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Grocery prices and promotions during the COVID-19 pandemic

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Executive summary

The COVID-19 pandemic has led many countries to implement lockdowns and social distancing requirements, which have resulted in a worldwide economic crisis. During lockdown, non-essential stores and eat-in restaurants and bars were forced to close, people were encouraged to work from home and to stay in their local area, and businesses that were permitted to remain open were required to abide by strict social distancing rules. The adoption of these measures coincided with a large spike in inflation for groceries, which is unprecedented in prior years and represents more inflation than is typical in a year. A primary driver of these higher prices was a reduction in promotions.

In this briefing note, we use comprehensive real-time data on grocery purchases and prices in Great Britain to show how inflation and promotional activity has evolved up until the beginning of August 2020.

Key findings

- 1 The inflationary spike of 2.5% in the first month of lockdown has largely been reversed. As of the first week of August 2020, the price level for groceries was around 0.5% higher than it was at the beginning of the year.
- 2 Changes in promotions played a key role in driving both inflation at the beginning of lockdown and deflation in the following months. In the first two weeks of lockdown, the share of transactions involving price promotions fell to 16.5%, about 4 percentage points lower than the 20.5% seen in the preceding weeks of the year; by the first week August, the share of transactions entailing price promotions had returned to pre-pandemic levels. In contrast, a reduction in transactions entailing quantity promotions throughout lockdown has

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persisted; by the first week of August, the share of transactions entailing quantity promotions was at 6.4%, around 1.5 percentage points lower than the 7.8% seen before the pandemic.

- 3 The pattern of a large spike in inflation at the beginning of lockdown, followed by gradual deflation afterwards, occurred in large store formats, small store formats and online shopping. It is, however, considerably more pronounced for the set of full-line supermarkets than for discounter supermarkets or convenience stores, and it is exhibited across all nine broad grocery product types.
- 4 There has been a substantial increase in online grocery shopping. In the first month of lockdown, the share of grocery spending online was 20% higher than for the same period in 2019. By the beginning of August, the increase compared with 2019 was nearly 70%.
- 5 A decline of 8% in the first week of lockdown in the number of unique products purchased by households has persisted since the beginning of lockdown. This indicates a reduction in the variety of products available to households. Separately from price changes, this fall in product variety has led to an increase in the cost of living, as some consumers are unable to purchase their favoured product; this has persisted until the beginning of August.
- 6 The inflationary spike at the beginning of lockdown was experienced by households across the income distribution, but was larger for better-off households. However, the gap in inflation experience across different income levels has since closed.

1. Introduction

The COVID-19 pandemic has led many countries to implement lockdowns and social distancing requirements, which have resulted in a worldwide economic crisis. During lockdown, non-essential stores and eat-in restaurants and bars were forced to close, people were encouraged to work from home and to stay in their local area, and businesses that were permitted to remain open were required to abide by strict social distancing rules.

In previous research (Jaravel and O’Connell, 2020a) we document how prices changed following the onset of lockdown, up until mid-May, using comprehensive real-time data on grocery purchases and prices in Great Britain. Using a dataset that tracks grocery purchases made by around 30,000 households at any point in time, we show that the beginning of lockdown coincided with a large spike in inflation for groceries – unprecedented in prior years and representing more inflation than is typical in a year – and that a primary driver of these higher prices was a reduction in promotions.

In this briefing note, we use updated data to show how inflation and promotional activity has evolved up until the first week of August. We begin in the next section by describing the dataset we use and our approach to measuring inflation. In Section 3, we show the evolution of aggregate grocery inflation and promotional activity, and variation in this by shopping format (e.g. brick-and-mortar stores versus online), retailer types and product type. In Section 4, we document changes in shopping format and, in particular, a big switch towards online shopping. In Section 5, we document evidence on changes in product availability and how this affects inflation. In Section 6, we report on heterogeneity in inflation experiences across households based on a measure of their permanent income.

2. Measuring inflation

Dataset

We use household-level scanner data that are collected by the market research firm Kantar FMCG Purchase Panel. The data cover purchases of fast-moving consumer goods brought into the home, by a sample of households living in Great Britain (i.e. the UK excluding Northern Ireland). Fast-moving consumer goods include food and drinks (including alcohol), as well as cleaning products, pet foods and toiletries. At any point in time, the dataset contains purchase records of around 30,000 households. Participating households are typically in the dataset for many months. Each household records all barcodes that they purchase using a handheld scanner, and they send their receipts (either electronically or by post) to Kantar. For each transaction, we observe quantity, expenditure, price paid, whether the product was on price or quantity promotion, barcode characteristics and store characteristics.

Our dataset runs until 9 August 2020. In the UK, lockdown started on 23 March 2020. This entailed the closure of non-essential stores and eat-in restaurants and bars. Stores specialising in fast-moving consumer goods, such as supermarkets, convenience stores and off-licenses, were permitted to remain open. From 11 May, England moved into the ‘stay alert’ phase, where the government no longer encouraged people to stay at home. From this point forward, lockdown restrictions were gradually lifted.

We focus on the period from the beginning of the year to 9 August. Over this period in 2020, we observe 25 million transactions and 107,000 distinct barcodes. We split the data into eight four-week periods, running from 30 December 2019 to 9 August 2020. For ease of exposition, we refer to these periods as months. We measure month-to-month inflation, and compare the evolution of inflation over 2020 with the preceding two years.

Price index

Inflation is a measure of the rate at which the price level of a basket of goods and services changes over some period of time. We focus on inflation for a basket of fast-moving consumer goods (or grocery products). Inflation measures are based on a price index that entails weighting product-level price changes using expenditure weights. Different price indices differ in how often the expenditure shares are updated and in their mathematical form. These, in turn, affect how well the inflation measure captures changes in the cost of living that consumers face.

We refer readers to Jaravel and O’Connell (2020a) for details of the price index we use and how it is computed. There are a number of advantages to our approach, compared with the official consumer price index (CPI) used by national statistical offices. First, we observe up-to-date expenditure patterns at the product level. This means that we can use expenditure weights for all products that reflect current spending patterns. In contrast, the CPI uses historic expenditure shares, which are only available for groups of products, rather than at the individual product level. Second, we use a ‘superlative’ index, which accounts for the possibility that consumers may respond to price rises by changing their spending. This reduces the substitution bias that tends to lead the CPI to overstate increases in the cost of living; see Jaravel and O’Connell (2020b) for further discussion. Third, we use information on all promotional transactions in our index measure; the CPI discards some forms of promotions (e.g. those entailing quantity discounts). Fourth, we use information on what households purchase to infer changes in product availability. Of course, a limitation of our data is that they only allow us to document inflation outside the grocery sector.

3. Grocery inflation during the pandemic

Headline grocery inflation

In Figure 3.1, we present descriptive evidence. Panel (a) shows the evolution of average unit price over time. It shows this for 2020, and for the preceding two years. In each week, for every barcode, we compute unit price as the ratio of total expenditure on that barcode to total quantity. The figure shows how the average of these unit prices varies across weeks. Average unit price evolved similarly across the years up until the first week of lockdown (indicated by the first red line), when it jumped by almost 3%. In the period of lockdown (between the two red lines), the higher price level persisted, before gradually declining. By the first week of August, the average price was about 1% higher than the level over the pre-lockdown weeks of 2020.

Figure 3.1(b) shows how the share of transactions entailing a promotion in 2020 evolved over time. The black line includes both price and quantity promotions. In the weeks prior to lockdown the average share of transactions entailing a promotion was around 28%. During the first four weeks of lockdown, this fell by around 4.5 percentage points to 23.5%, before gradually recovering to 27% by the first week of August.

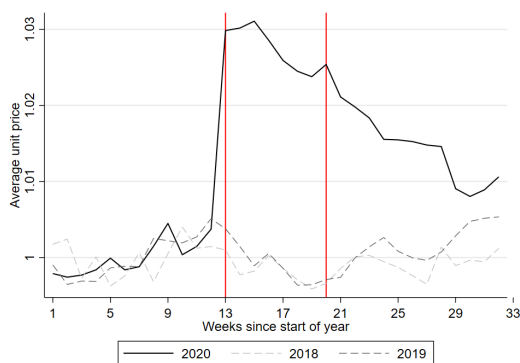
The dark and light green lines show the evolution of price promotions (e.g. £1 off) and quantity promotions (e.g. two for £2, 3 for 2, or 20% extra) separately. During the first two weeks of lockdown, the share of transactions entailing a price promotion was around 4 percentage points lower than the average level in 2020 prior to lockdown (20.5%). This unusually low level persisted for a few weeks before beginning to recover. By the first week of August, the share of transactions entailing price promotions had returned to pre-pandemic levels. In contrast, the share of transactions entailing quantity promotions fell by 1 percentage point at the beginning of lockdown and continued to fall throughout lockdown, before stabilising at the end of the lockdown period. At the beginning of August, the share

of transactions involving a quantity promotion remained lower than pre-pandemic levels.

Figure 3.1(a) shows that, on average, product prices increased at the beginning of lockdown, before gradually declining towards pre-pandemic levels. However, it does not take account of how important products are in households' grocery baskets – a seldom-purchased product is weighted the same as a very popular product. Price indices, which are used to measure inflation, weight individual products by how much expenditure households allocate to them. Aggregate inflation measures are based on the basket of a representative household (i.e. weights reflect product popularity across households).

Figure 3.1. Stylized facts

(a) Average price



(b) Transactions involving promotions



Note: Panel (a) shows average unit price across barcodes. It conditions on barcodes purchased in all weeks (which, depending on the year, account for 70–75% of total expenditure). Panel (b) shows the share of transactions that involve a price and a quantity promotion; changes are measured in percentage points from the average over the first 12 weeks of the year. The red vertical lines denote the first week of lockdown and the first week when lockdown restrictions began to be lifted.

Source: Authors' calculations using Kanter FMCG Purchase Panel data.

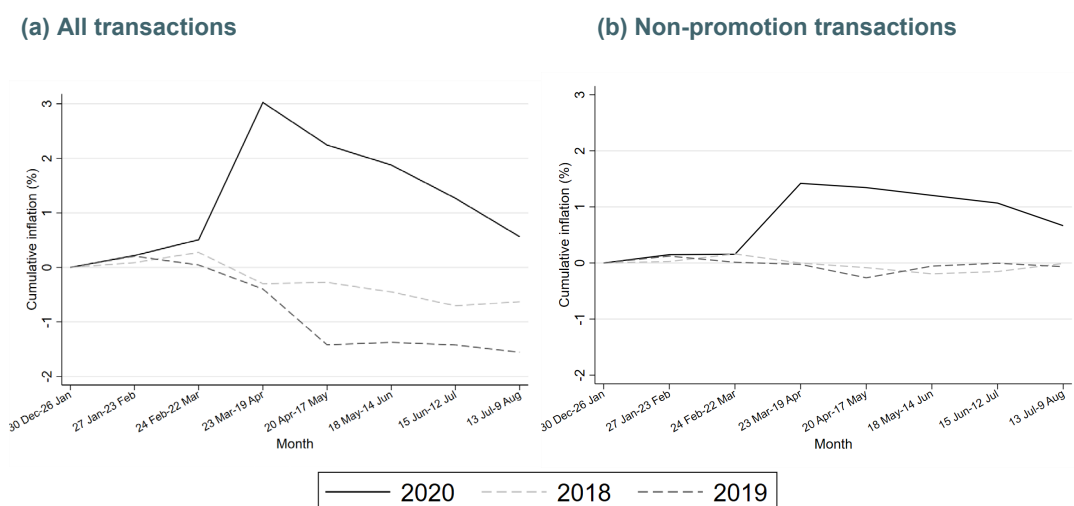
Figure 3.2(a) plots cumulative aggregate inflation over the eight months (i.e. four-week periods) from 30 December 2019 to 9 August 2020. It shows this in 2020, and for 2018 and 2019. As we document in Jaravel and O'Connell (2020a), the first month of lockdown (23 March to 18 April) sees a large spike in inflation of around 2.5 percentage points. However, the subsequent five months see a period of gradual deflation. Cumulative inflation for the whole eight-month period is 0.5 percentage points. Some deflation in spring is also apparent in preceding years. In both 2018

and 2019, cumulative inflation from the beginning of the year until the beginning of August is negative. A reasonable expectation is that, in the absence of the COVID-19 pandemic, we would have seen a similar pattern in 2020.

Figure 3.2(b) shows the same information as panel (a), except it is based only on transactions that do not involve price or quantity promotions. It shows that inflation for non-promoted items in the first month of lockdown is considerably less (1.3 percentage points) than inflation across all transactions. In addition, it shows that the reversal of inflation based only on non-promoted transactions in subsequent months is less stark than when computed based on all transactions (based on non-promotion transactions, cumulative inflation over the eight months is 0.7 percentage points).

Together, the figures show that changes in promotional activity were key in driving both the initial inflation spike (as emphasised in Jaravel and O’Connell, 2020a), and also the subsequent deflation. Figure 3.1(b) makes clear that a recovery in price promotions was key in driving this period of deflation.

Figure 3.2. Aggregate inflation



Note: Panels (a) and (b) show cumulative monthly inflation based on a chained Fisher price index, based on all transactions and only non-promotion transactions.

Source: Authors’ calculations using Kanter FMCG Purchase Panel data.

Variation across retail outlet

In Jaravel and O’Connell (2020b), we show that lockdown coincided with a higher share of consumer spending taking place online and in traditional full-line supermarkets. Here we show how promotional activity and inflation vary across transactions made in brick-and-mortar stores and online, and across different retailer types.

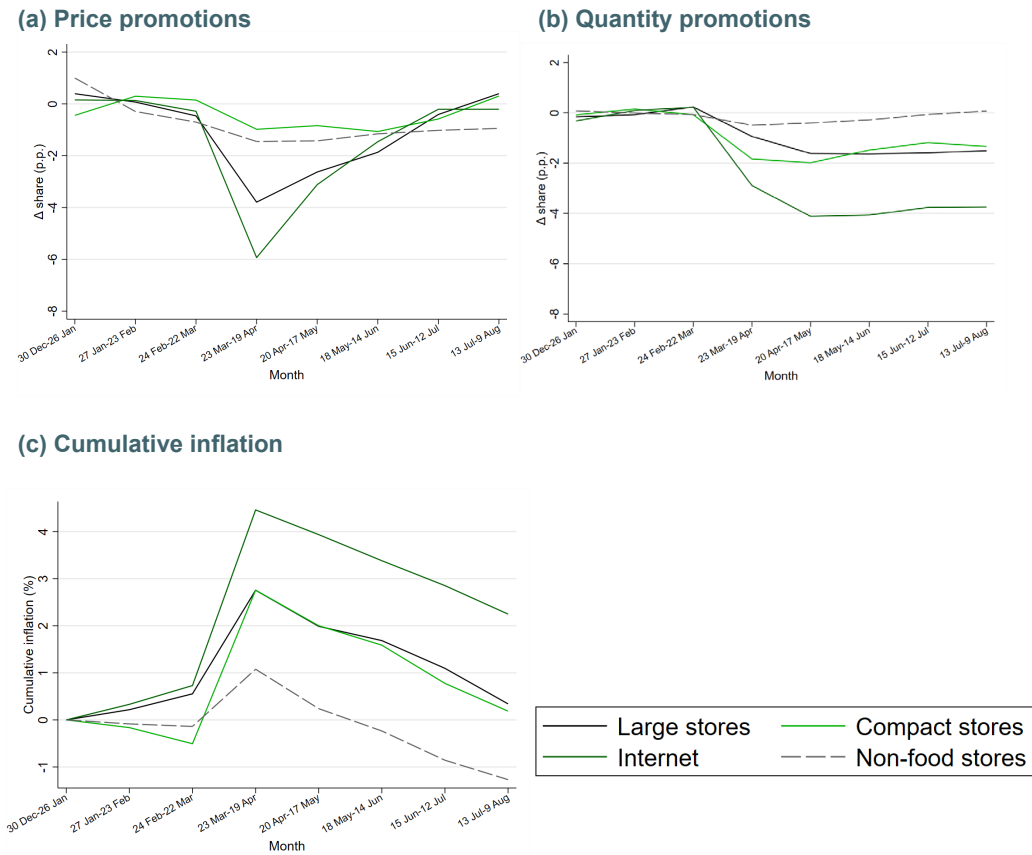
Shopping format

We use information on the store in which a transaction took place to construct a classification of transactions by ‘shopping format’. We distinguish between transactions that took place in large stores, compact stores, via Internet shopping and in stores that specialise in non-food produce. Figure 3.3 shows the evolution over time of the share of transactions that entail a price promotion, the share of transactions that entail a quantity promotion and inflation, and how these differ across the alternative shopping formats.

Figure 3.3(a) shows that the decline in price promotions at the beginning of lockdown was primarily driven by transactions in large stores and online; both compact stores and non-food stores exhibit smaller declines. In the weeks running up to lockdown, both larger stores and online had a higher share of transaction on price promotion (21% and 26%, respectively) than compact stores (15.5%) or non-food stores (3.5%). In the first month of lockdown, the share of transactions on price promotion had fallen to 17.2% for large stores, 20.1% for online, 14.5% for compact stores and 2.1% for non-food stores. The figure also shows that the reduction in price promotions in large stores and online had been reversed by the beginning of August. In contrast, Figure 3.3(b) shows a decline in quantity promotions online and, to a lesser extent, in large and compact stores at the beginning of lockdown, which has persisted through to August.

Figure 3.3(c) shows that the evolution in inflation across shopping formats is similar. The inflation spike at the onset of lockdown is 3.7 percentage points for online purchases, 2.2 percentage points for large stores, and 3.2 percentage points for compact stores. Across all three shopping formats, there has been deflation since the initial inflationary spike, with the price level gradually declining back towards pre-pandemic levels.

Figure 3.3. Promotions and inflation, by shopping format



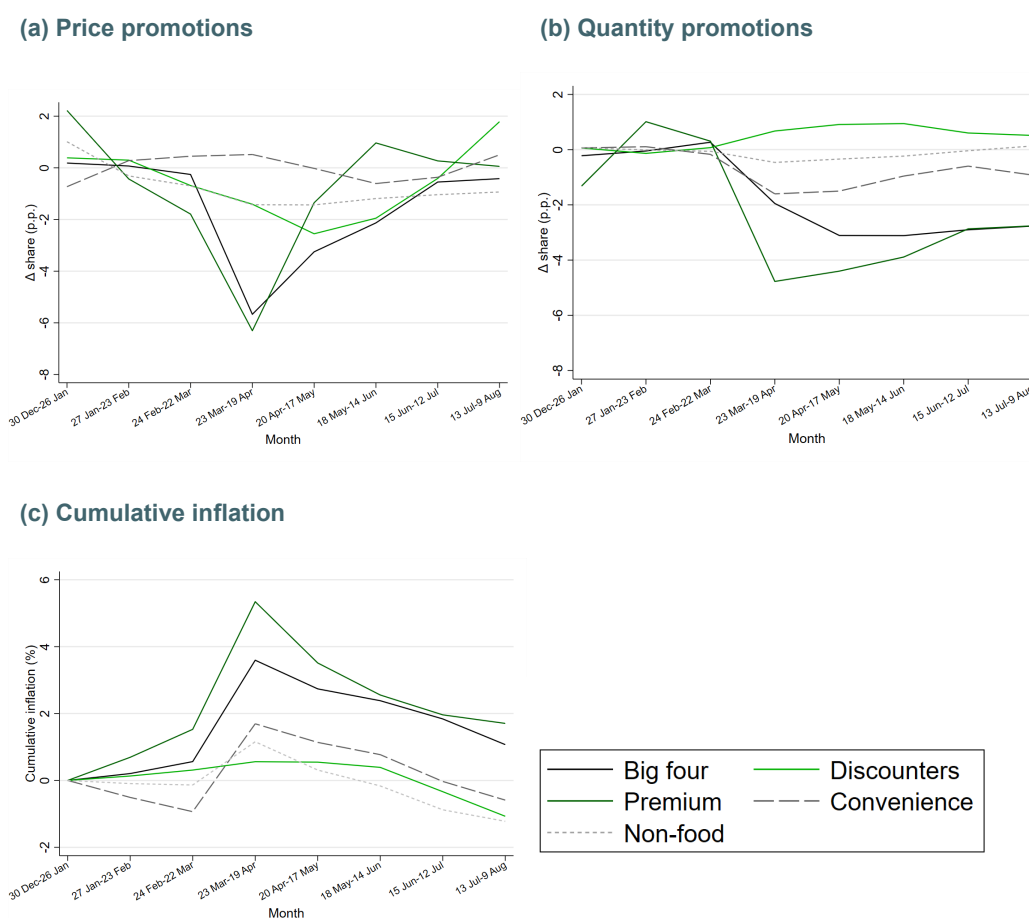
Note: Panels (a) and (b) show the share of transactions that involve a price and a quantity promotion; changes are measured in percentage points from the average over the period from 30 December 2019 to 22 March 2020. Panel (c) shows cumulative monthly inflation based on a chained Fisher price index.

Source: Authors' calculations using Kanter FMCG Purchase Panel data.

Retailer type

We also classify transactions, based on the retailer type in which they took place, into the following categories: (i) 'big four', which refers to transactions that took place with one of the dominant full-line UK supermarkets (Asda, Morrisons, Sainsbury's and Tesco); (ii) 'discounter', which refers to transactions that took place in national supermarket chains that focus on providing products at low prices (e.g. Aldi, Iceland and Lidl); (iii) 'premium', which refers to national retailers that focus on high-end products (e.g. Marks and Spencer, Ocado and Waitrose); (iv) 'convenience', which refers to national and local retailers that sell food; (v) 'non-food', which refers to retailers that specialise in non-food produce.

Figure 3.4. Promotions and inflation, by retailer type



Note: Panels (a) and (b) show the share of transactions that involve a price and a quantity promotion; changes are measured in percentage points from the average over the period from 30 December 2019 to 22 March 2020. Panel (c) shows cumulative monthly inflation based on a chained Fisher price index.

Source: Authors' calculations using Kanter FMCG Purchase Panel data.

Figure 3.4 shows that the big four retailers and the premium retailers were key to driving much of the aggregate patterns in promotional activity and inflation. In particular, the decline in price promotions at the start of lockdown and the subsequent recovery of price promotion activity are more pronounced for these retailer types, as is the sustained decline in quantity promotions. In contrast, the discounters and non-food outlets had much lower levels of promotions pre-lockdown and, in level terms, cut back on promotions by less than other retailer types. Figure 3.4(c) shows that the inflationary spike and subsequent deflation were also considerably more pronounced for the big four retailers and the premium retailers than for other retailer types.

Variation across product types

The inflation measures we have presented to this point aggregate across all grocery products (or all those available in a particular retailer type). However, the significant volatility in prices during the pandemic may affect the relative prices of different products. This could occur because panic buying of some product types leads to a surge in demand, followed by depressed demand, which may be reflected in prices. It could also occur if supply disruptions affect product types differently, for instance, as a result of differential exposure to disruption in trade.

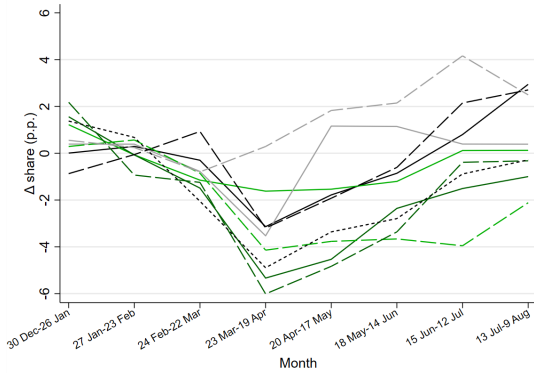
The consequences of big changes in relative prices for grocery products, in addition to affecting consumers' cost of living, are potentially to shift consumers towards more or less healthy products.

In the first two panels of Figure 3.5, we report how the shares of transactions on price and quantity promotions have evolved over time for nine different product types (e.g. confectionery and drinks, dairy, meat, etc.). Figure 3.5(c) shows cumulative inflation for each product type. Because of the significant seasonality in pricing for the product types, we report excess cumulative inflation in 2020 relative to the same period in 2019.

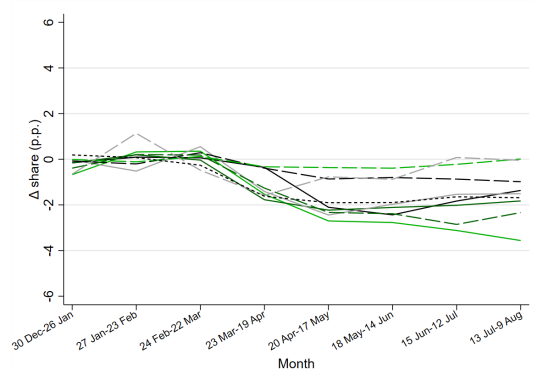
The figure shows that the aggregate patterns are replicated for the majority of product types. While there are some exceptions (e.g. no reduction in price promotions for alcohol at the beginning of lockdown and no reduction in quantity discounts for meat), the pattern of declines in price promotions followed by recovery, sustained declines in quantity promotions and a sharp inflationary spike followed by gradual deflation broadly holds across product types.

Figure 3.5. Promotions and inflation, by product type

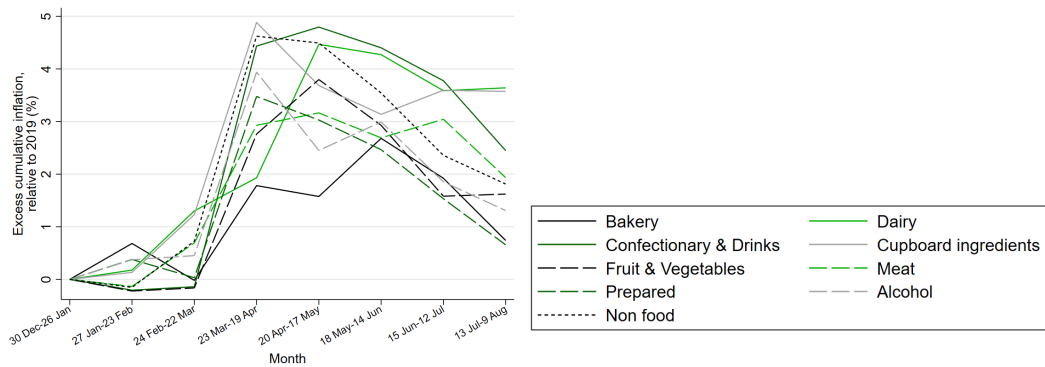
(a) Price promotions



(b) Quantity promotions



(c) Cumulative inflation



Note: Panels (a) and (b) show the shares of transactions that involve a price and a quantity promotion; changes are measured in percentage points from the average over the period 30 December 2019 to 22 March 2020. Panel (c) shows excess cumulative monthly inflation in 2020 relative to 2019, based on a chained Fisher price index.

Source: Authors' calculations using Kanter FMCG Purchase Panel data.

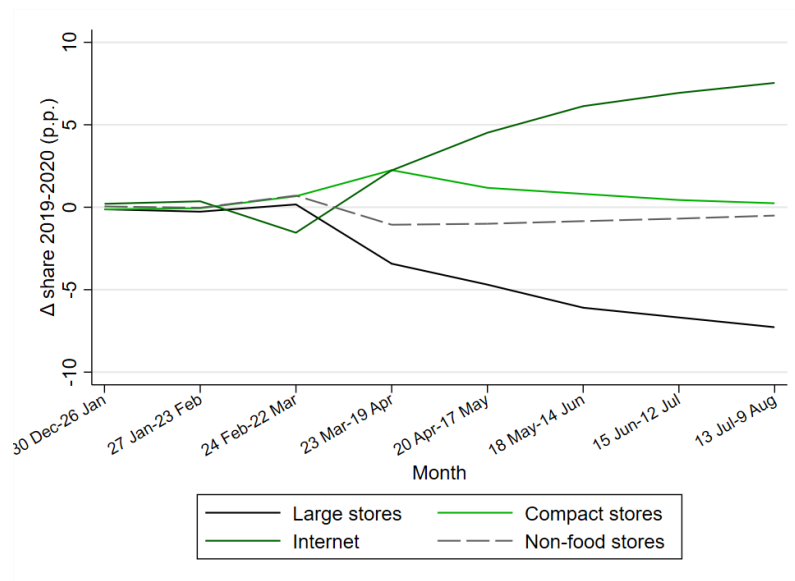
4. Switching across shopping formats

Consumers changed how and where they shop during lockdown. Given that lockdown entailed strict social distancing rules, which led to widespread queuing outside stores, and that people were encouraged to work from home and to shop locally, it is likely that consumers may have switched to online shopping or smaller local stores.

In Figure 4.1, we investigate the switching across shopping formats. For each shopping format – large stores, compact stores, online purchases and non-food stores – it shows the change, in percentage points, in the share of expenditure in the first eight months of 2020 relative to the corresponding month in 2019. In the first month of lockdown, there is an increase in online purchases (of 2.2 percentage points relative to the same period in 2019). This increase continues until the beginning of August; in the final month of data, the share of grocery spending done online is 7.5 percentage points (equivalent to almost 70%) higher than in 2019. There is also an increase in the share of expenditure in compact stores. Large stores exhibit the largest fall in share, and there is a modest fall for non-food stores.

In Jaravel and O’Connell (2020b), we compare the price of a comparable basket of groceries across these shopping formats and show that differences in price levels are modest; in 2019, the online and compact store baskets were about 1% more expensive than the large store basket. The combination of similar price levels and paths of inflation across shopping formats (shown in Figure 3.3(c)), and the fact that the most pronounced substitution occurred after the significant inflation in the first month of lockdown, shows that the switching across shopping formats did not play an important role in driving the path of aggregate inflation.

Figure 4.1. Switching across shopping formats



Note: The figure shows change in expenditure shares in percentage points in 2020 relative to 2019.

Source: Authors' calculations using Kanter FMCG Purchase Panel data.

5. Changes in product variety

Changes in prices affect individuals' cost of living by altering the amount of goods and services they are able to afford with a given level of expenditure. Another channel that influences individuals' cost of living – and therefore living standards – is changes in what goods and services are available. If some goods or service become unavailable, all else equal, this will act to raise the cost of living for individuals who would have otherwise purchased these had they been available. Over lockdown, a range of leisure services temporarily became unavailable, which likely led to a substantial deterioration in the cost of living for some people.

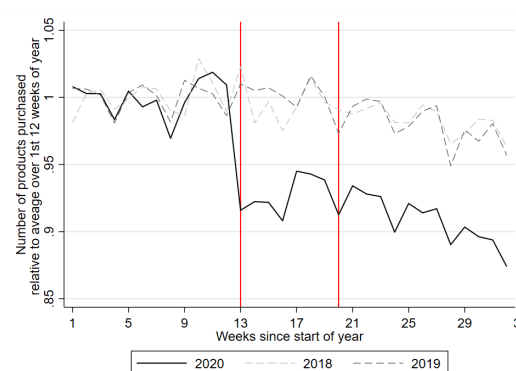
While the grocery sector remained open during lockdown, there was nonetheless a reduction in the set of grocery products available. This fact, documented in Jaravel and O'Connell (2020a), is illustrated in Figure 5.1(a). The graph shows the evolution of unique barcodes sold over time. Prior to the start of the lockdown, and similar to previous years, the number of unique products (i.e. barcodes) sold in each week is stable. However, from the beginning of lockdown, there is a fall of around 8% in the number of products purchased, indicating a reduction in product variety. This reduction persisted until the beginning of August.

The extent to which the reduction in product variety raises the cost of living depends on both the popularity of products that became unavailable and how closely substitutable consumers view alternative products. While the first can be measured directly from data, the second, which depends on consumer preferences, cannot. However, there is a recognised adjustment to the standard inflation measures, which, by making an assumption about consumers' willingness to switch across products, incorporates this product variety channel. In Figure 5.1(b), we plot the evolution of cumulative inflation in 2020, both adjusted for changes in product variety and unadjusted (as in Figure 3.2(a)). It shows that, once product variety

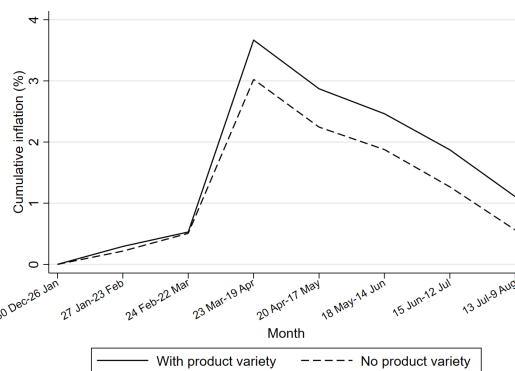
changes are into taken account, inflation in the first month of lockdown is higher.¹ After the first month of lockdown, the cumulative inflation adjustment for product variety remains similar, indicating that there is no recovery from the initial reduction in variety. As shown in Jaravel and O’Connell (2020a), in preceding years, product variety leads to *lower* inflation compared with times when this effect is not taken into account. Therefore, the pandemic not only led to a sharp reduction in product variety at the beginning of lockdown, but it appears also to have led subsequently to less entry of successful new products than in previous years.

Figure 5.1. Product variety

(a) Number of unique products



(b) Inflation adjusted for product variety



Note: Panel (a) shows the number of unique products (i.e. barcodes) purchased. The red vertical lines denote the first week of lockdown and first week when lockdown restrictions began to be lifted. Panel (b) shows cumulative monthly inflation in 2020. The solid line is based on a CES price index adjusted for product variety, based on an elasticity of substitution of 3. The dashed line repeats information from Figure 3.2(a).

Source: Authors’ calculations using Kanter FMCG Purchase Panel data.

¹ The magnitude of the adjustment depends on the assumed value of the elasticity of substitution. Estimates of this parameter vary between 3 (which gives an inflation adjustment of 0.6 percentage points) to 7 (which given an adjustment of 0.2 percentage points). The figure assumes a value of 3. For more details see Jaravel and O’Connell (2020a).

6. Inflation by income group

The preceding analysis documents inflation experienced by the representative household, meaning that the product weights reflect expenditure shares computed across all households in our data. However, because different types of households purchase different products, their experience of inflation will vary.

In this section, we document heterogeneity in inflation across households across a measure of their permanent income, based on their total equivalised expenditure in 2019.² We split households into quartiles and, for brevity, refer to these as ‘spending quartiles’. For each quartile, we compute inflation over the first eight months of 2020. Inflation may differ across quartiles both because of differences in the index weights (spending patterns of rich and poor differ) and because of differences in prices paid.

Figure 6.1(a) plots the evolution of inflation for each spending quartile. It shows that the inflationary spike in the first month of lockdown was experienced by all quartiles. However, there are some differences in the size of the spike across quartiles; for the lowest spending quartile, inflation for the period 23 March to 19 April is 2.2 percentage points, whereas for the middle two spending quartiles it is between 2.4 and 2.6 percentage points, and for the highest quartile it is 2.7 percentage points. Therefore, the poorest households experienced less inflation at the beginning of lockdown than better-off households. This gap between the bottom and top quartiles shrinks subsequently, with cumulative inflation over the period

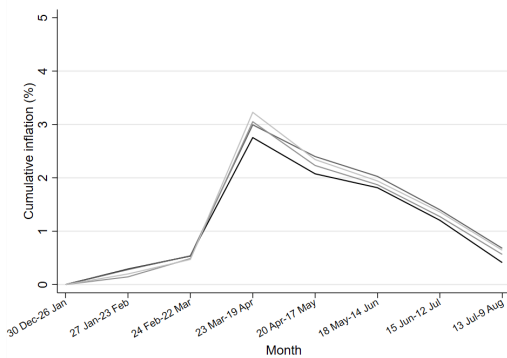
² For each household we compute their total expenditure on fast-moving consumer goods in 2019 and equivalise this using the standard OECD scale. We split households into quartiles of the equivalised expenditure distribution.

being 0.2 percentage points higher for the top quartile relative to the bottom quartile.³

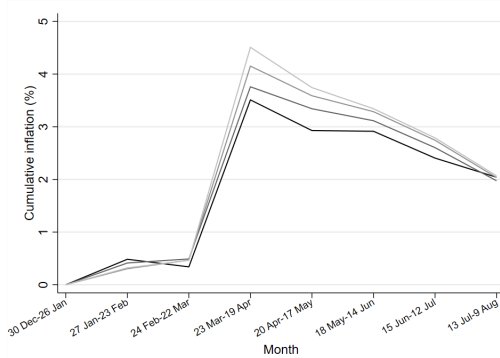
Figure 6.1(b) plots the evolution of inflation once we incorporate the adjustment for changes in product variety. It shows that the change in product variety acted to increase the differential size of the inflationary spike across spending quartiles (with better-off households experiencing more inflation through the product variety channel than less well-off households through April and May). It also shows a subsequent reduction in the gap in inflationary experiences (so that all spending quartiles experienced very similar product-variety-adjusted inflation over the entire eight-month period).

Figure 6.1. Inflation, by expenditure

(a) Inflation



(b) Inflation adjusted for product variety



— 1st (lowest) — 2nd — 3rd — 4th (highest)

Note: Panel (a) shows cumulative monthly inflation based on a chained Fisher price index. Panel (b) shows cumulative monthly inflation based on a CES price index adjusted for product variety, based on an elasticity of substitution of 3.

Source: Authors' calculations using Kanter FMCG Purchase Panel data.

³ We obtain similar results when computing inflation for each quartile, but with common (average) prices. This means that the differences in inflation are mainly driven by differences in the composition of grocery baskets across households.

7. Summary

The onset of lockdown on 23 March 2020 coincided with higher grocery prices. This was driven by a reduction in promotions and was experienced across all broad product types. There was also a reduction in product variety. Higher prices and less product variety resulted in inflation across all household groups, but the inflation was higher for better-off households. By the beginning of August, prices and price promotions had recovered, although a lower level of quantity promotions and product variety had persisted.

On 21 September, the UK Prime Minister announced a reintroduction of restrictions and warned of the possibility of more to come. It remains to be seen whether a slide back into lockdown will result in a return of grocery inflation.

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