*Research article*

# How vulnerable is the fiscal posture in Turkey?

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**Abstract:** This study gauges the degree of fiscal vulnerability in Turkey by calculating the debt stabilising primary balance level and evaluates how this variable measures up against the actual primary balance levels for the 1978–2019 period. Based on this comparison, we build up a fiscal fragility index using the methodology described in Stoian (2012). In addition, the Toda-Yamamoto causality test is carried out to detect the direction of causality among these two variables. The index-based analysis reveals that the fiscal performance of Turkey was chiefly satisfactory for the estimation period. Also, the Toda-Yamamoto causality test results imply a unidirectional causality from the required primary balance to real primary balance, suggesting that the government uses the primary balance to stabilise fiscal imbalances, which is an affirmative effort by the government to restore fiscal sustainability. Nevertheless, notwithstanding the implementation of corrective fiscal actions to preserve stability, the index value is steadily moving up in recent years, indicating a mounting fiscal vulnerability risk. Back-loading fiscal adjustments involving spending cuts, full-fledged tax reform, proper scrutiny of public expenses, etc., are among the prominent policy options available to the government to alter the ongoing unfavourable trend in the fiscal vulnerability index.

**Keywords**: fiscal sustainability; fiscal fragility index; Toda-Yamamoto Test

**JEL Codes:** E62, G01, H12, H3, H6

## 1. Introduction

In the last few decades, as an outcome of the mounting public debt levels in every country, the fiscal literature has primarily concentrated on concepts such as fiscal vulnerability, fiscal fragility,

fiscal sustainability, etc. It is also evident that the debt crises in recent history called attention to the importance of the intertemporal solvency of the government in the long run. Along with highlighting the importance of solvency, the repeating debt crises also brought about a departure from the Keynesian policies towards neo-classical alternatives that involve a balanced budget or even budget surpluses rather than budget deficits posited by the Keynesian paradigm. The underlying reason for this paradigm shift in the economic policy perception, to a large extent, originates from the heightened fiscal risks worldwide arising due to surging debt levels. Nevertheless, notwithstanding the global scope of fiscal vulnerabilities, the developing countries are generally more prone to confronting severe fiscal turbulences due to their delicate and precarious fiscal postures. The lack of sufficient domestic savings and fiscal space in those countries usually culminates in augmented fiscal deficits which aggravate the fiscal posture and ultimately carve out a vulnerable fiscal stance in the country. Besides, in the absence of adequate savings, those countries are predominantly reliant on the continuum of the influx of foreign financial resources to defray their fiscal obligations which render them vulnerable to sudden stops of the flow of international funds and thereby intensifies their degree of fiscal fragility.

Being a developing country, Turkey also encountered this type of fiscal fragility problem several times and has involved long episodes of fiscal fragility due largely to malfunctioning fiscal policies in the recent economic history. According to Celasun and Rodrik (1989), the borrowing profile was to a large extent shaped by short term bonds which magnified the degree of fiscal delicacy in the country during the 70s and 80s. The financial liberalisation during this period facilitated the borrowing procedure but increasing trade deficits gave rise to even higher borrowing requirements which exacerbated the deterioration in the fiscal sturdiness Voyvoda and Yeldan (2015). Even though the transition to financial openness in the 80s and 90s accelerated the inflow of international finance to the country, it also increased the fiscal vulnerability to outside shocks and made the country more susceptible in terms of fiscal soundness. As a result, Turkey faced three severe fiscal crises in 1994, 1998 and 2001 with devastating outcomes for the economy. In the last two decades, seemingly better performance has been exhibited in terms of debt reduction but in the last years, the country has been listed in *"The Fragile Five"* economies by Morgan Stanley. Also, recent data reveal alarming issues in terms of fiscal fragility for the country. According to the latest data from the Turkish Treasury, the debt stock more than doubled and the borrowing requirements to the GDP ratio has increased from 1.8 to 6.1% in the last three years which can be considered as an early warning signal for incipient fiscal turbulence.

In view of these points, it appears that the evolution and the current status of the level of fiscal fragility in Turkey turn out to be a notable research field. For this reason, it is worthwhile to gauge the past and current status of fiscal fragility in Turkey and scrutinise the direction of ongoing trends so as to offer caveats about the future course of fiscal fragility in the country. In this study, we aim to carry out empirical research in this particular field to enhance the existing literature by adapting the Stoian (2012) approach to the case of Turkey using the longest data set in the literature utilised for fragility analysis of Turkish public finances. To accomplish this objective, we calculate the debt stabilising primary balance levels, defined as the required level of primary balance to keep public debt under control. Then, we compare this value with actual primary balance realisations in a historical perspective to evaluate the fiscal strength of Turkey in the recent past to construct a fiscal fragility index. In addition, we ran a Toda-Yamamoto causality test between the actual and required primary balance levels to assess the extent to which the fiscal policy is responsive to the fluctuations in the level of vulnerability in Turkey.

In the view of this framework, the rest of the paper is designed as follows:

The next section is devoted to the analysis of the theoretical background of the index calculated to evaluate Turkey's fiscal performance. The underlying algebra behind the calculation of the index will be presented in this section. The second section will explore the literature on the analysis of fiscal stability since reviewing the current literature highlights the academic contribution of our paper. The third section introduces the data and the methodology used for the analysis along with the interpretation of the estimation results and makes a verdict about the status of fiscal fragility in Turkey. The final part provides the reader with a discussion on the public spending strategies in the developing countries and based on this discussion offers caveats and policy recommendations to revert the existing trend in the level of fiscal fragility in Turkey along with an overall conclusion.

## 2. Theoretical background

The theory behind the tools used to evaluate the fiscal fragility in this paper is based on the standard intertemporal budget constraint. This section will briefly consider the underlying algebra of solvency and obtain an operational condition for fiscal sustainability.

In the modern economy, solvency is crucial for the stability of the financial system since, in the absence of solvency, debt contracts are not honoured in time which is an important source of fragility for the entire economy. Since the government is the largest borrower in the economy, its solvency directly affects the stability of the overall economy. Hence, the sustainability of fiscal balances hinges to a large extent on the credibility and capacity to pay ratings of the sovereign. In theory, the government budget constraint always binds at least in an ex-post manner but what determines the level of credibility of the government is the time it takes for the government to meet the intertemporal budget constraint and the quality of the means it employs Horne (1991). Thus, from the perspective of fiscal fragility and sustainability, the question is not whether the government will fulfil the constraint but whether the preferred strategies are feasible and credible or not. A credible fiscal policy to keep public debt under control entails the generation of a sufficient amount of primary balance on a continuous basis. For this reason, the government should fulfil the intertemporal budget constraint by generating primary balance instead of other methods such as inflation tax or Ponzi financing so as to stay on the sustainable path in terms of public finances.

Our analysis in this paper is based on this argument, and we test the performance of Turkish public finances in systematic primary balance generation. Fulfilling the intertemporal solvency condition does not imply sustainability, and it is only a necessary condition since fiscal sustainability can only be formed through regular primary balance generation.

To carry out this analysis which is based on primary balance performance, we need to go over the arithmetic behind the budget constraint. Government spending is comprised of several types of expenditures, which also include interest payments. The interest payments occur as a result of previous debt.

Formally, government spending can be articulated as:

$G_t + (1 + r_t)D_{t-1}$ where $G_t$ denotes the non-interest government expenditures and $(1 + r_t)D_{t-1}$ denotes the interest payments on the previously accumulated debt. Also, the government revenues are made up of tax revenues and issuance of new debt for simplicity, $T_t + D_t$.

If the budget constraint binds, these two expressions must be equal to each other.

$$G_t + (1 + r_t)D_{t-1} = T_t + D_t \tag{1}$$

Slightly manipulating the Equation, we get:

$$D_t = (1 + r_t)D_{t-1} - (T_t - G_t) \tag{2}$$

The last term on the right-hand side denotes the difference between total revenues and non-interest government expenditures which is defined as primary balance. As we mentioned earlier, primary balance generation performance is the core of our analysis. Hence alternatively, the Equation can be written as follows:

$$D_t = (1 + r_t)D_{t-1} - (PB_t) \tag{3}$$

From a debt sustainability perspective, what matters is not the amount of public debt but its relative value against the capacity to pay, which is represented by GDP or, formally, $Y_t$. Scaling both sides of the Equation with $Y_t$ we get:

$$\frac{D_t}{Y_t} = (1 + r_t)\left(\frac{D_{t-1}}{Y_{t-1}}\right)\left(\frac{Y_{t-1}}{Y_t}\right) - \frac{PB_t}{Y_t} \tag{4}$$

Since the growth rate of the GDP can be formulated as $g_t = (Y_t - Y_{t-1})/Y_t$ and the real interest rate is $r_t = \left(\frac{1+i_t}{1+\pi_t}\right) - 1$ where $i_t$ is the nominal interest rate and the $\pi_t$ is the inflation rate, the whole Equation can be rewritten as:

$$d_t = \left(\frac{1+r_t}{1+g_t}\right)d_{t-1} - pb_t \tag{5}$$

or in differential terms:

$$\Delta d_t = d_t - d_{t-1} = \left(\frac{r_t - g_t}{1+g_t}\right)d_{t-1} - pb_t \tag{6}$$

The Equation above is the core of our analysis. It represents the change in public debt and its determinants. According to that, the public debt in a particular period grows as a product of real interest rate, growth rate, previous debt level, and the primary balance. Using this Equation, we can calculate the level of primary balance required to keep public debt constant as follows: Burger et al. (2012).

Setting $\Delta d_t = 0$ we get:

$$\left(\frac{r_t - g_t}{1+g_t}\right)d_{t-1} - pb_t = 0 \text{ and } pb_t^* = \left(\frac{r_t - g_t}{1+g_t}\right)d_{t-1}. \tag{7}$$

The last Equation implies that the primary balance required to keep the public debt stable can be calculated by using the previous public debt, real interest rate, and the growth rate. A positive real interest rate increases the government's interest bill; therefore, it increases the required primary balance, and the growth rate enhances the capacity to pay; consequently, it reduces the debt stabilising primary balance. Also, if the previous public debt level is higher, then, more amount of the primary balance will be needed next term to trim the excessive part thereof Stoian (2012).

Also, it is clear from the above articulation that the government needs to respond to upward movements in the public debt by increasing the level primary balance to preserve the balance in the Equation (5). This condition implies that the direction of causality needs to be from the required balance to real primary balance, which indicates that the government uses the primary balance as a

fiscal tool when required, which facilitates fiscal sustainability in the economy through an active fiscal policy Jha (2012).

In other words, in $\Delta d_t = d_t - d_{t-1} = \left(\frac{r_t - g_t}{1 + g_t}\right) d_{t-1} - pb_t$ articulation, to preserve the $\Delta d_t = 0$

condition, the $pb_t$ bit needs to respond to the movements in $\left(\frac{r_t - g_t}{1 + g_t}\right) d_{t-1}$.

The gap between the actual primary balance ($pb_t$) and the debt stabilising primary balance ($pb_t^*$) is called "the Excess Primary Balance" in Stoian (2012). According to her, this gap can be used as an index to monitor the fiscal vulnerability in the economy. As such, if $pb_t^* \le pb_t$, then the fiscal posture is deemed stable, whereas the $pb_t^* > pb_t$ case is interpreted as a bad signal for fiscal stability and indicates a vulnerable fiscal position. Formally,

$$EPB_t = pb_t^* - pb_t \tag{8}$$

Accordingly, the negative values of $EPB_t$ represent a stable fiscal posture while positive values are indicative of fiscal vulnerability.

Besides, the fiscal stability appraisal is not a static analysis and also it is not devoid of intertemporal intertwinedness. Thus, to appraise the fiscal stability more dynamically, Stoian (2012) calculates a cumulative version of the fiscal stability index, which comprises the accumulation of the differential between actual and required primary balance values over time. Formally, cumulative excess primary balance is calculated by:

$$CEPB_t = EPB_1 \qquad \text{if } t = 1 \tag{9}$$

$$CEPB_t = EPB_1 + \sum_{i=2}^{N} EPB_t, \text{ if } t > 1 \tag{10}$$

In the empirical section, we calculate the fiscal vulnerability index in normal and cumulative ways so as to evaluate the trends in the fiscal posture of Turkey.

## 3. Literature review

Now that we have gone over the underlying theory and the algebra behind the intertemporal budget constraint along with the calculation of debt stabilising primary balance, in this section, we will introduce the selected contributions to the literature on fiscal fragility to reconcile our contribution to the existing literature.

Stoian (2011) assesses the fiscal vulnerability for European countries based on an index that is calculated using the debt stabilising primary balance. Calculating the required primary balance for each year and comparing this value with the actual primary balance values, they evaluate each European country's fiscal performance in terms of fiscal vulnerability. According to their findings, the European countries are mostly vulnerable to fiscal shocks since they suffer from mismanagement on certain occasions.

Baldacci et al. (2011) create two fiscal stress indices to evaluate fiscal stability. Their findings indicate that the index values rose after the currency crisis in 2009 indicating an overall rise in fiscal vulnerability for all developed and developing countries.

Stoian (2012) tests the fiscal vulnerability for selected European countries. They conclude that all countries in the experiment except Bulgaria and Estonia suffer from fiscal vulnerability. Later, Stoian

et al. (2015) developed another V-L-D index to investigate the short-term fiscal fragility in EU member countries. They classify the vulnerability in four categories depending on their severity, from lowest to hardest. Their findings are suggestive that there are 310 vulnerability periods for the sample they used for estimation. In 2018, they enhanced their study and figured out that Greece, Portugal, Romania, the United Kingdom, Ireland, Spain, and Slovenia are the most fragile countries in Europe.

Ferrari-Filho et al. (2020) generate a financial fragility index for Brazil and conclude that Brazilian public finances were speculative during their observation years. This result indicates that Brazil's fiscal space was shrinking, leaving less room for manoeuvrability regarding social expenditures. Terra and Ferrari-Filho (2020) revisit the Brazilian fiscal stability and their results indicate that Brazilian fiscal policy has turned out to be a Ponzi game since budgeting was not possible without new borrowing in the country.

Similar results for Greece were obtained by Nikolaidi (2014). They estimate the same index for Greece and conclude that the country is suffering from ultra-Ponzi financing which is by no means sustainable. Argitis and Nikolaidi (2014) augments the argument in this paper by focusing on public sector cash inflows and outflows, and based on their findings; they critique the ineffectiveness of the government in fulfilling loan commitments to secure fiscal sustainability. They concur that the Greek public finances are under ultra-Ponzi dictation.

Rodriguez (2014), implements the Granger causality test and fiscal fragility index to evaluate the likelihood of the crises. His findings indicate that higher levels of fiscal fragility index emit a signal for a potential crisis, and there is a causal relationship between required primary balance and real primary balance in the economy.

Afonso and Jalles (2016) is another study that is based on the Granger causality test to evaluate fiscal sustainability. Their findings are suggestive that the direction of causality is from public debt to primary balance, which suggests the existence of Ricardian regimes in selected European countries. The overall results in this study imply the absence of sustainability for most European economies.

Karlsson (2020) analyses the time-dependent causality among fiscal variables via the Granger causality test using wavelet decomposition. His findings suggest that there is a bidirectional causal relationship between fiscal components in China that corresponds to fiscal synchronisation.

Herrera and Prats (2020) extend the causality framework to a panel data setting. In their analysis, they investigate the existence of fiscal sustainability in selected European countries. They run a Dumitrescu and Hurlin extension to causality testing, and their findings are indicative of a bidirectional causal relationship among fiscal variables.

Shevcuk and Kopych (2018) investigate the fiscal sustainability in Ukraine. Their primary conclusion is that fiscal sustainability does not exist in Ukraine, as evidenced by two-way Granger causality test results.

Zarei (2018) empirically tests fiscal sustainability in Iran. For this purpose, he runs a causality test among fiscal sustainability indicators. His findings evidence that excluding the oil revenues, the fiscal posture in Iran is not sustainable. Only if the oil revenues are included the fiscal balances turn sustainable in the country.

In the literature, numerous other contributions seek an answer to the question of fiscal fragility for different countries with different data sets; however, due to space limitations, we included only selected studies in this section. The main takeaway from this brief review is that it is empirically approved that the fiscal fragility is a common problem for developed and developing countries regardless of their economic status.

## 4. Empirics

### 4.1. Salient features of the data

The data we used for the analysis were retrieved from the Public Finances in Modern History, Fiscal Monitor and Financial Monitor databases of the IMF. The dataset covers the 1978–2019 period and is comprised of growth rate, deposit rate, inflation rate, public debt/GDP, and primary balance/GDP series.[1]

The figure below illustrates the primary balance/GDP ratio for the sample period. It is clear that the late 70s and entire 80s were characterised by negative levels of primary balance, i.e. primary deficits. From a fiscal stability standpoint, this trend is not suitable for public debt sustainability since primary deficits lead to explosive debt patterns rather than stabilised fiscal postures. This trend prevails in the economy until the mid-90s but comes to a halt thereafter. As a result of the IMF backed recovery programs, the primary balance hits positive values to restore public debt sustainability. However, during the economic downturn in 2001, the primary balance plunged dramatically but recovered swiftly during the first years of single-party government. However, during the second half of the decade, a gradual fall in the primary balance to GDP ratio is clearly visible. This decline continued until the global economic crisis, during which the primary balance to GDP ratio hit level zero after a long period. After the global downturn, the ratio seems to recover but through the end of the 2010s, it starts to fall once again and currently is in the negative territory for the last couple of years. The current trend in primary balance generation performance is seemingly weak compared to the last decade's outstanding performance, which raises concerns about fiscal vulnerability since positive primary balance is an important indicator of fiscal stability.
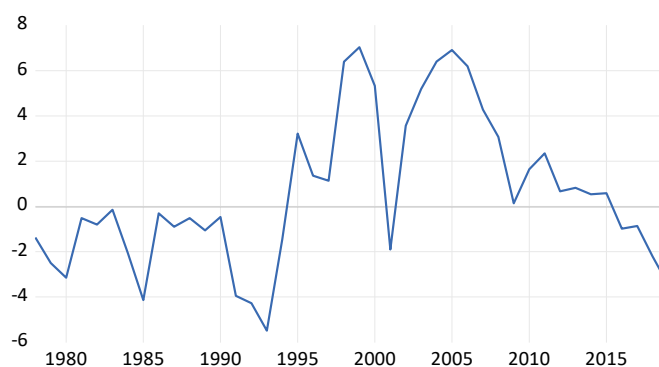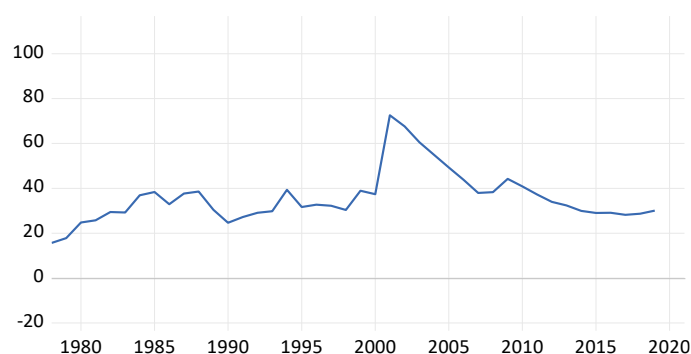


**Figure 1.** Primary balance to GDP ratio.
Source: IMF fiscal monitor and public finances in modern history databases.

Figure 2 below plots the public debt/GDP ratio over the sample period. The upward trend is visible during the 80s, which not surprisingly corresponds to a declining primary balance trajectory in the same period. Also, the IMF-backed policies' outcome is also visible from the early 90s onward, evidenced by the seemingly stable debt profile. However, the public debt ratio tops out in 2001 during the economic crisis, and in the rest of the sample, it falls gradually except for the global crisis in 2009.
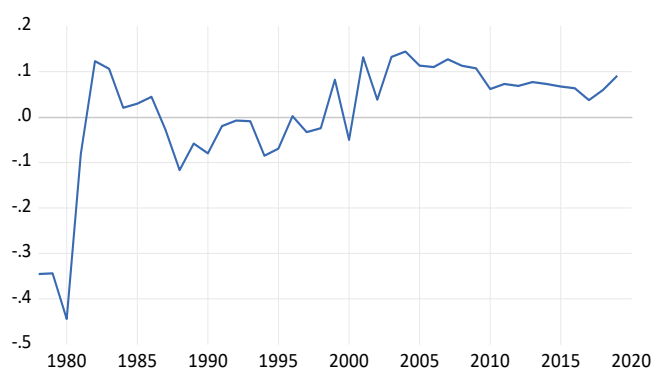
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[1] The data set is available upon request for replicating the analysis.

During the sample period, the public debt/GDP ratio mostly remains under the 60% Maastricht criteria threshold level, which is a distinctive sign for stability.



**Figure 2.** Public debt/GDP.

Source: IMF fiscal monitor and public finances in modern history databases.



**Figure 3.** Real interest rate.

Source: Own calculations using IMF data.

The figure above depicts the real interest rate for the sample period. It can be observed that, unlike the 80s, the economic recovery policy of the late 90s and 2000s is based on the positive real interest rate to attract international funds to the country. Nevertheless, despite its beneficial aspects, such as facilitating the influx of foreign capital, a positive real interest rate also has some impairing effects. The higher the real interest rate, the higher the cost of borrowing for the government. Thus, preserving an optimal level of real interest rate is crucial for sustainability to avoid snowballing public debt. With the exception of the 2001 summit, it can be observed on the graph that the real interest rate has been seemingly stable in Turkey.

Finally, the figure below shows the growth rate for the sample. Except for the occasional crises periods, the growth rate was mostly positive for the sample, which is a good sign for sustainability. However, it is also clear that the volatility in the growth rate dominates the economy, generating an unstable environment for public debt management. In recent years, despite remaining in the positive territory, the growth rate is gradually falling, emitting a signal for deteriorating conditions for stability.
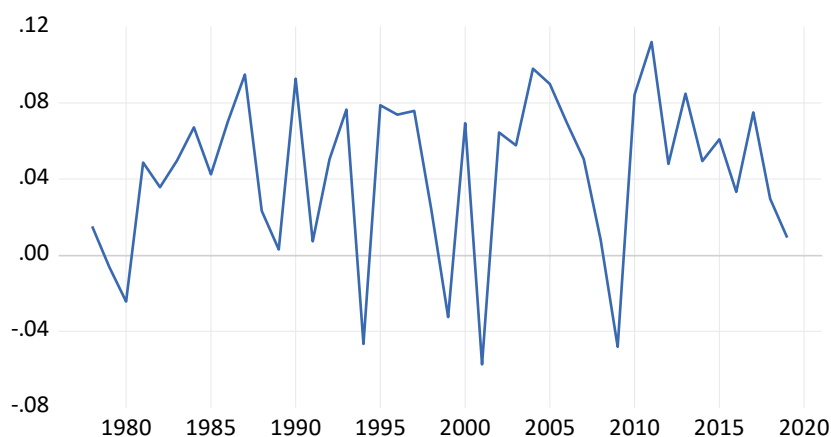
**Figure 4.** Growth rate.
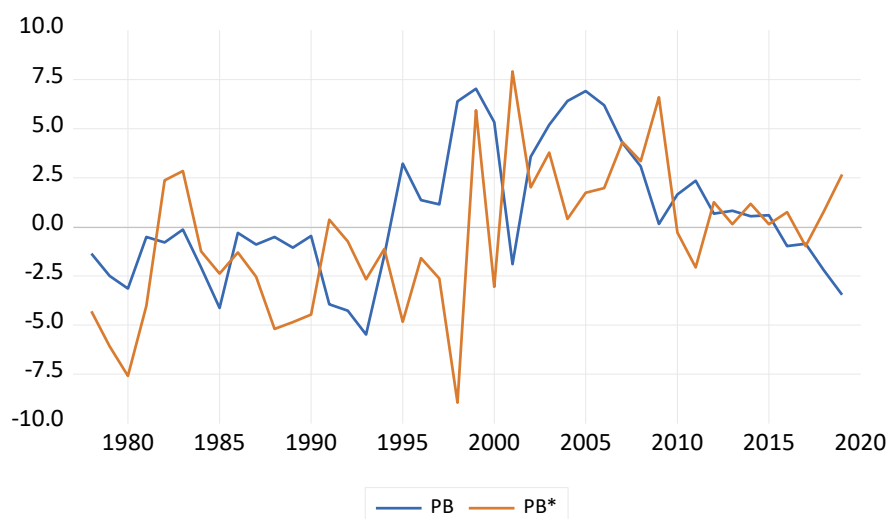Source: IMF financial statistics database.

### 4.2. Methodology and findings

#### 4.2.1. Index-based analysis

The methodology we use in this subsection for assessing fiscal stability is based on the algebra we put forward in the first section. The debt stabilising primary balance was defined as the hypothetical level of primary balance which is required to keep public debt under control. Using the formula described in the first section, we calculate this level of primary balance and compare it with the actual level of primary balance to evaluate the fiscal performance of Turkey. The smaller the gap between these two levels, the higher Turkey's performance in stabilising the country's fiscal posture.

It is evident from the figure below that the blue line is above the orange line whenever a stabilisation programme agreement with the IMF was signed in history. These periods include the late 80s, late 90s and early 2000s. During these periods, the fiscal policies were designed by IMF agreements, which impelled the government to run primary surpluses for restoring stability. The orange line is mostly above the blue line outside these years, indicating an inappropriate environment for fiscal stability. The gap between the actual and the required primary balance is the highest during the 2001 and 2009 crises implying that the government could not generate sufficient primary balances during these years.

However, during the early 2000s, the actual primary balance is remarkably higher than the required primary balance as an outcome of the IMF programme which stipulated a 6.5% primary surplus for each year of the agreement. This strategy not surprisingly coincides with the abruptly falling debt ratio in Figure 2 above (from 70% to 40%). Strong adherence to the IMF programme resulted in a falling debt ratio thanks to high primary balance performance. Nevertheless, in recent years, the gap between required primary balance and actual primary balance is negative, similar to crises of 2001 and 2009 which raises concerns about the future course of fiscal balances.

**Figure 5.** Actual vs required primary balance.
Source: IMF financial statistics and own calculations.

The difference between these two levels can also be considered an index for evaluating fiscal vulnerability using Equation four in the first section $(EPB_t)$. Figure six below displays the calculated index values for each year. The blue line represents the vertical distance between the blue and orange lines in figure five. This difference indicates the degree of fiscal risk for each year. By definition, negative values stand for stability while positive values stand for non-stable fiscal postures. The graph clearly shows that positive values of the index correspond to the crises periods, whereas the years during which IMF programmes supervised the fiscal policies, the index gets negative values which represent a stabilisation in the fiscal balances.

Not surprisingly, the index value tops out in 2001 with an outstanding positive level, and thereafter either stays in the negative territory or very close to zero except for 2009, which indicates that the fiscal stability was established throughout the 2000s. In 2009, however, the index once again made an upward movement, but this movement was not persistent, and it reverts back in a short period of time. Nevertheless, in recent years, the index value has hit once again positive levels, exhibiting an alarming condition for a potentially looming fiscal instability in the near future. If the current trend is not shifted through policy alterations, all good performance outcomes in the last 18 years will be lost promptly.

The cumulative behaviour of the index $(CEPB_t)$ value also provides some insights about the fiscal performance of Turkey. Since the fiscal posture of any country is not independent of the fiscal outcomes of the previous years, it is worthwhile to portray the fiscal fragility index in a cumulative manner for enhancing the scope of the analysis.

The figure above depicts the cumulative behaviour of the fiscal stability index for Turkey. It is clear from the graph that cumulatively the fiscal fragility index is permanently situated in the negative zone which indicates overall stability for the fiscal posture. There are episodes of occasional upward movements but they are not persistent. Especially in the post-2000 sector of the figure the cumulative index has the lowest values in the sample and is relatively stable. The persistent negative levels of the cumulative index indicate that Turkey performed well in general during the sample period. In 2009, the cumulative index once again made an upward movement but returns to its former position in the following years. Nevertheless, it is also clear on the graph that recently the cumulative index is heading

towards positivity and if the current trend is not shifted through policy alterations it will hit positive values once again after some forty years of good performance.
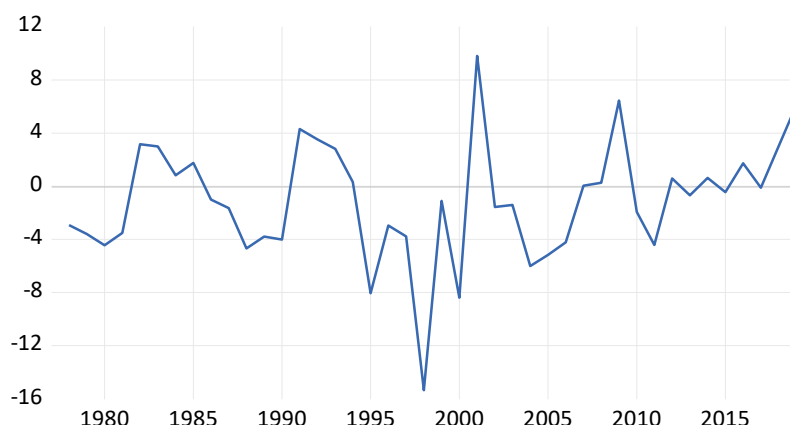


**Figure 6.** Fiscal vulnerability index ($EPB_t$).
Source: Own calculations.
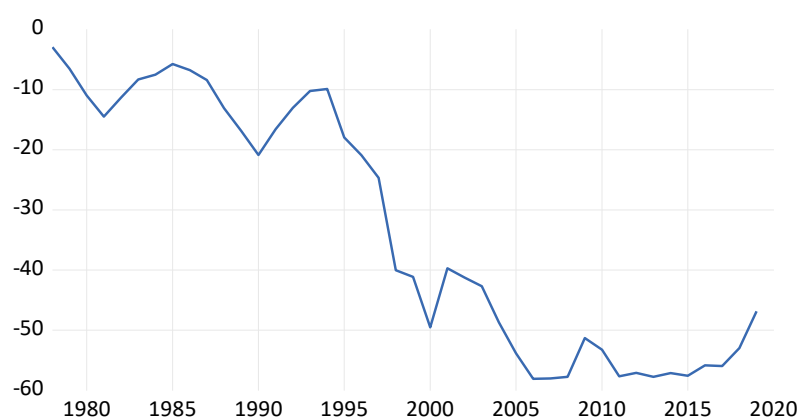


**Figure 7.** Cumulative fiscal fragility index ($CEPB_t$).
Source: Own calculations.

### 4.2.2. Toda-Yamamoto causality analysis

The second analysis we carry out to test the fiscal performance of Turkey is based on the articulation of debt stabilising primary balance level. According to Equation 3 in section 1, the primary balance generated by the government needs to respond to debt stabilising required primary balance to preserve fiscal stability. In the preceding subsection, we calculated the debt stabilising primary balance using Equation 3, namely $\left(\frac{r_t - g_t}{1 + g_t}\right) d_{t-1} - pb_t = 0$. For a stable fiscal posture, the primary balance $(pb_t)$ needs to respond to a movement in the required primary balance $\left(\frac{r_t - g_t}{1 + g_t}\right) d_{t-1}$, to preserve the balance in the Equation. The existence of such a causality proves that primary balance is actively used as a tool for stabilising the fiscal posture of the economy. We carry out a Toda-Yamamoto type causality test to determine the direction of causality between primary balance realisations and required

primary balance levels. The procedure of this test is based on Toda and Yamamoto (1995) and it is a modified version of the standard Granger causality test. TY version of the test overcomes the shortcomings classic Granger test by relaxing the stationarity requirement of the standard Granger causality procedure. The standard procedure involves the estimation of the following VAR:

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \cdots + \alpha_p Y_{t-p} + \theta_1 X_{t-1} + \cdots + \theta_p X_{t-p} + \epsilon_t \tag{11}$$

$$X_t = \beta_0 + \beta_1 X_{t-1} + \cdots + \beta_p X_{t-p} + \delta_1 Y_{t-1} + \cdots + \delta_p Y_{t-p} + v_t \tag{12}$$

In this setting $H_0$: $\theta_1 = \cdots = \theta_p = 0$ and $H_0$: $\delta_1 = \cdots = \delta_p = 0$ hypotheses are tested for detecting the existence and direction of causality among variables. In Toda-Yamamoto taxonomy, in the case of integrated variables, as far as the order of integration of the process does not exceed the true lag length of the model, the $(k + d_{(Max)})th$ order VAR can be estimated where $d_{(Max)}$ is the maximal order of integration and k is the optimal lag length Toda and Yamamoto (1995). We apply this procedure to seek causality between the real primary balance and debt stabilising primary balance calculated earlier in the study. Suppose that the debt stabilising primary balance Granger causes the real primary balance, and no causality in the reverse direction exists. In that case, we can conclude that the fiscal policy actively establishes fiscal stability when a divergence in fiscal balances occur in Turkey since it means that the government is actively using primary balance as a fiscal policy tool.

To carry out this objective we start with the determination of the level of integration and the optimal lag length.

**Table 1.** Lag length criteria.

| Lag | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|
| 0 | NA | 118.52100 | 10.45081 | 10.54060 | 10.48143 |
| 1 | 39.01830 | 42.63243 | 9.42745 | 9.696807* | 9.51931 |
| 2 | 10.94196 | 37.11335 | 9.28543 | 9.73436 | 9.43853 |
| 3 | 10.01865* | 32.65030* | 9.149667* | 9.77817 | 9.364004* |
| 4 | 4.41004 | 35.15080 | 9.20856 | 10.01663 | 9.48414 |
| 5 | 3.97690 | 38.22196 | 9.27095 | 10.25859 | 9.60776 |
| 6 | 0.66241 | 48.46202 | 9.47470 | 10.64191 | 9.87275 |
| 7 | 0.19570 | 63.68777 | 9.69969 | 11.04648 | 10.15898 |
| 8 | 5.26347 | 63.23380 | 9.62537 | 11.15173 | 10.14590 |

According to the tables above, the maximum order of integration is one, and the optimal lag length is three. Table 2 clearly shows that the variables are either I(1) or I(0) but none of them is I(2). Thus, regardless of the individual test results, it is safe to conclude that the maximum order of integration required for the T-Y procedure is one. Besides, four of the five lag length criteria indicate that the optimal lag length is three; therefore, with the help of democracy, we set the optimal lag length equal to three. As a result, $(k + d_{(Max)})$ is equal to four which is essential for the Toda-Yamamoto procedure.

**Table 2.** Formal stationarity test results.

(Level)

|  |  | ADF | DF-GLS | PP | KPSS | ERSP |
|---|---|---|---|---|---|---|
| Primary Balance |  | –2.68 | –2.72 | –2.68 | 0.23 | 2.28 |
|  | 1% | –3.57 | –2.61 | –3.57 | 0.73 | 1.87 |
|  | 5% | –2.92 | –1.94 | –2.92 | 0.46 | 2.97 |
|  | 10% | –2.59 | –1.61 | –2.59 | 0.34 | 3.91 |
| Required Primary Balance |  | –2.59 | –1.83 | –4.59 | 0.57 | 6.89 |
|  | 1% | –3.6 | –2.62 | –3.6 | 0.73 | 1.87 |
|  | 5% | –2.93 | –1.94 | –2.93 | 0.46 | 2.97 |
|  | 10% | –2.6 | –1.61 | –2.6 | 0.34 | 3.91 |

(First Difference)

|  |  | ADF | DF-GLS | PP | KPSS | ERSP |
|---|---|---|---|---|---|---|
| Primary Balance |  | –8.07 | –0.8 | –9.04 | 0.17 | 1.79 |
|  | 1% | –3.57 | –2.61 | –3.57 | 0.73 | 1.87 |
|  | 5% | –2.92 | –1.94 | –2.92 | 0.46 | 2.97 |
|  | 10% | –2.59 | –1.61 | –2.59 | 0.34 | 3.91 |
| Required Primary Balance |  | –4.83 | –4.89 | –16.59 | 0.19 | 1.93 |
|  | 1% | –3.62 | –2.62 | –3.6 | 0.73 | 1.87 |
|  | 5% | –2.94 | –1.95 | –2.93 | 0.46 | 2.97 |
|  | 10% | –2.61 | –1.61 | –2.6 | 0.34 | 3.91 |

Before determining the causality, we need to verify that the VAR on which the causality test will be based is stable. According to table three below, all inverse-roots of the VAR are located within the unit circle which implies stability for the establishment of the VAR model.

Inverse Roots of AR Characteristic Polynomial
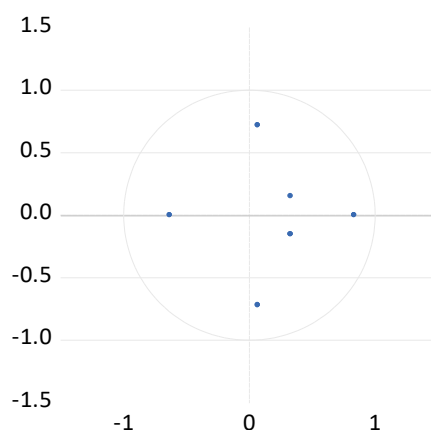


**Figure 8.** VAR inverse roots.

Now that we have determined the maximum order of integration and optimal lag length and tested the VAR inverse roots for stability, it is safe to conduct the Toda-Yamamoto causality test to investigate the relationship between real and the required levels of primary balance. The Table 3 below summarizes the causality test results.

**Table 3.** Toda-Yamamoto causality test results.

Dependent variable: PB

| Excluded | Chi-sq | df | Prob. |
|---|---|---|---|
| RPB | 10.64529 | 3 | 0.01381 |
| All | 10.64529 | 3 | 0.01381 |

Dependent variable: RPB

| Excluded | Chi-sq | df | Prob. |
|---|---|---|---|
| PB | 4.89253 | 3 | 0.17984 |
| All | 4.89253 | 3 | 0.17984 |

Toda-Yamamoto causality test results indicate that the direction of causality is from required primary balance to real primary balance as expected by the theoretical background in the first section. From a fiscal policy standpoint, this result implies that the government responds to the required level of primary balance by adjusting its primary balance and thereby uses the primary balance as an active policy tool. In other words, the fiscal policy is responsive to the requirements of fiscal stability, which facilitates the establishment of long-term fiscal sustainability in Turkey. Nevertheless, this numeric analysis need to be interpreted bearing its limitations in mind. Despite the fact that the causality analysis indicate a stable fiscal posture for the estimation period, the recent unpleasant trend exhibited in the index-based analysis still raises concerns and the overall stability implied by TY causality test does not guarantee that recent deterioration in the fiscal fagility will be reverted. Whether the fiscal fragility will improve is down to the fiscal policy preferences of the government in the following years.

## 5. Conclusions and final remarks

As implied in the literature review section, fiscal vulnerability is a thread for all countries regardless of their economic posture, but developing countries are generally more prone to suffer from more fragile fiscal positions. For contributing to the indicated literature, this study analysed the status of fiscal vulnerability in Turkey for the 1978–2019 period. Being a developing country, Turkey encountered several episodes of severe fiscal distress which entails rigorous analysis of the level of fiscal vulnerability from a historical perspective. To accomplish this objective, we calculated the debt stabilising primary balance, which can be defined as the level of primary balance needed to keep public

debt stagnant, and compared this value with the actual primary balance to gauge how the actual level measures up against the debt stabilising level. We calculated a fiscal fragility index denoting the margin between two variables based on Stoian (2012) approach. We also calculated the cumulative values of this index for taking into account the intertemporal dependence in fiscal management. Besides, we performed a Toda-Yamamoto type causality test to detect the direction of causality between required and real primary balance levels. The causality test results reveal that the required level causes the real primary balance level, which is a clear sign for overall fiscal stability. According to this result, the government responds to the requirements of the fiscal trajectory using the primary balance as a tool, which clearly indicates the existence of an active fiscal policy to restore fiscal stability whenever needed. Besides, the EPB index analysis indicate that the fiscal policy performance was sufficient to keep the index values mostly in negative territory, which implies that the fiscal posture was chiefly stable during this period. However, according to cumulative index results, in recent years the fiscal vulnerability risk is mounting continuously signaled by rising values of the cumulative index. Hence, the ongoing trend in the fiscal policies should be reversed promptly to avoid a fiscal turmoil reminiscent of 2001. However, for many emerging economies such a reversal appears to a daunting task due to their very nature of fiscal profile. Despite focusing on the case of one country, the empirical findings in this study shed light on the fiscal fragility of developing countries in general. According to Tanzi and Schuknecht (1997), the main characteristics of the welfare state are large public debt and prolonged fiscal deficits. Also, Alesina et al. (2008) points out that in developing countries people demand more transfer payments and public expenditures when the economy is growing since they do not have confidence in the way the funds will be spent due to political mistrust which is prevalent in developing countries. However, lacking sufficient domestic savings and assets, when a developing country acts as a welfare state, it jeopardizes the fiscal stability since defraying snowballing debt obligations will get more challenging. In the absence of sufficient domestic savings, the only way to rollover the existing debt accumulation is new borrowing. Such a Ponzi-type financing scheme is obviously not sustainable by definition. Putting these arguments together, it is almost inevitable for a developing country to confront fiscal fragility when they apply welfare state policies. Hence, the cumulative index-based empirical findings in this study signal a looming deterioration in fiscal posture in recent years in Turkey, but episodes of this type of trend are prevalent among all developing countries. In other words, those countries face a trade-off between two unpleasant scenarios. i.e. increasing the amount of social transfer payments at the expense of heightened fiscal fragility and cutting social spending to reduce fragility at the expense of socio-economic problems.

In many cases, it is extremely challenging for the governments to sidestep the potential fiscal costs of this trade-off and generally entails an effort by the government to reign in the expenditures. Due to politico-economic reasons, the governments in those countries usually prefer back-loading adjustments which involve gradual amendments in spending and taxes rather than front-loading adjustments which involve immediate reductions in government spending and abruptly increasing taxes. Also, reform strategies to promote fiscal discipline for restoring fiscal stability are essential for developing countries. For instance, most governments reform their inefficient subsidies (such as energy subsidies) which lead to market failures and deadweight losses in the country. In many emerging economies, a significant amount of financial resources are channelled to more productive areas and overall spending has been reduced remarkably through reforming unproductive energy subsidies. Besides, the contingent liabilities arising due to treasury purchase guarantees on large infrastructure investments also pose a great deal of challenge for developing countries for reducing

fiscal fragility since in most cases the contingent liabilities eventually turn out to be actual liabilities. Hence, from public expenditures perspective it is crucial to acuretely project the potential revenue and expenditure flows of those investments so as to shun large scale losses originating from the realisations of the contingent liabilities.

Moreover, it is crucial to reprioritize and reallocate budgetary resources to achieve sound expenditure management which is a prerequisite for reducing fiscal fragility. Accountable, flexible and transparent expenditure management improves the credibility of the budget authorities and thereby makes the country less vulnerable to outside fiscal shocks since increased credibility translates into a lower risk premium in the international market. Besides, performance-oriented design of the public spending along with thorough scrutiny and auditing facilitates the establishment of fiscal stability when strong connectivity between well-designed planning and budgeting is set up. Proper scrutiny and monitoring significantly reduce the amount of profligacy which is key for attaining efficiency in expenditure management. Also, they enable the government to detect the weaknesses of fiscal management promptly and to take measures to improve the quality of fiscal management in a timely manner. Proper public spending management entails a design that mirrors the economic and social preferences of society. Thus, the resources need to be collected and allocated responsively and efficiently which requires close cooperation between tax and expenditure authorities. Besides, the design and the implementation of public expenditure management must be tailored for country-specific factors since the economic and social preferences and priorities of each country is different from one another.

In addition, the public expenditure management entails a counter-cyclical approach to mitigate the adverse effects of business cycles so as to promote fiscal stability. Smoothing the fluctuations in the economy, dynamic public expenditure management facilitates the establishment of fiscal stability in the country. Procyclical expenditure policies, on the other hand, oftentimes lead to deteriorations in fiscal stance and in turn bring about fiscal fragility since in this case during expansions the excess funds are not put aside prudently by the government for the bust phases of the business cycle. Instead, they are spent inefficiently on politico-economic grounds procyclically. Thus, when the economy contracts after a period of expansion, the budget lacks sufficient resources to run counteractive fiscal policies which intensifies the fiscal fragility since extreme borrowing is inevitable in this situation. Hence, the developing countries utilising procyclical fiscal policies are more prone to confronting fiscal fragility. Besides, fiscal rules also serve an important role in keeping fiscal balances under control to avoid unpleasant movements in fiscal fragility. A strong commitment to fiscal rules improves the credibility of the government and thereby reduces the delicacy in fiscal posture. In the case of public spending, a policy rule is set for the execution of public expenditures and the extent to which the government complies with this rule directly affects the credibility of the government and thereby influences the intensity of fiscal fragility. For preserving fiscal stability, the fiscal rule needs to be grounded on realistic features of the economy and the targets involved need to be calculated taking the fiscal capacity and the economic needs of the society into account. Otherwise, failing to meet target levels inevitably brings about falling credibility of fiscal policy.

All in all, fiscal management in developing countries has a multi-faceted nature but its primary objective needs to be to reduce fiscal fragility originating from the very nature of fiscal posture in those countries. However, notwithstanding the plethora of policy alternatives mentioned in this section, the recent Covid-19 pandemic appears to be a remarkable hindrance to achieving this objective. The pandemic is currently leading to a paradigm shift in public finance management back to Keynesian postulations since social expenditures have boomed recently impelling the governments to run budget deficits. Even

before the outbreak of the current pandemic, the fiscal posture of many developing countries was seemingly fragile and therefore they were caught off-guard as far as the burden over their public finances is concerned. Theoretically, the more vulnerable the countries are, the more likely it is that the Covid-19 pandemic will devastatingly hit their economies. Thus, the outbreak of the Covid-19 pandemic is likely to impede fiscal recovery in the short run.

For this purpose, in addition to mainstream policies available in the arsenal of the governments such as spending cuts, tax system reform, extended scrutiny of public expenses, the governments should also consider complementary policies to alter the ongoing unfavourable trend in fiscal balances resulting from extraordinary conditions imposed by the pandemic. Due to their shallow fiscal space, the developing countries are more prone to confronting fiscal vulnerability arising due to current harsh conditions. Besides, unlike industrialized countries, emerging economies were unshielded against unforeseen circumstances because of their limited fiscal manoeuvrability. Also, the instant and dramatic surge in the financing needs did not allow time to recalibrate their fiscal policies for overcoming the existing dire situation. Hence, it is essential to promptly alter the conventional fiscal policies to preserve fiscal stability in those countries. A proper rationing mechanism to reprioritize the public expenditures is crucial and bureaucratic impediments to external financing can be alleviated since there is an emergency for social transfers and health expenditures. The gloomy conditions bring about uncertainty which intensifies fiscal fragility, therefore emergency bailouts, interest cuts, monetary easing (despite its inflationary effects), international funds can be considered for easing the fiscal burden of the pandemic arising mostly in the form of debt accumulation which is hazardous for fiscal fragility. However, no matter which policy is preferred by the authorities, it is very unlikely that the developing countries will be able to sidestep the adverse fiscal effects in the short run. According to the empirical findings in our study, fiscal fragility was already in a deteriorating trend even before the pandemic in Turkey. Thus, it is evident that the incipient deterioration in fiscal stance is likely to deepen in the near future due to the disruptive fiscal effects of the pandemic and apparently, the country will encounter worsened fiscal fragility should the necessary fiscal measures are not taken promptly.

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## Conflicts of interest

The author declares no conflict of interest.

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