








“Central bank independence as a prerequisite for ensuring price stability: Modeling the role of the national pattern”

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CENTRAL BANK INDEPENDENCE AS A PREREQUISITE FOR ENSURING PRICE STABILITY: MODELING THE ROLE OF THE NATIONAL PATTERN

Abstract

Ensuring price stability is a dominant function of the central bank. Empirical studies on various statistical samples give conflicting results regarding the influence of central bank independence on the inflation rate. The study offers a methodology for assessing the role of the formation of a national pattern of central bank independence in ensuring price stability. Calculations were made for 53 countries of the world using a combination of cluster analysis tools and panel regression modeling. The cluster analysis carried out at different time intervals of the study allowed defining three patterns of the formation of central bank independence. The changes in the clusters characterizing the peculiarities of the national patterns of central bank independence shows that for a number of countries there is no stable national pattern. Modeling based on panel data showed that when forming a country pattern "Limited level of central bank independence", an increase in the level of independence of the central bank by one unit on average leads to an increase in the inflation rate by 7.09%. On the other hand, in the countries with the national patterns of central bank independence "Dominance of the institutional and financial component of ensuring the independence of the central bank" and "Dominance of the personal and functional component of ensuring the independence of the central bank", the expected consequence of increasing the level of independence of the central bank by one unit is to reduce the inflation rate by an average of 3.32% and 6.03%, respectively.

Keywords

independence, central bank, price stability, inflation, personal independence, functional independence, financial independence, institutional independence

JEL Classification

E31, E58, F30

INTRODUCTION

In the context of dematerialization of production, increasing levels of digitalization and financialization, the importance of financial and price stability is increasing (Melnyk et al., 2021). Price stability is one of the most important macroeconomic factors ensuring the economic growth of countries (Sinaga, 2022; Rizk, 2022). On the other hand, price stability is considered one of the key factors in ensuring macroeconomic stability (Kashcha & Dun, 2022), the growth of credit and investment activity (Olonila et al., 2023), the inflow of foreign direct investments (Tahat, 2022; Tiutiunyk et al., 2022), and currency market development (Kuznyetsova et al., 2017b). Ensuring price stability is the most important function of central banks, which becomes especially important in the context of ensuring the independence of central banks, since the priority of this function established by the provisions of national and international legislation is considered one of the criteria for observing the independence of central banks. Thus, the presence of legislative norms regarding this aspect increases the

freedom of central banks in choosing tools for achieving price stability in the country, even in view of the decrease in its effectiveness in performing other functions. Researchers prove that the effectiveness of implementing the regulatory functions of the state depends on the quality of the management apparatus (Maris, 2022; Bozhenko et al., 2022; Zolkover et al., 2022) and the choice of a set of regulatory tools (Vasylyeva et al., 2014). In addition, Vasylieva et al. (2022) prove that the overall quality of public administration affects the level of central bank independence. It is important that in the conditions of digitalization, price instability is also a prerequisite for the loss of trust in central banks (Koziuk, 2021). At the same time, there is a necessity to define the set of prerequisites that allow maximizing the effectiveness of an independent central bank in ensuring price stability, considering the potential of relationship between an increase in the level of independence of central banks and a decrease in inflation rate.

1. LITERATURE REVIEW

The decisive role of the monetary policy of central banks in ensuring the regulation of inflation has been repeatedly proven by international researchers (Nguyen et al., 2022; Suhendra & Anwar, 2022). In particular, the importance of anti-inflationary policies in ensuring financial stability and macroeconomic growth has been established (Kerimov et al., 2023b). It has been proven that the development of the financial system of countries largely depends on its social, cultural, political features (Njegovanović, 2023; Bilan et al., 2020; Boiko et al., 2021; Chumachenko et al., 2021), as well as on the intensity of implementation internationally recognized regulatory norms and principles (Habiba, 2023; Kuznyetsova et al., 2017a). Even though international integration contributes to the unification of regulatory mechanisms of different countries (Babenko et al., 2017), the specifics of their application are determined by the conditions of national development. In particular, inflationary trends depend on the specifics of a country's economic development in each specific period (Aliyeva, 2022; Vasilyeva et al., 2013). In particular, in periods of war, the monetary policy of central banks has significant differences from the traditional approach to regulation (Danylyshyn & Bohdan, 2022), and in periods of financial crises, it is significantly softened (Oliveira & Santos, 2022). Researchers prove that the application of regulatory regimes should also be differentiated depending on the specifics of the objects of regulation (Buriak et al., 2015; Kozmenko & Vasylyeva, 2008). Thus, Mursalov (2022) explores the focus of banking activities regulation on minimizing the likelihood of financial instability (including banking crises). At the same time, to increase the effectiveness of regulatory influence on the development of the banking system, optimal conditions for the interaction

of the state, regulatory bodies and banks are important (Kerimov et al., 2023a; Kuznyetsova et al., 2022; Murshudli & Mursalov, 2020).

Conducted studies using a wide sample of countries have shown that increasing central bank independence leads to a reduction in the inflation rate (Garriga, 2016). At the same time, the obtained results are characterized by insignificant differences when using different parameters for measuring the independence of central banks. A multidirectional influence on macroeconomic parameters is provided in the section of separate assessment blocks. Masciandaro and Romelli (2018) confirm the conclusion that there is an inverse relationship between central bank independence and the level of inflation, while justifying that central bank independence is a transmission channel of influence on the level of inflation, which is governed by macroeconomic and political management variables.

On the other hand, a study conducted for 20 Asian countries empirically confirmed that the consequence of increased central bank independence is an increase in the level of inflation measured by the GDP deflator (Kunaedi & Darwanto, 2020). In addition, it is determined that the current level of inflation is determined by its previous value. Based on the study of the system of interrelationships between institutional and macroeconomic factors, the independence of the central bank and inflation, the authors justify the need to improve the institutional environment of the functioning of the central bank, which will ensure the strengthening of its de facto independence and allow stimulating its transmission efficiency in ensuring the regulation of inflation. In support of this thesis, Baydur et al. (2004) determined that trust in the central bank is an important prerequisite for increasing

the importance of its independence in achieving the goals of ensuring price stability.

A study of the relationship between the independence of the central bank, price stability and the level of inflationary culture in society (Hayo, 1998) made it possible to determine an inverse correlation between the economic independence of the central bank and the average level of inflation. At the same time, the importance of price stability for society is also inversely related to the average level of inflation.

The hypothesis about the different strength of influence of central bank independence on the level of inflation depending on the general level of central bank independence was confirmed in the section of developed economies and developing economies (Kokoszcyński & Mackiewicz-Łyziak, 2019). At the same time, it was found that there are time lags in the influence of the independence of the central bank on inflation, and there is a delayed and short-term influence of the economic and political component.

Thus, the results of studies already conducted have suggested that in the context of ensuring price stability in the country, not only the dynamics of the level of independence of the central bank is important, but also the initial conditions that determine the independence of the central bank. This determined the purpose of this study as studying the impact of the independence of the banking regulator on price stability, taking into account the national pattern of independence of a country's central bank.

2. METHODOLOGY

As part of this study, a sample of countries should be formed, which will be characterized by significant differences in the conditions for ensuring the independence of central banks. So, for this purpose, a sample was formed, which includes 53 countries from different parts of the world, characterized by different levels of central bank independence: USA, Canada, Brazil, Great Britain, Belarus, Azerbaijan, Sweden, Norway, Denmark, Nigeria, South Africa, Israel, China, Australia, New Zealand, Chile, Ireland, Netherlands, Belgium, France, Spain, Portugal,

Germany, Poland, Austria, Hungary, Czech Republic, Slovakia, Italy, Slovenia, Greece, Bulgaria, Estonia, Latvia, Lithuania, Ukraine, Georgia, Finland, Turkey, Mexico, Colombia, Venezuela, Peru, Bolivia, Argentina, Switzerland, Moldova, Romania, Armenia, Iceland, Ghana, Kazakhstan, and Japan.

The central bank independence index developed by A. Zukerman, S. Webb, and V. Neyapti was chosen as a criterion for measuring the level of independence of central banks. The peculiarities of the construction of this index are its compliance with the concept of evaluating the independence of the central bank, defined in the work (the presence of four components of ensuring the independence of central banks – personal, institutional, functional, and financial independence). The research period available for analysis is 2000–2012, which is determined by available statistical data (Garriga, 2016).

The first stage of the study is to analyze the features of the selected countries according to the structural ratios of the index components. The purpose of this analysis is to group the objects of the study in view of the similarity of approaches to ensuring the independence of central banks. For this purpose, cluster analysis tools were used. The levels of personal, functional, institutional, and financial independence were chosen as the studied variables for cluster formation. The cluster analysis was carried out in three stages:

- 1) hierarchical clustering for visual assessment of the distribution of countries;
- 2) determination of the optimal number of clusters by calculating the Kalinsky-Harabazh pseudo-F index; and
- 3) k-means clustering to divide countries into a given number of clusters.

For the analysis, it is necessary to evaluate the influence of the integral index of ensuring the independence of central banks. During the study, an integral index of central bank independence, calculated according to the methodology of A. Zukerman, S. Webb and B. Neyapti (CWN), is used.

The level of annual growth of the consumer price index (%) was chosen as a measure of price stabil-

ity. At the same time, the available studies proved the need to consider a number of control variables, which allow the model to determine the influence of the studied factor variable separately from the rest of the economic factors that cause objective changes in the outcome characteristic studied.

Thus, the following control variables were most often used in empirical studies: foreign trade openness, GDP growth, inflation rate in the world, presence of a period of financial instability, exchange rate regime, quality of political institutions, participation in the currency union, primary balance, savings, political freedom, loans to the private sector (Masciandaro & Romelli, 2018; Kokoszcyński & Mackiewicz-Łyziak, 2019; Kunaedi & Darwanto, 2020; Katseli et al., 2019).

Considering the scientific development and based on the goals of the planned research, a set of four control variables was chosen for calculations:

- 1) DomC – domestic loans to the private sector, % of GDP;
- 2) TrOp – openness of the economy (difference between exports and imports), % of GDP;

- 3) GDP – annual GDP growth, %; and
- 4) Sav – gross domestic savings, % of GDP.

Given the international sample of the study, the estimation should be carried out using a panel regression modeling tool. Verification of the input data using the Breusch-Pagan test proved that the specification of the econometric model with random effects is the most adequate, namely the generalized least squares method (GLS random-effects regression), which is suitable for estimating data samples with a significant number of observations.

The general form of the econometric model is constructed as follows:

$$CPI = \beta_0 + \beta_1 CWN_n + \beta_2 DomC + \beta_3 TrOp + \beta_4 GDP + \beta_4 Sav + \varepsilon, \quad (1)$$

where *CPI* – consumer price index; β_0 – constant; *CNW* – index of central bank independence; β_1, \dots, β_n – coefficients of impact of factor and control variables on consumer price index, and ε – specification and measurement error.



Figure 1. Results of hierarchical clustering of 53 countries by components of central bank independence in 2000 (Ward's method)

3. RESULTS AND DISCUSSION

The hierarchical clustering dendrogram was constructed using the Stata 12/SE software package (Figure 1).

Hierarchical clustering toolkit allows you to assess the distance of research objects from each other. Based on the obtained results, the visual analysis confirms the presence of 3 clusters of equal size. At the same time, it is necessary to conduct additional quality control of the grouping, which will allow you to determine the optimal number of clusters that most accurately describe the groups of countries characterized by significant differences in the input data of the study. For this purpose, econometric testing of clustering quality should be conducted, the results of which are shown in Table 1.

Table 1. Results of checking the quality of clustering of 53 countries of the world according to the Kalinsky-Harabazh criterion

Number of clusters	Kalinsky-Harabazh pseudo-F index
2	39.47
3	42.01
4	37.42
5	33.90
6	32.17
7	27.73
8	27.17
9	27.98
10	28.02
11	30.01
12	31.54
13	31.56
14	31.67
15	31.33

A feature of the interpretation of the results of the specified test is the need to maximize the pseudo-F value of the Kalinsky-Harabazh index, which indicates the optimality of dividing the research objects into groups. Based on the data in Table 1, it can be noted that the distribution of countries within three clusters should be considered as optimal, which confirms the conclusions made earlier.

At the same time, it should be noted that hierarchical clustering and the Stata software toolkit do not allow determining the average values of the investigated characteristics characterizing the identified

clusters. That is why it is advisable to conduct the next block of research using the k-means method and the STATISTICA 10 software complex. So, to begin with, the k-means method we will be applied to divide countries into a given number of clusters (3 clusters) and determine the average values of the input clustering parameters. Based on the clustering data, it should be noted that the studied countries are characterized by differences in the ratio of values of individual components of central bank independence. At the same time, such ratios will allow you to clearly outline the peculiarities of national approaches to ensuring the independence of central banks. Quite interesting is the fact that a group of countries with significantly lower than average integral level of independence of central banks, which is present in all components of its provision, is clearly visible. At the same time, the other two groups of countries are already determined not only by the absolute levels of all components, but also by the dominance of certain aspects of ensuring the independence of central banks, which indicates the presence of national specificity in forming the regulatory and legal framework that regulates prohibitions of political and economic interference in the activities of central banks.

Therefore, based on the results of clustering and the determined average values of the characteristics of individual clusters, the distribution of countries within the defined three clusters was carried out as of the beginning of the research period (2000), the results of which are shown in Table 2.

At the same time, the research period allows us to assume the possibility of changes in the regulation of central bank independence, which leads to the need for an additional clustering stage to check the sustainability of national approaches to ensuring the independence of central banks. Therefore, to compare the changes in the grouping of countries, their distribution was carried out using the k-means method as of 2012. The clustering results showed that there were minor changes within certain groups of the studied countries.

Accordingly, the division of countries into three clusters based on the results of the analysis as of 2012 (Table 3) makes it possible to assert the existence of three national patterns of ensuring the independence of central banks in the studied

Table 2. Results of clustering countries by approach to the formation of central bank independence using the k-means method as of 2000

Parameter	Cluster 1	Cluster 2	Cluster 3
Cluster name	The dominance of the personal and functional components of ensuring the independence of the central bank	Limited level of central bank independence	Dominance of the institutional and financial component of ensuring the independence of the central bank
Cluster characteristics	High level of personal and functional independence, medium level of institutional and financial independence	Low levels of all components of central bank independence	Average level of personal and functional independence, high level of institutional and financial independence
Countries in the cluster	Mexico, Colombia, Peru, Bolivia, Argentina, Great Britain, Hungary, Czech Republic, Slovakia, Slovenia, Moldova, Romania, Latvia, Armenia, Georgia, Denmark, Turkey, China, Japan	USA, Canada, Brazil, Lithuania, Belarus, Azerbaijan, Sweden, Norway, Iceland, Ghana, Nigeria, South Africa, Israel, Kazakhstan, Australia, New Zealand	Venezuela, Chile, Ireland, the Netherlands, Belgium, France, Switzerland, Spain, Portugal, Germany, Poland, Austria, Italy, Greece, Bulgaria, Estonia, Ukraine, Finland

countries. The first pattern “Limited level of central bank independence” characterizes relatively low levels of all four components of ensuring the independence of central banks; the second pattern “Dominance of the institutional and financial component of ensuring the independence of the central bank” indicates that the countries have formed a sufficient basis for ensuring the freedom of the central bank in the choice of monetary policy instruments and the formation and use of its own financial resources; accordingly, the third pattern “Dominance of the personal and functional component of ensuring the independence of the central bank” characterizes the minimum level of political influence on the appointment of the central bank management, as well as the clear regulation of the priority function of the central bank. At the same time, the preliminary analysis confirms that most countries during the analyzed period belong to a certain pattern of ensuring the independence of the central bank.

Thus, the analysis forms the basis for evaluating the impact of central bank independence on ensuring price stability, considering the national pattern of ensuring central bank independence. So, Table 4 shows the results of evaluating the impact of the integral level of central bank independence on price stability in countries described by the national pattern “Dominance of the personal and functional component of ensuring the independence of the central bank.”

The evaluation results showed that for this group of countries, there is a strong inverse relationship between the independence of the central bank and the level of inflation; for example, when the integral index of independence of the central bank increases by one unit, the average annual rate of inflation decreases by 6.03%. At the same time, it is important that other control variables were not statistically significant. This means that the studied economic prerequisites neither strengthen nor weaken the

Table 3. Results of clustering countries by approach to the formation of central bank independence using the k-means method as of 2012

Parameter	Cluster 1	Cluster 2	Cluster 3
Cluster name	Limited level of central bank independence	Dominance of the institutional and financial component of ensuring the independence of the central bank	The dominance of the personal and functional component of ensuring the independence of the central bank
Cluster characteristics	Low levels of all components of central bank independence	Average level of personal and functional independence, high level of institutional and financial independence	High level of personal and functional independence, medium level of institutional and financial independence
Countries in the cluster	USA, Canada, Brazil, Great Britain, Belarus, Azerbaijan, Sweden, Norway, Denmark, Nigeria, South Africa, Israel, China, Australia, New Zealand	Chile, Ireland, the Netherlands, Belgium, France, Spain, Portugal, Germany, Poland, Austria, Hungary, Czech Republic, Slovakia, Italy, Slovenia, Greece, Bulgaria, Estonia, Latvia, Lithuania, Ukraine, Georgia, Finland, Turkey	Mexico, Colombia, Venezuela, Peru, Bolivia, Argentina, Switzerland, Moldova, Romania, Armenia, Iceland, Ghana, Kazakhstan, Japan

Table 4. Results of assessing the impact of central bank independence on price stability, measured by the inflation rate, for countries in the cluster “Dominance of the personal and functional component of ensuring central bank independence”

Factor variable	Coefficient of impact	Standard error	z	P > z	Lowest 95%	Highest 95%
CWN	-6.0341***	1.9578	-3.08	0.002	-9.8713	-2.1968
DomC	-0.0204	0.0204	-1.00	0.317	-0.0605	0.0195
TrOp	0.0906	0.1536	0.59	0.555	-0.2104	0.3918
GDP	-0.0723	0.1424	-0.51	0.612	-0.3514	0.2068
Sav	-0.1103	0.1757	-0.63	0.530	-0.4548	0.2342
Constant	28.8483***	7.0136	4.11	0.000	15.1018	42.5949
Adequacy parameters						
Wald chi2(5)		13.61			-	
Prob > chi2		0.0183				

Note: *** identifies the level of statistical significance at the 99% confidence interval.

influence of central bank independence on price stability in the countries of the studied cluster.

The next evaluated group of countries is characterized by belonging to the “Limited level of central bank independence” pattern. The obtained results (Table 5) indicate completely opposite trends to those previously identified for countries with the national pattern “Dominance of the personal and functional component of ensuring the independence of the central bank.”

In countries with a national pattern of ensuring the independence of central banks “Dominance of the institutional and financial component of ensuring the independence of the central bank”, an increase in the integral level of central bank independence leads to reduced average annual inflation rate (Table 6). At the same time, this effect strengthens the influence of control variables, in

particular, the growth of the openness of the national economy and the growth of the gross domestic product created in the country.

At the same time, the national pattern “Dominance of the personal and functional component of ensuring the independence of the central bank” also turned out to be effective in the general block of the study. Comparing the quantitative results of a decrease in the average annual level of inflation, achieved under the conditions of an increase in the level of central bank independence, with different national patterns of its provision, testify that the maximum efficiency in this context is demonstrated by the national pattern “Dominance of the personal and functional component of ensuring the independence of the central bank”.

In the process of analysis, it was found that the national pattern of the formation of central bank

Table 5. Results of evaluating the impact of central bank independence on price stability, measured by the inflation rate, for countries in the “Limited level of central bank independence” cluster

Factor variable	Coefficient of impact	Standard error	z	P > z	Lowest 95%	Highest 95%
CWN	7.0996***	1.8194	3.90	0.000	3.5336	10.6657
DomC	-0.0594***	0.0208	-2.86	0.004	-0.1002	-0.0186
TrOp	0.1038	0.1715	0.61	0.545	-0.2323	0.4401
GDP	-0.4908**	0.1962	-2.50	0.012	-0.8754	-0.1063
Sav	0.2431**	0.1204	2.02	0.044	0.0070	0.4791
Constant	-5.3787	4.9259	-1.09	0.275	-15.0333	4.2759
Adequacy parameters						
Wald chi2(5)		35.59			-	
Prob > chi2		0.0000			-	

Note: *** and ** identify the level of statistical significance at 99% and 95% confidence intervals, respectively.

Table 6. Results of assessing the impact of central bank independence on price stability, measured by the inflation rate, for countries in the cluster “Dominance of the institutional and financial component of ensuring central bank independence”

Factor variable	Coefficient of impact	Standard error	z	P > z	Lowest 95%	Highest 95%
CWN	-3.3178*	1.8006	-1.84	0.065	-6.8471	0.2113
DomC	-0.0084	0.0078	-1.07	0.283	-0.0239	0.0069
TrOp	-0.2952***	0.0538	-5.48	0.000	-0.4008	-0.1895
GDP	-0.0839*	0.0500	-1.68	0.094	-0.1820	0.0142
Sav	0.2649***	0.0593	4.47	0.000	0.1487	0.3812
Constant	8.5491	6.0507	1.41	0.158	-3.3101	20.4084
Adequacy parameters						
Wald chi2(5)		46.53			–	
Prob > chi2		0.0000			–	

Note: *** and * identify the level of statistical significance at 99% and 90% confidence interval, respectively.

independence is not stable but can change in the course of the country’s development. Thus, a comparative analysis of the elemental composition of clusters as of 2000 and as of 2012 showed that, for example, Lithuania in 2000 belonged to the countries with a low level of all components of central bank independence, and in 2012 to the cluster “The dominance of the institutional and financial component of ensuring the independence of the central bank”. Iceland, Ghana and Kazakhstan moved from the “Limited level of central bank independence” cluster to the “Dominance of the personal and functional component of central bank independence” cluster. Venezuela and Switzerland moved from the cluster “Dominance of the institutional and financial component of ensuring the independence of the central bank” to the cluster “Domination of the personal and functional component of ensuring the independence of the central bank”. A significant number of countries (Hungary, Czech Republic, Slovakia, Slovenia, Latvia, Georgia, and Turkey) made the transition from the cluster “Dominance of the personal and functional component of ensuring the independence of the central bank” to the cluster “Dominance of the institutional and financial component of ensuring the independence of the central bank”. Attention should be paid to the scenario of the development of central bank independence in countries such as Great Britain, Denmark, and China, which as of 2000 belonged to the cluster “Dominance of the personal and functional component of ensuring the independence of the central bank”, and already in 2012 – to the cluster “Limited the level of independence of the central bank”.

Such trends proved the need to study the effectiveness of various scenarios for the development of the independence of central banks in view of ensuring a country’s price stability. For this purpose, the influence of the parameters of central bank independence on the level of inflation was assessed in the section of countries that in 2000–2012 formed one of the three patterns of ensuring central bank independence defined above. So, Table 7 shows the results of evaluating the impact of central bank independence on the level of inflation in countries for which a scenario of transition to the growth of institutional and financial independence was observed during the study period.

Therefore, in the countries in which during 2000–2012 there was a change in the national pattern of ensuring the independence of central banks with the formation of a pattern focused on the institutional and financial components of its provision, an increase in the integral level of independence by unit led, on average, to an increase in the level of the consumer price index by 5,04%. In addition, for this group of countries, the level of domestic loans to the private sector, as well as the openness of the national economy, turned out to be statistically significant control variables that restrain the growth of inflation.

The next of the studied scenarios for ensuring the independence of central banks is an increase in the level of the personal and functional component of ensuring their independence. So, as evidenced by the data in Table 8, such a scenario turned out to be effective in the context of ensuring price sta-

Table 7. Results of assessing the impact of central bank independence on price stability, measured by the inflation rate, for countries that formed the pattern “Dominance of the institutional and financial component of ensuring central bank independence” in 2000–2012

Factor variable	Coefficient of impact	Standard error	z	P > z	Lowest 95%	Highest 95%
CWN	5.0431***	1.5683	3.22	0.001	1.9693	8.1170
DomC	-0.0372**	0.0161	-2.31	0.021	-0.0689	-0.0056
TrOp	-0.2645**	0.1025	-2.58	0.010	-0.4655	-0.0635
GDP	0.0402	0.0857	0.47	0.639	-0.1277	0.2082
Sav	0.1259	0.0820	1.54	0.125	-0.0348	0.2868
Constant	-13.5857**	5.5019	-2.47	0.014	-24.3694	-2.8020
Adequacy parameters						
Wald chi2(5)		31.75			–	
Prob > chi2		0.0000			–	

Note: *** and ** identify the level of statistical significance at 99% and 95% confidence intervals, respectively.

bility in the country. Thus, for countries that have passed the transitive path to the growth of personal and functional independence, increasing the integral level of independence of central banks by one unit on average ensured a reduction in the annual rate of growth of the consumer price index by 6.13%. At the same time, it turned out to be quite interesting that among the control variables, only one is statistically significant in terms of ensuring price stability, namely gross domestic savings, the growth of which ensured the containment of inflationary processes in the economy.

It is important that in the studied sample of countries during the analyzed period, there were scenarios of a decrease in the level of independence of central banks. Therefore, the calculations carried out for the group of countries that implemented such a scenario (Table 9) demonstrated the absence of relevant relationships between the

dynamics of the integral level of independence of central banks and the level of price stability in the national economy, as well as the statistical insignificance of the influence of control variables on the inflation rate.

According to the results obtained, it can be noted that the national pattern of ensuring the independence of central banks with the dominance of the personal and functional component turned out to be the most effective in terms of maintaining price stability in the country. This also confirms the effectiveness of the implementation of the growth scenario of the personal and functional component of ensuring the independence of central banks in view of maximizing their anti-inflationary regulatory potential. Such results create additional practical value not only in view of confirming the expediency of increasing the independence of central banks to ensure price stability, but also in the con-

Table 8. Results of assessing the impact of central bank independence on price stability, measured by the inflation rate, for countries that formed the pattern “Dominance of the personal and functional component of ensuring central bank independence” in 2000–2012

Factor variable	Coefficient of impact	Standard error	z	P > z	Lowest 95%	Highest 95%
CWN	-6.1336**	3.0490	-2.01	0.044	-12.1097	-0.1576
GDP	-0.5905	0.3784	-1.56	0.119	-1.3322	0.1511
TrOp	-0.0953	0.0674	-1.41	0.158	-0.2276	0.0369
Sav	-0.3528***	0.1285	-2.75	0.006	-0.6047	-0.1009
Constant	44.2904***	8.5041	5.21	0.000	27.6225	60.9582
Adequacy parameters						
Wald chi2(5)		25.00			–	
Prob > chi2		0.0001			–	

Note: *** and ** identify the level of statistical significance at 99% and 95% confidence intervals, respectively.

Table 9. Results of evaluating the impact of individual parameters of central bank independence on price stability, measured by the level of inflation, for countries that formed the “Limited level of central bank independence” pattern in 2000–2012

Factor variable	Coefficient of impact	Standard error	z	P > z	Lowest 95%	Highest 95%
CWN	-3.0896	2.4519	-1.26	0.208	-7.8953	1.7160
DomC	0.0107	0.0132	0.82	0.415	-0.0151	0.0366
TrOp	-0.0747	0.1259	-0.59	0.553	-0.3215	0.1720
GDP	0.1180	0.1345	0.88	0.380	-0.1456	0.3817
Sav	-0.0159	0.0498	-0.32	0.750	-0.0113	0.0818
Constant	7.3908	6.7690	1.09	0.275	-5.8762	20.6579
Adequacy parameters						
Wald chi2(5)		4.32			–	
Prob > chi2		0.5046			–	

text of determining the priority tasks of ensuring the independence of central banks.

The analysis confirmed that the independence of the central bank is a significant factor in ensuring its regulatory effectiveness, in particular, in terms of maintaining price stability. Thus, in general, the results of the study proved that the increase in the level of independence of the central bank is a factor that restrains inflationary processes in the country. This generally correlates with the results obtained by Garriga (2016), Hayo (1998), and Masciandaro and Romelli (2020).

It should be noted that the study confirmed that the influence of central bank independence on the level of inflation largely depends on the national pattern of central bank independence formed in the country. In particular, it is important to conclude that with a limited level of central bank independence, there is a direct relationship between central bank independence and the level of inflation measured by the consumer price index. This is consistent with the results

obtained by Kokoszcyński and Mackiewicz-Łyziak (2019) on the importance of the achieved level of central bank independence, as well as on the differential effects of the influence of the economic and political independence of the central bank. In particular, the study demonstrated that it is the growth of the personal and functional component of the independence of central banks that has the greatest effect on maximizing their regulatory effectiveness in ensuring the main function of central banks.

Key limitations to the interpretation of the study results are the selected sample of countries and the period of analysis. At the same time, the proposed methodology allows expanding the scope and time horizon of research. In particular, the identified change in the direction of the influence of central bank independence on the inflation rate with different national patterns of its formation determines the scientific interest in further research on the identification of the level of independence of the central bank at which the growth of its regulatory effectiveness begins.

CONCLUSION

Research is aimed at the identification the impact of central bank independence on the price stability considering the national pattern of central bank independence. It has been proven that during 2000–2012, in a number of countries studied, significant changes occurred in the national pattern of central bank independence. Constructed empirical models proved that the strength and direction of influence of central bank independence on the level of price stability in the country largely depend on the formed national pattern of central bank independence. So, in particular, in the conditions of functioning of central banks according to the “Limited level of independence of central banks” pattern, when the integral index of independence of central banks increases by one unit, inflation also increases (the consumer price index increases by 7.09%). At the same time, the formation of more stable patterns of central bank independence provides a reduction in inflationary trends under the influence of increasing central bank

independence. The greatest potential for inflation regulation is the pattern “Dominance of the personal and functional component of ensuring the independence of central banks” – an increase in the level of independence of central banks in countries belonging to this pattern by one unit leads to a reduction in the average annual inflation rate by 6,03%. This proves that the scenario of growth of personal and functional independence of central banks is the most promising among possible ways of their development in the context of increasing the effectiveness of the central bank’s anti-inflationary policy.

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REFERENCES

1. Aliyeva, A. (2022). Post-Oil Period in Azerbaijan: Economic Transformations, Anti-Inflation Policy and Innovations Management. *Marketing and Management of Innovations*, 2, 268-283. <https://doi.org/10.21272/mmi.2022.2-24>
2. Babenko, V., Pasmor, M., Pankova, J., & Sidorov, M. (2017). The place and perspectives of Ukraine in international integration space. *Problems and Perspectives in Management*, 15(1), 80-92. [https://doi.org/10.21511/ppm.15\(1\).2017.08](https://doi.org/10.21511/ppm.15(1).2017.08)
3. Baydur, C. M., Süslü, B., & Bekmez, S. (2004). The independence of central bank in view of Rogoff: The Turkish experience. *European Research Studies*, 7(1-2), 141-164. https://www.ersj.eu/repec/ers/papers/04_12_p10.pdf
4. Bilan, Y., Tiutiunyk, I., Lyeonov, S., & Vasylieva, T. (2020). Shadow economy and economic development: A panel cointegration and causality analysis. *International Journal of Economic Policy in Emerging Economies*, 13(2), 173-193. <https://doi.org/10.1504/IJ-EPEE.2020.107929>
5. Boiko, A., Zwolińska-Ligaj, M., Bozhenko, V., Florczak, E., & Ovcharenko, V. (2021). Readiness for implementing innovations in banking in advanced and emerging economies. *Journal of International Studies*, 14(4), 236-250. <https://doi.org/10.14254/2071-8330.2021/14-4/16>
6. Bozhenko, V. V., Lyeonov, S. V., Polishchuk, E. A., Boyko, A. O., & Artyukhova, N. O. (2022). Identification of Determinants of Corruption in Government: A Mar-Spline Approach. *Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu*, 6, 176-180. <https://doi.org/10.33271/nvngu/2022-6/176>
7. Buriak, A., Lyeonov, S., & Vasylieva, T. (2015). Systemically important domestic banks: An indicator-based measurement approach for the Ukrainian banking system. *Prague Economic Papers*, 24(6), 715-728. <https://doi.org/10.18267/j.pep.531>

8. Chumachenko, D., Derkach, T., Babenko, V., Krutko, M., Yakubovskiy, S., & Rodionova, T. (2021). Development prospects of banking sector in Central and Eastern European countries in terms of financial integration. *Estudios De Economia Aplicada*, 39(7). <https://doi.org/10.25115/eea.v39i7.4949>
9. Danylyshyn, B., & Bohdan, I. (2022). Monetary policy during the wartime: How to ensure macroeconomic stability. *Investment Management and Financial Innovations*, 19(2), 344-359. [https://doi.org/10.21511/imfi.19\(2\).2022.30](https://doi.org/10.21511/imfi.19(2).2022.30)
10. Garriga, A. C. (2016). Central Bank Independence in the World: A New Dataset. *International Interactions*, 42(5), 849-868. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2928897
11. Habiba, M. (2023). Basel Agreements in the Efficiency of Algerian Banks Financial Evolution and Interdisciplinary Research. *Financial Markets, Institutions and Risks*, 7(1), 123-135. [https://doi.org/10.21272/fmir.7\(1\).123-135.2023](https://doi.org/10.21272/fmir.7(1).123-135.2023)
12. Hayo, B. (1998). *Inflation Culture, Central Bank Independence and Price Stability* (50 p.). Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=56192
13. Kashcha, M., & Dun, V. (2022). The impact of indicators of macroeconomic stability on the destructive manifestation of Covid-19 in Ukraine. *SocioEconomic Challenges*, 6(3), 107-113. [https://doi.org/10.21272/sec.6\(3\).107-113.2022](https://doi.org/10.21272/sec.6(3).107-113.2022)
14. Katseli, L. T., Theofilakou, A., & Zekente, K. (2019). *Central bank independence and inflation preferences: New empirical evidence on the effects on inflation* (Working Paper No. 265). Bank of Greece. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4197851
15. Kerimov, A., Babayev, A., Dudchenko, V., Samusevych, Y., and Tumpach, M. (2023a). Banking system stability in crisis periods: The impact of the banking regulator independence. *Banks and Bank Systems*, 18(3), 221-234. [https://doi.org/10.21511/bbs.18\(3\).2023.18](https://doi.org/10.21511/bbs.18(3).2023.18)
16. Kerimov, A., Babayev, A., Ashurbayli-Huseynova, N., & Gubadova, A. (2023b). Effectiveness of anti-inflation policy that ensures economic growth: Evidence from post-Soviet countries. *Problems and Perspectives in Management*, 21(2), 542-555. [https://dx.doi.org/10.21511/ppm.21\(2\).2023.50](https://dx.doi.org/10.21511/ppm.21(2).2023.50)
17. Kokoszczynski, R., & Mackiewicz-Lyziak, J. (2019). Central bank independence and inflation – Old story told anew. *International Journal of Finance & Economics*. 25(1), 72-89. <https://doi.org/10.1002/ijfe.1730>
18. Koziuk, V. (2021). Confidence in digital money: Are central banks more trusted than age is matter? *Investment Management and Financial Innovations*, 18(1), 12-32. [https://doi.org/10.21511/imfi.18\(1\).2021.02](https://doi.org/10.21511/imfi.18(1).2021.02)
19. Kozmenko, S., & Vasylieva, T. (2008). Specialized innovative investment banks in Ukraine. *Banks and Bank Systems*, 3(1), 48-56. Retrieved from <https://www.businessperspectives.org/index.php/journals/banks-and-bank-systems/issue-159/specialized-innovative-investment-banks-in-ukraine>
20. Kunaedi, A., & Darwanto, D. (2020). Central Bank Independence and Inflation: The Matters of Financial Development and Institutional Quality. *Signifikan: Jurnal Ilmu Ekonomi*, 9(1), 1-14. <http://dx.doi.org/10.15408/sjie.v9i1.12899>
21. Kuznetsova, A., Azarenkova, G., & Olefir, I. (2017a). Implementation of the “bail-in” mechanism in the banking system of Ukraine. *Banks and Bank Systems*, 12(3), 269-282. [https://doi.org/10.21511/bbs.12\(3-1\).2017.11](https://doi.org/10.21511/bbs.12(3-1).2017.11)
22. Kuznyetsova, A., Boiarko, I., Rudevskaya, V., & Maslov, V. (2022). Development of Business Architecture of the Banking Sector Based on Public-Private Partnership. *Banks and Bank Systems*, 17(2), 150-162. [https://doi.org/10.21511/bbs.17\(2\).2022.13](https://doi.org/10.21511/bbs.17(2).2022.13)
23. Kuznyetsova, A., Misiats, N., & Klishchuk, O. (2017b). The equilibrium model of demand and supply at the Ukrainian interbank foreign exchange market: Disclosure of problematic aspects. *Banks and Bank Systems*, 12(4), 31-73. [https://doi.org/10.21511/bbs.12\(4\).2017.03](https://doi.org/10.21511/bbs.12(4).2017.03)
24. Maris, M. (2022). Management of Competitiveness in the EU Member States: The Main Strengths and Weaknesses. *Marketing and Management of Innovations*, 2, 110-120. <https://doi.org/10.21272/mmi.2022.2-10>
25. Masciandaro, D., & Romelli, D. (2018). *Beyond the Central Bank Independence Veil: New Evidence* (Bocconi Working Paper No. 71). Retrieved from <https://repec.unibocconi.it/baffic/baf/papers/cbafwp1871.pdf>
26. Melnyk, L., Kubatko, O., Piven, V., Klymenko, K., & Rybina, L. (2021). Digital and economic transformations for sustainable development promotion: A case of OECD countries. *Environmental Economics*, 12(1), 140-148. [https://doi.org/10.21511/EE.12\(1\).2021.12](https://doi.org/10.21511/EE.12(1).2021.12)
27. Mursalov, M. M. (2022). Banking regulation and banking crises probability in European countries. *Finance: Theory and Practice*, 26(5), 90-105. <https://dx.doi.org/10.26794/2587-5671-2022-26-5-90-105>
28. Murshudli, F. F., & Mursalov, M. M. (2020). Anti-Crisis Regulation of Banking Business: Case of Azerbaijan. In: *Anti-Crisis Management: State, Region, Enterprise*. Collective monograph (pp. 220-241). Riga: Publishing House “Baltija Publishing”. <https://doi.org/10.30525/978-9934-26-020-9-15>
29. Nguyen, T. T., Phan, T. D., & Tran, N. A. (2022). Impact of fiscal and monetary policy on inflation in Vietnam. *Investment Management and Financial Innovations*, 19(1),

- 201-209. [https://doi.org/10.21511/imfi.19\(1\).2022.15](https://doi.org/10.21511/imfi.19(1).2022.15)
30. Njegovanović, A. (2023). Financial Evolution and Interdisciplinary Research. *Financial Markets, Institutions and Risks*, 7(1), 71-95. [http://doi.org/10.21272/fmir.7\(1\).71-95.2023](http://doi.org/10.21272/fmir.7(1).71-95.2023)
31. Oliveira, M. A., & Santos, C. (2022). Unveiling trading patterns: iTraxx Europe financials from the great financial crisis to ECB monetary easing. *Banks and Bank Systems*, 17(3), 188-200. [https://doi.org/10.21511/bbs.17\(3\).2022.16](https://doi.org/10.21511/bbs.17(3).2022.16)
32. Olonila, A., Amassoma, D., & Babatunde, B.O. (2023). Impact of Monetary Policy on Credit and Investment in Nigeria (1981–2020). *Financial Markets, Institutions and Risks*, 7(1), 136-144. [https://doi.org/10.21272/fmir.7\(1\).136-144.2023](https://doi.org/10.21272/fmir.7(1).136-144.2023)
33. Rizk, S. (2022). Efficiency in the MENA banking industry, the stochastic frontier approach (SFA). *Financial Markets, Institutions and Risks*, 6(2), 56-59. [https://doi.org/10.21272/fmir.6\(2\).56-59.2022](https://doi.org/10.21272/fmir.6(2).56-59.2022)
34. Sinaga, A. P. A. (2022). Inflation, Foreign Exchange, Interest Rate, Trade Balance, Payment Balance on Growth In The Covid-19 Pandemic. *SocioEconomic Challenges*, 6(4), 52-59. [https://doi.org/10.21272/sec.6\(4\).52-59.2022](https://doi.org/10.21272/sec.6(4).52-59.2022)
35. Suhendra, I., & Anwar, C. J. (2022). The response of asset prices to monetary policy shock in Indonesia: A structural VAR approach. *Banks and Bank Systems*, 17(1), 104-114. [https://doi.org/10.21511/bbs.17\(1\).2022.09](https://doi.org/10.21511/bbs.17(1).2022.09)
36. Tahat, I. (2022). Association Between Factors Likely to Have an Influence on Foreign Direct Investment: The Case of Jordan. *SocioEconomic Challenges*, 6(4), 34-45. [https://doi.org/10.21272/sec.6\(4\).34-45.2022](https://doi.org/10.21272/sec.6(4).34-45.2022)
37. Tiutiunyk, I., Ciesliński, W., Zolkover, A., & Vasa, L. (2022). Foreign direct investment and shadow economy: One-way effect or multiple-way causality? *Journal of International Studies*, 15(4), 196-212. <https://doi.org/10.14254/2071-8330.2022/15-4/12>
38. Vasilyeva, T. A., Leonov, S. V., & Lunyakov, O. V. (2013). Analysis of internal and external imbalances in the financial sector of Ukraine's economy. *Actual Problems of Economics*, 150(12), 176-184. Retrieved from https://essuir.sumdu.edu.ua/bitstream-download/123456789/50836/5/Vasilyeva_Analysis_of_internal.pdf
39. Vasilyeva, T., Dudchenko, V., Samusevych, Y., Marci, A., & Sofronov, V. (2022). The impact of governance quality on central bank's independence. *Public and Municipal Finance*, 11(1), 113-127. [https://doi.org/10.21511/pmf.11\(1\).2022.10](https://doi.org/10.21511/pmf.11(1).2022.10)
40. Vasilyeva, T. A., Leonov, S. V., & Lunyakov, O. V. (2014). Countercyclical capital buffer as a macroprudential tool for regulation of the financial sector. *Actual Problems of Economics*, 158(8), 278-283. Retrieved from https://essuir.sumdu.edu.ua/bitstream-download/123456789/80849/1/Vasilyeva_countercyclical.pdf
41. Zolkover, A., Tiutiunyk, I., Babenko, V., Melnychuk, M., Ivanchenkova, L., & Lagodiienko, N. (2022). The quality of tax administration, macroeconomic stability and economic growth: Assessment and interaction. *Review of Economics and Finance*, 20, 654-661. <https://doi.org/10.55365/1923.X2022.20.76>