MARINA TKALEC
The Institute of Economics, zagreb, Croatia

INFLATION RESPONSE TO THE COVID-19 PANDEMIC AND GOVERNMENT INTERVENTIONS: EVIDENCE FROM EU-27

Abstract:

Consumer expenditure went through major shifts during the COVID-19 pandemic, but these were not reflected in household basket weights used for measuring inflation. Using real-time credit and debit transactions for the US, we update consumer expenditure for 27 EU member states on a month-by-month basis from January 2020 to December 2023. We thereby consider expenditure changes and calculate an alternative measure of inflation—inflation with the Covid consumption basket. We find that the Covid inflation rate in May 2020 is higher than the official CPI in 25 out of 27 countries. Our fixed-effects econometric exercise suggests that government intervention to fight the pandemic tended to decrease the Covid inflation rate, by as much as 0.05 percentage points in the whole sample, and by 0.18 percentage points in the year 2022 alone. Government response, containment and health, and stringency measures were statistically significant in reducing inflation, while economic support measures proved not to be correlated with Covid inflation in the whole sample.

Keywords:

consumption basket; COVID-19; inflation; pandemic

JEL Classification: E01, E21, E31

Introduction[1]

The COVID-19 pandemic and associated containment measures have brought public life to a halt and triggered a significant economic downturn, impacting all EU, and many other nations. Measures enforced by governments throughout Europe, such as workplace and school closures, restrictions on gatherings, public transportation, travel controls, and social distancing regulations, have profoundly influenced consumer spending habits. Many non-essential businesses, including retail stores, restaurants, bars, and entertainment venues, were temporarily closed, while public transportation services operated at reduced capacities. Only essential services like grocery stores, pharmacies, banks, and post offices remained operational, often at reduced capacities (Seiler, 2020). Throughout the lockdown period, consumer spending was severely constrained, and later, when economic support measures were introduced, spending recovered at rates above previously projected.

The consumer price index—official measure for inflation in most countries—relies on expenditure weights that remain constant throughout a given year, and typically reflect consumption in previous years since they rely on household budget surveys that take time to process. The result is an index that manages to track price changes concurrently, but not the consumption patterns. In most cases, this approach is adequate and sufficient, but in times of abrupt changes in consumption patterns, it complicates the interpretation of inflation indices, for example during the COVID-19 pandemic (Tenreyro, 2020). During lockdown periods, the established weighting scheme no longer accurately reflected current consumption habits, leading to a weighting bias in inflation calculations.

Examining the impact of shifting spending patterns on inflation measurement during the COVID-19 crisis in the European Union (EU), this paper investigates the biases induced by such changes. Utilizing real-time high-frequency spending estimates, we update consumer basket weights and calculate an alternative price index, termed Covid inflation. The findings reveal that inflation during the lockdown surpassed official inflation estimates in 93% of our sample. Specifically, the average annual Covid inflation rate stood at 0.84% in May 2020, as opposed to the 0.21% of the official consumer price index. This discrepancy arises mostly from the heightened consumption in the category *Food and non-alcoholic beverages*, which exhibits greater inflationary tendencies compared to other spending categories.

This study contributes to the literature that uses 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). Such data also provide calculation of inflation rates for different household characteristics, namely for income, since consumption weights change not only in turbulent times, but also with income, age, and other socio-economic characteristics (Rubil et al., 2023). The study also adds to the body of research investigating inflation dynamics and potential biases during the COVID-19 crisis. The findings echo the insights of Seiler (2020), highlighting the possibility of a downward bias in consumer price indices due to outdated expenditure weights. Empirical evidence from Jaravel and O'Connell

[1] This work was made as part of the project "Is Croatia's Macroeconomic Convergence Sustainable?" at the Institute of Economics, Zagreb and funded/co-funded within the National Recovery and Resilience Plan 2021-2026 – NextGenerationEU.

(2020), based on UK scanner data documents a surge in inflation during the initial months of lockdown. Similarly, Cavallo (2023) updates consumer basket weights and recalculates inflation for the US, yielding comparable results. Although Cavallo includes a couple of EU countries in his additional calculations, Covid inflation has not been calculated for a majority of EU countries.

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. Addressing this challenge may necessitate leveraging high-frequency and alternative data sources on prices and consumer spending to ensure the development of a more robust and informative consumer price index.

The rest of the paper is organized as follows. Chapter 2 reviews the literature on high-frequency price indices, alternative inflation measures, and causes of higher Covid inflation. This is followed by the description of data sources and outlines of the methodology for measuring consumer weights and constructing the alternative Covid inflation. Chapter 4 presents the results of newly calculated Covid inflation rates for EU-27 and evaluates the impact of containment measures on Covid inflation. Finally, the last chapter provides concluding remarks and policy implications.

Literature review

Several papers that emphasize the role of differing consumption baskets on inflation rates have recently been published. With the availability of more detailed consumption and price data, particularly in the US, the disparities in measured inflation rates among various groups appear to be widening. For instance, 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. Similarly, 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) for example 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. This disproportionately impacts lower-income households, leading to a greater decline in real income compared to wealthier households. Beyond the US, research on inflation heterogeneity extends to other countries. 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.

Neglecting potential differences in inflation may lead to different biases in economic policy. Günther and Grimm (2007) demonstrate, using Burkina Faso as an example, 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 as opposed to the official price index.

Recent research by Goolsbee (2021) challenges the accuracy of the US's official inflation rate, revealing that the poor typically experience higher inflation than reported. In the context of COVID-19 and the Ukraine war, Cavallo (2023) demonstrates that the pandemic shifted consumer spending toward food, driving up prices and inflating the pandemic's true inflation rate. The war in Ukraine further exacerbated inflation inequalities by raising food prices, particularly affecting poorer households. 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.

Cavallo (2023) especially mentions that the rapid shifts in spending habits can introduce notable biases into measures of inflation (Diewert and Fox, 2020). Statistical offices usually update inflation expenditure weights annually, often using outdated survey-based expenditure data. For instance, the Croatian Bureau of Statistics revised weights in 2024 based on expenditure data from 2019. This practice, while customary in stable periods, complicates interpretation of the inflation index during turbulent times (Andersen et al., 2022; Baker et al., 2020; Carvalho et al., 2020; Chetty et al., 2020; Coibion et al., 2020; Dunn et al., 2020; Lane, 2020; Tenreyro, 2020).

Research we mostly rely on in this paper is the one by Cavallo (2023) made for the US, and Seiler (2020) for Switzerland in which they construct Covid consumption baskets based on real-time expenditure data, and then calculate corrected inflation rates. They both find that inflation was higher during the pandemic than reported by the official price index with the difference for both the US and for Switzerland at 0.7 percentage points.

Going beyond pure measurement issues, Ahumada and Hernández (2024) tap into the drivers of Covid inflation rates, and by using stringency and economic support indices for OECD countries during the COVID-19 pandemic, they 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. Additionally, stringency indices appear to have had mixed effects on prices.

Data and methodology

We follow Cavallo (2023) to construct the "Covid Basket," by calculating monthly averages of US consumption patterns since January 2020, as documented in the Opportunity Insights (OI) Tracker[2]. Estimations from the tracker rely on transactional data derived from credit and debit card transactions in the US (Chetty et al., 2020). These estimations of movements in consumption are integrated with the consumption weights from the official Consumer Price Index (CPI) data obtained by Eurostat for the year prior to the pandemic, 2019. Weights for each subsequent month are then recalculated and paired with price indices for the corresponding month, also obtained by Eurostat. The data spans from January 2020 to December 2023.

The challenge in translating consumption data to the CPI lies in aligning the OI categories with the CPI sectoral classification system, COICOP. Here we rely on Cavallo (2023) and his translation that follows the following logic. For "Food and non-alcoholic beverages" and "Alcoholic beverages and tobacco" we correspondingly employ the OI "Grocery" category. OI

[2] More information on website https://opportunityinsights.org/.

category "Food Away from Home" is matched with the category for "Restaurants and Hotels." As for "Other Goods and Services" and “Furniture”, we presume that the changes in expenditure mirror those of the entire OI basket, while for "Housing", "Education”, and “Communication," expenditures remain unchanged. “Clothing and footwear” is matched with the OI category “Apparel and general merchandise”, “Health” with “Health care”, “Transportation” with “Transportation”, and “Recreation and culture” with “Entertainment and recreation”.

Equation (1) presents how Covid weights are determined:

$$w_t^i = \frac{P_t^i Q_t^i}{\sum_i P_t^i Q_t^i} = \frac{w_{2019}^i \Delta e^i}{\sum_i w_{2019}^i \Delta e^i} \quad (1)$$

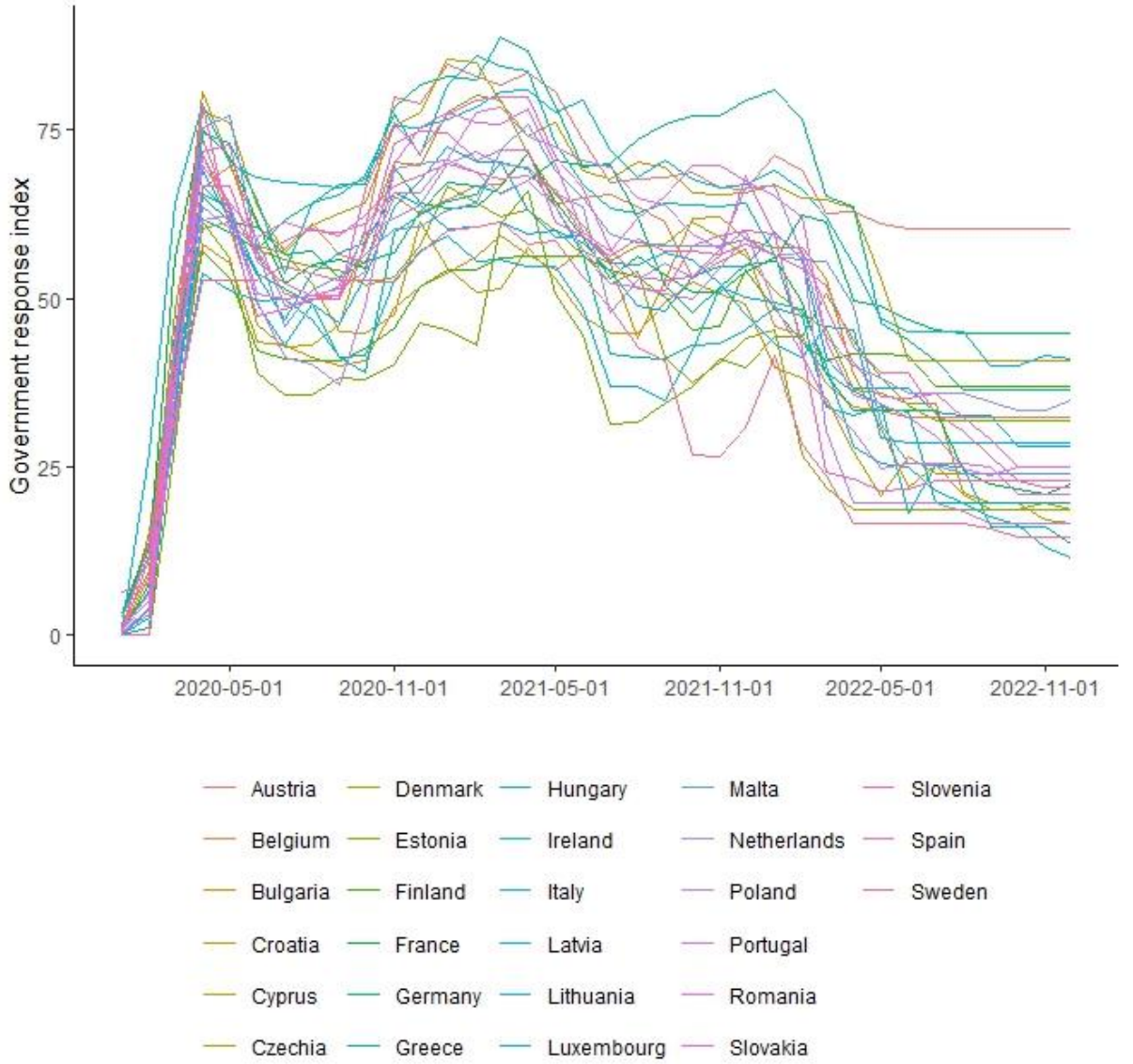
where Pit and Qit denote the prices and quantities of CPI category i at time t, and $\Delta e^i = \frac{P_t^i Q_t^i}{P_{2019}^i Q_{2019}^i}$ represents the expenditure change. The CPI and Covid price indices are computed by aggregating the changes in the official CPI indices by categories using weights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

To investigate the correlation between government responses and Covid inflation, we gather 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: containment and closure, economic response, and health systems.[3] Containment and closure encompass measures such as school closings, workplace shutdowns, and travel restrictions. Economic response indicators include income support and debt relief, while health systems indicators cover public information campaigns, testing policies, contact tracing, healthcare investment, and COVID-19 vaccine initiatives. These indicators vary in type, including both ordinal and numeric measurements.

The comprehensive indicators, which include the stringency index (ST), containment and health index (CH), economic support index (ES), and overall government response index (GR), are all calculated as simple averages of their individual component indicators. For instance, the ST comprises nine response indicators, encompassing all indicators under Containment and closure as well as the H1 indicator from the health systems category which describes public information campaigns. The scores range from 0 to 100, with higher scores indicating more stringent government responses to the COVID-19 pandemic. Figure 1 illustrates the changes in the government response index among the EU-27 countries from January 2020 to December 2022. These various indicators provide a comprehensive measurement of government intervention, enabling a deeper analysis of its impact on Covid inflation through four distinct indices focusing on different aspects.

[3] Classificaton, composition, and variable description can be found in the Appendix.

Figure 1. EU-27 development of the government response index



Notes: The trend of the government response index, whose score ranges from 0 to 100, calculated as monthly averages from daily values. A higher score indicates a more stringent government response to the COVID-19 pandemic. The data spans from January 2020 to December 2022.
Source: Website https://ourworldindata.org/grapher/cOVID-stringency-index.

Table 1 displays the statistical characteristics of the variables used in our econometric research. For the comprehensive indicators, the average government response is 48.11 with a standard deviation of 19.81. This suggests significant variations in efforts across governments, likely influenced by differences in economic size and the severity of the pandemic in each country. A comparison of the mean values of government response, containment and health measures, stringency and economic support reveals that the mean value of economic support exceeds the others. This indicates that the predominant focus of government response policies among various countries is on implementing financial support measures.

Table 1. Summary of descriptive statistics

Variable	Observations	Mean	Standard deviation	Min	Max
Covid inflation rate	972	4.72	4.98	-2.02	25.04
Government response index	972	48.11	19.81	0.00	88.83
Containment and health index	972	47.22	19.19	0.00	89.02
Stringency index	972	40.44	23.72	0.00	95.43
Economic support index	972	54.30	35.66	0.00	100.00

The econometric examination part of the study employs panel data from 27 countries and monthly values for the January 2020–December 2022 period. Utilizing panel data allows for the incorporation of multiple observations to enhance causal interpretation. To account for diverse idiosyncratic characteristics, the study adopts the fixed effects regression approach. Regarding the dependent variable, the study utilizes the newly constructed Covid inflation measure (CI). A set of explanatory variables representing government intervention (X) is used in addition to country-level fixed effects (μ), time-specific effects (η), and error terms (ε) as presented in equation (2).

$$CI_{it} = \beta_1 X_{it} + \mu_i + \eta_t + \varepsilon_{it} \quad (2)$$

Empirical results

Table 2 shows official CPI and Covid annual inflation rates calculated as 12-month changes in percent for May 2020. In 25 out of 27 EU countries, Covid inflation was 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.

Table 2. 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

Notes: Countries are arranged by the size of the difference between Covid inflation and the official CPI; Differential is expressed in percentage points, while the Covid inflation and the official CPI rate are annual rates in percent and 12-month changes.

Covid inflation rates calculated for each country and each month are subsequently used in an econometric exercise to estimate the effect of government intervention on inflation. Four different policy indices obtained from OxCGRT are used as explanatory variables for the dependent variable Covid inflation. Table 3 shows that 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. On the other hand, 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 (e.g., from 2.05 to 2 percent). Results are similar for the other two statistically significant measures.

Table 3. Econometric results of the effect of government measures on Covid inflation, 2020–2022

	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

*Notes: The dependent variable is Covid monthly inflation rate. Clustered standard errors are in parentheses. *** denotes 1% significance levels.*

When we split the sample by the years 2020, 2021, 2022, we get the results presented in Table 4. From there we can see that 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. We can also notice that the 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.

Table 4. Econometric results of the effect of government measures on Covid inflation, by years

	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

*Notes: The dependent variable is Covid monthly inflation rate. Clustered standard errors are in parentheses. ***, **, and * denote 1%, 5%, and 10% significance levels.*

Conclusions and policy implications

The COVID-19 pandemic and associated containment measures disrupted public life and triggered a significant economic downturn globally. Lockdown restrictions and social distancing regulations profoundly influenced consumer spending habits, leading to a notable shift in expenditure patterns. Conventional consumer price indices faced challenges in accurately reflecting real-time consumption shifts during the pandemic. Our study investigates the impact of these shifts on inflation measurement in the EU, revealing a significant discrepancy between official inflation estimates and Covid inflation rates.

Findings underscore the importance of leveraging real-time high-frequency spending data to monitor consumer expenditure during crises. This research contributes to the understanding of inflation dynamics during economic upheavals and advocates for the integration of real-time data into national statistics for more accurate inflation estimations.

Our results also reveal that government intervention measures significantly influenced Covid inflation rates, with stricter anti-epidemic measures correlating with reduced inflation rates. However, the effectiveness of financial support measures in influencing inflation remains inconclusive. Splitting the sample by years highlights that economic support measures gained significance over time, while containment measures exerted a greater influence on Covid inflation rates. These findings offer valuable insights for future policymaking endeavors in managing inflation dynamics during crises.

The main limitation of this study is that it relies on US expenditure patterns, so the results must be taken as approximations only. Also, real-time high-frequency spending data may have limitations in coverage and representativeness, potentially affecting the accuracy of inflation estimations. There are also methodological constraints in the sense that the econometric models to estimate the effects of government intervention on inflation may be subject to endogeneity issues that could impact the robustness of the results or that the study did not account for all possible external factors influencing inflation, such as changes in global commodity prices, exchange rates, or supply chain disruptions, which could have influenced the observed inflation rates. Finally, the analysis focused on a specific period during the COVID-19 pandemic, and the findings may not capture longer-term inflation dynamics or the effects of future crises on consumer spending and inflation.

Future research should focus on detecting the underlying mechanisms or causality in exploring the dynamics between government intervention measures and inflation rates in order to draw definitive conclusions about the effectiveness of specific policy interventions. Further research endeavors could contribute by calculating Covid expenditure weights through the utilization of high-frequency transactional data specific to each country.

References

Ahumada, V. M. C., & Hernández, I. P. (2024). Unit labor costs and inflation in the OECD countries. PSL Quarterly Review, 77(308), 3-22.

Akkoc, U., & Kizilirmak, B. (2021). Household Level Inflation Rates and Inflation Inequality in Turkey. Business and Economics Research Journal, 12(1), 17-32.

Aitken, A., & Weale, M. (2020). A democratic measure of household income growth: theory and application to the United Kingdom. Economica, 87(347), 589-610.

Andersen, A. L., Hansen, E. T., Johannesen, N., & Sheridan, A. (2022). Consumer responses to the COVID-19 crisis: Evidence from bank account transaction data. The Scandinavian Journal of Economics, 124(4), 905-929.

Artuc, E., Falcone, G., Porto, G., & Rijkers, B. (2022). War-induced food price inflation imperils the poor. VoxEU. org, 1.

Baker, S. R., Farrokhnia, R. A., Meyer, S., Pagel, M., & Yannelis, C. (2020). How does household spending respond to an epidemic? Consumption during the 2020 COVID-19 pandemic. The Review of Asset Pricing Studies, 10(4), 834-862.

Baldini, M. (2005). Inflation inequality in Italy. University of Modena and Reggio Emilia, mimeo.

Carvalho, V., Garcıa, J. R., Hansen, S., Ortiz, A., Rodrigo, T., Mora, J. V. R., & Ruiz, P. (2020). Tracking the COVID-19 crisis through the lens of 1.4 billion transactions. VoxEU. org, 27, 9696-9698.

Cavallo, A. (2023). Inflation with Covid consumption baskets. IMF Economic Review, 1-16.

Chetty, R., Friedman, J. N., Hendren, N., & Stepner, M. (2020). Real-time economics: A new platform to track the impacts of COVID-19 on people, businesses, and communities using private sector data. NBER working paper, 27431, 36-46.

Coibion, O., Gorodnichenko, Y., & Weber, M. (2020). The cost of the covid-19 crisis: Lockdowns, macroeconomic expectations, and consumer spending (No. w27141). National Bureau of Economic Research.

Diewert, W. E., & Fox, K. J. (2020). Measuring real consumption and CPI bias under lockdown conditions (No. w27144). National Bureau of Economic Research.

Dunn, A., Hood, K., & Driessen, A. (2020). Measuring the effects of the COVID-19 pandemic on consumer spending using card transaction data. US Department of Commerce, Bureau of Economic Analysis.

Goolsbee, A. (2021, December 30). The Missing Data in the Inflation Debate. The New York Times. https://www.nytimes.com/2021/12/30/opinion/inflation-economy-biden-inequality.html

Gouvea, R. R. (2020). Large devaluations and inflation inequality: evidence from Brazil. University of Massachusetts Amherst Working Paper 2020-05.

Günther, I., & Grimm, M. (2007). Measuring pro-poor growth when relative prices shift. Journal of Development Economics, 82(1), 245-256.

Gürer, E., & Weichenrieder, A. (2020). Pro-rich inflation in Europe: Implications for the measurement of inequality. German Economic Review, 21(1), 107-138.

Hale, T., Petherick, A., Phillips, T., & Webster, S. (2020a). Variation in government responses to COVID-19: version 2.0. Blavatnik School of Government Working Paper.

Hale, T., Webster, S., Petherick, A., Phillips, T., & Kira, B. (2020b). Oxford COVID-19 Government Response Tracker. Blavatnik School of Government. Available from: https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker

Jaravel, X. (2019). The unequal gains from product innovations: Evidence from the us retail sector. Quarterly Journal of Economics, 134(2), 715-783.

Jaravel, X., & O'Connell, M. (2020). Inflation spike and falling product variety during the Great Lockdown. IFS Working Papers, No. W20/17, Institute for Fiscal Studies (IFS), London.

Kaplan, G., & Schulhofer-Wohl, S. (2017). Inflation at the household level. Journal of Monetary Economics, 91, 19-38.

Lane, T. (2020). Policies for the great global shutdown and beyond. Online speech to CFA Society Winnipeg and Manitoba Association for Business Economics, May, 20.

Orchard, J. (2022). Cyclical demand shifts and cost of living inequality. Available at SSRN 4033572.

Rubil, I., Tkalec, M., & Žilić, I. (2023). Recent developments in inflation inequalities in Croatia. In 19th Interdisciplinary Management Research (IMR 2023) (pp. 506-525).

Seiler, P. (2020). Weighting bias and inflation in the time of COVID-19: evidence from Swiss transaction data. Swiss Journal of Economics and Statistics, 156, 1-11.

Tenreyro, S. (2020). Monetary policy during pandemics: inflation before, during and after Covid-19.

Appendices

Table A1 OxCGRT indicators and component indicators

Containment and closure
C1 School closures
C2 Workplace closing
C3 Cancel public events
C4 Restrictions on gatherings
C5 Public transportation
C6 Stay at home order
C7 Restrictions on internal movement
C8 International travel controls

Economic response
E1 Income support
E2 Debt/contract relief for households

Health system
H1 Public information campaigns
H2 Testing policy
H3 Contact tracing
H6 Facial coverings

H7 Vaccination policy

H8 Protection of elderly people

Table A2 Composition of comprehensive indicators

Index	C1	C2	C3	C4	C	C6	C7	C8	E1	E2	H1	H2	H3	H6	H7	H8
Government response index	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Containment and health index	x	x	x	x	x	x	x	x			x	x	x	x	x	x
Stringency index	x	x	x	x	x	x	x	x			x					
Economic support index									x	x						

Table A3 Variable definitions

Variable	Definition	Data source
Price indices	Monthly price index. Year-on-year rates.	Eurostat
Inflation	All-items CPI. Monthly year-on-year rates.	
CPI item weights	CPI item weights classified by the COICOP classification system. 12 categories. Weights are extracted for 2019.	
Government response index	The government response index is derived from eight containment, two economic response, and six health indicators. This index ranges from 0 to 100. Monthly averages.	Oxford COVID-19 Government Response Tracker (OxCGRT) database (Hale et al., 2020b)
Containment and health index	The containment and health index is derived from eight containment and six health indicators. This index ranges from 0 to 100. Monthly averages.	
Stringency index	The stringency index compiles data on social distancing measures (eight indicators encompassing factors such as school and workplace closures, limitations on public events, and travel restrictions) and a measure for public information campaigns. This index is derived from a simple sum of these underlying indicators and is recalibrated to range between 0 and 100. Monthly averages.	
Economic support index	The Economic Support Index is formulated using two indicators: government income support and	

	debt/contract relief for households programs, ranging from 0 to 100. Monthly averages.	