FISCAL POLICIES ARE NOT ALL ALIKE: COMPOSITION EFFECTS, REGIME SWITCHING AND UNCERTAINTY

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ABSTRACT

This paper examines the effects of fiscal policy on GDP, accounting for its composition and the prevailing policy regime (fiscal or monetary dominance). Using U.S. data, we estimate a Markov-switching Taylor rule to identify time-varying regimes and assess the dynamic effects of fiscal shocks—distinguishing between public consumption and investment—through nonlinear local projections. Our results show that under fiscal dominance fiscal shocks bring about larger and more persistent output responses. A DSGE model with regime shifts rationalizes these findings, showing that public consumption mainly boosts demand, while public investment enhances productivity through capital accumulation. The difference between the two components is particularly pronounced under monetary dominance, where monetary tightening dampens the demand-driven impact of consumption but not the supply-side gains from investment. Finally, we show empirically that policy uncertainty modulates these effects: government consumption is more stimulative in low-uncertainty environments, whereas government investment seems not to depend strongly on the uncertainty scenarios.

KEYWORDS

Fiscal multiplier; government investment; economic policy uncertainty; monetary-fiscal interactions; policy dominance.

JEL Codes

E52, E32, C32, E58, E61, E63.

Fiscal policies are not all alike: composition effects, regime switching and uncertainty*

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January 9, 2026

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1 Introduction

The rise in public debt following recent economic crises has reignited concerns about fiscal sustainability and prompted renewed calls for fiscal consolidation. In addition, there is the need to preserve public investment to support long-term priorities, such as the ecological transition and national security.

As a result, the composition of consolidation has become a key policy concern, since its real economic costs depend on the relative multipliers of public consumption and public investment. At the same time, large-scale *quantitative easing* programs by central banks have facilitated the accumulation of public debt, while the subsequent shift toward more orthodox monetary policy through *quantitative tightening* and the consequent increase in interest rates has tightened fiscal constraints. These contrasting monetary regimes underscore how the effectiveness of fiscal policy depends strongly on monetary policy.

The interaction between fiscal and monetary policy thus generates a range of different policy regimes.

In an increasingly uncertain geoeconomic environment marked by renewed geopolitical tensions, macroeconomic stability is more likely when regime shifts themselves do not become a source of additional global uncertainty. Against this backdrop, this paper aims to shed light on the three above-mentioned dimensions of fiscal policy effectiveness—namely, the composition of spending, the prevailing policy regime, and the degree of policy uncertainty. We investigate, from both an empirical and a theoretical perspective, the extent to which fiscal policy outcomes are conditioned by each of these dimensions and by their interactions.

Our work connects several strands of the literature examining how the impact of fiscal policy on GDP depends jointly on its composition—between public consumption and public investment—and on the prevailing policy regime, that is, whether the economy is under monetary or fiscal dominance.

While Boehm (2020), and Haug and Sznajderska (2024) suggest that public consumption and public investment have comparable effects on GDP—and in some cases may even exert a negative influence—other studies reach different conclusions. Burriel et al. (2010), Auerbach and Gorodnichenko (2012), and, more recently, Deleidi (2022) find that public investment exerts a significantly larger positive impact on GDP than public consumption. Accordingly, Klein and Linnemann (2023) find that the composition of fiscal policy is crucial: investment shocks display stronger and more persistent effects on GDP than consumption shocks. Their evidence that consumption shocks may even induce disinflation further reinforces the idea that the two spending components operate through different channels. The effectiveness of these fiscal components, however, may crucially depend on the underlying policy regime. Since the seminal contribution by Leeper (1991), the literature has identified two stable configurations: monetary dominance, in which monetary policy ensures price stability while fiscal policy maintains debt sustainability, and fiscal dominance, in which fiscal policy drives the price level and monetary policy accommodates fiscal expansion. Under monetary dominance, the effect of fiscal policy on GDP may be dampened by a tightening of monetary policy in response to rising inflation, whereas under fiscal dominance the same fiscal expansion is typically amplified (Davig and Leeper, 2011). In a similar vein, empirical studies show that fiscal multipliers are larger when monetary policy is accommodative (Cloyne et al., 2020) or constrained by the zero lower bound (Canova and Pappa, 2011; Miyamoto et al., 2018; Ramey and Zubairy, 2018).[1]

In addition, a separate strand of the literature has emphasized the role of macroeconomic uncertainty in shaping policy transmission (Bianchi and Melosi, 2017; Bianchi et al., 2023; Coibion et al., 2024). This line of research shows that uncertainty can alter the effectiveness of macroeconomic policies by affecting private agents' behavior and the formation of expectations. Recent contributions suggest that economic policy uncertainty may condition the size of government spending multipliers through different channels, with several studies documenting weaker output responses during periods of high uncertainty, while others point to more heterogeneous effects depending on the nature of uncertainty and the economic environment (Li and Wei, 2022; Jerow and Wolff, 2022; Goemans, 2023).

Using quarterly U.S. data spanning 1981–2024, we identify distinct policy regimes by estimating a Markov-switching (MS) Taylor rule.[2] The first step of the empirical approach allows us to extract the probabilities associated with different policy regimes. These probabilities indicate the likelihood of the economy being in either a monetary or a fiscal dominance regime. As regards the second step of the empirical approach, we follow the recursive identification strategy of Blanchard and Perotti (2002) to recover fiscal shocks, distinguishing between shocks to public consumption and shocks to public investment.[3] In the third step, we employ a non-linear specification, estimating a conditional threshold model (TM) based on policy and variance regimes (Jordà, 2005). Subsequently, we estimate a conditional smooth transition model (STM) following Auerbach and Gorodnichenko (2012). The STM incorporates the smoothed MS probabilities estimated earlier, allowing for time-varying weights across regimes and capturing gradual transitions in fiscal effects. After following these three steps, we highlight instrument-dependent and regime-dependent fiscal multipliers.

This new empirical evidence is supported by the theoretical outcomes of a small-scale DSGE model that differentiates between public consumption and public investment based on their respective supply- and demand-side effects, according to a setup initially developed by Aschauer (1989) and Baxter and King (1993). The model helps clarify the rationale of the empirical results and adds a theoretical contribution to the paper. As a final stage, following Mao et al. (2023), who highlight the relevance of uncertainty surrounding fiscal–monetary configurations, we take this line of research a step further by examining regime uncertainty from an empirical perspective and allowing it to condition the transmission of fiscal shocks. Specifically, we exploit the variance emerging from the estimation of the MS Taylor rule

[1]Recent contributions emphasize that the effects of government spending crucially depend on their persistence and long-run implications (Antolin-Diaz and Surico, 2025).

[2]Gonzalez-Astudillo (2018) builds on Leeper (1991)'s classification of four policy regimes and shows that U.S. data contain a few very short-lived episodes corresponding to an indeterminacy regime, as well as a single, short-lived episode of an exploding regime. These episodes align with periods of transition between monetary and fiscal dominance. In contrast, because of sample-length constraints our analysis assumes only two policy regimes, and we further investigate in section 6 how regime variance affects the real impact of fiscal policy. Our empirical results indicate that regime variance tends to peak during regime shifts, as in Gonzalez-Astudillo (2018), but not exclusively: we also identify episodes of heightened uncertainty during periods for which stability was originally taken for granted.

[3]To the best of our knowledge, a dataset decomposing between public consumption shocks and public investment shocks does not exist, and therefore the adoption of a narrative approach using historical information to isolate episodes of exogenous fiscal policy changes like in Ramey and Shapiro (1998) is not possible here.

to construct high- and low-uncertainty states, which we then interact with monetary and fiscal dominance regimes. This allows us to assess whether the output response to fiscal expansions—through public consumption or public investment—depends not only on the prevailing policy regime but also on the degree of uncertainty surrounding its identification.

Our work is also related to Beck-Friis and Willems (2017), who study fiscal multipliers under the Fiscal Theory of the Price Level, and Ascari et al. (2023), who analyze anticipation effects by preassigning periods of fiscal and monetary dominance. Building on these contributions, our paper takes a step further by estimating time-varying policy regimes and jointly considering fiscal composition and policy uncertainty within a unified framework.

In doing so, the paper makes four main contributions. First, it provides new evidence on how the effectiveness of public consumption and investment varies across fiscal and monetary dominance regimes, offering— to the best of our knowledge— the first attempt in the literature to compute fiscal multipliers under these two policy configurations. Second, it introduces a novel empirical approach that embeds regime probabilities from a MS Taylor rule into both dummy-based and smooth-transition frameworks. Third, it rationalizes the results through a small DSGE model with productive public investment, where we extend the analysis on fiscal multipliers in Beck-Friis and Willems (2017) to the composition effect in public spending. Finally, it shows that fiscal policy effectiveness varies not only across regimes but also with the level of policy uncertainty, for which we construct a new, endogenously estimated measure based on regime-variance dynamics.

The main empirical findings of the paper are as follows. Fiscal dominance systematically amplifies the effects of fiscal policy, leading to larger and more persistent output responses. The difference in the output reaction between consumption and investment is driven mainly by the monetary dominance regime: when monetary policy is restrictive, it dampens the demand-side effects of government consumption but not the supply-side gains from investment. In the short run, regime differences are less pronounced following a public investment shock, consistent with the view that investment is perceived as growth-enhancing and remains effective across policy environments. However, on longer horizons, public investment proves to be more powerful under fiscal dominance, as lower real rates and accommodative monetary policy amplify its impact on output.

These empirical findings are consistent with the predictions of the DSGE model, where public consumption exerts only a demand-side influence, while public investment also enhances supply-side capacity. As a result, an increase in public investment tends to mitigate the inflationary impact of a fiscal shock, in contrast to a shock driven by public consumption. We find that the role of public investment as a booster to the economy is particularly relevant with fiscal dominance, consistently with the empirical evidence. However, it remains that the difference in terms of output of a shock on either public consumption expenditure or public investment is larger under monetary dominance than under fiscal dominance. A public consumption shock under monetary dominance drives the policy rate upward, thus generating a crowding-out effect which is absent after a public investment shock. In contrast, under fiscal dominance, the relative benefit of public investment is slightly lower since in this regime the expansionary effect comes from the decrease in the real interest rate brought about by the higher inflation.

Having established the main empirical results and provided a theoretical rationale through the DSGE framework, we then deepen the empirical analysis by explicitly accounting for uncertainty in policy regime identification. We refer to this new type of uncertainty as estimated economic policy uncertainty (EEPU). Unlike the narrative, newspaper-based EPU index of Baker et al. (2016), our EEPU measure is endogenously estimated from the MS framework and captures the variance in the transition probabilities across policy regimes. We find that public consumption is more expansionary in low-variance states, where uncertainty is low. In contrast, for public investment this difference across variance regimes is less pronounced, although high-variance environments still tend to favor a more expansionary output response.

The paper is organized in the following way. Section 2 presents the estimation of the policy regimes and variances for the USA. Then in Section 3 we use linear projections to evaluate the effects of fiscal shocks based on the policy regimes. Section 4 presents a theoretical model that provides a rationale for the empirical findings. Section 5 presents the results related to EEPU and Section 6 concludes. Finally, an Appendix shows additional results.

2 Estimating policy regimes and economic policy uncertainty

As mentioned in the introduction, we draw on a Markov-Switching approach of the monetary policy rule to identify policy regimes and extract a measure of economic policy uncertainty.

2.1 Methodology

The linear model specification is based on the seminal work of Taylor (1993) and follows a policy rule defined as:

$$i_t = \alpha_0 + \alpha_\pi \pi_t + \alpha_y \hat{y}_t + \epsilon_t, \quad \epsilon_t \sim N(0, \sigma^2), \tag{1}$$

where i_t denotes the policy interest rate, π_t is the inflation rate, $\hat{y}_t$ represents the output gap, and ϵ_t is the error term of the model.

Our analysis focuses on how fiscal multipliers differ depending on whether the Taylor principle holds. We abstract from estimating an explicit fiscal rule and instead identify two regimes through a Markov-switching Taylor rule, interpreting the regime with a sub-unitary interest-rate reaction as a proxy for fiscal dominance.

For the nonlinear framework, we adopt a Markov-switching specification (Hamilton, 1989) that allows both the conduct of monetary policy and the volatility of shocks to vary across regimes (Sims and Zha, 2006). This approach distinguishes changes in systematic policy behavior from periods characterized by unusually large disturbances. In other words, it separates shifts in the central bank's policy rule (e.g., moving from a hawkish to a dovish regime) from episodes in which policy shocks themselves become unusually volatile, ensuring that true regime changes are not confounded with short-lived turbulence.[4]

[4]See Hubrich and Tetlow (2015) and Bianchi and Melosi (2017) for a discussion of why accounting for heteroskedasticity is crucial in structural models. In our setting, coefficient switching captures changes in policymakers' systematic responses or structural shifts in the economy, while variance switching reflects fluctuations in the size of shocks. Following standard MS practice (Sims and Zha, 2006; Bianchi and Melosi, 2017), the two sources of nonlinearity are modeled independently.

The nonlinear specification is expressed as:

$$i_t = \alpha_0(S_t^m) + \alpha_\pi(S_t^m)\pi_t + \alpha_y(S_t^m)\hat{y}_t + \epsilon_t^m, \quad \epsilon_t^m \sim N(0, \sigma^2(V_t^m)), \tag{2}$$

where monetary policy regimes are determined by a first-order Markov chain, S_t^m, which governs the systematic parameters of the policy rule. The regime process, S_t^m, evolves stochastically based on the data and identifies periods of regime changes. Each chain can take two discrete states, $S_t^m \in \{0, 1\}$, with transitions governed by the matrix $P^m = \begin{pmatrix} p_{00}^m & p_{01}^m \\ p_{10}^m & p_{11}^m \end{pmatrix}$, where $p_{ij}^m = \Pr[S_t^m = j | S_{t-1}^m = i]$ and $\sum_j p_{ij}^m = 1$.

Variance regimes, represented by V_t^m, follow a separate two-state Markov chain that captures heteroskedasticity in structural shocks (Sims and Zha, 2006). The associated transition matrix is $Q^m = \begin{pmatrix} q_{00}^m & q_{01}^m \\ q_{10}^m & q_{11}^m \end{pmatrix}$, where $q_{ij}^m = \Pr[V_t^m = j | V_{t-1}^m = i]$.

Importantly, these variance regimes are independent from the policy regimes, allowing us to disentangle the effects of changes in economic policy uncertainty from those driven by shifts in fiscal or monetary dominance. To combine the systematic and variance regimes, we construct a composite Markov chain by taking the Kronecker product of their transition matrices. We estimate the model using a Bayesian approach following Kim et al. (1999) and Koop (2003). Estimation is performed via Gibbs sampling, imposing for the linear model a normal prior for the regression coefficients, with mean zero and variance equal to one, and an inverse-gamma prior for the shock variance, with shape and scale parameters $T_0 = 1$ and $\theta_0 = 0.1$.

To compute regime probabilities for the MS estimation, we apply the recursive filtering algorithm of Hamilton (1989), which updates the probability of being in each regime at time t based on past information and the current observation, combining a prediction step (forward propagation) and an update step (likelihood correction). A Dirichlet prior is specified for each column of the transition matrices, following Chib (1995). For example, $p(p_{00}) \sim D(\alpha_{00}, \alpha_{01})$ with $\alpha_{00} = 15$ and $\alpha_{01} = 5$, implying a mean of 0.75 and variance of 0.009; the same applies to $p(p_{11})$. We perform $M = 7{,}000$ iterations, discarding the first 5,000 as burn-in. The remaining 2,000 draws are used to construct posterior distributions of the model parameters. Further details on the simulation algorithm are provided in Blake et al. (2012).

2.2 Dataset

Our analysis uses U.S. quarterly data from the third quarter of 1981 to the second quarter of 2024. The main variables are the Personal Consumption Expenditures (PCE) price index, real GDP, and a proxy policy rate from the San Francisco Federal Reserve. The PCE index— the Federal Reserve's preferred inflation measure—captures prices of goods and services consumed by households. The proxy rate reflects the stance of monetary policy by incorporating unconventional tools such as forward guidance and balance-sheet adjustments, in addition to the traditional federal funds rate (see Doh and Choi (2016)). The output gap is computed using the Hodrick–Prescott filter ($\lambda = 1600$) applied to real GDP. Additional details on data sources and variable definitions are reported in the Appendix.

2.3 Monetary dominance: when has it happened and in what kind of uncertainty environment?

Since the seminal contribution by Taylor (1993), numerous studies have estimated the U.S. monetary policy rule. Along these lines, Eleftheriou and Kouretas (2023) show that the Fed funds rate satisfies the Taylor principle—responding more than one-for-one to inflation—up to 2008, but not when the sample extends to 2015. In that case, compliance with the principle is restored when using a shadow rate as a proxy for the policy rate.[5]

Our own estimates (in Table 1) are consistent with the literature: the US Fed proxy rate reacts more than 1-for-1 to the PCE inflation rate while it also reacts significantly to the output gap.

Table 1: Proxy Rate and PCE

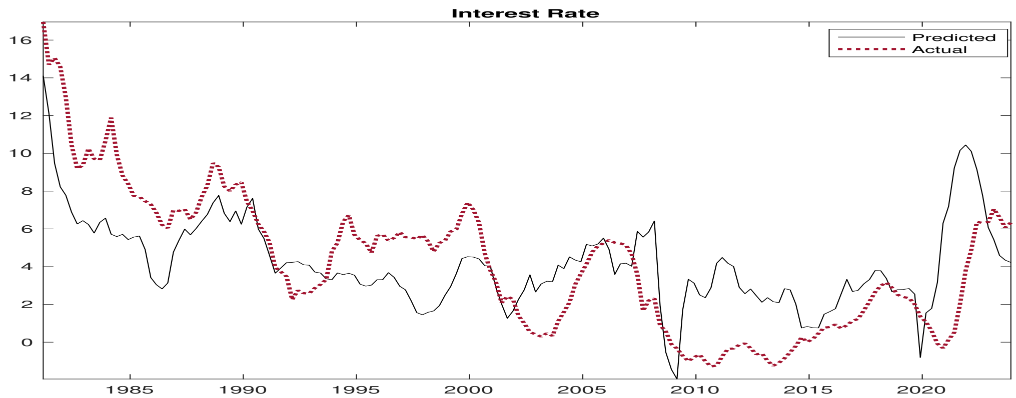
Linear Model				
Monetary Rule $i_t = \alpha_0 + \alpha_\pi \pi_t + \alpha_y \hat{y}_t + \epsilon_t$				
	Mean	**Std**	**CI -**	**CI +**
α_0	0.3599	0.3922	-0.0310	0.7523
α_π	1.4623	0.1356	1.3262	1.5955
α_y	0.2353	0.1692	0.0645	0.4062
σ^2	8.1699	0.8741	7.3338	9.0316

The table presents the estimated parameters of the linear Taylor Rule. The analysis includes the PCE price index, and a proxy interest rate from the San Francisco Federal Reserve. The output gap is calculated using the Hodrick-Prescott filter ($\lambda = 1600$) applied to real GDP. The analysis is based on U.S. quarterly data spanning from the third quarter of 1981 to the second quarter of 2024. The data are sourced from the FRED database.

As Figure 1 shows, there are frequent discrepancies between the actual proxy rate and its predicted value. Before 2000, the actual US Fed policy stands above the predicted rate whereas after 2000, actual monetary policy is less accommodative than the predicted response. Thus, we investigate the possibility of regime switches.

[5] For a broader discussion of empirical estimates and methodological approaches, see Carvalho et al. (2021) and related studies employing OLS, IV, and vector error correction models. These contributions generally confirm that U.S. monetary policy has fulfilled the Taylor principle over most of the post-1980 period.

Figure 1: Predicted vs Actual Interest Rate



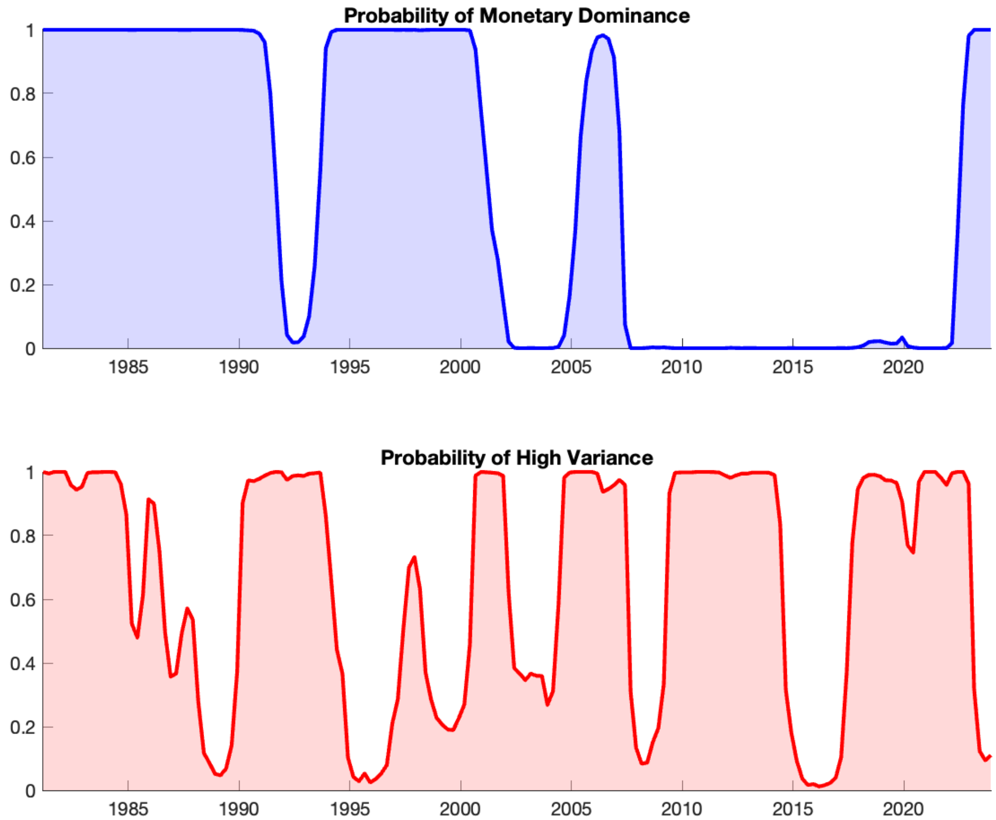
The figure compares the predicted interest rate from a linear model with the actual rate used in the estimation. The analysis incorporates the PCE price index and a proxy interest rate from the San Francisco Federal Reserve. The output gap is estimated using the Hodrick-Prescott filter ($\lambda = 1600$) applied to real GDP. The analysis is based on U.S. quarterly data spanning from the third quarter of 1981 to the second quarter of 2024. All data are sourced from the FRED Database.

Since the seminal contribution by Sims and Zha (2006), an abundant literature has investigated the regime shifts in the reaction of the US Fed towards inflation deviations. Davig and Doh (2014) and Bianchi (2013) showed that the US Fed was hawkish before the 1970s and dovish in the 1970s. A striking result is the long period of hawkishness since the early 1980s. In contrast with more recent contributions (e.g. Bianchi and Melosi (2017) or Gonzalez-Astudillo (2018)), we abstract in the following from the identification of a specific regime for the zero-lower-bound and, in line with Wu and Xia (2016), we use a single policy instrument to identify conventional and less conventional monetary policies: the proxy rate. Thus, we assume that there can be only two different types of policy regime in the economy which depend on their sensitivity towards inflation. The regime of monetary (resp. fiscal) dominance appears when monetary policy reacts more (resp. less) than one-for-one to inflation deviations.

Investigation of the U.S. Fed policy reaction to inflation and the output gap, via the use of the proxy rate, reveals many policy shifts since the 1980s (see Figure 2), in contrast with Bianchi and Melosi (2017). In the latter, the only prominent shift in regime between 1981 and 2015 occurs after the Global Financial Crisis, when the U.S. economy switches from a "monetary-led" regime to what the authors call the "zero-lower-bound" regime. It is also worth noting that Giuli et al. (2025) document monetary dominance in the United States from the early 1980s to the early 2000s. Our results are closer to those found in Gonzalez-Astudillo (2018), where monetary and fiscal regimes alternate regularly and policy shifts occur in 1990, 1993, 2000, 2005 and 2007. In addition, our longer sample permits us to reveal a final policy shift in 2022, with the return to a more aggressive monetary stance against inflation.

The contrasting monetary policy reactions towards inflation deviations and the output gap according to regimes 1 and 2 are reported in Table 2. Regime 1 highlights a 'hawkish' behaviour by the US Fed, thus a regime of monetary dominance, whereas Regime 2 shows a

Figure 2: Smoothed Probabilities.



The figure shows the smoothed probabilities derived from the MS estimation. The analysis incorporates the PCE price index, and a proxy interest rate from the San Francisco Federal Reserve. The output gap is estimated using the Hodrick-Prescott filter ($\lambda = 1600$) on real GDP. The analysis is based on U.S. quarterly data spanning from the third quarter of 1981 to the second quarter of 2024. All data are sourced from the FRED Database.

'dovish' behaviour, thus a regime of fiscal dominance: the reaction to inflation deviations is divided by 3 and it is significantly below unity. Fiscal dominance regime occurred between 1991 and 1993, between 2001 and 2005, and between 2007 and 2021.

Figure 2 also shows the smoothed probabilities associated with the high-variance regime, highlighting periods of elevated EEPU. This variance reflects greater uncertainty in the estimation of the monetary policy regime—i.e., times when the model finds it harder to clearly discriminate between monetary and fiscal dominance, indicating uncertainty about the conduct of policy itself. These include key episodes such as the early 1980s—likely reflecting the Volcker disinflationary shift—the early 1990s and early 2000s, possibly linked to the dot-com crisis, the 2008–2009 global financial crisis, and the COVID-19 pandemic. In each of these periods, the probability of being in a low-variance regime declines sharply, indicating that the MS model successfully captures transitions into high-uncertainty states.

Table 2: MS Estimation

Non Linear Model								
Monetary Rule: $i_t = \alpha_0(S_t)^m + \alpha_\pi(S_t)^m\pi_t + \alpha_y(S_t)^m\hat{y}_t + \epsilon_t$								
	Regime 1				**Regime 2**			
	Mean	**Std**	**CI -**	**CI +**	**Mean**	**Std**	**CI -**	**CI +**
α_0	3.3465	0.6110	2.0134	4.0790	0.3419	0.1987	0.0515	0.6775
α_π	1.1476	0.2044	0.8931	1.5747	0.4132	0.1045	0.2399	0.5761
α_y	0.2492	0.1590	-0.0894	0.4424	0.1187	0.1297	-0.0869	0.3300
p_{00}	0.9231	0.0260	0.8777	0.9613				
p_{11}	0.9217	0.0269	0.8733	0.9600				
Variance Regimes								
	Regime 1				**Regime 2**			
σ^2	3.7286	0.7937	2.6382	5.1543	0.1853	0.0884	0.0723	0.3393
q_{00}	0.8991	0.0302	0.8449	0.9436				
q_{11}	0.8356	0.0540	0.7394	0.9134				
Likehood = -122.9197								

The table presents the estimated parameters of the non-linear Taylor Rule. The analysis includes the PCE price index, and a proxy interest rate from the San Francisco Federal Reserve. The output gap is calculated using the Hodrick-Prescott filter ($\lambda = 1600$) applied to real GDP. The data are sourced from the FRED database. The analysis is based on U.S. quarterly data spanning from the third quarter of 1981 to the second quarter of 2024.

3 The impact of fiscal policy on GDP

Drawing on the regime shifts identified in the previous section, we investigate the differentiated effects on GDP of either public consumption or public investment via local projections in a first stage of the analysis.

The analysis draws on standard data sources. Expenditures data come from the Bureau of Economic Analysis. The GDP and interest rate data are the same as those used in the previous analysis. Nominal expenditure variables were tranformed into real variables after using the GDP deflator provided by Federal Reserve Economic Data (FRED). All details regarding the variables and their respective data sources are provided in the Appendix.

Local projection estimations exclude the period of the COVID-19 pandemic and focus on the period from Q3-1981 to Q1-2020, in order to avoid distortions associated with the exceptional economic conditions and policy responses during the pandemic.

3.1 Linear LP

Expenditure shocks are derived from a Structural Vector Autoregression framework, following the standard identification strategy proposed by Blanchard and Perotti (2002) and recently used by Ramey and Zubairy (2018). Specifically, we assume that government spending does not respond contemporaneously to macroeconomic conditions. The structural identification relies on a three-equation VAR model where total real public spending is ordered first, GDP is ordered second, and the short-term interest rate is ordered third.[6]

[6] By incorporating the short-term interest rate, this approach extends the Blanchard and Perotti identification strategy to account for interactions between monetary and fiscal policies (Perotti, 2005).

The Cholesky ordering reflects the assumption that government spending typically requires more than one period to adjust to changes in macroeconomic conditions. We use 2 lags for parsimony, but our results remain robust when using 4 lags. The term $\varepsilon_{g,t}$ from reduced-form Equation 3 corresponds to the identified expenditure shock, which serves as the structural innovation of interest:

$$g_t = \alpha + \sum_{j=1}^{2} \beta_j g_{t-j} + \sum_{j=1}^{2} \gamma_j y_{t-j} + \sum_{j=1}^{2} \delta_j i_{t-j} + \beta_T \,\text{trend} + \varepsilon_{g,t}, \tag{3}$$

where g_t represents total real government expenditure (deflated using the GDP deflator), y_t denotes real output, and i_t is the short-term interest rate. All variables are expressed in log levels.

Subsequently, this shock is incorporated into the local projection framework (Jordà, 2005) to estimate its dynamic effects on economic activity. Our specification is as follows:

$$y_{t+h} = \alpha^h + \beta_h \varepsilon_{g,t} + \phi x_{t-k} + u_{t+h}^h \quad h = 0, 1, ..., H-1 \quad k = 1, 2 \tag{4}$$

where x_{t-k} is a vector of control variables that includes two lags of GDP, public expenditure, interest rates, and a time trend. This approach is consistent with established methodologies in the literature, including those of Auerbach and Gorodnichenko (2017) and Ramey and Zubairy (2018). The coefficients β_h in this framework represent the impulse response of the dependent variable (y_t) to an exogenous shock in government expenditure (g_t), capturing its dynamic effects over time horizons $h = 0, 1, 2, \ldots, H$.

All the estimations are obtained using the HAC (heteroskedasticity and autocorrelation consistent) robust estimator, which corrects for heteroskedasticity and autocorrelation. We use the estimator proposed by Newey and West (1987).

To gain further insights, we extend the analysis to identify shocks to government consumption and investment expenditure separately. For this purpose, we employ a four-equation VAR model, where public investment (gi_t) is considered more exogenous than government consumption (gc_t). The remaining variables in the model are output (y_t) and the interest rate (i_t). This specification treats public investment as more exogenous based on the premise that investment decisions are often strategic, guided by political and industrial considerations, and less influenced by contemporaneous economic activity.

Finally, we reapply the local projection methodology (Equation 4) to estimate the dynamic effects of exogenous shocks to both government investment and consumption on output. This approach allows us to quantify how unexpected changes in each component of government spending influence economic activity over time.

3.2 Non Linear LP

As regards the non-linear specification, we estimate a conditional TM based on policy and variance regimes, following Jordà (2005). The TM (Equation 5) separates the dataset into different regimes depending on whether the economy is classified as being in a regime of monetary dominance (or fiscal dominance) or a regime of high variance (or low variance), as determined by the estimated smoothed probabilities in Section 2.

$$y_{t+h} = \alpha^h + (1 - I_{t-1})[\beta_a^h \varepsilon_{g,t} + \phi_a^h x_{t-k}] + (I_{t-1})[\beta_b^h \varepsilon_{g,t} + \phi_b^h x_{t-k}] + u_{t+h} \tag{5}$$

where I_{t-1} is a binary (dummy) variable lagged by one period with respect to the shock.[7]

We estimate two versions of this specification, depending on the regime dimension under consideration. In the first case, $I_{t-1} = 1$ when the economy is in a monetary dominance regime (and $I_{t-1} = 0$ otherwise), allowing us to estimate impulse responses conditional on the prevailing policy regime. In the second case, $I_{t-1} = 1$ when the economy is in a high-variance regime (and $I_{t-1} = 0$ otherwise).[8] This specification is presented after the theoretical analysis as a further step to investigate more deeply the role of economic policy uncertainty. In this interpretation, we associate the high-variance regime with periods of elevated EEPU, and the low-variance regime with relatively stable, low-uncertainty environments. Hence, throughout the discussion we use "variance" and "EEPU" interchangeably when referring to these regimes. The term $\varepsilon_{g,t}$ represents the estimated government spending shock, while x_{t-k} includes the control variables used in the linear specification: two lags of government spending, GDP, interest rates, and a time trend.

The sequence of β_a^h represents the impulse response function under a monetary dominance (or high variance) regime, whereas the sequence of β_b^h corresponds to the IRF under a fiscal dominance (or low variance) regime.

Subsequently, we estimate a conditional STM following Auerbach and Gorodnichenko (2012). The STM incorporates the smoothed MS probabilities estimated earlier to assign time-varying weights to each regime. Unlike the threshold model, this approach avoids discarding observations and, to our knowledge, is the first attempt to integrate MS probabilities into a smooth transition modeling framework.[9] This enables the analysis to capture the gradual nature of regime shifts in a more flexible and data-driven manner:

$$y_{t+h} = \alpha_i^h + (1 - P_{t-1})[\beta_a^h \varepsilon_{g,t} + \phi_a^h x_{t-k}] + (P_{t-1})[\beta_b^h \varepsilon_{g,t} + \phi_b^h x_{t-k}] + u_{t+h} \tag{6}$$

where P_{t-1} represents the smoothed MS probabilities of being in either the policy or variance regime.

The IRFs represent the elasticity of the variable of interest $y_{i,t+h}$ to a fiscal shock occurring at time t, denoted as $\varepsilon_{g,t}$. Formally, IRFs can be expressed as:

$$\beta^h = \frac{\Delta y_{t+h}}{\Delta \varepsilon_t}$$

However, our primary interest lies in fiscal multipliers, which measure the effect of fiscal policy on output, rather than elasticities. The cumulative fiscal multiplier is obtained by computing the ratio between the cumulative response of the variable of interest Δy_{t+h} and the cumulative change in fiscal expenditure $\Delta \varepsilon_{t+h}$, as follows:

[7] Following Ramey and Zubairy (2018), the dummy variable is lagged by one period to avoid potential interference between the regime classification and the shock at time t.

[8] This classification occurs when the estimated smoothed probability exceeds 0.5.

[9] We allow transition weights to be endogenously estimated from a MS Taylor rule rather than from a logistic function.

$$\beta^h_{cum} = \frac{\sum_{h=0}^{n} \Delta y_{t+h}}{\sum_{h=0}^{n} \varepsilon_{t+h}}$$

Cumulative multipliers allow us to assess whether a fiscal expansion generates persistent effects on the output. The estimation follows a three-step approach (Ramey and Zubairy, 2018): i) the cumulative change in the dependent variable is estimated using a local projection or VAR approach; ii) the cumulative change in government expenditure over the same horizon is computed by estimating the same specification with fiscal spending as the dependent variable; iii) the fiscal multiplier is obtained as the ratio of the coefficients estimated in the first two steps, multiplied by the ex-post conversion factor.

This approach ensures that fiscal multipliers properly reflect the effect of government spending on economic output, rather than mere elasticities. Our results remain robust, as fiscal multipliers are consistent even when applying an ex-ante conversion procedure (Owyang et al., 2013).

To test the statistical significance of state-dependent fiscal multipliers, we also implement a direct estimation strategy based on the instrumental variable (IV) approach proposed by Ramey and Zubairy (2018). In this framework, the interacted spending terms are instrumented using the underlying fiscal shock multiplied by the corresponding dummy, while the non-interacted terms are instrumented using the shock itself. In doing so, we can statistically test the difference between the two states, since our specification explicitly estimates the gap between the interacted and non-interacted responses; this allows us to directly assess whether regime-specific responses differ in a statistically meaningful way. The full estimation procedure and the corresponding IRF comparisons are documented in the Appendix (subsection 7.5).

3.3 Results

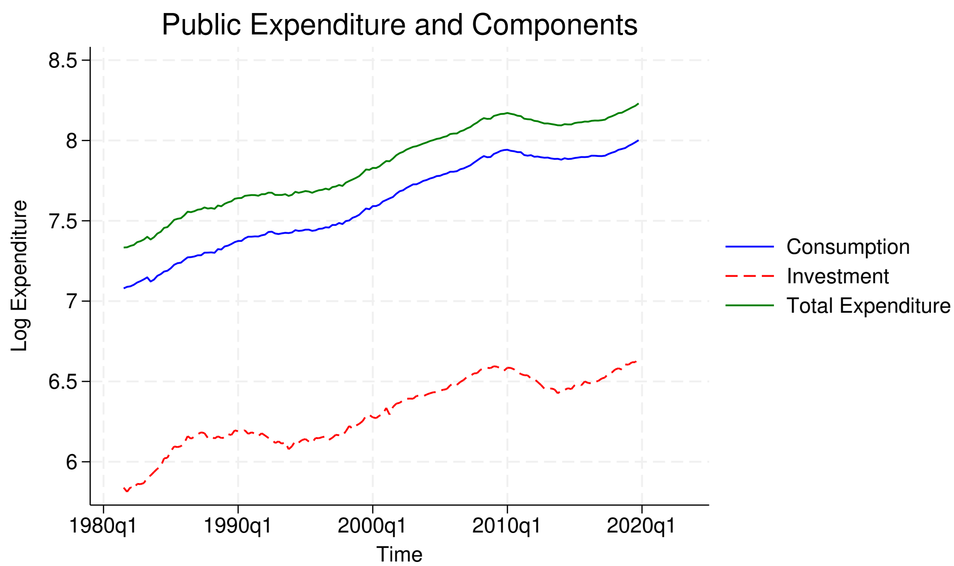
Results of the linear specification for total expenditures, public consumption and public investment, respectively, are left to the Appendix. Overall, the results show that the positive impact on GDP of total expenditures is mostly driven by public investment. These positive impacts of either total expenditures, public investment or public consumption are also very short-lived. This pattern is consistent with Klein and Linnemann (2023), who find that the composition of fiscal policy matters: investment shocks generate stronger and more persistent effects on output than consumption shocks.

As regards the non-linear specifications, results for total public spending are also reported in the Appendix. They closely mirror those obtained for public consumption, which is expected given the dominant share of consumption expenditures in total government spending, as shown in Figure 3.

3.3.1 The case of Consumption Expenditure

Starting from the case of Consumption Expenditure, we find compelling evidence that the effectiveness of public expenditure shocks in stimulating GDP depends significantly on the prevailing policy regime (see Figure 4). Results are shown with 68% confidence bands, but similar conclusions hold when using 90% bands, as most estimates remain statistically

Figure 3: U.S. Public Expenditures and Components



The figure shows the components of public spending in logarithmic levels: investment, consumption, and total expenditure, over the sample period from Q3-1981 to Q1-2020. Source: Bureau of Economic Analysis (BEA).

significant.[10] Figure 4 shows the response of GDP to consumption expenditure shocks, distinguishing between policy regimes with the dummy specification (panel A) and the smooth transition model (panel B).

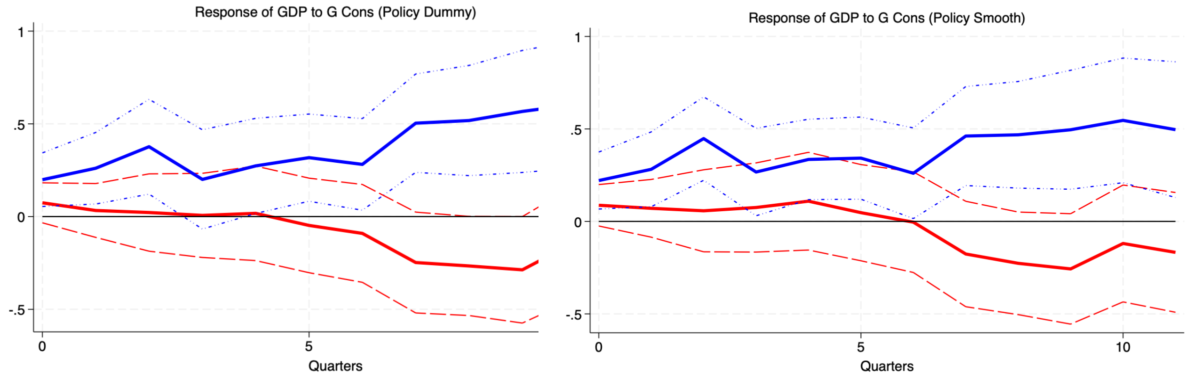
The results reveal clear nonlinearities: under fiscal dominance, the shock generates a positive and statistically significant effect on GDP, whereas under monetary dominance, the response is not statistically significant. This asymmetry can be naturally interpreted as the outcome of the interaction between fiscal and monetary policy: the inflationary pressures of a fiscal expansion tend to trigger a stronger monetary tightening under monetary dominance, which offsets the initial demand impulse. As a result, the likelihood of a crowding-out effect of fiscal policy is higher under monetary dominance than under fiscal dominance, where the expansionary impact of consumption expenditure is allowed to persist.

3.3.2 The case of Investment Expenditures

When analyzing the effect of public investment on GDP, we observe that initially output increases under both fiscal and monetary dominance (Figure 5), in contrast to the case of consumption expenditure. This is a crucial result, as it aligns with the well-established role of investment as an economic accelerator. Unlike public consumption, which is often perceived as affecting only the demand side, investment is seen by economic agents as a

[10]The use of 68% confidence bands is common in the literature (see for example Blanchard and Perotti (2002); Perotti (2005)). In addition, as noted by Sims and Zha (1999), 68% bands often offer a more accurate representation of the true coverage probability compared to the conventional 95% bands, and are therefore considered more informative in many applied settings.

Figure 4: Responses of GDP to consumption expenditure according to policy regimes



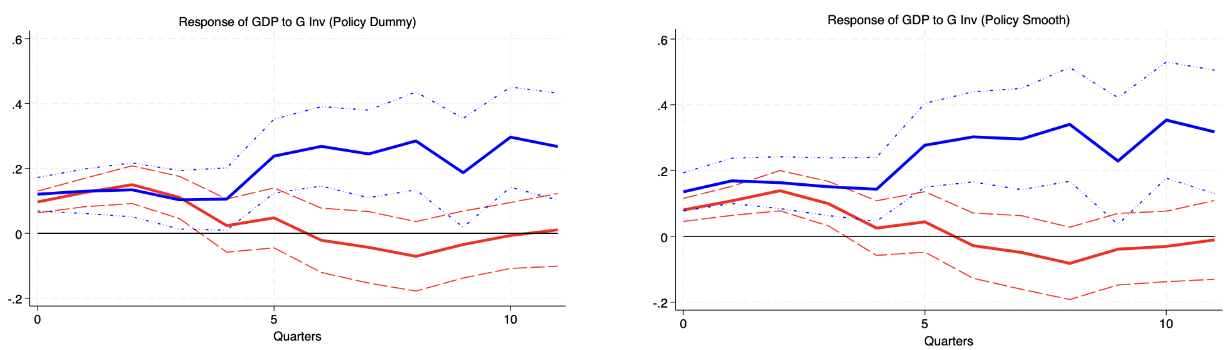
((a)) Response of GDP to G Cons. Policy Dummy

((b)) Response of GDP to G Cons. Policy Smooth

The IRFs show the responses of real output to a government consumption spending shock over a 12-quarter forecast horizon. The bands represent the 68% confidence intervals. The blue lines represent fiscal dominance, while the red lines correspond to monetary dominance. The figure on the left illustrates the dummy model specification (Equation 5), while the figure on the right refers to the smooth transition specification (Equation 6). Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987). The sample covers the period from Q3 1981 to Q1 2020.

productive expenditure that enhances future economic capacity and fosters long-term growth. This difference in perception strengthens the argument that public investment has a more substantial and lasting impact on economic dynamics, especially under fiscal dominance.

Figure 5: Responses of GDP to investment expenditure according to policy regimes



((a)) Response of GDP to G Inv. Policy Dummy

((b)) Response of GDP to G Inv. Policy Smooth

The IRFs show the responses of real output to a government investment spending shock over a 12-quarter forecast horizon. The bands represent the 68% confidence intervals. The blue lines represent fiscal dominance, while the red lines correspond to monetary dominance. The figure on the left illustrates the dummy model specification (Equation 5), while the figure on the right refers to the smooth transition specification (Equation 6). Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987). The sample covers the period from Q3 1981 to Q1 2020.

3.4 Cumulative Fiscal Multipliers

Table 3 summarizes the effects of fiscal shocks on GDP across different horizons.[11] It highlights that, in contrast to the results obtained from linear models (see the Appendix), fiscal shocks can have mid-term effects when a fiscal dominance regime is in place. Ignoring the nature of the policy regime obscures the potential of fiscal policy to generate sustained output gains. The table also reveals that the distinction between policy regimes is more consequential than the specific composition of fiscal policy: shocks to either public investment or public consumption yield broadly similar outcomes within each regime, except in the short run under monetary dominance. Overall, fiscal policy proves significantly less effective under monetary dominance. This is consistent with the anticipation effects of Ascari et al. (2023), who show that under monetary dominance fiscal policy can even have contractionary effects.

Looking at the composition of fiscal policy, the evidence suggests that public consumption has little or no impact under monetary dominance, while it generates persistent and sizeable effects under fiscal dominance. Public investment, in turn, appears more resilient (see also Table 12 in the appendix): although its short-run impact is weaker in that regime, it remains expansionary and becomes strongly effective in the medium run under fiscal dominance. This pattern likely reflects the fact that, unlike public consumption—which is often perceived as a temporary demand-side stimulus—public investment is regarded by economic agents as a productive expenditure that fosters long-term growth. Such expectations explain why investment retains its expansionary nature even when monetary policy is tight, and why its effectiveness is amplified when combined with fiscal dominance. The difference between public consumption and investment, however, is mainly driven by the monetary regime, where a contractionary stance limits the impact of consumption but allows investment to sustain output through productivity gains.

Table 3: Cumulative fiscal multipliers: policy regimes (short run / mid run)

	MD	**FD**
Public consumption	0 / 0	++ / ++
Public investment	++ / 0	++ / ++

The table displays a qualitative appraisal of the cumulative fiscal multipliers (- -: very negative (<-1) and significant; -: negative and significant; 0: no significant effect; +: positive and significant; ++: very positive (>+1) and significant). Fiscal cumulative multipliers are constructed following Ramey and Zubairy (2018).

To test statistically the differences across states, we rely on the IV approach of Ramey and Zubairy (2018), instrumenting both the interacted and non–interacted spending terms with the corresponding fiscal shocks. Using this IV strategy, we find that the differences across regimes are statistically significant. Table 4 reports the p-values associated with the difference in cumulative responses across regimes for selected horizons, providing formal statistical evidence on whether the state-dependent effects differ significantly over time.

The figures below present the graphical estimates. The red lines show the impulse response associated with the statistical difference across states, whereas the blue lines display the cumulative responses in the baseline regime—Fiscal Dominance in the policy-regime specification.

[11] Quantitative estimates of the cumulative fiscal multipliers are left to the Appendix.

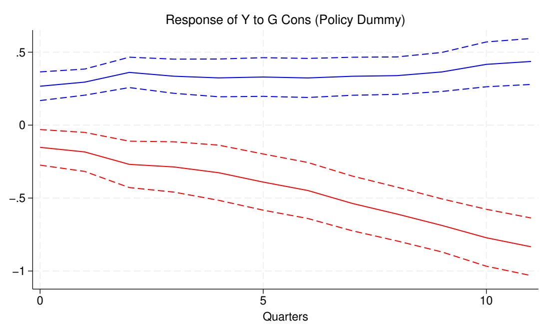
Table 4: Differences in cumulative responses for Y across policy regimes (horizons 0, 6, 12 quarters).

Differences (p-value)	Horizon 0	Horizon 6	Horizon 12
Panel A: Public Consumption (G_{Cons})			
MD – FD	-0.84 (0.17)	**-0.45** (0.02)	**-0.88** (0.00)
Panel B: Public Investment (G_{Inv})			
MD – FD	**-0.07** (0.06)	**-0.12** (0.02)	-0.16 (0.18)

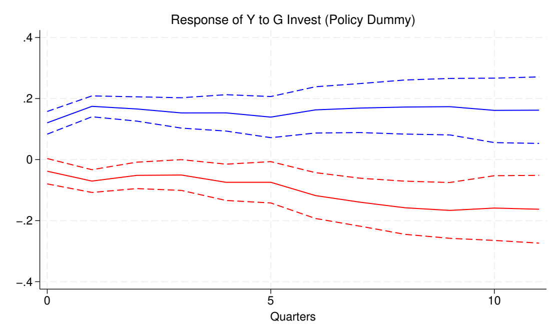
Note: Differences reported in bold are statistically significant at the 10% level.

Figure 6: State-dependent cumulative responses to fiscal shocks

((a)) Public Consumption (G_{Cons}): Monetary vs Fiscal Dominance



((b)) Public Investment (G_{Inv}): Monetary vs Fiscal Dominance



Note: The red line shows the difference between the two states. Shaded areas denote 68% confidence intervals.

Cumulative responses are systematically more expansionary under fiscal dominance than under monetary dominance, and this result holds for all categories of government spending—total expenditure (shown in the appendix), public consumption, and public investment. This confirms that the regime in place plays a central role in conditioning fiscal transmission, with fiscal dominance providing a more accommodative environment for the propagation of government spending. A more detailed presentation of the IV specification is reported in Appendix Section 7.3.

4 Theoretical Model

In this section we present a small-scale New Keynesian model with the objective to explain theoretically the mechanisms behind the empirical findings decribed before. In this model we abstract from private capital but we assume that a fraction of public spending is invested in public capital, which enters as an external input in the production of goods. This feature was pioneered in Aschauer (1989) and Baxter and King (1993). More recently the role of public investment was discussed, among others, in Bouakez et al. (2017) in closed economy DSGE model and Di Giorgio et al. (2018) in open economy. The model is kept deliberately simple to ensure tractability, yielding transparent mechanisms and sharp theoretical predictions.

4.1 Households

There is a representativee household supplying labor inputs (N) to firms and demanding consumption goods C in order to maximize

$$E_0 \sum_{t=0}^{\infty} \beta^t \Big[\log C_t + \delta \log(1 - N_t)\Big] \tag{7}$$

subject to a a sequence of budget constraints of the form

$$P_t C_t + T_t + \frac{B_t}{1 + i_t} = W_t N_t + D_t + B_{t-1} \tag{8}$$

According to the previous budget constraint, the representative household enters period t with B_{t-1} units of one-period riskless nominal bonds. Each period, the household receives a wage payment, $W_t N_t$, and dividends, D_t, from the monopolistically competitive firms. Taxes are lump-sum (T_t) and $\frac{1}{1+i_t}$ is the price of a nominal bond purchased at time t, with i_t being the nominal interest rate. Consumption bundle results from Dixit-Stiglitz aggregation of the consumption goods:

$$C = \left[\int_0^1 C(h)^{\frac{\epsilon-1}{\epsilon}} dh\right]^{\frac{\epsilon}{\epsilon-1}} \tag{9}$$

with ϵ >1.

The solution of the optimization problem of households delivers a set of equilibrium conditions which describe the aggregate labor supply and the dynamic path of aggregate consumption:

$$\delta P_t C_t = W_t (1 - N_t), \tag{10}$$

$$C_t = \frac{1}{\beta} E_t \left\{ \frac{1}{1 + i_t} \frac{P_{t+1}}{P_t} C_{t+1} \right\} \tag{11}$$

4.2 The Government and the Central Bank

Government spending can be financed by levying lump-sum taxes T_t to domestic households or by issuing nominal debt denominated B_t. This implies the following flow budget constraint for the fiscal authority of country H, in nominal per-capita terms:

$$B_t = (1 + i_{t-1}) B_{t-1} + P_t Z_t, \tag{12}$$

where Z_t denotes the real primary deficit, defined as

$$Z_t \equiv \frac{G_t}{P_t} - T_t. \tag{13}$$

The fiscal side will be closed with a fiscal rule responding to public debt. Such a rule and the policy regime in terms of monetary of fiscal dominance are discussed later.

4.3 The Supply Side

As mentioned before, we allow the government to potentially affect the private-sector productivity of labor by using a share ξ of total public spending to accumulate a stock of productive public capital Γ:

$$\Gamma_t = (1-\eta)\Gamma_{t-1} + \xi G_t,$$

where η is the rate of depreciation of public capital. In the steady state, the above law of motion implies

$$\bar{\Gamma} = \frac{\xi}{\eta}\bar{G}.$$

Each firm producing brand h has therefore access to a linear technology:

$$Y_t(h) = \Gamma_t^{\psi} N_t(h).$$

where ψ is the degree of public capital externality to labor productivity, and determines the steady-state marginal product of public capital (MPG):

$$MPG = \psi\frac{\bar{Y}_H}{\bar{\Gamma}} = \psi\frac{\eta\bar{Y}_H}{\xi\bar{G}} = \frac{\psi\eta}{\xi(1-\alpha)},$$

and $\alpha \equiv \frac{\bar{C}}{\bar{Y}}$ is the consumption-output ratio. Firms choose labor demand in a competitive labor market by minimizing their total real costs subject to the technological constraint. In equilibrium, the real marginal costs are:

$$MC_t = \frac{W_t}{\Gamma_t^{\psi}}.$$

Using the market clearing condition $Y = C+G$, we get the aggregate production function:

$$Y_t\Xi_t = \Gamma_t^{\psi} N_t,$$

in which

$$\Xi_t \equiv \int_0^1 \Big(P_t(h)/P_t\Big)^{-\epsilon} dh$$

.

Equilibrium in the labor market then implies that real marginal costs equal

$$MC_t = \frac{\delta C_t}{\Gamma_t^{\psi} - Y_t\Xi_t} \qquad (14)$$

.

In each period, each firm faces a probability ϑ of having to charge last period's price, without re-optimizing. The problem of the firm is therefore to choose P_t^o in order to maximize

$$E_t \left\{ \sum_{k=0}^{\infty} \vartheta^k \mathcal{F}_{t,t+k} \left[Y_{t+k|t}(h) P_t^o(h) - W_{t+k} P_{t+k} N_{t+k|t}(h) \right] \right\}$$

subject to

$$Y_{t+k|t}(h) = \left(\frac{P_t^o(h)}{P_{t+k}} \right)^{-\epsilon} Y_{t+k}$$

and

$$Y_{t+k|t}(h) = \Gamma_t^{\psi} N_{t+k|t}(h).$$

All firms re-optimizing at the same time will choose the same price, according to the following implicit rule:

$$E_t \left\{ \sum_{k=0}^{\infty} \vartheta^k \mathcal{F}_{t,t+k} Y_{t+k} P_{t+k}^{\epsilon} \left[P_t^o - (1+\mu) MC_{t+k} P_{t+k} \right] \right\} = 0.$$

4.4 The log-linearized model

The model is solved by log-linearizing the equilibrium conditions around a deterministic zero inflation steady state. In what follows, variables without a time subscript denote steady-state values and variables in lowercase denote percentage deviations from steady state. The log-linearized model is given by

$$y_t = (1-\bar{g})\, c_t + g_t \qquad \bar{g} \equiv \frac{G}{Y} \tag{15}$$

$$n_t = y_t - \psi \gamma_t \tag{16}$$

$$c_t = E_t c_{t+1} - (i_t - E_t \pi_{t+1}) \tag{17}$$

$$w_t = c_t - \frac{N}{1-N} n_t \tag{18}$$

$$\pi_t = \beta E_t \pi_{t+1} + \kappa\, (w_t - \psi \gamma_t) \tag{19}$$

$$g_t = \rho_g g_{t-1} + \nu_t^g \tag{20}$$

$$\gamma_t = (1-\eta)\gamma_{t-1} + \xi g_t \tag{21}$$

$$i_t = \phi_\pi \pi_t \tag{22}$$

$$b_t = \frac{1}{\beta} \left(b_{t-1} + \bar{B} i_{t-1} - \bar{B} \pi_t \right) + z_t \tag{23}$$

$$z_t = g_t - t_t - \phi_b b_{t-1} \tag{24}$$

The previous relationships present the main equations of the model, namely the resource constraint, the production function, the labor demand, the New Keynesian Phillips curve, public spending and public investment. The last three equations deserve some comments. First, the central bank follows a Taylor rule (equation 22) where $\phi_\pi > 1$ under monetary dominance, and $\phi_\pi < 1$ under fiscal dominance. Second, $\bar{B}$ represents the debt-to-GDP ratio in steady state, calibrated to be 60%. The values of policy coefficients ϕ_π and ϕ_b are varied to consider a monetary active/fiscal passive regime versus a monetary passive/fiscal active regime along the lines in Leeper (1991). In the monetary active/fiscal passive regime we set $\phi_\pi = 1.5$, $\phi_b = 0.1$: the Taylor principle holds and the response of fiscal authority guarantees public debt stability. On the other hand, in the monetary passive/fiscal active regime we set $\phi_\pi = 0.4$, $\phi_b = 0.01$: in this case public debt stability occurs only through a jump in inflation driven by a deviation from the Taylor principle. Finally, the calibration of the ratio of public investment to total public spending is $\xi = 0.23$, consistently with the empirical evidence from 1947 to 2012 documented by Bouakez et al. (2017). The latter contribution is also considered in the calibration of the elasticity of output with respect of public capital. Inspired by the meta analysis of existing empirical studies in Bom and Ligthart (2008) and Bom and Ligthart (2014), $\psi = 0.08$. The other values follow usual convention.

In the rest of our theoretical analysis, we will show analytical results for public investment multipliers before considering impulse response simulations after a fiscal shock that increases public investment in the economy.

4.5 Simulations

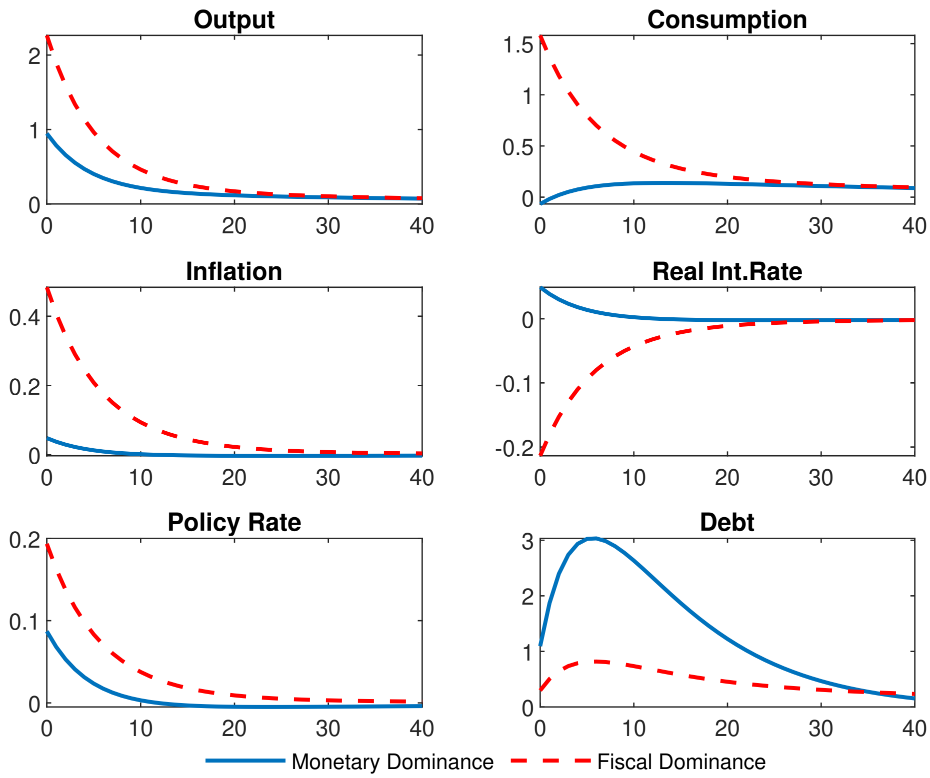
In this section, we simulate the model in the aftermath of a one-percent increase in public spending which in our model brings about a higher public investment. This implies that, differently from standard models, the fiscal shock here also affects the supply side, because it contributes to the accumulation of public capital. Therefore the inflationary pressures are lower than those brought about by a purely public consumption shock. In Figure 7 we show the dynamics of the economy after the fiscal shock, comparing the monetary dominance regime (solid line) and the fiscal dominance regime (dashed line). The figure shows that, under monetary dominance the stimulative effect is more limited because agents realize that taxation will increase to pay the deficit and because the monetary policy response is more aggressive. As a consequence, the real interest rate slightly increases and the real effect of the policy is limited. On the contrary, in the fiscal dominance regime, consumption and output increase much more, due to a larger increase in inflation that, in turn, brings the real interest rate into negative territory. Interestingly, public debt increases less in the fiscal dominant regime, but this is merely due to the fact that inflation is now much higher than in the monetary dominance regime, leading to a faster debt stabilization, albeit at the cost of higher inflation.

With the objective to compare the composition effects of different fiscal shocks, now we analyze multipliers. To that extent, we follow Beck-Friis and Willems (2017) (BF&W). While BF&W study fiscal multipliers in a standard three-equation New-Keynesian framework, our model introduces an additional state variable, the stock of public capital γ_t, described in equation (21). Public capital enters firms' marginal cost (and hence the NKPC) through the term $\psi\gamma_t$, capturing the productivity or cost-reducing effect of public capital.

In reduced form, the IS curve and the Phillips curve read as

$$\pi_t = \beta E_t \pi_{t+1} + \kappa(\alpha_y y_t - \alpha_c g_t + \psi(\theta - 1)\gamma_t), \tag{25}$$

Figure 7: Response of selected variables to a 1% increase in public investment.



Solid line: Monetary dominance regime; Dashed line: Fiscal dominance regime.

$$\alpha_c(E_t(y_{t+1} - g_{t+1}) - (y_t - g_t)) = \phi_\pi \pi_t - E_t \pi_{t+1}, \tag{26}$$

where, in the latter, we incorporated the Taylor rule (22).

Solving equations (25)–(26) for the coefficients linking output and inflation to the predetermined state γ_{t-1} yields[12]

$$y_t = a_y g_t + a_\gamma \gamma_{t-1} \tag{27}$$

$$\pi_t = b_y g_t + b_\gamma \gamma_{t-1} \tag{28}$$

The parameters (a_y, b_y) coincide with the BF&W coefficients when $\psi = \xi = 0$, i.e. when public investment is inactive.

Define the j-period government-spending multipliers as

$$GSM_y(j) = a_y \rho_g^j + a_\gamma \Delta_{j-1}, \qquad GSM_\pi(j) = b_y \rho_g^j + b_\gamma \Delta_{j-1},$$

where $\Delta_{j-1} = \xi \frac{(1-\eta)^j - \rho_g^j}{(1-\eta) - \rho_g}$ captures the gradual accumulation of public capital. The first

[12]With standard methods we also compute the relationship between endogenous variables and public spending, namely a_y and b_y introduced below. The complete algebraic derivations are available upon request.

component ($a_y\rho_g^j$, $b_y\rho_g^j$) corresponds to the *Keynesian* multiplier derived by BF&W,[13] while the second term ($a_\gamma\Delta_{j-1}$, $b_\gamma\Delta_{j-1}$) is new and reflects the *public-capital channel.* When $\psi = \xi = 0$, the latter term vanishes and the expressions reduce exactly to the BF&W multipliers,[14] hence our framework nests the BF&W monetary-regime results as a limiting case.

The inclusion of public investment modifies the value and dynamics of the multipliers in several ways. First, the impact multiplier ($j = 0$) remains essentially identical to BF&W's, but subsequent multipliers ($j \geq 1$) acquire persistence through the stock-building term Δ_{j-1}. The sign and magnitude of the additional term depend on ψ, ξ, and η. For $\psi > 0$ and $\xi > 0$ – so that higher public capital lowers marginal cost – the output multiplier exceeds that in BF&W and decays more slowly. Public investment thus acts as an endogenous propagation mechanism: even transitory spending shocks generate persistent effects on output and inflation through the accumulation of γ_t.

Quantitatively, the total multiplier in our model can be written as

$$GSM_x(j) = GSM_x^{BFW}(j) + PC_x(j), \qquad PC_x(j) \equiv (a_\gamma, b_\gamma)\Delta_{j-1},$$

where $PC_x(j)$ isolates the additional public-capital contribution. Hence, the multipliers of BF&W represent the special case of zero public investment, while our extended system shows that the inclusion of productive public capital amplifies and prolongs fiscal effects over time. We now evaluate the multipliers across different coordination regimes between monetary and fiscal policy.

(i) Monetary Dominance: Active Monetary Policy, Passive Fiscal Policy

Under monetary dominance ($\phi_\pi > 1$, $\varphi_b \in (1-\beta, 1+\beta]$), output and inflation respond to a government-spending shock through the standard aggregate-demand effect now augmented by the dynamic effect of γ_t. On impact, the multiplier is essentially driven by the demand effect, as γ_{t-1} is predetermined; hence $GSM_y(0) \simeq a_y$, reproducing BF&W's result. However, for $j \geq 1$, the additional term $a_\gamma\Delta_{j-1}$ prolongs the expansion: even a transitory spending shock increases the capital stock, which lowers marginal cost and stimulates future output. In terms of magnitude, public investment raises the total multiplier ($\psi, \xi > 0$ hence $GSM_y(j) > GSM_y^{BFW}(j)$) and slows its decay. Summing up, in the monetary regime, public investment primarily adds *persistence and amplification* to the standard Keynesian fiscal transmission.[15]

[13] Please refer to their equations (10)–(11).

[14] Specifically, the multiplier for output will be

$$GSM_y^{BFW}(j) = \rho_g^j \frac{(1-\rho_g)(1-\beta\rho_g) + \kappa(\phi_\pi - \rho_g)}{(1-\rho_g)(1-\beta\rho_g) + \kappa(\phi_\pi - \rho_g)} \Big[1 + \sigma^{-1}\xi(1-\bar{g})\Big].$$

[15] These new results do not alter determinacy or stability conditions, guaranteed by monetary dominance, ie $\phi_\pi > 1$, $\varphi_b \in (1-\beta, 1+\beta]$.

(ii) Fiscal Dominance: Active Fiscal Policy, Passive Monetary Policy

Under fiscal dominance ($\phi_\pi < 1$, $\varphi_b < 1 - \beta$), the adjustment of prices – rather than future public surpluses – restores the equilibrium. As shown by BF&W, this regime produces positive multipliers and a nominal-wealth effect. In our extension, public capital introduces an additional, real propagation channel.

The spending multipliers can again be decomposed as

$$GSM_x^F(j) = GSM_x^M(j) + TM_x^F(j) + PC_x(j),$$

where $GSM_x^M(j)$ is the Keynesian component identical to the monetary regime, $TM_x^F(j)$ is the nominal-wealth term emphasized by BF&W, and $PC_x(j) = (a_\gamma, b_\gamma)\Delta_{j-1}$ captures the public-capital channel. The nominal-wealth effect raises the response of demand and prices, while public capital adds further persistence through γ_t. The combination implies that fiscal-regime multipliers are both larger and more persistent than under monetary dominance. Moreover, the capital accumulation reinforces the wealth effect: higher spending increases perceived wealth and, via public investment, productivity.

The contrast between the two regimes is summarized in Table 5. Under monetary dominance, fiscal policy is constrained by the central bank's reaction to inflation, so public investment mainly affects the persistence of the shock. Under fiscal dominance, the same mechanism amplifies the endogenous wealth channel of the fiscal theory of the price level, generating potentially large and long-lasting output responses.

Table 5: Effects of Public Investment on Fiscal Multipliers across Regimes

	Monetary Dominance	**Fiscal Dominance**
Determinacy source	Taylor principle (monetary stability)	Fiscal backing of price level
Transmission channel	Persistence via γ_t	Wealth + capital accumulation
Effect on multiplier size	Moderate (amplifies slightly)	Strong (amplifies significantly)

To have a quantitative assessment, we compute the previous multipliers for output using the calibration defined above. In Figure 8 we show the demand effect and the public capital effect across the regime of fiscal dominance and monetary dominance. Starting with the demand effect, the figure shows that this is significantly above in the case of fiscal dominance, while the relative size of public capital effect is only larger in terms of its persistence. Our interpretation of these results is that what drives the larger multiplier under fiscal dominance is especially the demand effect brought about by the fiscal backing of the price level. To that extent, the inflationary effect is larger under fiscal dominance.[16] As to the public capital effect, being in a fiscal dominant regime contributes to making the supply-side effect of public investment more persistent.

To compare the effects of public investment with public consumption, in Figure 9 we show the total multiplier (again for ten quarters) of a shock on public investment or on public consumption under monetary dominance (upper panel) and fiscal dominance (lower panel). Clearly, the public capital effect is absent if the fiscal stimulus is in terms of public

[16] The inflation multiplier is available on request.

consumption. The figure shows that the multiplier is larger under fiscal dominance. The difference between public investment and public consumption is much larger under monetary dominance, confirming the results shown in the impulse response analysis.

Summing up, the nature of the fiscal shock matters with monetary dominance, since the expansion in output is significantly above when fiscal policy is in terms of public investment. On the other hand, under fiscal dominance the response of output is almost indistinguishable in the two kinds of fiscal policies considered. Our interpretation is that in a fiscal dominance regime the impact on GDP works through the demand effect brought about by the fiscal shock. A very low level of fiscal discipline coupled with monetary policy accommodation reduces the real rate stimulating aggregate demand. Consequently, the nature of the fiscal stimulus (productive or unproductive) is not so relevant to increase output. In the monetary dominance regime, instead, public investment is able to spur total productivity and, in turn, aggregate output. Therefore, a higher public investment is able to offset partially the balancing of the budget. Overall, the expansionary effect is however larger under fiscal dominance, independently of the nature of the stimulus.

Figure 8: Channels of public investment multipliers over time: monetary (solid blue line) and fiscal dominance (dashed red line).

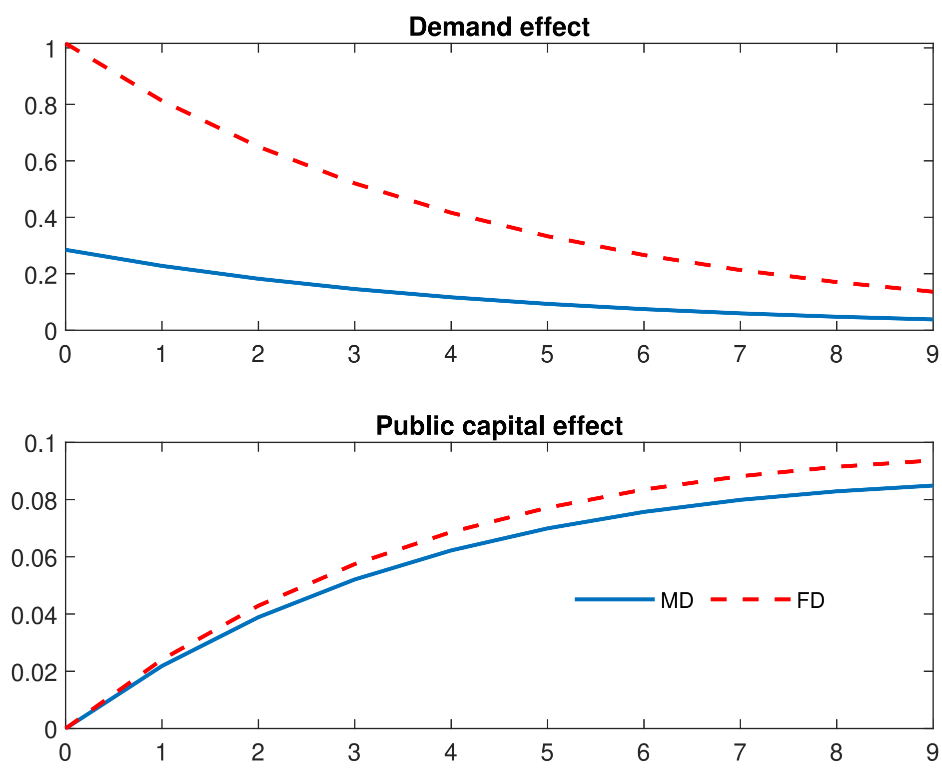
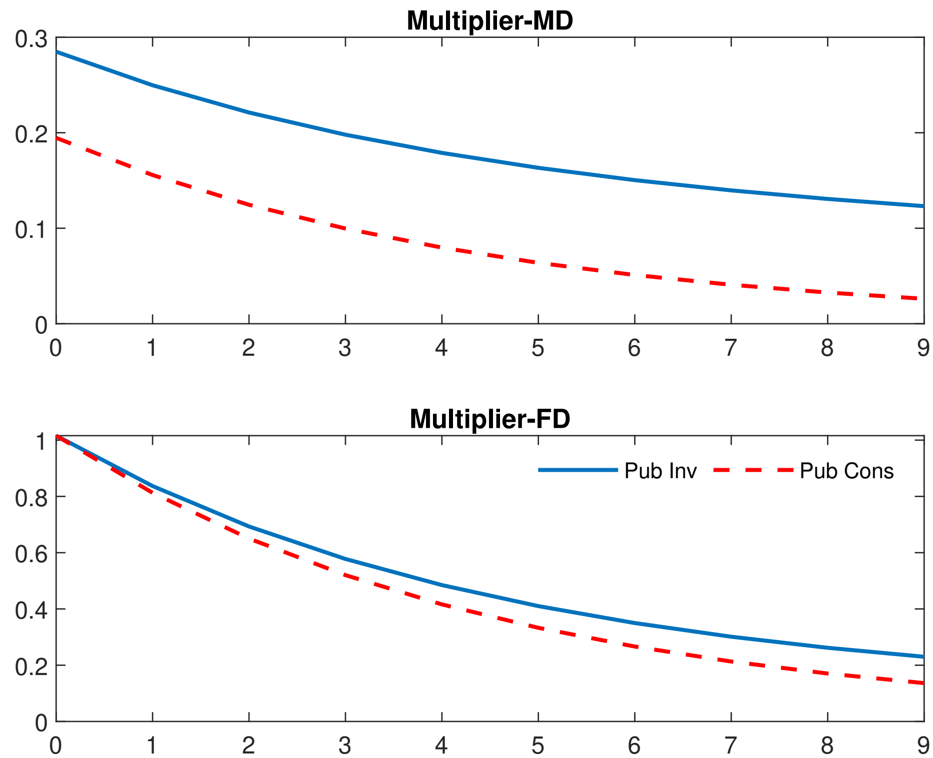


Figure 9: Fiscal multipliers over time: public investment (solid blue line) and public consumption (dashed red line).



5 The role of Estimated Economic Policy Uncertainty

Having established the importance of fiscal composition and regimes for policy effectiveness, we now turn to the role of EEPU. We extend the analysis by considering how regime-dependent volatility—captured by the variance in the estimated probabilities of policy regimes-conditions the transmission of fiscal shocks. To this end, we exploit the EEPU measure already discussed in Figure 2. We begin by analysing how high and low EEPU shape fiscal transmission by estimating the regime-dependent specifications in Equations (5) and (6). This step allows us to isolate the variance dimension of uncertainty and assess whether fiscal shocks have different effects across high- and low-EEPU environments.

To integrate this variance dimension with the policy-regime perspective developed earlier, we next consider a specification that jointly accounts for monetary/fiscal dominance and high/low EEPU. This extended framework defines four distinct states that combine policy regimes with variance regimes. The model is expressed as:

$$y_{t+h} = \alpha^h + (I_{t-1})(J_{t-1})[\beta_a^h \varepsilon_{g,t} + \phi_a^h x_{t-k}] + (1 - I_{t-1})(J_{t-1})[\beta_b^h \varepsilon_{g,t} + \phi_b^h x_{t-k}] \quad (29)$$

$$+(I_{t-1})(1 - J_{t-1})[\beta_c^h \varepsilon_{g,t} + \phi_c^h x_{t-k}] + (1 - I_{t-1})(1 - J_{t-1})[\beta_d^h \varepsilon_{g,t} + \phi_d^h x_{t-k}] + u_{t+h}$$

where I_{t-1} equals 1 in a monetary dominance regime (and 0 otherwise), and J_{t-1} equals

1 in a high-variance regime (and 0 otherwise). The coefficients β_a^h, β_b^h, β_c^h, and β_d^h represent the IRFs for the following regimes, respectively: - β_a^h: Monetary Dominance - High Variance, - β_b^h: Fiscal Dominance - High Variance, - β_c^h: Monetary Dominance - Low Variance, - β_d^h: Fiscal Dominance - Low Variance.

5.1 The case of Consumption Expenditure

Focusing first on consumption expenditure, the distinction between high- and low-variance regimes (Figure 10) reveals a pronounced nonlinearity. In response to a public consumption shock, GDP rises under low variance conditions but declines under high variance, with negative effects persisting for up to seven quarters.

When analyzing the four possible regime combinations following a public consumption shock (see Figure 11), we find that GDP exhibits a stronger and more persistent increase under fiscal dominance combined with low variance, thus confirming the former result. Under high variance, fiscal policy has at best no short-run impact on the economy under fiscal dominance, or generates temporary non-Keynesian effects under monetary dominance. To the best of our knowledge, this is a novel result in the literature using U.S. data.[17] Bottom-right graph on Figure 11 also shows a delayed but ultimately amplifying effect of a shock on public consumption expenditures under a high-variance regime. This effect becomes clearly visible after two years.

A possible interpretation of these results relates to the nature of uncertainty captured by our variance regimes. In our framework, high variance reflects greater uncertainty about the identification and persistence of the prevailing policy regime, that is, a higher perceived probability of future regime switches. When such uncertainty is elevated, the effectiveness of public consumption shocks is weakened, as agents may anticipate changes in the monetary–fiscal configuration and adjust their behavior accordingly, partially offsetting the demand impulse.

By contrast, under fiscal dominance combined with low variance, the policy environment is perceived as both accommodative and stable. In this case, the low probability of transitioning to an alternative regime enhances the credibility of the prevailing fiscal stance, allowing demand-side fiscal shocks to transmit more effectively to output. This mechanism explains why the response of GDP to public consumption shocks is strongest and most persistent in fiscal dominance–low variance states.

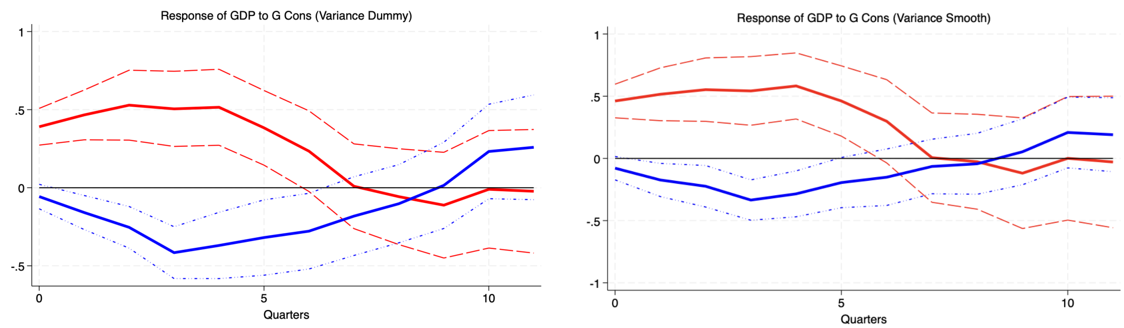
This interpretation is consistent with the insights of Bianchi and Melosi (2017), who show that uncertainty about future policy regimes—rather than the realization of regime changes per se—plays a crucial role in shaping macroeconomic outcomes by affecting agents' expectations. Even a small perceived likelihood of a policy shift can substantially dampen the transmission of demand-side policies.

This evidence is consistent with Goemans (2023), who shows that fiscal multipliers are sensitive to how uncertainty is measured. In particular, text-based policy uncertainty indicators such as EPU are associated with weaker and less persistent effects of public consumption.

[17] There has been a substantial body of literature on non-Keynesian effects of fiscal policy or on episodes of so-called expansionary fiscal contraction following Giavazzi and Pagano (1990). Most of the evidence for such episodes comes from European or emerging countries.

This result is also consistent with Li and Wei (2022), who document that elevated economic policy uncertainty leads to lower fiscal multipliers.

Figure 10: Responses of GDP to consumption expenditure according to variance regimes



((a)) Response of GDP to G Cons. Variance Dummy

((b)) Response of GDP to G Cons. Variance Smooth

The IRFs show the responses of real output to a government consumption spending shock over a 12-quarter forecast horizon. The bands represent the 68% confidence intervals. The blue lines represent the high variance regime, while the red lines correspond to the low variance regime. The figures on the left illustrate the dummy model specification (Equation 5), while the figures on the right refer to the smooth transition specification (Equation 7). Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987). The sample covers the period from Q3 1981 to Q1 2020.

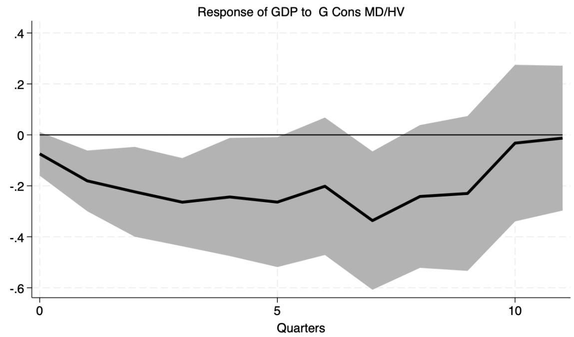
5.2 The case of Investment Expenditure

When distinguishing between variance regimes after an investment expenditure shock (Figure 12), we find limited statistical significance. A fiscal shock on public investment has a positive effect on GDP during the first year, but only in high EEPU regime. Interestingly, in the low EEPU regime, there is even a (hardly-significant) negative effect on output.

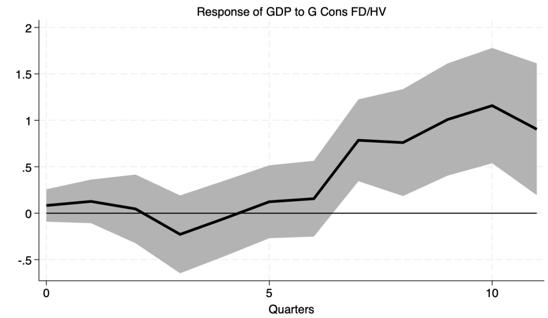
Examining the four regime combinations (see Figure 13), we identify a hump-shaped impulse response under monetary dominance with high variance: GDP initially rises upon impact but then declines after six quarters. By contrast, under fiscal dominance with high variance, GDP increases persistently and with markedly greater amplitude, making this configuration the most expansionary and effective for stimulating output. Our results align in a specific context with those of Ramey and Zubairy (2018), who identify a hump-shaped impulse response to a fiscal shock. Within our framework, this outcome corresponds to a particular configuration characterized by monetary dominance and high variance. In other configurations, results tend to be different.

The conditional effect of public investment on GDP—when differentiated by variance regimes under fiscal dominance—displays a novel and distinct empirical pattern compared to the other component of fiscal policy. In contrast to public consumption, the effectiveness of public investment appears less sensitive to differences across uncertainty states. This muted nonlinearity is consistent with the presence of a supply-side channel, whereby public investment enhances productive capacity and generates medium-term output gains that are less dependent on expectations about the persistence of the prevailing policy regime.

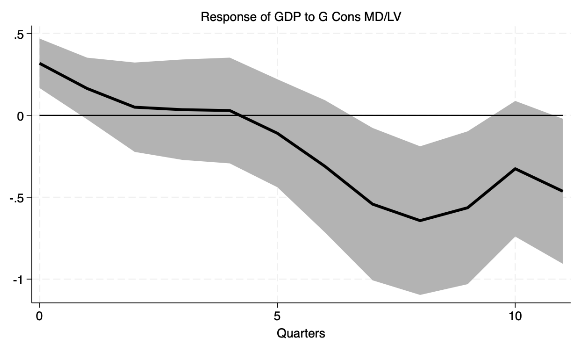
Figure 11: Responses of GDP to consumption expenditure according to interactions of policy and variance regimes.



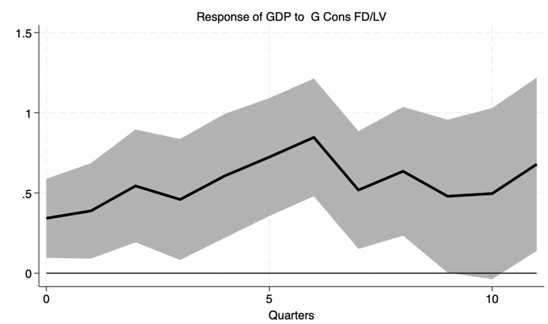
((a)) Response of GDP to G Cons. Monetary Dominance and High Variance Regime.



((b)) Response of GDP to G Cons. Fiscal Dominance and High Variance Regime.



((c)) Response of GDP to G Cons. Monetary Dominance and Low Variance Regime.

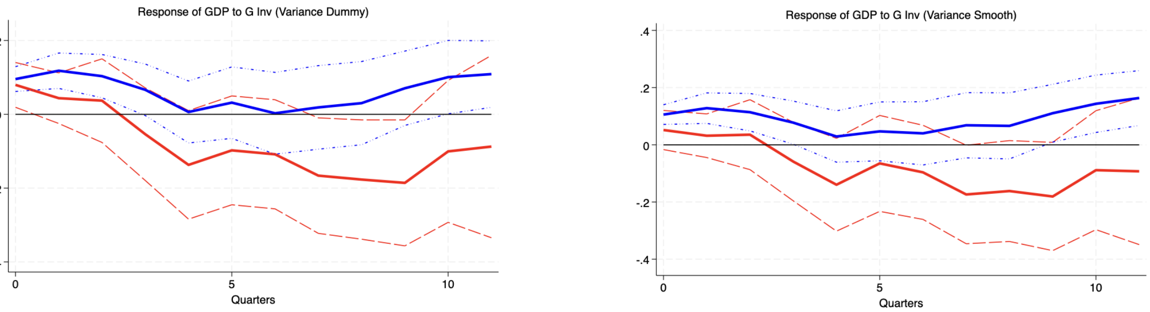


((d)) Response of GDP to G Cons. Fiscal Dominance and Low Variance Regime.

The IRFs show the responses of real output to a government consumption spending shock over a 12-quarter forecast horizon. The grey bands represent the 68% confidence intervals. The IRFs correspond to the four combinations of fiscal/monetary dominance and low/high variance (Equation 29). Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987).The sample covers the period from Q3 1981 to Q1 2020.

In this sense, higher variance—interpreted as greater uncertainty surrounding the policy environment—does not necessarily weaken the transmission of investment shocks. On the contrary, under fiscal dominance, high-variance regimes may even favor the expansionary effects of public investment, as productivity-enhancing expenditures remain effective despite elevated uncertainty. This pattern is consistent with Goemans (2023), who finds that economic policy uncertainty is central for public consumption but not relevant for public investment.

Figure 12: Responses of GDP to investment expenditure according to variance regimes



((a)) Response of GDP to G Inv. Variance Dummy

((b)) Response of GDP to G Inv. Variance Smooth

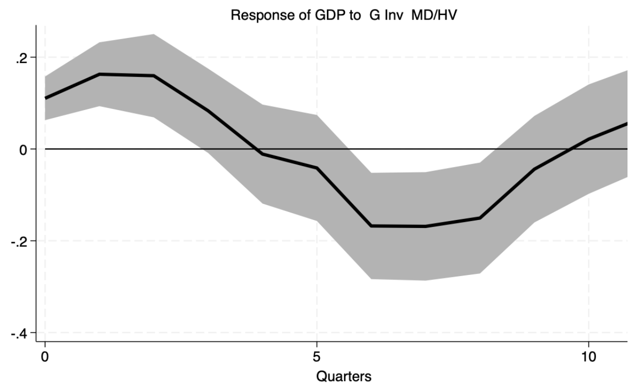
The IRFs show the responses of real output to a government investment spending shock over a 12-quarter forecast horizon. The bands represent the 68% confidence intervals. The blue lines represent the high variance regime, while the red lines correspond to the low variance regime. The figures on the left illustrate the dummy model specification (Equation 5), while the figures on the right refer to the smooth transition specification (Equation 6). Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987).

5.3 Cumulative Fiscal Multipliers

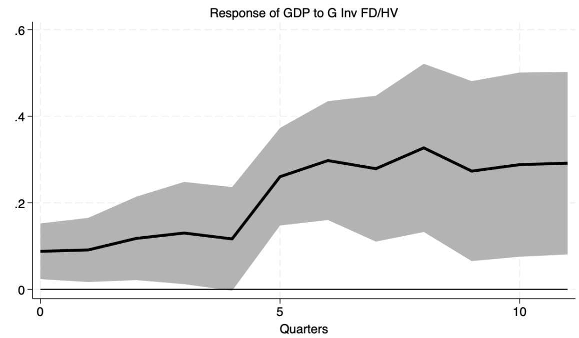
Beyond the distinction between fiscal and monetary dominance, Table 6 summarizes the role of uncertainty regimes and their interaction with policy regimes. The results suggest that variance matters for the composition effect: in low variance environments, public consumption is relatively more stimulative in the short run, while in high variance environments public investment proves more effective. Recent studies show that government spending is considerably less effective—and may even become contractionary—when uncertainty is high (Li and Wei, 2022; Jerow and Wolff, 2022). Unlike these contributions, however, our measure of uncertainty is endogenous rather than relying on external indicators. Our results refine this insight by demonstrating that uncertainty affects the two spending components in opposite ways. While public consumption tends to be more stimulative in low-variance environments, the effectiveness of public investment appears less sensitive to uncertainty conditions, with some evidence of stronger effects in high-variance states. This asymmetry underscores the importance of distinguishing between consumption and investment when evaluating fiscal policy transmission under uncertainty. Once policy regimes are interacted with variance regimes, the asymmetry becomes even sharper: under monetary dominance, reliance on public consumption tends to be contractionary, while under fiscal dominance its effects are amplified. By contrast, public investment retains an expansionary profile across regimes, with stronger persistence in tranquil periods, reflecting its perception as a credible and productivity-enhancing form of stimulus, particularly effective when macroeconomic and policy conditions are more predictable.

Regarding the variance-regime framework, we formally test differences across low- and high-EEPU states using the IV approach of Ramey and Zubairy (2018), instrumenting both the interacted and non-interacted spending terms with the corresponding fiscal shocks. This strategy allows us to assess whether cumulative output responses differ significantly across

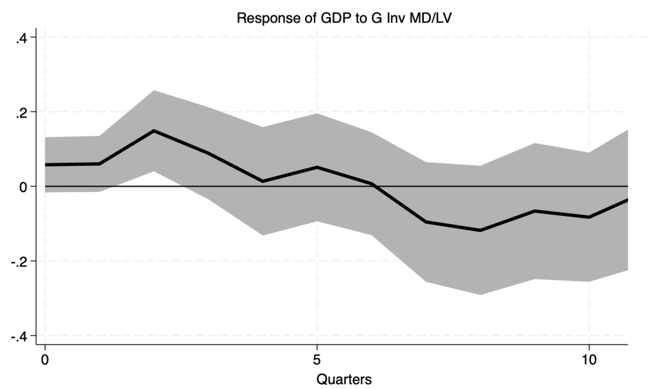
Figure 13: Responses of GDP to investment expenditure according to interactions of policy and variance regimes.



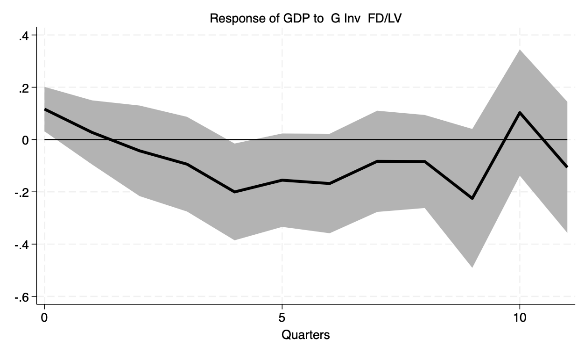
((a)) Response of GDP to G Inv. Monetary Dominance and High Variance Regime.



((b)) Response of GDP to G Inv. Fiscal Dominance and High Variance Regime.



((c)) Response of GDP to G Inv. Monetary Dominance and Low Variance Regime.



((d)) Response of GDP to G Inv. Fiscal Dominance and Low Variance Regime.

The IRFs show the responses of real output to a government investment spending shock over a 12-quarter forecast horizon. The grey bands represent the 68% confidence intervals. The IRFs correspond to the four combinations of fiscal/monetary dominance and high/low variance (Equation 29). Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987). The sample covers the period from Q3 1981 to Q1 2020.

Table 6: Cumulative fiscal multipliers: variance and interactions (short run / mid run)

	LV	**HV**	**MD/LV**	**MD/HV**	**FD/LV**	**FD/HV**
Public consumption	++/0	-/0	++/- -	-/0	++/++	0/++
Public investment	++/0	++/0	0/0	++/0	0/0	++/++

The table displays a qualitative appraisal of the cumulative fiscal multipliers (- -: very negative (<-1) and significant; -: negative and significant; 0: no significant effect; +: positive and significant; ++: very positive (>+1) and significant). Fiscal cumulative multipliers are constructed following Ramey and Zubairy (2018).

uncertainty regimes.

Table 7 reports the p-values associated with the differences in cumulative responses between low and high EEPU states at selected horizons. The results indicate that uncertainty regimes matter primarily for public consumption: cumulative responses to consumption shocks differ significantly across EEPU states, with low-uncertainty periods amplifying the effects of public consumption. By contrast, for public investment, the differences between high- and low-EEPU regimes are not statistically significant at conventional levels. The figures below present the graphical estimates. The red lines show the impulse response associated with the statistical difference across states, whereas the blue lines display the cumulative responses in the baseline regime—High Variance in the variance-regime specification.

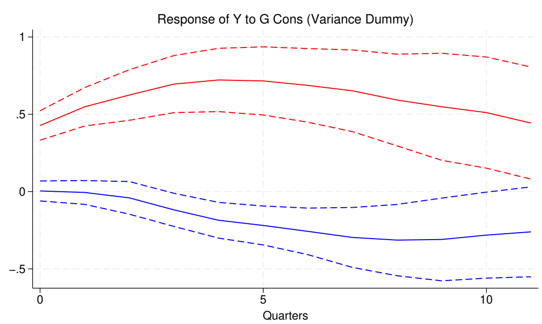
Table 7: Differences in cumulative responses for Y across EEPU states (horizons 0, 6, 12 quarters).

Differences (p-value)	Horizon 0	Horizon 6	Horizon 12
Panel A: Public Consumption (G_{Cons})			
Low EEPU – High EEPU	**0.55** (0.00)	**0.69** (0.00)	0.34 (0.35)
Panel B: Public Investment (G_{Inv})			
Low EEPU – High EEPU	-0.05 (0.32)	-0.10 (0.49)	-0.32 (0.16)

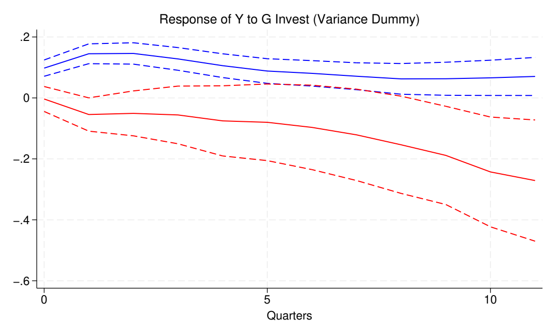
Note: Differences reported in bold are statistically significant at the 10% level.

Figure 14: State-dependent cumulative responses to fiscal shocks across EEPU states

((a)) Public Consumption (G_{Cons}): Low EEPU vs High EEPU



((b)) Public Investment (G_{Inv}): Low EEPU vs High EEPU



Note: The red line shows the difference between low and high EEPU states. Shaded areas denote 68% confidence intervals.

6 Conclusion

This paper investigates the macroeconomic effects of public spending, taking into account its composition, the prevailing policy regime, and the level of economic policy uncertainty. Using U.S. data, our empirical analysis underscores the importance of the interaction between fiscal and monetary policy in determining the effectiveness of government intervention. We find that the impact of public spending varies significantly depending on whether the economy is in a regime of monetary or fiscal dominance. Our results show that fiscal dominance systematically amplifies the effects of public spending—across its main components—making fiscal policy more effective in stimulating output regardless of whether the intervention takes the form of public consumption or investment. The difference in the output response between consumption and investment is mainly driven by the monetary dominance regime, where the restrictive stance of monetary policy dampens the demand-side effects of public consumption more than those of public investment. To provide a theoretical foundation for these empirical findings, we develop a simple DSGE model incorporating public investment as a productivity-enhancing factor. The model confirms that under fiscal dominance, both public consumption and investment generate stronger and more persistent output effects because the passive monetary stance keeps real interest rates low and allows demand and nominal wealth effects to fully unfold. In contrast, under monetary dominance, the central bank's tightening response offsets demand-driven expansions, especially for public consumption, while leaving the supply-side channel of public investment largely unaffected. As a result, the gap between investment and consumption multipliers is much wider under monetary dominance, where only productive spending can sustain output without triggering stronger policy tightening.

Building on the main empirical and theoretical results, we then deepen the analysis by introducing variance regimes, which capture the degree of economic policy uncertainty. These results indicate that the role of economic policy uncertainty is nuanced and component-specific. Public consumption is more effective in low-uncertainty, low-variance environments, where it provides a strong short-term stimulus. For public investment, differences across uncertainty regimes are less clear-cut.

These findings have important policy implications. Policymakers should carefully consider the interaction between fiscal and monetary policies when designing fiscal consolidation strategies, as different policy regimes yield distinct macroeconomic outcomes. Furthermore, economic policy uncertainty and regime shifts should be managed prudently to avoid exacerbating economic instability. Given the growing importance of public investment in addressing long-term challenges such as the ecological transition, our results suggest that maintaining a stable macroeconomic environment is essential for maximizing its effectiveness.

References

J. Antolin-Diaz and P. Surico. The long-run effects of government spending. *American Economic Review*, 115(7):2376–2413, 2025.

G. Ascari, P. Beck-Friis, A. Florio, and A. Gobbi. Fiscal foresight and the effects of government spending: It's all in the monetary-fiscal mix. *Journal of Monetary Economics*, 134: 1–15, 2023.

D. A. Aschauer. Is public expenditure productive? *Journal of Monetary Economics*, 23(2): 177–200, 1989.

A. J. Auerbach and Y. Gorodnichenko. Measuring the output responses to fiscal policy. *American Economic Journal: Economic Policy*, 4(2):1–27, 2012.

A. J. Auerbach and Y. Gorodnichenko. Fiscal stimulus and fiscal sustainability. Technical report, National Bureau of Economic Research, 2017.

S. R. Baker, N. Bloom, and S. J. Davis. Measuring economic policy uncertainty. *The Quarterly Journal of Economics*, 131(4):1593–1636, 2016.

M. Baxter and R. G. King. Fiscal policy in general equilibrium. *The American Economic Review*, pages 315–334, 1993.

P. Beck-Friis and T. Willems. Dissecting fiscal multipliers under the fiscal theory of the price level. *European Economic Review*, 95:62–83, 2017.

F. Bianchi. Regime switches, agents' beliefs, and post-world war ii us macroeconomic dynamics. *Review of Economic Studies*, 80(2):463–490, 2013.

F. Bianchi and L. Melosi. Escaping the great recession. *American Economic Review*, 107 (4):1030–58, 2017.

F. Bianchi, H. Kung, and M. Tirskikh. The origins and effects of macroeconomic uncertainty. *Quantitative Economics*, 14(3):855–896, 2023.

A. P. Blake, H. Mumtaz, et al. Applied bayesian econometrics for central bankers. *Technical Books*, 2012.

O. Blanchard and R. Perotti. An empirical characterization of the dynamic effects of changes in government spending and taxes on output. *The Quarterly Journal of Economics*, 117 (4):1329–1368, 2002.

C. E. Boehm. Government consumption and investment: Does the composition of purchases affect the multiplier? *Journal of Monetary Economics*, 115:80–93, 2020.

P. Bom and J. E. Ligthart. How productive is public capital? a meta-analysis. *CESifo Working Paper Series*, 2008.

P. R. Bom and J. E. Ligthart. What have we learned from three decades of research on the productivity of public capital? *Journal of Economic Surveys*, 28(5):889–916, 2014.

H. Bouakez, M. Guillard, and J. Roulleau-Pasdeloup. Public investment, time to build, and the zero lower bound. *Review of Economic Dynamics*, 23:60–79, 2017.

P. Burriel, F. De Castro, D. Garrote, E. Gordo, J. Paredes, and J. J. Pérez. Fiscal policy shocks in the euro area and the us: an empirical assessment. *Fiscal Studies*, 31(2):251–285, 2010.

F. Canova and E. Pappa. Fiscal policy, pricing frictions and monetary accommodation. *Economic Policy*, 26(68):555–598, 2011.

C. Carvalho, F. Nechio, and T. Tristao. Taylor rule estimation by ols. *Journal of Monetary Economics*, 124:140–154, 2021.

S. Chib. Marginal likelihood from the gibbs output. *Journal of the American Statistical Association*, 90(432):1313–1321, 1995.

J. S. Cloyne, O. Jorda, and A. M. Taylor. Decomposing the fiscal multiplier. Technical report, No. 26939, National Bureau of Economic Research, 2020.

O. Coibion, D. Georgarakos, Y. Gorodnichenko, G. Kenny, and M. Weber. The effect of macroeconomic uncertainty on household spending. *American Economic Review*, 114(3): 645–677, 2024.

T. Davig and T. Doh. Monetary policy regime shifts and inflation persistence. *Review of Economics and Statistics*, 96(5):862–875, 2014.

T. Davig and E. M. Leeper. Monetary–fiscal policy interactions and fiscal stimulus. *European Economic Review*, 55(2):211–227, 2011.

M. Deleidi. Quantifying multipliers in italy: does fiscal policy composition matter? *Oxford Economic Papers*, 74(2):359–381, 2022.

G. Di Giorgio, S. Nisticò, and G. Traficante. Government spending and the exchange rate. *International Review of Economics & Finance*, 54:55–73, 2018.

T. Doh and J. Choi. Measuring the stance of monetary policy on and off the zero lower bound. *Federal Reserve Bank of Kansas City, Economic Review*, 101(3):5–24, 2016.

M. Eleftheriou and G. P. Kouretas. Monetary policy rules and inflation control in the us. *Economic Modelling*, 119:106137, 2023.

F. Giavazzi and M. Pagano. Can severe fiscal contractions be expansionary? tales of two small european countries. *NBER macroeconomics annual*, 5:75–111, 1990.

F. Giuli, S. Ionta, and V. Patella. Monetary/fiscal policy dominance and conflicts: Evidence from crises. *Economics Letters*, page 112713, 2025.

P. Goemans. The impact of public consumption and investment in the euro area during periods of high and normal uncertainty. *Economic Modelling*, 126:106370, 2023.

M. Gonzalez-Astudillo. Identifying the stance of monetary policy at the zero lower bound: A markov-switching estimation exploiting monetary-fiscal policy interdependence. *Journal of Money, Credit, and Banking*, 50(1):115–154, 2018.

J. D. Hamilton. A new approach to the economic analysis of nonstationary time series and the business cycle. *Econometrica: Journal of the econometric society*, pages 357–384, 1989.

A. A. Haug and A. Sznajderska. Government spending multipliers: Is there a difference between government consumption and investment purchases? *Journal of Macroeconomics*, 79:103584, 2024.

K. Hubrich and R. Tetlow. Financial stress and economic dynamics: The transmission of crises. *Journal of Monetary Economics*, 70:100–115, 2015.

S. Jerow and J. Wolff. Fiscal policy and uncertainty. *Journal of Economic Dynamics and Control*, 145:104559, 2022.

Ò. Jordà. Estimation and inference of impulse responses by local projections. *American Economic Review*, 95(1):161–182, 2005.

C.-J. Kim, C. R. Nelson, et al. State-space models with regime switching: classical and gibbs-sampling approaches with applications. *MIT Press Books*, 1, 1999.

M. Klein and L. Linnemann. The composition of public spending and the inflationary effects of fiscal policy shocks. *European Economic Review*, 155:104460, 2023.

K. L. Kliesen and D. C. Wheelock. Managing a new policy framework: Paul volcker, the st. louis fed, and the 1979-82 war on inflation. *FRB of Saint Louis Review*, First Quarter, 103(1):71–97, 2021.

G. Koop. *Bayesian econometrics*. John Wiley & Sons, 2003.

E. M. Leeper. Equilibria under 'active'and 'passive'monetary and fiscal policies. *Journal of Monetary Economics*, 27(1):129–147, 1991.

R. Li and N. Wei. Economic policy uncertainty and government spending multipliers. *Economics Letters*, 217:110693, 2022.

R. Mao, W. Shen, and S.-C. S. Yang. Uncertain policy regimes and government spending effects. *European Economic Review*, 152:104330, 2023.

W. Miyamoto, T. L. Nguyen, and D. Sergeyev. Government spending multipliers under the zero lower bound: Evidence from japan. *American Economic Journal: Macroeconomics*, 10(3):247–277, 2018.

W. K. Newey and K. D. West. Hypothesis testing with efficient method of moments estimation. *International Economic Review*, pages 777–787, 1987.

M. T. Owyang, V. A. Ramey, and S. Zubairy. Are government spending multipliers greater during periods of slack? evidence from twentieth-century historical data. *American Economic Review*, 103(3):129–134, 2013.

R. Perotti. Estimating the effects of fiscal policy in oecd countries. *Available at SSRN 717561*, 2005.

V. A. Ramey and M. D. Shapiro. Costly capital reallocation and the effects of government spending. In *Carnegie-Rochester conference series on public policy*, volume 48, pages 145–194. Elsevier, 1998.

V. A. Ramey and S. Zubairy. Government spending multipliers in good times and in bad: evidence from us historical data. *Journal of Political Economy*, 126(2):850–901, 2018.

C. A. Sims and T. Zha. Error bands for impulse responses. *Econometrica*, 67(5):1113–1155, 1999.

C. A. Sims and T. Zha. Were there regime switches in us monetary policy? *American Economic Review*, 96(1):54–81, 2006.

J. B. Taylor. Discretion versus policy rules in practice. In *Carnegie-Rochester conference series on public policy*, volume 39, pages 195–214. Elsevier, 1993.

J. C. Wu and F. D. Xia. Measuring the macroeconomic impact of monetary policy at the zero lower bound. *Journal of Money, Credit, and Banking*, 48(2-3):253–291, 2016.

7 Appendix

7.1 Data Source

Table 8: Variables, definition, and data source

Country: US		
First Estimation (Taylor Rule Estimation)		
Variable	**Definition**	**Source**
i_t	Interest Rate. Q3-1981/Q2-2024 Proxy Funds Rate	**FRED Database**
π_t	Inflation Personal Consumption Expenditures: Chain-type Price Index, Percent Change from Year Ago (PCE) .	**FRED Database**
$\mathbf{y}_t$	Real GDP Real Gross Domestic Product, Billions of Chained 2017 Dollars.	**FRED Database**
Second Estimation (Local Projection)		
G_t	Total Expenditure Consumption expenditure + Gross Government Investment $GC_t + GI_t$	**Bureau of Economic Analysis**
GC_t	Consumption Expenditure Current Consumption Expenditure	**Bureau of Economic Analysis**
GI_t	Investment expenditure Gross Government Investment	**Bureau of Economic Analysis**
$Deflator_t$	Deflator. Gross Domestic Product: Implicit Price Deflator, Index 2017=100	**FRED Database**

7.2 Empirical responses of the GDP to a spending shock in the linear model

Drawing on the linear specification of equation (4), IRFs give quite contrasting outcomes. The statistically significant positive impact on GDP of total expenditures (part (a) of Figure 15) explains itself almost entirely by the impact of public investment (part (c) of Figure 15). Indeed, the impact of public consumption on GDP, although positive, is only weakly and temporarily significant. In contrast, a shock on public investment has a positive and growing impact on GDP during the first 4 quarters before it declines and turns out insignificant.

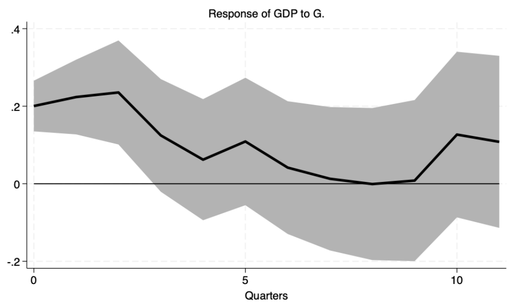
Overall, our findings are broadly consistent with those of Haug and Sznajderska (2024), although the impulse response functions exhibit notable differences in shape. A key distinction lies in the identification strategy: unlike their approach, we include a response to the short-term interest rate in our specification (see equation 3). Additionally, our sample periods differ significantly. While Haug and Sznajderska (2024) begin their analysis in 1947, such an early starting point would not be appropriate for our study, which focuses on identifying shifts in the Fed's policy rate reaction function towards inflation. This type of assessment is meaningful only from the early 1980s onward. In particular, it was with the appointment of Paul Volcker as Federal Reserve Chair in 1979 that U.S. monetary policy began to actively pursue inflation stabilization. Furthermore, in October 1982, the Fed abandoned the monetary aggregate targeting framework introduced in 1979 and returned to a system centered on managing the federal funds rate (see Kliesen and Wheelock (2021) on this transition).

7.3 State-Dependence: The case of Total Expenditure

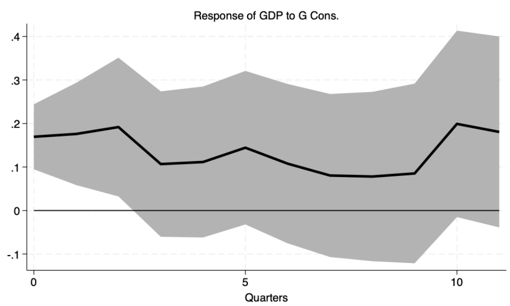
As regards the case of Total Expenditure, we find compelling evidence that the effectiveness of public expenditure shocks in stimulating GDP depends significantly on the prevailing policy regime (see Figure 16). Results are shown with 68% confidence bands. No matter

Figure 15: Linear Model. Responses of GDP to Different Expenditure Components

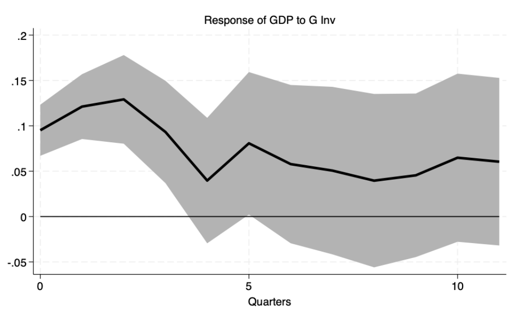
((a)) Response of GDP to G.



((b)) Response of GDP to G Cons.



((c)) Response of GDP to G Inv.



The IRFs shown in the figures come from the linear specification of Equation 4. They show the responses of real output to a government spending shock over a 12-quarter forecast horizon. The grey bands represent the 68% confidence intervals. Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987).

whether the regime shift is captured with a dummy variable or a smooth transition approach, the responses to a public expenditure shock diverge substantially after the first year between monetary and fiscal dominance. Under monetary dominance, the effect fades quickly and eventually turns negative, while under fiscal dominance it keeps building up and remains statistically significant for up to three years. This pattern can be interpreted as the outcome of fiscal–monetary interactions: inflationary pressures generated by higher public spending elicit a stronger monetary tightening when monetary dominance prevails, compared to fiscal dominance. As a result, the likelihood of a crowding-out effect is greater in the former regime

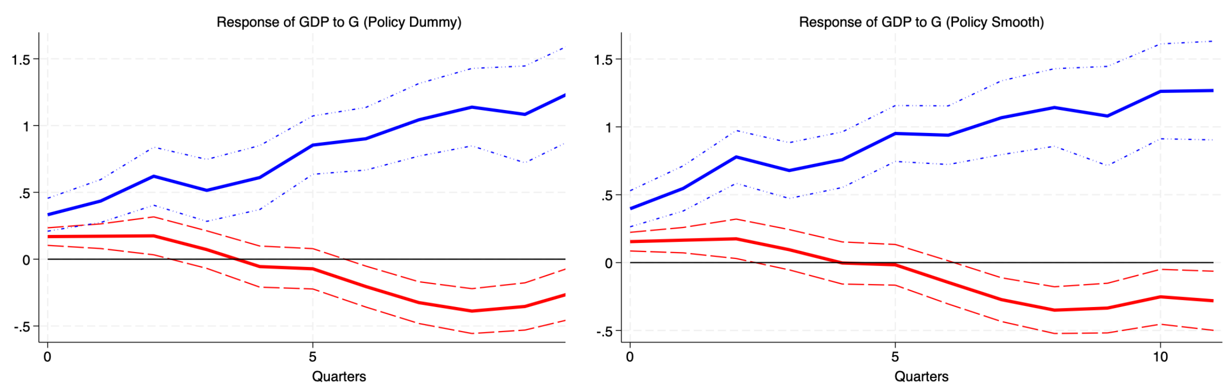
Table 9: Fiscal Cumulative Multipliers in the linear model

Quarters	Total Expenditure	Consumption Expenditure	Investment Expenditure
0	**1.04**	**1.12**	**2.32**
1	**1.11**	**1.23**	**2.86**
2	**1.14**	**1.31**	**3.08**
3	**0.97**	1.19	**2.82**
4	0.80	1.10	2.37
5	0.72	1.08	2.20
6	0.62	1.03	2.02
7	0.54	0.97	1.85
8	0.47	0.91	1.73
9	0.42	0.88	1.63
10	0.42	0.92	1.58
11	0.42	0.95	1.55
12	0.42	0.98	1.52

The fiscal cumulative multipliers are calculated on total public spending, consumption expenditure, and public investment. Fiscal Cumulative Multipliers are constructed following Ramey and Zubairy (2018), and the values in bold are significant at the 68% level. Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987).

than in the latter.

Figure 16: Responses of GDP to total expenditure according to policy regimes



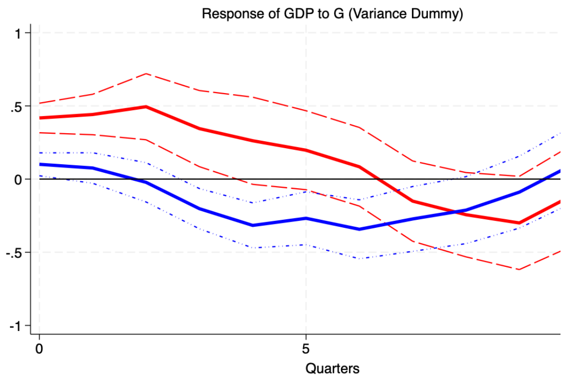
((a)) Response of GDP to G. Policy Dummy

((b)) Response of GDP to G. Policy Smooth

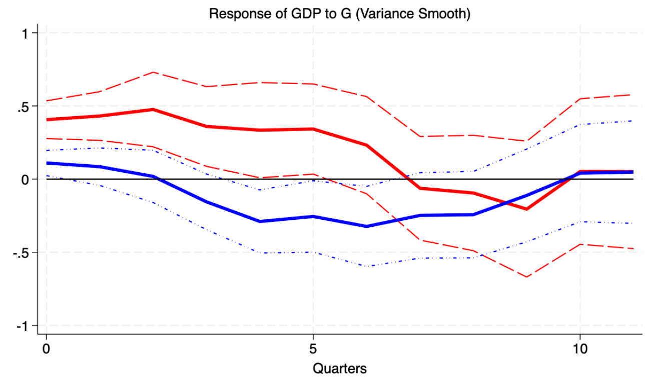
The IRFs show the responses of real output to a government spending shock over a 12-quarter forecast horizon. The bands represent the 68% confidence intervals. The blue lines represent fiscal dominance, while the red lines correspond to monetary dominance. The figure on the left illustrates the dummy model specification (Equation 5), while the figure on the right refers to the smooth transition specification (Equation 6). Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987). The sample covers the period from Q3 1981 to Q1 2020.

The real effects of a shock to total expenditures are also variance-dependent (see Figure 17). Our estimations indicate that fiscal policy has a stronger impact on economic activity when the variance regime is low, compared to periods of high volatility.

Figure 17: Responses of GDP to total expenditure according to variance regimes



((a)) Response of GDP to G. Variance Dummy



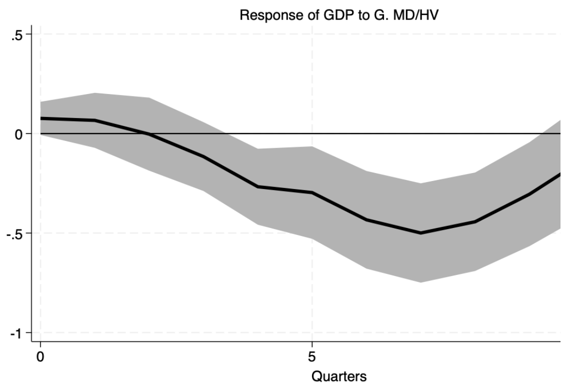
((b)) Response of GDP to G. Variance Smooth

The IRFs show the responses of real output and government expenditure over a 12-quarter forecast horizon. The bands represent the 68% confidence intervals. The blue lines represent the high variance regime, while the red lines correspond to the low variance regime. The figures on the left illustrate the dummy model specification (Equation 5), while the figures on the right refer to the smooth transition specification (Equation 6). Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987). The sample covers the period from Q3 1981 to Q1 2020.

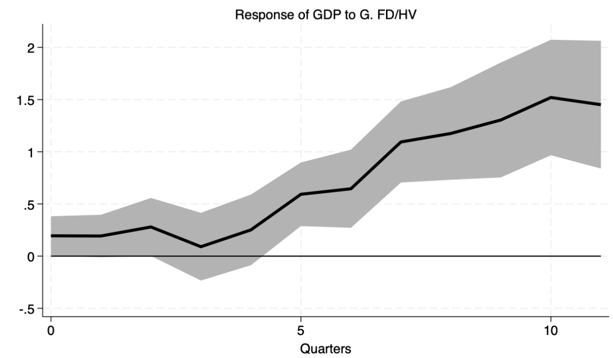
We now examine the interaction between policy and variance regimes, distinguishing four scenarios based on the nature of the policy regime (monetary or fiscal dominance) and the level of macroeconomic uncertainty (high or low variance). The impulse response functions corresponding to equation (29) are presented in Figure 18. The results indicate that the interaction term significantly influences the effectiveness of fiscal policy across regimes. Under fiscal dominance, fiscal policy consistently exerts a positive effect on GDP. This impact is both immediate and stronger when variance is low, whereas under high variance, the effect builds more gradually and becomes significant only after one year.

7.4 Values of the Cumulative Fiscal Multipliers in the non-linear models

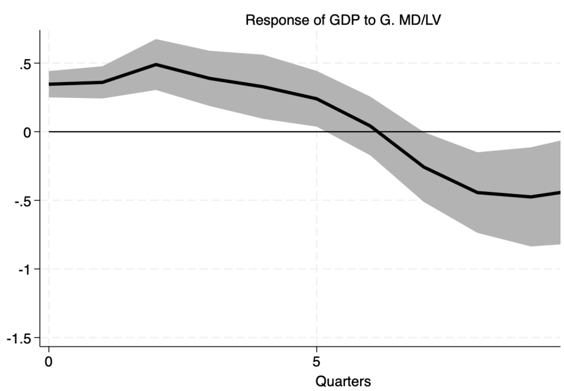
Figure 18: Responses of GDP to total expenditure according to interactions of policy and variance regimes.



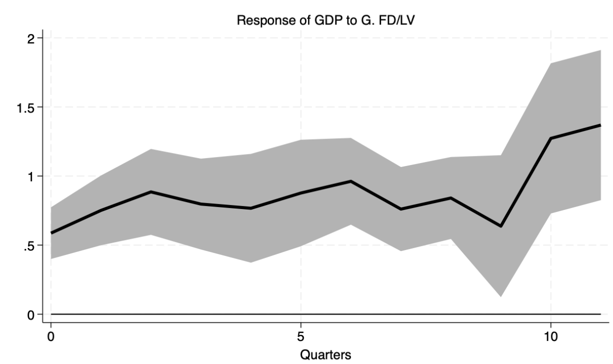
((a)) Response of GDP to G. Monetary Dominance and High Variance Regime.



((b)) Response of GDP to G. Fiscal Dominance and High Variance Regime.



((c)) Response of GDP to G. Monetary Dominance and Low Variance Regime.



((d)) Response of GDP to G. Fiscal Dominance and Low Variance Regime.

The IRFs show the responses of real output to a government spending shock over a 12-quarter forecast horizon. The grey bands represent the 68% confidence intervals. The IRFs correspond to the four combinations of fiscal/monetary dominance and high/low variance (Equation 29). Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987). The sample covers the period from Q3 1981 to Q1 2020.

7.5 Exploring and Testing Non-linearities

To assess the statistical significance of state-dependent responses, we implement a direct estimation strategy based on the instrumental variable (IV) approach proposed by Ramey and Zubairy (2018). This framework enables us to isolate exogenous fiscal shocks and to evaluate whether their effects differ systematically across alternative economic environments. We adapt the IV methodology to explicitly account for potential nonlinearities in the response of output (Y) to government spending shocks, focusing on two sources of state dependence: policy regimes and variance regimes.

Table 10: Total Expenditure Fiscal Cumulative Multipliers

	Dummy Approach		Smooth Approach	
Quarters	**Monetary Dominance**	**Fiscal Dominance**	**Monetary Dominance**	**Fiscal Dominance**
0	**0.88**	**1.72**	**0.80**	**2.05**
1	**0.95**	**1.82**	**0.90**	**2.25**
2	**0.96**	**2.15**	**0.93**	**2.68**
3	**0.79**	**2.07**	**0.81**	**2.64**
4	0.55	**2.07**	0.62	**2.64**
5	0.38	**2.21**	0.48	**2.77**
6	**0.18**	**2.34**	**0.29**	**2.88**
7	**-0.04**	**2.48**	**0.09**	**2.99**
8	**-0.24**	**2.59**	**-0.11**	**3.08**
9	**-0.38**	**2.66**	**-0.25**	**3.14**
10	**-0.44**	**2.75**	**-0.33**	**3.22**
11	**-0.51**	**2.78**	**-0.42**	**3.23**
12	**-0.57**	**2.81**	**-0.49**	**3.25**
Quarters	**Low Variance**	**High Variance**	**Low Variance**	**High Variance**
0	**2.16**	**0.52**	**2.15**	**0.54**
1	**2.35**	0.50	**2.48**	0.51
2	**2.45**	0.31	**2.66**	0.39
3	**2.36**	**-0.07**	**2.68**	0.08
4	**2.11**	**-0.43**	**2.53**	**-0.24**
5	1.90	-0.60	**2.46**	**-0.41**
6	1.62	-0.80	2.26	**-0.57**
7	1.30	-0.90	1.95	-0.64
8	1.01	-0.93	1.67	-0.69
9	0.75	-0.89	1.37	-0.66
10	0.62	-0.76	1.28	-0.59
11	0.52	-0.64	1.21	-0.53
12	0.38	-0.48	1.04	-0.43
Quarters	**MD/LV**	**MD/HV**	**FD/LV**	**FD/HV**
0	**1.79**	0.40	**3.04**	**1.01**
1	**2.03**	**0.41**	**3.24**	**1.02**
2	**2.25**	0.28	**3.55**	**1.28**
3	**2.32**	0.03	**3.55**	1.06
4	**2.17**	**-0.28**	**3.43**	1.11
5	**1.98**	**-0.50**	**3.39**	**1.45**
6	1.64	**-0.76**	**3.39**	**1.74**
7	**1.25**	**-1.02**	**3.31**	**2.18**
8	**0.84**	**-1.18**	**3.25**	**2.50**
9	**0.50**	**-1.22**	**3.14**	**2.82**
10	**0.26**	**-1.18**	**3.26**	**3.10**
11	**0.03**	**-1.15**	**3.32**	**3.22**
12	**-0.28**	-1.06	3.29	**3.34**

Total Expenditure Fiscal Cumulative Multipliers are constructed following Ramey and Zubairy (2018), and the values in bold are significant at the 68% level. Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987).

Thus, we estimate the following model:

$$\sum_{h=0}^{H} y_{t+h} = \beta_{MD}^{h} \sum_{h=0}^{H} g_{t+h}\, I_{t-1} + \phi_{MD}^{h} x_{t-k}\, I_{t-1} + \beta_{2}^{h} \sum_{h=0}^{H} g_{t+h} + \phi_{2}^{h} x_{t-k} + \alpha^{h} + u_{t,h},$$

where I_t is a dummy variable equal to 1 during periods of monetary dominance and 0 otherwise. The interacted and non-interacted spending terms are instrumented using the fiscal shock $\varepsilon_{g,t} \times I_t$ and $\varepsilon_{g,t}$, respectively. The coefficient β_{MD}^{h} captures the differential response of output in monetary-dominance versus fiscal-dominance states.

The same procedure is applied to evaluate how fiscal shocks transmit under high and low levels of economic policy uncertainty, and the analysis is conducted not only for total public expenditure but also separately for public consumption and public investment. This allows us to examine whether state dependence arises uniformly across spending categories

Table 11: Consumption Expenditure Fiscal Cumulative Multipliers

Quarters	Monetary Dominance	Fiscal Dominance	Monetary Dominance	Fiscal Dominance
0	0.49	**1.44**	0.57	**1.63**
1	0.43	**1.71**	0.64	**1.93**
2	0.39	**2.19**	0.65	**2.60**
3	0.33	2.15	0.71	2.65
4	0.31	**2.30**	**0.80**	**2.93**
5	0.18	**2.49**	0.78	**3.18**
6	0.02	**2.70**	0.67	**3.43**
7	-0.31	**3.19**	0.36	**3.99**
8	-0.60	**3.55**	0.05	**4.42**
9	-0.84	**4.09**	-0.24	**5.13**
10	-0.90	**4.59**	-0.33	**5.83**
11	**-1.02**	**4.74**	-0.47	**6.05**
12	-1.04	**4.79**	-0.52	**6.21**
Quarters	**Low Variance**	**High Variance**	**Low Variance**	**High Variance**
0	**2.53**	**-0.39**	**3.00**	**-0.53**
1	**3.27**	**-0.87**	**4.06**	**-0.99**
2	**3.60**	**-1.55**	**4.36**	**-1.55**
3	**3.79**	**-2.57**	**4.66**	**-2.28**
4	**3.78**	**-3.37**	**4.72**	**-2.82**
5	**3.70**	**-4.01**	**4.87**	**-2.96**
6	**3.35**	**-4.57**	**4.51**	**-3.05**
7	2.89	-5.04	3.98	-2.99
8	2.51	-4.96	3.54	-2.76
9	2.20	-4.64	3.19	-2.40
10	2.01	-4.01	3.02	-1.91
11	1.84	-3.40	2.81	-1.55
12	1.62	-2.70	2.44	-1.13
Quarters	**MD/LV**	**MD/HV**	**FD/LV**	**FD/HV**
0	**2.02**	-0.48	**2.38**	0.61
1	**2.63**	**-0.94**	**2.80**	0.94
2	2.10	**-1.47**	**4.11**	0.98
3	1.74	**-1.98**	**5.14**	0.10
4	1.35	**-2.40**	**6.73**	-0.10
5	0.92	**-2.90**	**9.35**	0.31
6	0.28	-3.16	**11.37**	0.91
7	**-0.50**	-3.93	**12.40**	**3.82**
8	**-1.20**	**-4.23**	**12.94**	**5.52**
9	**-1.69**	-4.29	13.62	**8.13**
10	**-1.83**	-4.35	15.28	**9.45**
11	**-2.22**	-4.55	**12.95**	**9.33**
12	**-2.53**	-4.30	**10.25**	**9.42**

Consumption Expenditure Fiscal Cumulative Multipliers are constructed following Ramey and Zubairy (2018), and the values in bold are significant at the 68% level. Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987).

or varies according to the composition of fiscal policy.

The differences across regimes are statistically significant. The cumulative responses are systematically more expansionary under fiscal dominance than under monetary dominance, and this pattern holds consistently across all categories of public spending—total expenditure, public consumption, and public investment. This confirms that the regime environment plays a central role in shaping the transmission of fiscal shocks, with fiscal dominance providing a more accommodative macroeconomic backdrop for the propagation of government spending.

Regarding the variance-regime framework, the results indicate that high and low EEPU conditions matter primarily for public consumption: the cumulative responses differ significantly across uncertainty states, with low-EEPU periods amplifying the effects of consumption shocks. In contrast, for public investment the difference between high- and low-uncertainty regimes is not statistically significant, as discussed in the main text.

The figures below present the graphical estimates. The red lines show the impulse re-

Table 12: Investment Expenditure Fiscal Cumulative Multipliers

	Dummy Approach		Smooth Approach	
Quarters	**Monetary Dominance**	**Fiscal Dominance**	**Monetary Dominance**	**Fiscal Dominance**
0	**2.49**	**2.67**	**1.98**	**3.36**
1	**3.15**	**3.09**	**2.54**	**4.31**
2	**3.57**	**3.23**	**2.98**	**4.55**
3	**3.33**	**3.06**	**2.80**	**4.49**
4	2.71	**2.84**	2.31	**4.18**
5	2.34	**3.24**	2.00	**4.70**
6	1.88	**3.55**	1.57	**5.08**
7	1.47	**3.65**	1.21	**5.19**
8	1.11	**3.92**	0.86	**5.55**
9	0.91	**3.91**	0.67	**5.56**
10	0.79	**4.10**	0.54	**5.81**
11	0.75	**4.20**	0.47	**5.93**
12	0.68	**4.32**	0.39	**6.09**
Quarters	**Low Variance**	**High Variance**	**Low Variance**	**High Variance**
0	**1.77**	**2.30**	1.14	**2.70**
1	**1.45**	**3.04**	0.94	**3.61**
2	1.36	3.10	**0.98**	**3.66**
3	0.72	2.70	**0.40**	**3.20**
4	-0.17	2.11	-0.44	2.60
5	-0.61	1.82	-0.68	2.27
6	-1.02	1.52	-1.03	2.02
7	**1.62**	1.33	-1.68	1.90
8	**-2.17**	1.26	-2.20	1.87
9	**-2.62**	1.30	-2.60	1.96
10	-2.68	1.40	-2.60	2.11
11	-2.80	1.51	-2.71	2.30
12	-3.05	1.66	-3.04	2.52
Quarters	**MD/LV**	**MD/HV**	**FD/LV**	**FD/HV**
0	**1.40**	2.69	2.84	**2.14**
1	1.47	**3.75**	2.03	**2.47**
2	2.45	**4.01**	1.02	**2.82**
3	**2.72**	**3.32**	0.05	**3.04**
4	2.41	2.44	**-1.18**	**2.94**
5	2.32	1.76	-1.77	**3.55**
6	2.13	**0.92**	-2.40	**4.02**
7	1.55	**0.33**	-2.53	**4.18**
8	0.92	**-0.05**	-2.79	**4.55**
9	0.57	**-0.14**	-3.50	**4.77**
10	0.22	**-0.08**	-2.81	**4.99**
11	0.15	0.04	-3.05	**5.12**
12	-0.22	0.20	-3.00	**5.26**

Investment Expenditure Fiscal Cumulative Multipliers are constructed following Ramey and Zubairy (2018), and the values in bold are significant at the 68% level. Estimates are obtained using the HAC robust estimator, correcting for heteroskedasticity and autocorrelation, following Newey and West (1987).

sponse associated with the statistical difference across states, whereas the blue lines display the cumulative responses in the baseline regime—Fiscal Dominance in the policy-regime specification and Low Variance in the uncertainty framework.

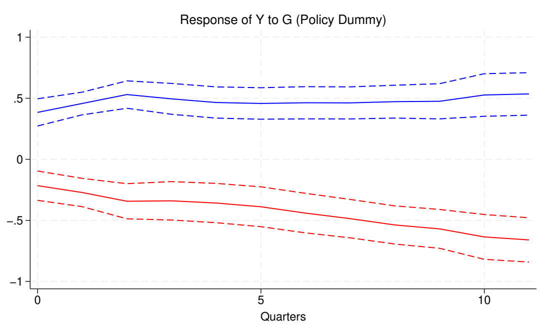
Table 13: Differences in cumulative responses for Y across policy regimes and EEPU states (horizons 0, 6, 12 quarters).

Differences (p-value)	Horizon 0	Horizon 6	Horizon 12
Panel A: Total Expenditure (G)			
MD – FD	**-0.22** (0.07)	**-0.44** (0.01)	**-0.69** (0.00)
Low EEPU – High EEPU	**0.38** (0.00)	**0.43** (0.02)	0.13 (0.60)
Panel B: Public Consumption (G_{Cons})			
MD – FD	-0.84 (0.17)	**-0.45** (0.02)	**-0.88** (0.00)
Low EEPU – High EEPU	**0.55** (0.00)	**0.69** (0.00)	0.34 (0.35)
Panel C: Public Investment (G_{Inv})			
MD – FD	**-0.07** (0.06)	**-0.12** (0.02)	-0.16 (0.18)
Low EEPU – High EEPU	-0.05 (0.32)	-0.10 (0.49)	-0.32 (0.16)

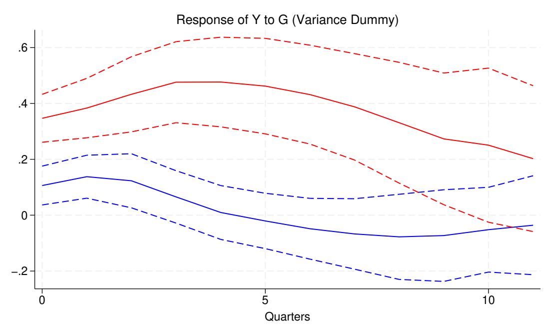
Note: Differences reported in bold are statistically significant at the 10% level.

Figure 19: Differences in cumulative responses

((a)) Monetary – Fiscal Dominance



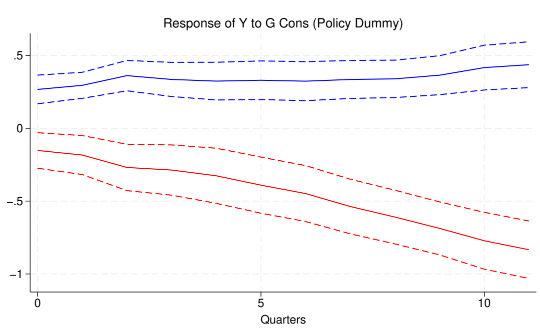
((b)) Low EEPU – High EEPU



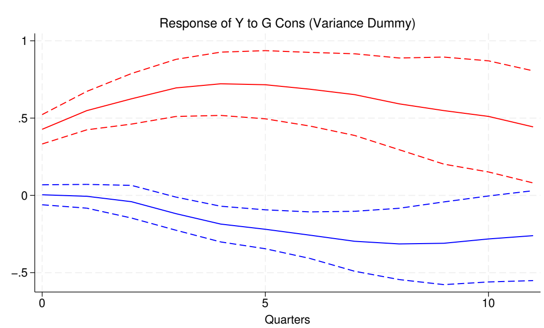
Note: The red line shows the difference between the two states. 68% Confidence intervals.

Figure 20: State-dependent cumulative responses for Public Consumption (G_{Cons})

((a)) Monetary – Fiscal Dominance



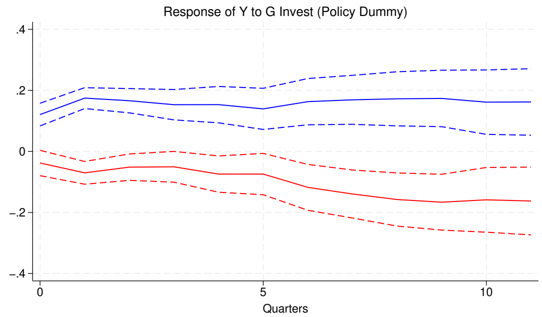
((b)) Low EEPU – High EEPU



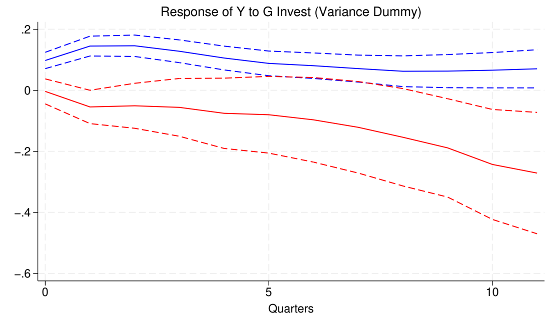
Note: The red line shows the difference between the two states. 68% Confidence intervals.

Figure 21: State-dependent cumulative responses for Public Investment (G_{Inv})

((a)) Monetary vs Fiscal Dominance



((b)) Low EEPU – High EEPU



Note: The red line shows the difference between the two states. 68% Confidence intervals.

ABOUT OFCE

The Paris-based Observatoire français des conjonctures économiques (OFCE), or French Economic Observatory is an independent and publicly-funded centre whose activities focus on economic research, forecasting and the evaluation of public policy.

Its 1981 founding charter established it as part of the French Fondation nationale des sciences politiques (Sciences Po) and gave it the mission is to "ensure that the fruits of scientific rigour and academic independence serve the public debate about the economy". The OFCE fulfils this mission by conducting theoretical and empirical studies, taking part in international scientific networks, and assuring a regular presence in the media through close cooperation with the French and European public authorities. The work of the OFCE covers most fields of economic analysis, from macroeconomics, growth, social welfare programmes, taxation and employment policy to sustainable development, competition, innovation and regulatory affairs.

ABOUT SCIENCES PO

Sciences Po is an institution of higher education and research in the humanities and social sciences. Its work in law, economics, history, political science and sociology is pursued through ten research units and several crosscutting programmes.
Its research community includes over two hundred twenty members and three hundred fifty PhD candidates. Recognized internationally, their work covers a wide range of topics including education, democracies, urban development, globalization and public health.
One of Sciences Po's key objectives is to make a significant contribution to methodological, epistemological and theoretical advances in the humanities and social sciences. Sciences Po's mission is also to share the results of its research with the international research community, students, and more broadly, society as a whole.

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