Inflation response to the COVID-19 pandemic and government interventions: Evidence from EU-27

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Motivation

- The COVID-19 pandemic and associated containment measures caused a significant economic downturn, impacting the EU and other nations
- During lockdown periods, the established weighting scheme no longer accurately reflected current consumption habits, leading to a weighting bias in inflation calculations
- Utilizing real-time high-frequency spending estimates, we update consumer basket weights and calculate an alternative price index
- Use high-frequency data sources such as scanner or credit card data to monitor consumer expenditure, a critical need during the rapidly unfolding COVID-19 crisis, where real-time data is paramount but official economic statistics typically suffer from significant delays (Cavallo, 2023)

Literature

- Jaravel (2019) analyzes price scanner data for the US from 2004 to 2015 and finds differences in inflation for highest and lowest quintile income groups
- Kaplan and Schulhofer-Wohl (2017) confirm heterogeneous inflation rates across households in the USA, with higher rates for lower-income, larger, and older households
- Orchard (2022) demonstrates that recessions exacerbate inflation inequality, as households, particularly lower-income ones, shift consumption towards essential goods during downturns, resulting in higher inflation rates for these items
- Baldini (2005) studies inflation's distributional effects on households in Italy, Akkoc and Kizilirmak (2021) for Turkey, Gouvea (2020) for Brazil, Gürer and Weichenrieder (2020) for 25 EU countries, and Rubil et al. (2023) for Croatia
- Günther and Grimm (2007) demonstrate that overlooking inflation inequality distorts perceptions of how much the poor benefit from economic growth
- Aitken and Weale (2020) found that in the UK real equalized household incomes grew by a smaller rate when an alternative price index is used
- Goolsbee (2021) reveals that the poor typically experience higher inflation than reported
- Cavallo (2023) demonstrates that the pandemic shifted consumer spending toward food, driving up prices and inflating the pandemic's true inflation rate
- Artuc et al. (2022) illustrate that the Ukraine war led to poorer households experiencing a more significant decline due to increased food prices and a higher share of food consumption in their budgets
- Ahumada and Hernández (2024) use stringency and economic support indices for OECD countries during the COVID-19 pandemic and find that cash transfers have generated inflation, while debt relief policies worked in the opposite direction, in a sense neutralizing the effect of total economic support measures

Data

- Monthly averages of US consumption patterns since January 2020
- Opportunity Insights (OI) Tracker → transactional data derived from credit and debit card transactions in the US (Chetty et al., 2020)
- Consumption weights from the official Consumer Price Index (CPI) data obtained by Eurostat for the year prior to the pandemic, 2019
- The data spans from January 2020 to December 2023

Aligning price categories

COICOP	OI
Food and non-alcoholic beverages	Grocery
Alcoholic beverages and tobacco	Grocery
Clothing and footwear	Apparel and general merchandise
Housing…	*Unchanged*
Furniture	Total
Health	Health care
Transportation	Transportation
Communication	*Unchanged*
Recreation and culture	Entertainment and recreation
Education	*Unchanged*
Restaurants and hotels	Restaurants and hotels
Other services	Total

Methodology

$$w_t^i = \frac{P_t^i Q_t^i}{\sum_i P_t^i Q_t^i} = \frac{w_{2019}^i \Delta e^i}{\sum_i w_{2019}^i \Delta e^i}$$

- Pit and Qit denote the prices and quantities of CPI category i at time t
- $\Delta e^i = \frac{P_t^i Q_t^i}{P_{2019}^i Q_{2019}^i}$ represents the expenditure change
- The CPI and Covid price indices are computed by aggregating the changes in the official CPI indices by categories using weights in the base and subsequent periods

Data for government responses

- Classification and comprehensive indicators for 27 EU countries using the Oxford COVID-19 Government Responses Tracker (OxCGRT), sourced from ourworldindata.org (Hale et al., 2020a)

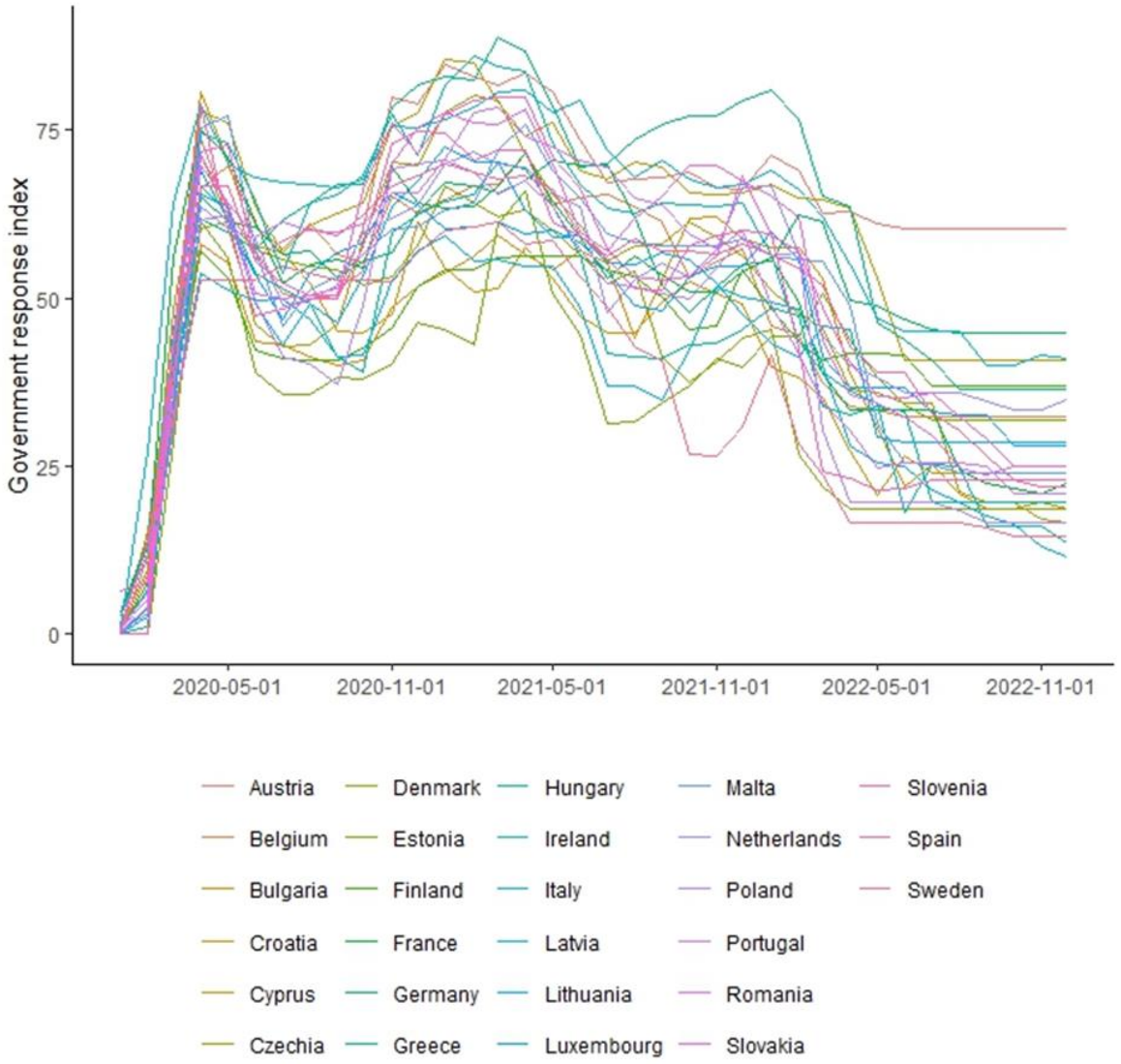
- The OxCGRT categorizes government measures into three domains:

i) containment and closure (school closings, workplace shutdowns, and travel restrictions)

ii) economic response (income support and debt relief)

iii) health systems (public information campaigns, testing policies, contact tracing, healthcare investment, and COVID-19 vaccine initiatives)

EU-27 development of the government response index



Methodology

- Stringency index (ST), containment and health index (CH), economic support index (ES), and overall government response index (GR)
- Four comprehensive indicators are all calculated as simple averages of their individual component indicators
- The scores range from 0 to 100, with higher scores indicating more stringent government responses to the COVID-19 pandemic
- Panel data from 27 countries and monthly values for the January 2020–December 2022 period
- To account for diverse idiosyncratic characteristics, the study adopts the fixed effects regression approach
- The dependent variable: Covid inflation measure (CI)

$$CI_{it} = \beta_1 X_{it} + \mu_i + \eta_t + \varepsilon_{it}$$

Covid and CPI annual inflation for May 2020

	May 2020		
	Covid inflation	CPI	Differential (in percentage points)
Hungary	3.82	2.20	1.62
Luxembourg	-0.15	-1.60	1.45
Romania	2.96	1.80	1.16
Poland	4.51	3.40	1.11
Bulgaria	2.00	1.00	1.00
Slovenia	-0.41	-1.40	0.99
Latvia	0.09	-0.90	0.99
Cyprus	-0.51	-1.40	0.89
Croatia	0.17	-0.70	0.87
Spain	-0.20	-0.90	0.70
Czechia	3.80	3.10	0.70
France	1.09	0.40	0.69
Lithuania	0.89	0.20	0.69
Slovakia	2.77	2.10	0.67
Germany	1.11	0.50	0.61
Finland	0.47	-0.10	0.57
Greece	-0.32	-0.70	0.38
Italy	0.07	-0.30	0.37
Estonia	-1.44	-1.80	0.36
Portugal	-0.26	-0.60	0.34
Sweden	0.41	0.10	0.31
Belgium	0.04	-0.20	0.24
Netherlands	1.30	1.10	0.20
Denmark	-0.02	-0.20	0.18
Austria	0.76	0.60	0.16
Malta	0.80	0.90	-0.10
Ireland	-0.99	-0.80	-0.19

- In 25 out of 27 EU countries, Covid inflation stood above the official inflation rate, reflecting mostly changes in the weights of categories for food and transportation which depicted higher spending/weights and higher inflation for the former category, and lower spending/weights coupled with deflation for the latter
- Hungary is leading the way with the biggest difference in inflation rates that stood at 1.62 percentage points or almost 75 percent of the official inflation rate
- Only two countries, Malta and Ireland, recorded lower Covid inflation, with Malta also being the country with the smallest absolute difference between the Covid and CPI rates
- The negative difference for Ireland stems mostly from the increased weight of the category “Housing” that went through deflation at the time

Results

	Model (1)	Model (2)	Model (3)	Model (4)
Government response index	-0.050*** (0.006)			
Containment and health index		-0.055*** (0.005)		
Stringency index			-0.045*** (0.003)	
Economic support index				-0.010 (0.007)
Fixed effects – country	Yes	Yes	Yes	Yes
Fixed effects – year	Yes	Yes	Yes	Yes
Number of observations	972	972	972	972
Adjusted R-square	0.80	0.80	0.80	0.77

Results

- Three of the four main COVID-19 response indicators are statistically significant in explaining Covid inflation rates
- Once the idiosyncratic country and year characteristics are controlled, we find that the indicators for the government response, containment and health, and overall stringency are of a negative sign and statistically significant at the 1% level, demonstrating that implementing stricter anti-epidemic measures by the government had the potential to reduce inflation rates
- The economic support index is not statistically significant, implying that the financial support measures introduced by the government were not correlated with inflation movements
- The empirical findings indicate that for every one-point increase in the government response index measuring the strength of government containment, closure, health, and economic support policies, there is a corresponding decrease of 0.05 percentage points in the inflation rate
- For example, increasing stringency for 10 points pushes inflation from from 2.0 to 1.5 percent)

Results

	2020				2021				2022			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Government response index	-0.020*** (0.002)				-0.126*** (0.017)				-0.179*** (0.024)			
Containment and health index		-0.021*** (0.002)				-0.113*** (0.015)				-0.180*** (0.023)		
Stringency index			-0.016*** (0.002)				-0.076*** (0.008)				-0.151*** (0.023)	
Economic support index				-0.013*** (0.002)				-0.025* (0.085)				-0.047** (0.018)
Fixed effects – country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects – year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	324	324	324	324	324	324	324	324	324	324	324	324
Adjusted R-square	0.88	0.88	0.86	0.87	0.32	0.45	0.51	0.26	0.51	0.50	0.50	0.16

Results

- When we split the sample by the years 2020, 2021, 2022, the economic support index becomes statistically significant and negative
- Its effect becomes stronger as years go by with the coefficient in 2022 rising to -0.047, similar to the whole-sample effect of other measures
- Other containment measures become stronger towards the end of the sample period, with the stringency index decreasing Covid inflation by -0.15 percentage points, the containment and health index by -0.18, and similarly for the government response index

Conclusions

- The findings of this study have implications for economic policy making, given the crucial role of the official inflation rate
- Our results demonstrate that traditional price metrics have underestimated inflation during the crisis, and therefore led to suboptimal policy responses
- By disclosing this discrepancy, this research aims to enhance the understanding of inflation during periods of economic and social turbulence
- On top of that, using real-time expenditure data could become more mainstream in national statistics, providing more accurate and less biased inflation estimations
- The main limitation of this study is that it relies on US expenditure patterns, so the results must be taken as approximations only
- Also, we did not account for all possible external factors influencing inflation, such as changes in global commodity prices, exchange rates, or supply chain disruptions
- Future research should focus on detecting the underlying mechanisms or causality in exploring the dynamics between government intervention measures and inflation rates to draw definitive conclusions about the effectiveness of specific policy interventions.