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Scared to be poor: Vulnerability and poverty in Great Britain at the beginning of the 20th century

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Abstract

This work explores the determinants of poverty in Edwardian Britain. We use a new household budget sample collected between 1900 and 1914 to understand what role vulnerability played in determining poverty and undernutrition. First, using a probit model we find that due to perceived risk on one hand, and to social norms on the other, families purchased insurance schemes as a strategy to cope with uncertainty. Second, using recursive mixed process estimation, we find that the decision to insure caused a reallocation from food to precautionary expenditures, which led to a significant reduction in calorie availability.

Keywords: poverty; vulnerability; insurance; Great Britain; 1900-1914.
JEL classification: C14, I31, I32, N33.

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1 Introduction

On the eve of WWI, the United Kingdom dominated the world economic and political scene (Maddison, 2013). Nonetheless, a broad range of evidence from both contemporary and modern studies has pointed out that, although the British economy was growing, the living conditions of the British population were not improving at the same pace (Rowntree, 1901; Bell, 1907; Oddy, 1970; Whiteside 2009). With almost one third of the population suffering poverty, wealth was failing to reach all population strata the strata of the population. Direct observers identified two main reasons behind widespread poverty (Gazeley, 2003): wages too low if compared to family size, and idiosyncratic shocks. While the first has been widely discussed (Williamson, 1985; Feinstein, 1988; Horrell and Humphries, 1999; Crafts, Gazeley and Newell, 2007), the issue regarding the high vulnerability of British households has been quite overlooked by modern literature, mainly due to the lack of data.

Yet contemporary investigators put great emphasis on the fact that the illness or death of any family member (or, in the worst case, of a wage earner) were likely to have severe negative consequences for household living conditions, in both the short and long run. High vulnerability was mainly attributed by direct observers to the poor ability of families to manage their resources in the face of possible future income shocks (Bell, 1907). Though it enjoyed a fairly wide consensus at the time, this hypothesis was the object of a harsh critique by Reeves (1912), whose view was that families did manage their budgets to face the possible occurrence of future negative shocks, but that precautionary expenditures (Scott and Walker, 2014) themselves were responsible for their poor living conditions. Aware of their vulnerable situation, poor people purchased insurance or saved money through societies and clubs, but the fees they had to pay for these services were very high relative to their income. According to Reeves, this lead to a shift of the budget from essential goods, food and clothes, to insurance and clubs, causing a deterioration of family health conditions and ultimately a worsening of their living conditions. In this self-fulfilling prophecy, vulnerability, defined as the household's expected probability of falling into poverty (Chaudhuri, 2003), actually determines poverty. In this sense, Reeves anticipated a well-developed modern literature about poverty traps locked in by the inability to smooth consumption and the need to mitigate risks (Murdoch, 1994; Chauduri, 2003; Christiaensen and Subbarao, 2005;

Dercon, 2007; Hoogeveen, et al., 2004; Günther and Harttgen, 2009; Hoddinott and Quisumbing 2010).

Whether a significant portion of poor British households were actually paying for insurance schemes and, most of all, whether the latters had negative repercussions on families' standards of living has never been ascertained in a rigorous way, due to the lack of data. Finding an answer to these questions would be a great advancement in understanding why prosperity failed to reach the most disadvantaged classes in the early 20th century United Kingdom. As part of a larger investigation, we collected and digitized 2,098 household budgets from across the United Kingdom; among these, 479 families reported information on insurance.

The first part of our analysis is devoted to understanding the determinants of the household insurance decision; in the second part we estimate whether the choice of the family to spend on insurance, societies and clubs had any impact on food expenditures and, in turn, on household caloric intake. Combining these two sets of results, we hope to gain insight into whether buying insurance had any influence on the overall level of inequality.

In Section 2 we recall the relevant contemporary literature illustrating the main point of the debate between Reeves (1912) on one side and Rowntree (1901), Bell (1907), and many others on the other. Moreover, we review some modern development literature useful to understand the relation between exposure to risk, vulnerability, and poverty. In Section 3 we go through the details of how relevant variables have been computed and how the estimation procedure has been designed. In Section 4 we describe how our sub-set of the original sample is composed and present preliminary evidence using selected descriptive statistics. Section 5 is divided into two parts: the first describes the results of an analysis of the determinants of the decision to insure; the second presents the results for the impact of the insurance decision on household food budgets and caloric intake. In section 6 we draw summary conclusions about the effect of the insurance decision on households' wellbeing.

2 Literature review

Workers' lives between the end of the 19th century and the beginning of the 20th were dominated by uncertainty and risk (Knight, 1921; Floud and Johnson, 2008): because of the poor social protection mechanisms in place, job loss, sickness, or the death of a family member were likely to deeply affect household disposable income. Nonetheless, contemporaries conceived vulnerability as the result of "lack of thrift", the inability of households to foresee income fluctuations and to manage their earnings to smooth consumption. According to this idea, poor people were such because they mismanaged their earnings, spending on amusements rather than setting money aside in view of future income restrictions. Hence, the phenomenon of poverty was often reduced to an issue of lack of morality or bad character. Bell (1907), in her study on the living conditions of ironworkers in northern England, states that:

> "We are apt to be surprised, when we consider the constant risk of illness and accident to which the ironworkers are subject, as well as the prospect before them in old age, to find that by no means all of them either insure their lives or put into any form of sick club. And the fact that there are so many of even the sensible and respectable workmen who do not take either of these precautions is one of the salient patent facts that we are most ready to label as want of thrift."

Bell's argument is that poor people were not taking any preventing measures to mitigate the risks they faced.

Reeves' (1912) study on the Lambeth district in London is in clear contrast with this view: working-class households were aware of the risks they were exposed to, and such perception drove them to spend money in societies and insurances they actually could not afford, resulting in a worsening of families' short-run living conditions. It was a self-fulfilling prophecy: the more they spent on insurance and societies, the less they spent on more essential items, and the higher the probability for them to be undernourished and fall sick, resulting in a deterioration of their living conditions.

In line with this view, modern development literature suggests that in the face of perceived risk, households try to insure against the occurrence of negative shocks. This perception, however depends on many factors, among which the three most important

are the level of exposure, risk management, and risk-coping abilities (Alderman and Paxon, 1992).

The level of exposure to risk clearly influences the perception that households have of their vulnerability. Following Alderman and Paxon's (1992) argument, risk exposure is tied to households wealth: the poor standard of living of low-income households together with the unhealthy sanitary standard of many dwellings were likely to boost risk exposure and to increase the probability of sickness or death. Walker and Wilson (1905), for example, provide evidence of how slum areas and overcrowding were a severe problem, affecting the health and living conditions of many poor urban households. Furthermore, inadequate diet of low-income families raised their exposure to sickness compared to high-income ones (Paton, et al., 1901; Oddy, 1970).

Second, all preventive measures taken by the households to reduce risks ex-ante fall under the category of risk-mitigation strategies; they can consist, for example, in diversifying the sources of income, or in choosing income sources that, though less profitable, are less volatile (Morduch, 1994). According to direct observers at the time, the ability of British working-class households to put in place mitigation strategies was very poor. As described by Rowntree (1901), this was related to the fertility cycle of households: when the woman entered her fertility period she quit the labor market, leaving the family with one source of income. The situation lasted until either the older children were old enough to take care of the youngest ones, or until children started working as well, increasing and diversifying family income. During the male sole-breadwinner period the household was at its minimum ability to mitigate risk.

Third, risk coping includes all those strategies put in place to smooth consumption in face of income shocks. If the household is able to smooth consumption over its lifetime, it will not fall under the poverty threshold in face of an (uninsured) income reduction. However, limited access to credit and, in general, to financial markets are likely to constrain households' ability to offset the effects of an income shock once it has occurred. The low wages of working-class people in Edwardian Britain were barely sufficient to make a life for the family, and no extra was left for saving; as a result the occurrence of a shock was likely to cause the depletion or pawning of households' assets (Gazeley, 2003). Another option households had to smooth their consumption pattern were pawnbrokers and moneylenders; due to the high interest rates applied and the use

of personal terrorism to enforce repayment, this was considered a last resort, though (Rathbone, 1909).

To summarize, since low-income households suffered a higher exposure to risk and were characterized by poor risk-mitigation and coping ability, their capacity to offset the effects of an income shock and to smooth their consumption pattern was very limited. Therefore their willingness to insure against the occurrence of such shocks was high.

In addition to the economic aspect of being affected by sickness or death, social and cultural benefits increased the willingness of poor households to buy insurance. Reeves' (1912) study takes into consideration burial insurance, and the conclusion she draws is that funeral and burial expenses are completely unaffordable for a poorly paid household, which has two options: the parish funeral or insurance. The fear of a socially unacceptable pauper funeral provided by the parish forced the family to buy insurance (the amount spent varying according to the number of children). The fact that the social return of insurance was as important as the economic one is also proved by the fact that despite providing for a decent funeral, the economic benefit of insuring was quite questionable. Reeves (1912, p. 4-5) presents the case of a six-month old child's funeral:

> The parents had insured her for 2d. a week, being unusually careful people. The sum received was £2:

Funeral	£1	12	0
Death certificate	0	1	3
Gravediggers	0	2	0
Hearse attendants	0	2	0
Woman to lay her out	0	2	0
Insurance agent	0	1	0
Flowers	0	0	6
Black tie for father	0	1	0
	£2	1	9

> This child was buried in a common grave with three others. There is no display and no extravagance in this list. [...] The survivors lived on reduced rations for two weeks in order to get square again.

Although Reeves emphasized the importance of the social component in determining the choice of poor people to insure, she probably understated its importance for middle-class households: "The middle class man does not need to pay out something like a twentieth part of his income in order to provide for the possible burials in his family". This argument has been disproved by a recent study conducted by Walker and Wilson (2015) on British railway clerks. Despite enjoying higher family income and lower vulnerability, white-collar workers were found by the authors to spend about 8 percent of their budget on insurance and clubs, the main reason being that they were considered positioning expenditures "seen as integral to clerks' self-identity" and necessary to meet the middle-class status. The conclusions that the authors draw about the impact of this choice, however are absolutely in line with those by Reeves: "food, fuel and light, were squeezed to meet the status-related costs of white-collar life". Reeves' intuition, though anticipating in many respects modern development literature about how vulnerability deteriorates household living conditions both *ex-ante* and *ex-post* (Morduch, 1994; Chauduri, 2003), has never been supported by empirical evidence. As a matter of fact, modern economic history literature investigating the causes of poverty and inequality in early 20th-century Britain completely overlooks the vulnerability issue, mainly focusing on wages.

In this study we put Reeves' hypothesis to the test for the first time, in order to understand whether and how vulnerability contributed to poverty and undernutrition in Britain at the dawn of the 20th century. More specifically, we investigate the factors influencing the choice to buy insurance and, in particular, we assess whether poor people, due to a more acute perception of risk, were willing to insure more than the well-off. We also test whether, to maximize their expected utility, households actually traded off food expenditure against less uncertainty, as Reeves argued. However, a food expenditure reduction per se is not evidence of a deterioration in health status if the household is able to maintain the same nutritional standard. Hence we go further in testing Reeves' argument by also analyzing the caloric intake of the households.[2]

In the following section we describe the construction of the relevant variables and the impact estimation strategy.

[2] Ideally, we would examine the intake of specific macronutrients in order to test for a lower dietary quality and diversity, but the dimension and nature of our database does not permit this analysis.

3 Methodology

In order to find an answer to the questions posed at the end of Section 2, we use a sample of 479 household budgets collected from 15 different sources. Though fairly well distributed among the different strata, it cannot be considered representative of the national population (see Table 4 in Section 4). In order to correct this bias, we use post-stratification techniques as described by Holt and Smith (1979).

This methodological framework has already been applied in economic history: while for the United Kingdom the only example we are aware of is Gazeley and Newell (2007), we can find several examples beyond the British borders: in Italy Rossi, et al. (2001), Vecchi and Coppola (2006) and Vecchi (2011) use post-stratification on a collection of around 20,000 budgets to reconstruct the Italian population's living conditions from unification in 1861 up to the present day.

The idea behind this technique is to use census data to turn a non-representative sample into a nationally representative one by means of a weighting scheme. To construct post-stratification weights we cross-classify the sample using post-stratification variables, in this case region of residence and occupation of the head of the household. We can spell out the weight associated with household h living in region r, whose head is employed in industry s as follows:

$$weight_{hsr} = N_{sr}/n_{sr}$$

Where N_{sr} is the total number of individuals in sector s and region r in the census, and n_{sr} is its sample counterpart.

Since the budgets span a period of 14 years between 1900 and 1914, the available censuses for this period are those from 1901 and 1911, the latter being closer to most of the budgets in our sample. We decided to provide more realistic and refined estimates, employing an interpolation between 1901 and 1911 and to take 1907 as the year of reference[3].

To reveal the sensitivity of our results to the post-stratification strategy, we also compute the estimates of interest in two additional scenarios: no post-stratification weighting at

[3] Monetary values in the family budgets are deflated to 1907 values using Twigger (1999).

all, and weights from the 1911 census. Results are shown in Appendix 1. We evaluate the determinants of the decision to buy an insurance scheme by estimating a probit model. We regress the dummy for the household having purchased insurance on a set of household characteristics to ascertain which are the most influential in determining the insurance choice.

In order to understand the impact of insurance purchase, we choose one of the many aspects of individual wellbeing, namely nutritional standard, measured here by per capita food expenditure. Although total expenditure or income might seem a more comprehensive, though not exhaustive, measure of individual wellbeing, it would not capture the shrinking effect that according to Reeves (1912) the purchase of insurance had on essential items: total expenditure might well be the same (or even higher) for an insured family compared to a non insured one, but this might mask differences in the share of food budgets. In other words, the problem is not how much a household spends or earns in total, but rather how it allocates its expenditures. For this reason the choice of food expenditure as a welfare aggregate seems to us the most appropriate in this context.

To test Reeve's hypothesis we regressed per capita household food expenditure on an insurance dummy and other household characteristics. However, we must take into consideration the endogeneity of the insurance decision: both the latter and the food budget allocation have common observed and unobserved determinants. A good way to address the endogeneity issue is to model the process generating food expenditure and the insurance decision in a simultaneous equations framework:

$$\begin{cases} PCF = a_0 + a_1 X_1 + a_2 I + e \\ I = b_0 + b_1 X_1 + b_2 X_2 + u \end{cases} \qquad (1)$$

where *PCF* is the log per capita food expenditure of the family (the household index *h* is omitted), X_1 is a set of demographic and labor force-related variables, *I* is a dummy assuming value 1 if the household decides to purchase insurance, and X_2 is a set of variables influencing the decision to insure but not the welfare outcome[4], for example the entering into force of the Insurance Act of 1911. This model can be estimated using a generalization of Seemingly Unrelated Regression, namely the Conditional Mixed-Process (CMP) technique proposed by Roodman (2011). Simultaneous equation

[4] The model does not use instrumental variable technique, so X_2 does not need to satisfy the typical strict instrumental variable requirements.

estimation allows us to take into account error correlation across the equations. One of the main advantages of the CMP technique compared to SUR is that it allows us to estimate different equations in a flexible way; in our particular case it allows us to estimate a linear model of food consumption by OLS and a probit model of the insurance decision by maximum likelihood. With regards to endogeneity, the CMP is able to produce consistent estimates when the system has clearly defined stages. In our case most of the budgets collected and digitized report an insurance decision made on a weekly basis[5] and food purchases made on a daily basis, which justifies an assumption that the insurance decision and budget allocation to food were distinct and clearly defined stages.

In order to test whether a possible budget shift from food to insurance purchase caused a reduction in caloric intake we also run the same CMP model for per capita caloric intake (*kcalpc*):

$$\begin{cases} kcalpc = c_0 + c_1 X_1 + c_2 I + v \\ I = d_0 + d_1 X_1 + d_2 X_2 + w \end{cases} \qquad (2)$$

The household's caloric availability is computed by multiplying food quantities by the amount of calories contained by each item acquired. When a detailed breakdown of food purchases and/or self-production by item is not available from the source, an estimate of the amount of calories available is computed as the ratio between the food expenditure of the household and the average unit cost of a calorie.

The fact that we consider the insurance decision endogenous in the calorie framework depends on our beliefs about the awareness of the households of their nutritional intake. In other words, it depends on their level of skill in managing nutritional aspects of their diets. Although many contemporaries point to the fact that part of the poor nutritional standards of families was due to the substantial lack of knowledge of these matters (Paton, et al., 1901; Oddy, 2003), we will assume that households were aware of their daily energy needs and how much food they had to acquire in order to meet them.

[5] The fact that in case insurance went unpaid policies lapsed (Reeves, 1912, p. 4) leads us to think that the coverage of the fee paid is prospective.

4 Database description

As anticipated, the sample is extracted from a wider collection of 2,098 households obtained from 15 different sources. While the full sample was built to be nationally representative, we have no guarantee that the sub-sample of 479 families with information on insurance covers all British regions and population strata as well. In fact, we can observe some differences in the selected sample compared to the full one, the major ones being reported in Table 1.

Table 1. Differences in regional distribution between full and selected sample

Region	Full sample (%)	Selected sample (%)
North	75.05	61.59
South	24.95	38.41
Total	*100*	*100*

With regard to the occupational distribution, differences are also non negligible: the share of households belonging to the industrial sector is dramatically reduced in favor of larger shares of services workers (see Table 2).

Table 2. Differences in sectoral distribution between full and selected sample

Sector	Full sample (%)	Selected sample (%)
Agriculture	8.83	12.01
Industry	67.51	27.77
Services	23.66	60.13
Total	*100*	*100*

In Table 3 we report differences in the average values of some key variables: we do not observe major differences between the full and selected samples in terms of rural or female-headed household shares, nor in household size. We are excluding, however,

more wealthy households than poor ones: although no major difference in per-capita income is observable, both food expenditure and caloric availability are lower in the selected sample. Average calorie availability is particularly low in our sub-sample; the reasons underlying this bias are mainly four: i) the richest tail of the income distribution remains unrepresented in our sub-sample; ii) most of the sources from which the budgets were extracted were aimed at raising awareness of the miserable living standard of the population observed, which raises suspicion about whether authors deliberately presented a pessimistic scenario by selecting more disadvantaged families or under-reporting expenditures; iii) some expenditure items were clearly under-reported because they were considered sensitive, for example alcohol; iv) rescaling to per adult equivalent basis would increase the caloric intake figure, but this is impossible given the limited information on family composition in some of the sources.

Table 3. Differences in the averages of some key variables between full and selected sample

Variable	Full sample	Selected sample
Rural	0.08	0.04
Female-headed household	0.04	0.03
Household size	6.2	6.1
Log income (day/person)	2.22	2.00
Log food expenditures	2.20	1.50
Kcal (day/person)	3,513	1,545
N	*2,098*	*479*

In order to address the representativeness issues presented so far, we applied the weighting technique of Holt and Smith (1979) as described in Section 3 using as post-stratification variables region of residence and sector of employment of the head of household (see Table 4).

Table 4. Household budget subsample reporting insurance purchase information

	Agriculture	Industry	Services	Total
North	16	80	199	295
South	42	53	89	184
Total	*58*	*133*	*288*	*479*

Among the 479 households for whom information about insurance purchase is reported, about 40 percent decided to acquire an insurance scheme.

Although for most of them the kind of insurance purchased is not specified, among those households that do report this information, life and health-related insurances are the most common. Insurance schemes related to unemployment or temporary job loss are completely absent in our sub-sample: this might be explained by the fact that most trade unions provided this kind of insurance to their members; however the latter were mostly skilled workers, while unskilled and casual workers could not afford unemployment insurance (Rowntree and Lasker, 1911).

Table 5. Household insurance decisions

Insurance	%
None	60.7
Insured	39.3
Not specified	24.0
Life insurance	7.3
Health insurance	1.8
Funeral	6.1

A short digression about who was providing insurance services in the early 20th century is worthwhile at this point. Since the mid-19th century, the number of mutual help associations like friendly societies providing sick and death benefits had been increasing in Britain (Boyer, 2008): while affiliated societies were large regional or even national organizations, ordinary societies were small and limited to a local dimension, often providing burial insurance only. Given the high premium charged by the formers, their

members were mostly skilled higher-paid workers; on the other hand lower-paid workers probably joined ordinary societies. Membership in friendly societies was the response to the revulsion of the working class against the poor law, which proved to be inefficient both in improving the situation of the poor (Bosanquet, 1909) and from the point of view of the financial sustainability for local authorities. This was cause for considerable concern in official circles, that started looking at pauperism not as a sin to be punished but rather as a form of inefficiency in the labour market draining local resources (Whiteside, 2009). In particular, the vicious cycle that had to be interrupted was the one linking sickness and unemployment; the 1911 Insurance Act promoted by the liberal British government aimed not so much to relieve poverty but rather to offer some help to those regular workers who were temporarily suffering unemployment due to sickness or to cyclicality of trade. Part I of the Act provided for compulsory health insurance for workers between 16 and 70 years old, to be paid jointly by the worker, the employer, and the government. The insurance scheme offered free access to the general doctor and a cash amount to any worker with annual earnings below a certain threshold (but not to his/her relatives and dependents). The amount was due on a weekly basis, which also constituted a disincentive for the employers to hire a labourer on a daily basis. Part II of the Act provided for compulsory insurance to protect regular workers against unemployment; the rationale behind this provision was to avoid unemployment and under-employment leading to unemployability. According to Beveridge (1909), if treated like pauper, the regular worker will eventually behave as such, turning him/herself in another casual worker. The government tried to address this issue by distinguishing between the regular workers temporarily out of employment from paupers and casual workers, who constituted the real social problem and still fell under the scope of the punitive poor law. Implicitly the Act provided a definition of unemployed workers as a "selected group of regularly employed men whose services were temporarily surplus to immediate requirements, in a scheme initially confined to trades known to suffer from seasonal fluctuations in demand" (Whiteside, 2009).

Preliminary evidence about the relation between wellbeing and the insurance decision does not seem to confirm the hypothesis of a higher willingness to insure among low-income households: in fact, the highest share of insured families is observed among high-income households (see Table 6).

Table 6. Percentage of insured households by per-capita income quartile

Tercile of income	Non insured (%)	Insured (%)	Total (%)
1	60.6	39.4	100
2	65.5	34.5	100
3	37.0	63.0	100
Total	*60.7*	*39.3*	*100*

This of course should not be interpreted as a lower propensity of low-income households towards precautionary spending. Table 6, however clearly suggests that exposure to risk, risk-mitigation as well as coping ability are not the only factors to be considered: following Scott and Walker's (2015) argument, well-to-do white collar workers too were willing to purchase some sort of insurance scheme to maintain their "middle-class status"; as discussed in Section 2 social norms are also part of the story. Limitations in the data prevented us from conducting a more in depth analysis, for example modelling not the mere decision to insure or not but rather the amount of money spent to purchase an insurance scheme. Many sources reported insurance expenditure together with other budget expenditure items, making it impossible to identify the exact insurance spending of many households.

In order to verify the hypothesis formulated by Reeves (1912), we want to understand whether and to what extent the decision to insure affected the food budget and the caloric availability of the households. What we see in Table 7 is in line with Reeves' prediction: both average food expenditures and average caloric availability of the insured are significantly lower than for non-insured households, exception being made for the top-income households, where the relation is reversed.

Preliminary descriptive statistics seems to confirm, by and large, the Reeves hypothesis: poor households buying insurance schemes reduced their available budget for essential items like food, which in turn lowered caloric availability for insured households compared to their non-insured counterparts.

In the following section we perform a more rigorous analysis considering additional household characteristics to better understand the determinants and the effects of the insurance decision, with particular attention to food expenditures.

Table 7. Food expenditure and calories by income tercile and insurance decision

Income tercile	Not insured	Insured	p-values
Food expenditures			
1	4.8 (75)	2.9 (85)	0.00
2	6.2 (66)	5.0 (94)	0.00
3	6.5 (14)	8.5 (145)	0.02
Kcal p.c.			
1	1,533 (74)	1,172 (86)	0.02
2	1,916 (66)	1,664 (94)	0.05
3	1,944 (14)	2,363 (145)	0.08

Note: In brackets the number of observations over which mean food expenditure is computed

5 Working with historical household budgets – a user guide

5.1 Determinants of insurance choice

In Table 8 we present the coefficients resulting from estimation of the probit model of the choice to purchase insurance (columns 1 and 3), together with relevant marginal effects (columns 2 and 4); in parentheses we reported robust standard errors.

The coefficient associated with the dummy for the head of household being a casual worker takes expected sign: being more exposed to risk because of their unstable working conditions, their perception of vulnerability was heightened, causing a 0.35 increase in the probability that the family bought insurance.

With poor relief often misallocated, mechanisms to protect widows from the risk of poverty and destitution were weak, which made female-headed households more vulnerable (Bosanquet, 1909). At the same time, since the male breadwinner was most of the time the only insured member in low-income families, at his death the wife might decide not to pay for insurance any more; the negative sign associated with the female-

headed household dummy indicates that this latter effect prevails. The negative sign associated with the number of earners indicates that the coefficient is probably capturing an income diversification effect, even though the effect is not statistically significant.

Furthermore, given that agriculture and industry should be interpreted relative to the missing category - i.e. services - we can also conclude that service workers had a particularly propensity for precautionary expenditures compared to workers in other sectors. As already discussed in Section 4, this result is driven by the prevalence of white-collar workers in our service sector sample stratum (Scott and Walker, 2015).

Table 8. Probit for the decision to buy insurance

	(1) Insurance purchase	**(2) Marginal effects**	**(3) Insurance purchase**	**(4) Marginal effects**
Casual	0.974** (0.383)	0.35	1.007** (0.395)	0.36
Female head	-0.682* (0.374)	-0.24	-0.689* (0.375)	-0.24
N. earners	-0.125 (0.138)	-0.04	-0.141 (0.147)	-0.05
Rural	-0.186 (0.523)	-0.07	-0.207 (0.520)	-0.07
London	-0.913*** (0.281)	-0.33	-0.907*** (0.281)	-0.32
Agriculture	-0.444 (0.600)	-0.16	-0.398 (0.606)	-0.14
Industry	-1.129*** (0.244)	-0.40	-1.101*** (0.249)	-0.39
Log-PCI			0.080 (0.159)	0.02
Insurance act	0.711 (0.595)	0.25	0.700 (0.601)	0.25
Constant	1.085*** (0.346)		0.778 (0.671)	
Observations	*479*		*479*	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Also the dummy for living in London takes expected sign: given the superior access to ex-post coping mechanisms such as informal financial services, households living in London are less willing to put money in friendly societies and clubs. Last, since some of the household budgets in our sample were gathered after 1911, we controlled for a possible National Insurance Act effect; also in this case the positive sign is expected and the probability that an household purchased insurance products increases by 0.25 after 1911. The sign and statistical significance of the regressors is not affected by the addition of log per-capita income as a regressor, the latter appearing with positive but not significant sign[6].

We can conclude that the determinants for the decision to insure can be found in two main factors: on one hand households with a higher perception of vulnerability were more prone to insure; on the other is the social factor, with white-collar workers a clear example of households that despite suffering a lower level of vulnerability compared to the working-class had a higher propensity to insure due to the need of meeting middle-class social standards (Scott and Walker, 2015).

5.2 Impact of insurance choice on food expenditures and intake

In Table 9 and 10 we show the regression coefficients estimated for equations (1) and (2) respectively. In columns 3 and 4 of both tables log-per capita income is added to the set of regressors.

Most of the coefficients take the expected sign: having a casual worker as head of the household as well as a high dependency rate negatively affects the wellbeing of the household, which is consistent with both the contemporary (Rowntree, 1901) and the modern literature (see for example Gazeley, 2003). The fact that the head of the household is a woman significantly affects the food budget, but not the amount of calories available. On one hand this confirms the common wisdom of female headed households being disadvantaged in terms of budget availability compared to their male-headed counterparts; on the other, this is also in line with modern literature proving the

[6] The non-significance of the coefficient associated with income might however be due to the post-stratification structure already controlling for income distribution in the sample; this seems to be confirmed by column 2 of Table 12 in Appendix 1, where the same probit model is estimated without the use of post-stratification weight and the income variable takes positive and significant size.

connection between female intra-household bargaining power and child health and nutritional outcomes (UNICEF, 2011).

While northern regions are associated with higher levels of food expenditures and intake (probably a consequence of rising northern wages compared to the south; Hunt, 1986), the impact of living in London is negative[7] albeit not significant for calorie intake. Working in agriculture is positively and significantly associated with calorie intake, which corroborates Mackenzie's (1921) argument that rural households had access to more affordable food compared to their urban counterpart. Interestingly, a household's decision to insure is associated with a negative and statistically significant coefficient: insurance purchase causes a 68% reduction in food expenditures. This effect decreases to 15% when per capita income is included as a regressor (column 3 of Table 9); although in this latter case the coefficient is not statistically significant, the magnitude of the decrease is meaningful.

A similar negative effect is also found on the caloric intake (Table 10) although the coefficient is not significant in this case. This might well be explained by the fact that although households reduced their food budgets to acquire insurance, they managed to smooth to a certain extent the effect of shrinking food expenditure on calorie availability. Still, the magnitude of the effect is -5.5% even with per capita income among the regressors. We should also keep in mind that these results may overlook important impacts on the quality and diversity of the diet: while the partial smoothing might be attributed to the ability of the households to spend their money in a "smarter" way (maybe buying from cheaper sources), on the other hand households might also be purchasing lower quality food or reducing their diet diversification in order to meet their reduced food expenditure budget. Nutritional studies argue that the lack of nutritional knowledge often led households to think that macronutrients like carbohydrates and animal fats were substitutable in terms of energy provision, and in turn to opt for a cheaper but less diversified diet (Oddy, 2003). Unfortunately, an in-depth analysis of macronutrient intake is impossible due to the dimensions and the structure of our sample, so we limit ourselves to concluding that we are probably underestimating the negative effect of insurance purchase on the nutritional standard of the households.

[7] Given that expenditures amount have not been spatially deflated, the negative coefficient is probably underestimating the negative effect of living in London on food expenditures.

Table 9. CMP for the impact of insurance decision on log per-capita food expenditures

	(1) Log-food exp	(2) Insurance purchase	(3) Log-food exp	(4) Insurance purchase
Casual	-0.190** (0.090)	0.588*** (0.186)	-0.299*** (0.086)	1.079*** (0.220)
Female head	-0.400*** (0.131)	-0.632* (0.344)	-0.221** (0.100)	-0.603* (0.323)
N. earners		-0.180** (0.077)		-0.210** (0.086)
Rural		0.940* (0.537)		1.485* (0.882)
London	-0.237** (0.113)	0.536 (0.448)	0.057 (0.093)	0.886 (0.715)
Insurance act		1.058*** (0.400)		2.016*** (0.672)
North	0.052 (0.108)	1.372*** (0.486)	0.024 (0.077)	1.989*** (0.724)
Industry	-0.418*** (0.078)	-1.095** (0.427)	0.118 (0.088)	-0.667 (0.473)
Services		0.009 (0.457)		0.484 (0.503)
Dep. Rate	-0.161*** (0.021)		-0.060*** (0.019)	
Agriculture	-0.089 (0.161)		0.169 (0.117)	
Insurance	-1.136*** (0.087)		-0.166 (0.182)	
PCI2			0.462*** (0.039)	0.149 (0.184)
Constant	2.716*** (0.150)	-0.050 (0.634)	-0.194 (0.256)	-1.734* (0.948)
Observations	*479*	*479*	*479*	*479*

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10. CMP for the impact of insurance decision on caloric intake

	(1) Log-kcal	(2) Insurance purchase	(3) Log-kcal	(4) Insurance purchase
Casual	-0.518***	0.999***	-0.362***	1.031***
	(0.121)	(0.208)	(0.123)	(0.216)
Female head	-0.167	-0.594*	-0.163	-0.575*
	(0.161)	(0.324)	(0.157)	(0.320)
N. earners		-0.150*		-0.208***
		(0.081)		(0.079)
Rural		1.492*		1.021
		(0.821)		(0.854)
London	-0.016	0.975	0.066	0.770
	(0.145)	(0.647)	(0.142)	(0.651)
Insurance act		2.192***		2.002***
		(0.586)		(0.602)
North	0.498***	2.065***	0.463***	1.889***
	(0.129)	(0.661)	(0.125)	(0.667)
Industry	-0.013	-0.654	0.224*	-0.701
	(0.115)	(0.480)	(0.119)	(0.462)
Services		0.554		0.463
		(0.509)		(0.500)
Dep. Rate	-0.055*		0.031	
	(0.029)		(0.029)	
Agriculture	0.620***		0.777***	
	(0.194)		(0.188)	
Insurance	-0.233		-0.056	
	(0.205)		(0.215)	
PCI2			0.469***	0.146
			(0.063)	(0.151)
Constant	7.253***	-1.358*	4.976***	-1.585*
	(0.223)	(0.808)	(0.371)	(0.938)
Observations	*479*	*479*	*479*	*479*

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

We might argue, however, that what really matters in assessing the impact of the decision to insure on health and nutrition is not the absolute reduction in caloric intake, but whether this reduction was sufficient to push the households below the minimum energy requirement threshold. In order to check this possible effect, we use the estimated coefficients from the CMP regression to predict the amount of calories each household would have consumed if it had chosen not to insure. The minimum energy requirement has been computed using FAO (2001) instructions combined with census information on population structure, working children, and pregnant women. The results are shown in Table 11, where insured households are classified according to their actual nutrition status (rows) and their predicted status if the insurance dummy is switched from 1 to 0. The table shows that only a small fraction of the population (about 3 percent of insured households) having less calories than the minimum requirement would have lain above this threshold had they not purchased insurance.

Table 11. Undernutrition reduction for insured households

	Predicted figures		
	Non undernourished	*Undernourished*	*Total*
Non undernourished	100.0	0.0	100.0
Undernourished	2.73	97.27	100.0
Total	*22.96*	*72.36*	*100.0*

The conclusion we can draw is that even the small (but significant) impact we have estimated was sufficient to push some households below the undernutrition threshold, probably due to their proximity to the minimum energy requirement level. Furthermore, the evidence of a shift from essential to non-essential goods near a poverty line calculated according to the modern cost of basic needs method can be interpreted as an evidence that the poverty line so constructed is a generous measure, probably not reflecting the subsistence minimum level of expenditures needed to meet the most essential needs of a family.

6 Conclusions

We used a sample of 479 household budgets to shed some light on the insurance decision of families in early 20th century Britain and its consequences for wellbeing in terms of purchases of essential items like food.

During the period considered, British workers suffered a high degree of uncertainty and risk due both to unstable working conditions and a poor health environment (Floud and Johnson, 2008; Mathias, 1983). Despite this, according to direct observers, many households did not insure themselves against risks (Bell, 1907). However, Reeves (1912) disagreed with this conclusion, arguing that the awareness of their vulnerable living conditions pushed poor households to purchase insurances; this in turn had the effect of reducing their food, housing, and clothing budgets, with obvious consequences for their wellbeing. In other words spending on friendly societies and clubs to mitigate risk activated a mechanism that led households to worsen their short and long-term living conditions. Recent contributions in economic history have largely overlooked vulnerability as a cause of poverty, and the issue remains inadequately understood.

With this study we partially found an answer to this question by proving that the factors leading households to insure were mainly two: on one hand, building on the work of Scott and Walker (2015), the need of maintaining social class status (in this sense insurance has been defined a positional expenditure); on the other the perceived vulnerability of households in terms of risk exposure, lower risk-mitigation ability, and lower ex-post coping ability. We thus reject the arguments of Rowntree (1901) and Bell (1907).

Furthermore we run a CMP (Roodman, 2011) estimation procedure for the impact of the insurance decision on food expenditures and, in line with the conclusions drawn by Reeves (1912), we find a negative correlation between the decision to insure and the food expenditures of households. This negative effect on food budgets translated into a significant negative effect on the caloric intake, even if with a reduced magnitude. We also find that, probably due to the proximity of diets to the minimum energy requirement, even small changes in expenditure pushed some households below this threshold: 3 percent of insured households consuming fewer calories than the minimum energy requirement would have lain above this threshold if they had decided not to insure.

The conclusion we can draw from the evidence presented in this work is that buying insurance was both a social and an economic issue; given their already limited budgets, this choice forced poor households to shift part of their food budget to the purchase of insurance, implying in turn a significant reduction of their food expenditures. The significant reduction in food budgets was accompanied by a non significant but meaningful reduction in calories intake, even though this latter result probably constitutes an underestimate as it neglects changes in the quality and diversity of the diet.

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Appendix 1: Sensitivity to post-stratification.

Table 12. Probit for the decision to insure - without post-stratification and using 1911 as reference population

	(1) Without post-stratification	(2) Without post-stratification	(3) Using 1911 weights	(4) Using 1911 weights
Casual	0.210 (0.258)	0.622** (0.277)	0.992*** (0.379)	1.026*** (0.391)
Female head	-1.172*** (0.299)	-1.274*** (0.300)	-0.701* (0.370)	-0.709* (0.372)
N. Earners	0.268*** (0.0968)	0.165* (0.100)	-0.126 (0.139)	-0.142 (0.148)
Rural	-0.558 (0.401)	-0.545 (0.402)	-0.189 (0.524)	-0.210 (0.521)
London	-0.972*** (0.158)	-0.880*** (0.164)	-0.907*** (0.279)	-0.902*** (0.280)
Agriculture	-0.411 (0.379)	-0.118 (0.384)	-0.445 (0.593)	-0.399 (0.598)
Industry	-1.421*** (0.159)	-1.142*** (0.172)	-1.115*** (0.242)	-1.087*** (0.247)
Log-income		0.600*** (0.149)		0.0804 (0.158)
Insurance act	0.456 (0.300)	0.448 (0.298)	0.718 (0.592)	0.706 (0.597)
Constant	0.906*** (0.188)	-1.632** (0.659)	1.067*** (0.343)	0.759 (0.665)
Observations	*479*	*479*	*479*	*479*
Pseudo R^2	*0.312*	*0.342*	*0.216*	*0.216*

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13. CMP estimates for the impact of insurance decision on log per-capita food expenditures - with no post-stratification and using 1911 as reference population

	Without post-stratification		**Using 1911 weights**	
	Log-PCF	*Log-PCF*	*Log-PCF*	*Log-PCF*
Casual	-0.389*** (0.0700)	-0.172** (0.0681)	-0.188** (0.0884)	-0.304*** (0.0865)
Female head	-0.185** (0.0878)	-0.190** (0.0794)	-0.393*** (0.128)	-0.215** (0.0988)
London	0.242*** (0.0873)	0.185** (0.0779)	-0.235** (0.112)	0.0516 (0.0936)
North	0.199*** (0.0761)	0.147** (0.0684)	0.0464 (0.108)	0.0223 (0.0770)
Industry	-0.0251 (0.0657)	0.111** (0.0551)	-0.406*** (0.0773)	0.111 (0.0870)
Dep. rate	-0.223*** (0.0192)	-0.113*** (0.0198)	-0.157*** (0.0206)	-0.0617*** (0.0185)
Agriculture	-0.123 (0.0924)	-0.0682 (0.0826)	-0.0944 (0.159)	0.157 (0.117)
Insurance	0.199* (0.106)	0.132 (0.0929)	-1.112*** (0.0861)	-0.165 (0.181)
Log PCI2		0.348*** (0.0349)		0.444*** (0.0383)
Constant	1.735*** (0.122)	0.133 (0.173)	2.687*** (0.148)	-0.112 (0.253)
Observations	*479*	*479*	*479*	*479*

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 14. CMP estimates for the impact of insurance decision on per capita log kcal intake - with no post-stratification and using 1911 as reference population.

	Without post-stratification		Using 1911 weights	
	Log-kcal pc	*Log-kcal pc*	*Log-kcal pc*	*Log-kcal pc*
Casual	-0.182* (0.104)	0.0389 (0.104)	-0.506*** (0.122)	-0.361*** (0.125)
Female head	0.107 (0.127)	0.0490 (0.121)	-0.163 (0.158)	-0.156 (0.155)
London	0.241* (0.128)	0.127 (0.118)	-0.0139 (0.146)	0.0685 (0.143)
North	0.403*** (0.114)	0.363*** (0.103)	0.498*** (0.129)	0.465*** (0.125)
Industry	0.187** (0.0866)	0.226*** (0.0850)	-0.00765 (0.115)	0.224* (0.120)
Dep. rate	-0.167*** (0.0253)	-0.0410 (0.0276)	-0.0541* (0.0286)	0.0276 (0.0292)
Agriculture	0.239* (0.138)	0.258** (0.125)	0.609*** (0.193)	0.759*** (0.189)
Insurance	0.626*** (0.124)	0.380** (0.148)	-0.220 (0.207)	-0.0353 (0.222)
Log PCI2		0.333*** (0.0524)		0.449*** (0.0622)
Constant	6.848*** (0.163)	5.453*** (0.256)	7.239*** (0.224)	5.053*** (0.370)
Observations	*479*	*479*	*479*	*479*

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 2: Impact of insurance purchase on other household expenditures.

To corroborate evidence presented in Tables 9 and 10 we present here a more extended CMP model estimation that includes also the impact of the insurance decision on the budget allocation for clothing, fuel and rent[8]. The aim of this exercise is to understand where families were sacrificing the most for the sake of insuring by comparing the impact on food expenditures with those on other household member necessities. Given that additional equations have been included in the system, the results in columns 1 and 6 do not replicate those in columns 1 and 3 of Table 9.

Nonetheless results should be taken with cautious as fuel expenditures suffer the same limitation already explained for insurance expenditures.

We can see that the impact of insurance decision is negative and significant for all budget items except for rent, the impact being the largest in magnitude on fuel expenditures even though the difference with the impact on food is small (approximately 60% reduction for both).

[8] The CMP has been estimated including also the equation for insurance purchase decision; the latter is not shown in Table 15 for the ease of presentation.

Table 15. CMP estimates for the impact of the insurance decision on per capita food expenditures as well as other household's expenditures.

	(1) Log-PCF	(2) Log-clothing	(3) Log-fuel	(4) Log-rent	(6) Log-PCF	(7) Log-clothing	(8) Log-fuel	(9) Log-rent
Casual	-0.128	0.191*	-0.115	-0.546***	-0.063	0.116	-0.116	-0.518***
	(0.093)	(0.105)	(0.101)	(0.074)	(0.077)	(0.109)	(0.091)	(0.075)
Female head	-0.446***	-0.628***	-0.188	0.264**	-0.385***	-0.553***	-0.108	0.309***
	(0.141)	(0.154)	(0.151)	(0.107)	(0.109)	(0.152)	(0.127)	(0.104)
London	-0.265**	0.042	-0.686***	0.337***	-0.137	0.139	-0.554***	0.428***
	(0.121)	(0.134)	(0.130)	(0.094)	(0.094)	(0.133)	(0.110)	(0.092)
North	0.052	0.383***	-0.308**	-0.308***	0.020	0.378***	-0.331***	-0.326***
	(0.118)	(0.127)	(0.125)	(0.089)	(0.089)	(0.125)	(0.104)	(0.086)
Industry	-0.482***	-0.418***	-0.665***	-0.300***	-0.172**	-0.244**	-0.377***	-0.098
	(0.078)	(0.092)	(0.087)	(0.065)	(0.069)	(0.097)	(0.082)	(0.067)
Log-PCI2					0.439***	0.101	0.328***	0.267***
					(0.045)	(0.064)	(0.053)	(0.044)
Dep. rate	-0.190***	-0.088***	-0.104***	-0.200***	-0.088***	-0.054*	-0.020	-0.141***
	(0.016)	(0.028)	(0.021)	(0.020)	(0.021)	(0.031)	(0.025)	(0.021)
Agriculture	-0.095	-0.469**	-0.683***	-0.575***	0.072	-0.399**	-0.541***	-0.467***
	(0.174)	(0.189)	(0.186)	(0.133)	(0.133)	(0.187)	(0.156)	(0.130)
Insurance	**-1.312*** **	**-0.807*** **	**-1.366*** **	**0.022**	**-0.908*** **	**-0.444*** **	**-0.915*** **	**0.306*** **
	(0.035)	**(0.103)**	**(0.073)**	**(0.074)**	**(0.083)**	**(0.120)**	**(0.105)**	**(0.083)**
Constant	2.908***	0.484***	1.485***	2.828***	0.552**	-0.296	-0.409	1.367***
	(0.135)	(0.173)	(0.155)	(0.121)	(0.251)	(0.343)	(0.290)	(0.235)
Observations	*479*	*479*	*479*	*479*	*479*	*479*	*479*	*479*

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 3: Sources of household budgets.

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