



What pandemic inflation tells: Old habits die hard

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ABSTRACT

COVID-19 has led to changes in individuals' consumption habits, which will cause the calculation of inflation based on the average consumption basket to give distorted information. Using debit and credit card spending data of Turkey, we build CPI weights and compute an alternative pandemic consumption basket price index for Jan 2020–Feb 2021. Our findings show that the pandemic inflation is higher than the official inflation rate during the first lockdown, suggesting a behavioral change in consumption. However, in the reopening period, old habits come back. During the second lockdown, the difference between the pandemic and the official inflation rates is trivial in comparison with the first lockdown.

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1. Introduction

COVID-19 is not only a supply shock but also a *preference* shock. At first glance, aggregate consumption has plummeted during the early stages; however, we observe consumption displacement among sectors when we delve into disaggregated data. Hence, the consumption basket is no longer representative of the COVID-19 period. The consumer price index (CPI) is designed to reflect the cost of living in a country. However, during the pandemic, due to changes in consumers' habits, the adaptation of CPI has been poor, and the information it provided was misleading. This paper uses debit and credit card spending data of Turkey to determine CPI weights and compute an alternative COVID-19 consumption basket price index for Jan 2020–Feb 2021.

Our contribution to the literature is two-fold. Technically, we calculate the cost of living in Turkey by building an alternative consumption basket that reveals individuals' consumption habits during the COVID-19 pandemic. Intuitively, by scrutinizing the underlying reasons for the difference between inflation rates with official and pandemic weights during lockdowns, we attempt to extract information about individuals' consumption behavior.

Several papers focus on the same issue for other countries and using different methodologies. Cavallo (2020) computes CPI weights using U.S. transaction data during the COVID-19 and provides cross-country evidence on inflation rates using U.S. weights.

In most cases, the alternative price index has higher inflation than the official CPI. Similarly, Seiler (2020) shows the existence of COVID-induced weighting bias in Switzerland. For Canada, the findings of Huynh et al. (2020) corroborate with the rest of the literature. Reinsdorf (2020) discusses how the design of the CPI basket is not adequate for events such as COVID-19 due to a change in consumption behavior.

Turkey's COVID-19 safety measures consist of two lockdowns during the analyzed period. The first one is between Mar 2020–May 2020; schools were closed, prayer gatherings banned, restaurants were only allowed to offer take-away service. The government and private sector moved their offices to homes. Turkey went back to normal by June 2020. Hotels and restaurants were open, and controlled public gatherings were allowed. The second lockdown is between Nov 2020–Feb 2021; schools closed again, curfew on weekends announced, restaurants switched to take-away service, home-offices were back. Therefore, Turkey's COVID-19 experience helps us dissect the analyzed period into three sub-periods: initial shock and the first lockdown, the reopening, the second lockdown. This decomposition enables us to identify whether the change in individuals' consumption habits is temporary or persistent.

According to our findings, there is a significant difference between the inflation rates calculated with official and pandemic weights during the first lockdown. Our COVID-19 inflation measure suggests that the first lockdown leads to a behavioral change in consumption. However, the difference disappears during the reopening so that the displacement in consumption did not seem

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Table 1
Matching CPI main groups and card transaction categories.

CPI main group	Transaction category	Pandemic weight		Official weight	
		1st lockdown	2nd lockdown	2020	2021
1-Food & non-alcoholic beverages	Various food	29.62	27.26	22.77	25.94
2-Alcoholic beverages & tobacco	Various food	7.88	6.10	6.06	4.88
3-Clothing & footwear	Clothing & accessory	4.10	5.38	6.96	5.87
4-Housing & energy	Service	15.57	14.18	14.34	15.36
5-Furnishing, household equipment	Furnishing & decoration; Computers, electric & electronic goods	10.47	12.12	7.77	8.64
6-Health	Health, health products, cosmetics	2.58	3.12	2.80	3.25
7-Transportation	Car rental & sales, service, parts; Petrol stations; Airlines; Travel agencies	11.10	12.80	15.62	15.49
8-Communication	Telecommunication	4.45	5.66	3.80	4.64
9-Recreation & culture	Casino; Club, association, social services	2.44	2.04	3.26	3.01
10-Education	Education, stationary	1.96	1.72	2.58	2.28
11-Hotels, cafes & restaurants	Accommodation; Food	3.68	4.09	8.67	5.91
12-Miscellaneous goods & services	Others; Market & shopping centers; Building supplies, hardware, hard goods; Direct marketing; Jewelry; Tax payments; Insurance; Private pension; Contractor services	6.48	5.36	5.37	4.73

Notes. 1st lockdown weights correspond to the March 2020–May 2020 averages, and 2nd lockdown weights correspond to the November 2020–February 2021 averages.

to be permanent. During the second lockdown, the gap reappears between two measures; however, the difference is smaller. The first lockdown was unexpected and unprecedented; thus, individuals change their habits significantly. For example, even though the take-away option of restaurants was present, people preferred home-cooking. On the other hand, in the second lockdown, individuals got used to the situation. The supply disruptions accounted for the trivial difference between official and the COVID-19 inflation rates.

This paper proceeds as follows. Section 2 presents data and methodology for the calculation of the pandemic consumption basket inflation. Section 3 presents the results and concludes.

2. Data and methodology

2.1. Card expenditure data

We use credit and debit card total expenditure data from January 2020 to February 2021 to determine CPI weights and compute an alternative pandemic consumption basket price index. The data is compiled by the Central Bank of the Republic of Turkey taken from POS devices—virtual POS are also included—of all banks operating in Turkey comprising domestic banks and foreign-owned banks. Data excludes cash withdrawals and cash advances by means of credit and debit cards.

To build the pandemic basket, we utilize not-seasonally-adjusted sectoral CPI figures and the expenditure weights of the official CPI basket. The data is provided by the Turkish Statistical Institute (TURKSTAT). Table 1 shows the mapping between the CPI main groups and card transaction categories. There are close matching in six categories, namely *clothing&footwear*, *furnishing&household equipment*, *health*, *transportation*, *communication*, *hotels& restaurants*. For both *food&non-alcoholic beverages* and *alcoholic beverages&tobacco*, we use the category *various food* from card expenditure data. We pair *housing&energy* group with *service* which contains electricity, natural gas, water etc. *Recreation&culture* and *miscellaneous goods &services* are matched with multiple categories.

Card transactions account for approximately 40% of personal consumption spending in 2020, making card spending dynamics a relevant indicator for aggregate demand and providing real-time information about consumption trends. Fig. 1 illustrates the changes in consumption patterns across main categories of goods and services normalized by their corresponding values in January 2020. The shaded areas mark the first and the second lockdowns.

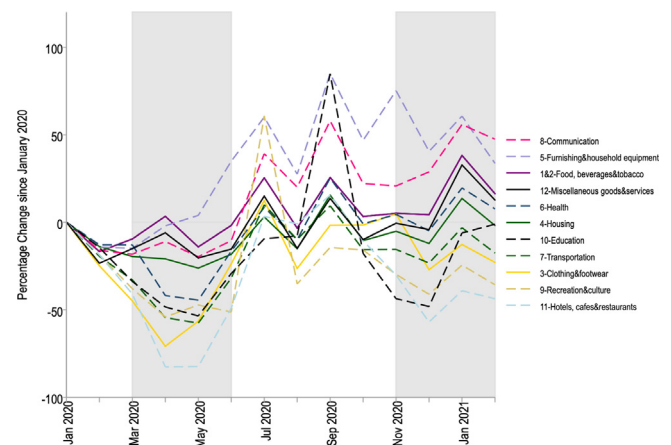


Fig. 1. Changes in consumer expenditure during the pandemic.

2.2. Constructing the pandemic weights

To calculate the expenditure shares in the pandemic basket, we multiply the official CPI weights w_0^j by the average percentage change in the corresponding expenditure category of each month and normalize them as a share of the total. Normalization is necessary to account for falling total spending during the pandemic period. The pandemic weights are given as follows:

$$w_t^j = \frac{w_0^j \Delta e_t^j}{\sum_i w_0^i \Delta e_t^i} = \frac{P_t^j Q_t^j}{\sum_i P_t^i Q_t^i} \quad (1)$$

where P_t^j and Q_t^j are price and quantity of CPI expenditure item j in month t , and $\Delta e_t^j = P_t^j Q_t^j / P_0^j Q_0^j$ is the change in expenditure since January 2020 which is measured by debit and credit card spending amounts. Since w_t^j 's in Eq. (1) are relative weights, the importance of a group in the basket can change even if its expenditure is unaffected.

Table 1 presents the pandemic weights for each category as averages during the lockdown periods. We also report the official weights for the years 2020 and 2021 to compare and discuss



Fig. 2. Turkish consumer inflation with pandemic weights.

whether the weights are updated in accordance with our calculations.¹ In most categories, pandemic weights are higher except for the sectors temporarily closed due to lockdowns. Moreover, official 2021 weights seem to be close to our calculated weights. TURKSTAT determined category weights in normal times by using consumption patterns in two years prior to the calendar year. However, following the EUROSTAT's guidance on the CPI calculation during pandemic, TURKSTAT utilizes the 2020 Household Budget Survey as a reference source to compute 2021 weights, capturing the most recent consumption behavior.

2.3. Constructing the pandemic inflation

We combine two different approaches, chained and Paasche indices, to compute the pandemic inflation by using the pandemic weights. First, we calculate the annual inflation rate with chained-index-weighted average of sectoral inflation rates—as follows:

$$\pi_{t,t-12}^{\text{Chained}} = \sum_j w_t^j \left(\frac{CPI_t^j}{CPI_{t-12}^j} - 1 \right). \quad (2)$$

Next, we calculate Paasche index as in Seiler (2020), using the costs of the current basket at current prices and at earlier prices. We compute the annual inflation rate as the weighted sum of sectoral price indices as follows:

$$\pi_{t,t-12}^{\text{Paasche}} = \left(\frac{\sum_j w_t^j CPI_t^j}{\sum_j w_t^j CPI_{t-12}^j} - 1 \right). \quad (3)$$

The Paasche index completely reflects up-to-date changes in expenditure shifts shown in Fig. 1, which usually causes overweighing the products that become cheaper. However, the consumption displacement during the lockdown periods results from certain goods being unavailable due to supply disruptions rather than relative price changes. Therefore, we smooth any potential methodological biases by constructing the pandemic inflation as a geometric average of these two inflation figures, as shown in Eq. (4).

$$\pi_t^{\text{Pandemic}} = \sqrt{\pi_{t,t-12}^{\text{Chained}} \times \pi_{t,t-12}^{\text{Paasche}}} \quad (4)$$

¹ As an alternative methodology to analyze the mismeasurement of the official inflation, Claeys and Gueta-Jeanrenaud (2021) constructs an ex-post inflation measure by using the weights of the following year. Our approach shares the same logic.

We also calculate the headline CPI inflation using the official weights and sectoral CPIs to obtain a comparable benchmark.

3. Results and conclusion

Fig. 2 plots the inflation rates with pandemic weights and official weights. During both lockdown periods, pandemic inflation is higher than CPI inflation. The difference is most considerable in April, in which the annual rate of the pandemic inflation was 13.11%, compared to 12% of the corresponding official CPI inflation. This finding is at odds with the *substitution bias* which leads inflation to be lower when measured with changing baskets than with fixed baskets due to substituting away from goods whose prices rise disproportionately. During uncertain times such as the pandemic, people tend to buy and stock up necessities, even as relative prices rise. At the beginning of the reopening phase, the gap closes immediately as proof of old habits die hard. Seiler (2020), by focusing on the early impact of the pandemic, had a prediction that consumption behavior would permanently change. However, our evidence shows the opposite. In fact, we expect another deviation from habits after the world goes back to normal. An increase in hedonism and overshooting in consumption is anticipated, leading to another jump in the inflation rate. To sum up, the conventional CPI is not enough to guide policymakers during abnormal times. The policymakers should account for such behavioral changes in consumption. To be precise, they should consider behavioral changes and expectations in CPI calculation instead of retrospective data.

Turkey is an inflation-targeting country with already high inflation before the pandemic. The contraction in the COVID-19 period has tied policymakers up and made it difficult to fight inflation. Hence, the policymakers must distinguish the sources of inflation. If it is due to a temporary change in the consumption behavior, it would be better to conduct *wait-and-see* policy. However, if there is a structural change in it, it would be better to internalize the change in policymaking. Our findings suggest that high inflation in the second lockdown cannot be attributed to the change in individuals' consumption habits.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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