

Budget Punctuations in Czech Local Government

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ABSTRACT

Purpose: This paper aims to identify which phases of the budgetary process are, according to the predictions of punctuated equilibrium theory, more prone to punctuations; to determine the factors influencing the occurrence of punctuations in these phases; and to test these assumptions using Czech regional data from 2005 to 2023.

Design/methodology/approach: The study utilises data on Czech regional current expenditure from 2005 to 2023, disaggregated into 113 functional budget lines. A two-sample Z-test is employed to determine whether the number of large annual changes in a functional budget line differs across the approved, amended, and executed budgets. A binary logit model is applied to assess whether external shocks, electoral changes, or budget complexity increase the likelihood of punctuations in the different budget phases.

Findings: The analysis reveals that punctuations occur more frequently in budget allocation than in actual spending, and that greater complexity in the budgeting process leads to an increased number of punctuations. The number of punctuations rose during the rebudgeting phase in response to the COVID-19 outbreak in 2020 and the influx of Ukrainian refugees in 2022. Elections and changes in government leadership were found to have no significant impact.

Academic contribution to the field: This paper offers a novel application of punctuated equilibrium theory by linking it to the distinct phases of local government budgeting. It traces the evolution of punctuations across the stages of approved, amended, and executed budgets, and evaluates the influence of external shocks. The study demonstrates the theory's

adaptability in analysing the effects of unprecedented events on public policy and budgeting.

Originality/significance/value: The research recognises the differentiation between local government budgeting phases in terms of institutional costs and exogenous shocks affecting decision-making and implementation. This segmentation of the budgetary process makes a significant contribution to both the theoretical understanding and practical application of the punctuated equilibrium theory.

Keywords: budgetary process, Czech Republic, local government, punctuated equilibrium theory, rebudgeting

Proračunske diskontinuitete v češki lokalni samoupravi

POVZETEK

Namen: avtorja si prizadevata ugotoviti, katere faze proračunskega procesa so po napovedih teorije prekinjenega ravnotežja bolj podvržene diskontinuitetam; določiti dejavnike, ki vplivajo na pojav diskontinuitet v teh fazah; ter te predpostavke preveriti na podatkih čeških regij za obdobje 2005–2023.

Načrt/metodologija/pristop: študija uporablja podatke o tekočih izdatkih čeških regij za obdobje 2005–2023, razčlenjene na 113 funkcionalnih proračunskih postavk. Za ugotavljanje, ali se število velikih letnih sprememb v posamezni funkcionalni postavki razlikuje med sprejetim, spremenjenim (rebalansiranim) in realiziranim proračunom, je uporabljen Z-test za dva vzorca. Za oceno, ali zunanji pretresi, volilne spremembe ali kompleksnost proračuna povečajo verjetnost diskontinuitet v različnih proračunskih fazah, je uporabljen binarni logitni model.

Ugotovitve: analiza razkrije, da se diskontinuitete pogosteje pojavljajo pri proračunskih alokacijah kot pri dejanski porabi ter da večja kompleksnost proračunskega procesa vodi v večje število diskontinuitet. Število diskontinuitet se je v fazi rebalansa povečalo kot odziv na izbruh covid-19 leta 2020 in prihod ukrajinskih beguncev leta 2022. Volitve in spremembe v vodstvu vlade niso imele pomembnega (statistično značilnega) vpliva.

Akademski prispevek k področju: članek ponuja novo aplikacijo teorije prekinjenega ravnotežja, saj jo povezuje z različnimi fazami proračunskega procesa v lokalni samoupravi. Sledi razvoju diskontinuitet skozi faze sprejetih, spremenjenih in realiziranih proračunov ter ocenjuje vpliv zunanjih pretresov. Študija pokaže prilagodljivost teorije pri analizi učinkov dogodkov brez primere na javne politike in proračun.

Izvirnost/pomen/vrednost: raziskava prepoznava razlikovanje med fazami lokalnega proračunskega procesa glede institucionalnih stroškov in eksogenih pretresov, ki vplivajo na odločanje in izvedbo. Ta segmentacija proračunskega procesa je pomemben prispevek tako k teoretičnemu razumevanju kot tudi k praktični uporabi teorije prekinjenega ravnotežja.

Ključne besede: proračunski proces, Češka republika, lokalna samouprava, teorija prekinjenega ravnotežja, rebalans proračuna

JEL: H70, H72

1 Introduction

The theory of punctuated equilibrium explains long-term empirical observations of budgetary behavior, showing that periods of relative stability or minor changes (so-called increments) are interrupted by more sizable changes (so-called punctuations) (True et al., 1999). Although the pattern, predicted by the punctuated equilibrium theory, was confirmed in every study examining public budgets (True et al., 2007), little attention was paid so far to the different phases of the budget cycle, when the budget is first approved by the legislative body, then goes under numerous budget amendments (rebudgeting) and faces impossibility or unwillingness to spend fully the budget allocation, ultimately leading to substantial differences between the approved, amended, and executed budgets (Dougherty et al., 2003).

The purpose of the paper is to determine what phases of the budgetary process are according to the predictions of the punctuated equilibrium theory more prone to punctuations, which factors determine the occurrence of punctuations in the different budget phases, and to test these assumptions using Czech regional data from 2005 to 2023.

We take advantage of the availability of detailed budget data in all three budget phases for the 13 Czech regions and use data on the Czech regional current expenditure from 2005 to 2023 disaggregated into 113 functional budget lines. The two-sample Z-Test is used to determine if the number of large annual changes in a functional budget line differs in the approved, amended, and executed budgets. A binary logit model is used to test whether external shocks, electoral change or budget complexity make policymakers more likely to adopt punctuations in the different budget phases.

The use of the punctuated equilibrium theory framework allowed us to expand the analysis of resource allocation in the public sector from merely analyzing final budget data to including the decision-making process that precedes these final outcomes as well. The decision-making process involves many participants and responds to a variety of rules, characteristics of the internal and external environment, and various impulses. The punctuated equilibrium theory provides predictions about how all these variables can affect the final allocation, and its verification in different contexts generally brings a better understanding of the decision-making processes in the allocation of public funds.

We see the contribution of our paper as twofold: in identifying the impact of additional budgetary changes during the fiscal year and in using unique data on the second tier of local government from a country in Central and Eastern Europe with fragmented public administration. To our knowledge, our study is one of the few studies (e.g., Sebők and Berki, 2017, Sebők and Berki, 2018, Wordlizek, 2021 or Pernica and Zdražil, 2022) testing the hypotheses of the punctuated equilibrium theory in the Central and Eastern Europe.

The paper begins with an introduction to punctuated equilibrium theory and its predictions regarding punctuations in various phases of the budget process. Five hypotheses are proposed to be tested. This is followed by an overview of the characteristics of Czech regions and the local government budget process. Subsequently, the data, variables, and methods used to test the hypotheses are described. Finally, the results are presented and discussed.

2 Punctuated Equilibrium Theory of Budgeting

Punctuated equilibrium theory offers an agenda-based model of budgeting when the boundedly rational process of human decision-making and disaggregated political institutions cause budgets to change only incrementally until a radical change occurs (True et al., 2007). Baumgarten and Jones proposed the theory for the very first time in 1993 and in the next two decades, they thoroughly developed, explained, and tested it with several coauthors.

When decision makers incrementally adjust this year's budget from a starting point of last year's budget, the annual changes within a given spending category have a normal distribution. This is, however, not the situation we observe in the real world, where decision-makers prioritize information and their subsequent actions and which leads to non-Gaussian dynamics (Jones et al., 2009). The distribution of annual budget changes is leptokurtic, with a high central tendency and fat-tails (Jordan, 2003).

Policymaking institutions are generally sticky and do not allow continuous adjustment to the environment. Jones et al. (2003) mark this as institutional friction. Friction results from either elevated decision costs or disproportionate information processing. The more friction an institution imposes on its ability to adapt to changes in the environment, the more punctuated is the institution's process of change (Park and Sapotichne, 2020).

Institutional friction is influenced by institutional costs, which include decision and transaction costs (Jones et al., 2003, and Jones and Baumgartner, 2005). Decision costs are incurred by actors that try to get to an agreement, such as bargaining costs or institutionally imposed costs, e.g., voting rule which requires that majority of all regional council representatives approve the budget, not just majority of representatives present at the meeting.

Transaction costs are incurred after the actors reach an agreement, e.g., costs to complete the transaction or costs of compliance with the agreement. Decision costs severely outweigh the transaction costs (Jones et al., 2003).

What are the institutional costs during the different phases of the budget cycle and how do they impact the occurrence of budget punctuations?

True et al. (2007) claim that punctuations occur at all levels of policymaking, all levels of the budget, and during all time periods. They expect that hierarchy will produce inequality in the transmission of punctuations from one level to another and by comparing the outputs of diverse institutional ar-

rangements. Jones et al. (2003) confirm that the kurtosis is higher for budget authority than budget outlays, meaning that the institutional costs hence the institutional friction are higher earlier in the budget process, leading to more punctuations in the budget debate and approval phase.

Decisions about how scarce resources are allocated to various social and economic needs take place throughout the entire process. The budget is primarily a political tool that reflects the preferences of individual participants in the process, and the resulting budget depends on whose preferences prevail (Wildavsky, 1992).

Before the beginning of the given budget year, the draft budget is prepared, debated, and approved by the legislative body. This phase lasts several months, many participants are involved, and getting an agreement may be quite costly, leading to more punctuations.

During the budget year, the executive body manages the affairs according to the approved budget. The approved budget is continuously adjusted through budget amendments (rebudgeting). The amended budget is the initially approved budget plus all budget amendments and fully reflects political will regarding the budget allocation.

The key player in this budget execution phase is the executive body, compared to the legislative body decisive in the first phase. The decision-making should be more flexible due to the composition of the executive body (there are only representatives from the leading party or bound by a coalition agreement) and likely higher professionalism of the representatives (especially in local governments members of the assemblies are involved in the administration only part-time). Therefore, theoretical expectations are:

H1: Approved budget has more punctuations than the amended budget.

Budget execution may or may not equal the amended budget and reflects impossibility, unwillingness, or intention not to spend the entire budget appropriation. Budget execution also brings some flexibility to the budgetary process (Raudla and Douglas, 2021).

In the execution phase, professional management plays an important role. This makes this phase quite flexible and thus less punctuated as suggested by Park and Sapotichne (2020) who confirmed a decreasing effect of bureaucracy on punctuated policy processes in Michigan cities. After the end of the budget year, the final account is compiled, audited, and approved by the legislative body. Therefore, it is expected that:

H2: Actual spending has fewer punctuations than the approved budget.

Budgets react to both endogenous and exogenous forces, which may include changing levels of public attention, striking, or compelling new information (True et al., 2007). Cavalieri (2025) expects that crisis moments produce budget punctuations as the urgency of the situation significantly reduces the time available for bargaining processes. The derived hypothesis is the following:

H3 Exogenous shocks lead to more punctuations.

Major policy changes are often associated with turnover in the composition of the decision-making body (True et al., 2007) or with electoral replacement. Kwak (2017) confirmed that the change in party control of the governorship in US states increased the number of budget punctuations. Consequently, the following hypothesis predicts that:

H4 The electoral change leads to more punctuations.

In the case of complex issues policymakers must consider more information and deal with less agreement about the priorities, which leads to the dynamic of policy change characterized by punctuated equilibrium theory (Epp and Baumgartner, 2017). Therefore, the more complex a policy area is, the greater the likelihood of extreme spending changes.

In the case of the budget and budgetary process, complexity is related to comprehensiveness, i.e., all operations of the given government unit are included and treated the same way (Premchand, 1983), which means that all operations are part of a single budget or that there is a single decision-making process for all operations. This allows for the following hypothesis:

H5 Complexity in the budgetary process leads to more punctuations.

We test these hypotheses using the Czech regional budget data to explore the difference between local government budgeting phases and the impact of exogenous shocks, electoral change or budget complexity when reaching and implementing a decision.

3 Czech Regions and Local Government Budgeting and Rebudgeting

After 1989, the Czech Republic transitioned from a centralized system towards a decentralized system of self-governing subnational governments. It has a two-tier subnational system with 6,254 municipalities, 13 regions, and the capital city of Prague, which has unique dual status as both a region and a municipality. The establishment of regions was legislated in 2000 and came into force in 2001. The first elections for regional assemblies took place in 2000 and since then have taken place every four years in the first half of October. In 2003, the competencies of the regions were significantly expanded in connection with the public administration reform and the abolition of district offices.

The regional assembly is an elected body. The regional committee represents the region's executive body and is composed of the president, vice presidents, and other members elected by and from within the regional assembly. The regional office is led by a director and presents a highly professional public office with four to seven hundred employees.

Regions exercise simultaneously the so-called own responsibility, which is exercised by the region and its bodies on its behalf, and delegated responsibility, which is performed on behalf of the state and the state is legally responsible for the performance of the delegated power. The Czech regions are responsible for the delivery of many key services. Their main spending categories include education, transportation, social services, healthcare, culture, and administration (Janský and Kolář, 2024). They are also responsible for the management of their property (Bečica, 2015), the development of their territory, regional economic development, and environmental protection (OECD, 2020).

Two thirds of regional revenue are earmarked grants and transfers; most of them are passing through transfers from the state budget to all the schools in the territory of the region and social care facilities. About 30% of revenue comes from the shared income and value-added tax. The shares of the individual regions have been stipulated by law since 2005 and roughly followed the estimated level of costs associated with delivering delegated services and functions. The individual regions cannot influence the volume of shared tax revenue they receive, so these revenues resemble more unconditional block grants than taxes (Blöchliger and Petzold, 2009). There is a debate to replace the fixed share by a formula now that would better reflect the needs of individual regions.

Czech legislation provides a general framework for the local government's budgetary process, including budget amendments, information disclosure, and roles that different subjects play in the budgetary process. Regions use detailed and binding economic and functional classifications of revenues and expenditures, which are uniform for all public budgets. The key parameters are summarized in Table 1.

The regional budget is prepared and debated for several months by both elected and professional regional officials, heads of regional organizations, and other relevant subjects (Memeti and Kreci, 2016). The regional assembly approves by most of all representatives the budget in a public meeting after the budget proposal is available online for at least 15 days. If the budget is not approved by the end of the previous year, special rules (the so-called budget provisory) are applied. Budget provisory is very rare in the regions' case.

The authority to implement budget amendments is divided between the regional assembly and the regional committee when the assembly decides on the extent of delegation of the authority to the committee. This decision is taken annually as part of the budget approval process. Four regions approve unlimited delegations, five define precise limits, usually limited by a specific amount (CZK 2 or 5 million, which allows approval of majority of amendments needed), and four define the scope of the power to make amendments, such as a specific list of operations. Only one region (South Bohemia) also delegates powers to the regional president and deputy in case of using reserves and other necessary measures. There were no changes in the extent of delegation between 2019 and 2022.

Table 1: Local governments budgetary process

Fiscal year

The fiscal year is given by law and is equal to the calendar year for all public budgets.

Single budget

The annual budget contains both current and capital operations.

Balanced budget requirement

The budget should be prepared as balanced. A deficit is allowed only if it can be covered by surplus from previous years or repayable resources, guaranteed by contract. Local governments are subject to debt regulation.

Budget classification

The uniform economic and functional budget classification applies to all public budgets.

Accounting standard

Budgetary documents and reports use cash accounting. Next to it accrual accounting and the double entry system are required for all local governments.

Multi-annual outlook

It is compiled mandatory and contains aggregated data on revenues, expenditures, debts, financial resources, and needs for a period of two to five years.

Budget preparation

The preparation of the budget draft must reflect the relationship with other public budgets. The draft budget must be available to the public before approval. Citizens can submit their comments in writing or orally at the council session.

Budget approval

The budget is approved by the regional council, i.e., the majority of all council members.

Budget amendments

Amendments are obligatory in the event of any changes in financial relations with other public budgets, at the legal level of control, or in the case of a danger of a deficit increase.

Year-end report

The year-end report includes budget reports, accounting statements, and information on the management of all local government organizations.

Audit

Audit of financial and legal compliance is obligatory for all local governments. In the case of regions, it is provided by the Ministry of Finance or private auditors, in the case of municipalities by regions or private auditors.

Financial reporting

Local governments submit monthly budget reports and quarterly accounting statements to the Ministry of Finance in a uniform format. These reports are publicly available through the application Monitor.

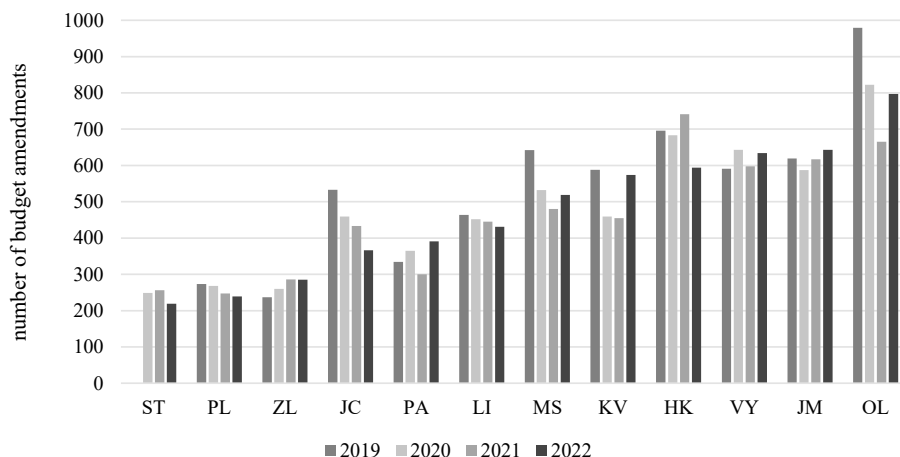
Information disclosure

Local governments publish on the Internet the budget and year-end report 15 days before their approval, and the approved budget, year-end report, and budget amendments within 30 days after their approval.

Source: Budgetary rules for local governments (250/2000 Coll.), Law on the Regions (129/2000 Coll.), Budget classification (412/2021 Coll.)

Rebudgeting is a consequence of specific organizational cultures, as the praxis among local governments differs (Anessi-Pessina et al., 2012) and the Covid-19 pandemic was expected to bring an unprecedented magnitude of rebudgeting (Anessi-Pesina et al., 2020). This expectation was not confirmed in the case of the Czech regions as all the regions showed only minor variability in both the number (Figure 1) and magnitude (Figure 2) of budget amendments over the period 2019-2022.

Figure 1: Number of budget amendments (12 regions, 2019-2022)



Source: authors, based on data provided by the regions on their respective webpages

Note that abbreviations represent the names of individual regions:

HK = Královéhradecký, JC = Jihočeský, JM = Jihomoravský, KV = Karlovarský,
 LI = Liberecký, MS = Moravskoslezský, OL = Olomoucký, PA = Pardubický,
 PL = Plzeňský, VY = Kraj Vysočina, ZL = Zlínský; Ústecký kraj is not shown as it uses an incomparable numbering system, i.e., it approved between 18 and 21 amendments between 2020 and 2022; data for Středočeský kraj (ST) for 2019 are not available due to changes in the reporting system.

Despite the information disclosure mandate on budget amendments (in force since 2017), rebudgeting is much less transparent than budgeting. It comprises several (many) minor amendments which are difficult to monitor and control both for the council members and the public (Anessi-Pessina et al., 2012). This is further strengthened in the Czech case by delegating the authority from the legislative to the executive body, which decides in closed meetings. Rebudgeting is, to a great extent, an informal and elusive process (Alesani, 2012). Rebudgeting complements the initial budget formulation (Anessi-Pessina et al., 2012) and can significantly change the initial budget (Anessi-Pessina et al., 2013).

Different regions use different budgeting practices allowed by law, which differ in comprehensiveness. Comprehensiveness is a basic principle in public budgeting and requires that all resources are allocated through the same process (Tommasi, 2013) and rebudgeting may violate this principle (Lauth, 2002). The level of comprehensiveness is related to the way expected trans-

fers are or are not included in the approved budget. Figure 2 shows the magnitude of rebudgeting, i.e. (amended – approved expenditure)/amended expenditure.

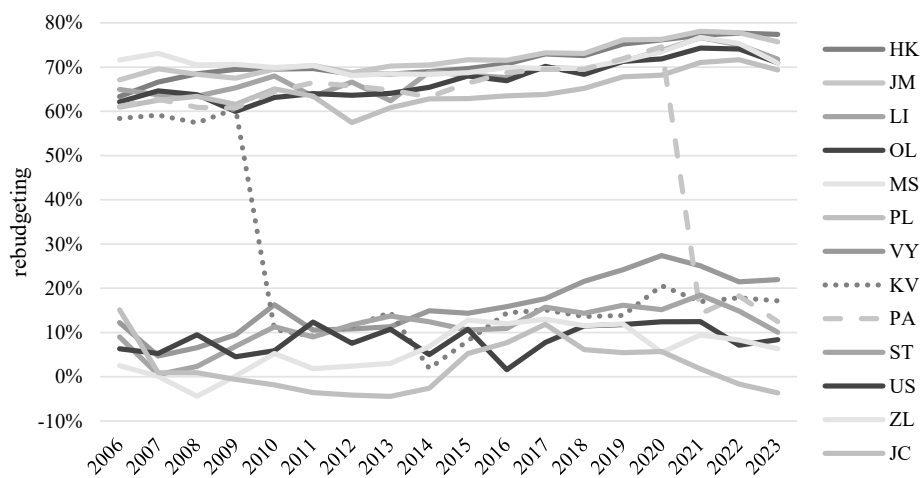
Here we can observe two clusters: The low cluster with eight regions in 2023, where the rebudgeting of current expenditure is below 30%, and the high cluster with five regions, where the rebudgeting is between 70 and 80%. Two regions did move from the high cluster to the low one: Karlovarský kraj (KV) in 2010 and Pardubický kraj (PA) in 2021.

A more detailed analysis shows that the primary reason for both the volume of rebudgeting and differences among the regions is related to how the approved budget deals with transfers from the central level.

Regions in the low cluster estimate expected transfers based on the current budget year and information provided in the state budget proposal for the next year. These estimates are approved in the budget, as well as expenditure financed from these transfers. Rebudgeting thus concerns only a small fraction of both transfers and related expenditures.

Regions in the high cluster do not budget for current transfers, and most or all transfers are included in the budget as rebudgeting in the first months of the year. Thus, the volume of rebudgeting of both transfers and the matching expenditure is above 70%.

Figure 2: Magnitude of rebudgeting of current expenditure (13 regions, 2006-2023)



Source: authors, based on data from Monitor

Note: HK = Královehradecký, JC = Jihočeský, JM = Jihomoravský, KV = Karlovarský, LI = Liberecký, MS = Moravskoslezský, OL = Olomoucký, PA = Pardubický, PL = Plzeňský, ST = Středočeský, US = Ústecký, VY = Kraj Vysočina, ZL = Zlínský; the legend is ordered according to rebudgeting in 2023
Rebudgeting = (amended – approved expenditure)/amended expenditure

While the regions in the low cluster comply with the principle of complexity and the budget debate concerns the full budget, the regions in the high cluster debate do not. Division of the decision-making into two periods – the allocation of own resources before budget approval and the allocation of transfers during rebudgeting – limits the complexity of the first period.

4 Data and Methods

The center of our attention is budget punctuation in current expenditure, i.e. a large annual change in a functional budget line in approved (B_PUN), amended (A_PUN), and executed (E_PUN) regional budgets.

The percentage change for each functional line is calculated as

$$change_t = \frac{budget_t - budget_{t-1}}{budget_{t-1}} \quad (1),$$

where the budget is either approved (B), amended (A), or executed (E).

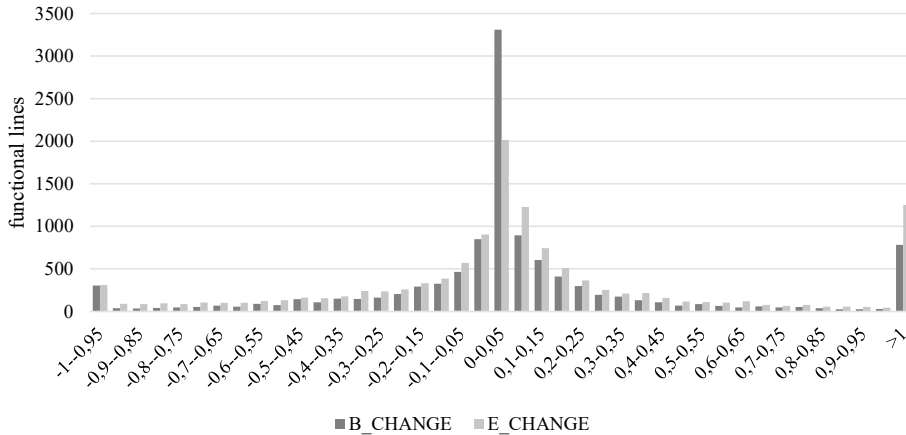
Functional line represents current expenditure for a given function. Current expenditure corresponds to the highest aggregation of economic classification, i.e., class 5, and to define a function we use the second lowest level of functional classification, e.g., 311x Preschool and elementary education, 312x Secondary education, 313x Institutional educational facilities, etc.

In total, our analysis includes 113 different functional lines, in the case of the individual regions there are between 33 and 59 functional lines in the approved budget, 42 and 68 lines in the amended budget, and 40 and 64 lines in the actual execution (Figure 3). Data on 13 regional budgets come from Monitor, a data portal provided by the Ministry of Finance. We use annual data for the period 2005 to 2023. The Monitor includes budget data using detailed economic and functional classifications. Both classifications use a 4-level coding system. Data for approved and amended budgets and for actual execution are provided.

To set threshold values, we follow Jordan (2003), i.e., a percentage decrease of more than 25 percent or a percentage increase of more than 35 is a punctuation. Budget punctuation is a discrete variable that can take a value 1 in the case of punctuation or 0 in the case of incremental change.

Similarly, to Kovari (2016), we observe functional lines with zero values in some years, which makes it impossible to calculate a percentage change due to a zero denominator ($budget_{t-1}$) in the percentage change formula (1). In that case, if $budget_{t-1}$ does not equal zero, this change is labelled as punctuation.

Figure 3: Distribution of budget changes in approved and amended budget (2005-2023)



Source: authors, based on data from Monitor

Note: B_CHANGE is the annual change in the approved budget and E_CHANGE is the annual change in the executed budget, both calculated using formula (1)

To test H1 (Approved budget has more punctuations than the amended budget) and H2 (Actual spending has less punctuations than approved budget) we compare if the share of budget punctuations in functional budget lines differs in the approved (B_PUN), amended (A_PUN), and executed (E_PUN) regional budgets. We use the two-sample Z-Test to determine if the meaning of two variables are equal.

To test H3 (Exogenous shocks lead to more punctuations), H4 (Electoral change leads to more punctuations) and H5 (Complexity in the budgetary process leads to more punctuations) we use the binary logit model for the estimation of factors influencing the dependent variable. The dependent variable is a discrete one and therefore this model is appropriate in this case. It is based on the maximum likelihood principle.

We estimate this equation:

$$PUNC = f(COVID, UKR, ELECT1, PERSON, PARTY, ELECT, COMP, C) + \varepsilon \quad (2)$$

where PUNC is punctuation in a functional line in a given budget process phase, COVID and UKR capture exogenous shock to test H3, ELECT1, PERSON, PARTY and ELECT represent electoral change to test H4 and COMP characterizes budget process complexity to test H5. C is a vector of control variables.

A similar approach was used by Robinson et al. (2007) to analyze the effects of organizational size and centralization on the budgetary process, by Flink (2017) to examine the impact of organizational performance and teacher turnover, and by Sebők and Berki (2017) to investigate factors influencing Hungarian state budget punctuations.

Czech regions play an important role in emergency management when they, among others, coordinate the delivery of health care services, provision for public health safety, emergency accommodation, and drinking water and food supply (Vilášek and Fus, 2023) so they have played a crucial role during the two recent unforeseen and unprecedented events: the COVID-19 pandemic starting in 2020 and the refugee wave after Russia invaded Ukraine in February 2022. To test H3 (Exogenous shocks lead to more punctuations), we introduce variables COVID and UKR. Both are dummy variables and are equal to 1 in the years 2020 and 2022, respectively.

Elections and their results, i.e., change in the party control of the assembly, are exogenous forces that may cause a change in the decision design and lead to a major change in choice (True et al., 2007). To test H4 (Electoral change leads to more punctuations), we introduce a set of dummy variables indicating the first post-election year (ELECT1), change in the party of the regional president (PARTY), and change of the regional president (PERSON). Data on regional presidents and their party affiliation come from the webpages of the individual regions.

According to the literature on political business cycle, governments strategically time policies following the electoral cycle to maximize their re-election chances (Nordhaus, 1975). Therefore, major reforms do not take place late in the election cycle, e.g., austerity reforms (Strobl et al., 2021), tax reforms (David and Sever, 2024), or welfare reforms (Wenzelburger et al., 2020). Consequently, there will likely be less punctuations in the election year. We introduce the dummy variable ELECT to test this assumption.

To test the impact of decision complexity or budget process comprehensiveness (H5) we introduce a dummy variable COMP, which reflects the region's praxis when budgeting transfers. Hence, COMP = 1 if the approved budget of the region is comprehensive, i.e., it includes transfers, COMP = 0 otherwise.

Additional control variables characterize the individual functional budget lines regarding their volume and their changes over the budget cycle. Volume of the functional line in the different budget phases - budgeted spending (B), spending in the amended budget (A) and actual or executed spending (E) - is expressed in millions CZK. Changes in the functional lines over the budget cycle are expressed as ratios when rebudgeting (REB) is amended to approved budget and execution (EXE) is actual to amended spending.

Table 2 provides detailed specification of all the variables and Table 3 shows the major descriptive statistics.

Table 2: List of variables

Variable	Description
B_PUNC	Dummy B_PUNC=0 if the approved budget annual change is between -0.25 and 0.35, B_PUNC=1 otherwise
A_PUNC	Dummy A_PUNC=0 if the amended budget annual change is between -0.25 and 0.35, A_PUNC=1 otherwise
E_PUNC	Dummy E_PUNC=0 if the actual spending budget annual change is between -0.25 and 0.35, E_PUNC=1 otherwise
REB	Rebudgeting = amended budget/approved budget
EXE	Execution = actual spending/amended budget
B	Budgeted spending in millions CZK
E	Actual spending in millions CZK
A	Amended budget spending in millions CZK
COVID	Dummy COVID=1 in the year 2020, COVID=0 otherwise
UKR	Dummy UKR=1 in the year 2022, UKR=0 otherwise
ELECT	Dummy ELECT=1 in the years of election, i.e., 2008, 2012, 2016, and 2020, ELECT=0 otherwise
ELECT1	Dummy ELECT1=1 in the first year after the election, ELECT=0 otherwise
PERSON	Dummy PERSON=1 in the first year after the regional president has changed, i.e., his/her first complete budget year, PERSON=0 otherwise
PARTY	Dummy PARTY=1 in the first year after the party of the regional president has changed, i.e., his/her first complete budget year, PARTY=0 otherwise
COMP	Dummy COMP =1 if the region includes transfers into the approved budget, COMP =0 otherwise

Source: authors

Table 3: Descriptive statistics

	average	median	min	max	st. dev.	skewness	kurtosis
B_CHANGE	1.34	0	-1	3,333	41.233	62.632	4,465.6
A_CHANGE	4.07	0.0304	-1	11,495	133	64.948	4,952.7
E_CHANGE	6.03	0.0269	-1	18,121	209.96	66.637	5,131.5
B_PUNC	0.46	0	0	1	0.4982	0.1709	-2.0
A_PUNC	0.44	0	0	1	0.4959	0.2587	-1.9
E_PUNC	0.42	0	0	1	0.4935	0.3263	-1.9
REB	16.43	1.14	0	14,056	213.75	51.768	3,149.2
EXE	0.83	0.97	0	2.5235	0.26501	-1.8344	2.6
B	130.74	5.11	0	17,986	578.97	12.514	238.3
A	233.69	12.37	0	18,975	832.71	8.4155	106.3
E	226.09	9.75	0	18,973	830.02	8.4926	107.9
COVID	0.06	0	0	1	0.2308	3.8445	12.8
UK	0.06	0	0	1	0.2292	3.8769	13.0
ELECT	0.22	0	0	1	0.4159	1.3344	-0.2
ELECT1	0.22	0	0	1	0.4154	1.3399	-0.2
PERSON	0.18	0	0	1	0.3808	1.7017	0.9
PARTY	0.14	0	0	1	0.3521	2.0172	2.1
COMP	0.46	0	0	1	0.4981	0.1741	-2.0

Source: authors

The description of the budgeting and rebudgeting process in 13 Czech regions is based on review of the valid legislation and information provided by the individual regions. We have approached the heads of the economic or similar departments with an e-mail request for budget guidelines (May 2023). The rest of the needed information (list of budget changes, delegation of responsibility from council to commission, or date of budget approval) was provided on the respective web pages or e-mail requests.

5 Results

The share of punctuations differs in the different budget phases. The highest (46%) is in the case of the approved budget, the punctuations in the amended and executed budgets are present in 39% and 39,8% of the functional lines, respectively. The two-sample Z-Test confirmed statistically significant differ-

ences between the approved and amended and approved and executed budget, but no significant difference between the amended and executed budget. The high number of punctuations is related to the further complexity of decision-making caused by the intergovernmental relationships (Meza, 2022).

The above-presented results confirm both H1 (Approved budget has more punctuations than the amended budget) and H2 (Actual spending has less punctuations than approved budget) and are in line with the predictions of the punctuated equilibrium theory. Punctuations are more common if the institutional, mostly the decision costs are high: approved budget is a result of demanding political negotiations and finding a coalition agreement for a single vote. This hinders smooth, incremental changes with a normal distribution and leads to many punctuations. The amended and executed budgets are adjusted through many small decisions which are more flexible and result in fewer punctuations. During the budget year, many of the originally approved punctuations do not materialize.

Results of the binary logit models show factors that influence the occurrence of budget punctuations in the different phases of the budget process (Table 4).

The approved budget is a result of budget preparation and debate that took place in the last months of the previous year. Punctuations in the approved budget B_PUNC are more common in regions with comprehensive budgeting COMP and less common in the election years ELECT.

The role of the volume of current expenditure in a functional line is negative, i.e., functional lines, with a small volume of current expenditure, experience punctuations more often than functional areas with a higher volume. This relationship is confirmed in all the models and variables budgeted spending B, amended spending A, and executed spending E. A similar situation was observed by Klase et al. (2001) in the case of West Virginia cities when extra money went into smaller departments during the within-year budget adjustments.

Punctuations in the amended budget A_PUNC are strongly positively influenced by the existence of the punctuations in the approved budget B_PUNC. The impact of the comprehensiveness of the budgeting approval is a little weaker than in the case of the approved budget, but still positive and significant. Both unexpected situations – Covid-19 and the Ukrainian refugee wave – led to significant growth of punctuations in the amended budget. The magnitude of rebudgeting, expressed as an amended budget to an approved budget, did not have a significant effect on the existence of punctuation.

Table 4: Results of the binary logit models

Dependent variable	B_PUNC	A_PUNC	E_PUNC_B_PUNC	E_PUNC_A_PUNC
Const	0.1507***	-1.0440***	0.9236***	
	(0.000)	(0.0461)	(0.0879)	
COVID	x	0.2024**	0.3222***	
		(0.0981)	(0.0036)	
UKR	x	0.1660*		
		(0.0979)		
ELECT	-0.1174**		-0.1291**	
	(0.0137)		(0.0364)	
COMP	0.1803***	0.1179***	0.0813*	
	(0.000)	(0.0445)	(0.0755)	
B_PUNC	x	1.5440***	1.2678***	x
		(0.0468)	(0.000)	
A_PUNC	x	x	x	3.6584***
				(0.0651)
EXE	x	x	-2.1531***	-2.1276***
			(0.000)	(0.0458)
B	-0.0053***	x	x	x
	(0.0000)			
A	x	-0.0023***	x	x
		(0.0000)		
E	x	x	-0.0023***	-0.0017***
			(0.0000)	(0.0000)
N	10772	10730	10653	12014
McFadden R2	0.0873	0.1752	0.2090	0.4906
Log-likelihood	-6783.693	-5912.323	-5651.394	-4158.695
Overall predicted cases	7314	7765	7752	10521
	(67.9%)	(72.4%)	(72.8%)	(87.6%)
Likelihood ratio statistics	1298.87***	2511.71**	2987.16**	8010.82**

Source: authors

Note: * denotes 90%, ** 95 % and *** 99% of statistical significance respectively, standard error in parenthesis; x denotes variables that were not included in the model, blank spaces show variables that were not statistically significant, variables REB, ELECT1, PARTY, and PERSON were not statistically significant in any model and, therefore are not shown

There are two models estimating E_PUNC, one uses as the starting point the approved budget E_PUNC_B_PUNC and the other uses amended budget E_PUNC_A_PUNC.

Punctuations in the executed budget E_PUNC are again strongly positively influenced by the existence of the punctuations in the approved budget B_PUNC. There is a positive influence of the complexity of the budget approval COMP and Covid-19 and a negative of the election year ELECT. Compared to the punctuations in the amended budget A_PUNC we can observe the significant impact of the election year ELECT but not the refugee wave UKR.

The difference between amended and executed budget is caused by the execution of the spending (executed spending to amended spending) and its role is strongly negative. If the amended budget is fully spent EXE = 1. The more remains unspent, the smaller is EXE. EXE's statistically significant negative impact on E_PUNC means that underspending leads to more punctuation. If we consider budget execution EXE as a component of performance, i.e., underspending is a sign of low performance, then this negative relationship between execution EXE and punctuations in the executed budget E_PUNC is in line with the findings of Flink (2017), who found that low levels of performance are associated with non-incremental (punctual) changes.

The last model E_PUNC_A_PUNC shows a very strong and positive relationship between punctuations in executed and amended budgets and again negative impact of budget execution EXE. None of the other factors is significant.

While the results shown in Table 4 confirm H3 (Exogenous shocks lead to more punctuations) and H5 (Complexity in the budgetary process leads to more punctuations) they do not give any support for H4 (Electoral change leads to more punctuations).

Regarding H3, extraordinary situations experienced in 2020 (COVID) and 2022 (Ukrainian refugee wave UKR) led to more punctuations in amended and/or executed budgets. Our finding on the impact of Covid-19 is stronger than suggested by Cavelleri (2025) in the case of European countries.

Despite the expectations from the literature (Jones et al., 2009 and Kwak, 2017) we did not confirm H4. None of the variables (ELECT1, PARTY, PERSON) which capture the changes in the government were significant. Restraint to changes before election was on the other hand a significant factor lowering the number of punctuated budget changes in approved and executed budgets.

We found strong support for H5 in all budget phases. The difference in the praxis among the regions regarding the complexity of the budgeting process has a sizable impact on the occurrence of punctuations. It is in line with the predictions of the punctuated equilibrium theory: complex decision-making is limited by disproportionated information processing and is more prone to punctuations.

6 Discussion and Conclusions

The punctuated equilibrium theory explains the pattern of annual budget changes we observe almost universally and worldwide. It proves the ability of organizations to hold steady policies as well as being able to adapt to changed needs at the same time. Existing literature offers limited research that links directly the punctuated equilibrium theory to financial management practices (Xiao et al., 2020). Our research addresses this issue and offers a novel integration of these findings with detailed knowledge of the budget process and its major phases in a local government setting.

Punctuations in the current expenditures are present in all the budgeting phases, however, during the rebudgeting and execution phase their number declines. This is supported by the confirmed hypotheses H1 (Approved budget has more punctuations than the amended budget) and H2 (Actual spending has less punctuations than approved budget). It corresponds to the estimated institutional costs associated with the different budget phases, existing procedural rules and the roles politicians and professional bureaucrats have during the different budget phases.

While policy change is more likely to occur in case of exogenous shocks and turnover in the composition of the decision-making body, our analysis using Czech regional data did confirm only the former one. Czech regions responded during their rebudgeting phase to two unexpected events which occurred in February: the COVID-19 pandemic starting in 2020 and the refugee wave after Russia invaded Ukraine in 2022. And this response manifested itself in a higher number of budget line punctuations. Here we can confirm H3 - Exogenous shocks lead to more punctuations.

Unlike theoretical predictions and results from other countries, changes in the political leadership did not have any impact on budget punctuations in any budget phase. Neither change in the person of the regional president, leading party or starting a new election term did lead to substantial policy change. The election year is manifested by less punctuations in approved budget and budget execution confirming the expectation that significant policy change rarely takes place at the end of the budget cycle. H4 - Electoral change leads to more punctuations was not confirmed.

Czech regions use a different approach when including intergovernmental transfers into the approved budget. This praxis influences the complexity and comprehensiveness of the budget and budget process and has a significant impact on budget punctuations in all budgeting phases. Comprehensiveness of the public budget process leads to more friction and limiting comprehensiveness may ease the decision-making process. H5 – Complexity leads to more punctuations was confirmed.

Presented results are limited by the applied definition of budget punctuation, i.e., a percentage decrease of more than 25 percent or a percentage increase of more than 35 percent is a punctuation. Sectoral analysis, reflect-

ing the high heterogeneity among the 113 analyzed functional budget lines, could consider the complex intergovernmental setting where Czech regions operate and bring more insight into the factors influencing policy change at this local government level.

Our findings confirm again that budget institutions influence budget outcomes. Therefore, it calls for further research. Do changes in budgeting comprehensiveness take place over time and what is their impact? Do other budget process rules or practices influence the budget behavior as predicted by the punctuated equilibrium theory as well?

Decisions leading to policy change, expressed as budget punctuation, occur more often in the case of higher institutional friction. Institutional friction stems from higher decision costs or disproportionate information processing. Our analysis showed that declining decision costs during the budget process led to less budget punctuations in the latter phases of the budgetary process. The impact of disproportionate information processing manifested itself in reaction to a crisis and complexity or comprehensiveness of the budget approval. No impact of the change in political leadership was observed.

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