

Measuring Real Consumption and CPI Bias under Lockdown Conditions

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The Challenge

- 1. Millions of good and services now unavailable.**
- 2. Unprecedented situation – methods haven't been developed for this situation. Advice defaults to standard treatment of non-available products.**
- 3. Consumer expenditure patterns have clearly changed dramatically yet statistical agency practice is to use expenditure weights from a previous period; these weights are likely to be irrelevant during lockdown conditions.**
- 4. This situation risks the public and policy makers losing confidence in key economic statistics.**

International Advice to National Statistical Offices

Advice from Eurostat to European Union countries on how to calculate the EU's Harmonized Index of Consumer Prices (HICP):

“The compilation of the HICP in the context of the COVID-19 crisis is guided by the following three principles:

- **Stability of the HICP weights,**
- **Compilation of indices covering the full structure of the European version of the Classification of Individual Consumption According to Purpose (ECOICOP),**
- **Minimizing the number of imputed prices and sub-indices.”**

The weights reflect “household consumption expenditure patterns of the previous year.”

Advice is effectively to carry on as usual, as if nothing has happened.

International Advice to National Statistical Offices

UNECE advice is similar, but notes:

“In all cases, it is important to apply imputation methods that ensure the index reaches the correct level when again it becomes possible to collect prices and include them in the index.”

Hence, it provides an explicit explanation for the carry on as usual methodology; i.e., when things return to “normal”, the post lockdown CPI indexes will be comparable to the pre-lockdown CPI index.

IMF advice is consistent with Eurostat and UNECE, but it is more explicit in one respect in that it rules out simple carry forward pricing and endorses inflation adjusted carry forward prices.

Empirical Evidence of Changing Expenditure: From Credit Cards in Spain

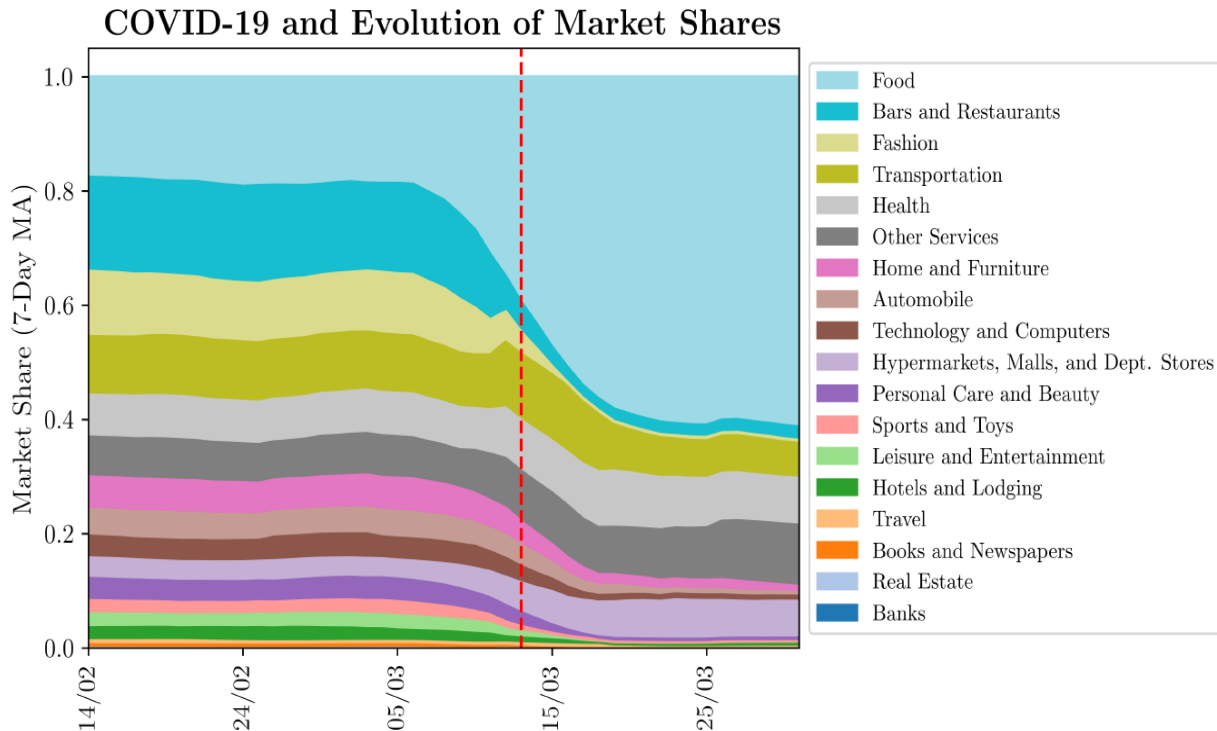
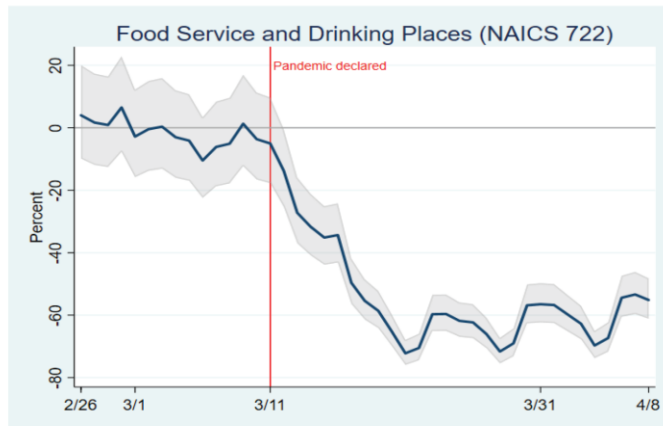


Fig. 7: The evolution of market shares for broad expenditure categories. Categories are stacked top to bottom in order of pre-crisis shares. The red dash indicates the announcement of the lockdown. Shares are expressed as a seven-day moving average.

Carvalho, V.M., J.R. Garcia, S. Hansen, Á. Ortiz, T. Rodrigo, J.V. Rodríguez Mora and J. Ruiz (2020), "Tracking the COVID-19 Crisis with High-Resolution Transaction Data", Cambridge-INET Working Paper Series No: 2020/16, University of Cambridge.

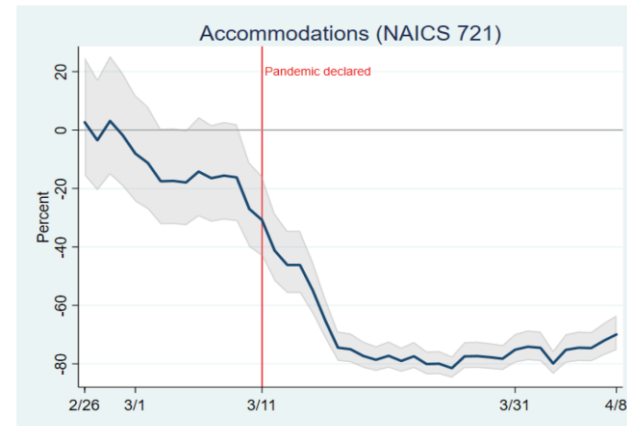
Empirical Evidence of Changing Expenditure: US

Figure 3. Event Study for Restaurants



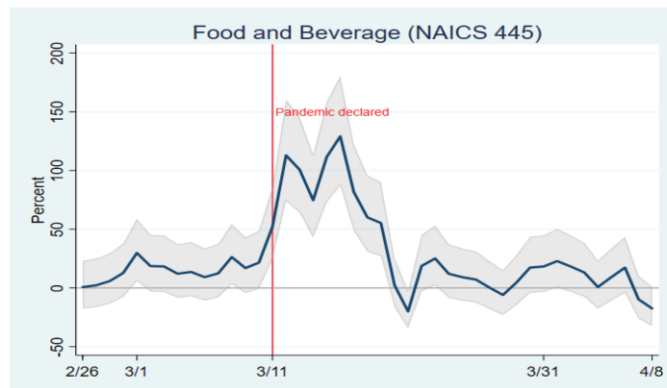
Notes. The estimates shown here have been transformed from log scale to percentages by using the exponential of the point estimate minus one, multiplied by 100. The vertical red line represents March 11, the date on which WHO declared a global pandemic. Deviations away from 0 indicate the change in the sector associated with the timing of the event. The bars represent the 95 percent confidence interval bands around the point estimate.

Figure 4. Event Study for Accommodations



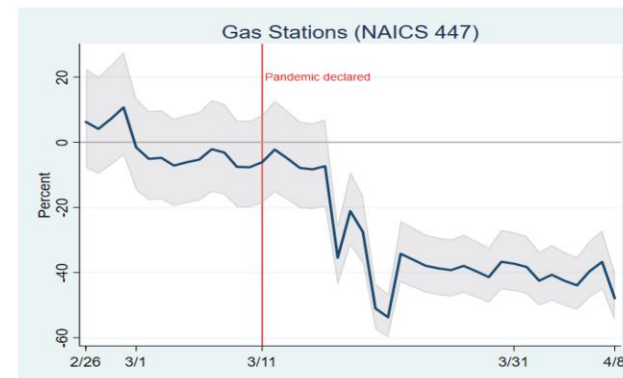
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Figure 5. Event Study for Food and Beverage



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Figure 6. Event Study for Gas Stations



Notes. The estimates shown here have been transformed from log scale to percentages by using the exponential of the point estimate minus one, multiplied by 100. The vertical red line represents March 11, the date on which WHO declared a global pandemic. Deviations away from 0 indicate the change in the sector associated with the timing of the event. The bars represent the 95 percent confidence interval bands around the point estimate.

Dunn, A., K. Hood and A. Driessen (2020), "Measuring the Effects of the COVID-19 Pandemic on Consumer Spending using Card Transaction Data," U.S. Bureau of Economic Analysis Working Paper WP2020-5.

Our Advice

1. In the short run, collect whatever prices are available and supplement these from scanner data and web scraped prices to make up for missing prices due to changes in price collection methodology. For prices which are still missing, **use inflation adjusted carry forward prices**, consistent with current advice from the international agencies.
2. At the same time, put in motion some method for getting current expenditure weights for the consumption basket. This would require either a **continuous consumer expenditure survey** or the use of new sources of data. These new sources could include credit card companies and companies that produce household expenditure data from households scanning barcodes of purchased items (“homescan” data).
3. Once the new consumer expenditure information becomes available, produce **a new analytic CPI**. This would be revisable while the new methodology was developed further. This would supplement the existing CPI, which would likely be heavily compromised due to the treatment of missing prices and use of out-of-date expenditure weights.

Issues Addressed

- 1. Measurement of real consumption.**
- 2. Measurement of the CPI.**
- 3. Advantages and disadvantages of using various “practical” approaches that NSOs are likely to implement, taking into account different levels of data constraints.**
- 4. Construction of elementary indexes with a lack of matching product prices.**
- 5. Other practical measurement problems facing NSOs in CPI construction under pandemic conditions.**

Key Findings

- 1. Using carry-forward prices (either unadjusted or adjusted for inflation) will lead to:**
 - An overestimation of real consumption growth.
 - An underestimation of changes in consumer inflation.
- 2. Fixed basket indexes, such as the Lowe index used in most countries to construct the CPI, are inadequate when there are dramatic changes in consumer expenditure.**
- 3. Need new expenditure weights for the lockdown period. Once the lockdown ends, price change comparisons should be made with the pre-lockdown period using pre-lockdown weights.**
- 4. A revisable CPI is needed.**

Real Consumption and CPI Biases

The problem is how to think about missing prices.

From the economic approach to index number theory, a price index is a ratio of expenditure functions with changing prices but fixed utility.

That is, consumers must have preferences over the same set of products in both periods being compared.

In the context of new goods, Hicks (1940) proposed reservation prices: the prices that drove demand to zero in the period before they are observed.

We adapt this to the disappearing goods context. This approach allows us to identify biases from the carry-forward prices approach.

Real Consumption and CPI Biases

Why reservation prices?

A lockdown is like being sent to jail – deprived of products and confined to a particular place.

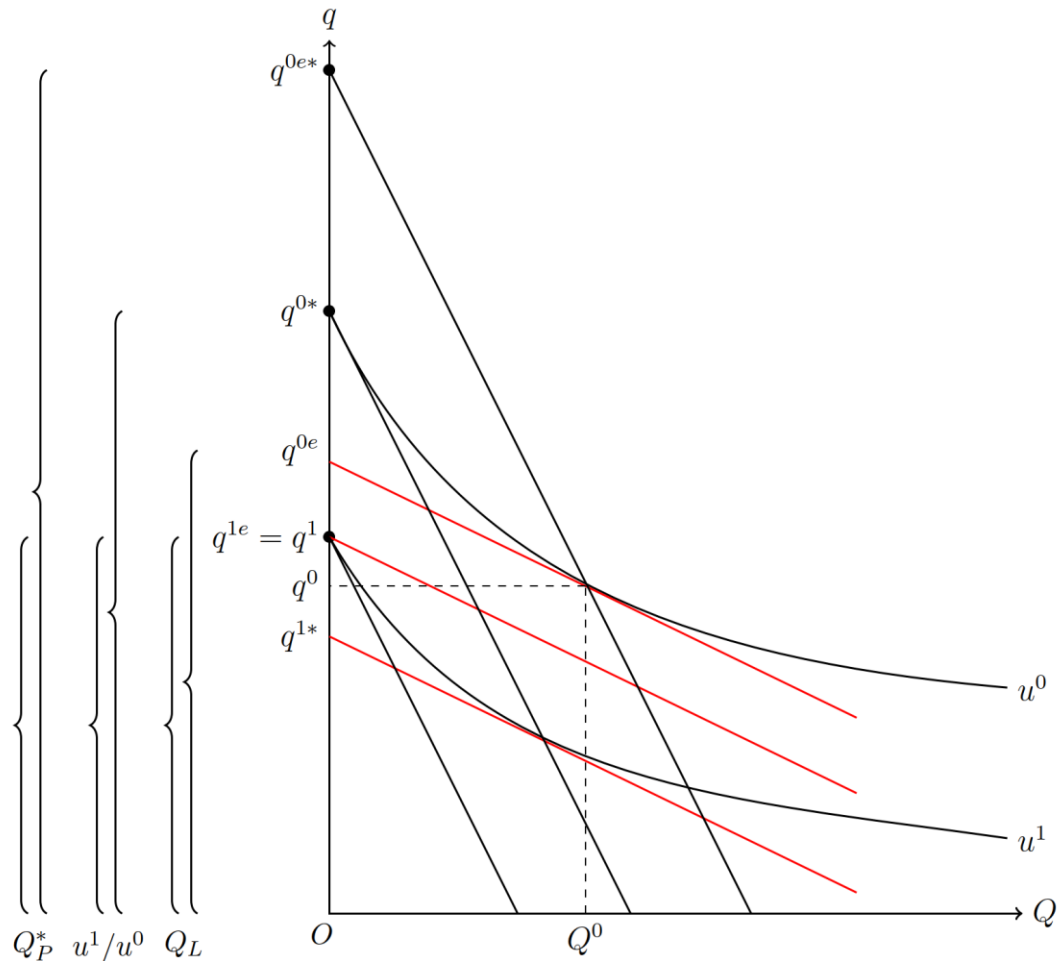
People are prepared to pay a lot of money to avoid jail, indicating that lockdowns decrease welfare.

To capture such declines in welfare, need the prices for unavailable products to be much greater than the corresponding prices in the previous period.

Real Consumption and CPI Biases

- 1. A theoretical quantity index is the ratio of two expenditure functions with prices held constant and utility allowed to change. Hence, it is a measure of welfare change.**
- 2. As (in ratio terms) we want value change = price change x quantity change, then for a fall in welfare (i.e. the quantity index) we need an increase the corresponding price index (as $Q = V/P$).**
- 3. Inflation adjusted carry forward prices will not give this increase.**
- 4. Hence, need reservation prices for the lockdown period, which will be much higher than carry forward prices.**

Real Consumption and CPI Biases



q available in both periods, Q available only in period 0

Some Other Practical Problems Considered

No NSO employee price collection:

- Use web scraping and other non-traditional methods, but need to make sure that only collect prices for products that were actually consumed by any household.

Stockpiling Problem:

- Look at what to do about goods that enter and exit the consumption basket as supply-chain issues/lockdown rules change. That is, products drift in and out of scope. Response may depend on information available.
- CPI is constructed (mainly) on an acquisitions approach rather than a consumption approach – should it be changed to reflect consumption not taking place in the period of acquisition? NSOs will likely stick with acquisition approach. But the assumption of a constant basket equal to a pre-lockdown basket for all post lockdown periods is going to be a rather poor assumption.

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Some Other Practical Problems Considered

Free Dwelling Rent:

- **If there is a policy of rent forgiveness, then these nonpaying tenants are getting free rent.**
- **Propose a methodology for getting reservation prices (Appendix C).**
- **It will typically be difficult to estimate these reservation prices, but either carry forward prices or inflation adjusted carry forward prices can be taken as approximate reservation prices.**
- **In this case, show how changes in price indexes will be dependent on depreciation of properties (i.e. declines in quality).**

Conclusions

NSOs should:

- **Collect whatever prices are available, including from non-traditional sources. For missing prices, use inflation adjusted carry forward prices. (We prefer reservation prices, but acknowledge that NSOs will not be able to calculate these in a timely fashion.)**
- **Urgently start a program to obtain current expenditure weights for the consumption basket.**
- **Produce a revisable CPI as an analytical series that can be updated as new methodology is developed and new data sources are exploited.**
- **Explain to the public and policy makers that the usual measures of real consumption and inflation are compromised due to the pandemic...and seek a big increase in budget to address this!**