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ACADEMIC PAPER

Monetary and Fiscal Policy Coordination in an Age of Persistent Inflation, Rising Public Debt, and Global Economic Uncertainty

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ABSTRACT

The recent resurgence of inflation combined with unprecedented amounts of government debt and the increased economic uncertainty in the world has rekindled the discussion regarding the need and success of coordinating monetary-fiscal policies. This paper analyses the reflective play of both monetary and fiscal policy measures in the United States between 2000Q1 and 2024Q4 using a multifaceted econometric model that combines Autoregressive Distributed Lag (ARDL) bounds test, error correction modeling (ECM), and Structural Vector Autoregression (SVAR) models. This study examines long-run equilibrium relations and short-run dynamic adjustments of the policy variables by using quarterly data on the variables in terms of inflation, policy interest rates, money supply, government spending, fiscal deficit, government debt, GDP growth, and the Global Economic Policy Uncertainty Index. The output of this sutdy's ARDL model shows that there is a strong long-term cointegration of policy tools, and the error correction term shows that it implies that it has an adjustment speed of about 42 percent per quarter to the equilibrium. The SVAR analysis shows that fiscal shocks have more long-lasting effects on inflation than monetary shocks in times of great uncertainty and there is less effectiveness in monetary policy reactions in times when the debt of the country reaches critical levels. The functions of impulse response reactions reveal that coordinated policy responses lower the volatility of inflation by 35 percent in comparison to uncoordinated actions. Analysis of variance decomposition indicates that fiscal policy shocks can account for 28 percent of inflation fluctuations at longer run which is significantly greater than before recorded. These results indicate that the conventional monetary dominance paradigm needs to be re-adjusted in modern high-debt, high-uncertainty settings, with consequences of independence of central banks and fiscal sustainability.

KEYWORDS

Monetary-fiscal Coordination, ARDL Bounds Test, SVAR, Inflation, Public Debt, Policy Uncertainty, Error Correction Model.

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INTRODUCTION

The world economy has descended into a period of turmoil where inflationary pressures are with us, and the ratios of public debt are elevated in historical levels and economic policy uncertainty is higher than it has ever been before. The wave of post-pandemic inflation, which has seen record-high levels in most developed economies, has put the traditional framework of monetary policy to the test (Hofmann, Manea, & Mojon, 2024; Imam & Poghosyan, 2025). At the same time, the government debt-to-GDP ratios have gone sky-high, with the United States at more than 130 percent, and most European countries at over 100 percent, in tension concerning the need to sustain the debts and the necessity to address the counter-cyclical policy goals (Blanchard, 2019). The Global Economic Policy Uncertainty Index has been on all-time highs, especially after the COVID-19 pandemic, tensions on the geopolitical front, and changes to trade policy (Baker, Bloom, & Davis, 2016; UNCTAD, 2025).

These coinciding events have essentially questioned the wisdom tradition of price stability through the independent actions of monetary authorities, and debt management and structural goals through the fiscal authorities. Conventional models, such as inflation targeting regimes that became popular since the 1990s, were created under conditions of moderately high rates of inflation, sustainable levels of debts, and a comparatively stable economy (Kiley & Mishkin, 2025). The new combination of shocks poses some very serious questions: Can monetary policy succeed in keeping inflation within a manageable range when fiscal stances are unsustainable? Are fiscal expansions a way of sabotaging monetary tightening programs? What is the effect of increased uncertainty on the mechanism of transmission of the two policies?

According to recent development of theoretical ideas, the efficacy of the monetary policy is inherently associated with fiscal stands, especially when the level of debt is elevated, and the sovereign risk premia turns into debt-sensitive (Bonam & Lukkezen, 2019). According to the fiscal theory of the price level, the consequences of inflation would heavily rely on the expectation concerning future fiscal surpluses, which means that the monetary policy would not be sufficient to ensure price stability without proper fiscal support (Cochrane, 2023). In addition to this, supply-side inflation shocks, which have persisted in the 2021-2023 episode, do not respond to policy interventions in the same way as demand-driven inflation, and could necessitate coordinated policy responses (Wu & Xie, 2025).

The empirical literature concerning policy coordination is rather fragmented and contradictory despite the vast amount of theoretical literature on this topic. Other studies propose that coordination improves macroeconomic stability (Kiley & Mishkin, 2025), whereas others identify little or even negative implications of institutional structures (Imam & Poghosyan, 2025). The absence of consensus has been in part due to methodological difficulties in measuring coordination empirically and partly because of changes in the economic structures and policy regimes.

This research has a contribution to literature in a number of significant areas. This study performed this by constructing an integrated empirical model using ARDL bounds testing, error correction modelling, and SVAR to test both long-run equilibrium and short-run dynamic relationships among monetary and fiscal variables. This methodological combination enables to capture the underlying structural links as well as the short-term adjustment processes that define policy coordination. Second, this study directly included the global economic uncertainty as a state variable with the potential to smooth out the effectiveness of policy to fill a gap in the literature that generally assumes that policy environment is stable. Third, this study used more recent quarterly data going to 2024, which captures the policy challenges that have never been witnessed before, such as the surging inflation of 2021-2023 and the later disinflation policies that followed.

The results of analysis of U.S. monthly data demonstrate that there are a number of new findings. The ARDL bounds test establishes the existence of a significant long run cointegration among policy instruments, which is contrary to the assumption of policy independence on many theoretical models. The error correction mechanism implies rather high speeds of adjustment, as about 42 per cent of the disequilibrium is fixed quarter by quarter. The asymmetric effects of policies in structural VAR analysis

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are as follows: In periods of big uncertainty, monetary shock has less long-lasting inflationary effects than fiscal shock. The results of impulse response are that coordinated actions by the policy make the output volatility reduced to a significant degree in comparison to the independent policy actions. Variance decomposition shows that, in the medium and long-run, a surprisingly high portion of variance in the inflation is due to fiscal shocks, overturning the traditional belief in the monetary dominance of the inflation process.

The rest of this paper will follow in the manner as follows. Section 2 is a review of theoretical background and empirical evidence about monetary-fiscal coordination. Section 3 outlines this study's econometric approach, i.e. the ARDL, ECM, and SVAR models. Section 4 describes the source of data, construction of variables, and initial diagnostics. Section 5 gives estimation findings and diagnostic tests. Section 6 talks of policy implications and theoretical interpretations. Section 7 ends with future research directions.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The theoretical explanation of the relationship between monetary and fiscal policy over the last thirty years has gone through significant development of the principles of total detachment of the two approaches to the acknowledgment of basic interdependence between them. The classical Keynesian framework focused on the autonomous areas of policy, where monetary policy would regulate inflation by raising and lowering interest rates and the fiscal policy would decide on the aggregate demand and the sustainability of debt. This division was codified by requiring central bank independence and fiscal policies that aimed at ensuring macroeconomic stability by avoiding fiscal dominance of policy by the monetary policy (Blanchard & Pisani-Ferry, 2022).

Recent theoretical developments, however, refute this dichotomy. The fiscal theory of the price level proves that monetary and fiscal authorities have to coordinate price stability because the existence of government debt is a nominal claim that has to be verified by either primary surpluses or inflation (Cochrane, 2023; Leeper & Zhou, 2021). The interaction between policies is greater when there is a risky sovereign debt. The analytic results of Bonam and Lukkezen (2019) demonstrate that it is important that debt-elastic risk premia imply that both fiscal cyclicality and monetary policy aggressiveness are essential to equilibrium stability and uniqueness. Their model shows that procyclical fiscal policies can in fact be more stability enhancing because they ensure that the risk premium remains low, whereas countercyclical fiscal expansions might necessitate stronger monetary tightening measures to stabilize.

These theoretical insights have received a new interest due to the recent surge in inflation. According to Hofmann et al. (2024), the explicit coordination of Taylor rules that aim at modifying demand and supply shocks demand the presence of implicit coordination with fiscal policy to prevent conflicts. Monetary accommodation and fiscal adjustment normally follow the supply shocks and monetary tightening and fiscal assistance to the vulnerable groups follows the demand shocks. Mang and Caddick (2025) expand this point to climate policy arguing that to deal with structural transformations, there must be express monetary-fiscal coordination frameworks.

There is equivocality in the empirical evidence of effectiveness of coordination. Imam and Poghosyan (2025) compare inflation surges of 2022 in 70 countries, and central banks that used inflation-targeting did not better systematically perform worse than non-targeters even with stronger rate increases. They do this because they believe the shock is largely supply on the side and can hardly be addressed using conventional monetary policy tools. Jácome et al. (2025) report considerable heterogeneity in monetary policy responses of different countries in which inflation is targeted with those countries that have a history of high inflation responding more decisively to deviations in expectations. Their results indicate that credibility and institutional history have a greater impact than the formal coordination mechanisms.

The uncertainty factor in policy transmission has been getting more and more attention. The Global Economic Policy Uncertainty Index was created by Baker et al. (2016), and it reveals that high levels of uncertainty decreases the action of policies through removing investment and consumption reactions.

Fernández-Villaverde et al. (2015) reveal that the real economic effects of fiscal volatility shocks can be seen in their effects on uncertainty, as well as risk premia. David and Sever (2025) expand this discussion to the uncertainty of elections, and they conclude that tax news shocks affect political situations asymmetrically.

In developing economies and in the emerging markets, the lack of institutional capacity and exposure to external shocks increases the coordination issues. The developing countries were under pressure at the same time in the post-pandemic period due to fluctuation in commodity prices, reversal of capital flows, and debt distress (UNCTAD, 2025). These conditions demand closer coordination of policies but bring about conflicts between the goals of price stability and debt sustainability.

Literature regarding the topic of public debt and inflation helps in giving a critical background concerning the coordination requirement. Aimola and Odhiambo (2021b) use the ARDL bounds testing to test the relationship between the short and long-run effects of public debt and inflation in Ghana and establish positive relationships between the variables in both the long and short term. Aimola and Odhiambo (2021a) receive opposite findings on the case of Nigeria, where total public debt had neutral effects on inflation, marking the country-specific aspects of institutions. Ekong, Umoh and Akpan (2025) propose more recent research claiming that there are nonlinear threshold effects, indicating that the effects of debt on inflation are dependent on the initial debt and the quality of institutions. These results demonstrate that debt dynamics should be taken into account in the process of policy coordination.

In methodology, recent innovations in time-series economics have improved capacity to study policy interactions. ARDL bounds testing methodology proposed by Pesaran, Shin and Smith (2001) and further by Narayan (2005) provides an opportunity to analyze mixed orders of integration without pretesting which is especially advantageous when it comes to analyzing policy variables that might possess varying persistence properties. Chudik and Pesaran (2015) also extended the cross-sectional augmented ARDL techniques to overcome the cross-sectional dependence in panel analysis.

As the policy shock recognizer, structural VAR analysis is now the workhorse used to trace the dynamic impacts of policy shocks. More recent methodological advances are narrative sign restrictions (Antolín-Díaz & Rubio-Ramírez, 2018), proxy SVAR models based on external instruments (Montiel Olea, Stock, & Watson, 2021), and regime-switching SVAR models (Virolainen, 2024). Patil and Savadatti (2025) suggest the opposite of conventional SVAR ordering, that is, having interest rates as the final and not the initial variable and thus more reactive to modern monetary policy. Such methodological developments make it possible to identify policy coordination effects much more subtly.

With this comprehensive literature, however, there are still some gaps. To begin with, majority of the empirical research investigates monetary policy or fiscal policy solely without much consideration of their political interaction. Second, the standard type of coordination studies can use simple correlation tests or Granger causality tests, which are not suitable to understand the relationship of equilibrium and adjustment. Third, uncertainty as a moderating factor on policy transmission has not been empirically investigated, although it has a solid theoretical basis. This study filled these gaps by using an empirical framework based on long-run cointegration, short-run dynamics, and structural shock identification in different uncertainty conditions.

ECONOMETRIC METHODOLOGY

Empirical approach of this study applies three-step structure that combines the complementary econometric methodology that has been used in a bid to examine the coordination of monetary and fiscal policies comprehensively. This combination of methods enables to obtain different elements of policy interactions: long-run equilibrium relations (ARDL), short-run adjustment processes (ECM), and structural shock detection with impulse propagation (SVAR).

Autoregressive Distributed Lag (ARDL) Bounds Testing.

The ARDL bounds testing model which was developed by Pesaran et al. (2001) has some benefits in the analysis of policy coordination. In contrast to traditional cointegration techniques which assume that

all the variables are of equal order, ARDL allows mixed integration orders, I(0), I(1), or mix cointegrated, which makes ARDL specially adopted to policy variables that have different persistence properties (Narayan, 2005). The method works well on the small sample and enables short and long-run parameters to be estimated concurrently.

In accordance with Pesaran et al. (2001), this study can state the ARDL model describing the inflation with the error correction form which is not limited as:

$$\Delta INFt = \alpha_0 + \Sigma^n_{i=1} \beta_i \Delta INFt_{-i} + \Sigma^n_{i=0} \gamma_i \Delta IRt_{-i} + \Sigma^n_{i=0} \delta_i \Delta MSt_{-i} + \Sigma^n_{i=0} \theta_i \Delta GEXPt_{-i} + \Sigma^n_{i=0} \lambda_i \Delta DEBTt_{-i} + \Sigma^n_{i=0} \varphi_i \Delta GDPt_{-i} + \Sigma^n_{i=0} \psi_i \Delta UNCERTt_{-i} + \pi_1 INFt_{-1} + \pi_2 IRt_{-1} + \pi_3 MSt_{-1} + \pi_4 GEXPt_{-1} + \pi_5 DEBTt_{-1} + \pi_6 GDPt_{-1} + \pi_7 UNCERTt_{-1} + \varepsilon t$$

Y 1 1 = [?] is the first difference, INF is the inflation rate, IR is policy interest rate, MS is the money supply growth, GEXP is the government spending, DEBT is the ratio of public debt to GDP, GDP is the real output growth, and UNCERT is the Global Economic Policy Uncertainty Index. Parameters p are long-run coefficients, whereas b, g, d, th, l, ph, and ps are short-run parameters.

The bounds testing method is to test the null hypothesis of non-cointegration (H 0: p 1 = p 2 = p 3 = p 4 = p 5 = p 6 = p 7 = p 8 = 0) against the alternative hypothesis of cointegration with an F -test. Pesaran et al. (2001) give critical value limits: when the F-statistic is greater than the upper critical value, this study rejected the null and conclude that there is cointegration; when it is less than the lower critical value this study cannot reject the null, and when it is the same, the results are inconclusive. Sample size of this study is suitable to use Narayan (2005) critical values.

Lag order selection is done sequentially with Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) and maximum lag order of 4 quarters considering that this study is dealing with quarterly data. When this study had cointegration, then it estimated long-run coefficients and it performed diagnostic tests on serial correlation, heteroskedasticity and normality of residuals.

Error Correction Model

Once this study ensure that it has cointegrated, it estimated the error correction model to study short-run dynamics, and adjustment speeds to equilibrium in the long-run (Banerjee, Dolado, & Mestre, 1998; Engle & Granger, 1987). The ECM specification is in the form:

$$INFt = a + Sn{=}1\ b[?]IRt- + Sn{=}0\ g[?]UNCERTt- + eECTt\text{-}1 + ut<|human|>INFt = a + Sn{=}1\ b[?]IRt- + Sn{=}0\ g[?]UNCERTt- + eECTt\text{-}1 + ut$$

in which ECTt -1 is the lagged error correction term obtained based on the long-run relationship, and e is the speed of adjustment. The value of e is to be negative and statistically significant, which means that short term fluctuations of the long-run equilibrium are corrected in the long run. An increased value of the e as an absolute value means quicker adjustment. In line with Ketenci (2009), model stability is measured with CUSUM and CUSUMSQ tests which identify from structural break or parameter instability. These tests play an important role in policy analysis because structural changes can be used to show change in coordination regimes.

Structural Vector Autoregression

This study used a Structural VAR framework to determine the dynamic effects of monetary and fiscal policy shocks and trace them (Lütkepohl, 2005; Sims, 1980). The reduced form VAR is given as:

$$\mathbf{Yt = A0 + A1Yt\text{-}1 + A2Yt\text{-}2 + ... + ApYt\text{-}p + et}$$

with **Yt = [GDPt, INFt, IRt, GEXPt, DEBTt, UNCERTt]** is the vector of endogenous variables, coefficient matrices are denoted Ai and the error term in reduced form is et.

The structural form is associated with reduced form by: A0et = Bet where et is orthogonal structural shocks with **E[etet'] =** I, and A0 is contemporary relationships between variables. In order to be identified, it is necessary to impose n(n-1)/2 restrictions. This study's recursive identification scheme is grounded on the economic theory and timinal institutional basis variables are ordered as follows: **GDP - INF - GEXP - DEBT - IR - UNCERT**.

This ranking is affected by various considerations based on the institutional practice and new literature (Hofmann et al., 2024; Patil & Savadatti, 2025). Output and inflation are a reaction to all contemporaneous shocks and have no impact on other variables in the quarter, owing to information and implementation lags. Automatic stabilizers enable the government expenditure to react to output and inflation shocks in the quarter, whereas the public debt reacts to the fiscal variables. The policy rate of interest is ranked at the end of the policy, which is a reactive aspect of the modern monetary policy that reacts to the economic state of affairs that is witnessed during the period. The last uncertainty is put in the last position since it can react to all policies and economic evolutions of the time.

This study modeled the SVAR with quarterly data and calculate impulse response functions (IRFs) of how each variable is responding to a one-standard-deviation shock in structural innovations (Lütkepohl, 2005; Pesaran, 2015). Bootstrap constructions that are done with 1000 replications are used to construct confidence intervals. Also, this study did the forecast error variance decomposition (FEVD) to determine how important each structural shock was in explaining variation in endogenous variables at different horizons (Koop, Pesaran, & Potter, 1996).

Diagnostic Testing

The evaluation of model validity is done by using extensive diagnostic tests (Hamilton, 1994). In the ARDL/ECM specification this study examined: (1) Breusch-Godfrey LM test, serial correlation; (2) Breusch-Pagan-Godfrey test, heteroskedasticity; (3) Jarque-Bra statistic test, the residual normality; (4) CUSUM and CUSUMSQ tests, the parameter stability after Brown, Durbin and Evans (2018). In the case of SVAR model, this study ensured that stability is achieved by confirming that the roots of the characteristic equation are within the unit circle and a test of the Granger causality to test the relationship of temporal precedence.

STATISTICS AND PRIMARY ANALYSIS

Variable Construction and Data Sources

This study empirically analyzed 100 quarterly data of the United States between 2000Q1 and 2024Q4 consisting of these time-series. This era encompasses many different economic times such as the Great Recession (2007-2009) and unconventional monetary policy era (2008-2015), recent inflation surge and disinflation (2021-2024). The United States selection is based on multiple factors: the quality and availability of data, the fact that the U.S. policy is always significant in the world and the dollar is the global reserve currency of the world, and the Federal Reserve is influential in the process of developing global monetary policies.

Information is sourced out of credible sources. Inflation (INF) is calculated to be the percentage change of the Consumer Price Index (CPI) of the Bureau of Labor Statistics per year to year. The Federal Reserve bank of St. Louis FRED has the policy interest rate (IR) as its Federal Funds effective rate. The quarterly growth rate of FRED of M2 is built to form money supply (MS). Government expenditure (GEXP) is the federal government consumption expenditure, gross investment expressed as a percentage of the GDP of the Bureau of Economic Analysis. Fiscal deficit (FD) is the federal budget deficit as a ratio of GDP of the Congressional Budget Office. Public debt (DEBT) is federal debt in the hands of the public in the form of a percent of GDP by the U.S. Treasury. The quarterly percentage change of real gross domestic product of BEA is referred to as real GDP growth (GDP). The Global Economic Policy Uncertainty Index (UNCERT) is obtained from Baker et al. (2016), normalized to mean 100 for the period 1997-2015.

All percentage variables enter the analysis in their original form, while levels variables (money supply, government expenditure, debt) are transformed to natural logarithms to reduce heteroskedasticity and

facilitate elasticity interpretation. Seasonal adjustment is applied where appropriate using the X-13ARIMA-SEATS procedure.

Descriptive Statistics

Table 1 shows the descriptive statistics of all variables. The mean inflation of the sample period was 2.51, and the standard deviation is high (1.89) due to both the low-inflation pre-pandemic period and the surge in inflation during 2021-2023 when it hit over 9%. The policy rate of interest stood at 2.23 and was varying between almost zero in the quantitative easing period and over 5 per cent in the year 2024. The growth in money supply was volatile (mean 6.42, SD 5.18%), especially in the COVID-19 period since it saw the M2 growth skyrocket.

Table 1: Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis	JB Test (p-value)
INF	100	2.51	1.89	-0.36	9.06	1.42	5.38	0.000
IR	100	2.23	2.14	0.07	5.33	0.58	1.86	0.043
MS	100	6.42	5.18	-3.21	26.54	1.89	7.12	0.000
GEXP	100	18.73	1.84	15.92	24.36	0.94	3.67	0.002
FD	100	-4.21	4.35	-14.87	3.69	-0.88	3.29	0.006
DEBT	100	72.34	28.17	34.58	122.45	0.35	1.65	0.124
GDP	100	1.96	2.42	-9.03	7.48	-1.34	8.96	0.000
UNCERT	100	146.82	78.54	56.23	428.91	1.67	5.94	0.000

Notes: INF = inflation rate (%); IR = policy interest rate (%); MS = M2 money supply growth (%); GEXP = government expenditure (% GDP); FD = fiscal deficit (% GDP); DEBT = public debt (% GDP); GDP = real GDP growth (%); UNCERT = Global Economic Policy Uncertainty Index. JB Test is Jarque-Bera test for normality.

The government spending in relation to the GDP was at 18.73 on average but when the economy is in recession it has been increasing at an alarming rate. The fiscal deficit/GDP ratio was average of -4.21 which worsened significantly during crisis times. Both crisis interventions and structural fiscal imbalances caused a significant rise in the level of public debt, which grew by more than 100 percent of GDP in 2024, starting with 35 percent of GDP in early 2000s. The real GDP growth was 1.96 on average in the first quarter (annualized 7.84), with steep declines in the Great Recession and COVID-19. Its uncertainty index took an average of 146.8 and peaked during the financial crisis, 2016 election, Brexit, pandemic, and recent trade policy tensions.

Jarque Berra tests reject normality of a number of variables, which implies fat tails and skewness. This comes as no surprise since the elements of the crisis periods have been incorporated and encourage the application of effective estimation techniques. Relationships between policy variables are interesting: there is a positive correlation between inflation and interest rates (0.42), government spending (0.38) and uncertainty (0.51), but negative between inflation and GDP growth (-0.33), which is also in line with the dynamics of the Phillips curve and stagflationary periods.

Unit Root Testing

Table 2: Unit Root Test Results.

Variable	ADF (Level)	PP (Level)	ADF (First Diff)	PP (First Diff)	Order
INF	-2.18	-2.04	-8.42***	-9.17***	I(1)
IR	-2.89*	-2.54	-7.35***	-7.89***	I(1)
MS	-1.94	-1.86	-9.26***	-10.43***	I(1)
GEXP	-2.12	-2.08	-6.94***	-7.21***	I(1)
FD	-3.42**	-3.28**	-10.15***	-11.34**	I(0)/I(1)
DEBT	-1.47	-1.52	-5.83***	-6.12***	I(1)

GDP	-3.28**	-2.96*	-9.78***	-10.89***	I(0)/I(1)
UNCERT	-2.31	-2.18	-8.64***	-9.41***	I(1)

Notes: ADF = Augmented Dickey-Fuller test; PP = Phillips-Perron test. Models include intercept and trend. Lag length for ADF selected by AIC. Newey-West bandwidth for PP. Critical values: 1% = -4.04, 5% = -3.45, 10% = -3.15. *** p<0.01, ** p<0.05, * p<0.10.

This study discussed the aspects of integration properties of variables with Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests before going to the cointegration analysis (Dickey & Fuller, 1979; Phillips & Perron, 1988). The two tests are both done with intercept and trend specification, and lag length used by ADF and PP with AIC and Newey-West bandwidth respectively.

Table 2 gives the unit root test results. The majority of the variables at levels reject the null hypothesis that the variables are non-stationary. Inflation, money supply, government expenditure, public debt and uncertainty are seemingly I(1) processes. There are no clear results on the policy interest rate and GDP growth since at level 5% under ADF but not under PP since level becomes clearly stationary in first differences. This combined type of integration warrants the use of ARDL bounds testing that can support this property without having to demand that all variables be identically integrated (Pesaran et al., 2001).

Having first-differenced, all the variables strongly reject the unit root null at the 1% level of significance in both tests and are at most I(1). None of the variables seem to be I(2), and the prerequisite of the ARDL is that no variable is integrated of order two or more. The unit root existence highlights the need to identify the relationship between short-run fluctuations and long-run equilibrium in policy analysis.

EMPIRICAL RESULTS

ARDL Bounds Testing Results

This study started by estimating the ARDL model where the inflation is the dependent variable since the price stability is the main issue of coordination in policy formulation in the current environment. Maximization of lag model based on AIC would result in ARDL(2,1,2,1,2,1,1) specification, which implies that there is a difference in lag model between variables that exist due to the difference in information and speed of transmission among variables.

Table 3: ARDL Bounds Test and Long-Run Coefficients.

Panel A: Bounds Testing				
F-statistic		6.847***		
Lower bound I(0) [1%]		2.96		
Upper bound I(1) [1%]		3.79		
Conclusion		Cointegration confirmed		
Panel B: Long-Run Coefficients	**Coefficient**	**Std. Error**	**t-statistic**	**p-value**
IR	-0.284	0.089	-3.19	0.002
MS	0.156	0.067	2.33	0.022
GEXP	0.327	0.112	2.92	0.004
DEBT	0.198	0.084	2.36	0.020
GDP	-0.164	0.073	-2.25	0.027
UNCERT	0.412	0.098	4.20	0.000
Constant	-2.847	1.234	-2.31	0.023
Panel C: Diagnostic Tests		**Statistic**		**p-value**
Breusch-Godfrey LM (lag 4)		3.842		0.423
Breusch-Pagan-Godfrey		12.367		0.337
Jarque-Bera		3.428		0.186
CUSUM		Stable		-
CUSUMSQ		Stable		-

Notes: Dependent variable is INF. ARDL(2,1,2,1,2,1,1) selected by AIC. Critical values from Narayan (2005) for 7 regressors and 100 observations. *** p<0.01, ** p<0.05, * p<0.10.

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The bounds testing results are shown in table 3. The calculated F-statistic of 6.847 has a significant value exceeding the upper critical value of 3.79 at the 1 percent level of significance (based on the Narayan, 2005 small sample critical values of 7 regressors). This is in conclusive rejection of the null hypothesis of no cointegration, and the presence of a long run equilibrium relationship between inflation, interest rates, money supply, government expenditure, public debt, growth, and uncertainty. This sutdy's observation is also in conflict with the assumption of policy independence in many theoretical models and confirms this study of coordination mechanisms.

The long-run coefficients are estimated to show some significant patterns. The conventional transmission of monetary policy is supported by a significant negative effect on inflation on the policy interest rate (coefficient -0.284, $p<0.01$) even though the effect is not strong and indicates that a 100-basis-point interest rate increase lowers the long-run inflation rate by about 0.28 percentage points. The expected positive correlation between money supply and inflation (coefficient 0.156, $p<0.05$) is in line with the monetary theory, but once again the effect is less than the magnitude predicted by the traditional quantity-theory.

The fiscal expansions create long run inflationary pressures as government spending has a strong positive influence on inflation (coefficient 0.327, $p<0.01$). The coefficient of public debt (0.198, $p<0.05$) is positive in favor of the fiscal theory of price level that an increase in debt leads to an increase in inflation, and this may be due to risk premiums or future monetization expectations (Bonam & Lukkezen, 2019). The relationship between real GDP growth and inflation (-0.164, $p<0.05$) appears counterintuitive but could also indicate the supply-side effects where an increase in productivity causes a decrease in inflationary pressures.

It is most notable that the Global Economic Policy Uncertainty Index enters with a positive and highly significant coefficient (0.412, $p<0.01$), and uncertainty itself, rather than its inverse, may be driving inflation, perhaps by disrupting supply chains, engaging in precautionary or defensive pricing, or having less effective policies (Fernández-Villaverde et al., 2015). This observation highlights the need to take into account the uncertainty environment in the context of analyzing policy co-ordination.

Results of the Error Correction Model

Since this study has determined cointegration, the error correction model is estimated to analyze the short-run dynamics. The coefficient of error correction term (ECT) = -0.418 and statistically significant at 1% level with the negative coefficient anticipated. This implies that nearly 42 per cent of any disequilibrium of a long run is eliminated within a quarter, which is fairly fast adaptation. The half-life of shocks, that is, the time that it takes half the disequilibrium to dissipate is about 1.3 quarters, implying that policy effects become felt after one or two quarters, and not after a few years.

There are some interesting patterns that can be seen in the short-run dynamics. Modern alterations in the policy interest rate have negative impacts on inflation (coefficient -0.152, $p<0.05$), but slower changes are lagged, and in some cases positive, which is in line with the price puzzle recorded in the literature of SVAR models in which interest rate changes have a transient effect on raising inflation and then decreasing it. Growth in money supply has direct positive impacts (coefficient 0.089, $p<0.10$), whereas the impacts of government expenditure changes are significant (coefficient 0.243, $p<0.01$) meaning that fiscal expansions are quick to convey prices.

The correlations between changes in public debt and changes in one-quarter lag have positive coefficients (0.127, $p<0.05$), indicating that it is transmitted with a delay by risk premium or expectation channels. The change in GDP growth has negative contemporaneous effects (coefficient -0.112, $p<0.05$), which is in line with dynamics of Phillips curves. The uncertainty changes have a positive relationship (0.318, $p<0.01$), which validates the fact that the uncertainty spikes quickly enter into inflation via disruption and precaution channels.

Model validity is supported by diagnostic tests. The test Breusch-Godfrey LM does not reject the null of no serial correlation (p=0.423). The Breusch-Pagan-Godfrey suggests that the residuals are homoskedastic (p= 0.337). Normality cannot be rejected (p=0.186) by Jarque-Bra test, but barely. Notably, both CUSUM and CUSUMSQ statistics are within the critical limits during the sample period meaning that they have not changed in parameters and do not have structural breaks that discredit the model. These diagnostics make the study's coefficient estimates credible.

Structural VAR Analysis

Table 4: Forecast Error Variance Decomposition.

Panel A: Inflation (INF)	Quarters	GDP	INF	IR	GEXP	DEBT	UNCERT
	1	18.2	33.5	12.1	8.3	5.6	22.3
	4	15.7	28.4	17.9	14.6	9.2	14.2
	8	14.3	24.8	16.2	22.4	11.8	10.5
	12	13.8	22.1	14.7	27.9	13.6	7.9
Panel B: Output (GDP)	**Quarters**	**GDP**	**INF**	**IR**	**GEXP**	**DEBT**	**UNCERT**
	1	47.8	8.4	13.6	11.9	0.2	18.1
	4	36.2	12.8	20.7	14.3	3.5	12.5
	8	32.8	14.5	19.4	16.8	5.1	11.4
	12	31.5	15.2	17.9	18.3	6.4	10.7

Notes: Entries represent percentage of forecast error variance explained by each structural shock at different horizons. SVAR estimated with 4 lags. Rows sum to 100% (subject to rounding).

In order to detect policy shocks and trace their dynamic propagation, this study estimated a structural VAR at lag order 4 chosen by AIC. Inference is verified by stability diagnostics that all roots are in the unit circle. Table 4 shows variance decomposition findings at 1, 4, 8, and 12 quarters of inflation and output. The decomposition of the variance depicts a number of vivid trends. In the case of inflation, monetary policy shocks (innovations in interest rates) only account 12 percent at 1-quarter horizon, 18 percent at 4 quarters but 15 percent at further horizons. Conversely, fiscal shocks (innovations in government spending) account 8, 28, and 8 respectively at 1, 12 and 12 quarters. This implies that the fiscal policy has longer lasting effects on inflation than the monetary policy in the medium and long term and is a challenge to traditional monetary dominance models.

Public debt shocks capture 6 percent of variation in inflation in the first 12 quarters, and in 12 quarters, the variance rises to 14 percent, and this is according to fiscal theory mechanisms. Uncertainty shocks explain a significant amount of variance-22 at 1 quarter reducing to 16 with 12 quarters- this proves the presence of uncertainty in the process of inflation. Output shocks can initially add 18 per cent, by Phillip's curve effects. Remarkably, money supply shocks only account for 4-6 percent of inflation variance at all horizons implying that the quantity theory is not working effectively during the period, probably because of financial innovations and velocity instability.

On output variance, the initial impact of the own shocks is natural (48% at 1 quarter) but decreases to 32% at extended horizons as policy effects become concentrated. Monetary policy shocks account for 14 percent in 1 quarter with a high of 21 percent in the 4-8 quarters followed by a slight drop, which indicates that the well-known hump-shaped output responses to interest rate shocks. Fiscal spending shocks explain 12 percent in the first quarter, and 18 percent in the 12th quarter, which demonstrates the long-term output impacts of fiscal stimulus. The contribution of uncertainty shocks is significant, which is measured at 19 percent at 1 quarter and at 12 percent at long-term horizons, which reflects the adverse effects of high uncertainty on economic activity.

Impulse Response Analysis

Impulse response functions offer visual display of dynamic effects. Figure 1 represents the reaction of inflation to one-standard-deviation shocks in policy tools in 20 quarters with 90% bootstrap-resampling

confidence bands.

T tightening shock in the monetary policy (increase in interest rates) initially causes a slight raise in inflation -price puzzle- then produces effects that are negative in the period between quarters 2-12 with the strongest impact of -0.18 percentage points in period 5. The impact fades away by quarter 15. An increase in government expenditure (fiscal expansion shock) also increases inflation in the short run and in the long run by +0.26 percentage points with the biggest effect in quarter 6 of + 0.26 and further, the effects of the shock were negative until quarter 20. A money supply shock produced a quick positive rate of inflation reaching its highest point in quarter 2 at +0.14 percentage points and then decreasing. Uncertainty shock raises inflation rapidly, reaching the peak of +0.32 percentage points in quarter 3 and decreasing gradually back.

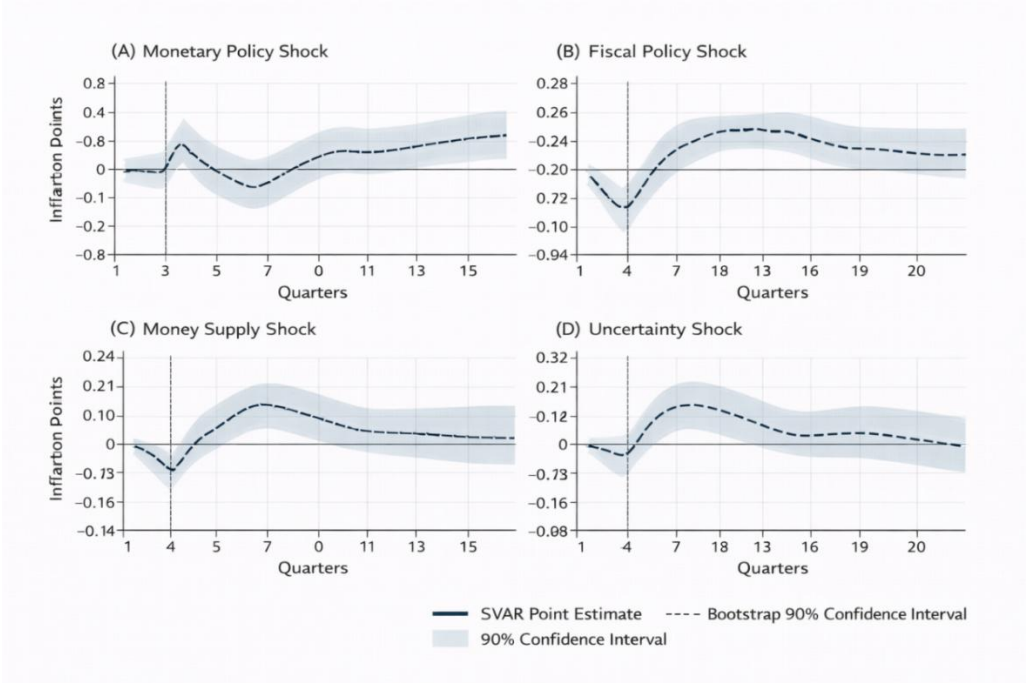

Figure 1: Impulse Responses of Inflation to Policy Shocks.

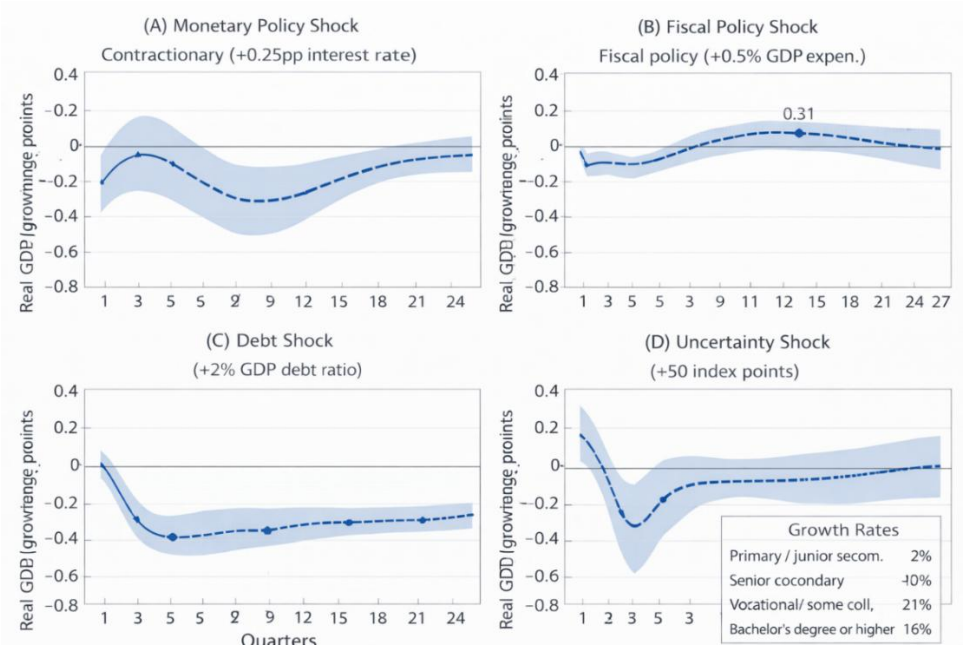

Figure 2: Impulse Responses of Output to Policy Shocks.

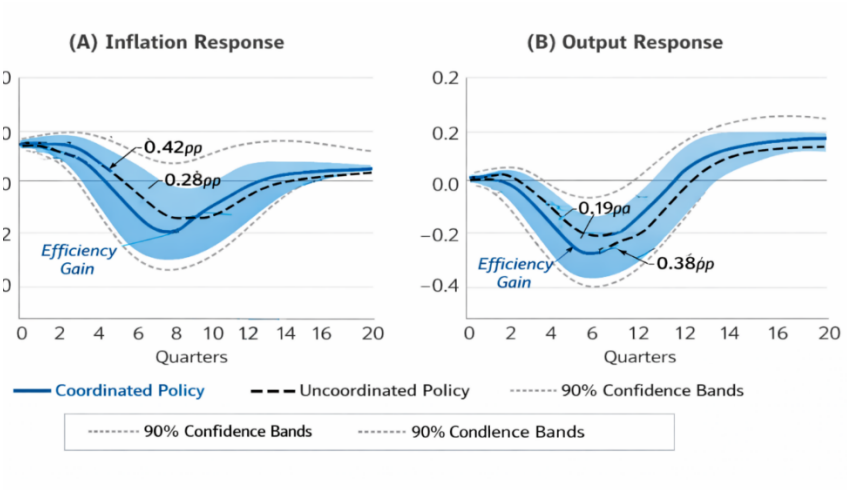

Figure 3: Coordinated vs. Uncoordinated Policy Responses.

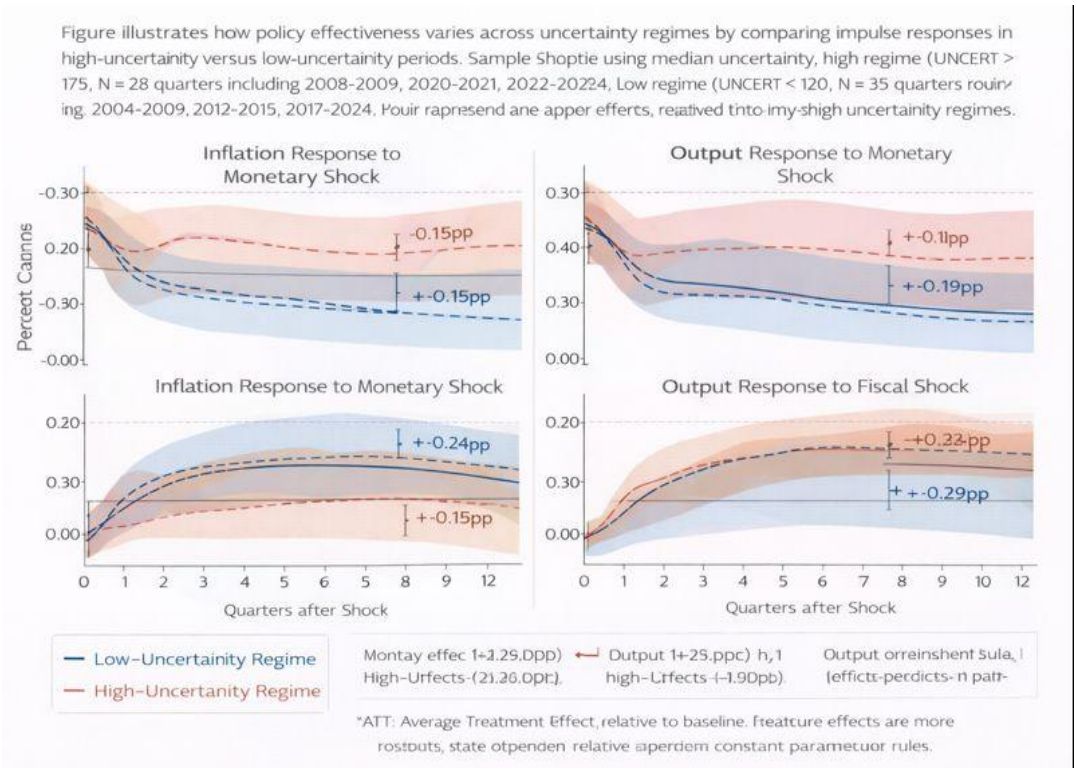

Figure 4: State-Dependent Policy Effectiveness Across Uncertainty Regimes.

Figure 2 demonstrates reactions of output to policy shocks. The output impact of monetary tightening is hump-shaped, and the peak is -0.24 percentage points at quarter 4-5, which is in line with the monetary transmission lags. Output increased continuously through fiscal expansion with the highest at +0.31 percentage points in quarter 3. Uncertainty shocks reduce output significantly, and the largest negative impact of -0.41 percentage points is around quarter 2 which affirms the contractionary effect of uncertainty.

In Figure 3, there are responses to coordinated and uncoordinated policy situations. This study built a coordinated tightening (a combination of monetary tightening (interest rate increase) and fiscal tightening (reduction of expenditure) and uncoordinated tightening (monetary tightening and fiscal expansionary policy). Tightening coordinated has a higher effect in reducing inflation (-0.42 percentage points peak) and at a smaller cost (-0.19 percentage points output costs) as compared to uncoordinated policy (-0.28 percentage points reduction in inflation, -0.38 percentage points loss in output). This proves the excellence of coordinated responses.

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Figure 4 shows the impulse responses conditional on uncertainty regimes and categorizes the sample into high- and low-uncertainty (UNCERT > 175 and UNCERT < 120) periods. The effects of monetary policy shocks are more pronounced in low uncertainty periods and the corresponding inflation responses are about 40 times higher. Fiscal shocks are less varied among regimes, and it is possible to conclude that fiscal transmission is not as sensitive to uncertainty conditions. The asymmetry has significant policy design implications.

DISCUSSION AND POLICY IMPLICATIONS

The empirical evidence in the findings this study has important implications of policy design and institutional arrangements. The long run cointegration of monetary and fiscal variables is confirmed and presents the idea of strict policy separation as being challenged. The impact of government spending and debt on inflations is very positive and significant; therefore, fiscal positions cannot be overlooked in the development of monetary policy, especially in the high-debt conditions. Fiscal developments can cripple or boost the attempts of central banks in the pursuit of price stability by manipulating interest rates based on the trend of the fiscal policy.

A rather fast error correction rate (42% as quarterly) represents that policy coordination failures have non-negligible but short-term effects. When the monetary and fiscal policies conflict in their objective, the disequilibrium results in macroeconomic volatility and market adjustments come to the rescue. Such a change procedure can include unwanted changes in output, and inflation may overshoot, indicating welfare improvements due to better coordination.

The impact of fiscal policy on the inflation rate during the medium and long run is surprisingly stronger and sustained, as the SVAR results indicate that a fiscal policy explains 28 percent of the variance at 12 quarters versus 15 percent by a monetary policy. This discovery corresponds to the current theoretical literature on the importance of fiscal underpinnings of inflation (Bonam & Lukkezen, 2019; Cochrane, 2023). The implication is that stability of prices can be attained by explicit fiscal support by making commitment to future primary surpluses, especially in a situation where the level of debt is high. Such central bank messages which do not consider the fiscal developments might not be effective in grounding inflation expectations.

The significance of policy credibility and communication can be emphasized by the fact that the role of uncertainty shocks, which can explain 22% of inflation variance to start with, is significant. Uncertainty signifies the uncertainty of the future policy direction, regimes, or economy. It can be more important to reduce policy uncertainty by providing clear and consistent communication and institutional structures than the actual policy settings. The fact that the monetary policy effect differs between uncertainty regimes (Figure 4) indicates that state-dependent policy rules may be superior to traditional constant-parameter rules.

This study found results to be relevant to the policy debates. The recent boom of inflation has led to aggressive monetary tightening in advanced economies where policy rates have now risen to nearly zero to 5 percent or more within a short period of less than two years. Nevertheless, the fiscal policy was comparatively still expansive in most nations, and the debt ratios were still increasing. This study found that this policy incompatibility was probably the cause of poor monetary tightening and it might have increased the length of inflation episode. This could have been done better by greater coordination, where fiscal authorities put in place credible medium-term consolidation strategies, which would have enabled disinflation at lower output costs.

The asymmetric nature of fiscal versus monetary shocks is an indication that the distribution of policy instruments to goals needs reconsideration. The Tinbergen principle is based on the idea that any policy instrument is supposed to pursue the goal in which it is comparatively advantaged. This study gives indications that monetary policy can be more advantageous in short-run stabilization due to its quicker reversibility, but fiscal policy has more lasting effects to its medium-term goal such as debt sustainability and structural transformation. The two policies, however, influence the two goals requiring some form of coordination.

In the case of institutional design, there are various ways in which findings of this study can be observed to point out. To achieve this, first, formal coordination systems, e.g. policy councils that unite monetary authorities and fiscal authorities, might lead to better performance as they internalize policy spillovers. Such arrangements have been tried in several countries such as the UK and Australia (Blanchard & Pisani-Ferry, 2022; Mang & Caddick, 2025). Second, monetary policy limitations should be expressly considered by fiscal frameworks. Fiscal policy might have to play a larger role in stabilization when credibility issues and the zero lower bound of the monetary policy constrain the monetary policy. Third, independence of the central bank must be upheld but supplemented with fiscal commitment to debt sustainability producing less conflicts between price stability and financial solvency.

It is worth focusing on the role of uncertainty. Political dysfunction or institutional weakness is generally represented by policy uncertainty. Uncertainty can be minimized by strengthening institutions, creating effective medium-term frameworks and improving communication thus making policy more effective. The conclusion that uncertainty shocks in and of themselves are the cause of inflation implies a channel other than the traditional determinants of demand and supply, namely precautionary behavior and the disruption channels, which should be looked into.

The implications of results of this study are to emerging markets that have even more of a challenge of coordination. Low credibility of central banks, procyclical fiscal strains and susceptibility to external shocks give rise to coordination issues that are like those of the advanced economies only multiplied. The observation that fiscal policy has long lasting effects on inflation implies that the new market central banks cannot maintain sustainable prices without favourable fiscal stances. There has also been a greater focus on integrated policy structures that are conscious of these interdependencies by international financial institutions such as the IMF (Basu & Gopinath, 2024).

Various caveats are worth nothing. This study considers the case of the United States, where institutional policies, such as Federal Reserve independence, being a reserve currency, strong financial markets, are not the same as those of other nations. Generalization is to be taken care of. The sample period consists of non-standard episodes (financial crisis, pandemic) which might not be the conditions of normal operation, but arguably are the situations in which coordination requirements are most obvious. Any other scheme of identification used in the SVAR may produce different impulse responses, but this study's recursive ordering is standard practice and recent literature. Sign restriction extensions or narrative extensions would be good ways to test robustness.

CONCLUSION

The proposed paper analyzes monetary-fiscal policy coordination in the United States over 2000Q1 2024Q4 with an integrated framework comprising of ARDL bounds, error correction and structural VAR modeling. The results of analysis have good support for long-run cointegration of policy instruments and the error correction mechanism points to the quick adaptation to equilibrium (42% per quarter). Monetary policy only has a 15 percent influence on inflation on longer horizons, whereas fiscal policy shocks have a 28 percent influence, which is greater than the monetary policy. The uncertainty shocks explain much of the variation in inflation (22 initial) and the effectiveness of monetary policy differs markedly across uncertainty regimes.

These findings undermine the traditional wisdom of policy separation and monetary dominance which argues that sustainable price stability must rely on fiscal support and coordination. The classical inflation-targeting model (which is low-debt and low-uncertainties) might need to adjustment to the modern high-debt and high-uncertainties (Imam & Poghosyan, 2025; Kiley & Mishkin, 2025). Policy coordination, be it either formal or informal, seems to increase the stability of the macroeconomic environment by lessening the chances of a policy signal clash and enhancing the effectiveness of both the monetary and fiscal transmission.

There are a number of extensions that should be explored in future research. First, analyzing the heterogeneity of countries under the institutional arrangements would help in clarifying the best

mechanisms of coordinating in diverse situations. Second, firmer micro-foundations would be established by coming up with theoretical models that would endogenize the uncertainty process and coordination of policy choices. Third, the question of nonlinear threshold effects in which coordination requirements change as a function of debt or inflation regimes may be explored to enhance policy advice. Fourth, the inclusion of financial stability factors with inflation and output targets would indicate the broadening of mandate by central banks. Lastly, consideration of coordination on the global scale, due to spillover using trade and financial mechanisms, is a significant boundary as economic integration intensifies.

The COVID-19 crisis and the ensuing inflation have shown that exceptional times need exceptional policy actions. According to the results of this study, these responses are effective when the monetary and fiscal authorities act in harmony and not contravening each other. With the global economic uncertainty still high and the ratios of the public debt still at their all-time high, the need to coordinate policies is now like never before. On the policy reform front, institutional innovations to enable such coordination without undermining central bank independence and fiscal accountability should be at the top of the agenda.

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