An analysis of food prices in Scottish remote rural areas

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Defra/AES One Day Conference, “Fairness in the agricultural supply chain”, December 8th, 2023, Westminster.

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Motivation

- This presentation derives from work for the Scottish Government as part of the 2022-27 Strategic Research Programme.
- Concerns that remote communities are particularly affected by higher grocery prices in comparison with average prices or prices in other areas.
- Higher prices affect not only the well-being of remote communities but also their future.
- Many reasons why remote areas may suffer of higher prices, e.g.,:
  - Higher transportation costs.
  - Existence of spatial market power (e.g., Clarke 2000; McEachern and Warnaby 2006; Paddison and Calderwood 2007; Smith et al. 2010).

Motivation

- Motivation to study whether there is remoteness charge (we call it premium in the paper) and food affordability is due to existing research stating that households in remote areas of Scotland pay higher prices for food than the rest of the country.
- It has been raised by several organisations in those communities looking at the high prices in local stores.
- For instance, advice work has expressed concerns that residents of small settlements in Dumfries and Galloway (Scotland), where public transport is limited throughout the region, often have to pay high prices for food (Dumfries and Galloway Citizen Advice Service 2015; 2017).

Motivation

- Other similar evidence comes from studies by Highlands and Islands Enterprise for remote rural areas in Scotland (e.g., BBC 2016; Hirsch et al. 2013; 2016).
- A common characteristic of the studies dealing with these price comparisons is:
  - They use a basket of goods that are not necessarily related to actual basket of goods used by consumers,
  - They use aggregated categories, where the presence of different qualities distorts price comparisons (Beatty 2010).
- Scotland is an interesting case to study remote rural areas prices given the substantive proportion of small rural communities (Melo 2015).

Purpose

- This paper addresses the price comparison issues using an approach introduced by Aguiar and Hurst (2007).
- It allows to investigate whether consumers in Scotland's remote areas suffer from food prices that are higher than the average national prices (i.e., whether a "remoteness premium" exists).
- We use actual purchasing prices (at retailer level) of a sample of Scottish households for 2017 and 2018.
- An expensiveness index was computed to measure the cost of food at household level and control for differences in quality.
- It considers households' ability to shop for lower prices is considered, unlike in previous studies (e.g., shelf based studies).

Data

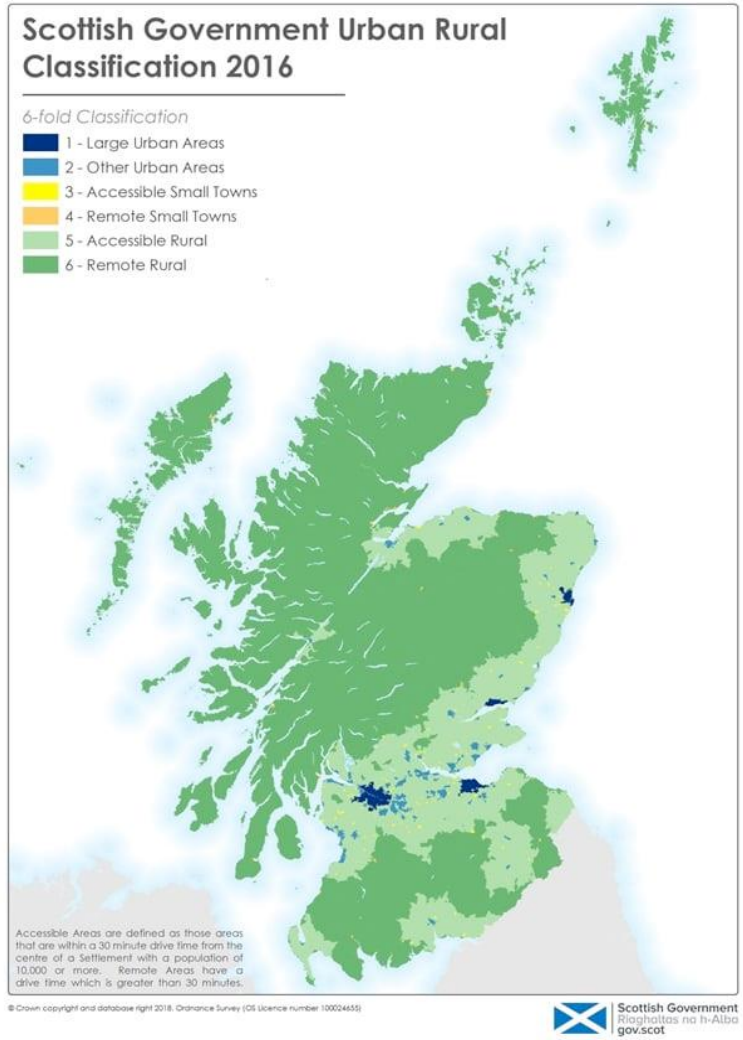
- The main data source was Kantar Worldpanel database for Scotland, which is a scanner panel dataset that includes information about food and drink purchases (at the level of the actual product, including bulk products).

- The dataset comprised 2,616 in 2017 and 2,636 in 2018. The 2 years were pooled in a single dataset.

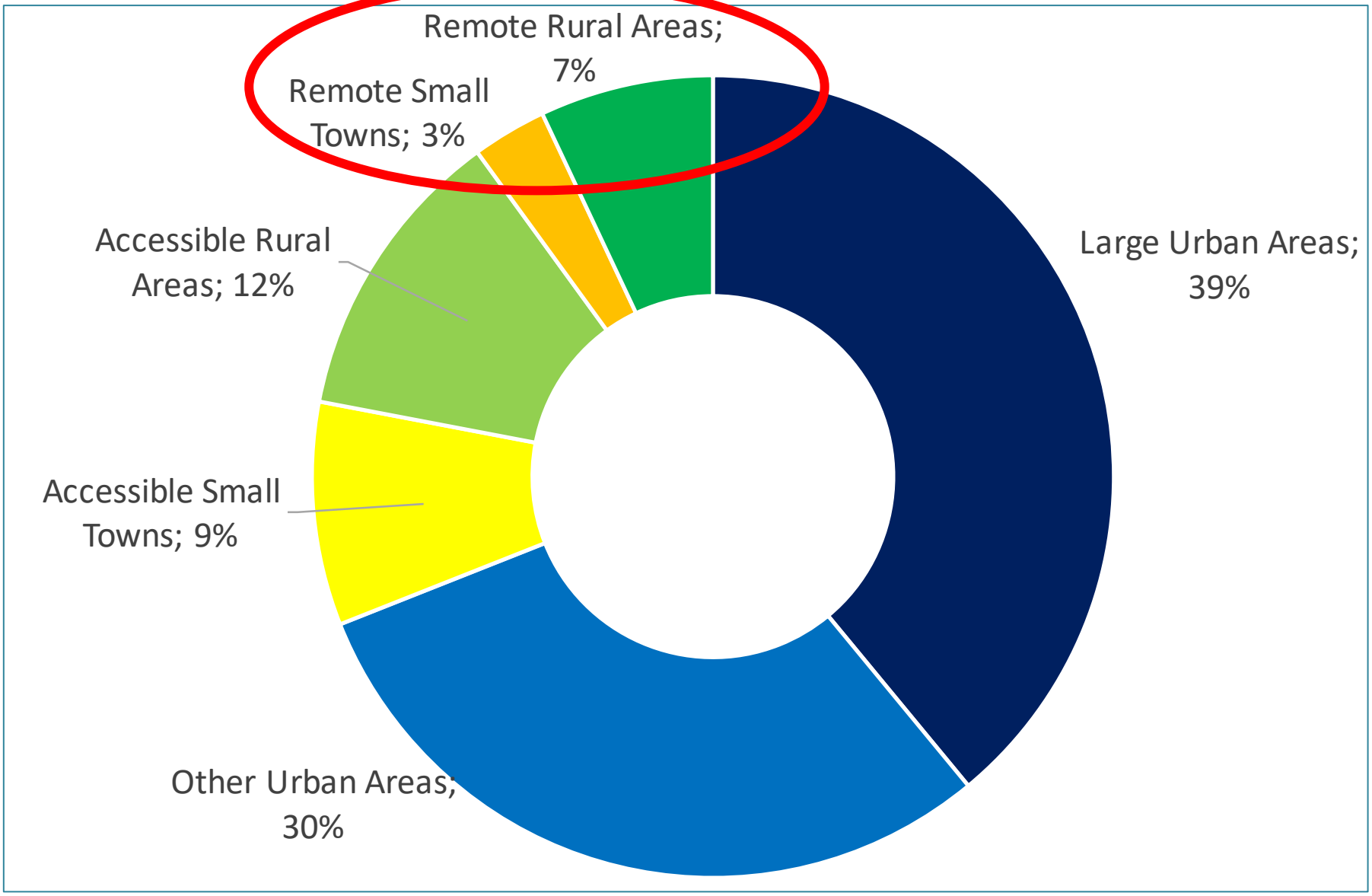
- Besides allowing to compute the food cost for each household, the dataset provided information about their characteristics such as: age of the main shopper, gender, number of children, number of trips to shops and in what shops the purchases were made.

Data

- The dataset was merged with information from the Scottish Neighbourhood Statistics (SNS).
- The SNS contains the **Scottish Index of Multiple Deprivation (SIMD) and The Scottish Government Urban/Rural Classification**.
- Remoteness (Scottish Government 2018) is based upon two main criteria:
  1. Population, as defined by the National Records of Scotland (NRS),
  2. Accessibility, based on drive time analysis to differentiate between accessible and remote areas in Scotland.



Importance of remote areas in Scotland (% of population)



Measuring remoteness premium

Issues in Literature

- Food quality
- Basket choice

Compute household *j's* **actual** expenditure in month *m:* X^j_m

Compute quantity-weighted **average** monthly prices

Evaluate actual basket at average prices: Q^j_m

Compute ratio $r^j_m = X^j_m / Q^j_m$

Normalize to center at 1000 $AHI^j_m = r^j_m / E(r^j_m) \times 1000$

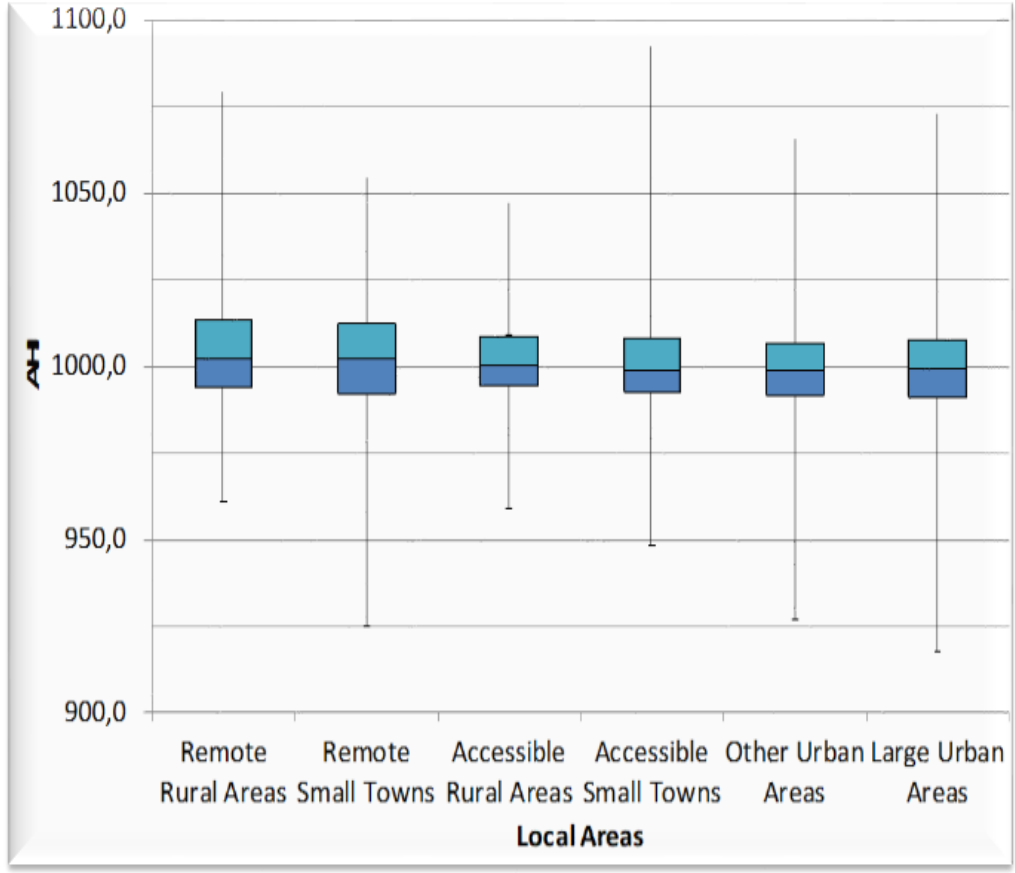
Aguiar and Hurst (2007)

- Actual baskets
- Controls for quality

$AHI^j_m > 1000$	Household *j* **pays more** for the ***actual food basket*** than they would have if they bought at Scotland's average prices
$AHI^j_m = 1000$	Household *j* **pays** for the ***actual food basket*** as if they bought at Scotland's average prices
$AHI^j_m < 1000$	Household *j* **pays less** for the ***actual food basket*** than they would have if they bought at Scotland's average prices

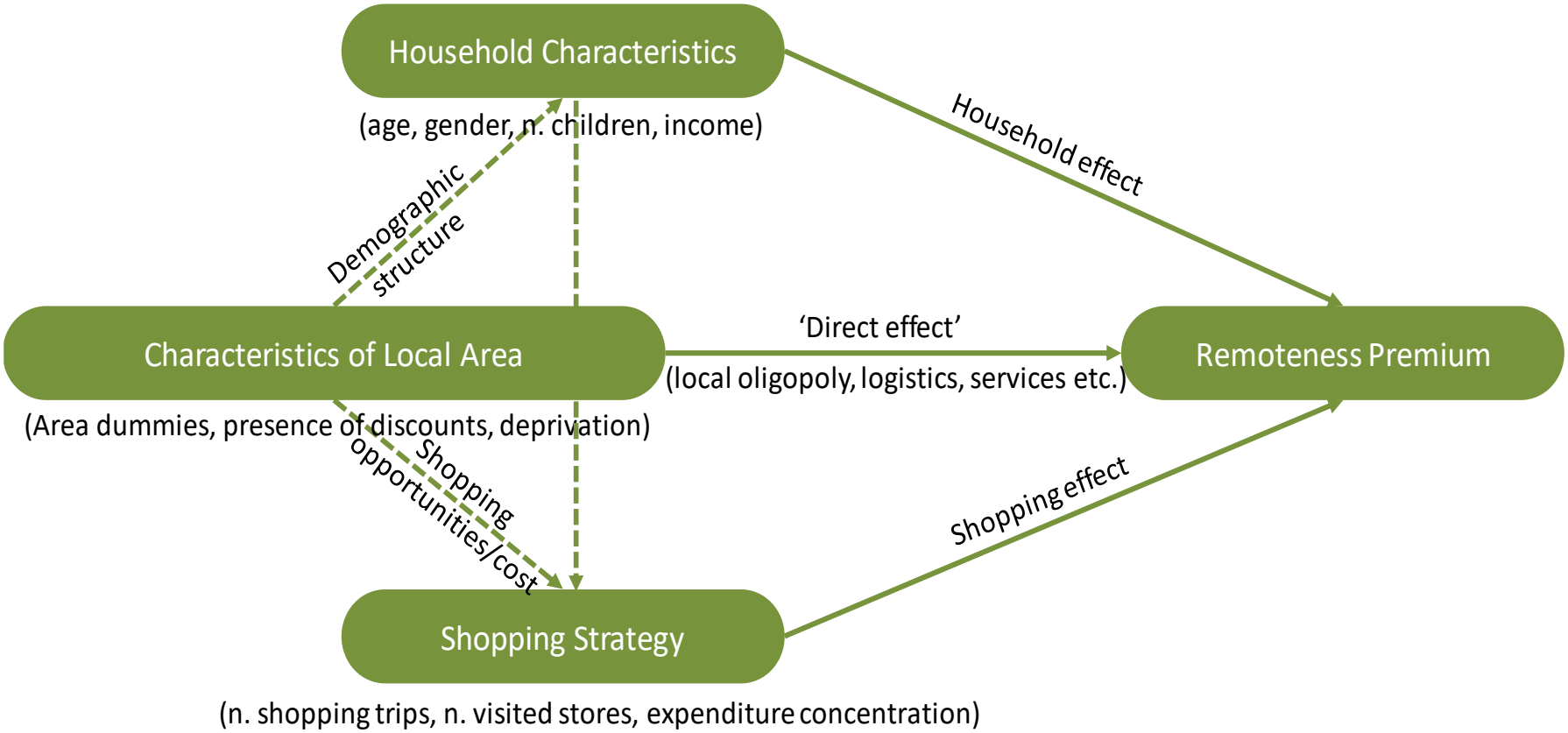
Results - remoteness premium

		Premium	
		95% confidence interval	
	avg. AHI	*lower bound*	*upper bound*
Large Urban Areas	999.4	-1.4	0.2
Other Urban Areas	**999.3**	**-1.3**	**-0.1**
Accessible Small Towns	1000.2	-1.2	1.6
Accessible Rural Areas	1001.2	0.2	2.2
Remote Small Towns	**1003.1**	**0.6**	**5.5**
Remote Rural Areas	**1004.3**	**2.3**	**6.3**
Scotland	1000.0	-	-



Although statistically significant, we found a very small remoteness premium (less than 1%).

Effect of some variables on the AHEI



Despite the small value, we tried to explain the "premium". It was hypothesised that depended on three factors: (1) households characteristics, (2) characteristics of the local area, and (3) shopping strategy.

Effect of some variables on the AHEI

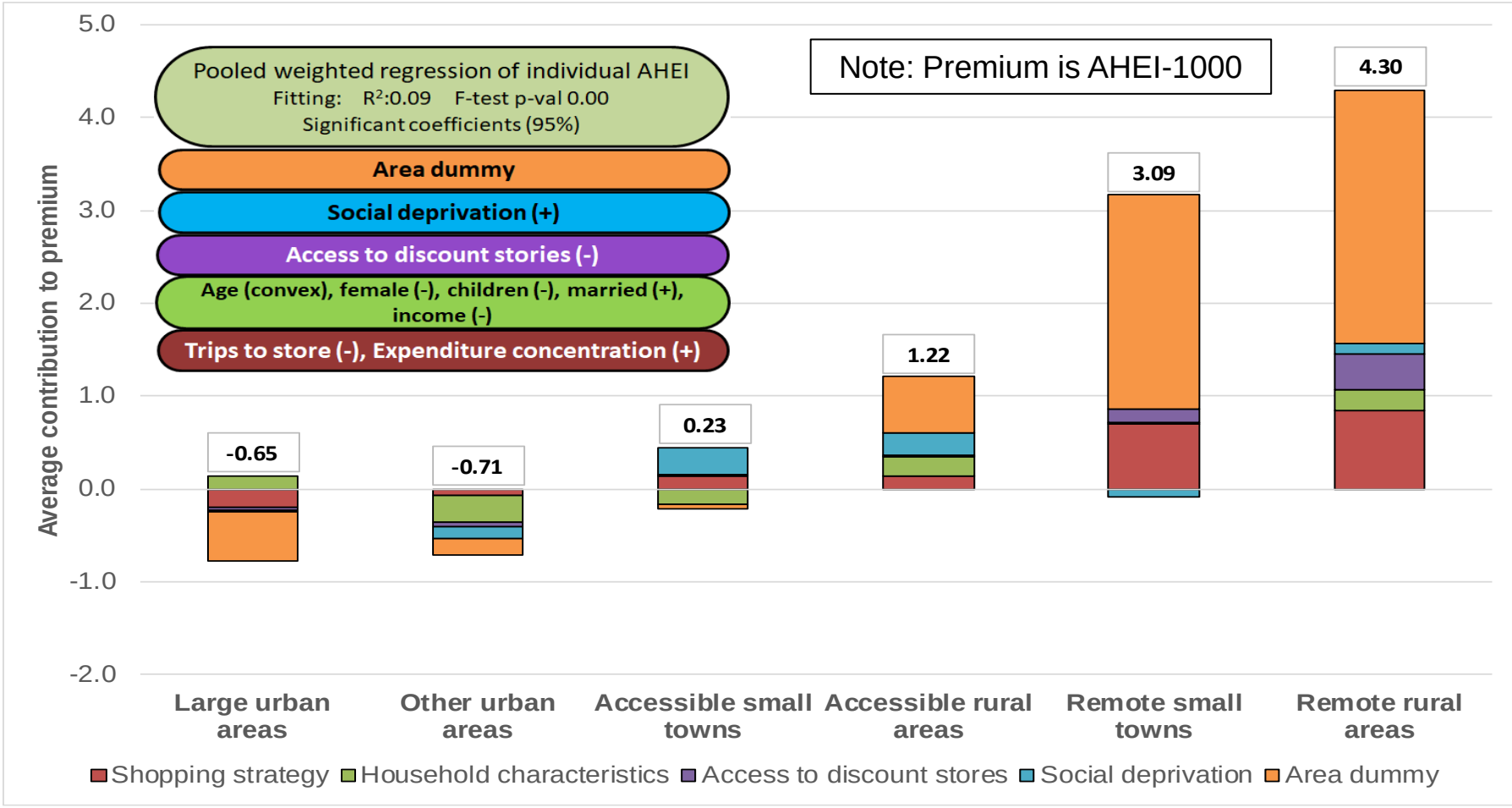
- A regression of the index AHEI on a set of explanatory variables was carried out a based on the conceptual framework.
- The estimated regression was:

$$\mathrm{AHEI_i} = \alpha + \sum_q \beta_q L_{q,i} + \sum_r \gamma_r H_{r,i} + \sum_s \delta_s S_{s,i} + \varepsilon_i$$

- Where α, β, γ, and δ are parameters to be estimated and ε_i is a heteroskedastic, normally distributed error term.

- H_r, S_s, and L_q are variables describing household *i*'s characteristics, their shopping strategies, and the characteristics of the area they live in.

Effect of some variables on the AHEI



"Place effect," local area effect not captured by other variables modelled with a dummy, and "shopping strategy" were the most important factors contributing to remote areas premium.

Concluding remarks

- Consumers in remote areas pay a small premium (0.3 to 0.4 per cent) with respect to average prices in Scotland. It is statistically significant but economically not relevant.
- To understand the effect of several factors, AHEI was regressed on several explanatory variables including local area characteristics and household demographics and consumers' shopping strategy.
- In the case of remote areas, **place and shopping strategy** were found to explain most of the premium.
- Although not presented here, the results were used to simulate three scenarios related to impact of changes in the population's age, access to discount stores, and social deprivation on food expensiveness.

Concluding remarks

- Simulations showed that aging of population in remote areas may bring an increase in the remoteness premium (maybe through less mobility) whilst increasing access to discount stores would reduce it although the effect would be limited. Reducing the deprivation did not have a clear effect.
- A limitation for more detailed comparison was that the dataset reports household purchases but without specifying the geographic place of purchase. (i.e., the retailer was not necessarily in a remote area).
- Future research may consider combining the two approaches to observe how households in remote areas react to changes in local prices and the drivers of outshopping.

References

- Aguiar, M. and Hurst, E., 2007. Life-cycle prices and production. American Economic Review, 97(5), pp.1533-1559.
- Revoredo-Giha, C. and Russo, C., 2023. Food Expensiveness in Scotland's Remote Areas: An Analysis of Household Food Purchases☆. Rural Sociology, 88(1), pp.32-70.

Further reading

- Russo, C. and Revoredo-Giha, C., 2023, August. Food Expensiveness In Remote Areas Of Scotland: A Natural Experiment Measuring The Out-Shopping Effect. In XVII EAAE Congress, August 29th–September 1st 2023.

Thank you for your attention!

Additional material

Weighted regression of AHEI on household shopping strategy and household characteristics and local area characteristics

	Variable	Coefficients	White's robust Std. err.	*t*-statistics	*P*-value|	Elasticity at means
Shop. Strat.	TRIPW	−2.066	0.279	−7.410	0.000	−0.005
	NSTORE	0.124	0.087	1.420	0.154	0.001
	HHI	7.165	1.394	5.140	0.000	0.003
Household characteristics	AGE	−0.238	0.114	−2.090	0.037	−0.011
	AGE2	0.004	0.001	3.360	0.001	0.009
	FEMALE	−1.054	0.523	−2.010	0.044	−0.001
	CHILD	−0.719	0.253	−2.840	0.005	−0.001
	MARRIED	1.996	0.520	3.840	0.000	0.000
	INCLOW	−1.923	0.480	−4.010	0.000	−0.001
Local area characteristics	DISCOUNT	−6.130	1.566	−3.920	0.000	−0.006
	S2	0.530	0.684	0.770	0.439	0.000
	S3	1.342	0.692	1.940	0.052	0.000
	S4	1.652	0.832	1.980	0.047	0.000
	S5	2.986	0.740	4.030	0.000	0.000
	LUA	−0.466	0.843	−0.550	0.581	−0.000
	OUA	−0.124	0.802	−0.150	0.877	−0.000
	ARA	0.681	0.899	0.760	0.449	0.000
	RST	2.370	1.714	1.380	0.167	0.000
	RRA	2.786	1.244	2.240	0.025	0.000
	YEAR2018	−0.142	0.446	−0.320	0.751	−0.000
	Constant	1007.489	3.497	288.090	0.000	1.009
	N. Observations	5,252				
	R^2	0.094				
	F (20, 5,231)	22.050*				

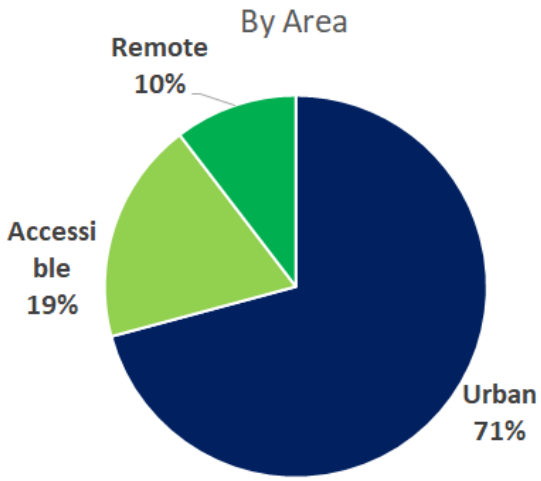
Note: * stands for statistically significant at 95 percent.

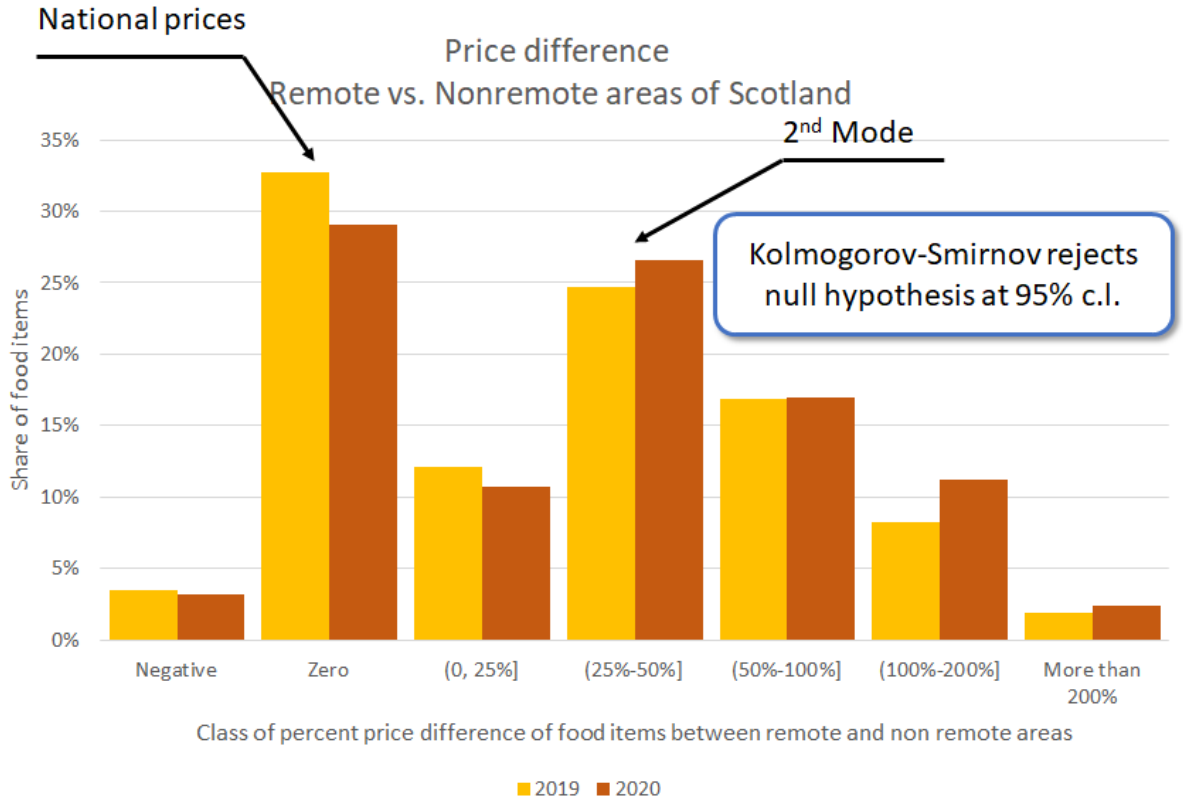
A snapshot of the 2019-2020 analysis during lockdown

Results: Are prices different?

Kantar Homescan Dataset Scotland

1441 Households
(at least one purchase in each period)





Source: Russo and Revoredo-Giha, 2023