test for information.

In attempting to measure β it is important to assess what β is actually measuring. So far this has been referred to as a peer effect, but what does that encompass? β can be broken down into three component parts: $\beta^* = \beta^i + \beta^s + \beta^z$ where β^i measures the positive element of the peer effect. For example, this could be by providing information about the eligibility criteria. β^s measures the negative peer effect related to stigma or negative social pressure, and β^z some other unknown elements that could be either positive or negative.

The task in this section goes beyond finding a peer effect and examines a more general question as to how to separate out the main effects of information and stigma. I do this by comparing the peer effect in two different states, when stigma (information) is present and when stigma (information) is absent. From the baseline estimate, at the school level, $\widehat{\beta} = 0.1$. Then in that case we know that $\widehat{\beta} = \beta^i + \beta^s + \beta^z = 0.1$, the problem is that we only know the combination of these three effects. One way around this would be to find a situation where we can set either β^i or β^s to 0, then estimate what the peer effect is in this case and compare the effects of a welfare shock in either case to see how each has a different effect in different environments.

Stigma Test

In order to do this I use a technological innovation that has been increasingly introduced into schools over the last few years, cashless catering systems. These replace the use of cash in the dining hall with some other payment method. There are a number of different types of cashless catering systems. These include swipe and smart cards[21], pin numbers, touch screen with student pictures displayed on screen, and biometric systems[22], where the pupils are identified using their finger print. I do not distinguish between the different systems in the analysis, however, they all have the key feature of introducing anonymity for those who

[21] Cash can be put on them by the parents and this would be automatic for those claiming free school meals

[22] The biometric systems are less popular than other methods, this is due to ethical issues surrounding the collection of pupils' fingerprints.

claim free school meals and as such remove the visible stigma associated with taking them. It is important to note that these systems would not necessarily remove the internal stigma associated with claiming benefits but would remove the visible stigma and remove the fear of bullying that could result in being known to be on free school meals. Therefore the key question is what happens to the peer effect when we remove visible stigma. Typically, before the introduction of cashless systems those eligible for free school meals would have been given a token in order to claim their meal, this would have made them very visible to the other pupils.

Therefore we are able to set $\beta^s = 0$ by using a subset of the schools and local authorities who have adopted this system. Data was collected by a phone interview from 406 secondary schools, a sample of around 10% of the total schools, in 31 local authorities[23]. The focus is on secondary schools, primarily because the cashless catering systems are far more likely to be used in secondary schools, given the cost involved and the gains in economies of scale that can be achieved are greater in a secondary school relative to primary. Second, it could be assumed that there is greater visible stigma in secondary schools, as children get older they are more likely to be aware of these issues. Finally, a practical reason is that one secondary school covers around 1000-1500 pupils compared to 100-300 pupils in a primary school.

The schools were asked whether they have introduced a cashless catering system. If the answer was positive, then a further question was asked enquiring when this was introduced. Figure 3 presents the coverage of cashless catering in schools in the sample. Coverage is measured in two ways, first by the number of pupils affected by the introduction of cashless system, and second by the number of schools. Around 10% of those contacted did not give a sufficient answer; of those for which it could be established whether or not they have a cashless system and in which year, around 60% of the schools contacted either operate some form of cashless system, 14.5% of schools had a cashless system before the analysis period (pre-2006), and 15.7% had introduced a system in 2010, 2011, or were planning to in the next academic year (2011/2012) beginning in September 2011. To determine whether this is a representative sample, I compare my sample to two other surveys of cashless catering systems, the School Food Trust (2009) surveyed 98 secondary schools and found 53% have a cashless system, with 16.3% considering introducing a system in the near future. Nelson et al. (2010) in a survey conducted in 2009/2010 found around 45% of schools with catering in local authority control have a cashless system, compared to 20% not in local authority

[23]The local authorities that were contacted were: Barking and Dagenham, Barnet, Barnsley, Bath and North Somerset, Bedford, Bexley, Birmingham, Bradford, Bury, Derby, Ealing, Enfield, Hartlepool, Lambeth, Leicester, Newham, Nottingham, Nottinghamshire, Plymouth, Poole, Portsmouth, Richmond upon Thames, Southampton, Southend, Staffordshire, Tower Hamlets, Trafford, Waltham Forest, Wandsworth, Warrington, Warwickshire.

control. Therefore, although the two surveys and this current study ask slightly different questions regarding the use of cashless systems, the results of the survey in the current study seem reasonable and not out of line with other surveys, although my sample has a slightly higher percentage this is perhaps not too surprising given my survey was conducted later.

The School Food Trust (2009) and Nelson et al (2010) also directly asked reasons why the systems were introduced. Both surveys cite removal of stigma related to the differentiation of free school meals students as the primary reason for the introduction of cashless system. The School Food Trust (2009) cites the removal of stigma as the main reason for 77% of the schools that are considering using a cashless system. What these surveys show is that the primary reason for the introduction of these systems is the removal of stigma. It is important to know why these are not introduced. The primary reason given is cost. These systems are quite costly, between £6000-25,000 depending upon the system and the size of the school, and 70% of those surveyed cited budget constraints as the main reason for not introducing the system. Therefore, there may be differences between the schools that adopt the system and those that do not, although as we have seen from the surveys this is mainly due to the budgets of the schools. As there may be differences in unobservable characteristics between the schools which adopt this technology, we also restrict the estimation to those which have cashless systems and identify the effect through the variation in timing of the changes.

To determine the peer effect when stigma is removed we estimate the following:

$$\begin{aligned} FSM_{islt} = \alpha + \beta_1 \text{CA}_{slt} * \overline{FSM}_{lt} + \beta_2 \text{CA}_{slt} * \overline{FSM}_{lt} * \text{Post Cashless}_{slt} + \\ + \beta_3 \text{Post Cashless}_{slt} + \delta \text{CA}_{slt} + X_{islt} + G_{slt} + Z_{st} + V_{lt} + \epsilon_{islt} \end{aligned} \tag{4}$$

This is the same equation as estimated in the previous sections; however I include the interaction of the peer group with a dummy variable that takes a value 1 for the year after the introduction of the cashless catering system. Therefore when Post Cashless = 1, the assumption made is that there is no stigma such that $\beta_s = 0$, hence $\beta = \beta^i + \beta^z = \beta^1 + \beta_2$. When Post Cashless = 0 then $\beta = \beta^i + \beta^z + \beta^s = \beta^1$ so we can compare the peer effect when stigma is present and when it is absent. Given information and stigma come through social interaction, I focus on how the peer effect changes with the introduction of a cashless system. Note that the Post Cashless$_{slt}$ variable is subsumed by the school by year fixed effects.

Table 11 presents the results of this estimation using the PLASC data from 2006 to 2009. Column 1 presents the peer group effect and the interaction with a post implementation ('post cashless') model for all schools in our sample that were called without any controls.

Column 2 includes the controls from the baseline regressions, the coefficients remain similar. The interaction term is positive, suggesting that the removal of stigma has a positive differential impact on the peer effect, i.e. removing visible stigma increases the peer effect. Alternatively, the results show that when a peer effect has stigma present it is lower than when it has been removed.

To interpret the effects, the same thought experiment is carried out as in the interpretation of the baseline results; hence I convert the effects into hypothetical welfare shocks, and show the welfare shock with and without stigma. Hence from the coefficients from column 2, we find a welfare shock is 15% higher when peers with stigma are present, however this increases to 29% in the absence of stigma, a 45% increase in the welfare shock. In column 3 we restrict our sample only to those who have adopted the cashless system. In this case identification comes from variation within only those schools with a cashless system and hence these schools should be more comparable on fixed unobservable characteristics that would predict adopting the cashless system. Here the removal of stigma has a greater effect. Column 4 and 5 include the white British ethnic group, the overall size of the welfare shocks decrease, however the presence of stigma has a larger effect reducing a positive welfare shock by 64% and 84% for all schools and cashless schools.

Information Test

Table 12 tests for the role that information may play in the peer effect. Aizer and Currie (2004), in examining the use of pre-natal medical care, assume that for second births mothers should know more about publicly funded pre-natal care programmes than those who are having their first birth. Therefore, they expect that if the role of the peer group is to pass on information, then for this group of second mothers the peer effect should be smaller. This section performs a similar test. The peer group is examined in a situation where the information element is less important for certain groups. Previously I examined groups where information from the peers is potentially less important, such as those who have high English Test scores. The results of this current test are shown in column 1 and 2, at the school and LSOA level. The assumption we make is that there should be no information to be gained for those who have claimed in either of the previous two years. The sample is restricted to 2009, therefore a previous claimant is defined as someone who claimed in either 2008 and or 2007.

The claim form for free school meals, as described, showed that the free school meals had to be applied for each year, and also that the criteria changes from year to year, therefore, there are changes to the information that one needs in order to register eligibility. Given the changes that occur to the criteria over time, the previous group's network effect may still have some residual information if we consider a longer timeframe. We estimate the

following equation:

$$FSM_{islt} = \alpha + \beta_1 \text{CA}_{slt} * \overline{FSM}_{lt} + \beta_2 \text{CA}_{slt} * \overline{FSM}_{lt} * \text{Previous FSM}_{islt} + \\ + \beta_3 \text{Previous FSM}_{islt} + \delta \text{CA}_{slt} + X_{islt} + G_{slt} + Z_{st} + V_{lt} + \epsilon_{islt} \tag{5}$$

Analogous to equation (2) this is the same equation as estimated in the baseline estimates with an added interaction of the peer group, a dummy variable that takes a value 1 if the pupil has claimed free school meals in the previous two years. Therefore when Previous FSM = 1, the assumption we make is that there is no information for this group such that $\beta_i = 0$, hence $\beta^* = \beta^s + \beta^z = \beta_1 + \beta_2$. When Previous FSM = 0 then $\beta^* = \beta^i + \beta^s + \beta^z = \beta_1$ so we can compare the peer effect when information is present and when it is absent. Column 1 presents baseline estimates for 2009. Column 2 and 3 define previous claimant as someone who claimed in 2007, column 4 and 5 as someone who claimed in 2008, and column 6 and 7 as someone who claimed in 2007 or 2008. The estimates are significantly lower for previous claimants, therefore suggesting that information is an important component of the peer effect, this is in contrast to Aizer and Currie (2004) who do not find that information plays a role, but similar to Figlio et al. (2011) who in a less stable informational environment find information is important. Examining column 6 and 7, these results show when a welfare shock, defined previously, increases by 4% when the peer effect contains no (or little) information, therefore not having information as part of the peer measure reduces the impact by 36%.

Heterogeneity of Stigma and Information

Finally, I examine how stigma and information vary according to both education and income. As the PLASC data does not have family background measures we utilise neighbourhood level information on education and income deprivation[24]. In table 10 I split the sample into 4 quartiles and re-estimate the tests carried out in column 3 of table 8 for each of those quartiles, I use the non-white sample and restrict to the cashless sample. The pattern across the different deprivation measures is similar with the lowest welfare shocks for the most deprived. These results suggest that for those who are potentially on the margins of applying then stigma from their peers plays an important role in preventing

[24]Deprivation measures come from the Office of National Statistics, Index of Multiple Deprivation Index. The two domains used here are defined as the following: Employment Deprivation - defined as involuntary exclusion of the working age population from work, and includes elements of the 'hidden unemployed' such as those out of work due to illness and disability. Education, Skills and Training Deprivation - the extent of deprivation in education, skills and training in an area. The indicators grouped into two sub-domains: one relating to children and young people and one relating to adult skills. These two sub-domains are designed to reflect the 'flow' and 'stock' of educational disadvantage within an area. For more information on indices of deprivation see http://www.communities.gov.uk/communities/research/indicesdeprivation/ http://www.communities.gov.uk/communities/research/indicesdeprivation/

take up, however for the least well off in society then this visible stigma is less important, potentially as the benefit of the welfare is that much greater.

Table 11 performs a similar exercise and replicates the two information tests for the quartiles of employment and education. These results are based on the most restrictive definition of previous claimant, i.e. having claimed in either 2008 or 2007. Interestingly, the results are the opposite of the stigma estimates. Along with education deprivation, information plays no part in the peer effects for the least deprived, i.e. for the best educated. This backs up the previous section that examined the test scores in language skill, for these groups information should be less important as they rely less on their peers or networks for information. Alternatively, it could be that the better educated are able to get information from other sources more easily. The pattern is also similar across income deprivation, with lack of information having the greatest impact for the most deprived.

These results suggest not only that both stigma and information have an impact on the magnitude of the peer effect, but that there is important heterogeneity in this impact which could imply important policy differences, targeting different policies at different parts of the population.

6 Conclusion

This paper has examined the role of peer effects in the UK's largest food welfare programme. To examine this issue I use a large administrative data set from the UK covering all school children. Defining the peer group as the interaction of quality and quantity as proposed by Bertrand et al (2000), it is found that a pupil is more likely to enrol for free school meals when surrounded by more of their peers who share a common ethnicity and language, if that ethnic language group is a high free school meal using group at the national level. These effects are robust to a range of specifications and the controlling for unobserved characteristics using school/small area level by year fixed effects. The magnitude of the effect is such that the presence of peers increases a welfare shock by around 20-30%. These results suggest that policies aimed at expanding (or contracting) enrolment will have a greater marginal impact for those living in enclaves.

In addition the larger contribution of this paper is to be able to examine the nature of the peer effect. It is widely thought that peers provide information about welfare programmes and that stigma, such as negative social pressure or from peers may prevent take up. I propose a range of tests to gauge the extent to which each of these elements has an impact. I examine how the peer effect differs when stigma and information is present and when it is not. Recently, more and more schools have adopted a technological innovation that removes the stigma associated with free school meals; cashless catering systems remove

the identification of those claiming. By collecting data from over 400 secondary schools I examine the impact of these systems on the peer effect. I find that stigma dampens welfare shocks by around 40-60%. I perform a similar test for information, assuming that the peer group should not provide information to those who have previously claimed. This test also shows that information is important. This confirms the findings that the peer effect is smaller for those with high English test scores.

Finally, I examine how the effect of stigma and information varies according to income and education. For the most deprived areas in society stigma is a less, and information is a more, important component of the peer effect. This has important policy implications suggesting that campaigns aimed at improving information will have a greater marginal effect in more deprived areas. In contrast, efforts to remove the visible element of stigma have a greater marginal impact in the better off areas.

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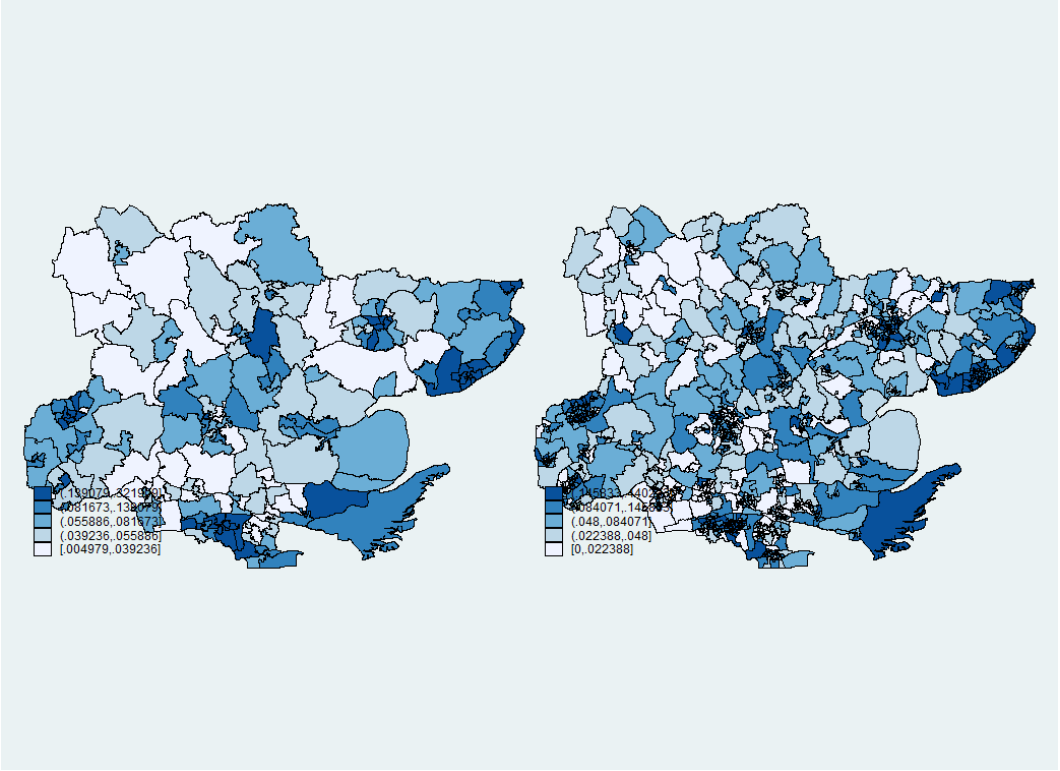
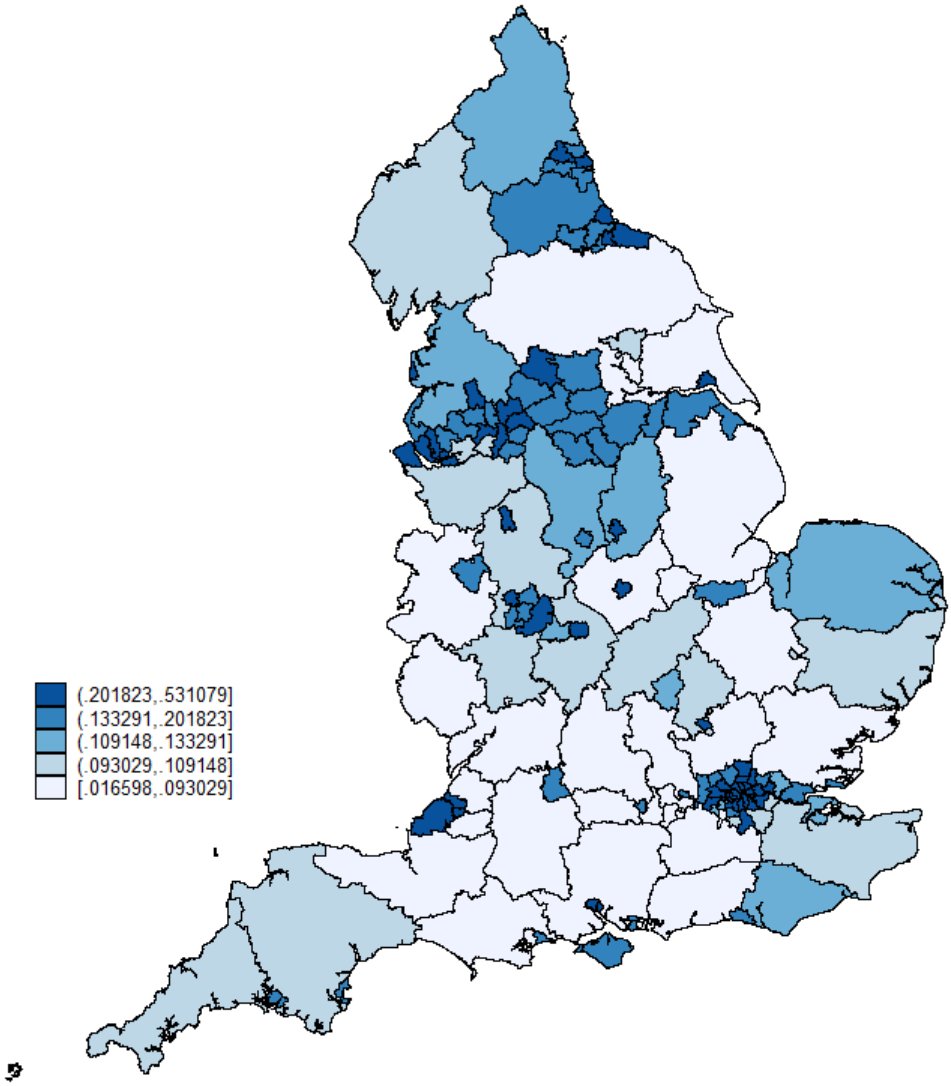
Figure 1: LSOA & MSOA Essex Map of Free School Meal Eligibility (Essex)



source: Based on 2008 PLASC data

Figure 2: Local Education Authority Map of Free School Meal Eligibility percentage in each



source: Based on 2008 PLASC data

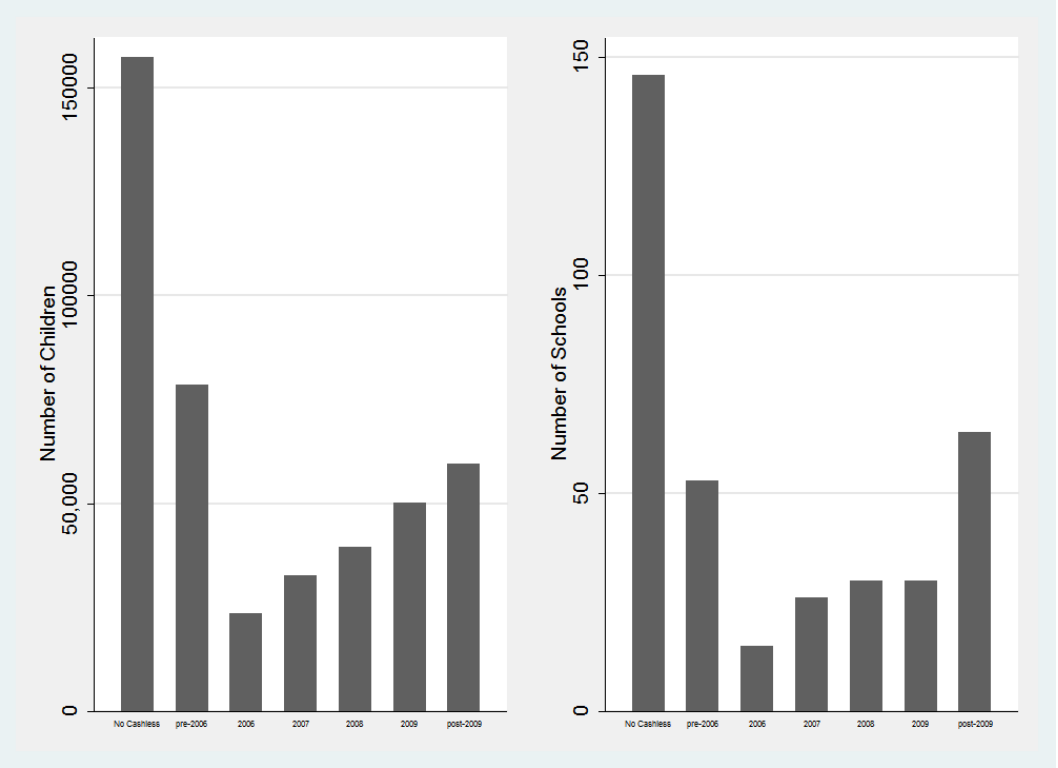


Figure 3: Cashless Catering Coverage: Children and Schools

Table 1: Summary Statistics

	PLASC Sample		LSYPE Sample	
	mean	sd	mean	sd
Free School Meal Eligible	0.260	0.439	0.241	0.428
Contact Availability and Peer Groups				
Year Group Contact Availability	13.48	51.60	12.04	15.73
Ln Year Group Contact Availability	1.920	1.155	1.795	1.248
Year Group Peer Group	0.216	0.310	0.189	0.327
School Contact Availability	10.39	30.03	10.36	14.39
Ln School Contact Availability	1.556	1.308	1.537	1.385
School Peer Group	0.185	0.300	0.170	0.323
LSOA Contact Availability	9.327	20.32	11.85	14.07
Ln LSOA Contact Availability	1.615	1.163	1.819	1.237
LSOA Peer Group	0.188	0.287	0.209	0.335
MSOA Contact Availability	7.411	10.05	9.966	12.73
Ln MSOA Contact Availability	1.318	1.281	1.561	1.342
MSOA Peer Group	0.161	0.274	0.184	0.325
Age	9.693	3.722	15.62	0.794
Male	0.509	0.500	0.469	0.499
Special Educational Need				
School Action	0.138	0.345	0.0847	0.278
School Action Plus	0.0612	0.240	0.0281	0.165
Statement	0.0275	0.163	0.0204	0.141
Mode of Transport				
Car	0.225	0.418		
Bus	0.130	0.337		
Walk	0.398	0.489		
Train	0.00692	0.0829		
Bullied				
Called Names			0.0502	0.218
Excluded from Friends			0.0239	0.153
Hand over money			0.00285	0.0533
Threatened with violence			0.0176	0.131
Experienced violence			0.0177	0.132
Other Background Characteristics				
Health of Main Parent Fairly or Very Good			0.784	0.412
Child Benefit			0.939	0.240
Guardian Allowence			0.00201	0.0448
Invalid Care Allowence			0.0219	0.146
Severe Disability Allowence			0.00736	0.0855
Disability Living Allowence			0.0800	0.271
Attendance Allowence			0.00569	0.0752
Income greater than 15,500			0.349	0.477
Disabled Mother			0.134	0.341
Disabled Father			0.122	0.327
Job Seekers Allowance			0.0196	0.139
Lone parent			0.216	0.411
Married Main Parent			0.726	0.446
Step Family			0.0382	0.192
Number of Siblings			2.070	1.483
Internet Access in the home			0.797	0.402
Main parent change to not working			0.0981	0.297
Income Source: pension			0.0385	0.192
Income Source: income support			0.202	0.402
Income Source: tax credits			0.419	0.493
Aware of EMA			0.630	0.483
Applied for EMA			0.107	0.309
Will apply for EMA			0.544	0.498
Number of observations	3,881,969		5975	

Notes: Summary statistics based on baseline sample from table 3 column 1 for PLASC sample, and table 4 for LSYPE sample

Table 2: Summary Statistics of Ethnicity Language Group by Free School Meal Eligibility

	PLASC Sample				LSYPE-PLASC Combined Sample			
	Non-FSM		FSM		Non-FSM		FSM	
	No.	%	No.	%	No.	%	No.	%
Ethnicity and Language Group								
African Eng	141,275	80.6%	34,019	19.4%	414	85.2%	72	14.8%
African Non Eng	185,613	50.7%	180,519	49.3%	453	54.8%	373	45.2%
Other Asian Eng	42,818	87.7%	5,986	12.3%	49	87.5%	7	12.5%
Other Asian Non Eng	158,684	83.7%	30,938	16.3%	128	81.5%	29	18.5%
Other Black Eng	53,736	70.7%	22,274	29.3%	68	90.7%	7	9.3%
Other Black Non Eng	18,793	59.9%	12,590	40.1%	19	61.3%	12	38.7%
Other Ethnic Eng	38,180	80.9%	9,017	19.1%	39	88.6%	5	11.4%
Other Ethnic Non Eng	133,788	64.9%	72,214	35.1%	96	65.8%	50	34.2%
Other Mixed Eng	168,664	78.7%	45,570	21.3%	319	85.1%	56	14.9%
Other Mixed Non Eng	39,790	77.1%	11,839	22.9%	52	76.5%	16	23.5%
Bangladeshi Eng	9,370	73.4%	3,387	26.6%	42	76.4%	13	23.6%
Bangladeshi Non Eng	166,410	61.9%	102,384	38.1%	607	50.2%	602	49.8%
Caribbean Eng	204,434	72.8%	76,442	27.2%	815	79.7%	208	20.3%
Caribbean Non Eng	10,164	69.4%	4,472	30.6%	40	65.6%	21	34.4%
Chinese Eng	16,959	93.8%	1,114	6.2%	18	100.0%	0	0.0%
Chinese Non Eng	53,981	89.7%	6,182	10.3%	56	90.3%	6	9.7%
Romany Eng	12,804	57.0%	9,667	43.0%	2	100.0%	0	0.0%
Romany Non Eng	4,373	66.5%	2,202	33.5%	0	0%	0	0.0%
Indian Eng	109,200	93.1%	8,108	6.9%	369	95.8%	16	4.2%
Indian Non Eng	361,554	90.2%	39,240	9.8%	1,447	90.2%	157	9.8%
Irish Eng	62,198	83.4%	12,369	16.6%	40	75.5%	13	24.5%
Irish Non Eng	600	78.0%	169	22.0%	0	0%	0	0.0%
Pakistani Eng	62,195	77.2%	18,363	22.8%	158	74.9%	53	25.1%
Pakistani Non Eng	446,662	72.4%	170,209	27.6%	1,008	65.7%	527	34.3%
Traveller Irish Eng	5,571	42.7%	7,477	57.3%	1	100.0%	0	0.0%
Traveller Irish Non Eng	73	29.9%	171	70.1%	0	0%	0	0.0%
White & Asian Eng	112,652	83.6%	22,035	16.4%	252	93.3%	18	6.7%
White & Asian Non Eng	17,496	78.9%	4,674	21.1%	32	80.0%	8	20.0%
White & Black African Eng	48,813	76.4%	15,103	23.6%	92	85.2%	16	14.8%
White & Black African Non Eng	10,592	66.1%	5,430	33.9%	7	36.8%	12	63.2%
White & Black Carib Eng	172,365	70.2%	73,099	29.8%	344	76.4%	106	23.6%
White & Black Carib Non Eng	3,433	70.0%	1,471	30.0%	7	70.0%	3	30.0%
Total	2,873,240	74.0%	1,008,734	26.0%	6,974	74.3%	2,406	25.7%

Notes: Summary statistics based on baseline sample from table 3 column 1 for PLASC sample, and table 4 for LSYPE sample

Table 3: Baseline I

Dependent Variable: Free School Meal Participation

	Panel A: School Level				
	(1)	(2)	(3)	(4)	(5)
CA Measure:	School	School	School	Year Group	Year Group
Estimation:	OLS	IV	IV	OLS	IV
$CA_{slt} * \overline{FSM}_{lt}$	0.106***	0.201***	0.184***	0.096***	0.136***
	(0.006)	(0.007)	(0.008)	(0.003)	(0.003)
CA_{slt}	-0.012***	-0.014***	-0.014***	-0.013***	-0.017***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Observations	3881969	3858263	3878419	3881969	3816367
R-squared	0.048	0.047	0.047	0.045	0.045
Welfare Shock	21.9%	53.3%	46.8%	23.4%	35.6%
School x Year FE	Yes	Yes	Yes	Yes	Yes
Ethnic Language x Year FE	Yes	Yes	Yes	Yes	Yes
Instrument	-	MSOA	LEA	-	School
	Panel B: Area Level				
	(1)	(2)	(3)	(4)	(5)
CA Measure:	LSOA	LSOA	LSOA	MSOA	MSOA
Estimation	OLS	IV	IV	OLS	IV
$CA_{slt} * \overline{FSM}_{lt}$	0.127***	0.154***	0.228***	0.122***	0.187***
	(0.005)	(0.006)	(0.008)	(0.006)	(0.008)
CA_{slt}	-0.014***	-0.018***	-0.009***	-0.015***	-0.022***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	3,861,867	3,858,355	3,858,391	3,861,831	3,861,792
R-squared	0.050	0.050	0.049	0.056	0.056
Welfare Shock	26.6%	33.1%	64.2%	19.4%	32.4%
School x Year FE	Yes	Yes	Yes	Yes	Yes
Ethnic Language x Year FE	Yes	Yes	Yes	Yes	Yes
Instrument	-	MSOA	LEA	-	LEA

notes:

a) Standard errors clustered at the level of the contact availability measure in parenthesis. Significance level denoted by: *** p<0.01, ** p<0.05, * p<0.1.

b) Additional controls include: age, age squared, month of birth, special educational need dummies, mode of transport dummies

c) Ethnic Language by year fixed effects are represented by 96 dummies

d) The sample comprises of the PLASC data from 2007-2009, exluded ethnic groups include white british, other white, excluded and unknown ethnicities. Those without a school or area code are also excluded from the sample.

e) CA is an abbreviation for Contact Availability as defined in the text.

f) Calculation for the response to a hypothetical welfare shock as defined in the text.

Table 4: Baseline II

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation	OLS	OLS	OLS	OLS	OLS	IV
$CA_{slt} * \overline{FSM}_{lt}$	0.110**	0.127***	0.132***	0.113**	0.122***	0.162**
	(0.0508)	(0.0466)	(0.0464)	(0.0449)	(0.0441)	(0.0637)
CA_{slt}	0.0296***	0.0141**	0.0128**	0.00933	0.00879	0.00536
	(0.00721)	(0.00628)	(0.00627)	(0.00621)	(0.00612)	(0.00770)
Income $\geq$ 15500		-0.0811***	-0.0751***	-0.0503***	-0.0457***	-0.0448***
		(0.00939)	(0.00945)	(0.00887)	(0.00888)	(0.00982)
Job Seekers Allowance (w2)		0.238***	0.233***	0.242***	0.241***	0.242***
		(0.0414)	(0.0415)	(0.0417)	(0.0420)	(0.0445)
Income Source: pension		0.168***	0.164***	0.152***	0.157***	0.157***
		(0.0300)	(0.0300)	(0.0295)	(0.0312)	(0.0312)
Income Source: income support		0.463***	0.459***	0.393***	0.386***	0.386***
		(0.0191)	(0.0192)	(0.0195)	(0.0196)	(0.0177)
Income Source: tax credits		0.00114	-0.00497	-0.00865	-0.00862	-0.00883
		(0.0109)	(0.0110)	(0.0107)	(0.0108)	(0.0102)
Child Benefit		0.0517**	0.0496**	0.0539**	0.0551**	0.0542**
		(0.0243)	(0.0244)	(0.0236)	(0.0237)	(0.0234)
Guardian Allowence		0.0826	0.0627	0.0457	0.0647	0.0842
		(0.0807)	(0.0827)	(0.0895)	(0.0907)	(0.0949)
Invalid Care Allowence		-0.0186	-0.0217	0.0247	0.0251	0.0265
		(0.0389)	(0.0389)	(0.0385)	(0.0390)	(0.0401)
Severe Disability Allowence		0.0632	0.0652	0.0283	0.0429	0.0479
		(0.0585)	(0.0582)	(0.0600)	(0.0613)	(0.0621)
Disability Living Allowence		0.0819***	0.0800***	0.0395*	0.0366	0.0384*
		(0.0235)	(0.0235)	(0.0240)	(0.0240)	(0.0231)
Attendance Allowence		0.0668	0.0624	0.0505	0.0456	0.0431
		(0.0786)	(0.0782)	(0.0783)	(0.0793)	(0.0782)
Aware of EMA (w2)			-0.0115	-0.0139	-0.0117	-0.0115
			(0.00956)	(0.00947)	(0.00964)	(0.00979)
Applied for EMA (w3)			0.0366**	0.0130	0.00840	0.0108
			(0.0174)	(0.0168)	(0.0166)	(0.0174)
Will apply for EMA (w3)			0.0424***	0.0138	0.0124	0.0121
			(0.0108)	(0.0110)	(0.0109)	(0.0105)
Lone parent				0.100***	0.102***	0.104***
				(0.0218)	(0.0219)	(0.0231)

Table 4 – continued from previous page

	OLS	OLS	OLS	OLS	OLS	IV
Married Main Parent				-0.0586***	-0.0609***	-0.0614***
				(0.0197)	(0.0196)	(0.0207)
Step Family				0.0142	0.0188	0.0174
				(0.0265)	(0.0268)	(0.0267)
Number of Siblings				0.0163***	0.0161***	0.0160***
				(0.00394)	(0.00402)	(0.00401)
Disabled Father				0.125***	0.125***	0.126***
				(0.0191)	(0.0192)	(0.0185)
Disabled Mother				0.0172	0.0196	0.0191
				(0.0179)	(0.0182)	(0.0176)
Health of Main Parent				-0.0590***	-0.0537***	-0.0542***
				(0.0144)	(0.0145)	(0.0154)
Internet Access in the home (w3)				-0.0376**	-0.0320**	-0.0336**
				(0.0149)	(0.0149)	(0.0142)
Main parent change to not working				0.0443**	0.0479***	0.0492***
				(0.0182)	(0.0182)	(0.0182)
Bullied: Called Names					0.00784	0.00882
					(0.0215)	(0.0226)
Bullied: Excluded from Friends					0.0289	0.0329
					(0.0332)	(0.0331)
Bullied: Hand over money					-0.0392	-0.0400
					(0.0470)	(0.0481)
Bullied: Threatened with violence					-0.0414	-0.0442
					(0.0349)	(0.0342)
Bullied: Experienced violence					-0.0304	-0.0318
					(0.0342)	(0.0366)
Welfare Shock	20.2%	24.1%	25.3%	20.9%	22.9%	33.2%
School FE	Yes	Yes	Yes	Yes	Yes	Yes
Yes						
Ethnic Language FE	Yes	Yes	Yes	Yes	Yes	Yes
Instrument	-	-	-	-	-	MSOA

notes:
a) Standard errors clustered by school in parenthesis.
b) Additional controls included in column 5 and 6 are six education dummies and ten age dummies of the mother.
c) F test of excluded instruments for column 6; F(2, 4611)=525.74
d) All columns contain controls from table 3, these are controls from the PLASC data and include include: age, age squared, month of birth, special educational need dummies, mode of transport dummies, ethnic Language by year fixed effects are represented by 96 dummies.
e) Excluded ethnic groups include white british, other white, excluded and unknown ethnicities. Those without a school or area code are also excluded from the sample.
f) Combined Pupil Level Annunal School Census and Longitudinal Survey of Young People in England.
g) Contact availability (CA) and mean free school meal calculated using the PLASC data.

Table 5: Robustness Checks: Sample Selection

	(1) Yr Group	(2) School	(3) LSOA	(4) MSOA
Panel A: *Age Samples*				
Age≥ 15	0.0815***	0.101***	0.119***	0.117***
	(0.00704)	(0.0101)	(0.00756)	(0.00662)
Age≥ 12	0.0988***	0.107***	0.133***	0.128***
	(0.00448)	(0.00967)	(0.00636)	(0.00636)
Age≤ 10	0.105***	0.112***	0.122***	0.120***
	(0.00367)	(0.00672)	(0.00570)	(0.00609)
Age≤ 7	0.106***	0.110***	0.117***	0.118***
	(0.00491)	(0.00718)	(0.00612)	(0.00614)
Panel B: *Age and Language Samples*				
Age≥ 15 & English Not 1st Language	0.109***	0.129***	0.111***	0.111***
	(0.00887)	(0.0122)	(0.0103)	(0.00831)
Age≥ 12 & English Not 1st Language	0.131***	0.143***	0.135***	0.135***
	(0.00555)	(0.0112)	(0.00808)	(0.00735)
Age≤ 10 & English Not 1st Language	0.138***	0.149***	0.140***	0.140***
	(0.00442)	(0.00773)	(0.00753)	(0.00645)
Age≤ 7 & English Not 1st Language	0.139***	0.145***	0.133***	0.136***
	(0.00590)	(0.00838)	(0.00726)	(0.00665)
Panel C: *Excluded Ethnic Groups*				
Pakistani	0.103***	0.110***	0.137***	0.128***
	(0.00272)	(0.00584)	(0.00529)	(0.00607)
African	0.0646***	0.0654***	0.0935***	0.0882***
	(0.00286)	(0.00493)	(0.00511)	(0.00454)
Bangladeshi	0.105***	0.113***	0.333***	0.127***
	(0.00278)	(0.00597)	(0.00105)	(0.00644)
Panel D: *Excluded High FSM Groups*				
Pakistani & English not 1st Language	0.102***	0.109***	0.136***	0.127***
	(0.00268)	(0.00364)	(0.00341)	(0.00466)
African & English not 1st Language	0.0680***	0.0682***	0.102***	0.0951***
	(0.00285)	(0.00329)	(0.00344)	(0.00375)
Bangladeshi & English not 1st Language	0.100***	0.108***	0.130***	0.124***
	(0.00258)	(0.00550)	(0.00508)	(0.00585)

notes:
a) Standard errors clustered at the level of the contact availability measure in parenthesis. Significance level denoted by: *** p<0.01, ** p<0.05, * p<0.1.
b) Additional controls include: age, age squared, month of birth, special educational need dummies, mode of transport dummies. Ethnic Language by year fixed effects are represented by 96 dummies c) Each cell is a separate regression, the coefficient is the interaction term $\text{CA}_{slt} * \overline{FSM}_{lt}$ estimated by OLS.

Table 6: Bilingual Staff and Language Help

	(1)	(2)	(3)	(4)
Estimation	OLS	OLS	OLS	P-value
		Panel A: School Bilingual Help		
$CA_{slt} * \overline{FSM}_{lt}$	0.103***	0.106***	0.097***	0.001
	(0.006)	(0.015)	(0.007)	
Bilingual Staff	-	Yes	No	-
Observations	1,303,272	290,544	1,012,728	1,303,272
R-squared	0.049	0.057	0.047	0.049
Number of Schools	19,177	1,445	17,732	19,177
		Panel B: Local Authority Language Forms		
$CA_{slt} * \overline{FSM}_{lt}$	0.128***	0.136***	0.128***	0.809
	(0.008)	(0.021)	(0.009)	
Language Forms	-	Yes	No	-
Observations	535,358	58,811	476,547	535,358
R-squared	0.048	0.068	0.047	0.048
		Panel C: Local Authority Language Help		
$CA_{slt} * \overline{FSM}_{lt}$		0.156***	0.071***	0.000
		(0.011)	(0.016)	
Language Help	-	Yes	No	-
Observations	388,178	147,180	535,358	
R-squared		0.050	0.048	0.049
Area by year FE	Yes	Yes	Yes	Yes
Ethnic Language by year FE	Yes	Yes	Yes	Yes

notes:
a) Standard errors clustered in parenthesis. *** p<0.01, ** p<0.05, * p<0.1. Each cell is a separate regression.
b) Data is from Pupil Level School Census 2009, controls as in table 3. Ethnic language fixed effects represented by 32 dummies.
c) Contact availability measures all at the school level.
d) Column 1 in Panel A is the entire sample, column 2 restricts the sample for those that have some bilingual ethnic minority members of staff, column 3 represents those without, column 4 presents the p-value of a test of no difference between column 2 and 3. The columns for panel 2 are analagous to panel a with language forms replacing bilingual staff. Column 1 in panel C is blank as this is based on the same sample for panel B.

Table 7: English Proficiency

	(1) School	(2) LSOA	(3) MSOA
Panel A: English as a First Language			
$CA_{slt} * \overline{FSM}_{lt}$	0.105***	0.173***	0.130***
	(0.00793)	(0.00745)	(0.00765)
$CA_{slt} * \overline{FSM}_{lt}$ x English Not 1st Language	0.108***	0.0754***	0.0902***
	(0.00814)	(0.00692)	(0.00827)
Panel B: Own Key Stage 2 English Results			
$CA_{slt} * \overline{FSM}_{lt}$	0.186***	0.186***	0.189***
	(0.0115)	(0.0115)	(0.0102)
$CA_{slt} * \overline{FSM}_{lt}$ x Eng Level 4 and Above	-0.0479***	-0.0557***	-0.0326***
	(0.00845)	(0.00867)	(0.00811)
$CA_{slt} * \overline{FSM}_{lt}$ x Eng Level 5 and Above	-0.0733***	-0.0835***	-0.0766***
	(0.00775)	(0.00810)	(0.00783)
Panel C: Own Key Stage 3 English Results			
$CA_{slt} * \overline{FSM}_{lt}$	0.137***	0.164***	0.172***
	(0.0149)	(0.0144)	(0.0134)
$CA_{slt} * \overline{FSM}_{lt}$ x Eng Level 5 and Above	-0.0216*	-0.0425***	-0.0468***
	(0.0125)	(0.0119)	(0.0123)
$CA_{slt} * \overline{FSM}_{lt}$ x Eng Level 6 and Above	-0.0512***	-0.0577***	-0.0520***
	(0.0110)	(0.0115)	(0.0119)
$CA_{slt} * \overline{FSM}_{lt}$ x Eng Level 7 and Above	-0.0590***	-0.0587***	-0.0616***
	(0.0181)	(0.0184)	(0.0177)
Panel D: Mean Level of English Of Contacts (Key Stage 2 English Results)			
$CA_{slt} * \overline{FSM}_{lt}$	0.196***	0.201***	0.251***
	(0.0172)	(0.0155)	(0.0162)
$CA_{slt} * \overline{FSM}_{lt}$ x % KS2 Eng Level 4 and Above in Area/School	-0.0189	-0.0550***	-0.102***
	(0.0215)	(0.0185)	(0.0216)
$CA_{slt} * \overline{FSM}_{lt}$ x % KS2 Eng Level 5 and Above in Area/School	-0.268***	-0.204***	-0.224***
	(0.0269)	(0.0217)	(0.0262)
Panel E: Mean Level of English Of Contacts (Key Stage 3 English Results)			
Peer Group	0.221***	0.199***	0.238***
	(0.0238)	(0.0174)	(0.0192)
$CA_{slt} * \overline{FSM}_{lt}$ x % KS3 Eng Level 5 and Above in Area/School	-0.138***	-0.0975***	-0.130***
	(0.0339)	(0.0214)	(0.0275)
$CA_{slt} * \overline{FSM}_{lt}$ x % KS3 Eng Level 6 and Above in Area/School	-0.0904**	-0.115***	-0.145***
	(0.0401)	(0.0252)	(0.0331)
$CA_{slt} * \overline{FSM}_{lt}$ x % KS3 Eng Level 7 and Above in Area/School	-0.119**	-0.0382	-0.0303
	(0.0517)	(0.0421)	(0.0526)

notes:
a) Standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1. In addition to the controls in the notes to table 3, the relevant key stage level of the pupils is included (Panel B and C) or the proportion who achieved the relevant key stage level of the pupil's contact group (Panel D and E).
b) Data is the PLASC and National Pupil Database merged using all pupils who have a level for Key Stage 2 and Key Stage 3 in 2006-2009
c) Each column in each panel represents a separate regression

Table 8: Cashless Catering: Stigma Test

	(1)	(2)	(3)	(4)	(5)
$CA_{slt} * \overline{FSM}_{lt}$	0.0757***	0.0753***	0.0512*	0.0482**	0.0197
	(0.0222)	(0.0225)	(0.0290)	(0.0221)	(0.0265)
$(CA_{slt} * \overline{FSM}_{lt}) *$ Post Cashless	0.0552**	0.0589**	0.0763**	0.0737**	0.0928***
	(0.0276)	(0.0281)	(0.0314)	(0.0286)	(0.0309)
Observations	438,100	438,100	281,721	1,437,540	876,581
R-squared	0.034	0.045	0.044	0.035	0.035
Sample	All Schools	All Schools	Cashless Schools	All Schools	Cashless Schools
Ethnic Language FE	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes	Yes
Includes White British	No	No	No	Yes	Yes
No Stigma $\beta_1 + \beta_2$	0.13	0.14	0.127	0.126	0.111
Welfare Shock - No Stigma	29%	33%	29%	7%	7%
Stigma β_1	0.0757	0.0753	0.0512	0.0482	0.0197
Welfare Shock - With Stigma	15%	15%	10%	3%	1%
Stigma reduces welfare shock	49%	53%	66%	64%	84%

notes:
a) Standard errors clustered by school in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.
b) Data is from Pupil Level School Census 2006-2009, controls as in table 3. Data on school operating (or not) a cashless system collected by the author.
c) Contact availability measures all at the school level.

Table 9: Previous Claimants: Information Test

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$CA_{slt} * \overline{FSM}_{lt}$	0.105***	0.0350***	0.0811***	0.0275***	0.0570***	0.0342***	0.0295***
	(0.00596)	(0.00959)	(0.00450)	(0.00818)	(0.00379)	(0.00857)	(0.00340)
$CA_{slt} * \overline{FSM}_{lt}$*Previous FSM			-0.0912***		-0.0705***		-0.0181***
			(0.00600)		(0.00561)		(0.00520)
Welfare Shock - No information							
Observations	1,177,465	273,877	1,177,465	240,392	1,177,465	313,356	1,177,465
R-squared	0.049	0.012	0.372	0.017	0.262	0.015	0.353
No Information $\beta_1 + \beta_2$			-0.0101		-0.002		0.0291
Welfare Shock - No information			-1.5%		-2.5%		4.3%
With Information β_1			0.0811		0.057		0.0443
Welfare Shock - With information			14.0%		8.7%		6.7%
No information decreases a welfare shock			111%		128%		36%

notes:
a) Standard errors clustered by school in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.
b) Data is from Pupil Level School Census 2006-2009, controls as in table 3. Data on school operating (or not) a cashless system collected by the author.
c) Contact availability measures all at the school level.
d) Column 1 presents baseline estimates for 2009. Column 2 and 3 define previous claimant as someone who claimed in 2007, column 4 and 5 as someone who claimed in 2008, and column 6 and 7 as someone who claimed in 2007 or 2008.

Table 10: Cashless Catering: Stigma, Education and Income

	(1)	(2)	(3)	(4)
Education Deprivation	Least			Most
$CA_{slt} * \overline{FSM}_{lt}$	0.0141	0.0578**	0.0826**	0.0952**
	(0.0538)	(0.0287)	(0.0322)	(0.0375)
$CA_{slt} * \overline{FSM}_{lt}$*Post Cashless	0.0926	0.0718**	0.0691*	0.0265
	(0.0571)	(0.0326)	(0.0408)	(0.0430)
Observations	52,264	151,583	104,177	53,497
No Stigma $\beta_1 + \beta_2$	0.107	0.130	0.152	0.122
Welfare Shock - No Stigma	18%	32%	41%	31%
With Stigma β_1	0.014	0.058	0.083	0.095
Welfare Shock - With Stigma	2%	12%	19%	23%
Stigma reduces a welfare shock by	89%	62%	54%	27%
Income Deprivation	Least			Most
$CA_{slt} * \overline{FSM}_{lt}$	0.0424	-0.0128	0.0419	0.106**
	(0.0409)	(0.0449)	(0.0365)	(0.0436)
$CA_{slt} * \overline{FSM}_{lt}$*Post Cashless	0.0657	0.0907**	0.111***	0.0316
	(0.0495)	(0.0441)	(0.0347)	(0.0464)
Observations	69,856	71,606	72,359	67,900
No Stigma $\beta_1 + \beta_2$	0.108	0.078	0.153	0.136
Welfare Shock - No Stigma	15%	15%	43%	43%
With Stigma β_1	0.042	-0.012	0.042	0.106
Welfare Shock - With Stigma	5%	-2%	9%	31%
Stigma reduces a welfare shock by	67%	84%	68%	18%

notes:
a) Standard errors clustered by school in parenthesis. *** p<0.01, ** p<0.05, * p<0.1. Each cell is a separate regression.
b) Data is from Pupil Level School Census 2007-2009, controls as in table 3. Data on school operating (or not) a cashless system collected by the author.
c) Contact availability measures all at the school level.
d) Each column represents a quartile of the sample based on two indices of deprevation (as described in the text) at the LSOA level.

Table 11: Previous Claimants: Information, Education and Income

	(1)	(2)	(3)	(4)
Education Deprivation	Least			Most
Interaction Method				
$CA_{slt} * \overline{FSM}_{lt}$	0.0602***	0.0406***	0.0420***	0.0369***
	(0.00534)	(0.00635)	(0.00636)	(0.00771)
$CA_{slt} * \overline{FSM}_{lt}$*Previous FSM	0.000857	-0.0129	-0.0109	-0.0200**
	(0.00984)	(0.00823)	(0.00843)	(0.00934)
No Information $\beta_1 + \beta_2$	0.06	0.027	0.031	0.0168
Welfare Shock - No information	8.2%	4.4%	5.1%	2.9%
With Information β_1	0.06	0.04	0.042	0.0368
Welfare Shock - With information	8.2%	6.6%	7%	6.5%
No Information decreases a welfare shock by	0%	33%	27%	56%
Income Deprivation	Least			Most
Interaction Method				
$CA_{slt} * \overline{FSM}_{lt}$	0.0527***	0.0586***	0.0346***	0.0370***
	(0.00528)	(0.00565)	(0.00665)	(0.00723)
$CA_{slt} * \overline{FSM}_{lt}$*Previous FSM	0.0212*	-0.00167	-0.0161**	-0.0313***
	(0.0117)	(0.00955)	(0.00754)	(0.00789)
No Information $\beta_1 + \beta_2$	0.074	0.057	0.019	0.0058
Welfare Shock - No information	7.8%	8.7%	3.3%	1.0%
With Information β_1	0.053	0.059	0.035	0.037
Welfare Shock - With information	5.5%	9.0%	6.3%	6.9%
No Information decreases a welfare shock by	-44%	3%	47%	85%

notes:
a) Standard errors clustered by school in parenthesis. *** p<0.01, ** p<0.05, * p<0.1. Each cell is a separate regression.
b) Data is from Pupil Level School Census 2007-2009, controls as in table 3.
c) Contact availability measures all at the school level.
d) Previous FSM (Claimant) defined as having claimed in either 2008 or 2007. e) Each column represents a quartile of the sample based on two indices of deprevation (as described in the text) at the LSOA level.

A Appendix

A.1 First-Stage Regressions

Table A1: First Stage Results for IV estimates from baseline regressions

	(1)	(2)	(3)
	Panel A: School Level		
CA Measure:	School	School	Year Group
CA Measure of Intruments:	MSOA	LEA	School
Instrumented Variable			
	F(2, 20488)	F(2, 20504)	F(2,118830)
$CA_{slt} * \overline{FSM}_{lt}$	12015.24	7495.33	410000
	(0.000)	(0.000)	(0.000)
CA_{slt}	10682.30	8294.18	330000
	(0.000)	(0.000)	(0.000)
	Panel B: Area Level		
CA Measure:	LSOA	LSOA	MSOA
CA Measure of Intruments:	MSOA	LEA	LEA
Instrumented Variable			
	F(2, 31606)	F(2, 31609)	F(2,6904)
$CA_{slt} * \overline{FSM}_{lt}$	58800.88	10407.01	10998.59
	(0.000)	(0.000)	(0.000)
CA_{slt}	72609.46	11682.33	9595.20
	(0.000)	(0.000)	(0.000)

notes:
a) The test presented is the F test of excluded instruments. P-values in parenthesis.
b) Column 1 refers to the first stage of column 3 in table 3, column 2 refers to column 3 in table 3, and column 3 refers to column 5 in table 3

A.2 Conditioning on Criteria

Table A2: LSYPE Data: Conditioned on Criteria

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation	OLS	IV	OLS	IV	OLS	IV
$CA_{slt} * \overline{FSM}_{lt}$	0.118**	0.182**	0.116**	0.213**	0.114**	0.214**
	(0.0575)	(0.0866)	(0.0571)	(0.0851)	(0.0578)	(0.0858)
CA_{slt}	0.0142	0.0238	0.0153*	0.0211	0.0164*	0.0197
	(0.00892)	(0.0154)	(0.00873)	(0.0150)	(0.00865)	(0.0148)
Income Criteria	Less than 12k		Less than 13k		Less than 14k	
Estimation	OLS	IV	OLS	IV	OLS	IV
$CA_{slt} * \overline{FSM}_{lt}$	0.106*	0.223***	0.109*	0.224***	0.111*	0.235***
	(0.0572)	(0.0863)	(0.0564)	(0.0851)	(0.0566)	(0.0856)
CA_{slt}	0.0159*	0.0192	0.0158*	0.0174	0.0150*	0.0162
	(0.00850)	(0.0147)	(0.00836)	(0.0143)	(0.00825)	(0.0140)
Income Criteria	Less than 15k		Less than 16k		Less than 17k	

*n*otes:
a) Standard errors clustered at the level of the contact availability measure (schools) in parenthesis. Significance level denoted by: *** p<0.01, ** p<0.05, * p<0.1.
b) For additional controls included see table 4 that exluded the variables conditioned on which include: an income threshold, whether the parents claim: job seekers allowance, any income from pension credit, income support and not claiming any working tax credit
c) Each pair of columns presents estimates analogous to 5 and 6 in table 6, each pair conditions on the income specified b) but varies the income threshold.

A.3 Ex-ante peer characteristics

One way round the reflection problem is to use ex ante peer characteristics (Ammermller and Pischke (2009), Brock and Durlauf (2001)). Therefore I re-estimate the baseline estimates in table 1 using the lag of the mean free school meal use of the ethnic language group, $\overline{FSM}_{lit-1}$, in the peer measure. In particular Manski (1993) posits that social effects may act with a lag, whereas non-social forces act contemporaneously. The assumption needed for this to be the case is that the environment should be relatively stable, such that there is not large scale immigration of one particular ethnic language group, and that there shouldn't be large scale changes to the school system. The results, found in Table A3.

Table A3: Ex-ante peer characteristics

Dependent Variable: Free School Meal Participation

	Panel A: School Level				
	(1)	(2)	(3)	(4)	(5)
CA Measure:	School	School	School	Year Group	Year Group
Estimation:	OLS	IV	IV	OLS	IV
$CA_{slt} * \overline{FSM}_{lt-1}$	0.089***	0.180***	0.165***	0.078***	0.114***
	(0.005)	(0.007)	(0.008)	(0.003)	(0.003)
CA_{slt}	-0.012***	-0.022***	-0.020***	-0.012***	-0.016***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Observations	3383424	3362517	3379209	3383424	3324605
R-squared	0.048	0.047	0.048	0.046	0.046
Area x year F.E.	Yes	Yes	Yes	Yes	Yes
Ethnic Language x year F.E.	Yes	Yes	Yes	Yes	Yes
Instrument	-	MSOA	LEA	-	School
	Panel B: Area Level				
	(1)	(2)	(3)	(4)	(5)
CA Measure:	LSOA	LSOA	LSOA	MSOA	MSOA
Estimation	OLS	IV	IV	OLS	IV
$CA_{slt} * \overline{FSM}_{lt-1}$	0.110***	0.134***	0.220***	0.110***	0.171***
	(0.005)	(0.006)	(0.008)	(0.006)	(0.007)
CA_{slt}	-0.012***	-0.015***	-0.025***	-0.014***	-0.021***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	3366767	3362221	3362246	3366742	3366712
R-squared	0.050	0.050	0.050	0.057	0.057
Area x Year F.E.	Yes	Yes	Yes	Yes	Yes
Ethnic Language x Year F.E.	Yes	Yes	Yes	Yes	Yes
Instrument	-	MSOA	LEA	-	LEA

notes:
a) see notes to table 3.

A.4 Alternative Specifications

Table A4 presents a range alternative specifications based on different model specifications and changing the definition of the peer group. Rather than estimating linear probability models as we do in the baseline specifications, we estimate non-linear specifications, in row 1 we estimate a logit and row 2 a probit. Across all four locational measures of peer group the effect is positive and significant.

In the baseline specifications, white British, other white groups, refused and not obtained ethnicities were excluded from the sample. Rows 3-5 test the sensitivity of this assumption. In row 3 all ethnicities are included, the largest group being white British over 5,000,000 observations, as such for computational reasons we only estimate this for 2008. Including the additional ethnic groups, the largest of which is the white British group, is likely to generate a large amount of noise into the peer group as there are too many in this group to be a good measure of the peer group. The estimates are smaller when all ethnic groups are included, as expected. Rows 4 and 5 go back to the baseline specification, then include the other white group, and identifiable ethnicity respectively. In both cases the results remain positive and significant.

Row 6, 7 and 8 check the sensitivity of the estimates to changing the peer group. Again the estimates are robust to these various changes. Row 6 replaces the log contact availability measure in the peer group with its level equivalent, rescaled by dividing by 100. Row 7 replaces the peer group measure with the percentage of free school meal eligibility of one's ethnic language group (excluding the individual). Finally, returning to the baseline peer group measure, we modify it in a number of ways. In the first column, rather than restricting to either an area or school, we define the group over both the school *and* area (LSOA). Column 2 excludes the year group from the school level peer group. Column 3 excludes the area from the school level peer group school and column 4 includes the area (LSOA) but excludes the school. In all these cases the effects remain significant.

Table A4: Alternative Specifications

	(1) Yr Group	(2) School	(3) LSOA	(4) MSOA
Logit	0.662***	0.659***	0.941***	0.703***
	(0.0104)	(0.00920)	(0.0105)	(0.00972)
Probit	0.426***	0.423***	0.587***	0.455***
	(0.00592)	(0.00522)	(0.00594)	(0.00547)
Include All Ethnicities	0.0445***	0.0562***	0.0755***	0.0703***
	(0.00384)	(0.00556)	(0.00532)	(0.00760)
Baseline inc other white background	0.0768***	0.0854***	0.104***	0.101***
	(0.00238)	(0.00328)	(0.00315)	(0.00446)
Baseline inc refused and not obtained	0.0949***	0.101***	0.126***	0.120***
	(0.00250)	(0.00340)	(0.00321)	(0.00444)
Levels/100 not logs	0.0501***	0.0964***	0.113***	0.474***
	(0.00674)	(0.0176)	(0.0239)	(0.125)
% FSM of Ethnic Language Group	0.0879***	0.490***	0.518***	0.572***
	(0.00218)	(0.00231)	(0.00175)	(0.00230)
	School and LSOA	School Not YGroup	School Not LSOA	LSOA not School
$CA_{slt} * \overline{FSM}_{lt}$	0.0412***	0.0956***	0.0879***	0.0857***
	(0.00276)	(0.00365)	(0.00371)	(0.00368)

notes:
a) See notes to table 3

A.5 Non-Linear Effects

This section examines potential non-linear effects. In particular we look at the peer effect for different percentages of free school meals below certain cut offs. The results are shown in figure A1. The four lines represent four different measures of the peer group (year group, school, LSOA, MSOA). It is estimated below the free school meal percentage at 5% intervals. There is very little peer effect in schools below 5-10% of free school meal eligibility, however this rapidly rises and reaches a plateau at around below 30-35%. Although there is no way to test the different elements in this analysis, one would think that at the lower level of free school meals there is greater stigma and less information, as one is in schools where more are eligible, then the information would increase and stigma fall, resulting in a greater effect of peers.

A.6 Regional Variation

In figure 2, it is shown that there are large variations in free school meal registration. Therefore we examine two aspects of this regional variation. Panel A of Table A5 examines the robustness of the estimates as a result of dropping each of the goverment organisation

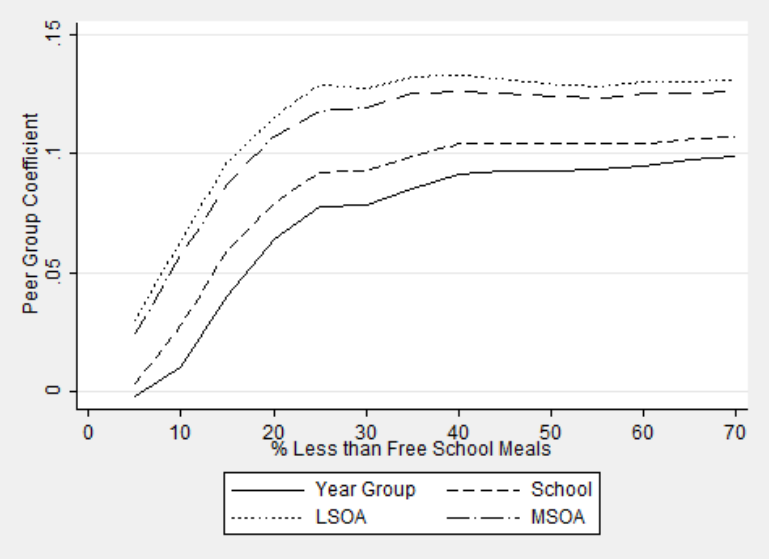


Figure A1: Peer Effects at different school levels percentages of Free School Meals

regions. Other than when the London region is dropped, each of the estimates reduce slightly. However, they all remain positive and significant. In panel B the estimation is run for each region separately. This gives a slightly varied picture from no effect in the North East, to larger than average effects in the South East and East Midlands. Other than the North East, which has a low sample size due to the sample being restricted to non-white pupils, the effects remain positive and significant, albeit varying in magnitude.

Table A5: Regional Analysis

	Panel A: Dropped Regions								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	London	West Mid	Yorks	N West	N East	S West	East	S East	E Mid
$CA_{slt} * \overline{FSM}_{lt}$	0.103***	0.0851***	0.0855***	0.0842***	0.0833***	0.0788***	0.0734***	0.0684***	0.0781***
	(0.00384)	(0.00345)	(0.00336)	(0.00343)	(0.00328)	(0.00333)	(0.00341)	(0.00350)	(0.00336)
CA_{slt}	-0.00963***	-0.00608***	-0.00706***	-0.00693***	-0.00673***	-0.00674***	-0.00612***	-0.00572***	-0.00654***
	(0.000436)	(0.000425)	(0.000408)	(0.000414)	(0.000398)	(0.000405)	(0.000416)	(0.000429)	(0.000412)
Observations	2926831	4239602	4450792	4395758	4757097	4639948	4438095	4280557	4539616
	Panel B: Individual Regions								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	London	West Mid	Yorks	N West	N East	S West	East	S East	E Mid
$CA_{slt} * \overline{FSM}_{lt}$	0.0251***	0.0990***	0.0524***	0.0698***	-0.00894	0.172***	0.0204**	0.104***	0.162***
	(0.00661)	(0.00789)	(0.0119)	(0.00935)	(0.0207)	(0.0120)	(0.00908)	(0.00956)	(0.0112)
CA_{slt}	-0.00593***	-0.0142***	-0.00440***	-0.00713***	-0.00389	-0.00633***	-0.00438***	-0.00692***	-0.00977***
	(0.000773)	(0.00107)	(0.00137)	(0.00121)	(0.00262)	(0.00141)	(0.000951)	(0.000875)	(0.00121)
Observations	1906706	593935	382745	437779	76440	193589	395442	552980	293921
R-squared	0.055	0.045	0.036	0.039	0.038	0.068	0.044	0.044	0.056

notes:
a) See notes to table 3