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Analysis of Interacting Factors in Medium-Term Forecasting and Planning of Government Budget Revenues

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Abstract: This dissertation develops and substantiates an improved methodological framework for medium-term forecasting and planning of state budget revenues. The study combines institutional analysis with econometric and scenario-based approaches to reduce forecast uncertainty, improve fiscal sustainability, and strengthen evidence-based budgeting. Using official macroeconomic, tax-base, and regional indicators, the research evaluates key drivers of revenue dynamics and proposes practical mechanisms for integrating data systems into forecasting workflows. The findings support policy recommendations to enhance forecast accuracy, transparency, and performance-oriented budgeting in Uzbekistan.

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1. Introduction

Medium-term (3–5 year) forecasting and planning of government budget revenues should be undertaken with a clear understanding that outcomes are jointly determined by macroeconomic conditions, institutional capacity, and external economic developments. Revenue projections cannot rely solely on mechanical trend extrapolation. Rather, they should be anchored in a coherent set of calculations that reflect potential scenario-driven changes in the economic cycle, productive capacity, domestic demand, investment activity, and the external trade environment. In this context, the quality of medium-term forecasting directly affects fiscal stability: overly optimistic forecasts can translate into revenue shortfalls and execution gaps, while excessive conservatism may lead to underfunding of priority social and investment programs.

Economic growth is the most fundamental determinant of government revenues because tax receipts are ultimately generated through the dynamics of key tax bases—GDP, the wage bill, consumption, imports, and corporate profits. Nominal growth (real growth plus inflation) may expand these bases, yet in high-inflation environments revenues do not necessarily increase in proportion to nominal expansion. Real household incomes may weaken, consumption patterns may shift, and the share of the shadow economy may rise, all of which can prevent tax collections from keeping pace with nominal indicators. Consequently, it is essential to separate real and nominal growth in the forecasting process and to estimate quantitative relationships that connect tax bases to indicators such as unemployment and employment, household income dynamics, and business activity.

Tax policy and tax administration define the “transmission” of macroeconomic performance into budget revenues. Changes in tax rates, exemptions, and preferences, as well as measures that broaden or narrow the tax base and alter the composition of taxes, can shift the revenue path significantly. At the same time, improvements in administration—expanding taxpayer coverage, strengthening reporting discipline, digitalization, risk-based audits, and more effective debt collection—can raise revenues even without policy changes; conversely, weak administration can leave revenues below potential even when the economy grows. For this reason, revenue forecasting practice typically distinguishes between an “existing-policy” baseline and the impact of discretionary measures, while also assessing administrative gains through the compliance gap.

Revenue stability is further influenced by demographics, shifts in the global economy, and technological innovation. Demographic changes affect labor markets, consumption capacity, and the design of social transfers, thereby shaping the size and structure of tax bases. Global conditions—energy and food prices, external demand, logistics, and international financial market trends—affect import-related revenues, foreign exchange inflows from exports, and profitability in key sectors. Technological innovation can broaden the tax base through the expansion of the digital economy, e-commerce, and fintech, yet it may also complicate traditional approaches to taxation through new business models. From a governance perspective, the quality and coverage of public services, and measures aimed at reducing corruption and inefficient resource use (transparent procurement, digital accountability, and service-quality monitoring), can stimulate economic activity, strengthen taxpayer trust, and support sustainable revenue growth.

Literature Review

In recent years, medium-term (3–5 year) revenue forecasts have increasingly been regarded as an integral component of public financial management, embedded within the Medium-Term Fiscal Framework (MTFF) and the medium-term budget/expenditure framework (MTBF/MTEF). Within these frameworks, multi-year projections for revenues, expenditures, the fiscal balance, and public debt are aligned under a single, coherent macro-fiscal logic [1]. In the literature, it is emphasized that the factors influencing revenue forecasting are interconnected through the “macroeconomic environment – tax bases – revenues” chain: while GDP growth, inflation, the exchange rate, and external trade (imports) shape the tax bases, discretionary changes in tax policy (rates, exemptions, base broadening) and administration/compliance factors (collection discipline, arrears, enforcement) determine the “pass-through coefficient” through which these bases translate into budget revenues [2]. It is also noted that recurring forecast deviations typically stem from: (i) errors in macroeconomic projections; (ii) delays in, or incomplete incorporation of, discretionary policy decisions; (iii) one-off revenue inflows; and (iv) institutional “forecast bias.” In this context, greater transparency and independent expert review/scrutiny mechanisms are identified as key factors for improving forecast quality [3]. In quantitatively assessing revenue sensitivity, tax elasticity—defined as the automatic response of revenues after netting out discretionary policy changes—is widely used as a core parameter in revenue forecasting models [4].

In the literature, revenue estimation is widely regarded as the central element in developing a Medium-Term Fiscal Framework (MTFF/MTBF) and preparing budget forecasts. Leal, Pérez, Tujula, and Vidal [5], synthesizing the existing research on fiscal forecasting, show that the main sources of forecast errors include overly optimistic projections of macroeconomic indicators, the influence of political cycles, and institutional constraints. Jonung and Larch [3], drawing on the experience of EU countries, emphasize that independent forecasting institutions are an effective tool for reducing “political optimism” in fiscal policy and strengthening medium-term stability.

In methodological guidelines developed by international organizations, revenue forecasts are likewise treated as an integral component of the macro-fiscal framework. In particular, the World Bank's Public Expenditure Management Handbook recommends a comprehensive approach to medium-term budgeting that integrates macroeconomic scenarios, changes in tax policy, and administrative reforms. An IMF survey by Kyobe and Danninger further indicates that, in low-income countries, revenue forecasts often rely on simple trend models and expert judgment—an approach that can amplify forecast errors in rapidly growing economies [6].

Studies assessing tax elasticity and tax buoyancy make it possible to quantify the "tax system – macroeconomic base – revenues" transmission chain in revenue forecasting. In analyses by the European Commission and the OECD, tax elasticities are used as a key parameter for estimating the cyclically adjusted budget balance and for producing medium-term revenue projections.

For example, Conroy, estimating elasticities for Irish income tax, shows that reducing forecast errors under macroeconomic shocks requires a more granular specification of the tax base and greater use of micro-level data [7].

2. Methodology

In constructing the revenue-forecasting models, this study follows an approach broadly consistent with that proposed by Leal et al and Kyobe and Danninger, whereby macroeconomic projections, discretionary tax-policy changes, and administrative effectiveness are treated as distinct analytical blocks [5], [7]. This structure makes it possible—through scenario analysis—to differentiate the effects of "existing policy" (the baseline) from the impacts of reforms expected in the near term. Accordingly, the study applies a comprehensive framework to identify and assess the factors that interact in medium-term government budget revenue forecasting and planning. The methodology includes: (I) compiling time series for the composition of revenues (tax categories and non-tax receipts) and key macro indicators (GDP, inflation, imports, the exchange rate, and employment); (II) estimating the relationship between tax bases and revenues using elasticity/buoyancy coefficients; (III) introducing interaction terms in regression models to capture joint effects (e.g., "GDP growth \times compliance indicator," "inflation \times rate change"); and (IV) decomposing revenue projections into blocks—baseline (existing policy), policy changes, and administrative effects—followed by scenario analysis (baseline, optimistic, and adverse/shock scenarios).

3. Results and Discussion

Finally, economic growth dynamics, tax rates and the broader tax system, the quality and coverage of public services, as well as measures aimed at reducing corruption and inefficient resource use, also exert a meaningful influence on government revenue growth.

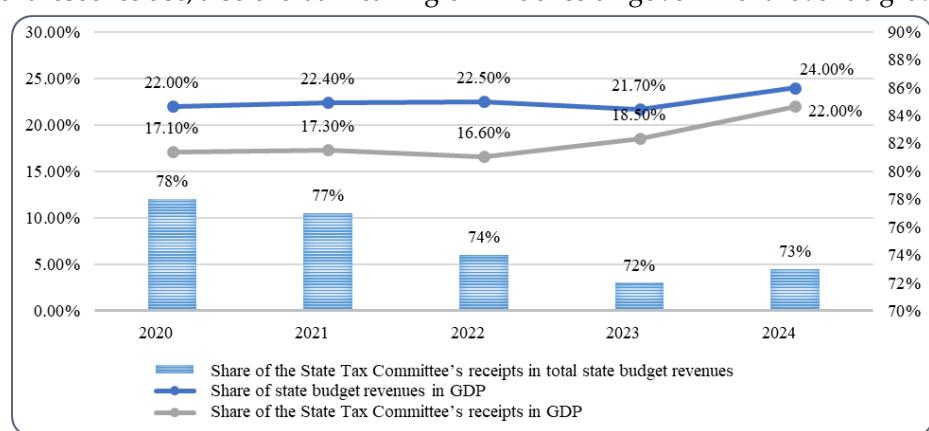


Figure 1. Share of the Republic of Uzbekistan's State Budget Revenues in GDP, 2020–2024 [8].

This table analyzes budget revenue collection as a share of GDP and also examines the share of State Tax Committee receipts within overall state budget revenues. The ratio of state budget revenues to GDP was 22% in 2020 and remained broadly unchanged in 2021 and 2022, before declining slightly in 2023 (21.7%). However, it is projected to increase to 24% by 2024.

The optimal level of the tax burden is country-specific and depends on a country's socio-economic development. In countries that develop under a socially oriented market-economy model, a relatively higher tax burden is often observed. In such cases, a key consideration is the extent to which the funds collected through taxes are redistributed by the state—particularly in line with public spending required to fulfill the government's social responsibilities—so a higher tax burden can be a natural outcome of broader social commitments.

According to data on the share of State Tax Committee receipts in GDP, this indicator was 17.1% in 2020 and rose slightly in 2021 (17.3%), then declined in 2022 (16.6%). It subsequently increased again, with the share projected to reach 22% by 2024. This trend suggests improved economic activity alongside greater effectiveness of tax policy and administration in translating GDP growth into fiscal revenues.

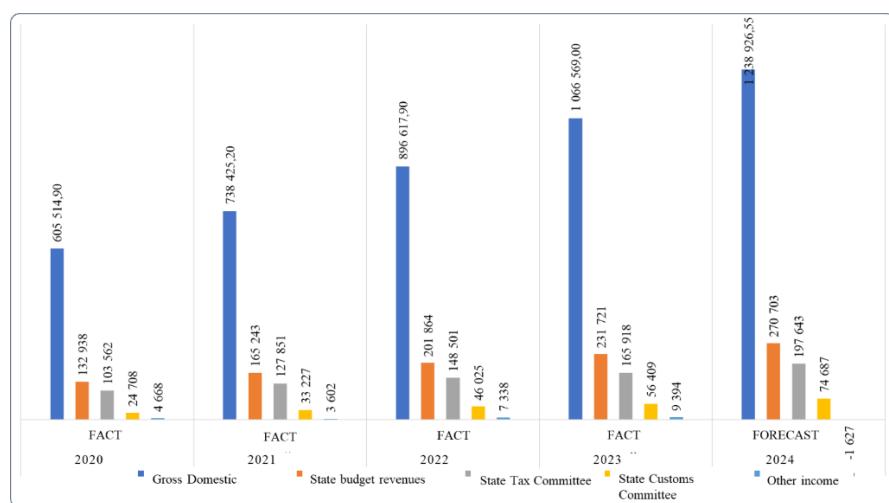


Figure 2. Structure of state budget revenues of the Republic of Uzbekistan in 2020-2024 [8].

Based on the share of State Tax Committee receipts in total state budget revenues, a gradual decline has been observed from 78%, with the share possibly reaching 73% by 2024. This may indicate that national revenues are becoming more diversified across different sources and that the role of other revenue streams is increasing.

An analysis of the structure of the Republic of Uzbekistan's state budget revenues over 2020–2024 suggests a positive growth trend in the indicators. Between 2020 and 2024, total state budget revenues in nominal terms nearly doubled, rising from 132.938 trillion to 270.703 trillion. In particular, revenues collected by the State Tax Committee increased from 103.562 trillion to approximately 197.643 trillion by 2024, which corresponds to roughly a 91% nominal increase. Revenues collected by the State Customs Committee also rose from 24.708 trillion to 74.687 trillion, implying an approximate 202% nominal increase. However, a deeper assessment would require adjusting for the GDP deflator and conducting the analysis in real (inflation-adjusted) terms.

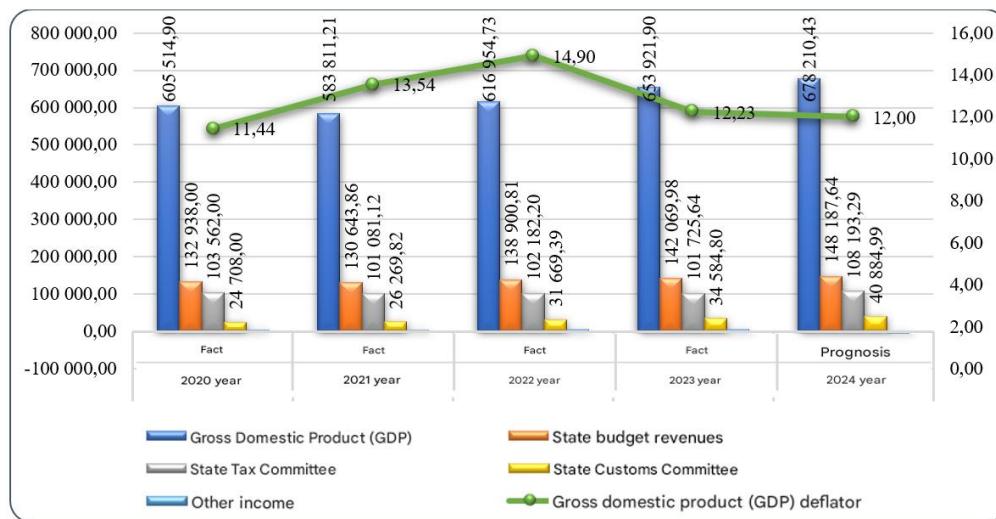


Figure 3. Structure of state budget revenues of the Republic of Uzbekistan in 2020-2024 (in real prices of 2020) [9].

The table presented shows percentage changes in gross domestic product (GDP), state budget revenues, and their key components relative to 2020. The GDP deflator reflects the inflation rate; according to this measure, inflation relative to 2020 was 13.54% in 2021 and reached its highest level of 14.90% in 2022. Inflation then declined slightly over the next two years, with 2024 projected at 12%, broadly maintaining the previous year's level.

An analysis of GDP indicates that, compared with 2020, GDP fell by 4% in 2021, suggesting an economic contraction driven by the COVID-19 pandemic. However, GDP growth above 6% is observed in both 2022 and 2023, indicating a return to economic expansion.

State budget revenues evolved in a manner consistent with these trends: although they declined by 2% in 2021, they increased by 6% in 2022 and by 2% in 2023. Revenues collected by the State Tax Committee appear relatively stable: a 2% decline in 2021, followed by a 1% increase in 2022, and a return to the 2020 level in 2023. The strongest growth rates are observed in revenues collected by the State Customs Committee: 6% growth in 2021, a high 21% growth in 2022, and 9% growth in 2023.

In conclusion, the dynamics of the overall price level (as captured by the deflator), state budget revenues, and tax and customs revenues in Uzbekistan point to increasing economic activity and strengthening fiscal resilience. GDP growth coupled with a declining deflator suggests economic stabilization and the preservation of macroeconomic balance, while the rise in customs revenues reflects an expansion of external trade and export capacity.

Table 1. Dynamics of changes in forecast and target indicators of consolidated budget revenues of the Republic of Uzbekistan in 2019-2026 [8].

Indicators	Forecast for 2019	Medium-term budget forecast	
		2020	2021
Consolidated budget revenues	100%	123%	122%
	Forecast for 2020	Medium-term budget forecast	
	130%	2020	2021
		128%	124%
	Forecast for 2021	Medium-term budget forecast	
		2020	2021

112%	109%	106%
Forecast for 2022	Medium-term budget forecast	
	2023	2024
142%	133%	132%
Forecast for 2023	Medium-term budget forecast	
	2024	2025
122%	128%	126%
Forecast for 2024	Medium-term budget forecast	
	2025	2026
121%	128%	130%

If we analyze this table, it is important—when examining the Republic of Uzbekistan's consolidated budget revenue forecasts and targets for 2019–2026—to focus primarily on the differences between the forecast figures and the planned (target) indicators. Over this period, certain inconsistencies between the revenue forecasts and targets become apparent, reflecting specific characteristics of budgeting based on a rolling three-year framework.

For example, while the target for 2020 is set at 123%, it declines to 122% by 2021. This represents a lower figure compared with the 130% forecast. The discrepancy is particularly pronounced in 2022–2023: compared with the 124% target for 2022, the forecast indicator for 2023 reaches 142%. Such differences may be associated with changes in the macroeconomic environment, price dynamics, or external economic factors.

Table 2. Dynamics of changes in the forecast and target indicators of the Gross Domestic Product of the Republic of Uzbekistan in 2019–2026 [8].

Indicators	Forecast for 2019	Medium-term budget forecast	
		2020	2021
GDP	100%	124%	122%
	Forecast for 2020	Medium-term budget forecast	
		2020	2021
	154%	150%	145%
	Forecast for 2021	Medium-term budget forecast	
		2020	2021
	105%	107%	107%
	Forecast for 2022	Medium-term budget forecast	
		2023	2024
	122%	115%	114%
Revenue	Forecast for 2023	Medium-term budget forecast	
		2024	2025
	127%	127%	125%
	Forecast for 2024	Medium-term budget forecast	
Expenditure		2025	2026
	122%	125%	122%

Similarly, when reviewing the forecast and target indicators for 2024–2026, it can be observed that the gap between them is gradually narrowing, reflecting an effort to achieve greater stability. For example, while the target for 2025 is set at 128%, the forecast for 2026 stands at 130%. This suggests that the rolling three-year budgeting approach is becoming more effective and demonstrates an orientation toward macroeconomic stability; however, the remaining differences still require further alignment with development needs.

If we analyze the data in this table, focusing on the differences between forecasts and budget targets for Uzbekistan's GDP indicators over 2019–2026 leads to several noteworthy conclusions. First, for 2020–2021, the GDP forecast for 2020 reaches 154%, whereas the budget target is 150%. In 2021, the discrepancy becomes more pronounced: the GDP forecast is 105%, while the budget target is 107%. These differences may be linked to various domestic and external economic influences, including the impact of the COVID-19 pandemic.

During 2022–2024, the gaps between GDP forecasts and budget targets appear to become relatively more stable. For example, in 2022 the GDP forecast is 122%, while the budget target falls to 115%. For 2024, the forecast indicator is 127% and the budget target is 125%. This period suggests an increasing emphasis on achieving economic stability and a gradual convergence of budget targets toward the forecast trajectory, which may reflect improved macroeconomic policy effectiveness and the preservation of relatively strong economic growth.

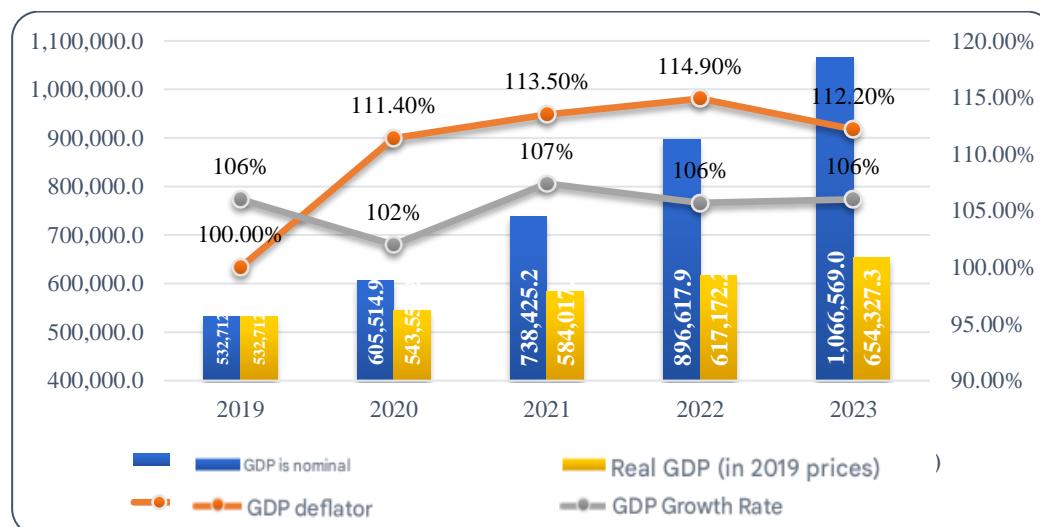


Figure 4. Analysis of real and nominal GDP indicators of the Republic of Uzbekistan for 2019-2023 [8].

Based on this figure and the preceding tables, it is essential to emphasize the interlinkages among real and nominal GDP growth, the GDP deflator, and the overall GDP growth rate.

Nominal GDP indicators show a steady year-on-year increase. Specifically, nominal GDP amounted to 532,711.0 million UZS in 2019, and by 2023 it had reached 1,066,569.0 million UZS—almost doubling over the period. Although real GDP (in 2019 prices) also increased, its growth rate was considerably lower than that of nominal GDP. This divergence reflects the impact of rising prices, i.e., inflation. For instance, in 2020 real GDP stood at 543,550.2 million UZS, which represents only a modest increase relative to 2019, whereas nominal GDP rose much more sharply over the same timeframe.

The GDP deflator measures the average increase in prices across the economy and therefore makes the gap between real and nominal GDP particularly clear. As shown in the figure, the deflator was 113.5% in 2021, while the GDP growth rate was 107%. This

implies that price growth (inflation) exceeded real output growth, meaning that the observed expansion was driven more by higher prices than by a substantial increase in real economic activity.

The budget targets and forecasts presented in the earlier tables are closely tied to GDP growth dynamics and nominal growth indicators [10], [11]. For example, where GDP was forecast to grow at a lower pace in 2022 and 2023, the corresponding real growth—consistent with the target indicators—was also relatively subdued [12]. Moreover, a high deflator signals elevated inflation, which can exert additional adverse effects on the state budget [13]. Accordingly, it can be inferred that the predominance of nominal growth in headline indicators is largely explained by the strong influence of inflation, and that this relationship is directly relevant for interpreting budget targets and forecasts [14].

Overall, the analysis suggests that in Uzbekistan over 2019–2026, a substantial portion of economic growth has been driven by price increases and inflation, while real growth has remained comparatively lower [15]. This underscores the need for economic policy to place greater emphasis on ensuring price stability.

4. Conclusion

The analysis demonstrates that, over the medium term (3–5 years), government budget revenue forecasting and planning are jointly shaped by macroeconomic dynamics, tax policy decisions, the effectiveness of tax and customs administration, and the external economic environment. Consequently, revenue forecasts should not be built on simple trend extrapolation; instead, they must be grounded in the “macroeconomic environment – tax bases – revenues” transmission chain and developed through a scenario-based approach that explicitly accounts for factors that may amplify or offset one another. Otherwise, excessive optimism or excessive caution in forecasts may lead to execution mismatches, financing disruptions, or a decline in the efficiency of resource allocation and use.

The evidence presented for 2020–2024 indicates that revenue dynamics exhibit relatively strong nominal growth, yet a significant portion of this increase is explained by price factors (the GDP deflator/inflation). From this perspective, assessing budget revenues requires a clear separation of real and nominal indicators and the use of calculations that link “real growth” to underlying tax bases (the wage bill, consumption, imports, and profits). The figures reported suggest that the share of state budget revenues in GDP was around 22% in 2020, declined slightly in 2023, and was projected to increase in 2024. This pattern reinforces the linkage between macroeconomic activity and revenue mobilization and highlights the growing importance of administrative capacity and policy design.

In analyzing revenue composition, the declining share of State Tax Committee receipts (for example, from 78% to 73%) may reflect diversification of revenue sources and an increasing role for other types of receipts. Nevertheless, this development itself calls for deeper assessment of tax-base sustainability, the design and scope of tax preferences, the quality of administration, and the size of the compliance gap. Moreover, the high nominal growth of customs revenues suggests strong sensitivity to external trade volumes, import dynamics, and broader market conditions. To reduce vulnerability to external shocks, it is therefore necessary to institutionalize scenario-based stress testing (exchange rate movements, external demand shifts, and price shocks) as a regular component of medium-term revenue forecasting and fiscal planning.

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