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RISK AVERSION AND BUDGET UNCERTAINTY: EMPIRICAL EVIDENCE ON YEAR-END GOVERNMENT SPENDING SPIKES IN INDONESIA

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ABSTRACT

Research Originality — Existing empirical research on year-end government spending spikes seldom employs well-defined indicators of risk aversion behavior. Moreover, most analyses rely on limited samples or macro-level data, posing difficulties regarding generalizability. This study contributes originality by examining behavioral responses at the micro-level of individual work units (*Satkers*) across all ministries and agencies (MAs) in Indonesia. It further offers novelty by employing external budget revision data as a proxy for risk aversion behavior related to year-end government spending spikes.

Research Objectives — This study aims to identify and quantify the impact of risk aversion behavior, driven by budget uncertainty, on year-end spending spikes among *Satkers* in Indonesia's ministries and agencies. The analysis focuses specifically on the accumulation of goods and capital expenditures, which constitute the primary components of year-end spending spikes.

Research Methods — This study used quarterly budget revision and expenditure data from 13,080 *Satkers* across all MAs for the periods 2018–2022. A quasi-experimental approach using the instrumental variable-two-stage least squares (IV-2SLS) method was employed to mitigate potential biases caused by reverse causality and omitted variable bias.

Empirical Results — The findings indicate a behavioral tendency toward risk aversion in response to budget uncertainty, which leads to year-end spending spikes. Empirical estimates showed that each additional external budget revision was associated with increased budget absorption by 1.697 percentage points, ceteris paribus. Furthermore, the manifestation of risk aversion behavior varied across islands and government sectors.

Implications — To anticipate and mitigate spending spikes, the Ministry of Finance is encouraged to develop a data-driven monitoring system to track and predict *Satker* spending behavior. In addition, both the Ministry of Finance and the technical ministries should enhance their guidance and capacity-building efforts for *Satker* financial management personnel.

Keywords: Year-end spending spikes, budget revision, uncertainty, risk aversion, instrumental variable
JEL Classification: E6, H3, H50, H61

INTRODUCTION
Budget Accumulation and Fiscal Uncertainty

Government spending is a crucial instrument for driving economic growth. The performance of government expenditure, as a key component of fiscal policy, can significantly influence long-term economic development (Eichenauer, 2020). In practice, the transmission of government spending must be supported by good governance to produce positive outcomes (Dinh Thanh et al., 2020). However, governments continue facing the recurring issue of year-end expenditure accumulation. This phenomenon primarily affects goods expenditure, particularly for consumables and services, and capital expenditure for the formation of fixed and non-fixed assets, which are often related to the provision of basic infrastructure services.

Figure 1 illustrates the quarterly (non-cumulative) trends of goods and capital expenditure absorption by ministries or agencies (MAs) during 2019–2021. The figure compares actual expenditure absorption with the ideal quarterly targets as stipulated in the Regulation of the Director General of Treasury No. PER-

5/PB/2022 on Technical Guidelines for Assessing Budget Performance Indicators. According to this regulation, the ideal quarterly absorption targets for capital expenditure are 10%, 30%, 30%, and 20% (totaling 90%). The absorption target is set below 100% to allow for budgetary efficiency and to avoid moral hazard behavior by spending units (*Satker*) that might seek to fully exhaust budgets despite having already achieved the intended outputs.

Figure 1 indicates two key patterns. First, over the past three years, both goods and capital expenditure absorption have shown a sluggish trend in the first quarter, picked up in the second and third quarters, and surged significantly in the fourth quarter. On average, fourth-quarter absorption reached 42.5%, substantially higher than the average in previous quarters. Second, the absorption percentages in the first, second, and third quarters consistently fell below the ideal targets, indicating negative gaps. At least 70 out of 85 MAs with allocations for goods and capital expenditures experienced negative absorption gaps during this period, suggesting that the majority failed to meet their quarterly absorption targets in Q1, Q2, and Q3.

APPLICATIONS FOR PRACTICE
- There is a tendency for risk-averse behavior in response to budget uncertainty, leading to the accumulation of expenditures at the end of the fiscal year among regional office working units (Kantor Daerah or KDs).
- Risk-averse behavior varies across working units by geographical region (island) and sector.
- It is necessary to manage the volume of external budget revisions toward the end of the fiscal year.
- Capacity building and competency development for financial management personnel within working units are essential, particularly in sectors and/or regions that show a strong tendency toward risk-averse behavior in response to budget uncertainty.

Figure 1 Quarterly Non-Cumulative Percentage of Goods and Capital Expenditure Absorption, 2019–2021
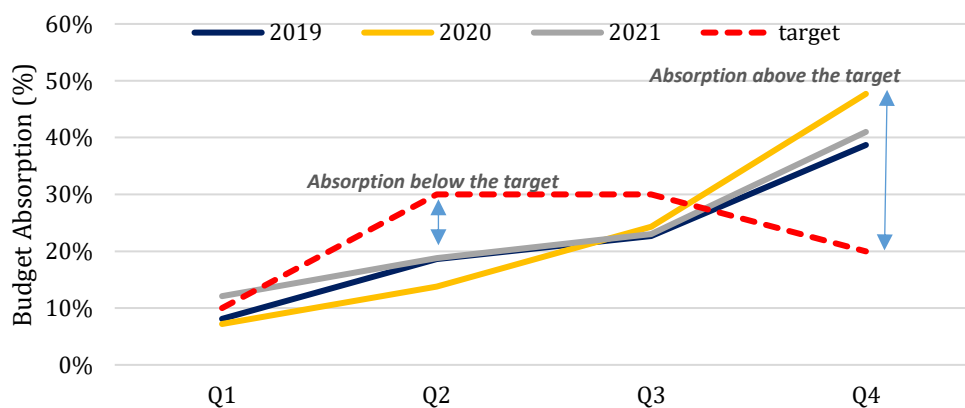
Source: Processed by the author

Previous studies have approached the issue of year-end government spending accumulation from the perspective of risk-averse behavior under conditions of uncertainty. In this context, budgetary uncertainty induces risk aversion among agents, leading to delays in spending (Eichenauer, 2020; Liebman & Mahoney, 2017; Rakhman, 2019). This results in information asymmetry between the principal and the agent. In this case, the principal refers to the Minister of Finance as the State General Treasurer, who ensures the availability of funds in the Budget Implementation List (DIPA) and sets quarterly absorption targets. The agent, meanwhile, refers to the spending units (*Satkers*) of the ministries or agencies, which are responsible for implementing the activities outlined in the DIPA. Information asymmetry arises because the principal cannot determine whether low absorption is due to (1) poor governance on the part of the agent, or (2) external conditions beyond the agent's control (Hurley et al., 2014; McCue et al., 2021).

In the context of budget governance in Indonesia, budget uncertainty is often represented by external budget revisions. These refer to revisions brought by external conditions beyond the *Satker*'s control, such as changes in the state budget (APBN), receipt of grants, disaster response needs, or budget reallocation across *Satker*s.

Over the past five years, the accumulation of government spending at year-end has consistently been accompanied by an increase in external budget revisions (Figure 2). These revisions tend to spike in October and November before declining in December. This surge is largely due to the deadline for submitting external budget revision proposals, which typically falls at the end of November of the fiscal year.

Figure 2 Trends in External Budget Revisions and Budget Absorption: Monthly Averages, 2018–2022
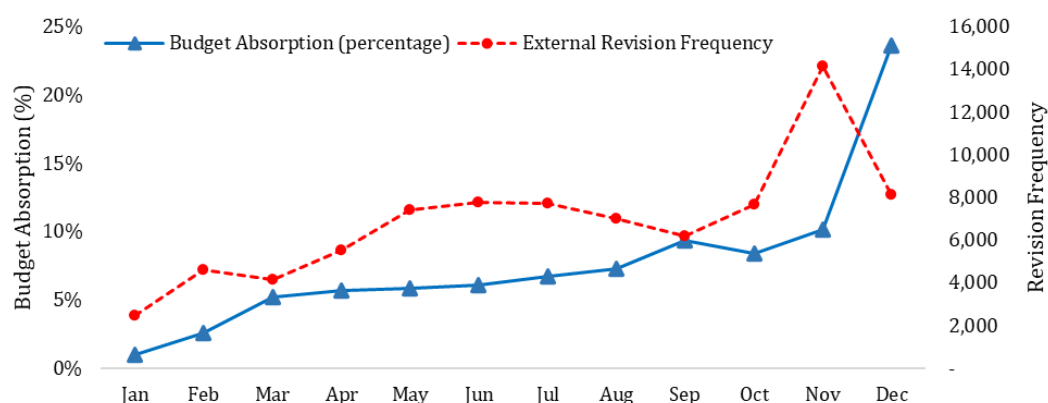
Source: Processed by the author

As the fiscal year-end approaches, uncertainty in budget allocations tends to decrease, which in turn increases the frequency of external budget revisions. The reduction in uncertainty motivates *Satker*s to execute delayed programs and activities swiftly to ensure full utilization of allocated funds before the fiscal year ends.

Despite being a frequently discussed and debated issue, empirical studies specifically addressing the year-end accumulation of government spending remain limited (Korac et al., 2019; Rausch & Wall, 2015). This is especially true for the Indonesian context, where most existing studies on spending accumulation are exploratory in nature, aiming to identify the contributing factors, as seen in the works of Herriyanto (2012), Rahim and Saputra (2017), Ruwaida et al., (2015), Setyawan (2016), and Zaenudinsyah (2016).

Therefore, this study aims to investigate whether risk-averse behavior in response to budgetary uncertainty contributes to the accumulation of government spending. Risk aversion is measured by examining the relationship between budget uncertainty and the rate of expenditure absorption across periods. In this study, external budget revisions were used as a proxy for budget uncertainty. A significantly positive relationship between external budget revisions and expenditure absorption such as spending accumulation may indicate the presence of risk-averse behavior in response to budget uncertainty.

This study aims to fill a research gap in the limited literature addressing the relationship between the frequency of external budget revisions as a proxy for budget uncertainty and the year-end accumulation of government spending. Most existing studies only explore general aspects of budget uncertainty without explicitly linking them to external budget revisions, which are more relevant as a proxy. Drawing on the work of Balakrishnan et al. (2007), Liebman and Mahoney (2017), and Eichenauer (2020), this study hypothesizes that external budget revisions have a significant positive effect on the budget absorption rate at the work unit (*Satker*) level.

This study offers novelty in three key aspects. First, it explores data at the *Satker* level, which is the smallest administrative unit with authority over program and activity implementation as outlined in the budget implementation document. By analyzing *Satker*-level data, the study aims to provide a more granular and generalizable understanding of the government spending accumulation phenomenon.

Second, the study employed the variable of external budget revisions as a proxy for budget uncertainty. While Eichenauer (2020) used proxies such as the number of people affected by natural disasters, economic crisis dummies, or changes in project leadership to represent uncertainty, these proxies do not capture budget-specific uncertainties. Such uncertainties may arise from changes in foreign loan allocations, budget freezes, or reallocations between *Satker*s due to central policy shifts. In contrast, this study used system-recorded transaction data on external budget revisions, offering a more representative and objective measure of budget uncertainty.

Third, the study utilized the instrumental variable two-stage least squares (IV-2SLS) to explain the causal relationship between variables. The IV-2SLS estimation is appropriate here because the frequency of external budget revisions is endogenous, due to: (1) reverse causality between budget revisions and absorption rates, and (2) omitted variable bias, where external budget revisions may correlate with unobserved factors influencing fiscal policy, such as economic and political dynamics.

LITERATURE REVIEW
Budget Revisions
Budget revision (rebudgeting) refers to the act of modifying and updating the government budget within the fiscal year (Forrester & Mullins, 1992). In Indonesia, budget revision is regulated under Minister

of Finance Regulation (PMK) No. 199/PMK.02/2021 concerning Procedures for Budget Revision. It is an adjustment to budget details initially established in the State Budget Law (APBN) and documented in the Budget Implementation List (DIPA) for the corresponding fiscal year. The DIPA serves as the basis for executing programs and activities, as well as for disbursing funds to carry out the functions of ministries and agencies (MAs). Essentially, both definitions reflect that a budget revision is a change or update to a previously approved budget.

Budget revisions may occur due to various factors. Studies by Forrester and Mullins (1992), Anessi-Pessina et al. (2012), and Dougherty et al. (2003) categorize the causes of budget revisions into three main areas. The first is managerial needs, which arise from technical complexities in estimating resources and needs, and from constraints on managerial decision-making. The second area is environmental pressures, which are caused by changes in the external environment where government services are delivered. The third is political considerations, due to the inherently political nature of public resource allocation decisions.

Referring to the studies of Forrester and Mullins (1992), Anessi-Pessina et al. (2012), and Dougherty et al. (2003) and Indonesia's regulatory framework, budget revisions can be classified by their level of authority. One such classification is external budget revisions, which fall outside the control of the *Satker* and are triggered by external factors. Although *Satker*s may initiate the proposal, the underlying cause stems from changes beyond their internal or managerial scope.

One example of an external budget revision is a shift in government program priorities that results in reallocation of funds at the national, ministerial, or directorate-general levels. These reallocated budgets can affect the budget allocations at the *Satker* level. Another example includes macroeconomic fluctuations that lead to increased public demand for services, resulting in higher-than-expected non-tax state revenue (PNBP). The increase in PNBP requires an adjustment in the *Satker*'s budget allocation. Also included in this category are revisions prompted by regulatory changes, such as updates to accounting mechanisms that necessitate reclassification of budget items.

Several studies have examined the determinants of budget revisions and their impact on budget effectiveness. Dougherty et al. (2003) suggest that one driver of budget revisions is risk-averse behavior, which serves as a buffer strategy against unexpected events. Anessi-Pessina et al. (2020) found that political conditions, organizational characteristics, financial conditions, and the socio-economic environment all influence budget revisions. Similarly, Rachmadani et al. (2022) showed that uncertainty, specifically the uncertainty brought about by the COVID-19 pandemic, significantly affected budget revisions within local governments. From a performance perspective, Fitriandini and Widajantie (2021) conducted a study on budget effectiveness within regional government agencies (Organisasi Perangkat Daerah, OPD) in Surabaya and found that budget revisions had a significantly positive effect on budget effectiveness.

Agency Problems in Budget Uncertainty and Year-End Spending Accumulation

Theoretically, the phenomenon of government spending accumulation at the end of the fiscal year has frequently been analyzed through the lens of agency theory (Baiman, 1990; Baumann, 2019; Eichenauer, 2020; Jensen & Meckling, 1976; Liebman & Mahoney, 2017; McCue et al., 2021). Agency theory posits that there are two parties involved, agents and principals, where the agent is entrusted by the principal to manage and deliver certain outcomes (Hurley et al., 2014; McCue et al., 2021).

In the context of central government budget governance, the roles of agent and principal can be understood through the allocation of authority in drafting, approving, implementing, and accounting for the national budget (APBN), as outlined in Law No. 17 of 2003 on State Finance. More specifically, ministers or heads of government agencies serve as chief operational officers (COOs) and function as agents, while the Minister of Finance, as the chief financial officer (CFO), acts as the principal.

The Minister of Finance, as the principal, sets quarterly budget absorption targets to promote proportional spending. Proportional quarterly absorption is expected to ensure that programs and activities implemented by line ministries or agencies (*Satker* MAs), as agents, are executed efficiently and effectively. Improved proportionality in budget execution can help reduce the risk of year-end spending surges, which are often associated with inefficient or wasteful government expenditures (Eichenauer, 2020).

However, the recurring phenomenon of year-end spending accumulation gives rise to information asymmetry. While the principal desires efficiency and proportionality in budget absorption, agents being risk-averse, tend to prioritize risk management over efficiency. In practice, this asymmetry arises because the Minister of Finance, as principal, cannot determine whether the year-end spending accumulation is due to (1) poor internal governance by the agents or (2) external factors beyond the agents' control (Hurley et al., 2014; McCue et al., 2021). Economically, this information asymmetry leads to welfare losses within the agent-principal relationship (McCue et al., 2021).

External factors beyond the control of agents represent a form of budget allocation uncertainty that *Satkers* must navigate. This uncertainty can be proxied by the frequency of external budget revisions

undertaken by *Satkers*. Although such revisions are formally proposed by *Satkers* themselves, the underlying triggers typically originate from external conditions beyond their managerial authority. In uncertain environments, agents tend to avoid risk and adopt cautious strategies, leading to delays in budget execution (Eichenauer, 2020; Rakhman, 2019). From a contingency theory perspective, slow budget execution is a rational response by agents to ongoing fiscal uncertainty throughout the budget year (Balakrishnan et al., 2007).

Satkers within ministries or agencies are likely to exhibit risk-averse tendencies in budget management. This argument is supported by findings from several countries, where public sector institutions offer higher job security and more stable compensation compared to the private sector (Bonin et al., 2007; Clark & Postel-Vinay, 2009). These attract individuals with risk-averse characteristics to pursue careers in the public sector, where job security and financial stability are more assured (Buurman et al., 2012). Consequently, the risk-averse behavior of public employees influences how budgets are managed at the *Satker* level, prompting more conservative financial management approaches within government agencies.

METHODS

This study employed secondary data on budget implementation sourced from the databases of the Ministry of Finance. More specifically, the majority of the data were obtained from the State Treasury and Budget System (Sistem Perbendaharaan dan Anggaran Negara/SPAN), which manages a range of transaction data including the stages of budgeting, budget execution, and financial accountability. In addition, supporting data were drawn from two sources: (1) budget performance data retrieved from the Online Monitoring SPAN (OMSPAN) application, and (2) data on the certification status of financial management personnel, obtained from the Competency Assessment Information System (Simaspaten).

The analysis was conducted at the *Satker* (work unit) level, which represents the smallest unit with autonomous authority over budget management. Conducting the analysis at this micro level offers an advantage in capturing individual behavioral patterns. In this regard, micro-level data allow for a more accurate reflection of decision-making characteristics within each *Satker*, enabling a more relevant examination of how budget revision behavior affects the absorption of government spending.

Two main criteria were used to determine the *Satkers* included in this study's observation: (1) they belonged to a central government ministry or agency (Kementerian/Lembaga or K/L), and (2) they had complete budget transaction records throughout the observation period. *Satker* classified as Public Service Agencies (Badan Layanan Umum, or BLU) and overseas diplomatic missions were excluded from the study due to their distinctive budget execution characteristics, which are governed under separate regulations. The budget execution procedures for BLU *Satker* are governed by Ministry of Finance Regulation (PMK) No. 202/PMK.05/2022 on BLU Management Guidelines, while those for overseas *Satker* refer to PMK No. 160/PMK.05/2015 on Procedures for State Budget Implementation in Indonesian Foreign Missions.

The observation period covered quarterly data from 2018 to 2022. Quarterly analysis aligns with the budget performance monitoring and evaluation (M&E) cycle conducted by both the Ministry of Finance and the respective MAs, as stipulated in PMK No. 195/PMK.05/2018 on Monitoring and Evaluation of Budget Implementation in Ministries/Agencies. The use of M&E periodicity aims to capture the dynamics of external conditions affecting each *Satker* throughout the fiscal year.

The variables used in this study consisted of the dependent variable, which is the quarterly budget absorption percentage for goods and capital expenditures. The primary independent variable of interest was the frequency of external budget revisions. To obtain more accurate estimates, the analysis also incorporated several control variables, including performance scores, employee competency, operational complexity, a dummy variable for the end of the fiscal year, and year fixed effects.

This study used an unbalanced panel dataset comprising 13,080 *Satkers* under 76 central government ministries/agencies. The data were unbalanced due to several factors. First, some *Satkers* (2,769) were inactive during specific periods of analysis. Second, some active *Satkers* (4,821) lacked complete transaction data in the available database due to policy changes occurring during certain periods. For example, changes in employment status of personnel (from non-civil servant to civil servant or vice versa) may have affected data availability. The resulting data structure reflected random data attrition, indicating that the panel imbalance was not due to systematic dropout but rather to natural, uncontrollable conditions. In such cases, unbalanced panel data are more appropriate for analysis, as the panel reduction is not caused by sample self-selection but by exogenous factors (Wooldridge, 2010).

To mitigate estimation bias arising from endogeneity and omitted variable bias, this study employed the instrumental variable two-stage least squares (IV-2SLS). Estimation bias may occur due to two primary issues: (1) the potential for reverse causality between external budget revisions and budget absorption, and (2) omitted variable bias, in which external budget revisions are correlated with unobserved variables that influence fiscal policy decisions, such as economic and political conditions.

The estimation model to assess the effect of the frequency of external budget revisions on budget absorption is specified through the following first-stage and second-stage equations:

First-stage regression:

$$RevEkst_{it} = \pi_0 + \pi_1 PropTeknis_{it} + \pi_2 Year_t + \eta_i + v_{it} \qquad \text{............ (1)}$$

Second-stage regression:

$$\begin{aligned}Absorptionpercentage_{it} &= \beta_0 + \beta_1 RevEkst_{it} + \beta_2 \Sigma Performance_{it} + \beta_3 HR_{it} + \beta_4 \Sigma Complexity_{it} \qquad \text{............ (2)}\\ &+ \beta_5 Year-end_t + \beta_6 Year_t + \eta_i + \epsilon_{it}\end{aligned}$$

where:

$RevEkst_{it}$	:	frequency of external budget revisions for *Satker i* in period t
$PropTeknis_{it}$	:	proportion of technical program expenditure allocation to the total budget ceiling for capital and goods expenditure for *Satker i* in period t
$Absorptionpercentage_{it}$	:	non-cumulative percentage of capital and goods expenditure absorption for *Satker i* in period t
$Performance_{it}$	:	performance scores representing budget execution quality, including cash management and disbursement planning performance for *Satker i* in period t
HR_{it}	:	number of employees with financial management certification for *Satker i* in period t
$Complexity_{it}$	:	complexity characteristics comprising five variables (see Appendix 1) for *Satker i* in period t
$Year-end_t$	:	dummy variable indicating whether the period corresponds to the end of the fiscal year (fourth quarter).
$Year_t$	:	year fixed effect for periode t
c_i	:	individual fixed effect for *Satker i*
ϵ_{it}	:	error term

In this estimation model, the proportion of the technical program budget is used as an instrumental variable. This variable reflects the *Satker*'s focus and priorities in implementing activities directly related to the core services of the respective ministries or agencies. As stipulated in the Regulation of the Minister of National Development Planning/Head of Bappenas No. 1 of 2021 concerning the Procedures for Preparing, Reviewing, and Amending Ministry/Agency Work Plans, technical programs are executed to support the government's priority agenda. The allocation of technical programs is likely to be strongly correlated with external budget revisions as it represents the *Satker*'s main service priorities. Technical program allocations tend to remain more stable and consistent throughout the fiscal year compared to allocations for management support programs. A higher proportion of budget allocated to technical programs is expected to reduce budget uncertainty, as these allocations primarily support the core functions and responsibilities of the ministries or agencies. This may reduce the likelihood of external budget revisions for the *Satker*.

To explore and identify potential variations in the relationship between variables across different subsamples, this study also performed a heterogeneity analysis. The first heterogeneity analysis was based on expenditure authority, referring to the budget management authority of the *Satker*, including central office (kantor pusat/KP) and regional office (kantor daerah/KD) authorities. Central office authority refers to the authority that carries out activities under the Budget Implementation List (DIPA) granted to *Satkers* within the ministry or agency's central office. Meanwhile, regional office authority is the authority granted to central government *Satkers* located in regional areas to carry out activities under the DIPA.

The second heterogeneity analysis was based on island clusters where *Satkers* operate. There are six major island clusters in Indonesia: Sumatra, Java, Kalimantan, Sulawesi, Bali and Nusa Tenggara, and Maluku and Papua. These clusters have distinct characteristics, including socio-economic conditions, geographic features, and cultural factors, all of which may influence budget management at the *Satker* level.

The third heterogeneity analysis is based on sectoral classification, referring to the classification of government budget functions as outlined in the Regulation of the Minister of Finance No. 102/PMK.02/2018 concerning Budget Classification. Functional classification aims to group national budget expenditures based on the functions of government performed by ministries or agencies. This regulation outlines 11 government functions. For analytical clarity and ease of interpretation, the study reclassified these into five broad sectors: (1) basic services, (2) economy, (3) defense, security, and law enforcement (Hankam and Gakkum), (4) infrastructure, and (5) others.

RESULTS AND DISCUSSION

The allocation of expenditure for goods and capital within central office *Satker*s (*Satker* KP) was found to predominate the overall ministerial or institutional (MAs) spending budget. Although the number of *Satker* KP was significantly smaller than that of regional office *Satker*s (*Satker* KD), on average, the budget allocation for *Satker* KP was approximately 35 times larger than that for *Satker* KD. *Satker* KP generally supervise *Satker* KD and are tasked with more complex responsibilities and greater budgetary autonomy.

From a regional perspective, *Satker*s located in Java led in both quantity and budget allocation. Budget allocations for Java accounted for approximately 70% of the total MAs expenditure across Indonesia. This is consistent with the fact that a majority of *Satker* KP are based in Java. This dominance reflects the classical fiscal policy pattern, wherein government spending tends to concentrate in regions that serve as economic growth centers (Martin, 1978).

In terms of the frequency of external budget revisions, similar trends were observed across *Satker* groups (see Table 1). The average frequency of external budget revisions increased from the first to the second quarter, remained relatively stable in the third quarter, and rose again in the fourth quarter. Based on expenditure authority, *Satker* KP exhibited a higher average frequency of external budget revisions than *Satker* KD. Regionally, the quarterly averages of external budget revision frequencies were relatively similar across islands, except for Java. Sectorally, greater variation was observed, with the highest revision frequencies found in infrastructure and other sectors.

Table 1 Descriptive Statistics: Quarterly Averages, 2018–2022 Periods

No.	Category	Number of *Satkers*	Avg. Budget Ceiling (Billion IDR)	Avg. Frequency of External Budget Revisions				Avg. Budget Absorption (%)			
				Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
By Expenditure Authority											
1.	Regional Offices (KD)	12,585	8.64	0.34	0.93	0.92	1.63	17.34	23.22	22.84	32.31
2.	Central Offices (KP)	495	300.54	0.72	1.26	1.52	2.07	12.38	20.08	23.08	38.53
	Total	13,080									
By Island Cluster											
3.	Java	4,077	46.42	0.38	0.99	1.03	1.84	15.89	22.75	23.12	33.99
4.	Sumatra	3,725	7.16	0.33	0.91	0.85	1.57	17.76	23.40	22.43	32.01
5.	Kalimantan	1,481	6.93	0.33	0.95	0.91	1.60	17.23	22.83	23.01	32.27
6.	Sulawesi	1,725	7.68	0.35	0.96	0.93	1.56	18.46	23.37	22.85	31.38
7.	Bali & Nusa Tenggara	939	7.84	0.38	0.94	0.96	1.56	17.29	23.37	23.39	31.53
8.	Maluku & Papua	1,142	8.60	0.35	0.84	0.94	1.50	17.56	23.05	22.54	32.10
	Total	13,080									
By Sector											
9.	Basic Services	5,498	10.31	0.16	0.75	0.62	1.63	19.34	23.02	23.61	30.97
10.	Economy	1,703	30.61	0.36	0.93	1.10	1,62	13.46	21.80	22.58	35.02
11.	Defense, Security, and Law Enforcement (Hankam and Gakkum)	3,665	22.76	0.47	0.94	0.84	1,39	18.03	23.89	23.50	30.74
12.	Infrastructure	524	44.86	0.44	1.26	2.00	2,39	14.78	21.29	23.44	34.85
13.	Others	1,690	25.37	0.71	1.50	1.75	2,07	12.24	23.39	19.02	38.54
	Total	13,080									

Source: Processed by the authors

The pattern of budget absorption also mirrored the trend in external budget revision frequency. All observed groups showed lower budget absorption rates in the first quarter (below 20%), slight increases in the second and third quarters (between 20%–23%), and sharp increases in the fourth quarter (between 30–39%). In terms of expenditure authority, *Satker* KP recorded the highest absorption rate in the fourth quarter (38.53%), significantly exceeding that of *Satker* KD (32.31%). Regionally, the highest fourth-quarter absorption rate was recorded in Java (33.99%), while other islands displayed relatively low variation. In

contrast, from a sectoral perspective, *Satkers* in the economic, infrastructure, and other sectors exhibited the most substantial increases in fourth-quarter budget absorption. The inter-sectoral variation in the average absorption surge was also considerable.

Estimation of the Effect of External Budget Revisions on *Satker* Budget Absorption

The estimation results using ordinary least squares (OLS) and fixed effects (FE) panel regression indicated the potential for estimation bias due to unobserved time-invariant factors (see Table 2). Moreover, the inclusion of control variables altered the beta coefficient parameters. The coefficient for the frequency of external budget revisions remained positively significant ($\alpha = 1\%$) after introducing controls. The R-squared value obtained from the FE model was higher than that of the OLS model, suggesting that the FE model provides a better estimation of the relationship between the frequency of external budget revisions and the budget absorption rate. However, the FE model is still susceptible to bias due to endogeneity and omitted variable bias. To address these issues, instrumental variable estimation using two-stage least squares (IV-2SLS) is necessary.

Table 2 Estimation Results of OLS and Fixed Effects (FE): The Effect of External Budget Revisions on Budget Absorption by Ministry/Agency Work Units (Satker MAs)

Dependent Variable	Budget Absorption Rate (%)			
Independent Variables	*OLS*		Fixed Effects (FE)	
	(1)	(2)	(3)	(4)
FrekRevEkst	1.037***	0.907***	1.249***	1.031***
Control Variables:				
Performance Indicator	No	Yes	No	Yes
Human Resource Competency	No	Yes	No	Yes
Task Complexity	No	Yes	No	Yes
Final Quarter Dummy	No	Yes	No	Yes
Year Fixed Effects	No	Yes	No	Yes
Constant	22.904***	18.504***	22.698***	15.917***
R-Squared	0.018	0.051	0.023	0.058
Number of *Satkers*	13,080	13,080	13,080	13,080

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.   Source: Processed by the authors

The analysis began with a first-stage regression estimation to examine the relationship between the proportion of technical program budget allocation (PropTeknis), used as an instrumental variable, and the frequency of external budget revisions (FrekRevEkst). As shown in Table 3, the proportion of technical program budget allocation exhibited a statistically significant negative effect on the frequency of external budget revisions.

Table 3 First-Stage Regression Estimation Results: The Effect of the Proportion of Technical Program Budget on the Frequency of External Budget Revisions

Dependent Variable	Frequency of External Budget Revisions
Independent Variables	(FrekRevEkst)
Proportion of Technical Program Budget (PropTeknis)	-0.002***
Constant	15.917***
Observations	246,510
Number of local *Satkers*	13,080
R-squared	0.058

Robust standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.   Source: Processed by the authors

The coefficient for PropTeknis was -0.002 ($\alpha = 1\%$), indicating that a higher proportion of technical program budget allocation is associated with a lower tendency to revise the budget externally. In other words, work units managing predominantly technical programs tend to experience lower levels of budget uncertainty, as reflected in more stable and consistent budget allocations throughout the fiscal year.

The second-stage regression estimation confirmed the study's hypothesis, which suggests the presence of risk-averse behavior in response to budget uncertainty, resulting in the accumulation of expenditures at the end of the fiscal year (Table 4). This risk aversion was evidenced by the statistically significant and positive coefficient of 1.697 ($\alpha = 5\%$) for the frequency of external budget revisions. This implies that each additional external revision is associated with an average increase of 1.697 percentage points in budget absorption, ceteris paribus.

Moreover, the model estimation satisfied key statistical requirements. First, the model passed the underidentification test, as indicated by the rejection of the null hypothesis in the Kleibergen–Paap rk LM statistic ($p < 0.01$). This suggests that the instrumental variable used in the IV-2SLS model provides sufficient information to identify the endogenous variable's parameter. Second, the model met the

Table 4 Second-Stage Regression Estimation Results

Dependent Variable Independent Variables	Budget Absorption Percentage (PersenSerap)
Frequency of External Budget Revisions (FrekRevEkst)	**1.697****
Controls:	
Performance	Yes
Human Resource Competence	Yes
Complexity	Yes
End-of-Quarter Dummy	Yes
Year Fixed Effects	Yes
Kleibergen–Paap rk LM Statistic (p-value)	0.000
Kleibergen–Paap Wald F Statistic	192.9
Number of *Satkers*	13,080

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.   Source: Processed by the authors

instrument strength assumption, with a Kleibergen–Paap Wald F statistic of 192.9, well above the commonly accepted threshold of 10 (Stock & Yogo, 2005).

The estimation results, disaggregated by budget authority, revealed a positive relationship between the frequency of external budget revisions and the percentage of budget absorption (Table 5). However, this statistically significant positive relationship was only observed among KD (Budget Executor) work units. For this group, the coefficient of 1.659 (α = 10%) indicates that each additional external budget revision increases the average percentage of budget absorption by 1.659 percentage points, ceteris paribus. Moreover, the estimation model for KD work units satisfied the key requirements for instrument validity and strength, including (1) the underidentification test (Kleibergen-Paap rk LM statistic), which rejected the null hypothesis (p-value < 0.05), and (2) the instrument strength test (Kleibergen-Paap Wald F statistic), which exceeded the critical threshold of 10 points (Stock & Yogo, 2005).

Table 5 Estimation of the Effect of External Budget Revision Frequency on Budget Absorption Percentage by Budget Authority

Dependent Variable	Budget Absorption Percentage (PersenSerap)	
Independent Variables	Central Office (KP)	Regional Office (KD)
Frequency of External Budget Revisions (FrekRevEkst)FrekRevEkst	**2.461**	**1.659***
Controls:	Yes	Yes
KP RK LM Stat (p-val)	0.0396	0.000
KP Wald F Stat	4.24	193.9
Number of *Satkers*	495	12,585

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * <0.1. Controls include performance, human resource competence, complexity, end-of-quarter dummy, and year fixed effects.

Source: Processed by the authors

In contrast, the estimation results for KP (Budget User) work units showed that the frequency of external budget revisions was not statistically significant, and the instrument strength requirement was not met. These findings suggest that risk-averse behavior, manifested in the accumulation of government expenditures at the end of the fiscal year, is more likely to occur within KD work units.

Further analysis by sector revealed a varied influence of external budget revisions (Table 6). Although the direction of the relationship was generally positive, statistical significance was observed only in the economic sector. The marginal effect for economic sector work units was 1.358, implying that one additional external budget revision increases budget absorption by 1.358 percentage points, ceteris paribus. The instrumental variable used in estimating the causal relationship between the frequency of external budget revisions and budget absorption met the requirements for validity and strength in the basic services, economic, and defense-security-law enforcement sectors. Instrument validity was confirmed through (1) the underidentification test (Kleibergen-Paap rk LM statistic), which rejected the null hypothesis (p-value < 0.05), and (2) the overidentification test (Hansen J-test), which failed to reject the null hypothesis (p-value > 0.05). The instruments also satisfied the strength requirement, as the KP Wald F statistics exceeded the Stock–Yogo threshold of 10. Meanwhile, the influence of external budget revision frequency in other sectors was negative and statistically insignificant. These sectors also failed to meet the requirements for instrument strength and underidentification.

Regionally, estimation results based on the geographic location of work units (by island group) indicate a positive impact of external budget revisions across all islands, except in Maluku and Papua (Table 7). Statistically significant positive effects were observed in work units located in Sumatra and Kalimantan,

Table 6 Estimation of the Effect of External Budget Revision Frequency on Budget Absorption Percentage by Sector

Dependent Variable	Budget Absorption Percentage (PersenSerap)				
Independent Variables	Basic Services	Economic	Defense & Law Enforcement	Infrastructure	Others
Frequency of External Budget Revisions (FrekRevEkst)	**0.893**	**1.358****	**0.657**	**0.880**	**-2.000**
Controls	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap rk LM Statistic (p-value)	0.000	0.000	0.000	0.002	0.025
Kleibergen-Paap Wald F Statistic	148.20	197.60	410.40	9.27	5.02
Number of *Satkers*	5,498	1,703	3,665	524	1,690

Robust standard errors in parentheses: *** p<0.01, ** p<0.05p, * p<0.1. Controls include variables for performance, human resource competence, complexity, end-of-quarter dummy, and year fixed effects.

Source: Processed by the authors

with marginal effects of 3.675 and 3.028, respectively (α = 10%). In Sumatra-based work units, a single external budget revision increased budget absorption by 3.675 percentage points, ceteris paribus. Similarly, in Kalimantan, such a revision led to a 3.028 percentage point increase in budget absorption. The instruments used demonstrate sufficient validity to explain the relationship between variables across all island groups. These findings suggest that risk-averse behavior resulting in the accumulation of public expenditure tends to occur partially, specifically in the Sumatra and Kalimantan regions·

A comparative analysis of sectoral (Table 6) and regional (Table 7) heterogeneity revealed different coefficients for the frequency of external budget revisions. In the sectoral heterogeneity analysis, coefficients ranged from -2.000 to 1.358, with varying levels of statistical significance. In contrast, the regional heterogeneity analysis showed a broader range, from -0.134 to 3.675. The greater variation in coefficients across regions suggests that geographic or regional context plays a more sensitive role in explaining differences in risk behavior in response to budget uncertainty.

In general, this study found that risk-averse behavior in response to budget uncertainty contributed to the accumulation of spending by central and regional government work units (*Satkers*) in Indonesia. *Satker*s appeared to delay their spending as a precautionary response to changes in budget allocations. This finding is consistent with the findings of Liebman and Mahoney (2017), who concluded that uncertainty is a key factor underlying year-end government spending spikes.

However, this study also found that in the Indonesian empirical context, the tendency toward risk-averse behavior in response to budget uncertainty was not systemic but partial. It was observed only in specific subsets of *Satker*s, namely, regional work units (*Satker* KD), *Satker*s operating in the economic sector, and those located in Sumatra and Kalimantan. These findings are consistent with those of Eichenauer (2020), who argues that budget uncertainty is not a systemic factor causing year-end expenditure accumulation.

In terms of budgetary authority, risk-averse behavior resulting in spending accumulation was predominantly found among *Satker* KD. Conversely, the empirical analysis did not identify similar behavior among central work units (*Satker* KP), despite the fact that the average frequency of external budget revisions was higher in *Satker* KP than in *Satker* KD (see Table 1). This may be attributed to differences in

Table 7 Estimation of the Effect of External Budget Revision Frequency on Budget Absorption Percentage by Island Group

Dependent Variable	Budget Absorption Percentage (PersenSerap)					Maluku & Papua
Independent Variables	Java	Sumatra	Kalimantan	Sulawesi	Bali & Nusa Tenggara	
Frequency of External Budget Revisions (FrekRevEkst)	**0.543**	**3.675***	**3.028***	**2.732**	**0.442**	**-0.134**
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap rk LM Statistic (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
Kleibergen-Paap Wald F Statistic	39.04	37.86	45.37	27.85	39.15	18.70
Number of *Satkers*	4,130	3,738	1,483	1,732	939	1,142

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1. Controls include variables for performance, human resource competence, complexity, end-of-quarter dummy, and year fixed effects.

Source: Processed by the authors

the budgetary characteristics between the two groups. *Satker* KP appeared to benefit from greater autonomy and budgetary flexibility, as their expenditures were largely composed of management support programs (non-technical programs). These types of budgets generally allow for higher discretion and flexibility in spending. This finding aligns with those of Krause (2002), who suggests that greater bureaucratic flexibility can help mitigate the adverse effects of budget uncertainty.

Further analysis based on regional (island-level) and sectoral subsamples showed that the tendency toward risk-averse behavior varied across analytical groups. Sectorally, such behavior, leading to the accumulation of spending, was observed only among *Satker*s in the economic sector. This variation may stem from differences in the complexity, duties, and functions across sectors. Regionally, the differences in risk-averse behavior are consistent with the work of Rieger et al. (2015), who found that regional differences in risk preferences can be attributed to variations in economic conditions and cultural backgrounds.

Robustness test

A potential issue in the estimation model is the possibility of a delayed effect from external budget revisions on budget absorption. That is, external budget revisions may only begin to influence budget absorption in the subsequent quarter. This is plausible in practice, as there is often a considerable time lag between the budget revision and the disbursement of funds. This process typically includes the formal approval of the budget revision, preparation of the term of reference (TOR) for the activity, implementation of the activity, documentation of payment administration, submission for fund disbursement, and finally, payment from the state treasury. To address this issue, a robustness test was conducted using semester-based data to examine the persistence of the model's findings.

In addition, a robustness check was conducted by modifying the model specification through an alternative measurement of the dependent variable. Given that this study focuses on the relationship between external budget revisions and expenditure accumulation, the robustness strategy employed involved changing the measurement of the dependent variable. In this case, the dependent variable was measured using the nominal amount of budget absorption, expressed in natural logarithm form.

Table 8 Robustness Test – Effect of External Budget Revision Frequency on Budget Absorption Percentage using Semester-Based Analysis

Dependent Variable Independent Variables	Budget Absorption Percentage (PersenSerap)
Frequency of External Budget Revisions (FrekRevEkst)	**1.697****
Controls	Yes
Kleibergen-Paap rk LM Statistic (p-value)	0.000
Kleibergen-Paap Wald F Statistic	229.5
Number of *Satkers*	13,080

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Controls include performance, human resource competence, complexity, end-of-quarter dummy, and year fixed effects*.*

Source: Processed by the authors

Table 9 Robustness Test – Effect of External Budget Revision Frequency on Budget Absorption in Rupiah Terms

Dependent Variable Independent Variables	ln(Budget Absorption in Rupiah)
Frequency of External Budget Revisions (FrekRevEkst)	**0.427*****
Controls	Yes
Kleibergen-Paap rk LM Statistic (p-value)	0.000
Kleibergen-Paap Wald F Statistic	192.5
Number of *Satkers*	13,080

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Controls include performance, human resource competence, complexity, end-of-quarter dummy, and year fixed effects.

Source: Processed by the authors

Table 8 summarizes the results of the robustness tests which used a semester-based analysis. The results showed a statistically significant and positive coefficient for FrekRevEkst of 1.937 (α=1%), confirming the consistency of the main findings. The direction and magnitude of this coefficient were consistent with the main model estimates (Table 2).

A similar result was observed in the robustness test using an alternative dependent variable measurement (Table 9). The estimation in Table 9 revealed a positive and statistically significant coefficient of 0.427 (α=1%) for FrekRevEkst, indicating that each additional external budget revision is associated with an average increase in budget absorption value of approximately 42.7%, ceteris paribus.

CONCLUSION

The accumulation of government spending toward the end of the fiscal year signals weak spending capacity and quality, inefficiency, and budgetary ineffectiveness. Empirical studies have shown that such spending patterns can negatively impact economic outcomes and social welfare. One of the key drivers of year-end expenditure accumulation is risk-averse behavior in response to budget uncertainty, which causes *Satker*s to postpone spending and concentrate financial activities near year-end.

This study found that, generally, risk-averse behavior in response to budget uncertainty significantly contributed to expenditure accumulation among central and regional government work units (*Satker* MAs). However, this tendency was not uniformly distributed across all *Satker*s. Risk-averse behavior was more evident among regional work units (*Satker* KD). Additionally, variations in such behavior were observed across regions and sectors. Risk aversion in response to budget uncertainty showed a statistically significant positive effect on spending accumulation. The sectoral variation may stem from differences in operational complexity and functional responsibilities, while regional differences may reflect underlying economic and cultural conditions.

To mitigate the risk of spending accumulation driven by such behavior, the Ministry of Finance and relevant sectoral ministries or agencies should develop capacity-building strategies to strengthen the competencies of *Satker* financial managers. These efforts should target sectors and regions where risk-averse behavior is most prevalent, namely *Satker* KD, *Satker*s in the economic sector, and *Satker*s located in Sumatra and Kalimantan. Furthermore, the Ministry of Finance should consider developing a data-driven monitoring system to anticipate *Satker* spending patterns. This system can help reduce information asymmetry and enable more effective oversight of *Satker* budget behavior.

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Appendix 1 Operational Definitions of Variables

No.	Proxy	Variables	Definition	Unit	Period	References
1	Budget Absorption	$PersenSerap_{it}$	Realized budget amount divided by budget ceiling for the respective quarter or semester. The percentage of budget absorption is non-cumulative and only considers the absorption within the respective period.	Percent (0-100%)	Quarterly	Balakhrisnan et al, 2007; Hurley et al., 2014; Liebman and Mahoney, 2018; Korac et al., 2019; Eichennauer, 2020;
2	Frequency of External Budget Revisions	$RevEkst_{it}$	Budget revisions as a result of conditions beyond the authority or control of the implementing work unit (*Satker*).	Count (0-...)	Quarterly	Forrester & Mullins,, 1992; Rakhman, 2019; Pessina et al., 2020; Fitriandi & Widajanti, 2021; Rachmadani et al., 2022
3	Unit Performance					Buana & Widiatmoko, 2019; Eichenauer, 2020
3a	Cash Management Performance	$KinKas_{it}$	IKPA performance score for the cash management indicator (management of petty cash) in the relevant quarter or semester.	Index (0-100)	Quarterly	
3b	Planning Performance	$KinRPD_{it}$	IKPA performance score for the planning indicator in the relevant quarter or semester.	Index (0-100)	Quarterly	
4	Human Resource Quality Characteristics	SDM_{it}	Number of employees with certified financial management credentials during the relevant year.	People (0-...)	Annual	Fleisher et al., 2014
5	*Satker* Complexity Characteristics					
5a	Proportion of Contractual Spending		Proportion of expenditures subject to public procurement procedures (i.e., tender).	Percent (0-100)	Annual	Astiti, 2016; Ghaniyar & Qibthiyyah, 2021; Qoriiba et al., 2021
5b	Managed Funding Type		Funding sources listed in DIPA, including Pure Rupiah (RM) and Non-Rupiah sources (e.g., PNBP, loans, grants).	Dummy (1 = manages non-RM funds; 0 = RM only)	Annual	Eichenauer, 2020; Ghaniyar & Qibthiyyah, 2021
5c	Ministry or Agency Size		Categorization of MAs size based on Minister of Finance Decree No. 58/KMK.02/2022 concerning awards for MAs budget performance in FY 2021; reflects operational scale, function diversity, control span, and complexity of resource allocation.	Dummy (1 = medium/large budget; 0 = small budget)	Annual	Barnes & Webb, 2007

Appendix 1 Operational Definitions of Variables (Continued)

No.	Proxy	Variables	Definition	Unit	Period	References
5d	*Satker* Budget Ceiling		Natural logarithm of the total allocation for goods and capital expenditures managed by the *Satker*. Larger budgets indicate greater complexity in planning, allocation, execution, and accountability.	Ln (Budget Allocation)	Quarterly	Eichenauer, 2020
5e	Proportion of Technical Program Budget		Proportion of expenditures allocated to MAs technical programs, which implement national development priorities set in the Government Work Plan (RKP) and Medium-Term Development Plan (RPJMN), targeting beneficiaries outside the MAs.	Percent (0-100)	Annual	Ghaniyar & Qibthiyyah, 2021
5f	Ln of Number of Employees		Natural logarithm of the number of civil servants (ASN) employed by the *Satker*.	People (ln scale) (-xxxx - +xxxx)	Annual	Barnes & Webb, 2007; Jung & Lee, 2016
6	Year-End Period	Year-end$_t$	Dummy variable indicating the final quarter of the fiscal year, used to control for the effect of activity scheduling patterns that tend to cluster in Q4. Equals 1 if the observation falls in Q4.			Balakrishnan et al., 2007; Eichenauer, 2020
7	Year fixed effect	Year$_t$	Year fixed effect used to control for (1) policy changes regarding budget revisions and implementation that affect all units, and (2) global shocks such as the COVID-19 pandemic.	2019 = 0 (base)	-	Balakrishnan et al., 2007; Eichenauer, 2020
8	Individual Fixed Effect	c_i	Individual fixed effect for *Satker*.		-	Eichenauer, 2020; Wooldridge, 2010