Chapter 7

The Situation of Inflation Hysteresis in OECD Countries: Empirical Evidence

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Abstract

The main objective of this study is to analyze the existence of inflation hysteresis in OECD countries, taking into account the period between 1991 and 2023. The study investigates the existence of inflation hysteresis using both Bai and Ng (2004) PANIC and PANIC Fourier panel unit root tests. The findings generally indicate that inflation hysteresis is not valid for the OECD countries as a group. The panel results of both tests suggest that there is no unit root in the inflation series, meaning that the shocks experienced by inflation rates do not leave lasting effects and return to their equilibrium levels over time.

1. Introduction

Inflation is one of the key indicators of macroeconomic stability. It provides critical information about the direction and pace of price movements in an economy. Ensuring price stability has become one of the primary objectives of modern central banking and macroeconomic policies (Friedman, 1968; Mishkin, 2022). This is because high and volatile inflation negatively affects economic growth by increasing investment uncertainty, leads to inequalities in income distribution, and erodes the purchasing power of the currency (Barro, 1995). In this context, how inflation dynamics respond to inflationary or deflationary shocks is of vital importance for the design of effective monetary and fiscal policies. The question of whether inflation persists with short-term or permanent effects after shocks has been a central topic of debate in theoretical and empirical literature for many years.

The concept of inflation hysteresis, which lies at the heart of this debate, refers to the tendency of inflation, once it has risen, to remain at high levels

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even after temporary shocks have subsided (Azazi et al., 2024). In other words, in the presence of inflation hysteresis, factors such as a temporary supply shock or a decline in demand can permanently alter the long-term natural rate or equilibrium level of inflation. This means that inflation exhibits a "past-dependent" characteristic and, contrary to the temporary effect of shocks assumed in most standard macroeconomic models, inflation's response to shocks may be irreversible (Setterfield, 2009). Mechanisms that could lead to inflation hysteresis include adaptive expectations, wage-price spirals (Taylor, 1980), inflexible structures in labor markets (Blanchard and Summers, 1986), and persistent disruptions in global supply chains. The existence of inflation hysteresis poses significant challenges for monetary policymakers. This is because efforts to reduce inflation can be more costly and have longer-lasting negative effects on economic output (Ball, 1991).

This study aims to empirically examine the existence of inflation hysteresis in OECD countries using data from 1991 to 2023. To overcome the limitations of the existing literature, the study employs the Bai and Ng (2004) PANIC (Panel Analysis of Nonstationarity in Idiosyncratic and Common Components) test, which accounts for cross-sectional dependence in panel data analysis, along with the PANIC Fourier panel unit root test, which has the ability to model structural breaks. These advanced methodologies provide more robust and reliable results by taking into account common factors and nonlinear structural changes that traditional unit root tests may overlook. In addition, the study aims to contribute to the literature by investigating whether inflation hysteresis is valid in OECD countries on a panel basis, as well as revealing differences in inflation dynamics on an individual country basis. The empirical evidence obtained will provide important policy implications for central banks and governments in their strategies to combat inflationary pressures, increase economic flexibility in the face of shocks, and manage expectations.

The remainder of the study is structured as follows: The second section reviews the relevant literature, while the third section details the data set and econometric methodology used in the study. The fourth section presents and discusses the empirical findings. Finally, the fifth section summarizes the results of the study and presents policy recommendations.

2. Literature Review

In the literature, there are generally studies on unemployment hysteresis. Therefore, this section first includes studies that test the validity of unemployment hysteresis, and then addresses studies related to inflation

hysteresis. Due to the very limited number of studies on inflation hysteresis in the literature, this study is expected to contribute to the literature by using Bai and Ng (2004) PANIC and PANIC Fourier panel unit root tests.

Studies on unemployment hysteresis present different findings depending on the countries and methodologies used. Studies conducted specifically on Türkiye have found that unemployment hysteresis is valid. Studies by Bayrakdar (2015) and Tekin (2018) support these findings. Additionally, Karakuş (2025) found that hysteresis is valid for both total unemployment and gender-based unemployment in Türkiye. When looking at other country groups, Eryer and Konuk (2023) state that unemployment hysteresis is valid in G8 countries, while Chang and Lee (2011) confirm the validity of this hypothesis for France, Germany, and Italy among G7 countries.

Similar findings are also present in extensive studies conducted on OECD countries. Özcan (2015) found that hysteresis was prevalent in most of the 20 OECD countries; Khraief et al. (2020) found it in 25 of the 29 OECD countries, Fosten and Ghoshray (2011) found it in all 6 countries, and Marques et al. (2017) found evidence of hysteresis in the United States and all 28 OECD countries. Camarero and Tamarit (2004) found it in 7 out of 19 OECD countries, and Tıraşoğlu (2019) found it in all 31 OECD countries except Poland.

On the other hand, some studies show that unemployment hysteresis is not valid in certain countries and regions. Arı et al. (2015) did not find evidence of hysteresis in their study of East Asian and Pacific countries. Specifically for Latin American countries, Ayala (2012) stated that unemployment hysteresis was not valid in all 16 countries he examined. There are also cases where the hypothesis is not valid among OECD countries; Pata (2020) argues that the hypothesis is not valid in 12 out of 15 OECD countries, while Lee and Chang (2008) were unable to find evidence of the hypothesis in 14 countries.

Compared to comprehensive studies on unemployment hysteresis, the literature directly examining the concept of inflation hysteresis is more limited, and findings may vary. There are studies focusing on inflation hysteresis for the Turkish economy. Öztürk (2021), in his study using monthly inflation data, found that producer and consumer price index series did not return to their previous equilibrium levels after shocks, in other words, he identified the existence of inflation hysteresis. Similarly, Dibooglu and Kibritcioğlu (2001) found that monetary shocks led to permanent increases in inflation in their study covering the 1980-2000 period for the Turkish economy.

On the other hand, there are also conflicting findings regarding the validity of inflation hysteresis. Azazi et al. (2024) investigated the existence of inflation hysteresis in the Turkish economy using goods and services sector inflation data for the period 2003:2-2022:12 and concluded that the increase in inflation rates did not exhibit a permanent feature after appropriate policy adjustments. Similarly, Tunay (2009) analyzed the phenomenon of inflation persistence in Türkiye for the period 1994:1-2007:11 using the ABKBHO model and concluded that inflation persistence was low during this period. This finding suggests that inflation shocks do not leave lasting effects.

This literature review reveals the effects of the concept of hysteresis on macroeconomic variables and, in particular, its controversial nature in the context of inflation. The present study aims to contribute to the body of knowledge in this field by analyzing inflation (GDP deflator annual %) data and inflation hysteresis.

3. Data and Methodology

In this study, inflation data (GDP deflator, annual %) were utilized to test the validity of inflation hysteresis in 38 OECD countries. Since the inflation data to be analyzed could be compiled for the broadest period between 1991 and 2023, the study period was determined accordingly. The data were obtained from the World Bank database.

To test the validity of inflation hysteresis, the study employed the Bai and Ng (2004) PANIC panel unit root test and the PANIC Fourier panel unit root test developed by Nazlıoğlu et al. (2023). The Bai and Ng (2004) PANIC panel unit root test is based on the assumption that the variables in the panel consist of common factors, factor loadings, and unit-specific components. The basic model can be expressed as follows:

$$\gamma_{i,t} = d_{i,t} + \pi_i^{'} F_t + e_{i,t} \qquad (1)$$

In the equation, $\gamma_{i,t}$ represents the observed series for the i-th unit at time t. The term $d_{i,t}$ refers to deterministic components such as constant terms and/or trends that may be specific to each unit. F_t denotes the vector of unobservable common factors that have a common effect on all units in the panel and form the basis of cross-sectional dependence. $\pi_i^{'}$ is the factor loadings matrix that determines the sensitivity of the i-th unit to the common factors or the magnitude of the effect of common shocks on the unit. Finally, the term $e_{i,t}$ denotes the unit-specific error term, which is specific to each unit and time and is adjusted for the effect of common factors. This decomposition enables the test to account for common effects in the data, thereby allowing for a more accurate unit root analysis.

The PANIC Fourier panel unit root test developed by Nazlıoğlu et al. (2023), one of the latest methods of the PANIC procedure developed by Bai and Ng (2004) and Bai and Carrion-I-Silvestre (2009), essentially consists of the use of two different Fourier functions.

$$d_{i,t} = c_i + \gamma_i t + \sum_{k=1}^{m_i} a_{ik} \cos\left(\frac{2\pi kt}{T}\right) + \sum_{k=1}^{m_i} b_{ik} \sin\left(\frac{2\pi kt}{T}\right) \quad (2)$$

$$d_{i,t} = c_i + \gamma_i t + a_i \cos\left(\frac{2\pi k_i t}{T}\right) + b_i \sin\left(\frac{2\pi k_i t}{T}\right) \quad (3)$$

Equation 2 and Equation 3 represent the Fourier functions used. Equation 2 expresses the main equation containing cumulative frequencies, while Equation 3 is a reduced form of the cross-sectional term of Equation 2. The cumulative frequency term *m* in Equation 2 is limited by the cumulative frequency in accordance with the recommendation of Nazlıoğlu et al. (2023) in line with Enders and Lee (2012)'s suggestion that cumulative frequency should be limited due to the tendency to increase conformity. Equation 4 is necessary to eliminate the trend effect of the variables used in Equations 2 and 3.

$$\Delta y_{i,t} = \gamma_i + \sum_{k=1}^{m_i} a_{ik} \Delta\cos\left(\frac{2\pi kt}{T}\right) + \sum_{k=1}^{m_i} b_{ik} \Delta\sin\left(\frac{2\pi kt}{T}\right) + q_{i,t} \quad (4)$$

$$\Delta_{i,t} = \Delta y_{i,t} - \hat{\gamma}_i - \sum_{k=1}^{\hat{m}_i} \hat{a}_{ik} \Delta\cos\left(\frac{2\pi kt}{T}\right) + \sum_{k=1}^{\hat{m}_i} \hat{b}_{ik} \Delta\sin\left(\frac{2\pi kt}{T}\right) + \hat{\pi}_i' \hat{f}_t \quad (5)$$

$$\Delta y_{i,t} = \gamma_i + \beta_i \tilde{S}_{i,t-1} + \sum_{k=1}^{m_i} a_{ik} \Delta\cos\left(\frac{2\pi kt}{T}\right) + \sum_{k=1}^{m_i} b_{ik} \Delta\sin\left(\frac{2\pi kt}{T}\right) + \pi_i' \hat{f}_t + \sum_{s=1}^{p_i} c_{is} \Delta\tilde{S}_{i,t-s} + v_{i,t} \quad (6)$$

After completing the process of removing trend effects from the variables, the residual values are determined using Equation 5. Then, the outputs obtained from Equations 4 and 5 are combined, and Equation 6 is used to calculate the final trend-free residual values.

$$x_i = B_i \alpha_i + f \pi_i + z_i \quad (7)$$

$$P = -2\sum_{i=1}^{N} ln\tilde{p}_i \rightarrow X_{2N}^2 \quad (8)$$

Equations 7 and 8, formulated based on the approaches proposed by Maddala and Wu (1999) and Choi (2001), are applied to determine the probability values for each country unit and the panel as a whole. The $\tilde{p}_i$ and $\tilde{\tau}_i$ in the equation are the p values of the test statistic. The P statistic is designed for fixed N panels.

4. Empirical Findings

In this section of the study, descriptive statistics for the inflation variable are first presented, followed by an interpretation of the results of the Bai and Ng (2004) PANIC panel unit root and PANIC Fourier panel unit root tests performed for the inflation variable. The analysis concludes that inflation hysteresis is valid if inflation rates do not return to their previous levels after an extraordinary event such as a shock.

Table 1: Descriptive Statistics

Country	Australia	Austria	Belgium	Canada	Chile	Colombia
Mean	2.748937	2.056396	2.070843	2.212504	6.244923	10.12559
Median	2.711442	1.819938	1.90887	1.740738	4.828192	6.386803
Maximum	7.175534	6.647653	6.84398	7.664865	21.39098	33.67537
Minimum	-0.66316	0.219323	0.476638	-2.32492	0.311133	1.481725
Std. Dev.	1.996604	1.216915	1.225748	1.940059	4.653559	8.355744
Skewness	0.346601	1.887935	2.03425	0.861216	1.294885	1.198654
Kurtosis	2.521391	7.823599	8.463159	5.361989	4.682999	3.441018
Jarque-Bera	0.975695	51.5959	63.79834	11.75042	13.11667	8.169681
Probability	0.613947	0	0	0.002808	0.001418	0.016826
Sum	90.71492	67.86106	68.33782	73.01263	206.0825	334.1445
Sum Sq. Dev.	127.5656	47.38824	48.0787	120.4425	692.9797	2234.191
Observations	33	33	33	33	33	33
Country	Costa Rica	Czechia	Denmark	Estonia	Finland	France
Mean	10.44631	5.675192	1.843887	40.30778	1.875324	1.535055
Median	9.720938	3.115181	1.687445	5.539173	1.64467	1.221816
Maximum	64.77469	36.19239	9.096966	873.6429	5.449434	5.303572
Minimum	-0.08792	-0.48513	-3.78892	-0.38763	-0.08136	0.105961
Std. Dev.	11.14004	7.175389	1.876222	151.9225	1.257503	1.007053
Skewness	3.604399	2.698503	1.001062	5.234661	0.739246	1.667791
Kurtosis	18.37803	11.36124	9.979705	29.18174	3.448619	7.114756
Jarque-Bera	396.6196	136.1772	72.49657	1093.249	3.282394	38.57881
Probability	0	0	0	0	0.193748	0
Sum	344.7283	187.2813	60.84828	1330.157	61.88569	50.65683
Sum Sq. Dev.	3971.218	1647.559	112.6467	738574.3	50.60207	32.45295
Observations	33	33	33	33	33	33
Country	Germany	Greece	Hungary	Iceland	Ireland	Israel
Mean	1.848129	4.064055	9.76421	4.663743	2.576469	4.185792
Median	1.499309	2.968811	5.443677	4.015888	2.435151	1.93993
Maximum	6.142917	19.78774	35.71544	12.13528	8.908451	20.12977
Minimum	-0.34381	-1.96032	1.320472	0.491863	-4.6246	-0.52347
Std. Dev.	1.533921	5.087519	8.526067	2.811517	2.915131	4.673682
Skewness	1.555884	1.402931	1.296235	0.970495	-0.13929	1.597496
Kurtosis	5.093967	4.576747	3.942653	3.263285	3.177263	5.36457
Jarque-Bera	19.34323	14.24361	10.46306	5.275547	0.149916	21.72385
Probability	0.000063	0.000807	0.005345	0.07152	0.927782	0.000019
Sum	60.98827	134.1138	322.2189	153.9035	85.02349	138.1311
Sum Sq. Dev.	75.29325	828.251	2326.202	252.9482	271.9356	698.9859
Observations	33	33	33	33	33	33
Country	Italy	Japan	Korea Rep.	Latvia	Lithuania	Luxembourg
Mean	2.517795	-0.06605	2.890959	40.92595	51.41898	3.033555
Median	2.215891	-0.35438	2.737497	4.316379	3.59301	3.117327
Maximum	7.581329	3.793018	9.141033	932.4946	942.3066	6.609965
Minimum	0.59784	-1.88074	-1.22984	-5.73163	-3.08953	-2.03255
Std. Dev.	1.59266	1.327936	2.489251	162.7014	172.579	1.968045
Skewness	1.248501	1.105263	0.85093	5.224908	4.483119	-0.36122

Kurtosis	4.513087	3.91456	3.343586	29.07061	23.07915	3.222529
Jarque-Bera	11.72112	7.868913	4.144775	1084.703	664.9028	0.785716
Probability	0.00285	0.019556	0.125885	0	0	0.675125
Sum	83.08724	-2.17956	95.40164	1350.556	1696.826	100.1073
Sum Sq. Dev.	81.17007	56.42926	198.2839	847096.2	953072.5	123.9424
Observations	33	33	33	33	33	33
Country	**Mexico**	**Netherlands**	**New Zealand**	**Norway**	**Poland**	**Portugal**
Mean	10.1482	2.237958	2.389268	3.936749	9.56703	3.366406
Median	6.107154	2.064624	2.068417	2.860823	3.887648	2.966345
Maximum	42.86762	7.343743	5.587088	28.16182	55.25599	11.44603
Minimum	1.703883	0.242656	-0.18964	-10.6192	0.082862	-0.3764
Std. Dev.	9.822024	1.541604	1.428112	7.187933	13.33363	2.663501
Skewness	2.113253	1.495558	0.476311	1.319036	1.983558	1.391991
Kurtosis	6.769841	5.747303	2.707585	5.960282	6.147804	4.803226
Jarque-Bera	44.1032	22.67987	1.365368	21.6187	35.26418	15.12799
Probability	0	0.000012	0.505259	0.00002	0	0.000519
Sum	334.8905	73.85261	78.84585	129.9127	315.712	111.0914
Sum Sq. Dev.	3087.109	76.04934	65.26412	1653.324	5689.141	227.0157
Observations	33	33	33	33	33	33
Country	**Slovak Republic**	**Slovenia**	**Spain**	**Sweden**	**Switzerland**	**Türkiye**
Mean	5.35473	14.81801	2.786586	2.269151	0.742172	38.10777
Median	2.985363	4.200251	2.63478	1.832707	0.457544	16.51228
Maximum	34.60714	208.1778	6.935139	8.246789	5.409105	143.6397
Minimum	-1.12257	-0.49147	-0.22069	0.414635	-1.26506	5.446449
Std. Dev.	6.703447	38.70848	2.047203	1.663937	1.294353	36.51637
Skewness	2.705187	4.218826	0.171907	2.013656	1.435466	1.037553
Kurtosis	12.08627	20.66867	2.142395	7.148547	6.20174	3.280557
Jarque-Bera	153.7697	527.1419	1.17383	45.96582	25.42841	6.02907
Probability	0	0	0.55604	0	0.000003	0.049069
Sum	176.7061	488.9942	91.95733	74.882	24.49167	1257.557
Sum Sq. Dev.	1437.958	47947.1	134.1133	88.59798	53.61115	42670.24
Observations	33	33	33	33	33	33

Country	**United Kingdom**	**United States**
Mean	2.730624	2.223656
Median	2.119051	1.974315
Maximum	11.489	7.129481
Minimum	-0.14683	0.616781
Std. Dev.	2.27108	1.206833
Skewness	2.105496	2.231409
Kurtosis	8.183581	9.606226
Jarque-Bera	61.32769	87.39358
Probability	0	0
Sum	90.11059	73.38065
Sum Sq. Dev.	165.0498	46.6063
Observations	33	33

Descriptive statistics on inflation data for 38 OECD countries covering the period 1991-2023 are provided in Table 1. When examining the inflation data for OECD countries, Lithuania (51.41%), Latvia (40.92%), and Estonia (40.30%) stand out in terms of mean inflation rates, while Japan (-0.06%), Switzerland (0.74%), and France (1.53%) stand out with the lowest means. When maximum values are analyzed, it is observed that the highest inflation rate occurred in Lithuania at 942%, while the lowest inflation rate occurred in Norway at -10.61%. These results indicate that inflation dynamics vary across countries. The study continues with panel unit root test results.

Table 2: Bai and Ng (2004) PANIC Panel Unit Root Test Results

	Constant			Constant and Trend		
Country	**ADF**	**Probability Value**	**Lags**	**ADF**	**Probability Value**	**Lags**
Austria	-1.409	0.147	0	0.957	0.897	0
Australia	-1.159	0.22	1	0.348	0.762	1
Belgium	-1.525	0.12	0	0.941	0.895	0
Canada	-1.251	0.19	1	-3.066***	0.005	0
Chile	-1.982**	0.05	0	-1.556	0.113	0
Colombia	-1.003	0.275	1	-0.586	0.44	1
Costa Rica	-0.674	0.403	0	-0.639	0.417	0
Czechia	-2.765***	0.007	0	-2.018**	0.045	0
Denmark	-0.554	0.453	1	-0.784	0.36	1
Estonia	-2.086**	0.04	0	-1.53	0.12	0
Finland	-0.89	0.318	1	0.354	0.765	1
France	-1.687*	0.09	0	0.895	0.887	1
Germany	-2.22**	0.03	0	0.903	0.887	0
Greece	-1.25	0.19	0	-1.217	0.2	0
Hungary	-1.303	0.175	0	-1.285	0.18	0
Iceland	-1.498	0.125	0	-0.696	0.395	0
Ireland	-2.388**	0.02	0	-0.879	0.323	1
Israel	-0.879	0.32	1	-0.115	0.615	1
Italy	-1.676*	0.09	1	0.189	0.715	0
Japan	-1.734*	0.08	0	0.268	0.74	0
Korea Rep.	-2.684**	0.01	0	-1.363	0.158	0
Latvia	-1.018	0.268	1	-0.392	0.512	1
Lithuania	-1.423	0.142	0	-1.056	0.255	0
Luxembourg	-0.656	0.41	1	-0.765	0.367	1
Mexico	-1.382	0.152	0	-1.117	0.233	0

Netherlands	-1.377	0.155	0	0.776	0.865	0
New Zealand	-2.291**	0.025	1	-1.311	0.172	1
Norway	-1.372	0.158	1	-1.235	0.195	1
Poland	-0.851	0.333	1	-0.181	0.593	1
Portugal	-1.076	0.247	0	-1.252	0.19	0
Slovak Republic	-1.092	0.242	0	-1.55	0.115	0
Slovenia	-1.643*	0.098	0	-1.703*	0.085	0
Spain	-1.305	0.175	1	-0.557	0.45	1
Sweden	-1.989**	0.048	0	0.93	0.892	0
Switzerland	-2.438**	0.018	0	-2.07**	0.04	0
Türkiye	-2.199**	0.03	0	-2.67**	0.01	0
United States	-2.078**	0.04	0	0.222	0.725	0
United Kingdom	-1.549	0.115	0	-0.228	0.575	0
Panel Results	**Statistic**	**Prob. Value**		**Statistic**	**Prob. Value**	
P	171.705***	0		98.457**	0.043	
P_m	7.763***	0		1.821**	0.034	

Note: *, ** and *** Critical values indicate 10%, 5% and 1% significance level, respectively.

Table 2 presents the results of the PANIC panel unit root test for the inflation (GDP deflator, annual %) data of 38 OECD countries for the period 1991-2023. Countries that are significant at the 1%, 5%, or 10% level in at least one of the stationary or stationary and trend models, in other words, countries where inflation hysteresis is not valid, are highlighted in bold. In Table 2, the stationarity analysis is presented separately for both fixed-term and fixed-term and trend models. When examining the panel results, it is observed that the probability values of the test statistics for both fixed-term and fixed-term and trend models are statistically significant. Thanks to these significance levels, it has been concluded that inflation does not contain a unit root across the panel and that inflation hysteresis is not valid. This situation can be interpreted as the inflation rates not having lasting effects from the shocks they experience, returning to equilibrium levels over time.

When examining individual country results, considering the probability values obtained from fixed-term or fixed-term and trend models, it was determined that the inflation series is stationary, in other words, does not contain a unit root, and therefore inflation hysteresis is not valid in a total of 16 countries, including Canada, Chile, Czechia, Estonia, France, Germany, Ireland, Italy, Japan, Korea Republic, New Zealand, Slovenia, Sweden,

Switzerland, Türkiye, and the United States. In other words, these countries do not contain a unit root, and therefore inflation hysteresis does not apply. In these countries, it is understood that the response of inflation to shocks is temporary. In the remaining 22 OECD countries, however, both models indicate that the inflation series is non-stationary, contains a unit root, and that inflation hysteresis is valid.

In conclusion, although the PANIC panel unit root test results of Bai and Ng (2004) show different results due to the presence or absence of hysteresis in inflation dynamics in some countries at the individual country level, they reveal that inflation in the OECD countries group exhibits a more flexible structure in the long term in response to shocks and that inflationary pressures do not create permanent trends.

Table 3: PANIC Fourier Panel Unit Root Test Results

	m=1			*m*=1,2		
Country	**LM**	**Probability Value**	**Lags**	**LM**	**Probability Value**	**Lags**
Austria	-2.9676	0.4254	0	-3.1052	0.7453	0
Australia	-5.0093**	0.011	0	-4.3377	0.1856	3
Belgium	-4.1312*	0.0603	1	-4.1448	0.2673	1
Canada	-4.5495**	0.0292	0	-4.9223*	0.0851	0
Chile	-4.0359*	0.072	1	-5.3216**	0.043	1
Colombia	-5.5909***	0.0031	0	-5.608**	0.0275	0
Costa Rica	-2.2907	0.8025	0	-2.4986	0.9519	0
Czechia	-3.132	0.3423	0	-3.2886	0.6578	0
Denmark	-4.3565**	0.0426	0	-5.2155**	0.045	3
Estonia	-2.7546	0.5456	0	-3.7888	0.3885	3
Finland	-3.6424	0.1554	0	-4.7402	0.1067	2
France	-5.0603***	0.0098	0	-5.3175**	0.0452	0
Germany	-3.3108	0.264	0	-3.5714	0.5223	2
Greece	-2.2372	0.827	0	-4.2493	0.2251	2
Hungary	-1.2025	0.9991	1	-5.1224*	0.0599	1
Iceland	-3.7167	0.1363	0	-3.554	0.5262	0
Ireland	-3.3163	0.2619	0	-4.9745*	0.0784	0
Israel	-1.6766	0.9629	3	-4.3349	0.2036	0
Italy	-2.4713	0.7116	0	-2.7644	0.883	0
Japan	-3.7858*	0.0992	3	-4.0438	0.2816	3
Korea Rep.	-3.4147	0.194	3	-4.5105	0.1432	3
Latvia	-4.4531**	0.0354	0	-5.1178*	0.0623	0

Lithuania	0.5606	1	1	-0.1388	1	1
Luxembourg	-2.0191	0.8905	3	-8.6549***	0.0002	0
Mexico	-2.6942	0.5461	3	-1.8727	0.9913	3
Netherlands	-5.2691***	0.0057	1	-4.9612*	0.0781	1
New Zealand	-5.8612***	0.0017	0	-5.6191**	0.0256	1
Norway	-4.0746*	0.0713	0	-4.8545*	0.0945	0
Poland	-2.6735	0.5956	1	-3.2396	0.6989	1
Portugal	-3.1092	0.3177	3	-2.9105	0.8201	3
Slovak Republic	-3.1464	0.3305	1	-1.3093	1	1
Slovenia	-2.0297	0.8872	3	-1.6545	0.9963	3
Spain	-2.7768	0.5191	2	-2.9014	0.8236	3
Sweden	-4.6175**	0.021	2	-4.2454	0.2124	3
Switzerland	-1.5818	0.9734	3	-3.437	0.5663	3
Türkiye	-2.8052	0.5153	0	-2.9567	0.8131	0
United States	-2.9003	0.4613	0	-3.1749	0.713	0
United Kingdom	-2.8962	0.4636	0	-3.0469	0.762	3
Panel Results	**Statistic**	**Prob. Value**		**Statistic**	**Prob. Value**	
P	137.4825***	0		118.4107***	0.0013	
P_m	4.9869***	0		3.44***	0.0003	

Note: *, ** and *** Critical values indicate 10%, 5% and 1% significance level, respectively.

Table 3 presents the results of the PANIC Fourier panel unit root test for inflation (GDP deflator, annual %) data for 38 OECD countries for the period 1991-2023. Countries where at least one of the $m=1$ or $m=1,2$ tests is significant at the 1%, 5%, or 10% level, in other words, countries where inflation hysteresis does not apply are shown in bold. Upon examining the panel results, it is observed that the probability values of the P and P_m test statistics are significant at the 1% level for both the single Fourier frequency ($m=1$) and the two Fourier frequencies ($m=1,2$). These results indicate that in both cases, the inflation series does not contain a unit root, meaning that inflation hysteresis is not valid at the panel level according to the PANIC Fourier panel unit root test results, similar to the PANIC panel unit root test results by Bai and Ng (2004).

When examining the individual country results, considering the probability values of the LM test statistics obtained for both Fourier frequencies, it is determined that the inflation series is stationary (does not contain a unit root) and therefore inflation hysteresis is not valid in a total of 16 countries,

including Australia, Belgium, Canada, Chile, Colombia, Denmark, France, Hungary, Ireland, Japan, Latvia, Luxembourg, Netherlands, New Zealand, Norway, and Sweden. In the remaining 22 OECD countries, it was concluded that inflation hysteresis is valid.

While Bai and Ng (2004) use the PANIC panel unit root test with traditional fixed and trend models, the PANIC Fourier panel unit root test offers a more flexible approach by modeling structural breaks using Fourier series. Although the same number of stationary countries were found in both tests, it was determined that the specific lists of countries identified as stationary differed from each other. This situation shows that different methodologies, the way structural breaks are modeled, or other factors can lead to different interpretations of individual country inflation dynamics.

5. Conclusions and Policy Recommendations

This study investigates the existence of inflation hysteresis in the inflation (GDP deflator, annual %) data of 38 OECD countries between 1991 and 2023, using both Bai and Ng (2004) PANIC and PANIC Fourier panel unit root tests. The primary objective of the study is to analyze whether inflation rates exhibit a persistent response (hysteresis) to shocks at both the panel and individual country levels.

The findings generally indicate that inflation hysteresis does not hold for the group of OECD countries. The panel results of both tests suggest that there is no unit root in inflation series, meaning that shocks to inflation rates do not leave persistent effects and return to equilibrium levels over time. This suggests that the monetary and fiscal policies implemented across OECD countries are effective in combating inflationary pressures and that inflation expectations remain stable in the long term. However, when individual country results are examined, a significant difference is observed. Although both tests identified the same number (16 countries) of inflation series as stationary, the specific lists of stationary countries differed between methodologies. This finding emphasizes that inflation dynamics may have unique characteristics for each country and that different test approaches may exhibit different sensitivities. In the other 22 non-stationary OECD countries, it was concluded that inflation hysteresis is valid, meaning that inflation shocks can have lasting effects in these countries.

In light of these results, some important conclusions can be drawn for policymakers. The fact that inflation in most OECD countries exhibits a flexible structure in response to shocks suggests that central banks can be more flexible and forward-looking in their fight against inflation, while

also suggesting that policies aimed at long-term price stability, such as inflation targeting, are generally successful. However, policymakers need to be more cautious in countries where inflation hysteresis is still observed. This is because deflationary or inflationary shocks can have more lasting effects in these countries. Therefore, it is of great importance for these countries to strengthen inflation expectations more firmly and implement structural reforms such as increasing labor market flexibility and promoting competition to enhance the economy's resilience to demand and supply shocks. Especially in economies where hysteresis prevails, central banks play a critical role in maintaining stable inflation expectations and preventing potential shocks from turning into persistent inflationary pressures by maintaining transparent communication and credibility. Finally, as the study shows, the fact that different unit root tests can yield different results at the individual country level highlights the need for policymakers to adopt a holistic approach when assessing inflation dynamics, rather than relying on a single analytical tool, by considering findings from various methodologies. In conclusion, although inflation dynamics across OECD countries have been found to be resilient to shocks, the inflation hysteresis observed in some countries highlights the need for policymakers in these countries to maintain constant vigilance and adopt unique policy approaches.

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