The Performance of Medium-Term Budgeting in Türkiye: An Analysis of Budget Forecasts

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ABSTRACT

The accuracy of medium-term budgeting is crucial for sustainable financial management and strategic planning in both the public and private sectors. Realistic forecasts ensure the efficient allocation of resources, prevent unnecessary expenditures, and help maintain fiscal discipline. It is believed that, especially for developing countries, medium-term budgeting can establish long-term sustainable development. Motivated by this perspective, this study evaluates the success of medium-term budgeting in Türkiye based on medium-term forecasts of budget revenues and expenditures. Given that Türkiye adopted medium-term budgeting in 2005, the study analyzes two- and three-year budget forecasts for the period between 2009 and 2023. Initially, the accuracy of the forecasts was calculated, identifying which items had higher forecast errors and the direction of these errors. Subsequently, the Holden-Peel (1990) test was employed to determine whether there was any upward or downward bias in the forecasts. The results indicate that forecast errors for both revenues and expenditures were significantly high, revealing that medium-term budgeting was quite unsuccessful. However, there was negligible bias in the forecasts. Despite being prepared 16 times during the examined period, medium-term budgeting practices in Türkiye did not achieve the desired success.

Key Words*: Medium-Term Budgeting, Budget Forecasting, Türkiye, Holden-Peel Test*
JEL Classification*: H61, H68, E61, E66*

Türkiye'de Orta Vadeli Bütçeleme Performansı: Bütçe Tahminleri Üzerinden Bir Analiz

ÖZ

Orta vadeli bütçe gerçekçiliği hem kamu hem de özel sektörün sürdürülebilir finansal yönetim ve stratejik planlaması için hayati öneme sahiptir. Gerçekçi tahminler, kaynakların etkin bir şekilde dağıtılmasını sağlamakta, gereksiz harcamaların önüne geçmekte ve mali disiplinin korunmasına yardımcı olmaktadır. Özellikle gelişmekte olan ülkelerin, orta vadeli bütçeleme sayesinde, uzun vadeli sürdürülebilir kalkınmayı tesis edebileceği düşünülmektedir. Bu motivasyonla hareket edilen çalışmada, Türkiye'de orta vadeli bütçelemenin başarısı, bütçe gelir ve harcama ile toplamlarının orta vadeli tahminleri üzerinden değerlendirilmiştir. Türkiye'de orta vadeli bütçelemeye 2005 yılında geçildiği için 2009-2023 yılları arası, iki ve üç yıllık bütçe tahminleri analiz edilmiştir. İlk olarak tahminlerin gerçekliği hesaplanmış, hangi kalemlerde tahmin hatasının daha fazla olduğu ve hataların hangi yönde seyrettiği tespit edilmiştir. Akabinde Holden-Peel (1990) testi aracılığıyla tahminlerde aşağı yahut yukarı yönlü bir yanlılığın var olup olmadığı test edilmiştir. Sonuçlar hem gelir hem de harcama tahmin hatalarının oldukça yüksek olduğunu, orta vadeli bütçelemenin oldukça başarısız olduğunu ancak tahminlerde yanlılığın yok denecek kadar az olduğunu ortaya koymuştur. Türkiye'de orta vadeli bütçeleme uygulamaları, incelenen dönemde 16 kez hazırlanmış olmasına rağmen, istenilen başarı elde edilememiştir.

Anahtar Kelimeler*: Orta Vadeli Bütçe, Bütçe Tahmini, Türkiye, Holden-Peel Testi*
JEL Sınıflandırması*: H61, H68, E61, E66*

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INTRODUCTION

The process of determining public policies and allocating resources to these policies consists of planning, programming, and budgeting stages. The most critical of these is the budgeting stage, where the scarce public resources are distributed according to policy priorities. The effective and efficient use of public resources depends on the success of this stage. Decisions made and their outcomes in this process directly affect the quality of public services, the overall state of the economy, and societal welfare.

The primary function of modern public financial management is shaped within the framework of the public budget (Schick, 1998, p. 11). The determination of who will use public resources, in what amount, and for what purpose, essentially fiscal policy, is defined by the budget (Atiyas & Sayın, 1997, p. 6). The alignment of these financial targets with the fiscal policies required to achieve them is only possible through effective budget management (Çetinkaya et al., 2011, p. 121).

Evaluating the success of the budget process, and consequently fiscal policy, through annual budgets is quite challenging. Nearly all economic impacts resulting from budget implementation manifest over a period longer than one year. For this reason, especially since the second half of the 20th century, many countries have adopted medium-term budgeting systems (MTB), guided by institutions such as the OECD, World Bank, IMF, and the European Union (OECD, 2023; World Bank, 2013)

The practice of MTB initially emerged in developed countries. The need for these countries to transform their annual budgeting processes into a medium-term framework dates back to the development planning literature of the 1950s (Schiavo-Campo, 2009, p. 4). During this period, it became apparent that single-year budgets were inadequate for governments to adapt to sudden economic changes. The crises in economies, their reflections on budget balances, and the shifts in governmental approaches during this period resulted in changes in expenditure and revenue compositions (Kesik, 2005, p. 126). This situation led to the failure of long-term economic plans and fiscal instability. The relevant literature concluded that the fundamental issue was the confinement of the budget process, and consequently the managers, to a one-year timeframe (Diamond, 2006, p. 8). Studies initiated based on these conclusions were quickly implemented. By the early 1970s, many OECD countries had begun to adopt the MTB (Allen & Tommasi, 2001, p. 176).

The MTB approach refers to a budgeting method where annual budgets are evaluated alongside multi-year revenue and expenditure forecasts. In this approach, budget laws include forecasts for the next two or more years in addition to the annual budgets. Through MTB, the connection between the government's annual budget and its plans and policies is established, and the government's strategic priorities are integrated into the budget preparation process with a vision extending beyond one year. This integration makes it possible to base inter-functional and intra-functional resource allocation on a sound foundation by prioritizing

expenditures according to the government's socio-economic programs and allocating resources only to the most important functions.

MTB also provides significant advantages for managers. By allowing timely implementation of policies, it enhances the ability to identify and address issues (Jason, 2013, p. 141). Particularly in terms of expenditures, planning budget constraints and policies for periods longer than one year offers managers greater flexibility, enabling more efficient use of public resources. This is because it is quite challenging to determine strategic priority services, carry out planning, and perform controls with annual budgets alone.

On the other hand, MTB is also believed to make significant contributions to accountability. By providing a mechanism for the systematic review of spending priorities and commitments, it promotes efficiency in the allocation of public resources (Boex et al., 2000, p. 92). Medium-term planning and monitoring reports facilitate the public scrutiny of governments' compliance with legal regulations, the timely making of economic decisions, and the performance in achieving targets. This is also crucial for fostering medium-term public awareness.

MTB serves as a planning function against long-term uncertainty. It acts as a protective factor against inefficient spending that could negatively impact growth and societal welfare (Muzychenko et al., 2017, p. 330). It allows policymakers to see their constraints in the medium term and enables them to conduct cost-benefit analyses of spending plans. Particularly because investment expenditures spread over many years are executed through annual budgets, their efficiency and effectiveness cannot be analyzed.

The success of an application that has many benefits like this depends on various requirements. Firstly, in situations where there is no political and economic stability, a successful MTB will not be possible. Therefore, MTB needs to be integrated into annual budgets. However, practices that disrupt stability, such as changing resource allocation within the budget year, should not be employed. Thorough analysis, reporting, and auditing of macroeconomic data are also indispensable. To achieve this, non-budgetary practices such as funds, associations, foundations, revolving funds, etc., should be minimized, and an accounting and reporting system that complies with international standards must be used. For the success of MTB, it is essential for politicians to take ownership of the program and conduct necessary analyses, especially cost-benefit analyses, before making decisions on programs. Showing activity results in accounting records to allow for audits and conducting comprehensive audits is another necessity.

The transition process to MTB started in Türkiye in the 1990s (Çetinkaya et al., 2011, p. 125). The frequent economic crises during this period increased the need to enhance transparency and accountability in public finance, leading to reforms aimed at ensuring budget discipline. At the same time, the requirements of the European Union accession process and relations with the IMF resulted in the restructuring of budgeting and planning processes, which culminated in the adoption of Law No. 5018 in 2003.

With the implementation of this law starting in 2005 and the acceptance of the first medium-term fiscal plan covering the period 2006-2008, MTB practices were officially introduced. Türkiye adopted a rolling budgeting system, where, as each year progresses, the first year of the multi-year budget drops out and a new final year is added. This approach, which ensures continuity and adaptability in fiscal planning, has been a key feature of Türkiye's budget system since 2006. There is extensive literature on this topic in Türkiye, highlighting the significance of this rolling framework for long-term fiscal stability.

This study was prepared to evaluate the success of medium-term budgeting in Türkiye. Since Türkiye transitioned to medium-term budgeting in 2005, the period between 2009 and 2023 was considered for analysis. Although medium-term forecasts for 2007 and 2008 were included in the 2006 budget rationale, the study begins with the forecasts made in the 2007-2009 budget rationale. This decision was taken because, in the 2006 budget rationale, only the first-level expenditure categories were listed according to the analytical budget classification system, while revenues were presented in aggregate under budget revenues. As a result, to maintain consistency in comparing both revenues and expenditures across individual items and over two- and three-year forecasts, the study starts with the more detailed 2007 budget rationale.

The success of MTB was evaluated based on the medium-term forecasts of budget revenues and expenditures. Firstly, the accuracy of the forecasts was calculated, identifying which items had higher forecasting errors and the direction of these errors. Subsequently, using the Holden-Peel (1990) test, whether there was a directional bias in the forecasts (upward or downward) was examined. The results revealed that forecasting errors were quite high, indicating that medium-term budgeting was largely unsuccessful, although the biases in the forecasts were negligible.

I.RELATED WORKS

The MTB has generally been implemented over the past 20-30 years, with a few exceptional developed countries starting earlier. Considering that a certain period is needed to measure the success of this practice, studies on this topic have increased in recent years, although their number remains limited.

First, Plesko (1988) stated that the long-term budget deficit forecasts of the Congressional Budget Office and the Office of Management and Budget in the United States were biased. Heinemann (2006) empirically examined the Federal Government's medium-term budget forecasts from 1968-2003 and the factors influencing these forecasts. The analyses concluded that the existing medium-term fiscal planning in Germany was ineffective in making budget policy more predictable, with forecasts being excessively optimistic. Additionally, the study found evidence that budget deficit forecasts were used to give the impression of better fiscal performance during election years. In terms of relations with the European Union, it was noted that the Maastricht Treaty did not make budget forecasts more realistic as expected but instead led to excessively optimistic budget forecasts.

Frankel (2011) examined growth and budget balance forecasts in 33 countries and found that three-year forecasts were more biased than short-term forecasts. Shortly after, Breuer (2015) identified that medium-term forecasts in Germany from 1968 to 2012 were upward biased. Overoptimistic revenue projections were particularly pronounced after German reunification. Forecasts were likely to overestimate tax revenues if the predicted tax-GDP ratio exceeded its structural level of approximately 22%.

Finally, Yılmaz (2019) used the ARIMA method to examine the error in revenue forecasts for the following three years, using data from the 2006-2014 period. Although both the official forecast and the model used in the study failed in the last period of this timeframe, the ARIMA model was much more successful than the official forecast for the first two periods.

II.DATA SET AND METHODOLOGY

MTB are composed of forecasts of various macroeconomic variables such as revenue, expenditure, budget balance, growth, inflation, etc. Evaluating the success of MTB based on these forecasts is possible. Indeed, the success of MTB is largely dependent on the functionality and accuracy of these forecasts. In this study, the success of MTB implemented in Türkiye since 2006 has been evaluated based on forecasts of revenue and expenditure items, as well as their aggregates.

Since MTB in Türkiye are typically prepared for three years, forecasts for the second and third years in the medium term have been included in the scope of the study. Initially, budget forecast errors were calculated through equations (1), (2), and (3) provided below.

$$PE_t = \frac{(A_t - F_t) * 100}{F_t} \quad \text{...} \quad (1)$$

$$MPE_t = \frac{1}{T} \sum_{T=1}^{T} \frac{(A_t - F_t) * 100}{F_t} \quad \text{...}$$
(2)

$$MAPE_t = \frac{1}{T} \sum_{T=1}^{T} \frac{|(A_t - F_t)| * 100}{|F_t|} \quad \text{...}$$
(3)

In the equations, the variable A_t represents actual outcomes for year t, while the variable F_t represents budget forecasts for fiscal year t. The PE (Percentage Error) equation, in its simplest form, measures the deviation of actual outcomes from budget forecasts. Similarly, the MPE (Mean Percentage Error) and MAPE (Mean Absolute Percentage Error) metrics provide specific values for assessing forecast accuracy (Hyndman & Athanasopoulos, 2018). The MPE value is used to measure the magnitude of forecast errors over the years in percentage terms and then to calculate their average. The MPE value offers initial insights into potential over- or under-forecasting. However, it falls short as a comprehensive measure of overall forecast accuracy since it combines both negative and positive errors. This

combination can result in a small value, especially when significant errors in both directions balance each other out. Therefore, it is necessary to also calculate the MAPE value, which considers the absolute value of errors, provides a clearer perspective on the overall magnitude of errors, and helps in more effectively evaluating the accuracy of forecasts (Pathak et al., 2022, p. 18).

Although MPE provides information about potential bias in forecasts, it does not indicate whether the errors are consistent and systematic over time or whether the bias is statistically significant. To this end, the Holden-Peel (1990) test was employed to determine the presence of forecast bias.

For the Holden-Peel test, the Mean Error (ME) value was first calculated as a linear transformation of the MPE value. The ME represents the average difference between actual and forecasted values, and it is calculated as follows:

$$ME = \frac{1}{n}\sum_{t=1}^{n} \quad (A_t - F_t)\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(4)$$

Where A_t is the actual value at time t, and F_t is the forecasted value. This linear transformation is applied to shift the MPE, which is expressed as a percentage, into an absolute value (ME) to allow for direct analysis. The transformation ensures that forecast errors are not relative but absolute, making it easier to assess the overall bias in monetary terms rather than percentages.

Subsequently, a regression analysis was performed using the following equation:

$$A_t - F_t = \lambda + U_t\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.\ldots\ldots\ldots\ldots\ldots (5)$$

In this equation, λ represents the bias coefficient, and it is equivalent in magnitude to the ME. This equivalence is derived from the fact that the regression analysis is designed to test whether the average forecast error (ME) reflects a consistent and systematic bias in the forecasts over time. The bias coefficient λ essentially captures the mean deviation from the forecast, allowing us to statistically test whether forecast errors tend to be systematically positive (underestimation) or negative (overestimation).

The existence of bias in the forecasts was tested using a t-test on the hypothesis ($H_0:\lambda=0$). A positive and statistically significant λ indicates that revenues or expenditures are consistently underestimated, while a negative and statistically significant λ suggests that they are consistently overestimated.

III.   RESULTS

First, the MTB revenue forecast errors have been calculated. It is important to clarify that the year 2009 in the tables refers to the forecast made three years earlier, in 2006. In the 2006 budget, forecasts were prepared not only for 2007 but also for 2008 (t+1) and 2009 (t+2). Therefore, the forecast error for 2009 reflects the forecast made in 2006. This clarification applies similarly to the other forecast error tables. Table 1 below shows the budget revenue forecast errors for the three-year (outer-year two) medium-term period.

Table 1. Outer-Year Two Forecasting Errors of Revenues (%)

PERIOD	FORECAST ERROR (%) (MPE)								
	PIT	**CT**	**MVT**	**DVAT**	**ET**	**BITT**	**SCT**	**IVAT**	**TOTAL**
2009	-14.35	14.28	10.84	-8.03	-6.29	5.00	-10.24	-29.70	-3.61
2010	-8.35	7.29	8.08	5.74	17.97	-23.11	-23.97	1.55	7.97
2011	-12.66	3.00	1.21	9.39	16.14	-16.93	-32.40	-0.66	0.68
2012	14.22	32.31	28.89	14.82	15.01	13.61	-22.26	35.51	20.74
2013	4.69	-1.82	-0.70	30.14	24.89	10.78	-16.68	18.99	16.41
2014	8.96	3.30	-7.33	11.19	12.66	30.14	-15.04	-4.35	8.93
2015	9.46	-5.51	-1.53	7.52	13.29	12.74	-21.52	2.62	10.52
2016	12.10	12.41	0.87	22.95	22.06	28.23	-0.65	-3.21	16.99
2017	11.94	21.46	9.18	18.22	26.67	17.94	-20.25	7.93	18.01
2018	15.83	64.13	2.52	15.74	-0.18	35.64	-30.73	7.30	17.30
2019	24.41	40.91	3.57	14.48	-6.13	38.72	-17.76	13.94	23.19
2020	4.31	28.76	-7.93	8.06	21.56	35.90	8.17	20.08	22.09
2021	-2.55	73.97	-21.37	35.76	-7.81	51.21	48.15	23.75	23.65
2022	54.27	363.94	8.20	-18.59	101.01	84.30	99.06	182.47	146.64
2023	182.87	451.34	74.77	107.00	261.54	299.71	207.96	308.73	292.92

PIT: Personal Income Tax, **CT:** Corporate Tax, **MVT:** Motor Vehicles Tax, **DVAT:** Domestic Value-Added Tax, **ET:** Excise Tax, **BITT:** Banking and Insurance Transactions Tax, **SCT:** Special Communication Tax, **IVAT:** VAT on Import, **TOTAL:** All revenue items included in the study or not.

Source: Budget rationales (SBB, 2007-2021) and final account laws (HMB, 2006-2023).

Table 1 shows that three-year revenue forecasts in Türkiye have been significantly inaccurate. The majority of the errors were positive, meaning that the actual revenues were much higher than the forecasts, and the government collected much more revenue than it had forecasted three years ago. Notably, the total revenue forecast error was negative only in the first forecast period (2009), and negative errors in revenue items were rare. Among the items, the most accurate forecasts were for the MVT. This accuracy is due to the high predictability of the MVT, which is collected from vehicles registered in the traffic registry.

On the other hand, it is understood that the least accurate forecasts were for CT. The increase in CT forecast errors, especially since the onset of the 2018 crisis, has contributed to this outcome. During this crisis period, some corporations achieved exceptionally high revenues. Additionally, in the same period, CT rates, which had been consistently applied at 20% since 2006, fluctuated between 22% and 25%, and for some corporations, the rate even reached 30% in certain periods. These two factors have resulted in the CT forecasts being the least accurate. Furthermore, when looking at the table, it is evident that the exchange rate/debt crisis starting in 2018, and the impact of the COVID-19 pandemic have caused forecast errors to become significantly higher from this period onwards. Following

the identification of these results regarding outer-year two forecasts, Table 2 below presents the two-year (outer-year one) budget revenue forecast errors.

Table 2. Outer Year One Forecasting Errors of Revenues (%)

PERIOD	FORECAST ERROR (%) (MPE)								
	PIT	CT	MVT	DVAT	ET	BITT	SCT	IVAT	TOTAL
2009	-7.21	8.88	6.23	-2.31	-7.40	-8.34	-16.52	-22.28	-2.28
2010	-19.61	-9.79	-4.02	3.10	10.73	-22.74	-29.27	-16.63	-5.68
2011	9.12	32.75	26.67	11.18	11.46	1.07	-15.77	43.58	17.27
2012	5.91	12.65	0.65	21.31	10.69	11.45	-9.69	7.20	8.28
2013	4.37	-0.12	-4.49	11.34	10.85	21.04	-11.33	4.05	8.44
2014	5.30	-0.45	-5.97	-0.19	3.46	4.49	-14.42	-3.53	5.98
2015	9.74	-2.11	-0.78	15.56	13.05	15.77	-2.76	4.41	10.69
2016	6.40	8.62	7.79	12.48	18.96	11.02	4.39	-9.27	12.85
2017	3.24	25.74	-2.11	6.97	10.55	12.00	-21.07	0.90	6.22
2018	15.42	50.51	2.52	12.81	-8.28	23.05	-29.39	26.59	16.57
2019	18.24	10.57	-5.74	6.37	-8.02	30.80	3.10	4.23	14.38
2020	-20.52	16.55	-22.13	-7.77	7.92	35.95	6.25	-16.06	1.39
2021	6.23	92.59	-5.03	40.69	6.64	16.06	50.02	41.85	34.90
2022	58.83	295.46	11.86	-20.06	82.78	87.10	81.99	177.34	131.89
2023	107.89	236.73	17.66	194.87	232.90	210.87	121.75	153.31	209.32

PIT: Personal Income Tax, **CT:** Corporate Tax, **MVT:** Motor Vehicles Tax, **DVAT:** Domestic Value-Added Tax, **ET:** Excise Tax, **BITT:** Banking and Insurance Transactions Tax, **SCT:** Special Communication Tax, **IVAT:** VAT on Import, **TOTAL:** All revenue items included in the study or not.

Source: Budget rationales (SBB, 2007-2021) and final account laws (HMB, 2006-2023).

As can be seen from Table 2, the outer year one revenue forecasts are significantly more accurate compared to those from three years ago. Notably, the forecast errors for all items, except for DVAT, have nearly halved. Interestingly, despite being closer to the forecasted period, the error for DVAT has increased. Apart from this, there has been a slight increase in the periods with negative forecast errors. The most accurate forecasts were for the MVT, while the least accurate were for CT. It is also evident from Table 2 that the effects of the COVID-19 pandemic and the crisis that began in 2018, although relatively diminished, still persist. Following the identification of these conditions related to revenue forecasts, Table 3 below presents the outer-year two budget expenditure forecast errors.

Table 3. Outer-Year Two Forecasting Errors of Expenditures (%)

PERIOD	FORECAST ERROR (%) (MPE)							
	PE	SPE	GSPE	IE	CUT	CE	CAT	TOTAL
2009	17.32	-22.91	74.01	5.97	34.77	39.02	10.80	23.69
2010	13.72	50.09	15.85	2.22	28.63	75.99	145.31	24.22
2011	5.90	52.43	0.36	-29.32	0.04	40.91	76.28	0.39
2012	26.27	17.71	14.29	-12.61	10.45	71.64	66.83	15.09
2013	14.48	11.21	9.11	-0.03	8.92	63.29	56.48	13.68
2014	14.91	12.74	30.33	-9.25	5.34	40.74	71.38	9.81
2015	6.77	4.03	20.86	-7.82	1.92	36.90	114.99	7.46
2016	14.98	11.38	30.46	-1.48	20.62	30.70	7.25	17.60
2017	16.34	14.73	36.91	3.11	31.58	43.54	69.47	25.30
2018	14.16	16.19	24.33	17.40	32.70	22.64	100.29	24.14
2019	31.47	36.10	45.82	37.85	41.31	-1.72	36.82	33.23
2020	32.26	32.13	31.64	39.54	40.46	3.43	-20.33	31.86
2021	10.93	4.35	60.60	5.54	24.01	121.42	108.13	30.28
2022	87.94	72.81	191.41	76.25	111.01	321.88	540.46	127.16
2023	249.10	194.11	333.85	209.32	284.77	348.22	8594.49	318.55

PE: Personnel Expenditures, **SPE:** State Premium Expenditures to the Social Security Institution, **GSPE:** Goods and Services Procurement Expenditures, **IE:** Interest Expenditures, **CUT:** Current Transfers, **CE:** Capital Expenditures, **CAT:** Capital Transfers, **TOTAL:** All expenditure items included in the study or not.

Source: Budget rationales (SBB, 2007-2021) and final account laws (HMB, 2006-2023).

Medium-term expenditure forecasts made for three years ahead in Türkiye have proven to be significantly more inaccurate compared to revenue forecasts. Examining the direction of the errors, it is evident that the vast majority are positive, indicating that expenditures are much higher than anticipated in the budget. Only IE occasionally resulted in negative forecast errors. In fact, IE had the most accurate forecasts during the period under consideration. Apart from IE and the CE in 2019, expenditures in all other periods, including total expenditures, were significantly higher than forecasted.

On the other hand, it has been determined that the least accurate forecasts were for CAT, with an astronomical error rate in 2023. Excluding 2023, the least accurate forecasts were for CE. Additionally, the impact of the exchange rate/debt crisis that began in 2018 has notably increased over the past three years, with forecast errors reaching extraordinary levels. Following these assessments of outer-year two forecasts, Table 4 below presents the outer year one budget expenditure forecast errors.

Table 4. Outer Year One Forecasting Errors of Expenditures (%)

PERIOD	FORECAST ERROR (%) (MPE)							
	PE	SPE	GSPE	IE	CUT	CE	CAT	TOTAL
2009	7.16	4.90	23.70	6.19	24.21	48.60	62.86	17.16
2010	-0.85	41.60	2.10	-15.41	4.26	38.75	120.48	4.24
2011	13.72	9.69	18.83	-23.49	0.82	70.19	94.77	5.49
2012	10.62	7.12	3.71	-7.78	2.88	41.59	31.48	6.65
2013	8.60	5.27	22.21	-5.69	3.57	40.76	75.79	7.12
2014	3.02	2.29	15.20	-9.25	-1.94	28.06	67.73	2.72
2015	5.79	3.74	16.94	0.01	4.33	38.51	47.20	8.73
2016	15.20	12.04	23.56	-6.95	16.48	33.04	20.99	15.24
2017	-0.33	-0.22	22.55	-3.88	19.22	9.70	78.23	9.65
2018	13.47	16.54	32.58	19.29	21.46	19.58	53.37	19.62
2019	24.53	27.66	22.93	17.58	21.95	1.52	-2.69	19.26
2020	1.64	-3.24	22.62	-9.30	9.81	62.83	41.09	8.21
2021	13.46	10.15	62.77	13.39	27.25	118.81	252.54	33.97
2022	73.79	64.27	165.35	51.97	94.07	176.71	423.22	102.12
2023	166.93	129.57	246.09	131.91	223.61	275.49	7810.57	233.49

PE: Personnel Expenditures, **SPE:** State Premium Expenditures to the Social Security Institution, **GSPE:** Goods and Services Procurement Expenditures, **IE:** Interest Expenditures, **CUT:** Current Transfers, **CE:** Capital Expenditures, **CAT:** Capital Transfers, **TOTAL:** All expenditure items included in the study or not.

Source: Budget rationales (SBB, 2007-2021) and final account laws (HMB, 2006-2023).

Table 4 shows that the accuracy of outer year one expenditure forecasts in Türkiye, excluding CUT, has significantly increased compared to outer-year two expenditure forecasts. Some expenditure items have seen their error rates nearly halved. However, overall, the error rates remain well above acceptable levels. Notably, since 2018, errors have consistently increased, indicating a worsening situation. Similar to the outer-year two forecasts, the most accurate outer year one forecasts were for IE, while the least accurate were for CAT. However, in the outer year one forecasts, there is not a significant difference in the error levels between IE and those for PE and SPE.

As discussed so far, the accuracy of medium-term forecasts in Türkiye is quite low. The magnitudes of the errors are generally well above acceptable levels. To make more accurate evaluations, it is necessary to determine whether this situation arises from the forecasters' deliberate actions or due to various influencing factors. To test for any potential bias in the forecasts, the Holden-Peel (1990) test has been conducted. The results of the test are presented in Table 5 below.

Table 5. Holden-Peel Test Results

PERIOD & ITEM		MPE	MAPE	ME/λ	p-value	obs	NoNEP	NoPEP
Outer-Year One Revenue Forecast	**PIT**	13.557009	19.869566	35100000	0.1833	15	3	12
	CT	51.905655	53.566532	73400000	0.1058	15	4	11
	MVT	1.5398465	8.2422476	223526	0.6988	15	8	7
	DVAT	20.423508	24.468002	28400000	0.2315	15	4	11
	ET	26.418659	29.578232	61300000	0.1846	15	3	12
	BITT	29.973404	34.117359	9480178	0.1380	15	2	13
	SCT	7.8187714	27.849546	554083	0.4571	15	9	6
	IVAT	26.378294	35.413647	68100000	0.1433	15	5	10
Outer-Year Two Revenue Forecast	**PIT**	20.343513	25.39781	43800000	0.1679	15	4	11
	CT	73.984688	74.961563	82200000	0.1078	15	2	13
	MVT	7.2840037	12.466239	1059748	0.4009	15	5	10
	DVAT	18.292761	21.841181	27400000	0.1430	15	2	13
	ET	34.159023	36.879982	67500000	0.1594	15	4	11
	BITT	41.592594	46.930653	10800000	0.1223	15	2	13
	SCT	10.122948	38.321999	447815	0.6212	15	11	4
	IVAT	38.996082	44.05241	80500000	0.1416	15	4	11
Outer-Year One Expenditure Forecast	**PE**	23.781822	23.939821	84400000	0.1525	15	2	13
	SPE	22.092072	22.553539	11400000	0.1318	15	2	13
	GSPE	46.742203	46.742203	42600000***	0.0792	15	0	15
	IE	10.571466	21.471663	32500000	0.2349	15	8	7
	CUT	31.465324	31.723789	174000000	0.1385	15	1	14
	CE	66.942848	66.942848	53000000***	0.0718	15	0	15
	CAT	611.84021	612.19885	62800000	0.2817	15	1	14
Outer-Year Two Expenditure Forecast	**PE**	37.103626	37.103626	102000000	0.1257	15	0	15
	SPE	33.807503	36.862049	14200000	0.1051	15	1	14
	GSPE	61.320606	61.320606	46900000***	0.0721	15	0	15
	IE	22.446581	30.512983	43200000	0.1848	15	6	9
	CUT	45.102222	45.102222	200000000	0.1113	15	0	15
	CE	83.905708	84.135101	56300000***	0.0765	15	1	14
	CAT	665.24249	667.95355	62600000	0.2839	15	1	14
Outer-Year One Total Revenue		31.347649	32.409645	398000000	0.1292	15	2	13
Outer-Year Two Total Revenue		41.496025	41.977489	444000000	0.1196	15	1	14
Outer-Year One Total Expenditure		32.911354	32.911354	480000000	0.1444	15	0	15
Outer-Year Two Total Expenditure		46.830833	46.830833	549000000	0.1240	15	0	15

PIT: Personal Income Tax, **CT:** Corporate Tax, **MVT:** Motor Vehicles Tax, **DVAT:** Domestic Value-Added Tax, **ET:** Excise Tax, **BITT:** Banking and Insurance Transactions Tax, **SCT:** Special Communication Tax, **IVAT:** VAT on Import.
PE: Personnel Expenditures, **SPE:** State Premium Expenditures to the Social Security Institution, **GSPE**: Goods and Services Procurement Expenditures, **IE:** Interest Expenditures, **CUT:** Current Transfers, **CE:** Capital Expenditures, **CAT:** Capital Transfers.
MPE: Mean Percentage Error**, MAPE:** Mean Absolute Percentage Error**, ME:** Mean Error**, obs:** Observations
NoPEP: Number of Positive Error Periods**, NoNEP:** Number of Negative Error Periods
***: Indicates that the one-sided p value of MacKinnon (1996) is significant at the 10% level.

As can be seen from Table 5, the MPE values for all medium-term forecasts, both outer-year one and two, in Türkiye indicate a positive bias. In other words, actual outcomes have been significantly higher than the forecasts for all items and totals. It is observed that only for the MVT, ET, and IE, the MPE values are relatively low compared to others. This is clearly reflected in the number of periods with positive and negative forecast errors. With a few minor exceptions, the forecasts have resulted in positive errors in most periods.

However, the MPE value alone does not provide information on whether the results described above are statistically significant. This is where the ME and the bias coefficient (λ) come into play. In Table 5, ME/λ represents the magnitude of forecast bias in, specifically, the average forecast error over time. A positive and statistically significant ME/λ means that revenues or expenditures are consistently underestimated, while a negative λ indicates overestimation.

The probability value (p-value) of the Holden-Peel test provides further insight into whether the observed bias is statistically significant. As indicated in Table 5 shows that GSPE and CE exhibit bias in both outer-year one and two forecasts. In other words, the significant λ values at the 10% level suggest the presence of an underestimation bias in the forecasts for GSPE and CE, though this significance level is not very high. Therefore, rather than definitive proof, these results support the possibility of a deliberate underestimation bias in the forecasts for GSPE and CE. However, such a result is not observed in the forecasts of other revenue and expenditure items and totals. This finding proves that the vast majority of forecasts resulting in such high levels of errors are not a deliberate strategy but rather a result of various economic, political, institutional, structural, technical, and other factors.

CONCLUSION

The accuracy of MTB forecasts is crucial for both the public and private sectors in terms of sustainable financial management and strategic planning. Realistic forecasts ensure effective allocation of resources, prevent unnecessary expenditures, and contribute to maintaining fiscal discipline. Moreover, by providing more accurate insights into future economic conditions, they enable decision-makers to take more informed and proactive steps. This helps maintain financial stability and makes it more feasible to achieve long-term development goals.

Türkiye transitioned to medium-term planning at the beginning of the 21st century. Initially, the budget prepared in 2005 included forecasts not only for 2006 but also for 2007 and 2008. This study aims to evaluate the state of MTB by examining the revenues and expenditures from these forecasts. With Türkiye having prepared MTB for over 15 years, success in implementation is the theoretical expectation of this study. Accordingly, medium-term revenue and expenditure forecasts for the period 2009-2023 have been analyzed, considering both forecast accuracy and potential biases in the forecasts, for each revenue and expenditure item as well as their totals.

Upon examining the revenue forecasts, it has been determined that both the outer-year one and two forecasts were significantly inaccurate, far from an acceptable level. With the exception of the SCT, the majority of errors were positive, meaning that revenue collection exceeded the medium-term forecasts. While there were a few exceptional periods of negative errors in all other revenue items and the total revenue forecast, SCT experienced mostly negative errors across periods. However, due to the impact of the economic crisis, especially in the last four years, there has been a high rate of positive forecast errors in SCT forecasts as well. The number of periods with negative errors has increased in the outer-year one forecasts compared to the outer-year two forecasts.

It has been observed that the most accurate revenue forecasts, both for outer-year one and two, belong to the MVT. There are several key reasons for this phenomenon. Firstly, the MVT is collected from vehicles registered in the traffic registry. The regular, up-to-date, and accurate maintenance of these records in Türkiye enables more precise MVT forecasts. Secondly, as a tax collected from registered vehicles, the tax base of MVT is more stable compared to other taxes. Additionally, the MVT is less affected by economic conditions and is considered an easily enforceable tax that must be paid under all circumstances, making it easier to detect and enforce non-payment. These factors contribute to the accuracy of MVT revenue forecasts.

When looking at the least accurate forecasts, it is evident that the CT was significantly overestimated by a wide margin compared to others. There are believed to be two main reasons for this situation. Firstly, the profitability levels of corporations are heavily influenced by economic fluctuations. When the Turkish economy faced high inflation and exchange rates in the later years of the period considered in the study, this led to at least a nominal increase in the taxes that corporations had to pay. Secondly, and most importantly, the CT rates in Türkiye, which have been consistently applied at 20% since 2006, varied between 22% and 25% at times, and even reached 30% for some corporations in certain periods. These unforeseen increases in CT rates in the MTB naturally led to an increase in forecast errors.

Looking at the forecasts for other revenue items, although not as significant as the CT, it is observed that the forecast errors are far from an acceptable level. Interestingly, while the outer-year one forecasts for all items are more realistic compared to the outer-year two forecasts, this situation is the opposite for the

DVAT. The errors in the outer-year one forecasts, especially in the last three years with the intense impact of the economic crisis, have nearly doubled compared to the outer-year two forecast errors.

Ultimately, Türkiye has not reached the desired level of accuracy in MTB revenue forecasts. This indicates that Türkiye has not been able to achieve the expected gains from MTB. Unforeseen disruptions in macroeconomic variables, particularly during crisis periods, have also manifested in forecast errors. Increases in inflation rates and exchange rates, in particular, have led to revenue exceeding the forecasted amounts. Although obtaining more revenue than anticipated may not initially seem like a problem, it can have contractionary effects on the economy. This can lead to deviations in budget planning and jeopardize long-term economic stability. Additionally, the challenge of allocating surplus revenue to new expenditure programs, which may be difficult to close once opened, is not out of the realm of possibility.

When looking at the expenditure forecasts, similarly, both the outer-year one and two forecasts have resulted in significantly inaccurate results, far from an acceptable level. Except for occasional exceptions in some revenue items for 1-2 periods, all forecasts have resulted in positive errors. In other words, almost every period and expenditure item has seen expenditures exceeding the forecasted amounts. This pattern is consistent in both outer-year one and two forecasts. Only in IE there are a greater number of periods with negative errors compared to other items.

Upon examination of the items, it has been determined that the most successful expenditure forecasts, both in outer-year one and two forecasts, belong to IE and SPE. There are various reasons for this situation. Firstly, regarding IE, it is observed that governments pre-determine their borrowing needs and repayment plans, usually based on long-term borrowing plans and fixed interest rates. When coupled with the almost zero error rate in borrowing data recording, forecasting for IE is expected to be easier compared to other expenditure items. A similar situation applies to SPE as well. The forecast for this item is based on factors such as the number of public employees, salaries, legal contribution rates, and their planned increases throughout the year. The high predictability of these factors makes forecasting for SPE also easier. Furthermore, upon examining the data for both items, it is observed that the majority of the forecasted expenditure amount is based on historical data. This aspect is considered one of the main reasons for this successful performance.

When looking at the least successful expenditure forecast, it is evident that CAT stands out significantly, especially when considering the forecast errors of the past two years. Excluding the data from the last two years, it can be seen that CE also resulted in errors of a similar magnitude to CAT. The likelihood of this unsuccessful performance stemming from the deteriorated macroeconomic structure Türkiye has been grappling with in recent years due to crises is quite high. Increases in inflation and exchange rates have significantly increased the costs of both projects and their financing to extraordinary levels. However, natural disasters

during the period under review have led to an increase in the number of projects. Furthermore, it is also possible that the increase in CAT, especially in the last two years, could be attributed to coinciding with election periods. Comprehensive reports regarding these expenditures have not been published yet, so detailed assessments cannot be made. However, there is a general consensus that CAT in Türkiye is heavily influenced by political factors[1].

When looking at the forecasts other than the ones mentioned as the most successful and least successful, it is observed that PE achieved relatively successful forecasts compared to other items due to its high predictability. On the other hand, it has been determined that outer-year one forecasts showed significant improvement compared to outer-year two forecasts. However, CAT is an exception to this trend. The improvement in this item is relatively low and could be disregarded in terms of percentage. Generally, although there is an improvement, it is observed that forecast errors are far from an acceptable level, significantly high for both items and totals, except for a few exceptional periods.

Like the situation with revenue, the accuracy of MTB forecasts in Türkiye has not reached the desired level on the expenditure side as well. Moreover, it is understood that the situation is much worse on the expenditure side compared to revenue. This indicates that Türkiye has not achieved the expected gains from medium-term expenditure planning. With some minor exceptions, forecast errors have always resulted in positive errors. In other words, Türkiye has consistently spent much more than it forecasted in the medium term. This situation has worsened especially after 2009 and in the period after 2018 due to economic crises. During this period, disruptions in macroeconomic variables such as increased inflation and exchange rates due to economic crises naturally increased the cost of public expenditures. Together with populist spending during election periods, natural disasters such as earthquakes and forest fires during the period under review also had an exacerbating effect. When added to the failure of decision-makers in planning and management, MTB in Türkiye has not had the same effect of ensuring fiscal discipline and economic stability as seen in advanced countries.

The failure in MTB forecasts may be attributed to the factors mentioned above, but it could also be a result of conscious bias. Indeed, in many developing countries, budget forecasts are often used as a policy tool to create contractionary or expansionary effects in the economy. To determine if this is the case in Türkiye, a Holden-Peel test was conducted. The test results shown in Table 5 indicate that bias is not prevalent in the majority of medium-term forecasts in Türkiye. In other words, it was found that the errors in MTB forecasts do not reflect conscious judgments of forecasters but rather stem from their inability to predict the future accurately. Only GSPE and CE were observed to exhibit bias in both outer-year one and two forecasts according to the Holden-Peel test results. These two expenditure items' forecasts are deliberately kept low based on the Holden-Peel test results.

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[1] For detailed information about CAT, see: Arslantürk (2018), Küçükoğlu et al. (2018).

In summary, the study's findings indicate that MTB revenue and expenditure forecasts in Türkiye have resulted in significant errors, which do not reflect conscious judgments of forecasters. Despite being prepared 16 times during the study period, MTB in Türkiye have not achieved the desired success. The lack of effective expenditure control mechanisms, insufficient focus on fiscal discipline and macroeconomic balance, and the misconception that the budget will solve all problems are among the main reasons for this failure. The system's inherent vulnerabilities also play a significant role. Additionally, the foreign exchange rate issues commonly encountered in developing countries directly increase future expenditures and lead to a continuity of budget increases. These problems hinder the ability of multi-year budgeting practices to generate fundamental solutions and reduce the effectiveness of the budgeting process.

Considering the medium-term effects of modern public financial policy, it is evident that Türkiye needs more robust and data-driven methods to minimize errors in these forecasts. Particularly, given the significant contributions of macroeconomic variables, economic crises, and political uncertainties to forecast errors, future predictions need to be supported by more careful analyses and various scenario assessments. In this way, budget planning will be more accurate, and public finance will achieve a more sustainable structure.

To improve the accuracy of MTB forecasts, it is essential to enhance data analysis and forecasting models. The economic modeling techniques employed should be updated, and more advanced analytical methods should be adopted. Leveraging cutting-edge technologies such as machine learning and artificial intelligence can facilitate more accurate and detailed predictions of macroeconomic variables. Moreover, the development of a performance-based program budgeting system could provide potential benefits to multi-year forecasting. Transitioning from a "forecasting MTEF" to a "programmatic MTEF" is crucial in this regard, as it allows for more structured and goal-oriented fiscal planning. This could further reduce forecast errors and align the budgeting process with long-term objectives more effectively.

MTB's success is of great importance for Türkiye's economic stability and sustainable growth objectives. A successful MTB ensures efficient and effective use of public resources, increases predictability in economic planning, and strengthens investor confidence. The integration of a performance-based program budgeting system into the medium-term fiscal framework can provide an opportunity to enhance the effectiveness of multi-year forecasting. By aligning budget forecasts more closely with specific programs and outcomes, this system could improve the precision of future predictions and further strengthen the fiscal discipline required to meet Türkiye's economic goals.

Additionally, raising the educational levels and technical expertise of public officials and analysts involved in the budgeting process is crucial for improving forecast accuracy. Regular training programs on fiscal policies and economic analysis should be implemented, and best practices from international standards should be reviewed and adopted. Ensuring that everyone involved in the

budgeting process operates with up-to-date and accurate information will enable more realistic forecasts.

Moreover, transparency and accountability principles should be emphasized in the budgeting process. Detailed reports on how forecasts are made should be shared with the public, and the views of all relevant stakeholders should be sought throughout the process. This approach will enhance the objectivity and reliability of the forecasts and make it easier to identify and correct errors within the process. Transparency will increase public trust and strengthen confidence in the accuracy of the forecasts.

Finally, ensuring economic stability and coordinating fiscal policies are of great importance. Reducing economic uncertainties will contribute to more accurate budget forecasts. Therefore, government fiscal policies should be aligned with long-term plans, and efforts should be made to maintain macroeconomic stability. Effective communication and coordination among policymakers will help solidify the forecasting process and prevent deviations.

Research and Publication Ethics Statement

All processes of this article have been conducted in accordance with the research and publication ethics principles of the Journal of Management and Economics.

Conflict of Interest Statement

The author has no conflicts of interest with any individual or organization.

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