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Fiscal Policy and Stock Markets at the Effective Lower Bound

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Fiscal Policy and Stock Markets at the Effective Lower Bound

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Abstract

We study the impact of fiscal policy at the effective lower bound (ELB) in the stocks markets of the Euro Area, specifically looking at a government spending shock. To uncover the impact of this shock, we estimate a factor-augmented interacted panel vector-autoregressive (FAIPVAR) model. We find statistically different impacts of the government spending shock across the ELB and non-ELB periods, with relatively stronger positive impact on stock returns under the former. Conversely, the differences are not statistically significant for the United States using a time series data-based FAIVAR. Our findings have important implications from the perspectives of both policymaking and investors.

Keywords: Fiscal policy, Effective lower bound, VAR, Stock Market
JEL Classification: C32, E52, E58, G12

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1. Introduction

The role of stock prices and/or returns as a leading indicator of real activity and inflation is well-established (Stock and Watson, 2003; Plakandaras et al., 2017; Pierdzioch and Gupta, 2020; Gupta et al., 2022). Naturally, the role of policies, both monetary and fiscal, in affecting the equity market is of crucial importance from the perspective of policymakers and investors. In this regard, a huge number of studies have delved, and continue to do so, into the role of monetary policy shocks on stock market movements (see Çepni and Gupta (2021), Çepni et al. (2021) and Plakandaras et al. (2022) for detailed reviews of this literature).[1] Comparatively, the effect of fiscal policies on stock markets is a relatively new literature, which has gained momentum since the effective lower bound (ELB) situation of the monetary policy rates that emerged in the wake of the global financial crisis (GFC), and the "Great Recession" that followed (see for example, Afonso and Sousa (2011), Afonso and Sousa (2012), Agnello and Sousa (2013), Chatziantoniou et al. (2013), Gupta et al. (2019), Montasser et al. (2020), Marfatia et al. (2020),Mumtaz and Theodoridis (2020)), with a strong focus on the United States (US), and at times selected advanced European economies.

Theoretically, fiscal policy stances can influence stock market performance via primarily three alternative routes: Keynesian, Classical, or Ricardian (Bernheim, 1989). For instance, in the Keynesian context, fiscal decisions can support aggregate demand, boosting the economy and potentially driving stock prices higher. Also, higher stock prices due to expansionary fiscal policies can result from higher levels of consumer confidence and consumption, resulting in firms experiencing a corresponding increase in sales and earnings. But then according to Classical economic theory, crowding out effects of fiscal policy in the market for loanable funds and in the productive sectors of the economy can potentially drive stock prices lower, as financing of the budget deficit by borrowing from the private sector, would cause an increase in real interest rates. Finally, from a Ricardian-equivalence perspective, fiscal policy is expected to have no effect on stock markets, since there is no impact on the aggregate demand as borrowing from the private sector will be offset by the private savings of rational households, who expect

[1] It is well-accepted that central banks in their effort to maintain low inflation will mainly influence the economy's interest rates, and in the process monetary policy can influence stock market price and/or returns via five possible channels, namely the interest rate channel, the credit channel the wealth effect, the exchange rate channel and, the monetary channel.

a higher tax collection in the future for the repayment of the debt. Given these channels, the above-cited studies have generally detected stronger negative influence of expansionary fiscal policies for European markets than for the US, thus lending support primarily for the Classical economics line of reasoning.

Note that fiscal policy may interact with monetary policy via the impact of the inter-temporal budget constraint of the government, and through monetary variables (such as inflation, interest and exchange rates). Also, when the ELB is reached, monetary policy ceases to operate in the conventional way, with central banks implementing quantitative easing, and forward guidance to affect long-term interest rates. Given these two critical points, and unlike the above-mentioned works, this paper investigates, for the first time, the impact of a government spending shock on the stock markets of the Euro area primarily, and the US as a comparison, when monetary policy is constrained by the ELB and operates in an unconventional manner, highlighting differences from the reactions observed in normal times.

To circumvent the difficulty of capturing the intricacy associated with monetary policy decisions during ELB and non-ELB periods, we condition the computation of the impact of the government spending shock on equity market returns on an indicator that summarizes the overall monetary policy stance. In this regard, we utilize a prominent indicator with this desirable feature that has been recently developed by Wu and Xia (2016), known as the shadow short rate (SSR), which is based on an approximation of a nonlinear term structure model. To fully take the dynamics of the shadow rate into account, we use a factor-augmented interacted panel vector-autoregressive (FAIPVAR) model for the ten stock markets of the Euro area (Amendola et al., 2020) as our main focus, and a corresponding time series version for the US (Caggiano et al., 2017). The main advantage of this econometric framework is that the presence of an interaction term allows capturing nonlinearities and estimating the reaction of the variable of interest, i.e., stock returns, to a government spending shock conditional on monetary policy regimes, proxied by the shadow short rate, which we endogenize in our model. Furthermore, augmenting the specification with factors extracted from a large number of macroeconomic variables mitigates concerns regarding limited information, and in the process possibly overestimating the response of stock returns. Note that, we concentrate more on the Euro area than the US in our analysis, since the ELB-situation, until the emergence of COVID-19, continued for a more prolonged period in the former than the latter, and because debates on fiscal policy has been intense in Europe since the sovereign debt crisis that followed the "Great Recession".

With the European Central Bank (ECB) and the Federal Reserve now pursuing hikes in the monetary policy interest rates to curb high inflation, resulting from expansionary unconventional monetary policy measures, used due to the ELB situation, associated with expansionary fiscal policy since the outbreak of the coronavirus pandemic to boost demand, as well as supply-chain disruptions and energy price spikes related to the ongoing Russia-Ukraine war, the role of expansionary fiscal policy in reducing the risk of global economic slowdown and weak financial markets remains an important issue. Accordingly, the question we ask in this paper is a pertinent one, and the associated answer has implications for investors and policymakers. Our results question the existing evidence outlined above, which suggests that a contractionary fiscaly policy is likely to raise stock returns, and reduce the negative impact on economic activity, while keeping the current surging inflation in check. The remainder of the paper is organized as follows: Section 2 outlines the basics of the empirical model, while Section 3 presents the data. Section 4 discusses the findings and associated robustness test involving an alternative measure of the SSR, developed by Krippner (2013, 2015), given its importance in the interacted model. Finally, Section 5 concludes.

2. Methodology

We employ an extended version of the small-scale model originally proposed by Caggiano et al. (2017) to study the impact of uncertainty under ELB in a time-series context for the US, by undertaking a factor-augmented approach in the panel data-based set-up developed by Amendola et al. (2020). A time-series version of the same model is used when we move from the panel of Euro area countries and compare our findings with that of the US. The underlying model features only one interacted term, since having multiple such terms would lead to instability in estimations. The interaction terms implies the use of two endogenous variables, government spending (G_t) as well as the conventional or unconventional monetary policy stance as revealed by the shadow short rate(SSR_t).

$$\begin{aligned} Y_{i,t} = \sum_{i=1}^{N} C_i D_{i,j} + \sum_{i=1}^{N} \sum_{k=1}^{L} A_{i,k} D_{i,j} Y_{i,t-k} + \\ \sum_{i=1}^{N} \sum_{k=1}^{L} A^1_{i,k} D_{i,j} G_{i,t-k} \times SSR_{t-k} + \sum_{i=1}^{N} V_i D_{i,j} f_{(t|t-1:t-4)} + V^1 z_{t-1} + u_{i,t} \end{aligned} \quad (1)$$

where, t is the time index, with $t = 1, ..., T$, with the number of countries given by $i = i, ..., N$, while $k = 1, ..., L$ stands for the number of lags. We further denote $Y_{i,j}$ as the vector of endogenous variables. The interacted term is given by $G_{i,t-k} \times SSR_{t-k}$. There are also two sets of variables, one standing for the forecast of time-t government spending over the previous year and denoted by $f_{(t|t-1:t-4)}$, and the other involving the exogenous foreign variables, denoted by z_{t-1}. The coefficients C_i are country-specific intercepts, with $A_{i,k}$ denoting the matrix of country level coefficients. We use V_i to capture the coefficients associated with the country-level coefficients of exogeneous variables, with V^1 being the pooled coefficients of the other set of exogenous variables. We also use $D_{i,j}$ as an indicator variable for each variable which is equal to 1 when $i = j$. $u_{i,t}$ is the vector of residuals which follows a normal distribution characterized by a mean of zero and a covariance matrix of Σ_i.

We estimate the reduced-form model by adopting a Bayesian strategy for inference with an uninformative independent Normal–Wishart prior, which in turn uses a Monte Carlo simulation to recover the posterior distribution of the parameters. The reader is referred to Amendola et al. (2020) for complete details regarding the the computational issues surrounding inference and identification.

3. Data

We build on the dataset of Amendola et al. (2020), which we extend in time and adapt to our analysis of the stock markets in the Euro area countries. The data frequency is quarterly, and the sample spans 2002:Q1 to 2019:Q4. The starting date is based on data availability. We did consider whether to extend the sample in time from 2020 onwards, but the data are affected by the COVID-19 generated recessions as well as the extraordinary measures taken by the national governments. We focus on ten original members of the Euro area, namely: Austria, Belgium, Finland, France, Germany, Ireland, Italy, the Netherlands, Portugal and Spain. We do not include Luxembourg as its government spending patterns are known to be volatile (Auerbach and Gorodnichenko, 2012).

We use several types of datasets which we combine to produce our estimates. First, we start from a specification commonly used for government spending in the VAR literature, which we adapt to the analysis of the stock market as follows: the stock market variable, is considered to be a fast-moving variable and ordered last in the VAR, allowing us to identify the government spending shock using a Cholesky decomposition:

$$Y_{i,t} = (G_{i,t}, T_{i,t}, SM_{i,t}) \tag{2}$$

where $G_{i,t}$ stands for government spending (the sum of government gross fixed capital formation and government consumption), while $T_{i,t}$ represents the net taxes (the sum of government receipts of direct and indirect taxes minus transfers to businesses and individuals). $SM_{i,t}$ is a stock market index. Government spending and taxes are taken from the Organisation for Economic Co-operation and Development (OECD) Economic Outlook database, and are scaled by potential Gross Domestic Product (GDP), from the same source. The stock market data are national all-share or broad stock price indices, extracted from the OECD Main Economic Indicator (MEI) database, which are converted to log-returns in percentages.

We further add series related to monetary policy. We use the the shadow short rate ($SSR_{i,t}$) taken from Wu and Xia (2016)[2] as the conventional and unconventional monetary policy interest rate series. The main advantage of the SSR is that it is not constrained by the ELB and thus allows us to combine the data from the ELB period with the data from the non-ELB era. The SSR is based on models of term-structure. The yield curve-based framework essentially removes the effect that the option to invest in physical currency (at an interest rate of zero) has on yield curves, resulting in a hypothetical "shadow yield curve" that would exist if physical currency were not available. The "shadow policy rate" generated in this manner, therefore, provides a measure of the monetary policy stance after the actual policy rate reaches zero. We also add five factors to the baseline dataset which helps us eliminate the possibility of non-fundamental shocks (Forni et al., 2009). The five factors are computed from a large number of macroeconomic and financial series (see Appendix A for complete details).[3]

In terms of endogenous variables, the final dataset used in the model specification above can be described below as:

$$Y_{i,t} = (G_{i,t}, T_{i,t}, SR_t, F_t, SM_{i,t}) \tag{3}$$

We also add an exogenous series related to the forecasts of government spending at time-t over the last year (i.e., four quarters). This is employed in

[2]The data is available for download from: `https://sites.google.com/view/jingcynthiawu/shadow-rates?authuser=0`.

[3]We excluded the overall GDP from the data set, since we already have included the different components of the same, especially in light of the fact that fiscal policy is expected to impact the stock returns via the aggregate demand.

the fiscal policy literature to alleviate the issue related to fiscal foresight, i.e., to eliminate the impact of government spending anticipated by the agents. Exogeneous series related to the US, namely the US output gap, inflation, from the OECD Economic Outlook database and SSR, derived from Wu and Xia (2016), are included to control for potential international influences.

As a robustness check, we also consider the SSR developed by Krippner (2013, 2015), which is considered to be an improvement based on a two-factor term structure model over those obtained by Wu and Xia (2016), who rely on three factors.[4]

As far as the dataset of the US is concerned, as exactly in Amendola et al. (2020), it covers 1966:Q4 to 2017:Q4, with the ELB regime running from 2008:Q4 to 2015:Q4 (Caggiano et al., 2017). While we utilize the SSR of both Wu and Xia (2016) and Krippner (2013, 2015), details on the rest of the variables including the factors (derived using 64 publicly available time series from the FRED Economic Database of the Federal Reserve Bank of St. Louis) which augment the IVAR can be found from the Appendix A.4 of Amendola et al. (2020).

4. Empirical Findings

In this section we report impulse response functions (IRFs) of government spending, net taxes, the shadow rate, and the stock returns to an unexpected shock to government spending. One of the advantages of the FAI(P)VAR model is that it allows conditioning the IRFs on a specific initial condition, which in our case is represented by the Euro area and US economies being in a given monetary policy regime. In line with Amendola et al. (2020), we report IRFs of the Euro area conditional on two regimes: (i) normal times, which corresponds to the period between the beginning of our sample (2002:Q1) and the bankruptcy of Lehman Brothers (2008:Q3), and; (ii) ELB, with this state corresponding to the period of 2012:Q4 to the end of our sample period (2019:Q4).[5] For the US, the ELB period covers 2009:Q3 to 2015:Q3, following Wu and Xia (2016).

The left panel of Figures 1 to 4, which deals with the SSRs of Wu and Xia (2016) and Krippner (2013, 2015) for the Euro area and the US, contrasts the IRFs for the normal times regime with those for the ELB regime, with the right panel reporting the difference in the IRFs across these two regimes.

[4] See Krippner (2020) for a detailed discussion in this regard.

[5] We do not report IRFs for the intermediate period (2008:Q4-2012:Q3) as it is a hybrid period in which the monetary policy rate was quickly lowered but did not reach the ELB.

We can make the following observations from Figure 1, based on the SSR of Wu and Xia (2016): First, in both cases the effect on government spending to its own shock is quite persistent, and stays above the baseline for about twelve quarters before it starts to die out. Second, the response of net taxes is stronger, though a delayed mild positive impact is observed under the ELB-regime, but the credible set of responses of net taxes includes zero, and hence is insignificant. Third, the SSR, responds negatively and significantly for around three years only under the ELB-state, with the response being mainly insignificant and small in normal times. Fourth, turning to the focus of our paper, i.e., stock returns, we find that the government spending shock has a a short-lived positive, but insignificant effect, under normal times. However, under the ELB, stock returns are found to respond positively in a delayed fashion, with the impact being significant over the seventh till the twelfth quarter following the shock. Fifth, comparing the results for normal times against those for ELB unveils that, when the economy is at the ELB, the response of stock returns, though initially lower for a quarter, is larger in a statistically significant manner over the horizon of fourth- till the fifteenth-quarter-ahead, as the 90-percent credible set of the difference in the median responses of the ELB regime vis-à-vis normal times excludes zero. At the same time, government spending and the SSR are also significantly lower for prolonged periods (till seventeen- and thirteen-quarter-ahead, respectively), while net taxes initially decline, but then remain higher beyond eleven-quarter-ahead.

[Insert Figure 1 here.]

The finding seems to be in line with theory, since when the ELB is strictly binding, an increase in government spending leads to a bigger rise in expected inflation, which drives down the real interest rate and in turn boosts private spending to a larger extent, ultimately delivering a relatively stronger effect on the the stock market due to the boost to the macroeconomy (Christiano et al., 2011). In other words, the earlier-mentioned Keynesian channel seems to be at work here, but only during the ELB, when the positive effect on stock returns is statistically significant. As seen from Figure 2, our results continue to be qualitatively and even quantitatively similar, if not slightly stronger in terms of persistence of the positive effect on stock returns during ELB, under the alternative metric of the SSR of Krippner (2013, 2015).

[Insert Figure 2 here.]

Although our paper focuses on the Euro area, the issue of the impact of a government spending shock on stock returns at the ELB is also interesting to compare with the the largest advanced economy namely, the US, which too faced the challenges of the ELB. This is more so, given the concentration of the literature on the nexus of fiscal policy-stock returns on the US. Unlike the Euro area, the effect on stock returns across the two regimes is statistically insignificant, with the non-result staying robust to the alternative measures of the SSR. This finding seems to be driven by the fact that, while in the Euro area the SSR declines in a statistically significant manner, for the US, the impact on it is insignificant, thus failing to boost the stock returns.

[Insert Figures 3 and 4 here.]

At this stage, it is important to put our results in perspective of the existing literature, which tends to find a negative effect on stock returns following an expansionary fiscal policy, with stronger effects for European countries than the US. While we confirm the generally weak effects for the US, the negative impact on stock returns for the Euro area is observed only under the normal times, but the effect is insignificant, which in turn is possibly due to the fact that we rely on a factor-augmented approach that prevents any ommitted variable bias and any associated "spurious" statistical significance.

5. Concluding Remarks

The objective of our paper is to analyze the impact of a government spending shock on stock returns in a panel of ten Euro area countries at the effective lower bound (ELB). At the same time, we also perform a similar analysis for the US. In this regard, we estimate a factor-augmented interacted panel vector-autoregressive (FAIPVAR) model for the Euro area, while a time series data-based FAIVAR is employed for the US. We found statistically different impacts of the government spending shock across the ELB and non-ELB periods, with a relatively stronger positive impact on stock returns under the former for the Euro area. However, the differences are not statistically significant for the case of the US. From the perspective of a policymaker, it implies that expansionary government spending can lead to improvement in stock returns of the Euro area, but only when the economy is in the ELB situation, but not during normal times. As far as the US is concerned fiscal policy is clearly not a reliable tool to impact the stock market. In the current context of relatively high interest rate policies used for keeping inflation in check, government spending expansion is less likely to boost stock markets, and hence, when pricing assets, investors can ignore fiscal decisions from their list of state-space variables.

As part of future research, it would be interesting to conduct a similar analysis for the housing market, in light of the importance of residential real estate in net worth and total asset of households, besides its leading role in causing the GFC and the associated ELB situation.

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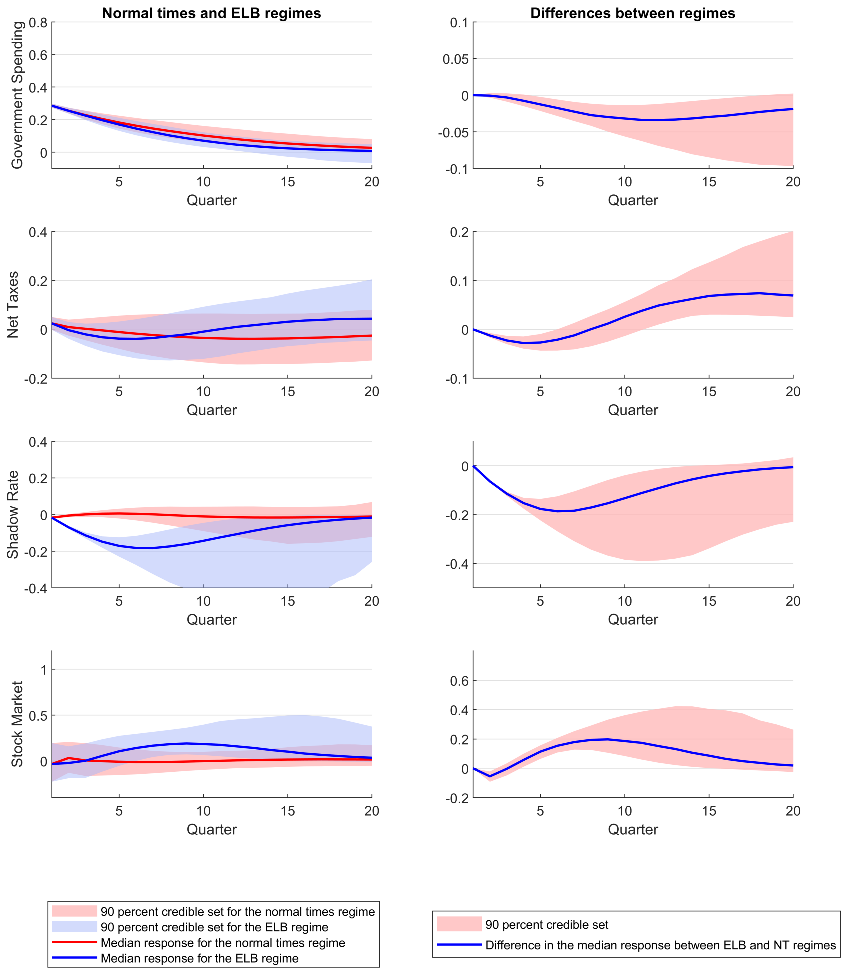
Appendix A. Data for Factors

Table A.1: Details on Data for Factors

Variable	Source
Real total domestic demand	OECD Economic Outlook
Real exports	OECD Economic Outlook
Real imports	OECD Economic Outlook
Real fixed investment	OECD Economic Outlook
Real private consumption	OECD Economic Outlook
Change in inventories (contribution to GDP growth)	OECD Economic Outlook
Government debt-to-GDP ratio (Maastricht definition)	OECD Economic Outlook
Unit labour cost (total economy)	OECD Economic Outlook
Indicator of competitiveness based on relative unit labour costs	OECD Economic Outlook
Indicators of competitiveness based on relative consumer prices	OECD Economic Outlook
Labour productivity (total economy)	OECD Economic Outlook
Total employment	OECD Economic Outlook
Dependent employment	OECD Economic Outlook
Unemployment rate	OECD Economic Outlook
10-year government bond yield	OECD Economic Outlook
Harmonised Index of Consumer Prices (HICP)	OECD Economic Outlook
HICP excluding food and energy	OECD Economic Outlook
Manufacturing production	OECD Main Economic Indicators
Industrial production (excluding construction)	OECD Main Economic Indicators
Retail sales	OECD Main Economic Indicators
Hourly earnings in manufacturing	OECD Main Economic Indicators
Credit to households (% of GDP)	Bank for International Settlements
Credit to non-financial corporations (% of GDP)	Bank for International Settlements
Bank credit to the private non-financial sector (% of GDP)	Bank for International Settlements

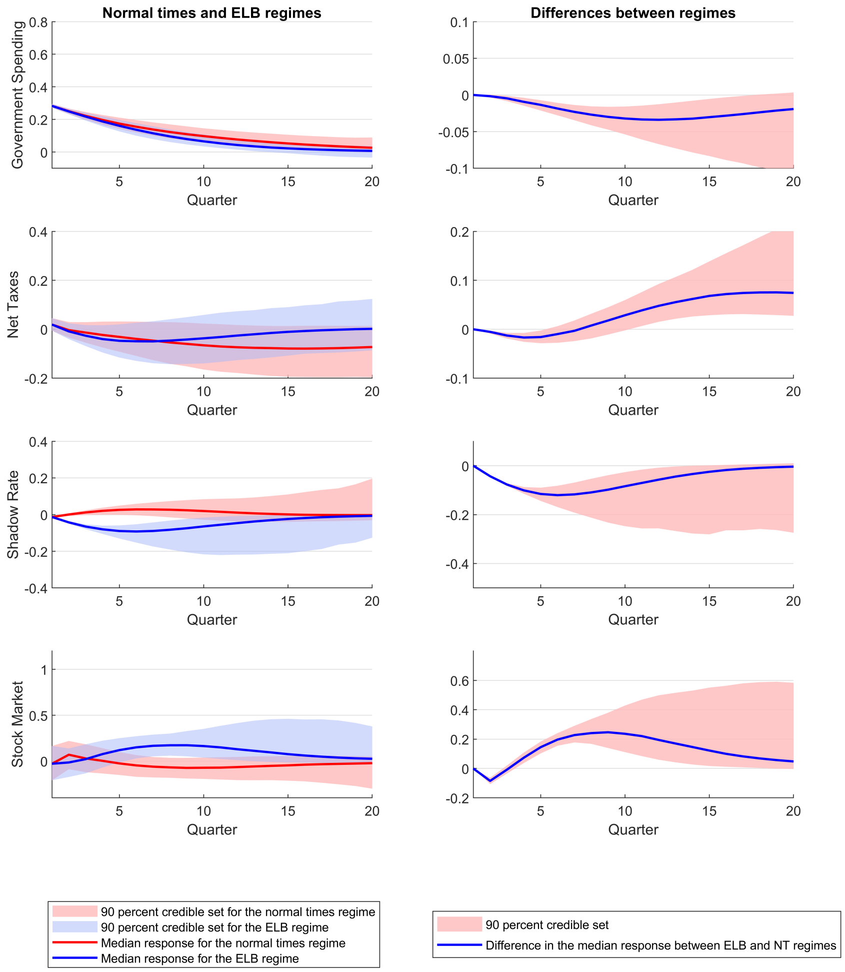
Source: OECD and Bank for International Settlements data can be accessed through: `https://stats.oecd.org/` and `https://www.bis.org/statistics/totcredit.htm?m=2669`.

Figure 1: Impulse Responses to a Government Spending Shock in Normal Times and at the ELB for the Euro area with the Wu and Xia (2016) Shadow Short Rate.



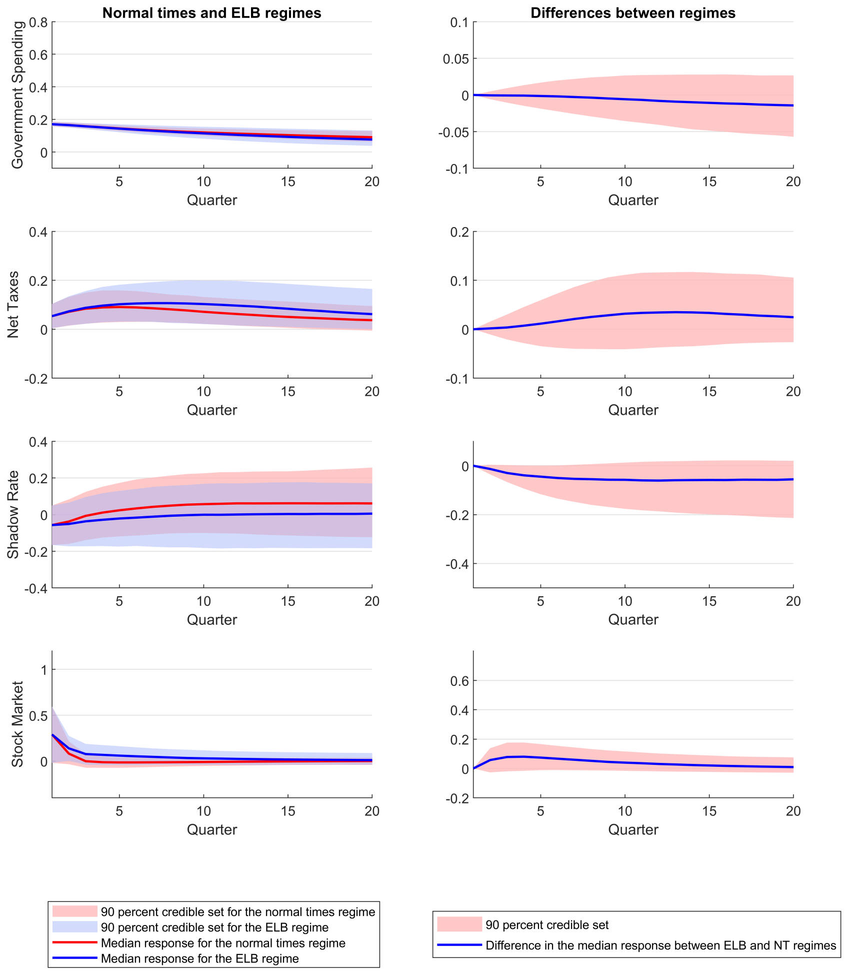
Notes: Impulse responses in percent to a shock of size one standard deviation. Bold lines represent median responses. Shadowed areas represent 90 percent credible sets.

Figure 2: Impulse Responses to a Government Spending Shock in Normal Times and at the ELB for the Euro area with the Krippner (2013, 2015) Shadow Short Rate.



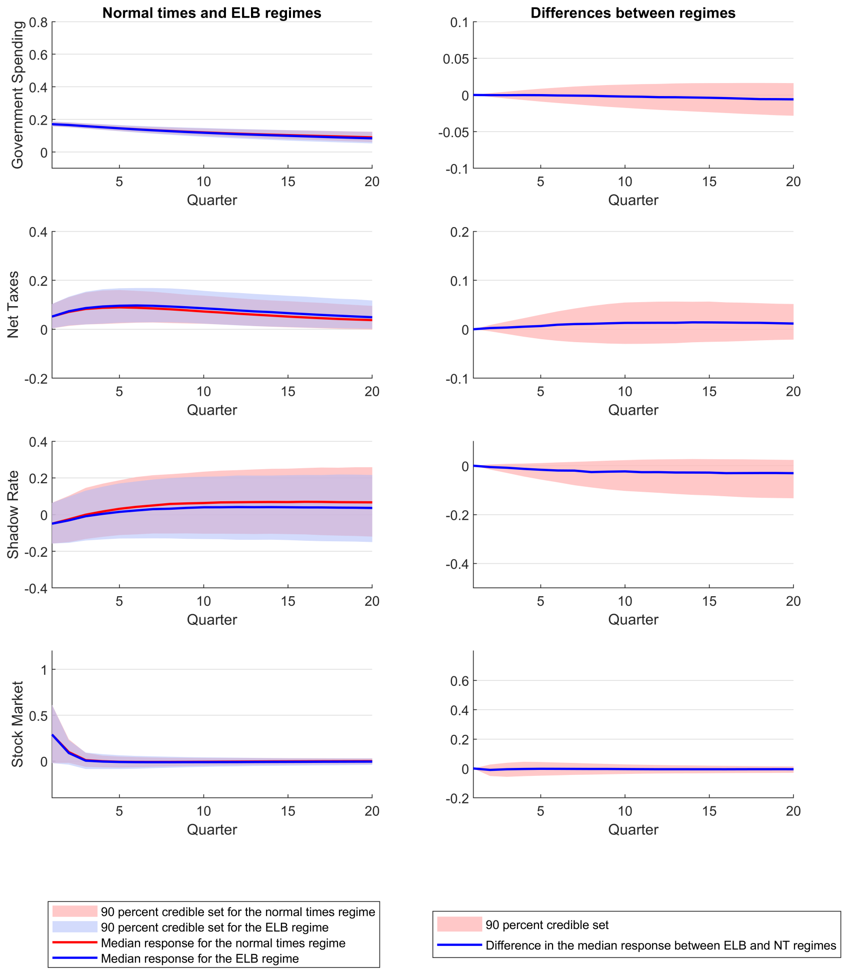
Notes: Impulse responses in percent to a shock of size one standard deviation. Bold lines represent median responses. Shadowed areas represent 90 percent credible sets.

Figure 3: Impulse Responses to a Government Spending Shock in Normal Times and at the ELB for the US with the Wu and Xia (2016) Shadow Short Rate.



Notes: Impulse responses in percent to a shock of size one standard deviation. Bold lines represent median responses. Shadowed areas represent 90 percent credible sets.

Figure 4: Impulse Responses to a Government Spending Shock in Normal Times and at the ELB for the US with the Krippner (2013, 2015) Shadow Short Rate.



Notes: Impulse responses in percent to a shock of size one standard deviation. Bold lines represent median responses. Shadowed areas represent 90 percent credible sets.