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DETERMINANTS OF INFLATION IN OECD COUNTRIES AFTER THE COVID-19 PANDEMIC

Covid-19 Pandemisi Sonrası OECD Ülkelerinde Enflasyonun Belirleyicileri

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ABSTRACT

High inflation has been prevailing almost in all countries since the Covid-19 pandemic. This paper uses recent data to explore the main drivers of inflation in OECD countries after the pandemic. Our empirical model is estimated with the Ordinary Least Squares (OLS) method applied on cross-sectional data for OECD countries in 2022. The main result confirms that fiscal and monetary expansions during and after the pandemic are strongly associated with high inflation across countries. Another important finding suggests that democracy seems to be an important factor in countries to have less inflation rate. In other words, our study shows that less democratic countries face higher inflation rates. We also find that the government debt to GDP ratio is negatively associated with the inflation rate. Another striking result is that the Covid-19 death toll is linked with lower inflation, causing total demand to reduce due to lockdowns. Specifically, we contribute to the inflation debate by analyzing the political stability with monetary and fiscal growth in the same model.

Keywords: *Inflation, OECD, Covid-19*

ÖZET

Covid-19 pandemisinden sonra neredeyse tüm ülkelerde yüksek enflasyon görülmektedir. Bu makale, son güncel verileri kullanarak salgın sonrası OECD ülkelerinde enflasyonun ana belirleyicilerini araştırmaktadır. Ampirik modelimiz OECD ülkeleri için yatay kesit verilerine dayanan Sıradan En Küçük Kareler (EKK) yöntemidir. Ana sonuç, pandemi sırasında ve sonrasında mali ve parasal genişlemenin ülkeler genelinde yüksek enflasyonla güçlü bir şekilde ilişkili olduğunu doğrulamaktadır. Bir diğer önemli bulgu ise demokrasinin ülkelerin enflasyon oranlarının düşük olmasında önemli bir faktör olduğu yönündedir. Başka bir deyişle, çalışmamız daha az demokratik ülkelerin daha yüksek enflasyon oranlarıyla karşı karşıya olduğunu göstermektedir. Ayrıca, devlet borcunun GSYİH'ya oranının enflasyon oranı ile negatif ilişkili olduğunu da bulunmuştur. Çalışmanın diğer dikkat çeken bulgusu, salgın nedeniyle uygulanan kapanmaların toplam talebi azaltarak enflasyonu düşürmüş olduğudur. Çalışma, parasal ve mali büyüme ile siyasi istikrarı analiz ederek enflasyon tartışmasına katkıda bulunmaktadır.

Anahtar Kelimeler: *Enflasyon, Covid-19, OECD*

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INTRODUCTION

In December 2019, an outbreak of pneumonia of unknown cause was reported in Wuhan, China's Hubei province. The Chinese Center for Disease Control and Prevention identified it as a new coronavirus from lower respiratory tract diseases. Later, the World Health Organization (WHO) named this infection caused by SARS-CoV-2 as Covid-19. The epidemic spread to almost the whole world by showing a serious spread rate in a short time like 3 months. WHO declared on March 11 that the Covid-19 outbreak is a pandemic (Park, 2020). According to Worldometers (2020), as of March 29, 2022, the number of cases worldwide caused by Covid-19 reached about 484 million, while the number of deaths due to Covid-19 reached 6 million. Therefore, the Covid-19 pandemic, which started at the end of 2019 has caused noticeable problems in many areas such as social, economic, psychological, and health all over the world. In this study, we analyze the drivers of inflation in light of the impact of COVID-19.

Since inflation affects both income distribution and purchasing power, it is also important socially as well as economically. There are many studies in the economic literature on the determinants of inflation. When we look at the determinants of inflation, we come across four factors. The first is when the increase in aggregate demand exceeds the increase in aggregate supply, which is called demand-driven inflation. The second is inflation based on monetary factors, that is, inflation resulting from monetary expansion. The third is inflation based on exogenous factors affected by external sources such as nominal exchange rates, foreign interest rates, or any political reasons. A change in the exchange rate may cause a change in the prices of imported goods. Lastly, the fourth factor determining inflation is related to supply-side factors, leading to cost inflation. Here, we can mention that increased wages cause production costs to increase (Özcan, 2014).

This paper contributes to the existing literature by examining inflation during the COVID-19 pandemic utilizing political and main fiscal and political variables. We also include the number of deaths due to covid per million in the population to understand whether it has a role in inflation in OECD countries.

The paper investigates the discussion on inflation and its theoretical reasons mentioned in economics, shedding light on the pandemic (section 1), summarizes the literature review (section 2), and introduces data and the econometric model (section 3). The final part of the article includes the conclusion and discussion of the research, formulating the answers to the research objectives.

1. ACTUAL CHALLENGES IN INFLATION DURING THE COVID-19 PANDEMIC

Despite generally accepted arguments on determinants and types of inflation in the literature, these arguments have changed, or new arguments have been added due to the COVID-19 pandemic. When we talk about the sources of inflation, we usually mean either demand inflation or supply inflation. With the COVID-19 pandemic, this situation has changed, and inflation has increased due to both supply and demand pressures (Lim and Sek, 2015). The crisis brought by the COVID-19 pandemic is beyond the crises we have been accustomed to until now. The most basic feature that distinguishes the Covid-

19 pandemic from other shocks is that it cannot be categorized as a supply or a demand shock. We are faced with a shock that includes both supply and demand shocks. For this reason, while a limited policy is followed by giving weight to the supply side in some sectors, an expansionary policy should be followed due to the contraction on the demand side. While there is an abundance of demand in the face of supply constraints in areas such as food and health, there is a shortage of demand in service sectors such as tourism, cinema, and hotel. This requires policymakers to implement a selective policy that is needed in the sectoral base, not the same policy for all sectors. As a matter of fact, when a policy that increases demand by following an expansionary path in monetary and fiscal policies is adopted, insufficient supply problems will be exacerbated, thus causing famine and inflation. On the other hand, policies that increase supply will be ineffective in restoring activity when applied to demand-constrained sectors (Baqaee and Farhi, 2022). During the pandemic, the fall in total demand and input prices were positive developments in fighting inflation. However, the contraction in supply, especially with the deterioration of the supply chain, had a negative impact on inflation. Under normal conditions, a fall in total demand causes prices to decrease, yet the complications experienced on the supply side caused this fall in prices to be temporary. It becomes difficult to control inflationary pressures due to the imbalance between supply and demand (Erdoğan et al. 2020). The Central Bank of Turkey (CBRT) describes this situation in its 2021-IV Inflation Report as follows: "The pandemic caused both a negative supply shock that has restricted the capacity of economies to produce goods and services at a certain price, and a negative demand shock that reduced the ability of consumers to purchase goods or services at a certain price." (CBRT, 2021). Thus, shrinkage was inevitable in economies, no matter how developed they are.

Apart from the deterioration of the supply chain, we could also count the increase and uncertainty in exchange rates and expansionary policies among the causes of inflation during the pandemic. The climate of uncertainty and fear created by the pandemic has caused investors in developing countries to convert their capital into more reliable currencies. For this reason, an increase in the demand for foreign currency has occurred, causing the national currency to depreciate. The increase in exchange rates and uncertainty also led to higher production costs and thus higher prices. However, almost all countries have implemented expansionary policies to fight the recession and tackle the losses experienced by households during the pandemic. Since the expansionary policy trend experienced globally was not compatible with the increase in production, it led to global inflation (Erdoğan et al. 2020).

The world has become the “Global Village” as Marshall McLuhan (McLuhan, 2014) refers to. The interdependence of countries and economic integration has enlarged today. Hence, economic conditions should not be evaluated independently of global conditions. This situation has become even more evident with the Covid-19 pandemic. Consequently, inflation should no longer be viewed solely because of local economic factors. In this context, a policy that closely follows global developments and reacts instantly to global developments should be adopted in order to ensure price stability (Bayır and Kutlu, 2019).

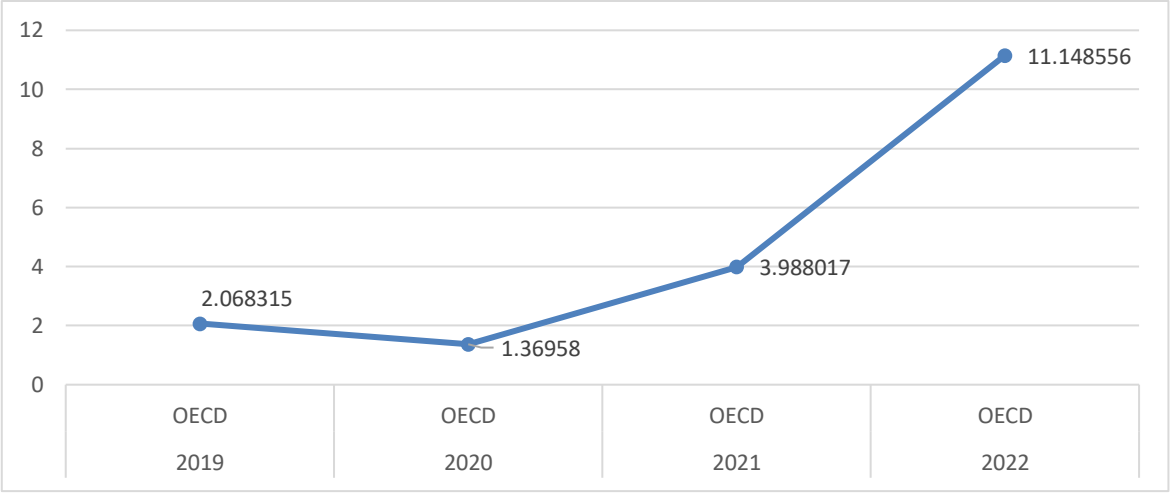

Figure 1: Average Inflation in OECD Countries (%)
Source: OECD, 2022.

Figure 1 presents average inflation rates in OECD countries from 2019 to 2022. As shown in the figure, the average inflation rate in OECD countries was 1.36% in 2020, particularly due to the shock in demand. However, the inflation rate was 2.06% in 2019. The decrease in demand due to the closures during the pandemic also reduced inflation. At the same time, supply-side problems suppressed inflation. In addition, the expansionary policies followed by the governments to compensate for the losses of the citizens during the pandemic also put pressure on demand inflation. Thus, the fall in inflation reversed in the last quarter of 2020 and rose sharply. When we look at the OECD inflation average in 2021, we see a high rate of 3.98%. The average inflation rate in April 2022 is 11.14%, which is the highest rate in decades. Year-on-year inflation in the OECD area rose to 7.2% in January 2022, reaching its highest rate since February 1991. This increase reflected in part another sharp rise in inflation in Turkey. Excluding Turkey, inflation in the OECD area rose to 5.8%, after 5.5% in December 2021 (OECD, 2022). It is obvious that there is general inflation in the world. Very high inflation rates have started to appear in many countries that have not existed in the last 30 years. The biggest factor that prevents governments from fighting inflation is the ongoing effects of the pandemic. As a matter of this fact, the contractionary policies that should be done to curb inflation cannot be implemented due to the losses caused by the pandemic. While the closure of many sectors due to the pandemic has caused damage, the contractionary policies implemented by governments may cause unbearable burdens on the citizens and companies.

2. LITERATURE REVIEW

There exists a bunch of literature on the determinants of inflation, however, we focus on the studies during and after the Covid-19 pandemic in this paper. Some researchers detect an increase in inflation rates after the pandemic compared to previous periods. Among them, Jaravel and O'Connell (2020) conducted an inflation study for the pandemic period between March 23, 2020 and May 17, 2020 in the United Kingdom using a series of different price indices and showed that there was a significant

increase in inflation during the pandemic. A unique increase in inflation was detected, coinciding with the fall in product assortment at the beginning of the quarantine period. For example, in the first month of the quarantine, the inflation rate was 2.4%, 10 times higher than in previous months. As a result of the decline in product diversity, the purchasing power of consumers also declined, resulting in an 85-basis point increase in the cost of living. The study also presents that 96% of households experience inflation.

Similarly, Apergis and Apergis (2021) calculated the inflation expectations and volatility of the Covid-19 pandemic over the US inflation swap rates for January 2, 2019, and July 31, 2020. To do so, they employed the GARCH (Generalized Autoregressive Conditional Heteroskedasticity) model. According to the findings, inflation expectations and volatility are positively affected by the Covid-19 pandemic. Moreover, Yuniarti et al. (2021) employed a one-way (individual-effect) fixed-effects model, using inflation rates from January to July 2020 and monthly positive cases infected per province in Indonesia, to analyze how inflation in Indonesia was affected by the pandemic during the Covid-19 period. According to the results of the analysis, the increase in the number of additional positive cases in Indonesia in the period from January to July 2020 affected Indonesia's inflation. They showed that the reason for this change in inflation is the increase in layoffs during the pandemic period and the implementation of the work-from-home model.

On the other hand, some economists argue that inflation rates may be inaccurate due to miscalculations. In this way, Cavallo (2020) showed that the spending models used to calculate inflation during the Covid-19 pandemic period may be problematic due to the data collected from credit and debit transactions in the US to estimate the impact on the Consumer Price Index to update the official basket weights. Accordingly, the headline and core indices in the US were higher than the Consumer price index during the Covid-19 period in the analysis. Food and health expenditures increased because of the closures and recession in the service sector experienced during the pandemic. Furthermore, there is a disproportion in expenditures between sectors, and the calculated inflation is insufficient to reflect the reality. Therefore, Cavallo (2020) reports calculations for 18 countries between January 2019 and May 2020, and most of his results are in line with those in the US. For example, in the US, in May 2020, inflation with the Covid basket was 0.95%, while CPI-weighted inflation was 0.13%, showing that the inflation basket used in normal times does not reflect reality not truth during the Covid-19 pandemic period. While the consumer expenditures are higher in food and similar products where inflation is high, their expenditures in sectors such as transportation and tourism, where the deflationary effect is experienced, are relatively lower. Finally, one of the study results is that the inflation for low-income earners is relatively higher than that of high-income earners. For instance, in May 2020, annual inflation was 1.12% in low-income households; however, this rate was 0.57% in high-income households.

Gharehgozli and Lee (2022) used a modified vector autoregression (VAR) model to analyze post-Covid-19 structural shocks. This model performed well in predicting future price levels during the pandemic period. The US January 2022 inflation rate was 5.2%, the highest rate of increase in the last

40 years. The model predicted that the quarterly inflation rate could increase to 5.03% in the first quarter of 2022 and 5.45% in the second quarter. It is estimated that inflation could rise to 8.57% unless a tightening monetary policy is implemented. Therefore, they showed that the inflation shock that started in the Covid-19 period was not something temporary.

We also document some papers on the factors determining inflation in countries. For instance, Erdogan et al. (2020) employed spatial panel data analysis for 28 European Union member and candidate countries between January-2020 and July-2020 and analyzed the determinants of inflation during the pandemic period. The empirical findings obtained from the analysis show that changes in the exchange rate and money supply are the primary causes of inflation. Furthermore, the neighborhood relationship between countries affects the inflation of the countries. Accordingly, the study confirms that inflation is affected by developments in neighboring countries and their domestic problems. This fact explains that inflation has spillover effects throughout countries. Lim and Sek (2015) determined the drivers of inflation by dividing countries into two groups as high inflation and low inflation. The study uses data on inflation, money supply, national expenditures, imports of goods and services, and gross domestic product growth of 28 countries between 1970 and 2011. The findings reveal that GDP growth and imports of goods and services have significant long-term effects on inflation in low-inflation countries. In hyperinflationary countries, the growth of the money supply, national expenditure, and GDP are the drivers of inflation in the long run. Furthermore, there is no factor affecting inflation in the short run in the countries where inflation rates are high, while variables have a significant effect on inflation in low inflation countries.

Özcan (2014) investigates the sources of inflation using the GMM dynamic panel data estimation based on 44 developing countries between 2000 and 2009. According to the analysis, inflation inertia, excess money supply, current account deficit, trade openness, and increases in the nominal exchange rate cause inflation to accelerate. Finally, the analysis provides evidence that workers' incomes do not put pressure inflation.

In the light of the foregoing discussion, Coibion et al. (2020) conducted a survey with more than 10,000 participants. The survey measures how the different timing of quarantines due to Covid-19 have affected the spending and expectations of households. Half of those surveyed report a loss of income due to the pandemic. Moreover, they expect lower inflation and higher uncertainty in the future. The analysis also suggests some policies to alleviate the recession during the pandemic. The survey predicts that many households have defaulted on debt payments, which will create a wave of bankruptcy. It would be beneficial for policymakers to consider less traditional measures such as long-term fiscal incentives and debt forgiveness to avoid negative situations such as hysteresis.

Amani et al. (2023) examined the data from 36 OECD member countries to examine inflation during the Covid-19 period. For this reason, they used monthly data on Covid-19 and inflation rates from February 2020 to August 2021. The method used in the study is the quantile panel regression analysis. A dual result was obtained in the study. The first effect; the increase in deaths due to Covid-19

led to a decline in the inflation rate, which in turn halted economic activity due to labor restrictions. On the other hand, there is a conclusion that the economic uncertainty caused by Covid-19 may increase inflation.

Dunn et al. (2020) used card transaction data to analyze the impact of the Covid-19 pandemic on consumer spending. According to the results of the analysis, they determined that there was a contraction of 70% - 80% in service sectors such as accommodation and restaurants. However, on the other hand, it was observed that there was a 100% increase in the food and beverage group. According to the analysis, it was estimated that there was a 13.7% decrease in total spending for March and the rate of this contraction in total expenditures would increase to 27.8% due to the measures implemented due to the pandemic.

Bayır and Kutlu (2019) analyze the domestic and global determinants of inflation during the inflation targeting period of the Turkish economy with the help of ARDL methods using quarterly data between 2003-2018 for the Turkish economy, which has the highest inflation rate among OECD countries in 2022. The findings reveal that global commodity prices, exchange rate, gross domestic product growth and global food prices affect inflation. Moreover, exchange rates, global commodity prices and incomes positively affect inflation in the long run, while global food prices affect inflation in the short run. Accordingly, the result obtained from the analysis is that the impact of global factors on inflation in the 2003-2018 period is undeniable.

3. DATA AND ECONOMETRIC ANALYSIS

3.1. Data

In this section, we introduce the data and the methodology to determine the main drivers of inflation in OECD countries. Following Magazzino (2011), Bordo and Levy (2021), and Desai et al. (2003), we construct our dataset; public expenditure, public debt, and gross domestic product (GDP) growth rate are from the World Bank Data Indicator website. The Democracy index is obtained from the Polity II data set, and the number of covid mortality is taken from the World Health Organization. Finally, the money supply growth rate is taken from the global economy website (www.theglobaleconomy.com), which presents the most recent data on the broad money supply for countries. We use government expenditure and government debt variables as a share of GDP. The Democracy index is constructed by Economist Intelligence Unit (EIU) and ranges from 0 to 10, representing the highest level of democratic level as 10. The number of Covid deaths per million of the population is included in the analysis. Since we tried to focus on drivers of high inflation for the period of the COVID-19 pandemic, we use recently published annual data in 2022 and 2021.

Summary statistics of the variables in the paper are given in Table 1 below.

Table 1: Descriptive Statistics

Variables	Obs	Mean	Std.Dev.	Min	Max
GDP growth rate	38	5.816	2.817	.7	13.5
Government debt	38	78.188	49.916	18.458	254.13
Democracy index	38	8.04	1.058	4.48	9.81
Government expenditure	38	46.153	10.119	22.548	61.783
Covid deaths	38	1806.289	1095.125	11	4487
Money growth	38	9.544	8.464	-3.47	53
Inflation	38	6.072	5.493	0.8	36.1

As shown in Table 1, there are enough variations among variables across countries. For instance, the lowest government expenditure of a country is 22.5 % of GDP, while the highest government expenditure constitutes 61.7 % of GDP in a country. We also observe similar differences in other variables, such as money growth. Turkey has the highest money supply growth and inflation rate, while Costa Rica in South America shrank the money supply by 3.47% in 2021.

3.2. Econometric Analysis and Findings

In this article, we employ the OLS estimation method to determine the factors affecting the inflation rate in OECD countries. With this aim, the constructed econometric model is as follows:

$$Inf_i = \alpha_0 + \alpha_1 GDPgrowth_i + \alpha_2 Govdebt_i + \alpha_3 Govexp_i + \alpha_4 moneygrowth_i + \alpha_5 Democracy_i + \alpha_6 Coviddeath_i + \varepsilon_i \quad (1)$$

Table 2 provides the OLS estimation of equation (1). Table 2 presents two columns in which column (1) shows the empirical findings where government expenditure is included, and column (2) highlights the importance of monetary expansion on inflation.

Table 2: Regression Results

	(1)	(2)
VARIABLES	inflation	inflation
GDP growth	0.497**	0.0421
	(0.214)	(0.138)
Govdebt	-0.0394***	-0.0221***
	(0.00915)	(0.00576)
Govexp	0.135**	
	(0.0633)	
Democracy	-5.056***	-2.142***
	(1.357)	(0.670)
Covid deaths	-0.00264**	-0.000626**
	(0.00108)	(0.000248)
Money growth		0.380***

		(0.0771)
Constant	45.43***	22.29***
	(11.41)	(6.858)
Observations	38	38
R-squared	0.716	0.816

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

According to the results, inflation is positively associated with government expenditure, which results from expansionary fiscal policy. Money supply growth is also a primary driver of inflation in OECD countries. Both coefficients are positive and statistically significant at 5 percent and 1 percent, respectively. Furthermore, government debt is negatively associated with inflation in OECD countries, meaning that countries with lower debt-to-GDP ratio have a higher inflation rate. The empirical findings from the two models provide a very strong relationship between government debt and inflation. Another crucial result from the analysis is that the democracy variable is statistically significant, and its sign is positive, meaning that more democracy brings low inflation in OECD countries. The OECD has thirty-eight members with different cultural, political, and economic backgrounds. In this regard, the impact of the democracy variable on the inflation rate deserves more attention from researchers. The GDP growth rate is statistically significant in the model (1) in which government expenditure is used; however, its significance disappears in the model (2) when we replace government expenditure with the money supply of countries. Therefore, we cannot argue that it is one of the factors affecting inflation during the COVID-19 pandemic. Finally, we included the number of covid deaths (per million people) in the regression. Its sign is negative and statistically significant in both models. This result might be explained by the fact that with an increase in the number of Covid-19 deaths, economic activities decrease because of the business restrictions. To summarize the empirical findings, we explore that democracy, government expenditure, money supply, and the number of covid deaths are the variables strongly associated with inflation rates in countries during the COVID-19 pandemic.

CONCLUSIONS AND DISCUSSION

The coronavirus disease (COVID-19), which was reported in Wuhan, China on the last day of December 2019, has spread rapidly in almost all countries around the world, causing millions of deaths. Countries have implemented lockdowns, including stay-at-home orders, curfews, and quarantines. All these measures naturally have led to economic downturns around the world. As a result of this, the world economy shrank by 3.3% in 2020, according to the World Bank (2022). In response to the COVID-19 pandemic, policymakers have implemented large stimulus packages to deal with economic problems.

Governments have also enacted monetary and fiscal policy packages to tackle economic slowdown. To cushion the economic effects of the coronavirus pandemic, central banks have taken far-reaching monetary policy measures such that The US Federal Reserve has lowered its interest rates and the European Central Bank has expanded its bond purchase programs.

Therefore, this paper endeavored to find the main drivers of inflation, considering expansionary economic policies across OECD countries in 2022. The empirical findings reveal that government expenditure, so the fiscal expansion, and money supply is strongly associated with high inflation rates in countries during the COVID-19 pandemic. This finding is in line with Erdoğan et al. (2020) and Bordo and Levy (2021) who also argued that the money supply is the reason for the increase in inflation in European and OECD countries, respectively. Furthermore, more democratic countries succeeded in mitigating the inflationary pressure in the post-pandemic period, which has parallel findings with Fenira (2014). Finally, the Covid-19 death toll is linked with lower inflation, causing total demand to reduce due to lockdowns.

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