Extended Abstract
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Paper	**Food prices in remote areas of Scotland: A natural experiment measuring the out-shopping effect**

Abstract prepared for presentation at the 98th Annual Conference of The Agricultural Economics Society will be held at The University of Edinburgh, UK, 18th - 20th March 2024.

Abstract	***200 words max***
An important aspect of the survival of remote areas in a country is whether the food prices that their citizens face are similar to those elsewhere. There is a conflictive literature about existence and magnitude of a "remoteness premium" (i.e., whether households in remote areas pay more for food than the average prices paid in the country). This paper investigates the effect of out-shopping on food expensiveness in remote areas in Scotland. For this purpose, this study takes advantage of the lockdown due to COVID-19 as a natural experiment. An expensiveness index was constructed using home scanner data. Food expensiveness was compared during the 2020 COVID-19 lockdown, when travel restriction prevented out-shopping, with the data from the same period in 2019. It was assumed that the difference – after controlling changes in the purchased goods – may be attributed to the lockdown effect. The results find that the premium paid in remote rural areas was small and out-shopping is an important factor limiting food expensiveness in remote areas of Scotland. Implication to facilitate communication for remote areas (e.g., transport) are discussed.	

Keywords	Remote areas, food prices, rural development, distribution system
JEL Code	Rural economics R2

Introduction	***100 – 250 words***

There is a consistent literature investigating whether food prices in remote areas are higher than those in cities and urban areas, with conflicting results. Examples of these studies in Scotland include Dawson et al. 2008 Cummins et al. 2010, Hirsch et al. 2013, Hirsch et al. 2016, Dumfries and Galloway Citizen Advice Service 2015; 2017, BBC 2016; Hirsch et al. 2013; 2016.

The aforementioned studies share a similar structure: a "reference basket" is chosen, then shelf prices of the basket are collected at representative stores in remote and urban areas and compared and determinants of the differences are identified. In Scotland the premium paid by remote areas ranges between 10 and 40 per cent depending on the type of goods in the basket, location, and store type (e.g., Hirsh et al. 2013). In contrast, a recent study by Revoredo-Giha and Russo (2022) used actual household purchases for the period 2017 to 2018 and found that it was less than 1 per cent.

This paper investigates the aforementioned differences and the effect of out-shopping on food expensiveness in remote areas in Scotland taking advantage of a natural experiment, i.e., measuring food expensiveness during the 2020 COVID-19 lockdown (when travel restrictions prevented out-shopping).

Methodology ***100 – 250 words***

This study used the Aguiar and Hurst index (AHEI) to measure food expensiveness at household level. The AHEI is obtained from the ratio between the actual food expenditure in the time of reference and the cost of the same food bundle evaluated at quantity-weighted average of prices paid by all households.

The AHEI was computed for a sample of 1,441 Scottish households from the Kantar HomeScan dataset. The sample was selected considering households in the dataset that were observed in both periods to assess the lockdown effect at household level. The high number of observations can be considered sufficient to provide meaningful insights. The Scottish Neighborhood Statistics (SNS) classification was used to divide the households into three groups depending on their location in Remote Areas, Accessible Areas, and Urban Areas according to 2016 SNS classification.

Two hypotheses were tested. First, whether the lockdown affected the way Scottish households in remote areas buy food and if the effect in remote areas differed from other areas. This test validates the natural experiment. If no differences were found, no inference on out-shopping could be made. Second, whether there were differences in the absolute and relative remoteness premia before and during the lockdown. If households who changed their shopping behaviour during lockdown exhibit higher remoteness premia, we concluded that an out-shopping effect was possible. If the null hypothesis of no change in the premia was rejected, one can conclude that the data do not support an out-shopping effect.

Results ***100 – 250 words***

The results show that households in remote areas in 2019, on average, visited less stores in a week, made a lower number of shopping trips, concentrated their expenditure in a more limited number of stores and bought a lower share of their food expenditure at discounters than urban households.

The effect of COVID-19 lockdown, measured computing the difference in the average values of shopping variables between 2019 and 2020 in each area, was found to decrease the number of visited stores and the number of trips per week. The average expenditure share in supermarkets increased and the one in discounters decreased. The signs of the variations were consistent with the expected effect of a reduction in public mobility, with concentration in space and time of purchases.

The results also confirmed the finding that a remoteness premium exists, but its magnitude is limited (in 2019 it was 3.4 points on a 1000 scale and 5.2 points in 2020). In addition, the estimate of the out-shopping effect accounts for a fraction of the difference between the findings of shelf-price studies (a price difference between 10 and 40 per cent for goods of a reference basket) and actual-purchase investigations (a difference in food expensiveness of 1 per cent or less). This implies that other factors should explain the gap, including the difference between the reference basket that is

used in the study and the actual baskets that are purchased by households in remote areas.	
Discussion and Conclusion	***100 – 250 words***
The empirical analysis found that lack of access to low-price food sources like from discounter retailers is a key driver of food expensiveness. This result is consistent with previous literature pointing out that accessibility and affordability of healthy food is affected by the presence of medium and large stores in the area. When the movement restrictions that were imposed during the lockdown resulted in a loss of access to discounters, the food-expensiveness measure AHEI in rural areas increased on average by 6.6 points on a 1000 scale, a value that is almost double of the average remoteness premium. A clear implication of the study is the need for the Scottish Government to ensure the normal functioning of public transport as it reduces the isolation of remote areas and allow their population not only to improve their living standards but also make those areas more resilient to cost of living crisis as well as sustainable.	