

EFFECTS OF FISCAL POLICY UNCERTAINTY ON TURKISH ECONOMY*

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Abstract

Uncertainty is one of the most important issues for economic actors. Uncertainty about tax, expenditure and debt policy has an impact on the economy. The central question in this study asks how fiscal policy uncertainty affects the Turkish economy. First, we quantify Turkey's fiscal policy uncertainty index based on volatility measurements between 1998Q1 and 2020Q4. This index represents major fiscal, economic and political incidents in Turkey. Next, we analyse the effects of fiscal policy uncertainty on the Turkish economy using a VAR model. Our study finds that fiscal policy uncertainty shocks have detrimental and long-lasting effects on the Turkish economy. The results indicated that a positive standard deviation shock in fiscal policy uncertainty decreases the confidence, output and consumption. The findings of this study reveal critical fiscal policy implications for decision-makers. These findings imply that reducing Turkey's fiscal policy uncertainty is a critical policy priority for the business cycle fluctuations.

Keywords: Fiscal policy uncertainty, business cycle, VAR, Turkey

JEL Classification: E30, E62, H30, H60

1. Introduction

Economic agents consider consumption, production, investment and hiring decisions within the framework of several factors. One of these factors is uncertainty. For many years, uncertainty has been a major topic of discussion in the field of contemporary economics. Especially the effects of uncertainty on the economy have a significant place in the history of economic thought.¹ Uncertainty can change the decisions of economic actors and affect the direction and severity of business cycles. It is claimed that uncertainty is one of the crucial factors affecting the magnitude of the economic contraction.

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1 For the development of uncertainty in the history of economic thought, see Köhn (2017).

Uncertainty has been at the centre of discussions after the 2008 crisis and has become a frequently discussed issue in the literature (Bernanke, 1983; Bomberger, 1996; Attamensah, 2004; Bloom, 2009, 2014; Baker *et al.*, 2016; Leduc and Liu, 2012; Bachmann *et al.*, 2013; Jurado *et al.*, 2015; Huang and Luk, 2020; Ghirelli *et al.*, 2021). These discussions are also examined within the framework of economic policies (monetary and fiscal policy). When monetary and fiscal policymakers try to control the economy, how the economic policy will be shaped creates uncertainty (Mankiw, 2019).

One of the essential types of uncertainty affecting the decisions of economic agents is fiscal policy uncertainty (henceforth, FPU). FPU arises from many issues such as what kind of tax policy will be implemented in the future, the size of government expenditures, whether the government debt is sustainable in the future, and the composition and the exact timing of fiscal consolidations. For instance, what kind of fiscal policy will be implemented to support consumption, investment and employment in response to the COVID-19 pandemic has caused uncertainty in Turkey as well as in the world. In addition, political factors such as the existence of political interests, snap and re-election, or whether governments can be re-elected can cause fiscal policy uncertainty.

In recent years, there has been an increasing amount of literature on Turkey's economic uncertainty and economic policy uncertainty (Erdem and Yamak, 2016; Gürgün, 2019; Sahinoz and Coşar, 2018, 2020; Çevik and Erduman, 2020). However, to the best of our knowledge, our paper is the first attempt to estimate FPU for Turkey and analyse the macroeconomic effects of an unexpected FPU shock. There is some evidence that FPU has macroeconomic effects on the business cycle for both advanced and emerging countries. A considerable amount of literature has been published on FPU (Alm, 1988; Aizenman and Marion, 1993; Hassett and Metcalf, 1999; Ali, 2001; Henisz, 2004; Davig *et al.*, 2010; Bi *et al.*, 2011; Croce *et al.*, 2012; Fatas and Mihov, 2013; Agnello and Sousa, 2013; Born and Pfeifer, 2014; Richter and Throckmorton, 2015; Fernández-Villaverde *et al.*, 2015; Ricco *et al.*, 2016; Mumtaz and Surico, 2018; Davig and Foerster, 2019; Kim, 2019; Lee and Xu, 2019; Montes and Souza, 2020; Anzuini *et al.*, 2020; Saijo, 2020; Anzuini and Rossi, 2021). In this paper, we estimate the fiscal policy uncertainty variable for Turkey, which is a small open economy, and investigate the macroeconomic effects of the FPU at a quarterly frequency between 1998Q1 and 2020Q4. One of the main reasons for considering this sample period and choosing Turkey is that this period includes many incidents in the Turkish economy. Turkey experienced economic, fiscal and political incidents during this period. However, in this period, the emergence of economic crises due to domestic and foreign incidents, the elections and the inability to form governments, domestic and foreign political relations, the presence of geopolitical developments, developments on financial markets and the COVID-19 pandemic have led to uncertainty

about the direction of fiscal policy implementations. Therefore, the FPU has become a central issue for policy-makers.

First, we estimate a fiscal reaction function based on the volatility measurement for Turkey. The volatility of innovations or fiscal volatility is used as the FPU variable. We concluded that the FPU index for Turkey represents major fiscal, economic and political incidents. Then, we utilize a vector autoregression (VAR) with the estimated FPU shock to capture whether FPU has macroeconomic effects on the business cycle. We conclude that the unexpected change in the FPU shock affects the economy negatively. Shortly, an unexpected FPU shock has dismal effects on the business cycle.

The structure of the paper is as follows. Section 2 describes how we measure FPU and how FPU has historically evolved in Turkey. Section 3 analyses the macroeconomic effects of an unexpected FPU shock using a VAR model, presents results and robustness checks. Finally, Section 4 is the conclusion.

2. Measuring Fiscal Policy Uncertainty for Turkey

2.1 Model, data and methodology

In the current study, we follow a standard routine to estimate uncertainty. We aim to measure uncertainty by considering studies that use ARCH or GARCH models to proxy uncertainty. We model the fiscal reaction function to obtain the FPU. The fiscal reaction function or fiscal policy reaction function is created to understand past fiscal developments and guide us to identifying the actual behaviour of governments. Therefore, we follow a typical method in the construction of the FPU index. The fiscal reaction function is as follows:

$$capb_t = c_0 + \beta_1 d_{t-1} + \beta_2 lrgap_{t-1} + \sum_{i=1}^k \beta_i capb_{t-i} + \mathbf{Z}_t \mathbf{dum}_i + u_t, \quad (1)$$

where c_0 is the intercept term, d_{t-1} shows the lagged annual percentage change in the ratio of total central government debt stock to GDP (seasonally adjusted); u_t represents the error term and has the property $u_t \sim N(0, \sigma_t^2)$. The central government debt ratio was obtained from the Republic of Turkey Ministry of Treasury and Finance; $capb$ represents the cyclically adjusted primary balance. We use the central government expenditures and revenues (seasonally adjusted) to estimate $capb$. The central government expenditures and revenues are gathered from the Central Bank of the Republic of Turkey (henceforth, the CBRT); $lrgap_{t-1}$ is the lagged log output gap (seasonally adjusted). The $capb$ and $lrgap_{t-1}$ variables are own calculations. We first produce a linear Gaussian state-space model by using equations in Harvey (1990) and Durbin and Koopman (2012) and then

estimate these equations using the Kalman filter method to obtain the output gap. We also estimate the output gap using the Hodrick-Prescott (HP) filter (Hodrick and Prescott, 1997) and methods of Christiano and Fitzgerald (2003). We compare the output gap estimate obtained using the Kalman filter method to the estimates obtained using the HP filter and methods of Christiano and Fitzgerald (2003). The two output gap estimates are similar. We calculate the cyclically adjusted primary balance in order to decompose the cyclical effects of fiscal variables and to accurately determine how policy-makers respond to business cycles. The cyclically adjusted primary balance can be calculated using the IMF and OECD methods. We estimate the *capb* variable by following the study of Fedelino *et al.* (2009), known as the IMF method. The model also includes lags of the dependent variable to remove autocorrelation from error terms (Çevik *et al.*, 2014; Caprioli *et al.*, 2017). Z_t is a dummy variable vector that includes elections ($dum_{elections}$) and the COVID-19 dummy ($dum_{COVID-19}$). $dum_{elections}$ represents the periods of elections (general, local and snap elections) and referendums in Turkey, which takes the value of 1 or 0. $dum_{COVID-19}$ represents the COVID-19 pandemic, which had its effect throughout the year 2020.

Table 1: Descriptive statistics

	<i>capb</i>	<i>d</i>	<i>lrgap</i>
Average	0.015186	0.030432	9.87E-10
Median	0.020167	−0.035445	0.011015
Max.	0.061042	1.002759	0.122753
Min.	−0.055922	−0.155535	−0.179536
Std. dev.	0.024846	0.209874	0.052890
Skewness	−1.028582	2.864227	−0.647297
Kurtosis	3.751298	12.18459	3.619447
Jarque-Bera	18.38609	449.1589	7.895467

Source: Authors' own calculations

As shown in Table 1, the variables have suitable properties for volatility modelling according to their mean, standard deviation, skewness and kurtosis values. Mainly, three variables have left-skewed or right-skewed distributions.

We first tested for the stationarity of the variables using the Augmented Dickey-Fuller (ADF), Dickey-Fuller Generalized Least Squares (DF-GLS) and Ng-Perron (2001) unit root tests. The variables are used according to the stationarity levels in Equation (1). The unit root test results of the variables involved in the measurement of fiscal policy uncertainty are given in the table below.

Table 2: Results of ADF, DF-GLS and Ng-Perron unit root tests

	ADF		DF-GLS		Ng-Perron			
	Intercept	Intercept and trend	Intercept	Intercept and trend	Mz_a		Mz_t	
					Intercept	Intercept and trend	Intercept	Intercept and trend
<i>capb</i>	0.661 (4)	-0.887 (4)	0.011 (4)	-0.247 (4)	0.13 (4)	-0.06 (4)	-0.10 (4)	0.08 (4)
<i>d</i>	-4.821*** (1)	-4.917*** (1)	-2.625*** (5)	-4.838*** (1)	-25.96*** (5)	-51.86*** (1)	-3.506*** (5)	-5.00*** (1)
<i>lrgap</i>	-3.773*** (0)	-3.762** (0)	-1.773* (0)	-2.616 (0)	-5.94* (0)	-11.59 (0)	-1.68* (0)	-2.39 (0)

Notes: Numbers in parentheses represent the optimal lag. ***, **, * indicate 1%, 5% and 10% significance levels. The lag length is chosen using SIC. The AR GLS method was used as the spectral estimation method in the Ng-Perron unit root test.

Source: Authors' own calculations

As seen in Table 2, *d* does not contain a unit root according to all unit root tests and has an I(0) process. The variable *capb* shows the existence of the unit root in all unit root tests. As for the unit root test results for the variable *lrgap*, we cannot strongly deny that the variable does not contain a unit root at all significance levels. Thus, we consider that *lrgap* has a I(1) process. Next, we estimated different OLS models to find a proper mean equation based on Model (1). We used different diagnostic checks for choosing a proper model. Table 3 shows different OLS models.

Table 3: Model selection based on different OLS

Dependent variable: $\Delta capb$	OLS (1)	OLS (2)	OLS (3)	OLS (4)
$\Delta capb_{t-1}$	−0.522*** [−12.224]	−0.519*** [−11.658]	−0.533*** [−8.307]	−0.719*** [−11.108]
$\Delta capb_{t-2}$	–	–	–	−0.266*** [−4.887]
d_{t-1}	–	0.004* [1.878]	0.005*** [2.709]	0.004 [1.459]
$\Delta lrgap_{t-1}$	–	0.061* [1.662]	0.063 [1.600]	0.012 [0.348]
$dum_{COVID-19}$	–	–	−0.006** [−2.018]	−0.008** [−2.552]
$dum_{elections}$	–	–	–	−0.007* [−1.849]
c	−0.0007 [−0.633]	−0.0008 [−0.734]	−0.0005 [−0.549]	0.0005 [0.437]
N	92	92	92	92
R^2	0.270	0.287	0.292	0.364
F -statistics	32.640***	11.549***	8.806***	7.842***
AIC	−5.543	−5.522	−5.508	−5.557
SSR	0.019	0.019	0.019	0.017
ARCH(5)	7.111***	6.747***	8.249***	9.148***
ARCH(10)	5.240**	3.922***	4.490***	4.303***
White Test	13.848***	2.677***	2.877***	4.215**

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels. Numbers in square brackets correspond to t -statistic values; AIC: Akaike information criterion, SSR: Sum of squared regression.

Source: Authors' own calculations

After finding a proper mean equation, we estimated different ARCH models to find the variance equation using alternative information criteria. We considered that the proper model is ARCH(1) as follows:

$$h_t = \alpha_0 + a_1 u_{t-1}^2, \quad (2)$$

where the conditional variance or volatility, h_t , is the variance of u_t in Model (1), conditional on information being available up to time $(t-1)$. α_0 and a_1 are the intercept and coefficient, respectively. We estimated Model (1) using ARCH(1) based on alternative information criteria. Table 4 shows the results of the ARCH(1) model estimation for OLS(4).

Table 4: Results of ARCH(1) model estimation for OLS(4)

Variance equation	
u_{t-1}^2	0.838*** [4.189]
α_0	0.0006*** [4.092]
N	89
Log-L	264.327
R^2	0.248
F	0.575
χ^2	0.585
Jarque-Bera	0.250
$h_t = 0.0006 + 0.838 u_{t-1}^2$ (0.000) (0.200)	

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels. Numbers in square brackets and parentheses represent z-statistic values and standard errors respectively. The coefficient covariance was computed using the Bollerslev-Woolridge Quasi Maximum Likelihood.

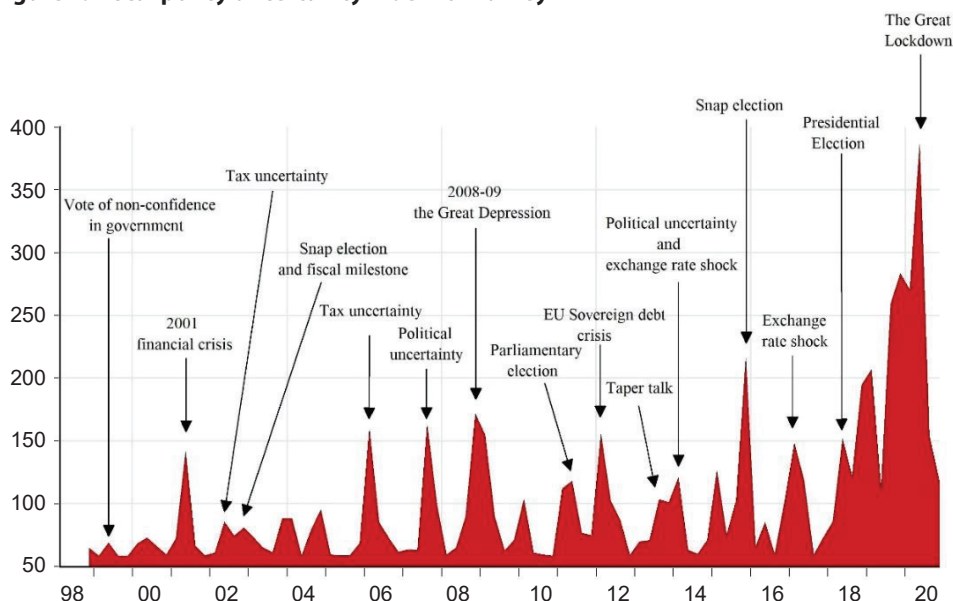
Source: Authors' own calculations

We obtained conditional volatility series by estimating the ARCH(1) model. Then, we transformed these conditional volatility series into conditional standard deviation. We divided the index by its mean, multiplied by 100 to get the normalized FPU index as in Sahinoz and Coşar (2018). We used this index to proxy fiscal policy uncertainty.

2.2 Evolution of fiscal policy uncertainty for Turkey

The FPU index obtained in the previous section is shown in Figure 1. A surge in the FPU index points to an increase in the level of fiscal policy uncertainty. As shown in Figure 1, the FPU index represents Turkey's major fiscal, economic, financial and political incidents.²

Figure 1: Fiscal policy uncertainty index for Turkey



Source: Authors' own calculations

Tax reform uncertainty, rising political tensions and concerns about the spread of Russia's economic crisis led to an increase in FPU in 1998Q3. In 1998Q4, the FPU index starts climbing due to a vote of non-confidence in the government, after which no new government was formed. In addition, the delay of the 1999 budget and the Banks Law increased the FPU in this period.

As a result of the policies implemented at the end of the 1990s, the economic problems aggravated, government debt dynamics and budget deficits became unsustainable and the financial sector lost its functioning. This unsustainable situation resulted in the crisis on 19 February 2001, when the Prime Minister announced that there was a severe political crisis, which inflamed a crisis in the highly alerted markets due to what had happened at the end

2 We examined Turkish and English-language newspaper coverage of major incidents that coincided with the periods when the FPU increased in Turkey. This newspaper coverage can be found in the Appendix.

of the preceding year (Ozatay and Sak, 2002). The crises in November 2000 and February 2001 are some of the worst crises that Turkey has ever experienced. From 2002Q2 to 2003Q1, postponement of tax regulations, the Fiscal Milestone Law and snap general elections on 3 November 2002 caused the FPU to increase. Postponement of tax regulations envisaged to be enacted by the end of October 2002 and resignations within the government led to an increase in the FPU.

One of the main reasons for the rise in uncertainty from 2005Q4 to 2006Q1 was the corporate tax rate uncertainty. The government announced that the corporate tax would be reduced from 30% to 20% at the end of 2005. However, an act of law was not enacted until June 2006. Therefore, companies faced corporate tax rate uncertainty.

Political tensions in the second quarter of 2007 increased the FPU. The political tensions started to rise with protests and the presidential election. Turkey's political tensions and election agenda lasted for about five months and created one of the significant FPU spikes.

In the last quarter of 2008, the mortgage crisis in the United States affected the whole world. Uncertainty increased the severity of the crisis effects. Bloom (2014) argues that the uncertainty experienced in 2008–2009 is three times greater than an average uncertainty shock and it is twice more permanent than an average recession. The crisis affected Turkey through financial markets and foreign trade. However, the measures taken in the first quarter of 2009 and the recovery in expectations caused the FPU to decrease.

In May 2013, Turkey paid off the last installment of its debt to the IMF. However, the positive economic and political mood was suddenly reversed. In June 2013, the Fed's taper talk announcement led to a panic atmosphere in emerging economies. The global risks reached new high levels, and outflows from emerging economies caused foreign exchange shocks. Next, political tension started to climb to new high levels and the value of the Turkish lira fell. The CBRT announced rate hikes in January 2014 due to continued Turkish lira weakness and rising risks. The FPU climbed fast from 2013Q2 to 2014Q1.

The FPU started to increase because of the failure to form a government after the general elections held in June 2015. The results of the general elections led to rising political tensions between June 2015 and November 2015, fiscal policies came to a halt and budget negotiations could not be held. Turkey also entered 2016 with a temporary budget. As a result, the FPU rose to one of its highest levels during 2015Q2 and 2015Q4.

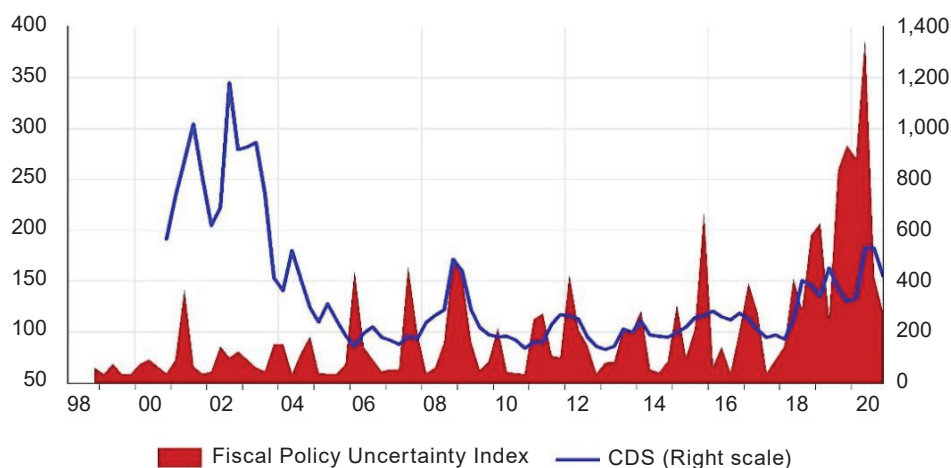
The FPU reached a high level again from 2016Q3 to 2017Q1. It increased massively with the failed coup attempt of July 2016, the effect of the exchange rate shock in the first months of 2017, and a constitutional referendum that was held in April 2017. 2018 witnessed both domestic and foreign incidents. Turkey held snap elections (parliament and presidential) in June 2018. There were many unknowns about the fiscal policy, especially with restructuring institutions under the new presidential system.

In the first months of 2019, Turkey entered an election period again. Local elections were held across the nation in March 2019 and the ruling party lost control of big cities. It raised questions about whether the ruling party had an approval rate. The announcement of the decision to re-hold the Istanbul elections by Turkey's electoral body contributed to the FPU increase.

The FPU index reached an all-time peak in 2020Q2, which corresponds to the outbreak of the COVID-19 (known as the Great Lockdown). After the first case of COVID-19 was reported in Turkey, the government adopted multiple containment measures such as social distancing, travel bans and closures of schools/universities, shops and entertainment venues.³ The quarantine measures caused the economy to almost come to a standstill. As a result, the economic agents faced considerable uncertainty about fiscal policy. Moreover, it caused the FPU to peak.

After all, we considered that Credit Default Swap (CDS) is an essential indicator for investors to monitor uncertainty about a country. In this framework, we compared the FPU and CDS premium for Turkey. Figure 2 compares the FPU and CDS variables.

Figure 2: Fiscal policy uncertainty index and CDS



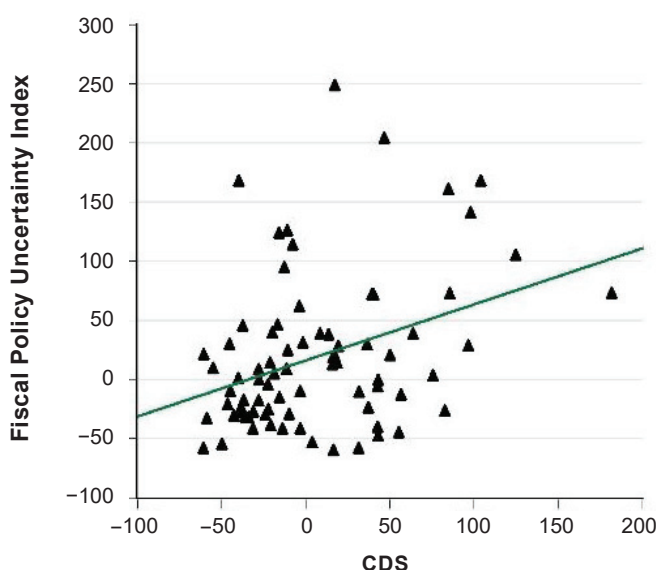
Note: Sovereign CDS is weekly close data and starts from the second week of October, 2000. Therefore, we converted sovereign CDS from weekly data to quarterly data.

Source: 5-year quarterly average Sovereign CDS data obtained from Bloomberg and DataStream

3 All measures taken by the government regarding COVID-19 can be found in “Policy Responses to COVID-19” on the IMF’s website.

It is apparent from Figure 2 that there are very similar movements such as the 2001 crisis, the 2007 political uncertainty, the Great Depression in late 2008, the taper talk announcement in June 2013, the exchange rate shock in early 2014, the snap election and rising political tensions in 2015, and the Great Lockdown in 2020Q2. What is interesting in Figure 2 is that there is a particularly high correlation between the FPU and CDS after 2004. The correlation coefficient is 0.49 at 1% significance level after 2004. We also find that the correlation coefficient increased after the Great Depression (it is 0.65 at the 1% significance level).⁴ We further provide a scatter plot of the FPU and CDS as annual percent change in Figure 3.

Figure 3: Scatter plot of fiscal policy uncertainty index and CDS, annual percent change



Note: The green line represents the linear regression line.

Source: Authors' own calculations

In Figure 3, there is a clear increasing trend between the FPU and CDS. As can be seen from Figures 2 and 3, the FPU index is highly correlated with CDS.

4 We compared the FPU with the output gap (calculated using both the HP filter and the Kalman filter) and found that there is a negative correlation between the variables (-0.28). We also obtained a scatter plot of these variables. Additionally, we examined the correlation between the world uncertainty index calculated by Baker *et al.* (2016) and the FPU index. We found a correlation of 0.49 at the 1% significance level. These results are available upon request.

3. Impact of Fiscal Policy Uncertainty on Business Cycle: VAR Evidence

We analyse the effects of fiscal policy uncertainty on the Turkish economy by estimating the reduced-form VAR(p) model for the period 1998Q4–2020Q4. The VAR(p) model is as follows:

$$Z_t = v + t + \Phi Z_{t-p} + u_t \quad (3)$$

where Z_t represents variables including fiscal policy uncertainty (*FPU*), the real sector confidence index (*RSCI*), the real effective exchange rate (*REER*), output (*Y*), consumption (*C*) and investment (*I*); v is the intercept term and t is the time trend. Φ represents a vector of coefficients. u_t is a vector of error terms. *RSCI* is a variable that includes the future expectations in the manufacturing industry. A decrease in *REER* indicates the depreciation of the Turkish lira, while an increase indicates the appreciation of the Turkish lira. *Y* represents the real GDP. *C* is the real consumption of resident households. *I* is the real gross fixed capital formation. All the data are retrieved from the CBRT. All the variables are in logarithmic form. The variables were adjusted seasonally via TRAMO/SEATS method except *FPU*.

We used the Cholesky decomposition and ordered the variables given above, taking into account the transition mechanisms of fiscal policy uncertainty in Turkey. We ordered the variables from the most exogenous to the most endogenous. Accordingly, fiscal policy uncertainty is exogenous. We identified the ordering based on the relevant studies in the literature, economic theory, the structure of the Turkish economy and transition mechanisms of uncertainty. We decided to use VAR in level in this study. As is known, VAR specification in level against VAR specification in difference is a crucial point of discussion. In this regard, some have suggested that VAR specification in level be used, while some recommended that VAR specification in difference be used. The main argument for estimating VAR specification in level is that differencing loses information concerning comovements in the data (Enders, 2015; Hwang, 2017). Therefore, VAR specification in level is estimated in this study. The Schwarz and Hannan-Quinn Information Criteria (SIC and HQ, respectively) are used to determine the lag length (Table 5). The SIC and HQ chose one lag while the Final Prediction Error (FPE) information criterion showed a model with two lags.⁵

Additionally, we checked for serial correlation in residuals (Table 6). There is only very small serial correlation in the residuals due to a small lag. We estimated a second-order VAR model in the robustness check due to possible serial correlation. However, we concluded that the results did not change.

5 We reached similar results based on FPE information criteria in our robustness analysis.

Table 5: VAR lag order selection criteria

Lag	LR	FPE	AIC	SIC	HQ
1	376.0614	1.40e-15	-17.17625	-15.75732*	-16.60696*
2	69.37261	1.23e-15*	-17.32277	-14.83964	-16.32651
3	43.48188	1.53e-15	-17.14670	-13.59937	-15.72347
4	52.86222	1.54e-15	-17.21894	-12.60741	-15.36874
5	49.08716	1.57e-15	-17.33183	-11.65610	-15.05466
6	38.69384	1.91e-15	-17.34280	-10.60287	-14.63865
7	56.14690*	1.39e-15	-17.97140	-10.16727	-14.84028
8	35.16704	1.71e-15	-18.21693*	-9.348599	-14.65884

Notes: * indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion.

Source: Authors' own calculations

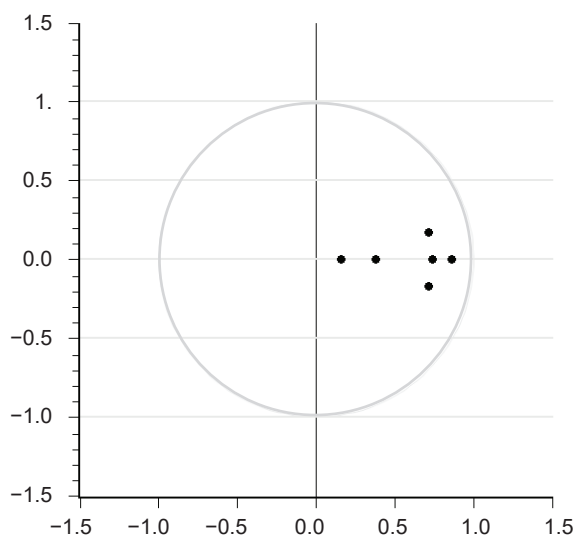
Table 6: VAR residual serial correlation LM tests

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	70.14604	36	0.0006	2.061812	(36; 305.8)	0.0006
2	41.80492	36	0.2333	1.174505	(36; 305.8)	0.2348
3	47.03091	36	0.1032	1.332317	(36; 305.8)	0.1041
4	60.97652	36	0.0058	1.766162	(36; 305.8)	0.0059
5	36.04737	36	0.4664	1.003575	(36; 305.8)	0.4681
6	58.50718	36	0.0103	1.687970	(36; 305.8)	0.0104
7	50.38678	36	0.0562	1.435011	(36; 305.8)	0.0569
8	37.03611	36	0.4210	1.032712	(36; 305.8)	0.4227

Source: Authors' own calculations

We determined whether the VAR(1) specification in level model meets the stability criterion using the inverse roots of the AR characteristic polynomial (Figure 4). We concluded that the stability condition is met.

Figure 4: Inverse roots of AR characteristic polynomial

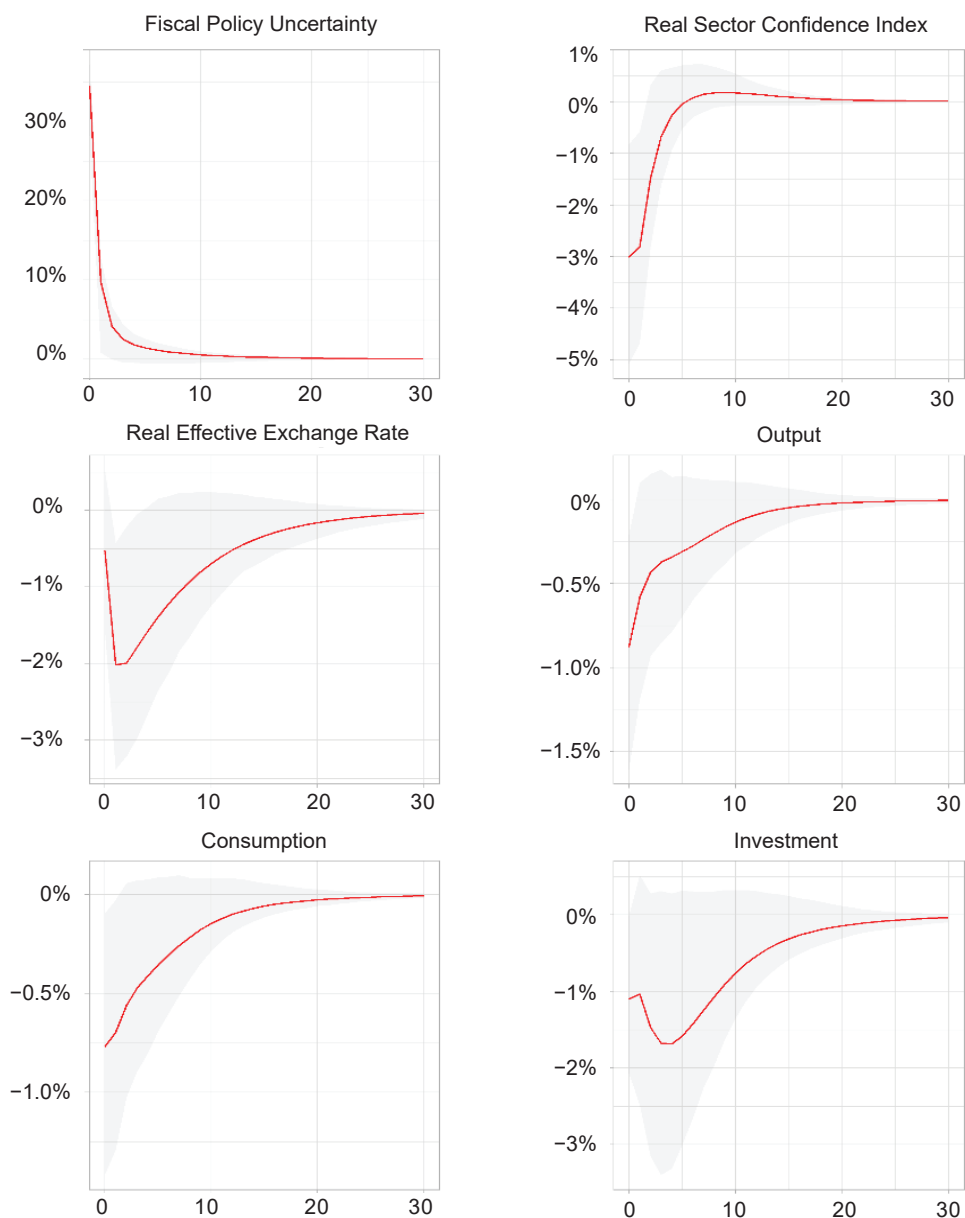


Source: Authors' own calculations

We concluded that the VAR(1) model satisfies the stability condition. We estimated the VAR(1) in level model. Figure 5 presents the impulse responses of the real sector confidence index, the real effective exchange rate, output, consumption and investment to a positive one-standard-deviation fiscal policy uncertainty shock. As shown in Figure 5, the FPU shock negatively affects the real sector confidence index, the real effective exchange rate, output, consumption and investment. The FPU shock shows its most expansive effect on the real sector confidence index in a statistically significant way. The real effective exchange rate decreased by about 3% in the first quarter after the shock, and the effect of the shock continued for five quarters. Similarly, there is a significant decline in the real effective exchange rate for two quarters (at around -2%). The FPU shock has a significant negative effect on output and consumption for the first two quarters (about -0.75% and -1%, respectively). The FPU shock leads to a significant negative effect on investment for merely one quarter. The decline in output and consumption is smaller compared to the decline in investment. The impulse response functions showed that the FPU creates instability in the Turkish economy.⁶ Together, the FPU causes business cycle fluctuations according to the VAR model results.

6 These results differ from the effects of fiscal policy shocks. As Yörükoğlu and Kılınç (2012) and Çebi and Çulha (2014) showed, a fiscal policy shock (an increase in government expenditures) positively affects the real effective exchange rate, output and consumption.

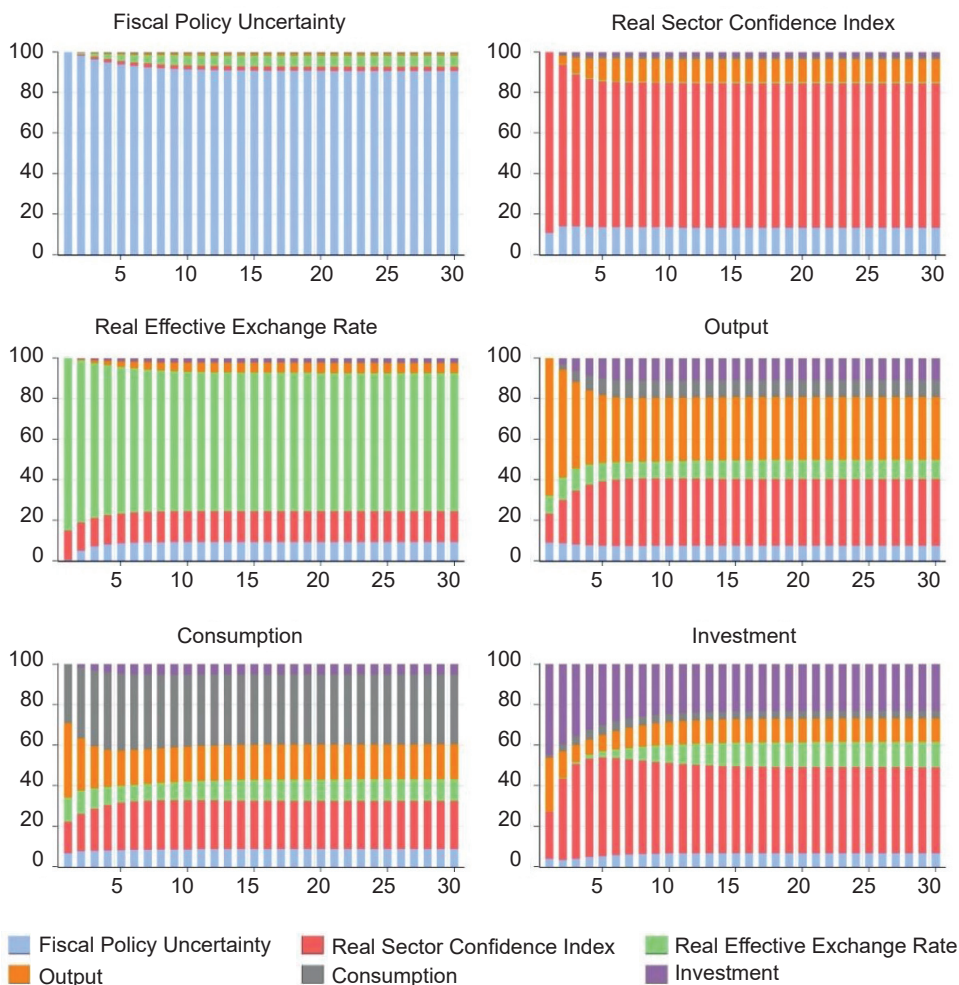
Figure 5: Impulse responses to fiscal policy uncertainty shock



Notes: The grey area represents 90% of confidence bands reached after 1000 repetitions with the bootstrap method. The red line represents the effect of fiscal policy uncertainty shock on the variables for 30 quarters.

Source: Authors' own calculations.

Figure 6: Forecast error variance decomposition



Note: The figures show the forecast error variance decomposition at different horizons.

Source: Authors' own calculations

We investigated how much of the changes in the variance of the variables is due to other variables using the forecast error variance decomposition method for 30 quarters. Figure 6 represents the forecast error variance decomposition for each variable. Figure 6 shows that fiscal policy uncertainty explains about 14% of the real sector confidence index variance. The effect of fiscal policy uncertainty on the change in the variance of the real

effective exchange rate has an increasing rate. This rate approaches 10% at the end of the 30th period. The FPU shock accounts for different proportions of fluctuations in the variance of output, consumption and investment. This proportion is approximately 8%, 9% and 7% respectively for output, consumption and investment at the end of the 30th quarter.

The results of this study will now be compared to the findings of previous works. These results are consistent with those of Fernández-Villaverde *et al.* (2015), Mumtaz and Surico (2018), Kim (2019), Anzuini *et al.* (2020), Saijo (2020) and Ghirelli *et al.* (2021), which have examined the effect of FPU on the business cycle based on different countries such as the USA, Italy and Spain. Additionally, these findings are in agreement with Erdem and Yamak (2016), Gürgün (2019), Sahinoz and Coşar (2018, 2020), Çevik and Erduman (2020), findings that show the effects of economic policy uncertainty on the Turkish economy. Succinctly, the FPU negatively affects economies.

Our results may be explained by the fact that the fiscal policy uncertainty is driven by a “wait-and-see” mechanism within the framework of precautionary behaviour of economic actors in Turkey. When fiscal policy uncertainty increases, the expectations of economic actors for the future are worse. The decrease in economic confidence in Turkey triggers a decrease in the real effective exchange rate because economic actors make relatively risk-free choices with precautionary motives. This situation coincides with Keynes’ thought that an increase in uncertainty will change actors’ liquidity preferences. Keynes defines that uncertainty makes people save liquidly, investment become volatile and interest rate not balance investment and savings. Uncertainty also explains why the economic process has been so slow and erratic throughout history (Skidelsky, 2010).

We also examined the macroeconomic effects of the fiscal policy uncertainty based on alternative VAR models as a robustness check. We estimated the VAR(2) model based on the FPE information criterion. Next, we used the economic activity index obtained from the IMF database instead of the GDP variable for the VAR(1) model. We also considered a VAR model including the variables separated from the trend values using the HP filter to account for the low-frequency movements in the variables.⁷ Additionally and lastly, we re-estimated the VAR(1) model in difference according to the results of unit root tests. Although the half-life of the responses of variables to fiscal policy uncertainty shock decreased slightly, the results were similar to the previous VAR models.⁸ According to the results of these robustness checks, we concluded that a positive

7 Similarly, Mumtaz and Surico (2018) separated the macroeconomic variables from the trend using the linear trend decomposition method in order to account for the low-frequency movements in the variables.

8 All results are in the Appendix.

one-standard-deviation fiscal policy uncertainty shock affects macroeconomic variables similarly in all VAR models. To sum up, the results are very robust.

4. Conclusion

This study was designed to determine the effects of fiscal policy uncertainty on the Turkish economy. Therefore, we first quantified a fiscal policy uncertainty index for Turkey based on volatility measurement. Our fiscal policy uncertainty index showed major fiscal, political, economic and financial incidents in Turkey. Then, we analysed the effects of fiscal policy uncertainty using a VAR model. These results presented the most significant findings.

The results showed that fiscal policy uncertainty in Turkey negatively affects economic confidence, the real effective exchange rate, output, consumption and investment. Moreover, while the adverse effects of fiscal policy uncertainty on confidence and the real effective exchange rate are long-lived, it causes short-term sharp declines in output, consumption and investments. This situation reveals that economic actors in Turkey adopt a “wait-and-see” behaviour in high uncertainty.

These findings imply that reducing Turkey’s fiscal policy uncertainty is a critical policy priority for the business cycle fluctuations. Although it is not possible to eliminate uncertainty, it is in the hands of policymakers not to create more uncertainty.

Appendix

We collected news from Turkish and English-language newspapers about the incidents that coincided with the periods when fiscal policy uncertainty increased in Turkey. This news can be seen below.

Table A1: News on fiscal policy uncertainty in Turkey

Period	News headlines	Sources
1998Q3–1999Q2	<i>"Fiscal milestone became history"</i> <i>"...The most important pillar of the tax reform, the fiscal milestone, remained uncertain after 2002."</i> <i>"Turkish Government set to fall"</i>	<i>Milliyet (Turkish newspaper)</i>, August 8, 1999, p. 7. <i>BBC</i>, 20 November 1998, http://news.bbc.co.uk/2/hi/europe/218198.stm.
2000Q4–2001Q2	<i>"Turkish political crisis deepens"</i> <i>"Turkey's economy shrinks"</i>	<i>BBC</i>, 19 February 2001, http://news.bbc.co.uk/2/hi/europe/1179079.stm. <i>BBC</i>, 31 August 2001, http://news.bbc.co.uk/2/hi/business/1518467.stm.
2002Q2–2002Q4	<i>"Political crisis will delay tax regulations"</i> <i>"... The fate of the tax regulations, which were planned to be prepared in advance and enacted by the end of October 2002, is uncertain."</i> <i>"Crisis-hit Turkey agrees early poll"</i>	By Mustafa Ozyurek, 7 July 2002, <i>Milliyet</i>, p. 6. <i>BBC</i>, 31 July 2002, http://news.bbc.co.uk/2/hi/europe/2161855.stm.
2005Q4–2006Q1	<i>"Tax cut news from Prime Minister Erdogan"</i> <i>"Erdogan said that the corporate tax rate will be reduced from 30 percent to 20 percent and that the number of tranches in the income tax tariff will be reduced from 5 to 4."</i> <i>"Gradually loss of confidence"</i> <i>"Last December, Prime Minister Tayyip Erdogan announced that the corporate tax rate will be reduced from 30% to 20%. Companies prepared their first quarterly accounts over 20%. But the law has not passed yet. A few days later, taxes will begin to be paid over 30%..."</i>	<i>Bigpara (Turkish economy news website)</i>, 11 November 2005, https://bigpara.hurriyet.com.tr/haberler/genel-haberler/basbakan-erdogan-dan-vergi-indirimi-mujdesi_ID543347/. By Metin Munir, 5 May 2006, <i>Milliyet</i>, https://www.milliyet.com.tr/yazarlar/metin-munir/gidim-gidim-giden-guven-157025.
2007Q3	<i>"Turkey sets July 22 election to unlock crisis"</i> <i>"Turkish parliament cancels presidential election"</i>	By Gareth Jones, Hidir Goktas, <i>Reuters</i>, 3 May 2007, https://www.reuters.com/article/us-turkey-president-idUSL0324193920070503. <i>Reuters</i>, 9 May 2007, https://www.reuters.com/article/us-turkey-president-idUSL0972419420070509.
2008Q3	<i>"Turkish GDP falls 13.8 percent, economy enters recession"</i>	<i>Hurriyet Daily News</i>, 30 June 2009, https://www.hurriyet.com.tr/gundem/turkish-gdp-falls-13-8-percent-economy-enters-recession-11971517.

Table A1: Continuation

2011Q4– 2012Q1	<i>"Simsek: We cannot say 'we will not increase taxes in an environment of uncertainty'"</i> <i>"Uncertainty persists, investor not taking risks"</i> <i>"2012 will be the year of uncertainty"</i>	<i>Dünya (Turkish economy news website)</i>, 10 October 2011, https://www.dunya.com/gundem/simsek-belirsizlik-ortaminda-039vergiyi-artirmayiz039-diyemeyiz-haberi-156792. <i>Dünya</i>, 11 November 2011, https://www.dunya.com/gundem/belirsizlik-suruyor-yatirimci-risk-almiyor-haberi-158162. <i>Dünya</i>, 12 December 2011, https://www.dunya.com/gundem/2012-belirsizlik-yili-olacak-haberi-161250.
2013Q2– 2014Q1	<i>"Turkey's Economic Growth Slows Sharply"</i> <i>"Turkey uncertainty deters investors"</i> <i>"Gigantic Rate Hike in Turkey"</i>	By Emre Peker and Yeliz Candemir, 1 April 2013, <i>The Wall Street Journal</i>, https://www.wsj.com/articles/SB10001424127887323296504578396200677967468. By David Edgerly, 27 November 2013, <i>The Financial Times</i>, https://www.ft.com/content/f58b72da-4d40-11e3-9f40-00144feabdc0. By Mamta Badkar, 29 January 2014, <i>Business Insider</i>, https://www.businessinsider.com/cbrt-decision-2014-1.
2015Q2– 2015Q4	<i>"Plunged into uncertainty, Turkey could face early election"</i> <i>"Fitch: Turkey election heightens political, policy uncertainty"</i> <i>"Turkey may enter 2016 with temporary budget"</i> <i>"Turkey's private equity spree suffers gloomy politics, lira's decline"</i>	By Orhan Coskun and Ercan Gurses, 9 June 2015, <i>Reuters</i>, https://www.reuters.com/article/idUSKBN00M0WF20150609. <i>Hurriyet Daily News</i>, 9 June 2015, https://www.hurriyetdailynews.com/fitch-turkey-election-heightens-political-policy-uncertainty-83719. <i>Daily Sabah</i>, 4 September 2015, https://www.dailysabah.com/economy/2015/09/04/turkey-may-enter-2016-with-temporary-budget. By Asli Kandemir, 30 October 2015, <i>Reuters</i>, https://www.reuters.com/article/turkey-privateequity/turkeys-private-equity-sprees-gloomy-politics-liras-decline-idINL8N12R4BM20151030.
2016Q3– 2017Q1	<i>"Uncertainties tiring out Turkish economy"</i>	<i>Hurriyet Daily News</i>, 28 March 2017, https://www.hurriyetdailynews.com/uncertainties-tiring-out-turkish-economy-leading-banker-111325.
2018Q2– 2018Q4	<i>"Turkey to hold snap elections on 24 June, says Erdogan"</i> <i>"Tensions Between Turkey and U.S. Soar as Trump Orders New Sanctions"</i> <i>"Turkey unveils new economic program for 2019–2021"</i>	By Kareem Shaheen, <i>The Guardian</i>, 18 April 2018, https://www.theguardian.com/world/2018/apr/18/turkey-to-hold-snap-elections-on-24-june-says-erdogan. By Carlotta Gall and Jack Ewing, <i>The New York Times</i>, 10 August 2018, https://www.nytimes.com/2018/08/10/business/turkey-erdogan-economy-lira.html. By Muhammed Ali Gurtas and Tuba Sahin, <i>Anadolu Agency</i>, 20 September 2018, https://www.aa.com.tr/en/economy/turkey-unveils-new-economic-program-for-2019-2021/1259911.
2019Q1– 2019Q2	<i>"Turkey's myriad uncertainties worry investors"</i>	By Stéphane Monier, 9 May 2019, <i>International Investment</i>, https://www.internationalinvestment.net/opinion/4002131/comment-turkey-myriad-uncertainties-worry-investors.
2020Q2	<i>"Global uncertainty over coronavirus at record high: IMF"</i>	<i>Xinhua</i>, 5 April 2020, https://www.xinhuanet.com/english/2020-04/05/c_138947976.htm.

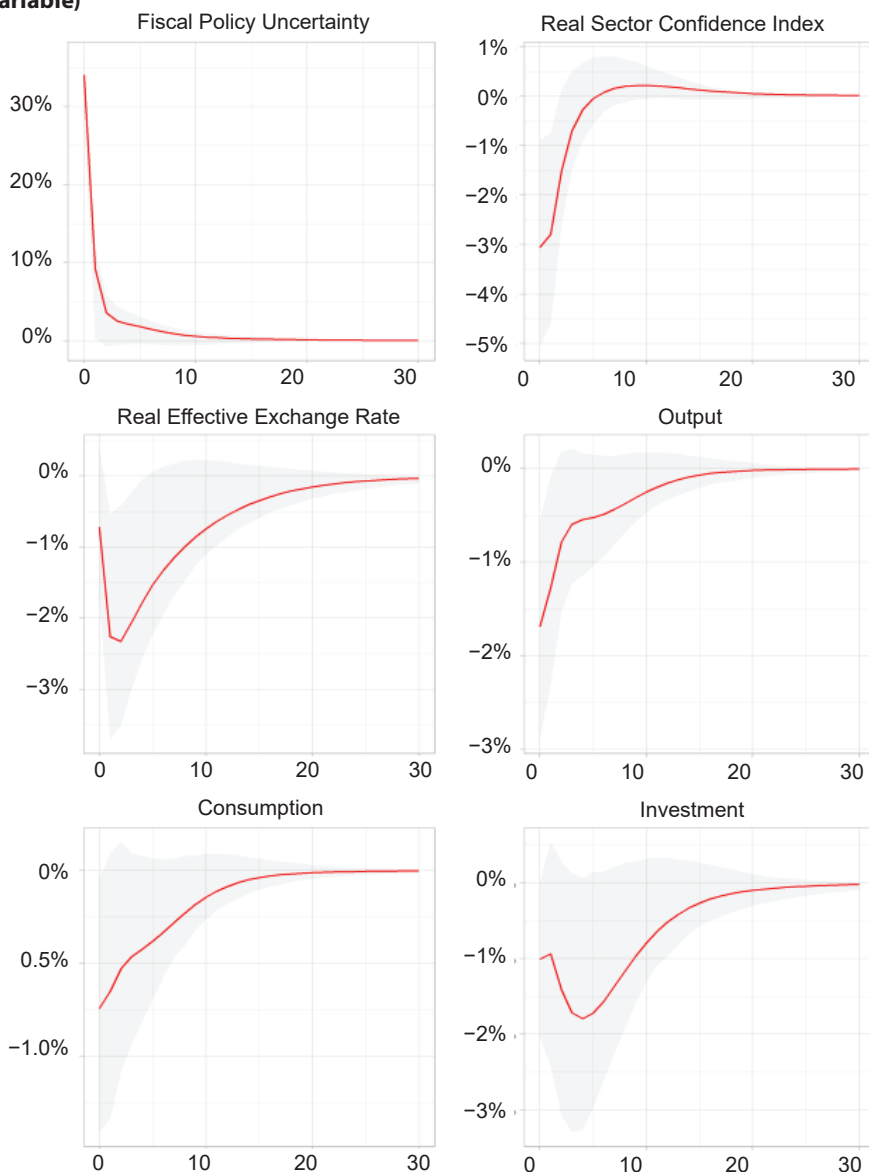
Figure A1: Impulse responses to fiscal policy uncertainty shock in the VAR(2) model



Notes: The VAR(2) model was estimated based on the FPE information criteria. The grey area represents 90% of confidence bands reached after 1000 iterations using the bootstrap method. The red line represents the effect of fiscal policy uncertainty shock on the variables for 30 quarters.

Source: Authors' own calculations

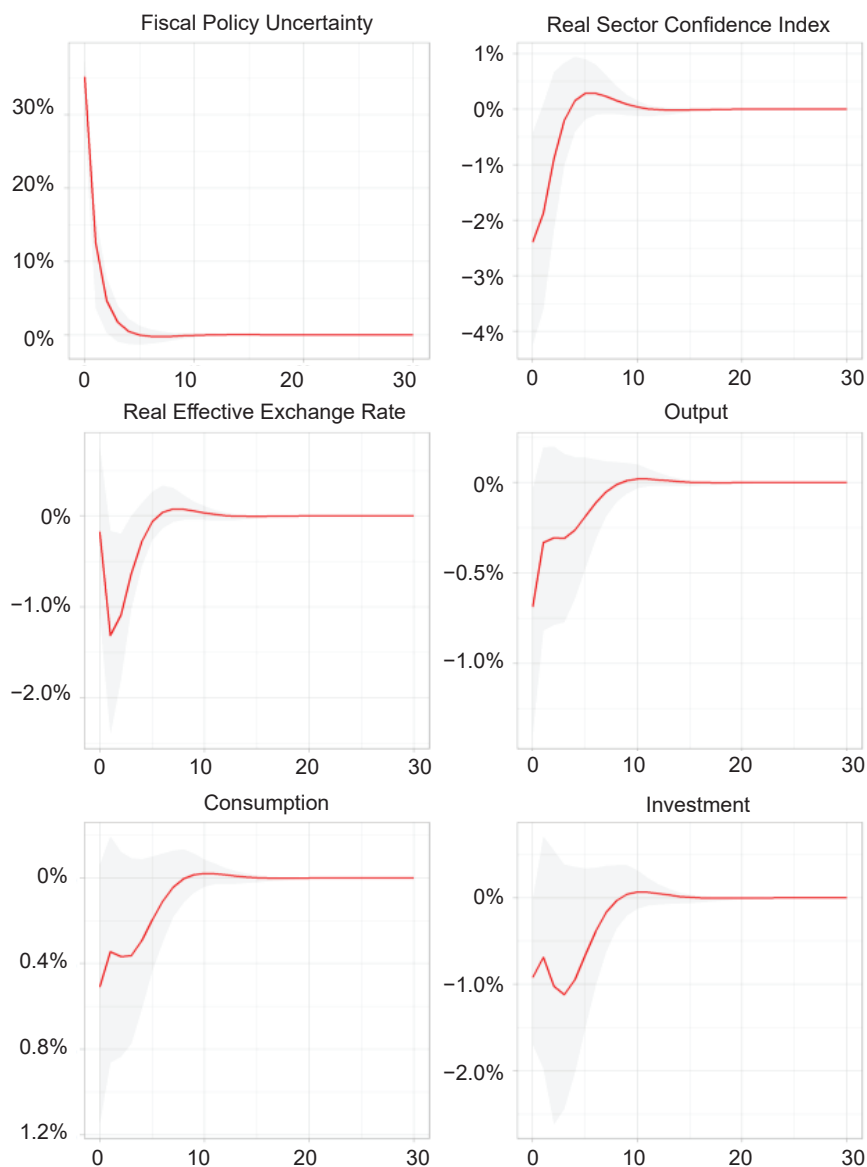
Figure A2: Impulse responses to fiscal policy uncertainty shock (with alternative the GDP variable)



Notes: The economic activity index obtained from the IMF database instead of the GDP variable was used in the VAR(1) model. The grey area represents 90% of confidence bands reached after 1000 iterations using the bootstrap method. The red line represents the effect of fiscal policy uncertainty shock on the variables for 30 quarters.

Source: Authors' own calculations

Figure A3: Impulse responses to fiscal policy uncertainty shock (with filtered variables)



Notes: The VAR(1) model was estimated including the variables separated from the trend values using the HP filter to account for the low-frequency movements in the variables. The grey area represents 90% of confidence bands reached after 1000 iterations using the bootstrap method. The red line represents the effect of fiscal policy uncertainty shock on the variables for 30 quarters.

Source: Authors' own calculations

We checked whether the series are an $I(0)$ and $I(1)$ process. According to the unit root test results, *REER*, *Y*, *C* and *I* are an $I(1)$ process while *FPU* and *RSCI* are an $I(0)$ process. The results are in the table below.

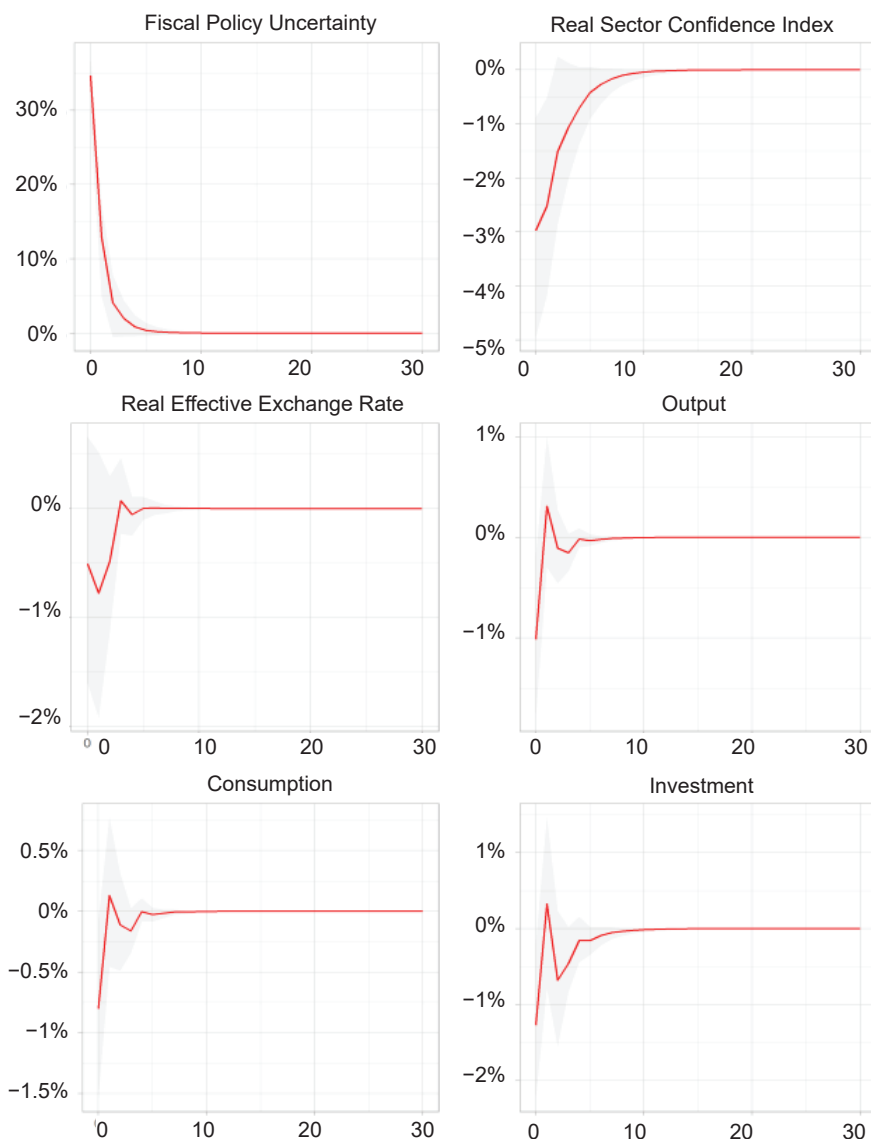
Table A2: Results of unit root tests

	ADF		DF-GLS		Ng-Perron			
	Intercept	Intercept and trend	Intercept	Intercept and trend	Mz_a		Mz_t	
					Intercept	Intercept and trend	Intercept	Intercept and trend
FPU	-4.98*** (0)	-6.29*** (0)	-4.46*** (0)	-6.33*** (0)	-26.94*** (0)	-38.03** (0)	-3.63*** (0)	-4.35*** (0)
RSCI	-4.67*** (0)	-4.75*** (0)	-2.15** (0)	-3.69*** (0)	-8.7** (0)	-20.26** (0)	-2.01** (0)	-3.17** (0)
REER	0.50 (4)	-0.38 (4)	-0.16 (4)	-0.50 (4)	0.25 (4)	-0.68 (4)	0.11 (4)	-0.28 (4)
Y	-0.21 (1)	-3.71** (0)	1.70* (0)	-3.08** (0)	1.58 (0)	-15.38* (0)	1.89* (0)	-2.76* (0)
C	0.07 (1)	-3.53** (0)	1.65* (0)	-2.26* (1)	1.62 (0)	-9.88 (1)	1.83* (0)	-2.20 (1)
I	-0.98 (0)	-2.93 (2)	0.57 (0)	-3.00* (2)	0.71 (0)	-22.60** (2)	0.70 (0)	-3.32** (2)

Notes: Numbers in parentheses indicate the lag length. ***, ** and * represent 1%, 5% and 10% significance levels, respectively. The SIC was used in all unit root tests. ADF: Augmented Dickey-Fuller; DF-GLS: Dickey-Fuller Generalized Least Squares.

Source: Authors' own calculations

Figure A4: Impulse responses to fiscal policy uncertainty shock for VAR(1) model in difference



Notes: The VAR(1) model in difference was estimated based on the results of unit root tests in Table A2 above. The grey area represents 90% of confidence bands reached after 1000 iterations using the bootstrap method. The red line represents the effect of fiscal policy uncertainty shock on the variables for 30 quarters.

Source: Authors' own calculations

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