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The Use of Financial Information for Budget Cuts under Unprecedented Fiscal Pressure

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Abstract

We investigate the utilization of financial information by the central government and policymakers for budget cuts under unprecedented fiscal pressure caused by COVID-19 in South Korea. Previous research (Helden, 2016; Raudla and Savi, 2015) strongly suggests the possibility that, owing to several reasons including time pressure, constrained analytical capabilities, and the political nature of the budgetary process, financial information might not be used for budget reductions under unprecedented fiscal strain. However, we find that financial information, which is simple but provides useful information to identify the progress of government projects, is utilized for budget cuts even under such fiscal stress.

Keywords: Financial Information, Executed Budget, Unused Budget, Budget Cuts, Budgetary Process

JEL Codes: H5, H6, H8

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1 Introduction

The governments and policymakers of many countries significantly and rapidly increased government expenditures as a response to the COVID-19 pandemic. Contrastively, COVID-19 seriously damaged the government revenues of several countries. As a result, COVID-19 placed the governments of these countries under unprecedented fiscal pressure. To maintain fiscal sustainability despite this fiscal strain, the governments and policymakers of many countries, including the United States (Aratani, 2020), the United Kingdom (Zeffman and Philp, 2021), Canada (Wells, 2020), and China (Chen, 2020), made immediate cuts to the budgets of government projects not directly related to COVID-19.

From the perspective of fiscal health, it seems inevitable to reduce the budgets of some projects not immediately connected to COVID-19. However, there is little known about whether and how governments and policymakers are utilizing financial information to cope with unprecedented fiscal pressure. In this paper, we try to fill this knowledge gap. Especially, among several kinds of financial information, we focus on the use of financial information which provides useful information to identify the progress of government projects and thus, the allocation efficiency of government budgets (Kim, 2019; Kim et al., 2021). Budget execution rates and unused budget rates belong to such financial information. The budget execution rate of a government project is the proportion of the project's cumulative annual executed budget (i.e., spent budget) to its total budget.[1] The unused budget rate of a government project is the ratio of the project's unused budget (i.e., unspent budget) to its total budget.[2]

[1] For example, suppose that, in the 2020 fiscal year, 100 billion Korean Won (KRW) were assigned to a highway construction project. Also, suppose that, among this 100 billion KRW, 30 billion KRW were executed (i.e., spent) from January 1st, the starting date of the South Korean government's fiscal year, to March 31st. In this case, the budget execution rate of this highway construction project on March 31st is 30%.

[2] For instance, suppose that, in the 2019 fiscal year, 100 billion KRW were allocated to a highway construction project. Additionally, suppose that, among this 100 billion KRW, 5 billion KRW remained unused (i.e., unspent) by December 31st, the last day of the South Korean government's fiscal year. In this case, the unused budget rate

Although it seems that economists do not often use terminologies such as budget execution rates and unused budget rates, these terminologies are also used by the World Bank (Piatti-Fünfkirchen et al., 2021)[3] and other research (Jang et al., 2019). Thus, following the World Bank and other research, we utilize these terminologies throughout this paper.

Governments and policymakers might interpret a project's low budget execution rate or high unused budget rate as a sign that the progress of the project is sluggish, implying that budgets larger than needed were allocated for the project. Such stagnant progress can originate from several reasons such as insufficient numbers of beneficiaries or operational problems in implementation (Kim, 2019; Kim et al., 2021). For this reason, in the previous literature on budgetary decision-making in normal situations, Lee and Johnson (1998), Liebman and Mahoney (2017), Kim (2019), and Kim et al. (2021) point out that governments and policymakers can interpret high unused budget rates of certain government projects as an indicator for sluggish progress of those projects, thus cutting their budgets in the next budget cycle.

However, it is questionable whether the financial information, such as budget execution rates and unused budget rates, can also be utilized under unprecedented fiscal crisis.[4] On one hand, previous qualitative research strongly suggests the possibility that such financial information might not be utilized under unprecedented fiscal stress. Some qualitative studies claim that the real use of financial information of policymakers, such as politicians, is much lower than their appreciation of financial information (Helden, 2016; Buylen, 2014; Liguori et al., 2012; Ezzamel et al., 2008). Other qualitative studies show that, in a fiscal crisis, performance information is not used for budget cuts because of time

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of this highway construction project in the 2019 fiscal year is 5%.

[3] Please refer to *Budget Execution in Health: Concepts, Trends and Policy Issues* published by the World Bank.

[4] We emphasize that, as explained above, Lee and Johnson (1998), Liebman and Mahoney (2017), Kim (2019), and Kim et al. (2021) focus on budgetary decision-making in normal circumstances, not under unprecedented fiscal strain.

pressure, constrained analytical capabilities, and the political nature of the budgetary process. In a fiscal crisis, governments and policymakers do not have enough time or cognitive space[5] to analyze performance information. Cutting budgets based on performance information might lead to conflict-ridden negotiations and long delays for reaching decisions (Raudla and Savi, 2015). For similar reasons, financial information might not be used for budget reductions under unprecedented fiscal stress. Therefore, instead of using financial information for budget reductions, especially considering the urgent needs to respond fiscally to COVID-19, governments and policymakers might choose a different budget cut strategy, such as across-the-board cuts,[6] that is easy to implement quickly. Across-the-board cuts require low decision-making costs. Across-the-board cuts are also politically feasible since they minimize conflicts and are regarded as equitable (Raudla et al., 2015).

On the other hand, there are several reasons that the financial information, such as budget execution rates and unused budget rates, can be utilized even under unprecedented fiscal stress. This financial information does not require a high level of analytical capacities to be used. In addition, as written above, governments and policymakers might interpret a project's low budget execution rate or high unused budget rate as a signal that the progress of the project is stagnating, thus signaling the possibility that a large amount of the project's budget will remain unused by the end of the fiscal year. In this situation, it might not be politically difficult to persuade the stakeholders of such a project to cut the project's budget since governments and policymakers are trying to decrease the budget, which is not likely to be used by the end of the fiscal year.

Given all these arguments, it is an empirical task to examine whether and how governments

[5] Time pressure and cognitive limitations are regarded as the main factors for an individual's or an organization's bounded rationality (Simon, 1964).

[6] According to a previous survey paper (Raudla et al., 2015) on cutback budgeting, budget cut strategies are basically classified into two categories: across-the-board cuts and selective cuts. Budget cuts based on financial information or performance information are the most representative strategies of selective cuts.

and policymakers use the financial information for budget cuts under unprecedented fiscal pressure. Considering the unprecedentedly strong and universal worldwide fiscal stress caused by COVID-19, we claim that this is a research question which is important for researchers worldwide. The discussions on the impacts of budget reductions during COVID-19 on social welfare might be possible only after we obtain empirical evidence, not just anecdotal evidence, on whether and how governments and policymakers are utilizing financial information for budget cuts. The examination on the use of financial information for budget reductions during COVID-19 can also provide valuable guidance on how to cope with a fiscal crisis that might happen in the future. Thus, in this research, we explore this issue using the experiences of South Korea. As was the case in many other countries, the central government of South Korea faced unprecedented fiscal stress due to COVID-19. Figure 1 shows the sharp increase in government debt experienced by South Korea in 2020.[7] To deal with this problem, South Korea's central government and policymakers cut the budgets of some projects not directly relevant to COVID-19 during the 2020 fiscal year (Kim, 2020; Ministry of Economy and Finance, 2020a; Ministry of Economy and Finance, 2020b). As explained in Subsection 3.2, these budget cuts were implemented under severe time constraints. We exploit these experiences in South Korea for this research. To our knowledge, this is the first quantitative study analyzing the role of financial information in the context of budget reductions under unprecedented fiscal pressure, such as that experienced during the COVID-19 pandemic.

The remainder of this paper is organized as follows. Section 2 provides the theoretical

[7] Even though South Korea's government debt as a percentage of gross domestic product (GDP) is relatively lower than those of other industrialized countries, owing to unprecedentedly rapid aging of the population, there exist widespread worries about government debt in South Korea. The central government of South Korea anticipates that the share of the population aged 65 or over among the total population will increase from 15.7% in 2020 to 34.4% in 2040 and 46.4% in 2070. On the other hand, the central government of South Korea predicts that the share of working age population, the population aged between 15 and 64, among the total population will decrease from 72.1% in 2020 to 56.8% in 2040 and 46.1% in 2070 (Statistics Korea, 2021).

foundations of this research. Section 3 introduces the institutional background of this study. Section 4 describes the data used for this research. Section 5 explains the empirical strategy. Section 6 presents the results. Section 7 concludes the paper.

2 Theoretical Foundations

Governments and policymakers facing unprecedented fiscal stress must balance the allocation efficiency of government budgets with administrative costs and political costs associated with budget cuts. To formalize the budgetary decision-making process, a simplified economic model can illustrate how these trade-offs influence the choice between two strategies: across-the-board cuts and selective cuts.[8]

Consider a finite set of projects $p \in P$, where $B_p > 0$ represents the budget allocated for each project p before budget cuts. Let s^0 denote the across-the-board cut strategy, s^1 indicate the selective cut strategy, and I_p represent financial or performance information for each project p, including budget execution rates and unused budget rates. Let $I \equiv \{I_p\}_{p \in P}$ represent the financial or performance information for all the projects. $U(s^i|I)$ indicates the aggregate utility of projects achieved under each budget cut strategy, conditional on I. Let C_p^i denote the amount of budget cut for project p under strategy s^i. In this setting, the across-the-board cut strategy s^0 reduces budgets uniformly across all projects by a fixed proportion $c \in (0,1)$, yielding $C_p^0 = cB_p$. In contrast, the selective cut strategy s^1 results in $C_p^1 = w(I_p)B_p$, where $w(I_p)$ is the proportion allocated to project p for budget cuts based on its financial or performance information, I_p.[9] In other words, the proportion

[8] As mentioned in footnote 6, budget cut strategies are basically categorized into these two types (Raudla et al., 2015).

[9] For example, if I_p denotes budget execution rates, $\frac{dw(I_p)}{dI_p} < 0$. In the case that I_p represents unused budget

assigned to project p, w_p, (i.e., $C_p^i = w_p B_p$) is c under strategy s^0 (i.e., $w_p = c$) and $w(I_p)$ under strategy s^1 (i.e., $w_p = w(I_p)$). $B_p - C_p^i$ is the remaining budget for each project p under strategy s^i, and the allocation of the remaining budgets across the projects $\{B_p - C_p^i\}_{p \in P}$ affects the aggregate utility of projects, $U(s^i|I)$. It is reasonable to assume that $U(s^1|I) > U(s^0|I)$ since s^1 is the strategy that utilizes financial or performance information I for budget reductions (i.e., $C_p^1 = w(I_p)B_p$).

The optimal choice between the strategies is impacted by minimizing costs, which include administration costs, $A(s^i)$, and political costs, $P(s^i)$. Typically, $A(s^1) > A(s^0)$, as the selective cut strategy s^1 requires higher analytical efforts than the across-the-board cut strategy s^0. Especially, under unprecedented fiscal pressure, $A(s^1)$ can be high due to limited time and constrained analytical capability to use I (Raudla and Savi, 2015). It is also common that $P(s^1) > P(s^0)$ because the across-the-board cut strategy s^0 is regarded as fair, curtails conflicts, and avoids conflict-ridden negotiations and long postponement for making decisions (Raudla and Savi, 2015; Raudla et al., 2015). Actually, the political costs, $P(s^i)$, strongly influenced by perceived fairness, are an increasing function of the variance of the proportion assigned to project p, w_p. Expressed differently, $P(s^i) = \varphi(Var(w_p))$, where φ is an increasing function, $\frac{d\varphi}{dVar(w_p)} > 0$. Then, since $Var(w(I_p)) > Var(c) = 0$, $P(s^1) = \varphi\left(Var(w(I_p))\right) > P(s^0) = \varphi(Var(c))$.

Governments and policymakers select the optimal strategy $s^* \in \{s^0, s^1\}$ that maximizes net aggregate utility: $s^* = argmax_{\{s^0, s^1\}}[U(s^i|I) - A(s^i) - P(s^i)]$. As mentioned in Section 1, previous qualitative research (Raudla and Savi, 2015; Raudla et al., 2015) strongly suggests the possibility that, since $A(s^1) + P(s^1)$ is much larger than $A(s^0) + P(s^0)$, governments and policymakers select the across-the-board cut strategy s^0 (i.e., $U(s^0|I) - A(s^0) - P(s^0) > U(s^1|I) - A(s^1) - P(s^1)$).

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rates, $\frac{dw(I_p)}{dI_p} > 0$. If I_p indicates performance information and higher I_p implies better performance, $\frac{dw(I_p)}{dI_p} < 0$.

However, financial information, such as budget execution rates and unused budget rates, is simple to calculate since it is sufficient to divide the executed budget and unused budget of a project by its total budget. It might not be politically difficult to persuade stakeholders to decrease a project's budget that is unlikely to be utilized by the end of the fiscal year. In this case, $A(s^1) + P(s^1) \approx A(s^0) + P(s^0)$. Then, since $U(s^1|I) > U(s^0|I)$, governments and policymakers choose the selective cut strategy s^1 (i.e., $U(s^1|I) - A(s^1) - P(s^1) > U(s^0|I) - A(s^0) - P(s^0)$).

The use of financial or performance information might also vary by the characteristics of department heads. Now suppose that there are three types of department heads: internally promoted bureaucrats, indicated by b; external experts, denoted by e; and politicians, represented by l.[10] It is trivial to assume that $A(s^0, d)$ and $P(s^0, d)$ do not depend on d. First, suppose that internally promoted bureaucrats are more familiar with financial or performance information and thus, can use such information more effortlessly to make budgetary decisions than the other types of department heads. In this case, $A(s^1, d) > A(s^1, b)$ for each $d \in \{e, l\}$. Then, it is possible that, while the departments led by internally promoted bureaucrats choose the selective cut strategy s^1 (i.e., $U(s^1, b|I) - A(s^1, b) - P(s^1, b) > U(s^0, b|I) - A(s^0, b) - P(s^0, b)$), the other departments select the across-the-board cut strategy s^0 (i.e., $U(s^0, d|I) - A(s^0, d) - P(s^0, d) > U(s^1, d|I) - A(s^1, d) - P(s^1, d)$ for each $d \in \{e, l\}$).[11] Second, let's assume that politicians can persuade stakeholders more easily than the other types of department heads. This implies that $P(s^1, d) > P(s^1, l)$ for each $d \in \{b, e\}$. Then, it is possible that, while the department heads, which are politicians, choose the selective cut strategy s^1 (i.e., $U(s^1, l|I) - A(s^1, l) - P(s^1, l) > U(s^0, l|I) - A(s^0, l) - P(s^0, l)$), the other department heads select the across-the-board cut strategy s^0 (i.e., $U(s^0, d|I) -$

[10] This kind of classifications of heads is common in the research on public organizations in South Korea (Jeong and Han, 2014; Yu, 2009).

[11] For simplicity, it is additionally assumed that $U(s^0, d|I)$, $U(s^1, d|I)$, and $P(s^1, d)$ are similar for all $d \in \{b, e, l\}$.

$A(s^0, d) - P(s^0, d) > U(s^1, d|I) - A(s^1, d) - P(s^1, d)$ for each $d \in \{b, e\}$).[12] Lastly, it might be easy for all department heads to utilize simple financial information, such as budget execution rates and unused budget rates, for their budgetary decision-making. It might not be challenging for any department head to persuade stakeholders to cut a project's budget that is unlikely to be used by the end of the fiscal year. This means that $A(s^1, d) + P(s^1, d) \approx A(s^0, d) + P(s^0, d)$ for all $d \in \{b, e, l\}$. In this situation, the selective cut strategy s^1 is chosen regardless of the characteristics of department heads (i.e., $U(s^1, d|I) - A(s^1, d) - P(s^1, d) > U(s^0, d|I) - A(s^0, d) - P(s^0, d)$ for all $d \in \{b, e, l\}$).

It is empirically testable whether governments and policymakers utilize financial information, such as budget execution rates and unused budget rates, by estimating the causal relationships between the financial information, I_p, and the proportion assigned to project p, w_p. If governments and policymakers use such financial information, this implies that governments and policymakers choose the selective cut strategy s^1. In this case, $\frac{dw_p}{dI_p} = \frac{dw(I_p)}{dI_p} < 0$ if I_p indicates budget execution rates and $\frac{dw_p}{dI_p} = \frac{dw(I_p)}{dI_p} > 0$ if I_p denotes unused budget rates. On the other hand, if governments and policymakers do not use such straightforward financial information and select the across-the-board cut strategy s^0, $\frac{dw_p}{dI_p} = \frac{dc}{dI_p} = 0$. We also can empirically test whether such financial information is utilized regardless of department heads' characteristics by similarly estimating $\frac{dw_p(d)}{dI_p}$ for each $d \in \{b, e, l\}$. We implement these empirical tests below exploiting South Korea's experiences during the COVID-19 pandemic.

[12] For simplicity, we make an additional assumption that $U(s^0, d|I)$, $U(s^1, d|I)$, and $A(s^1, d)$ are similar for all $d \in \{b, e, l\}$.

3 Institutional Background

3.1 The Structure of South Korea's Central Government and the Institution of South Korea's Public Finance

As is the case for most other democratic governments, South Korea's central government comprises the executive branch, the National Assembly, and the judicial branch. As of July 2020, the executive branch consists of 54 central administrative departments (Government Organization Act, 2020).

The South Korean government's fiscal year starts on January 1st and ends on December 31st. To compile the original budget, the Minister of Economy and Finance should notify each central administrative department's head of the fiscal guidance of the next fiscal year by March 31st after receiving the approval of the President. The executive branch should submit the next fiscal year's original budget proposal to the National Assembly by 120 days before the beginning of the next fiscal year. (National Finance Act, 2020). The National Assembly should deliberate, adjust, and approve the original budget proposal of the next fiscal year by 30 days before the start of the next fiscal year (Constitution of the Republic of Korea, 1987).[13]

Supplementary budgets are formulated during a fiscal year by adjusting the original budget, which was approved at the end of the last fiscal year, or the previously confirmed supplementary budget in the current fiscal year. The executive branch can compile supplementary budgets to respond to large-

[13] In reality, the executive branch handed in the original budget proposal of the 2020 fiscal year on September 3, 2019 (National Assembly Budget Office, 2019a) and the National Assembly passed it on December 10, 2019 (Ministry of Economy and Finance, 2019). The National Assembly violated the Constitution due to political reasons. However, owing to the strong administrative ability of the executive branch of South Korea, there was no problem in preparing for the immediate executions of the budgets of the 2020 fiscal year. As a result, spendable budgets were sent to each department on January 6, 2020, the first Monday of the 2020 fiscal year. The budgets required to respond to urgent needs were sent on January 2, 2020 (Relevant Ministries, 2020).

scale disasters, wars, and significant changes in domestic and foreign conditions. The significant changes in domestic and foreign conditions include economic recessions, mass unemployment, changes in the relationship between South and North Korea, and economic cooperation. When the executive branch compiles a supplementary budget proposal, the Ministry of Economy and Finance consults with the other central administrative departments. After a supplementary budget proposal is submitted by the executive branch, the proposal is deliberated and adjusted by the National Assembly. Afterwards, the National Assembly approves the supplementary budget (National Finance Act, 2020).

South Korea's central government operates the General Account, Special Accounts, and Funds to manage government revenues and government expenditures. The General Account is operated for the management of general government revenues and general government expenditures. The general government expenditures of the General Account are financed by general government revenues such as tax revenues. The central government operates Special Accounts when it needs to specially implement specific projects, own and manage specific money, or carry out accounting separately from the General Account. As of the 2020 fiscal year, there are 20 Special Accounts. The government expenditures of each Special Account are financed exclusively by government revenues from the corresponding specific sources. The central government operates Funds when it needs to flexibly manage specific money for specific purposes (National Finance Act, 2020). The revenues of Funds consist of self-generated revenues, intergovernmental revenues, surplus asset collection, and loans (Kim, 2018).

Government expenditures are classified by their functions into 16 different areas such as Public Order and Safety, National Defense, Education, and Health. The government expenditures are also categorized into 7 objects: Personnel Expenses, Goods and Services Expenses, Current Transfer Payments, Asset Acquisition Costs, Loan Repayments, Transfer Payments, and Contingency Expenses and Others (National Assembly Budget Office, 2019b). The central government of South Korea calls the basic unit of its projects a detailed project. South Korea's central government calls a group of detailed projects a unit project (Korea Public Finance Information Service, 2019).

3.2 Supplementary Budgets in the 2020 Fiscal Year

Table 1 presents the supplementary budgets in the 2020 fiscal year.[14] As Table 1 shows, due to the imminent need to respond to COVID-19, the supplementary budgets were compiled and approved quickly several times in the 2020 fiscal year. Since there were no budget reductions in either the 1st or 4th supplementary budgets as illustrated in Table 1, we concentrate on the 2nd and 3rd supplementary budgets in this subsection.[15]

The executive branch handed in the 2nd supplementary budget proposal on April 16th (National Assembly Budget Office, 2020b). The National Assembly passed the 2nd supplementary budget on April 30th. The goal of the 2nd supplementary budget was to provide emergency disaster relief money to households. Initially, the executive branch planned to distribute emergency disaster relief money to only the bottom 70 percent, in terms of income (Ministry of Economy and Finance, 2020a). The executive branch suggested the allocation of 7.6 trillion KRW to this new detailed project in the 2nd supplementary budget proposal. To prepare this necessary budget, the executive branch proposed the reduction of the budgets for 164 detailed projects. These proposed budget cuts totaled 2.9 trillion KRW. However, the National Assembly decided to expand the distribution of emergency

[14] For Table 1, we use data files for the budgets of detailed projects, which are available on the "Open Fiscal Data" website (www.openfiscaldata.go.kr) operated by the Ministry of Economy and Finance. We explain these data files in Section 4. Only the budgets of detailed central administrative department projects managed by the General Account or Special Accounts, which are the focus of this study, are used for this table.

[15] The purpose of the 1st supplementary budget was to strengthen epidemic control, aid small and medium-sized enterprises, and support people's livelihoods, job security, and regional economy (Ministry of Economy and Finance, 2020c). The objective of the 4th supplementary budget was to support small and medium-sized enterprises, improve job security, aid low-income households, and provide childcare relief funds (Ministry of Economy and Finance, 2020d). For other details of the 1st and 4th supplementary budgets, please refer to Table 1.

disaster relief money to all households (Ministry of Economy and Finance, 2020a). As a result, the budget of this detailed project increased to 12.2 trillion KRW. To meet this new requirement, the National Assembly increased the number of detailed projects subject to budget reductions to 323. Accordingly, the budget cuts increased to a total of 3.6 trillion KRW.

The executive branch submitted the 3rd supplementary budget proposal on June 4th (National Assembly Budget Office, 2020c). The National Assembly approved the 3rd supplementary budget on July 3rd. The purpose of the 3rd supplementary budget was to provide financial support to firms in critical situations, to enhance employment stability and social safety nets, and to stimulate the economy (Ministry of Economy and Finance, 2020b). In the 3rd supplementary budget proposal, the executive branch suggested the increase of the budgets for 222 detailed projects along with the decrease of the budgets for 824 detailed projects. The suggested budget increases totaled 14.3 trillion KRW, and the proposed budget reductions totaled 6.6 trillion KRW. The goal of the budget reductions was to minimize the negative effects of the budget increases on fiscal sustainability. In the approved 3rd supplementary budget, the number of detailed projects selected for budget increases rose to 236, and the number of detailed projects selected for budget reductions decreased to 822. There were 2 detailed projects with budgets that the executive branch proposed to be cut but were ultimately increased.[16] Budget increases decreased to a total of 13.7 trillion KRW, and budget cuts decreased to a total of 6.5 trillion KRW.

The significant budget reductions in the 2nd and 3rd supplementary budgets in the 2020 fiscal year were unprecedented in the light of past fiscal years. From the 2011 fiscal year to the 2020 fiscal year, supplementary budgets were compiled and approved in the 2013, 2015, 2016, 2017, 2018, 2019, and 2020 fiscal years. Except for the 2020 fiscal year, supplementary budgets were proposed and confirmed only once per fiscal year. In these fiscal years, the main purposes of the supplementary

[16] There are no publicly available materials that supply information on why the executive branch and the National Assembly made different judgements for these 2 detailed projects.

budgets were to cope with economic recessions and mass unemployment.[17] In the supplementary budget in the 2013 fiscal year, the budgets of 5 detailed projects were cut. These budget cuts totaled only 0.28 trillion KRW. There were no budget reductions in the supplementary budgets in the other fiscal years.[18]

4 Data

We obtain the data for this study from the "Open Fiscal Data" website (www.openfiscaldata.go.kr), which is operated by South Korea's Ministry of Economy and Finance. This website provides data files with comprehensive information on the revenues and expenditures of the central government. As described in Subsection 3.2, there were no budget cuts in either the 1st or 4th supplementary budgets. Therefore, we focus on the 2nd and 3rd supplementary budgets.

Specifically, we use data files for the daily executions of government expenditures in the 2020 fiscal year.[19] These data files offer information on the amounts of the cumulative annual executed budget and the total budget of each detailed project, per day. We calculate the budget execution rate of a detailed project,[20] an independent variable of this study, using these data files. To identify the most

[17] Please refer to the press releases of the Ministry of Economy and Finance (www.moef.go.kr) in these fiscal years.

[18] Thus, it is not feasible to compare the use of financial information for budget reductions during the 2020 fiscal year with the utilization of financial information for budget cuts during other fiscal years when there was no serious fiscal stress.

[19] As explained in footnote 13, the central administrative departments were able to execute budgets from the beginning of the 2020 fiscal year. As described in Subsection 3.2, the 2nd and 3rd supplementary budgets were compiled and approved in April, June, or July of the 2020 fiscal year. Thus, using daily-level data for this research is appropriate.

[20] When p in Section 2 indicates a detailed project, I_p in Section 2 includes the budget execution rate of a

updated status of budget executions before each supplementary budget, we use the annual executed budget, as accumulated one day before the submission of each supplementary budget proposal. As we explain in Subsection 3.2, the 2nd supplementary budget proposal and the 3rd supplementary budget proposal were submitted on April 16th and June 4th, respectively. Thus, we use the cumulative annual amount of the executed budgets as of April 15th for the detailed projects in the 2nd supplementary budget and as of June 3rd for the detailed projects in the 3rd supplementary budget. This assumes that the central government and policymakers can use the most updated information on budget executions for their informed decisions. Considering that the data files for the daily executions of government expenditures are usually uploaded "for the public" within a few days due to the strong administrative capability of the central government of South Korea, this assumption is quite reasonable. We calculate the budget execution rate of each detailed project by dividing the detailed project's cumulative annual executed budget by its total budget.

In addition, we utilize data files for the settlement statement of expenditures in the 2019 fiscal year. These data files provide information on the amounts of the unused budget and the total budget of each unit project in the 2019 fiscal year. This information is not available at the level of a detailed project. Therefore, the unused budget rate of a unit project,[21] another independent variable of this study, is calculated by dividing the unused budget of the unit project by its total budget. The supplementary budgets we are focusing on, were compiled and approved during the 2020 fiscal year. Since the unused budget rate in the 2020 fiscal year is calculable only after the end of the 2020 fiscal year, this information is unavailable to the central government and policymakers when they formulate the supplementary budgets during the 2020 fiscal year. Due to these reasons, we use the unused budget rate in the 2019 fiscal year, not the unused budget rate in the 2020 fiscal year, as our independent variable.

Furthermore, we use data files for the budgets of detailed projects. These data files afford

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detailed project.

[21] When p in Section 2 denotes a unit project, I_p in Section 2 contains the unused budget rate of a unit project.

information on the amounts of the budget in the original budget and the budget approved by the National Assembly in a supplementary budget for each detailed and unit project. This information is available only for the detailed and unit projects that are managed by the General Account or Special Accounts. Using this information, we calculate each detailed and unit project's budget reduction rate[22][23] between the 1st and 2nd supplementary budgets or the 2nd and 3rd supplementary budgets. For the projects in the 2nd supplementary budget, we calculate the budget reduction rate of each project by dividing the project's budget cut between the 1st and 2nd supplementary budgets by its total budget in the 1st supplementary budget. For the projects in the 3rd supplementary budget, we calculate each project's budget reduction rate as the ratio of the project's budget reduction between the 2nd and 3rd supplementary budgets to its total budget in the 2nd supplementary budget. To answer our research question on whether and how the central government and policymakers use the financial information for budget cuts under unprecedented fiscal pressure, we need to estimate the effects of budget execution rates and unused budget rates on budget reductions. Thus, we use the budget reduction rate, which shows the share of each project's budget cut relative to the project's total budget, as the dependent variable. When the budget execution rate is the independent variable, we calculate the budget reduction rates at the level of a detailed project. As explained above, the unused budget rates in the 2019 fiscal year are available only at the level of a unit project. Thus, when the unused budget rate in the 2019 fiscal year is used as the independent variable, the budget reduction rates are calculated at the level of a unit project.

The data files for detailed projects' budgets also provide information on the department that proceeds each detailed and unit project and the area that each detailed and unit project belongs to. These data files offer information on, among the General Account and 20 Special Accounts, which each

[22] The terminology, budget reduction rate, is also used by administrators such as the Kent City Manager in Ohio (Ruller, 2010).

[23] The budget reduction rate accurately corresponds to w_p in Section 2 since $C_p = w_p B_p$.

detailed and unit project is managed by. Based on this information, we create dummy variables for each department and area as well as indicators for the General Account and each Special Account. We use all these dummy variables as control variables in this study. We calculate the proportion of a project's budget relative to the department budgets, another control variable, using these data files.

Additionally, we utilize data files for the budgets of detailed projects' items. These data files offer information on the amount of each detailed project's budget that is allocated for each object. Using this information, we generate several types of control variables, such as the proportions of Personnel Expenses, Goods and Services Expenses, Current Transfer Payments, Asset Acquisition Costs, Loan Repayments, Transfer Payments, and Contingency Expenses and Others to a project's budget.

We create the control variables mentioned above based on the 1st supplementary budget for the projects in the 2nd supplementary budget and based on the 2nd supplementary budget for the projects in the 3rd supplementary budget. When we use the budget execution rate as the independent variable, these control variables are created at the level of a detailed project. When the unused budget rate is used as the independent variable, we generate these control variables at the level of a unit project.

Lastly, since the Ministry of Economy and Finance discusses with the other central administrative departments to compile a supplementary budget proposal, as described in Section 2, it is possible that the use of the financial information varies by department heads' characteristics. To examine this, we classify the department heads into three categories: internally promoted bureaucrats, external experts, and politicians. These categories are based on the department heads' profiles as reported in newspapers. We categorize a department head as an internally promoted bureaucrat if he or she passed an open competitive examination, such as the Higher Civil Service Examination, or trained at an official training school, such as the Republic of Korea Air Force Academy or the Korean National Police University, and worked in the department or other relevant departments. The relevant departments are the ones that supervise or are supervised by the department led by the head. We classify a department head as a politician if he or she is the former or present member of the National Assembly. The other department heads are classified as external experts. We create dummy variables for these

three types of department heads. The data files for the budgets of detailed projects mentioned above do not separate the budgets of the Office for Government Policy Coordination and those of the Prime Minister's Secretariat.[24] Therefore, we exclude the projects of these central administrative departments from the samples when we generate these dummy variables.

We merge all the data files explained above. Since the information provided by the data files for detailed projects' budgets is only available for the detailed and unit projects managed by the General Account or Special Accounts, our samples do not include the detailed and unit projects managed by Funds. There are 6,644 detailed and 2,278 unit projects in the 2nd supplementary budget, and 6,703 detailed and 2,283 unit projects in the 3rd supplementary budget that are managed by the General Account or Special Accounts. The projects of the National Assembly, the Supreme Court of Korea, the Constitutional Court of Korea, the National Unification Advisory Council, the National Election Commission, and the Special Investigation Commission on Humidifier Disinfectants and 4·16 Sewol Ferry Disasters are excluded since they are not central administrative departments. We drop interior transactions from our samples. We also exclude projects with budgets that increased between the 1st and 2nd supplementary budgets or the 2nd and 3rd supplementary budgets from our samples since at least some policymakers judged that these projects were directly related to COVID-19. Detailed projects with missing information on cumulative annual executed budgets and unit projects with missing information on unused budgets in the 2019 fiscal year are dropped from our analysis samples. As a result, the observations in our analysis samples decrease to 6,162 detailed and 1,973 unit projects in the 2nd supplementary budget and 5,995 detailed and 1,815 unit projects in the 3rd supplementary budget. In other words, the numbers of observations are 12,157 when the analysis is conducted at the detailed project level and 3,788 when the analysis is implemented at the unit project level.

Table 2 shows the summary statistics for selected variables. The mean of budget reduction

[24] The Office for Government Policy Coordination and the Prime Minister's Secretariat jointly constitute the Prime Minister's Office. However, the heads of these central administrative departments are appointed separately.

rates is 0.851 percent at the detailed project level and 1.022 percent at the unit project level. The mean of budget execution rates is 41.754 percent, a little lower than 50 percent. This is quite natural considering that the 2nd supplementary budget and the 3rd supplementary budget were respectively submitted on April 16th and June 4th, the early to middle periods during the 2020 fiscal year. The standard deviation of budget execution rates is 28.044 percent. This shows that there exist wide variations in budget execution rates across different detailed projects. The mean of unused budget rates in the 2019 fiscal year is 3.000 percent. This implies that, on average, the central government of South Korea spent almost all the budgets allocated for unit projects in the 2019 fiscal year. However, the standard deviation of unused budget rates in the 2019 fiscal year is 8.000 percent, much larger than the mean. This large standard deviation shows that there are huge variations in unused budget rates in the 2019 fiscal year across different unit projects. Among the detailed projects in our samples, those that are proceeded by the departments with heads that are internally promoted bureaucrats, external experts, or politicians respectively occupy 34.5 percent, 41.9 percent, or 23.6 percent. The corresponding proportions among the unit projects in our samples are 34.8 percent, 43.4 percent, or 21.8 percent.

5 Empirical Strategy

5.1 Main Analysis

If the central government and policymakers use the financial information, as mentioned in Sections 1 and 2, it can be expected that the budgets of projects with lower budget execution rates just before the submission of the supplementary budget proposal or higher unused budget rates in the 2019 fiscal year are reduced more. In this case, budget execution rates right before the supplementary budget proposal submission are expected to negatively impact budget reduction rates. Unused budget rates in the 2019 fiscal year are predicted to positively affect budget reduction rates. To examine these impacts of budget execution rates and unused budget rates on budget reduction rates, we estimate the following equation (1):

$$w_{pabdt} = \beta_0 + \beta_1 I_{pabdt} + \beta_2 Z_{pabdt} + a + b + d + t + \varepsilon_{pabdt}, \quad (1)$$

where subscript p denotes project p; subscript a indicates account a, which project p is managed by; subscript b denotes area b, which project p belongs to; subscript d indicates department d, which proceeds project p; and t denotes the tth supplementary budget. w_{pabdt} is the budget reduction rate of project p between the 1st and 2nd supplementary budgets or the 2nd and 3rd supplementary budgets. I_{pabdt} is an independent variable, such as project p's budget execution rate one day before the supplementary budget proposal submission or project p's unused budget rate in the 2019 fiscal year. w_{pabdt} and I_{pabdt} exactly correspond to w_p and I_p in Section 2. Z_{pabdt} indicates control variables, including the proportion of project p's budget relative to department d's budgets and the proportions of Personnel Expenses, Goods and Services Expenses, Current Transfer Payments, Asset Acquisition Costs, Loan Repayments, and Transfer Payments out of project p's budget. To avoid collinearity, we do not include the proportion of Contingency Expenses and Others among project p's budget in Z_{pabdt}. ε_{pabdt} is an error term. The parameter of interest is β_1. $\beta_1 = \frac{\delta w_{pabdt}}{\delta I_{pabdt}}$ accurately corresponds to $\frac{dw_p}{dI_p}$ in Section 2. Thus, if the central government and policymakers use the financial information for budget cuts, it is anticipated $\beta_1 < 0$ when we use the budget execution rate as the independent variable and $\beta_1 > 0$ when the unused budget rate in the 2019 fiscal year is used as the independent variable.[25]

[25] There might be some worries about the inertia of budgetary decision-making as implied by incremental budgeting (Wildavsky, 1984). If this is the case, we might need to include a lagged dependent variable, $w_{pabdt-1}$, as an additional control variable.

However, since there were no budget cuts in the 1st supplementary budget as explained in Subsection 3.2, the budget reduction rates for all the projects in the 1st supplementary budget, w_{pabd1}, are zero (i.e., $w_{pabd1} = 0$). Thus, it is not possible to create such a control variable, $w_{pabdt-1}$, for the projects in the 2nd

As described in Section 2 and Subsection 3.1, since the Ministry of Economy and Finance consults with the other central administrative departments to compile a supplementary budget proposal, the utilization of the financial information might vary by department heads' characteristics. To investigate this, we estimate the following equation (2):

$$w_{pabdt} = \beta_0 + \beta_1 I_{pabdt} + \beta_2 external_{pabdt} + \beta_3 external_{pabdt} \cdot I_{pabdt} + \beta_4 pol_{pabdt}$$
$$+\beta_5 pol_{pabdt} \cdot I_{pabdt} + \beta_6 Z_{pabdt} + a + b + d + t + \varepsilon_{pabdt}, \quad (2)$$

where $external_{pabdt}$ is a dummy variable for departments with heads that are external experts and pol_{pabdt} is an indicator for departments with heads that are politicians. The omitted group is the departments with heads that are internally promoted bureaucrats. The other variables are the same variables in equation (1). The parameters of interest are β_1, β_3, and β_5. β_1, $\beta_1 + \beta_3$, and $\beta_1 + \beta_5$ respectively correspond to $\frac{dw_p(d)}{dI_p}$ for each $d \in \{b, e, l\}$ in Section 2. If the financial information is used regardless of the characteristics of department heads, it is expected $\beta_1 < 0$, $\beta_1 + \beta_3 < 0$, and $\beta_1 + \beta_5 < 0$ when the budget execution rate is used as the independent variable and $\beta_1 > 0$, $\beta_1 +$

supplementary budget nor an instrumental variable, $w_{pabdt-2}$ (Arellano and Bond, 1991) or $\triangle w_{pabdt-1} = w_{pabdt-1} - w_{pabdt-2}$ (Arellano and Bover, 1995; Blundell and Bond, 1998), for the projects in the 3rd supplementary budget. For this reason, unlike budgetary decision-making in normal situations, it is not possible to include such a control variable, $w_{pabdt-1}$, in the context of this study which focuses on budget cuts under unprecedented fiscal stress.

Moreover, the correlation coefficient between the dependent variable, w_{pabdt}, and the lagged dependent variable, $w_{pabdt-1}$, for projects in the 3rd supplementary budget is extremely low (0.003 at the detailed project level and 0.04 at the unit project level). This means that, in this abnormal situation, we do not need to be concerned about an omitted variable bias incurred by the inertia of budgetary decision-making.

$\beta_3 > 0$, and $\beta_1 + \beta_5 > 0$ when we use the unused budget rate in the 2019 fiscal year as the independent variable.

As explained in Section 4, the control variables are generated at the detailed project level when we use the budget execution rate as the independent variable and at the unit project level when we use the unused budget rate in the 2019 fiscal year as the independent variable. When the budget execution rate is used as the independent variable to estimate equations (1) and (2), standard errors are clustered at the level of a detailed project. When the unused budget rate in the 2019 fiscal year is used as the independent variable, standard errors are clustered at the level of a unit project.

As described above, the independent variable in equations (1) and (2), I_{pabdt}, is project p's budget execution rate one day before the submission of the supplementary budget proposal or project p's unused budget rate in the 2019 fiscal year. In other words, the independent variables in equations (1) and (2) are predetermined variables. It is not possible for the budget reduction rate of project p, w_{pabdt} in equations (1) and (2), to have impacts on these predetermined independent variables. Owing to the strong administrative ability of the central government of South Korea, particularly the Ministry of Economy and Finance, we can calculate all of the variables in equations (1) and (2) precisely using the data from the "Open Fiscal Data" website. These imply that there are no worries about biases from reverse causality or measurement errors. As shown in Section 6, the point estimates of the coefficients of interest, especially β_1 in equation (1), are robust when we include more control variables in Z_{pabdt}. This means that it is quite unlikely that our point estimates suffer from omitted variable biases. For these reasons, it is plausible to believe that our empirical strategy provides unbiased point estimates of the coefficients of interest: β_1 in equation (1) and β_1, β_3, and β_5 in equation (2). Additionally, since the numbers of clusters in each estimation are much larger than 30, it is a reasonable assumption that the sampling distributions of the coefficients of interest asymptotically follow Gaussian distributions (Cameron et al., 2008; Cameron and Miller, 2015).

5.2 Additional Analysis

If the central government and policymakers utilize the financial information to choose projects for budget cuts, it is anticipated that projects with lower budget execution rates just before the submission of the supplementary budget proposal or higher unused budget rates in the 2019 fiscal year are selected for budget reductions. To examine this, we conduct a series of t-tests to compare the mean budget execution rate and the mean unused budget rate of the projects that were selected for budget cuts and those of the projects that were not chosen for budget reductions.[26]

Among the projects selected for budget cuts, the budgets of projects with lower budget execution rates right before the supplementary budget proposal submission or higher unused budget rates in the 2019 fiscal year are expected to be cut more significantly if the central government and policymakers utilize the financial information when deciding the exact amount of budget reductions. In other words, budget execution rates just before the submission of the supplementary budget proposal are predicted to negatively impact the budget reduction rates of the projects chosen for budget reductions. Also, unused budget rates in the 2019 fiscal year are anticipated to positively affect the budget reduction rates of the projects selected for budget cuts. To investigate this, we estimate equations (1) and (2) including only the projects selected for budget reductions in the samples.

6 Results

6.1 Main Results

Table 3 shows the effects of budget execution rates just before the submission of the supplementary budget proposal on budget reduction rates. Table 4 displays the impacts of unused budget rates in the

[26] When we run logistic regressions to investigate this, the regressions do not converge. Therefore, we implement t-tests instead.

2019 fiscal year on budget reduction rates. The estimates in Columns (1), (2), (3), and (4) of each table are obtained by estimating equation (1). For the estimations in Column (1) of each table, we do not include any control variables in equation (1). For the estimations in Column (2) of each table, we include the proportion of a project's budget relative to the department budgets, the proportions of Personnel Expenses, Goods and Services Expenses, Current Transfer Payments, Asset Acquisition Costs, Loan Repayments, and Transfer Payments to a project's budget, and account fixed effects as control variables in equation (1). For the estimations in Column (3) of each table, we include area fixed effects and department fixed effects as additional control variables in equation (1). For the estimations in Column (4) of each table, the dummy variable for the 3rd supplementary budget is included in equation (1) in addition to all the control variables mentioned above. We prefer the results in Column (4) of each table since all the control variables are included in the estimations in these columns.

The results shown in Tables 3 and 4 provide evidence that the central government and policymakers use financial information such as budget execution rates and unused budget rates when determining budget cuts. Point estimates in Columns (1), (2), (3), and (4) of Table 3 show that, as expected, budget execution rates negatively impact budget reduction rates. According to the point estimate in Column (4), an increase of 1 percentage point in a detailed project's budget execution rate decreases its budget reduction rate by 0.027 percentage point. This point estimate is statistically significant at the 1 percent level. As shown in Columns (1), (2), (3), and (4) of Table 3, this point estimate is quite robust across different specifications. Point estimates in Columns (1), (2), (3), and (4) of Table 4 show that unused budget rates in the 2019 fiscal year positively influence budget reduction rates, as predicted. The point estimate in Column (4) implies that an increase of 1 percentage point in a unit project's unused budget rate in the 2019 fiscal year increases its budget reduction rate by 0.049 percentage point. This point estimate is statistically significant at the 5 percent level. Columns (1), (2), (3), and (4) of this table show that this point estimate is quite robust across different specifications. Since the point estimates of the coefficients of the independent variables (i.e., budget execution rates and unused budget rates) are robust, it is quite unlikely that these point estimates are biased due to

omitted variables.

Column (5) of Tables 3 and 4 presents the estimation results of equation (2). The estimates in these columns suggest some evidence that the financial information is utilized for budget reductions regardless of the department heads' characteristics. According to Column (5) of Table 3, the point estimates for the effects of budget execution rates on budget reduction rates among the detailed projects of the departments led by internally promoted bureaucrats, external experts, or politicians are respectively -0.029, -0.021, or -0.032. All these point estimates are statistically significant at the 1 percent level. As reported in Column (5) of Table 4, the point estimates for the impacts of unused budget rates on budget reduction rates among the unit projects of the departments led by internally promoted bureaucrats, external experts, or politicians are respectively 0.053, 0.003, or 0.101. Even though the point estimates among the unit projects of the departments led by internally promoted bureaucrats (0.053) or politicians (0.101) are not statistically significant at the 10 percent level in two-sided tests, these are statistically significant at the 10 percent level in one-sided tests.

6.2 Additional Results

Table 5 shows the results of t-tests that examine the use of the financial information to select projects for budget cuts. For Panel A, we compare all the projects selected for budget cuts and those that were not. Our findings coincide with the prediction that the central government and policymakers use the financial information to select projects for budget reductions. The mean budget execution rate of the detailed projects selected for budget cuts is lower than that of the detailed projects not selected for budget reductions by 4.745 percentage points. This difference is statistically significant at the 1 percent level. The mean unused budget rate in the 2019 fiscal year of the unit projects selected for budget reductions is 0.832 percentage point higher than that of the unit projects not chosen for budget cuts. This difference is statistically significant at the 5 percent level. The executive branch chooses projects for budget cuts when it hands in the supplementary budget proposals. For Panel B, the projects selected

by the executive branch for budget reductions in the supplementary budget proposals are compared with those that were not chosen by the executive branch for budget cuts. The results in Panel B-1 show that the executive branch uses the financial information to select projects for budget cuts. The results in Panels B-2, B-3, and B-4 provide some evidence that the financial information is utilized to choose projects for budget reductions regardless of the characteristics of department heads. As explained in Subsection 3.2, in the 2nd supplementary budget, the National Assembly selected more projects for budget reductions in addition to the projects chosen by the executive branch for budget cuts. For Panel C, we compare the projects selected by the National Assembly for budget cuts and those that were not chosen for budget reductions either by the executive branch or the National Assembly.[27] The results present evidence that the National Assembly utilizes the financial information to select additional projects for budget reductions.

Table 6 shows the effects of budget execution rates and unused budget rates on the budget reduction rates of the projects selected for budget cuts. As we explain in Subsection 5.2, we include only the projects chosen for budget reductions in the samples. We estimate equation (1) for Columns (1) and (3) and equation (2) for Columns (2) and (4). Our findings are consistent with the expectation that the central government and policymakers utilize the financial information to decide the exact amount of budget reductions among the projects chosen for budget reductions. Columns (1) and (3) show that, among the projects chosen for budget cuts, an increase of 1 percentage point in a detailed project's budget execution rate decreases its budget reduction rate by 0.288 percentage point and an increase of 1 percentage point in a unit project's unused budget rate in the 2019 fiscal year increases its budget reduction rate by 0.173 percentage point. Both point estimates are statistically significant at the 1 percent level. Columns (2) and (4) provide some evidence that the financial information is used to

[27] The National Assembly chose additional projects for budget reductions after the executive branch selected projects for budget cuts. Therefore, the projects chosen by the executive branch for budget reductions are excluded from the samples for this comparison.

determine the amount of budget cuts among the selected projects regardless of the department heads' characteristics. In unreported results, we find that the executive branch utilizes the financial information to propose the exact amount of budget reductions for the projects chosen for budget cuts.[28] We find no evidence that the National Assembly uses the financial information to adjust the amount of budget cuts proposed by the executive branch.[29] This might be because the executive branch utilizes the financial information to suggest the amount of budget cuts before the National Assembly makes adjustments. However, our findings show that the National Assembly utilizes the financial information to decide the amount of budget cuts for the projects it independently selects for budget reductions.[30]

7 Conclusions

In this study, we quantitatively examine whether and how governments and policymakers use financial information to determine budget cuts under unprecedented fiscal pressure. Especially, we focus on financial information, such as budget execution rates and unused budget rates, which signals the progress of government projects and therefore, the allocation efficiency of government budgets. To this end, we exploit the budget reductions during the 2020 fiscal year in South Korea. Our findings present evidence that, despite time limitations, constrained analytical abilities, and the political nature of the

[28] For these examinations, we use the amount of budget cuts proposed by the executive branch, not the finally approved amount of budget reductions, as the dependent variable. On the other hand, in Tables 3, 4, and 6, we utilize the finally approved amount of budget cuts as the dependent variable.

[29] For these investigations, we use the difference between the amount of budget reductions suggested by the executive branch and the finally approved amount of budget cuts as the dependent variable.

[30] For these investigations, the amount of budget cuts proposed by the National Assembly is used as the dependent variable. However, since the National Assembly has the authority to approve the supplementary budgets, the amount of budget reductions proposed by the Nationally Assembly is the same as the finally approved amount of budget cuts for these projects.

budgetary process, the central government and policymakers utilize such financial information in a way that a government project's budget is cut more if its budget is anticipated to remain largely unused by the end of the fiscal year. In more detailed investigations, we find that the central government and policymakers use the financial information to select government projects for budget cuts and to decide the exact amount of budget reductions for those selected projects. We find some evidence that the financial information is used regardless of the department heads' characteristics.

Our findings contrast with the findings of previous qualitative research that performance information is not used for budget cuts in a fiscal crisis due to time pressure, restricted analytical capacities, and the political nature of the budgetary process (Raudla and Savi, 2015) or that the real use of financial information of policymakers, such as politicians, is quite low (Ezzamel et al., 2008; Buylen, 2014). Meanwhile, our findings imply that the points by Lee and Johnson (1998), Liebman and Mahoney (2017), Kim (2019), and Kim et al. (2021) can be applied not only to budgetary decision-making in normal situations but also to budget reductions under unprecedented fiscal stress. While we admit that our findings might be explained by other theories, we speculate that budget execution rates and unused budget rates are utilized even under unprecedented fiscal strain since the financial information is simpler than performance information or other financial information. We also conjecture that, since the central government and policymakers are trying to cut the budgets which are unlikely to be used by the end of the fiscal year, it is politically acceptable for the stakeholders of government projects with lower budget execution rates or higher unused budget rates to cut the budgets of those projects. Therefore, it might not be difficult to use budget execution rates and unused budget rates for budget reductions to respond to a fiscal crisis that can occur in the future.

The implications of our findings for social welfare are the following. On one hand, our findings imply that, in terms of the allocation efficiency of government budgets, South Korea's central government and policymakers implemented budget cuts efficiently since a government project's budget was reduced further if its budget was expected to remain largely unused by the end of the fiscal year. This might be helpful to efficiently utilize budgets for government goals under the unprecedented fiscal

pressure imposed by COVID-19. On the other hand, from a dynamic perspective, using the financial information for budget reductions to cope with the unprecedented fiscal stress caused by COVID-19 might strengthen the incentives for government officers to spend their budgets wastefully in order to avoid future budget reductions. For example, Liebman and Mahoney (2017) show that U.S. federal government agencies spend their budgets wastefully at the end, specifically in the last week, of the fiscal year since their budgets expire at year's end. If financial information such as budget execution rates and unused budget rates is used for budget reductions, this might provide government officers with similar incentives to expend their budgets wastefully. In this case, it might not be desirable for social welfare to decide budget cuts utilizing the financial information. It is not clear which effect dominates. This would be an interesting topic for future research.

In addition, as described in Section 1, many countries other than South Korea reduced the budgets of government projects not directly connected to the COVID-19 pandemic. There exist several reasons to believe that, under unprecedented fiscal crisis including COVID-19, it is not difficult to discover budgetary decision-making in other countries similar to our findings. First, Lee and Johnson (1998), Liebman and Mahoney (2017), Kim (2019), and Kim et al. (2021) indicate that governments and policymakers can utilize financial information such as unused budget rates for budgetary decision-making in normal circumstances. This literature focuses on the United States (Lee and Johnson, 1998; Liebman and Mahoney, 2017) as well as South Korea (Kim, 2019; Kim et al., 2021). Considering this literature, at least in normal situations, it might not be unreasonable to say that this kind of budgetary decision-making is globally universal. Second, governments and policymakers in other countries certainly have financial information such as budget execution rates and unused budget rates. It is quite straightforward to calculate this financial information for governments and policymakers in any country since it is enough to divide the executed budget and unused budget of a project by its total budget. In modern countries, it is hard to imagine that governments and policymakers work without this simple financial information. The findings of Liebman and Mahoney (2017) that U.S. federal government agencies expend their budgets in a wasteful manner in the last week of the fiscal year provide indirect

evidence that supports this claim. These behaviors are possible only when U.S. federal government agencies have such financial information. Third, it is natural to think that, in any country, stakeholders obtain little from the budgets which are not likely to be used by the end of the fiscal year. In this case, it might not be politically challenging for governments and policymakers in other countries to persuade the stakeholders to cut such budgets, either. The second and third reasons imply that the theoretical foundations suggested in Section 2 are sufficiently generalizable. Thus, we conjecture that the points by Lee and Johnson (1998), Liebman and Mahoney (2017), Kim (2019), and Kim et al. (2021) are applicable to budget cuts under unprecedented fiscal pressure in other countries as well. Expressed differently, there are enough reasons to speculate that governments and policymakers in other countries are also able to utilize financial information such as budget execution rates and unused budget rates for budget cuts under unprecedented fiscal stress including the COVID-19 pandemic. However, this is an empirical question out of the realm of this study. It would be another fruitful area of future research to investigate whether and how the governments and policymakers of other countries utilize financial information to determine budget reductions under unprecedented fiscal strain and its implications for their social welfare.

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Table 1. Supplementary Budgets in the 2020 Fiscal Year:
Expenditure Budgets of Central Administrative Departments

	Date		Type of Change	Amount (Trillion KRW) [Number of Detailed Projects]	
	Proposal Submission	Approval		Proposed by Executive Branch	Approved by National Assembly
1st Supplementary Budget	March 5th	March 17th	Increase	5.7 [32]	7.2 [42]
			No Change	0 [6239]	0 [6229]
			Decrease	0 [0]	0 [0]
2nd Supplementary Budget	April 16th	April 30th	Increase	7.6 [1]	12.2 [1]
			No Change	0 [6107]	0 [5948]
			Decrease	2.9 [164]	3.6 [323]
3rd Supplementary Budget	June 4th	July 3rd	Increase	14.3 [222]	13.7 [236]
			No Change	0 [5284]	0 [5272]
			Decrease	6.6 [824]	6.5 [822]
4th Supplementary Budget	September 11th	September 22nd	Increase	3.5 [11]	3.4 [16]
			No Change	0 [6319]	0 [6314]
			Decrease	0 [0]	0 [0]

Notes: We use data from the “Open Fiscal Data” website (www.openfiscaldata.go.kr), which is operated by the Ministry of Economy and Finance. Only the expenditure budgets of detailed projects managed by the General Account or Special Accounts are used for this table.

Table 2. Summary Statistics

	Detailed Projects	Unit Projects
Budget Reduction Rate (%)	0.851	1.022
	(5.583)	(4.719)
Budget Execution Rate (%)	41.754	
	(28.044)	
Unused Budget Rate (%)		3.000
		(8.000)
Internally Promoted Bureaucrat	0.345	0.348
	(0.475)	(0.476)
External Expert	0.419	0.434
	(0.493)	(0.496)
Politician	0.236	0.218
	(0.425)	(0.413)
Proportion Relative to	0.745	2.340
Department Budgets (%)	(3.756)	(7.605)
Proportion of	7.897	10.306
Personnel Expenses (%)	(22.445)	(25.429)
Proportion of	38.456	34.013
Goods and Services Expenses (%)	(42.941)	(38.851)
Proportion of	39.322	43.672
Current Transfer Payments (%)	(46.342)	(45.204)
Proportion of	14.177	11.631
Asset Acquisition Costs (%)	(31.593)	(26.141)
Proportion of	0.099	0.264
Loan Repayments (%)	(3.138)	(5.128)
Proportion of	0.016	0.050
Transfer Payments (%)	(1.283)	(2.179)
Proportion of	0.033	0.063
Contingency Expenses and Others (%)	(1.615)	(1.858)
Observations	12,157	3,788

Notes: We use data from the "Open Fiscal Data" website (www.openfiscaldata.go.kr), which is operated by the Ministry of Economy and Finance. The samples include all central administrative department projects in the 2nd or 3rd supplementary budgets in the 2020 fiscal year, excluding the projects selected for budget increases. All these projects are managed by the General Account or Special Accounts. The definitions of budget reduction rate, budget execution rate, and unused budget rate are explained in the main text. Standard deviations are presented in parentheses.

Table 3. The Effects of Budget Execution Rates on Budget Reduction Rates

	(1)	(2)	(3)	(4)	(5)
	Budget Reduction Rate (%)				
Budget Execution Rate (%)	-0.019***	-0.022***	-0.022***	-0.027***	-0.029***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)
External Expert					4.404^
					(3.324)
External Expert ×					0.007*
Budget Execution Rate (%)					(0.004)
Politician					0.121
					(0.676)
Politician ×					-0.004
Budget Execution Rate (%)					(0.007)
Proportion Relative to		0.031***	0.022**	0.023**	0.023**
Department Budgets (%)		(0.007)	(0.010)	(0.010)	(0.010)
Proportion of		0.018**	0.011*	0.012*	0.010^
Personnel Expenses (%)		(0.008)	(0.006)	(0.006)	(0.007)
Proportion of Goods and		0.016*	0.008^	0.009^	0.007
Services Expenses (%)		(0.009)	(0.006)	(0.006)	(0.007)
Proportion of Current		0.025***	0.019***	0.021***	0.019***
Transfer Payments (%)		(0.009)	(0.006)	(0.007)	(0.007)
Proportion of Asset		0.025***	0.018***	0.019***	0.017**
Acquisition Costs (%)		(0.009)	(0.007)	(0.007)	(0.007)
Proportion of		0.061**	0.049^	0.051*	0.048^
Loan Repayments (%)		(0.031)	(0.031)	(0.031)	(0.031)
Proportion of		0.017*	0.011	0.018*	0.018*
Transfer Payments (%)		(0.010)	(0.009)	(0.010)	(0.010)
Budget Execution Rate + (External Expert × Budget Execution Rate) (%)					-0.021*** (0.003)
Budget Execution Rate + (Politician × Budget Execution Rate) (%)					-0.032*** (0.006)
Account Fixed Effects		X	X	X	X
Area Fixed Effects			X	X	X
Department Fixed Effects			X	X	X
3rd Supplementary Budget				X	X
Observations	12,157	12,157	12,157	12,157	12,027

Notes: We use data from the "Open Fiscal Data" website (www.openfiscaldata.go.kr), which is operated by the Ministry of Economy and Finance. The samples include every detailed project of the central administrative departments in the 2nd or 3rd supplementary budgets in the 2020 fiscal year, excluding the detailed projects selected for budget increases. All these detailed projects are managed by the General Account or Special Accounts. The definitions of budget reduction rate and budget execution rate are explained in the main text. Standard errors clustered at the detailed project level are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1, ^ p<0.1 in a one-sided test

Table 4. The Effects of Unused Budget Rates on Budget Reduction Rates

	(1)	(2)	(3)	(4)	(5)
	Budget Reduction Rate (%)				
Unused Budget Rate (%)	0.047**	0.051**	0.049**	0.049**	0.053^
	(0.023)	(0.024)	(0.024)	(0.024)	(0.035)
External Expert					4.760^
					(3.299)
External Expert ×					-0.051^
Unused Budget Rate (%)					(0.035)
Politician					-0.808
					(0.638)
Politician ×					0.047
Unused Budget Rate (%)					(0.074)
Proportion Relative to		0.016**	0.008	0.009	0.009
Department Budgets (%)		(0.007)	(0.009)	(0.009)	(0.009)
Proportion of		0.040***	0.060	0.061	0.063
Personnel Expenses (%)		(0.015)	(0.061)	(0.061)	(0.065)
Proportion of Goods and		0.038**	0.057	0.058	0.060
Services Expenses (%)		(0.015)	(0.061)	(0.061)	(0.066)
Proportion of Current		0.043***	0.065	0.067	0.069
Transfer Payments (%)		(0.015)	(0.061)	(0.061)	(0.066)
Proportion of Asset		0.046***	0.066	0.068	0.069
Acquisition Costs (%)		(0.016)	(0.062)	(0.062)	(0.066)
Proportion of		0.058^	0.069	0.070	0.072
Loan Repayments (%)		(0.035)	(0.070)	(0.070)	(0.074)
Proportion of		0.010	0.032	0.038	0.064
Transfer Payments (%)		(0.017)	(0.061)	(0.061)	(0.066)
Unused Budget Rate + (External Expert × Unused Budget Rate) (%)					0.003 (0.009)
Unused Budget Rate + (Politician × Unused Budget Rate) (%)					0.101^ (0.066)
Account Fixed Effects		X	X	X	X
Area Fixed Effects			X	X	X
Department Fixed Effects			X	X	X
3rd Supplementary Budget				X	X
Observations	3,788	3,788	3,788	3,788	3,726

Notes: We use data from the "Open Fiscal Data" website (www.openfiscaldata.go.kr), which is operated by the Ministry of Economy and Finance. The samples include every unit project of the central administrative departments in the 2nd or 3rd supplementary budgets in the 2020 fiscal year, excluding the unit projects selected for budget increases. All these unit projects are managed by the General Account or Special Accounts. The definitions of budget reduction rate and unused budget rate are explained in the main text. Standard errors clustered at the unit project level are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1, ^ p<0.1 in a one-sided test

Table 5. Selection of Projects for Budget Cuts:
Comparing the Mean Budget Execution Rates and Unused Budget Rates

Panel A	Selected for Budget Cut	Not Selected for Budget Cut	Difference	P-value
Budget Execution Rate (%)	37.445	42.189	-4.745	0.000
	(0.620)	(0.273)	(0.880)	
	[1,115]	[11,042]		
Unused Budget Rate (%)	4.070	3.238	0.832	0.012
	(0.303)	(0.144)	(0.330)	
	[734]	[3,054]		
Panel B	**Selected for Budget Cut by Executive Branch**	**Not Selected for Budget Cut by Executive Branch**	**Difference**	**P-value**
B-1		All		
Budget Execution Rate (%)	38.999	41.990	-2.991	0.002
	(0.680)	(0.270)	(0.943)	
	[959]	[11,198]		
Unused Budget Rate (%)	3.858	3.307	0.551	0.116
	(0.319)	(0.143)	(0.350)	
	[631]	[3,157]		
B-2		Internally Promoted Bureaucrat		
Budget Execution Rate (%)	37.711	43.344	-5.633	0.000
	(1.067)	(0.457)	(1.515)	
	[361]	[3,783]		
Unused Budget Rate (%)	3.950	3.557	0.393	0.510
	(0.419)	(0.263)	(0.596)	
	[232]	[1,065]		
B-3		External Expert		
Budget Execution Rate (%)	38.248	41.842	-3.594	0.018
	(1.085)	(0.421)	(1.523)	
	[372]	[4,669]		
Unused Budget Rate (%)	3.452	3.307	0.145	0.775
	(0.420)	(0.204)	(0.507)	
	[253]	[1,363]		
B-4		Politician		
Budget Execution Rate (%)	40.133	40.401	-0.268	0.900
	(1.636)	(0.566)	(2.131)	
	[195]	[2,647]		
Unused Budget Rate (%)	4.462	2.885	1.577	0.082
	(1.189)	(0.314)	(0.906)	
	[118]	[695]		
Panel C	**Selected for Budget Cut by National Assembly**	**Not Selected for Budget Cut**	**Difference**	**P-value**
Budget Execution Rate (%)	27.888	36.786	-8.897	0.000
	(1.223)	(0.370)	(2.275)	
	[156]	[5,843]		
Unused Budget Rate (%)	5.365	3.128	2.237	0.005
	(0.904)	(0.185)	(0.796)	
	[103]	[1,765]		

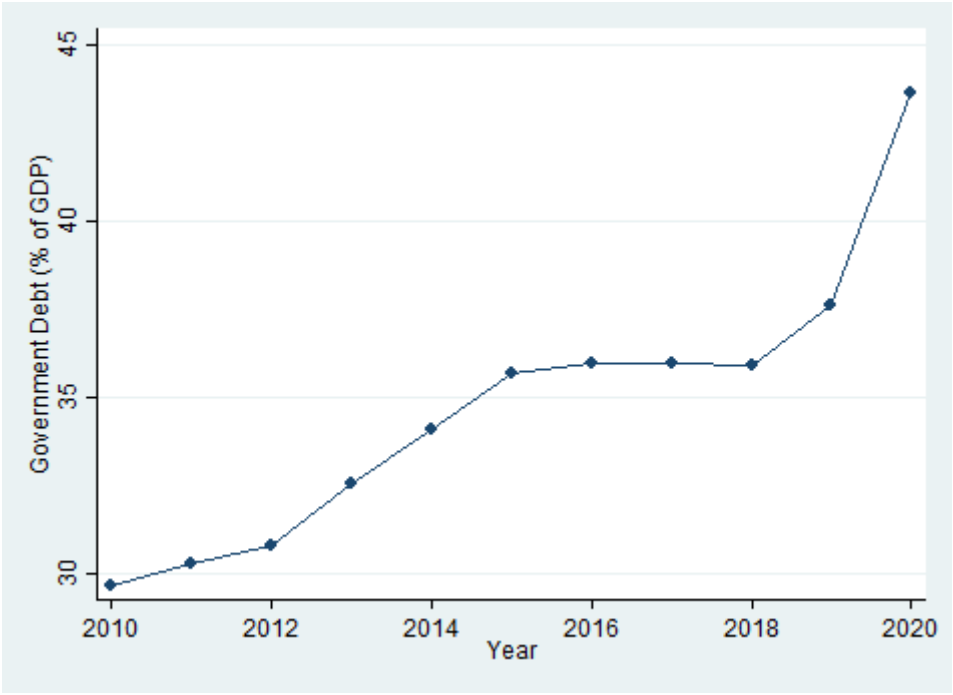
Notes: We use data from the "Open Fiscal Data" website (www.openfiscaldata.go.kr), which is operated by the Ministry of Economy and Finance. The samples include all central administrative department projects in the 2nd or 3rd supplementary budgets in the 2020 fiscal year, excluding the projects selected for budget increases. All these projects are managed by the General Account or Special Accounts. The budget execution rates are compared between detailed projects. The unused budget rates in the 2019 fiscal year are compared between unit projects. Standard errors are presented in parentheses. The numbers of projects are presented in brackets.

Table 6. The Effects of Budget Execution Rates and Unused Budget Rates on the Budget Reduction Rates of the Projects Selected for Budget Cuts

	(1)	(2)	(3)	(4)
	Budget Reduction Rate (%)			
Budget Execution Rate (%)	-0.288***	-0.280***		
	(0.030)	(0.038)		
External Expert		0.029		
× Budget Execution Rate (%)		(0.052)		
Politician		-0.077		
× Budget Execution Rate (%)		(0.071)		
Unused Budget Rate (%)			0.173***	0.350***
			(0.062)	(0.107)
External Expert				-0.341***
× Unused Budget Rate (%)				(0.124)
Politician				-0.192
× Unused Budget Rate (%)				(0.136)
Budget Execution Rate + (External Expert × Budget Execution Rate) (%)		-0.251*** (0.041)		
Budget Execution Rate + (Politician × Budget Execution Rate) (%)		-0.357*** (0.064)		
Unused Budget Rate + (External Expert × Unused Budget Rate) (%)				0.009 (0.056)
Unused Budget Rate + (Politician × Unused Budget Rate) (%)				0.158* (0.085)
External Expert		X		X
Politician		X		X
Control Variables	X	X	X	X
Account Fixed Effects	X	X	X	X
Area Fixed Effects	X	X	X	X
Department Fixed Effects	X	X	X	X
3rd Supplementary Budget	X	X	X	X
Observations	1,115	1,081	734	705

Notes: We use data from the "Open Fiscal Data" website (www.openfiscaldata.go.kr), which is operated by the Ministry of Economy and Finance. The samples include only the central administrative department projects selected for budget cuts in the 2nd or 3rd supplementary budgets in the 2020 fiscal year. All these projects are managed by the General Account or Special Accounts. The units of analysis are a detailed project in Columns (1) and (2) and a unit project in Columns (3) and (4). The definitions of budget reduction rate, budget execution rate, and unused budget rate are explained in the main text. The control variables are the proportion of a project's budget relative to the department budgets and the proportions of Personnel Expenses, Goods and Services Expenses, Current Transfer Payments, Asset Acquisition Costs, Loan Repayments, and Transfer Payments to a project's budget. Clustered standard errors are presented in parentheses. When the budget execution rate is used as the independent variable, standard errors are clustered at the detailed project level. When the unused budget rate in the 2019 fiscal year is used as the independent variable, standard errors are clustered at the unit project level. *** p<0.01, ** p<0.05, * p<0.1, ^ p<0.1 in a one-sided test

Figure 1. The Evolution of Government Debt of South Korea



Data Source: Ministry of Economy and Finance (https://kosis.kr)