

Determinants of tax revenue forecasts accuracy in Czech municipalities¹

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Abstract

The paper explores factors influencing accuracy of tax revenue forecast in 198 municipalities of extended scope between 2003 and 2011 using the fixed-effects model analysis. The accuracy of municipal tax revenue forecasts is influenced not only by the national economic situation (especially GDP growth rate) but local economic and fiscal conditions have their importance as well. Tax revenue forecasts tend to be more optimistic in smaller municipalities and in municipalities with less favorable economic and fiscal conditions. Our results also suggest that municipal tax revenue forecasts are subject to political business cycle.

Key words

Budget accuracy, Revenue forecasting, Political budget cycle

JEL Classification: H68, H71

1. Introduction

Revenue forecasts influence the decision-making of resource allocation and their inaccuracy may affect this allocation. Therefore it may be tempting to adjust the revenue forecast in order to push through a desired allocation or diminish the need to undertake expenditure cuts (Plesko, 1988, 483). Knowing the major determinants of revenue forecast accuracy allows confirming or rejecting such suspicion.

While the accuracy of tax revenue forecasts at the Czech central government level received attention repeatedly (e.g., Klazar (2003), Špalek and Moravanský (2005) or Bayer (2011), the study of local government lags behind. Sedmihradská (2009) and (Sedmihradská and Kramoliš, 2012) showed that majority of municipalities underestimate their tax revenue forecasts and approve budgets with much more conservative estimates than the revenue

¹ The study was supported by the Internal Grant Agency of the University of Economics, Prague, project F1/1/2012 „Fiscal federalism in the Czech Republic“.

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forecast of the Ministry of Finance. Municipal tax revenues were on average underestimated by 4% in the last decade with significant differences among individual municipalities.

Numerous foreign studies confirm that local government tax revenue forecasts are influenced not only by the economic environment, but that fiscal situation, technical and organizational aspects and political factors play their role as well. The aim of the paper is to explore factors influencing accuracy of Czech municipal tax revenues.

First, based on the literature review, there are recognized major factors which influence tax revenue forecast accuracy.

Then we test if these factors can explain the differences in total revenue and tax revenue forecast accuracy in 204 municipalities with extended power, except the capital Prague, between 2005 and 2011 using the fixed-effects model analysis.

2. Revenue forecasting as a part of the municipal budgetary process

Public budgeting is a process of decision-making about resources and their allocation. It is a sequence of numerous steps taken by various actors which can be grouped in four main stages: budget preparation by the executive body, budget debate and approval by the legislative body, budget execution and budget control. Municipal budgetary process in the Czech Republic is mainly regulated by the Budgetary rules for territorial entities (250/2000 Coll.), which lists basic requirements municipalities must comply with, and by the Law on municipal establishment (128/2000 Coll.), which specifies the roles different subjects play in the budgetary process. The municipal management is also regulated by the Law on audit of local government units (420/2004 Coll.) and the Law on financial control in the public administration (320/2001 Coll.). The central regulation leaves significant space for municipalities to choose how they will proceed preparation and debate of the draft budget. It only requires that the draft budget and the draft final account are available to the public for comments and that they are approved by the municipal council (see Klazar and Sedmihradská (2006) for more details).

Revenue forecasting is one of the first steps while preparing the draft budget and its results influence the decision-making of resource allocation, thus inaccuracy of the forecasts may have tangible impacts. Inaccuracy can occur in the form of both underestimation and overestimation; however the costs of overestimation are much higher than that of underestimation (see Rodgers and Joyce, 1996, p.49).

Overestimation means that the estimated and approved revenues exceed the real (actual) ones, thus not all approved expenditures can take place and cuts are needed. Revenue overestimation softens the hard budget constraint and shifts the decision-making about the needed cuts from the preparation and approval phase of the budgetary process to the execution phase. Rubin (1987, p. 83) stresses the associated shift in power in favor of the budget officer. As in the Czech Republic municipalities do not operate under strict balanced budget requirement, revenue overestimation may result in budget deficit.

Underestimation means that during the budget year there appear some additional revenues which can be either added to the year-end balance or spend on newly approved expenditures. The process of the decision making during the year, however, may be less transparent than the standard budgetary process, as less publicity for budget amendments than the draft budget is required and because of common praxis of delegation of decision-making power from the municipal council to municipal commission or the mayor (see Češková and Kinšt, 2011, p. 209). As underestimation of budget revenues is considered to be fiscally responsible – thus positive – some authors, e.g. Rodgers and Joyce (1996, p. 49), argue that a part of the revenue forecast error “can only be explained by the very rational choice to underestimate revenues in order to provide cushion against a recession that is unanticipated”. Špalek and Moravanský (2005, p. 185) come to similar conclusions for the Czech Republic.

The accuracy of revenue forecasts is influenced by numerous factors which Chatagny and Soguel (2012, p. 6-9) divide into four main groups: economic environment, fiscal situation, technical and organizational aspects and political factors. Some of the factors are the same for all municipalities such as the national GDP growth rate, inflation rate or date of municipal council elections, but many factors are specific for each municipality. For example economic situation in a particular municipality may influence some tax revenues as well. Similarly each municipality is in a different fiscal situation. Fiscal situation influences the revenue forecasting bias toward underestimation. Rubin (1987, p. 92) found that “the greater the cities’ overall fiscal stress, the greater the likelihood of overestimating revenue.” Thus fiscal hardship leads to acceptance of thinner “forecast cushion” than generally wanted. This finding is consistent with Rose and Smith (2012) who found that U.S. states which adopted budget stabilization funds, i.e., have reserve funds at their disposal in case of an unexpected event, are less conservative in their revenue estimates. Thus again, thinner “forecast cushion” is accepted because real reserves exist.

While revenue forecasting is most of all a technical process regardless how sophisticated methods are used, the approved budget, or exactly the expected revenues approved in the annual budget, is a result of political decision-making. As mentioned above, less conservative revenue estimates may allow approval of higher or additional expenditures. This can be especially tempting before elections when the incumbent tries to show voters their competence and get reelected. Empirical evidence of the existence of political budget cycle in revenue forecast shows, however, only weak support such as Bischoff and Gohout (2010) in case of German lands or Chatagny and Soguel (2012) in case of Swiss cantons.

The outcomes of the decision-making are influenced by the strength or composition of the decision-making body. Goeminne, Geys and Smolders (2008) suppose that more fragmented local governments are more optimistic than a single party government, because optimistic revenue forecasts allow accommodating better the claims of the individual parties. Their research into tax revenue accuracy in Flemish municipalities confirmed this hypothesis only partly, because two party governments appear to be more optimistic than single party governments, but governments with more than three parties were more cautious.

At the same time it is expected that the adjustment of municipal behavior is quite slow and thus the inaccuracy in previous year persists to some extent in the current year (Goeminne, Geys and Smolders, 2008, p. 306).

3. Budget inaccuracy in the Czech Republic

Budget inaccuracy is the difference between the approved (budgeted, estimated, planned) and actual (real) revenues or expenditures. In this paper the following budget inaccuracy indicator is used:

$$BI_x = \frac{B_x - A_x}{A_x}, \text{ where}$$

(1)

x = analyzed budget segment (revenues, expenditures or a line of them)

BI = budget inaccuracy

B = approved amount

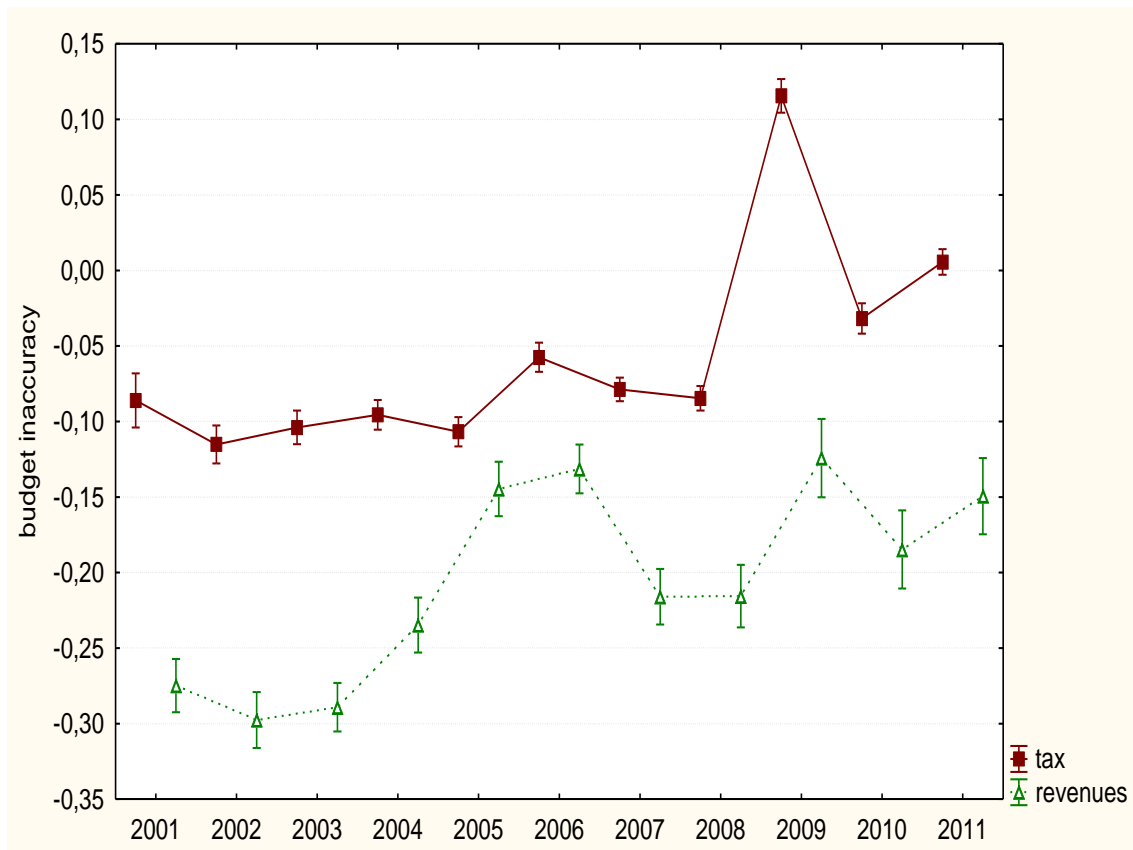
A = actual amount

The inaccuracy can be either in the form of overestimation, i.e., the approved revenues (or expenditures) exceed the actual revenues (or expenditures) and $BI_x > 0$ or underestimation, i.e., the estimated revenues (or expenditures) are lower than the actual ones and $BI_x < 0$. Thus in case BI_x grows the forecasts are less conservative, i.e., the underestimation is smaller or it turns into overestimation or the overestimation grows. Growth of BI_x thus does not generally mean improvement of budget accuracy.

The development of budget inaccuracy of municipal tax and total revenues in the 204 municipalities of extended scope (except the capital Prague) between 2001 and 2011 is described in Figure 1. It shows the average inaccuracy and the 95% confidence interval of the indicator. The difference between the drawn line and zero line shows the volume of additional revenues received during the budget year with only exception of tax revenues in 2009 when there were tax revenues missing.

The total revenues show relatively stable development, the correlation analysis confirmed our expectation that the revenue inaccuracy is negatively influenced by the share of grants and capital revenues in total revenues, the correlation coefficients being -0.2531 and -0.1754, respectively. The inaccuracy of tax revenues shows, with exception of 2009, improvement. We suppose that one of the reasons could be continuous decline of the importance of the revenues from the individual income tax paid by entrepreneurs. 30 % of proceeds from this tax remain in the municipality of the permanent residence of the particular entrepreneur and thus this tax is much more volatile as well as hard to forecast than the taxes shared based on the revenue sharing formula. The average share of this tax in total tax revenues in the analyzed municipalities fell from 9.8% in 2001 to 2.1% in 2011. The correlation coefficient between tax revenue inaccuracy and share of individual income tax paid by entrepreneurs is -0.3739.

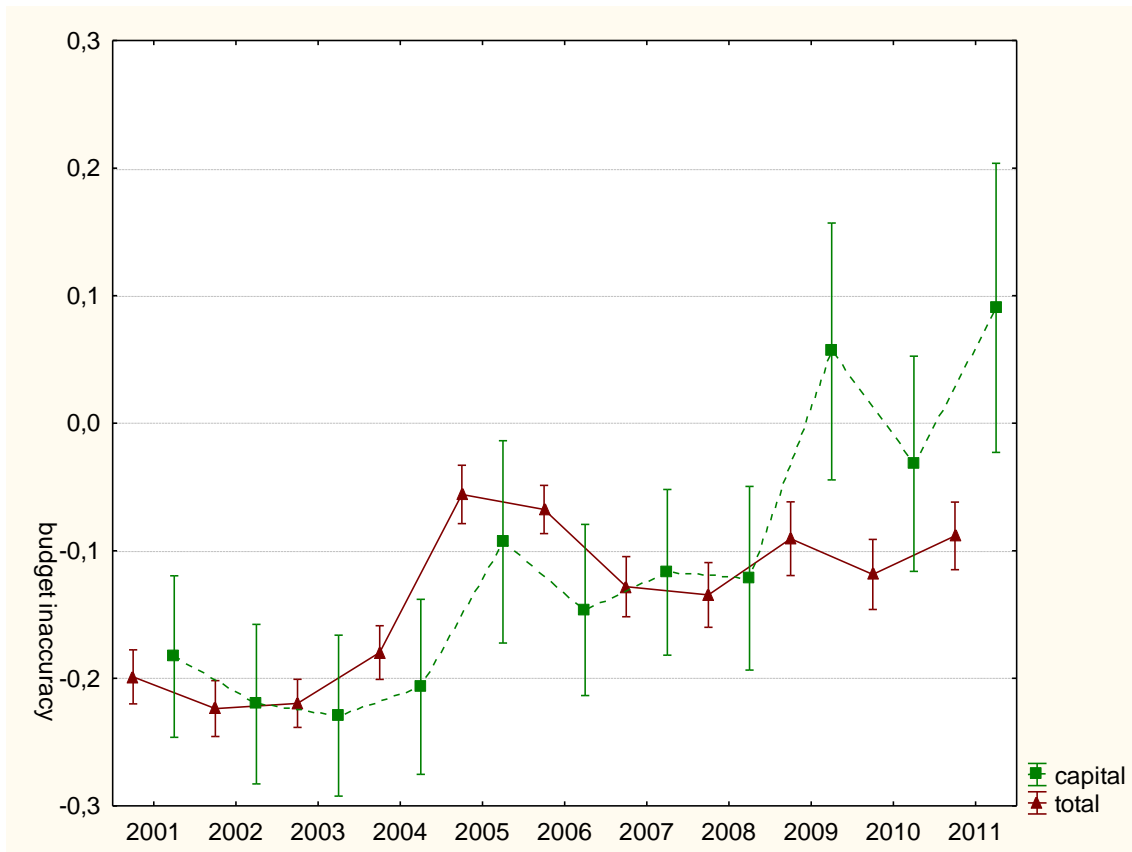
Figure 1 Revenue inaccuracy (2001-2011)



Source: ARIS, ÚFIS, own calculations and presentation

Figure 2 shows the development of expenditures inaccuracy. Inaccuracy of current expenditures is not shown because the line overlapped that of total expenditures inaccuracy and the picture would not be clear. The inaccuracy of expenditures copies, as expected, the development of the inaccuracy of revenues. The correlation coefficient is 0.8548. The development of capital expenditures inaccuracy copies the development of total expenditures inaccuracy until 2008. This is quite interesting as one would expect, that the gradual approval of capital grants leads also to gradual approval of capital investments and thus that the inaccuracy of capital expenditures would be higher. Of course the analysis of average values is very simplified, as confirmed by greater spread of the 0.95 % confidence interval in case of capital expenditures. Since 2009 the situation has changed, in the budgets of 2009 and 2011 there were approved more capital investments than were actually realized. We suppose that this is a result of growing number of investments financed through the EU structural funds, when the administration process takes longer and intervenes in several budget years.

Figure 2 Expenditure inaccuracy (2001-2011)



Source: ARIS, ÚFIS, own calculations and presentation

4. Determinants of revenue forecasts inaccuracy

Forecasting of budget revenues is influenced by the revenue structure. The ability to exactly estimate individual revenue types differs significantly and therefore our analysis focuses only on tax revenue inaccuracy (BI-TAX) and we deal with variables representing the economic environment, fiscal situation and political factors.

The key factor influencing the forecast inaccuracy is the economic situation, which can be characterized by three major indicators: GDP growth rate, inflation rate and unemployment rate. While data on the former two are available only nationally, the unemployment rate is available for individual municipalities of extended scope. Higher economic growth (GDP) results in higher actual revenues (BI decreases), higher inflation (INFL) means higher actual nominal revenues (BI decreases) and higher unemployment (UNEMPL) results in lower tax collections due to both lower incomes and lower consumption. Due to the revenue sharing mechanism, the differences in the unemployment rate among municipalities have only a limited impact. We can, however, consider it as a proxy for characteristic of economic

situation in the particular municipality. So it can indirectly impact the activity and so the taxes paid by entrepreneurs, i.e., higher unemployment means lower actual revenues (BI grows).

The impact of the size of the municipality (POP) can be twofold: bigger municipalities employ more specialized staff and revenue forecasting can be based on more sophisticated methods. On the other hand, bigger municipalities start budget preparations earlier (see Sedmíhradská, 2006), so the uncertainty about further development is bigger. Neither Rubin (1987) nor Goeminne, Geys and Smolders (2008) found effect of population size on forecast accuracy.

Fiscal situation of a municipality is described through two indicators: total revenues per capita (REV) and budget balance as a share on total revenues (BAL). These indicators do not indicate if a municipality observes fiscal stress, however they indicate if the fiscal situation is more or less favorable. We expect that municipalities with lower revenues per capita and budget deficit will be more optimistic. Thus BI grows if per capita revenues and budget balance falls.

The theory of political business cycle assumes that revenue forecasts are more optimistic before elections (ELECT); therefore BI should be higher in the election years.

To empirically assess the relation between budget inaccuracy and economic, fiscal and political factors we use a panel dataset from 2003 to 2011 for 198 municipalities of extended scope. Out of the total 206 municipalities of extended scope we have excluded 8 cities (Brno, Liberec, Opava, Ostrava, Pardubice, Plzeň, Praha and Ústí nad Labem) which are divided into districts with own budgets. We do not have data on individual districts budgets and the evaluation of accuracy of the aggregated (consolidated) budgets seems inappropriate.

Financial data were acquired from the information systems Automated Budget Information System (ARIS) and Accounting and Financial Information System (ÚFIS) administered by the Ministry of Finance. The data are based on the Czech budget classification, i.e., all the data are recorded on the cash principle. The data for GDP growth rate and inflation rate are from the Czech Statistical Office and for unemployment rate from the Ministry of Labor and Social Affairs.

We estimate the following multivariate model to test our predictions (subscripts i and t referring to municipalities and time respectively):

$$\text{BI-TAX}_{i,t} = a + b_1\text{GDP}_t + b_2\text{UNEMPL}_{t-1} + b_3\text{INFL}_{i,t} + b_4\text{POP}_{i,t} + b_5\text{REV}_{i,t} + b_6\text{BAL}_{i,t} + b_7\text{ELECT}_t + e_{i,t}$$

(2)

where

$BI-TAX_{i,t}$ is the budget inaccuracy of the tax revenues calculated based on formula (1),

GDP_t is the annual change in the gross domestic product expressed in the real terms, in percent,

$UNEMPL_t$ is the unemployment rate, i.e., number of registered unemployed divided by number of economically active inhabitants, in December, in percent,

$INFL_{i,t}$ is the yearly average inflation rate, in percent,

$POP_{i,t}$ is the number of inhabitants, in thousands,

$BAL_{i,t}$ is the budget balance as a share of total revenues, i.e., difference between total revenues and total expenditures divided by total revenues, in percent,

$REV_{i,t}$ are total municipal revenues per capita, in thousands CZK,

$ELECT_t$ is a dummy variable that takes the value 1 in election years (i.e., 2006 and 2010) and 0 in other years.

For estimation of the model we have used fixed-effects models analysis in the software Gretl 1.9.2. This approach is similar to Rose and Smith (2012).

Results

The obtained results are presented in Table 1 and confirm some of our expectations: higher GDP growth and lower unemployment leads to higher actual revenues and consequently higher tax revenue underestimation, i.e., lower BI-TAX. The impact of GDP growth is much stronger, increase by 1 percentage point leads to increase of tax underestimation by 2 percentage points in case of GDP growth and decrease by only 0.2 percentage points in case of unemployment rate. At the same time there is no impact of inflation. Despite our expectation the impact of the population size is significant: smaller municipalities are more optimistic than bigger ones.

Table 1 Estimates of the tax revenue inaccuracy models (198 cross-sectional units, time-series length 9; 1,782 observations)

	Model 1
CONST	17.3043*** (5.1261)
GDP(t)	-2.0582*** (0.0555)
UNEMPL(t-1)	0.2179*** (0.0828)
INFL(t)	0.0211 (0.1024)
POP(t)	-0.5538** (0.2664)
REV(t)	-0.3119*** (0.0394)
BAL(t)	-0.033** (0.016)
ELECT(t)	3.8666*** (0.3569)
Mean value of the dependent variable	-4.8505
Standard error of dependent variable	9.7392
Adjusted R-squared	0.6364
Durbin-Watson statistic	1.7206

*Note: std. error reported in parenthesis, *** significant at 0.01 %, ** significant at 0.05 %*

Fiscal situation influences BI-TAX as expected, municipalities in less favorable situation, i.e., with lower revenues per capita and budget deficit, tend to underestimate tax revenues less. This finding is consistent with Rubin (1987). The influence of these factors is, however, not very strong: decrease of per capita revenues by one thousand CZK leads to increase of BI-TAX by 0.3 percentage points and increase of budget deficit share in total revenues by 1 percentage point leads to increase of BI-TAX only by 0.03 percentage points.

The most surprising result is the strong and highly significant positive impact of election which suggests the existence of political business cycle in municipal revenue forecasts, i.e., the BI-TAX is in the election years higher by 3.9 percentage points than in the other years. Interpretation of this finding is quite difficult, when we consider the following: First, both the municipal council elections and the elections to the Chamber of Deputies take place in the same year. Second, there is some interdependence between municipal tax revenue forecasts and the forecasts of the Ministry of Finance. Municipalities are independent in their revenue forecasts, however, they know the tax revenue forecasts provided by the Ministry of Finance and they consider them to some extent during their own forecasting process. Existing case

studies (Talíř, 2012 and Radilová, 2012) show examples, when the budget officers take the ministerial forecasts as the most optimistic scenario. So, without further research, it is unclear, whether this forecast optimism rises at the municipal side or if is caused by optimism in the forecasts of the Ministry of Finance.

Conclusions

Czech municipalities systematically underestimate their revenues and there are significant differences among municipalities. Our results confirmed that the accuracy of municipal tax revenue forecasts is influenced not only by the national economic situation (especially GDP growth rate) but that local economic and fiscal conditions have their importance too. Underestimation of tax revenues tends to be higher in bigger municipalities with more favorable economic and fiscal conditions. This finding is consistent with Rubin (1987) and suggests that in worse times municipalities use all available resources including “hidden” reserves in the form of revenue underestimation.

Obtained results suggest, that municipal tax revenue forecasts are subject to political business cycle. This finding is interesting, especially, because there is only very limited empirical support of this common assumption. Due to the interdependence of municipal forecasts and forecasts of the Ministry of Finance and concurrence of municipal council elections and the elections to the Chamber of Deputies in the same year, further research is needed to find out if the forecast optimism rises at the municipal or ministerial side.

Revenue forecasts may be subject to manipulation and the determination of the factors, which influence them, allows assessing if this is happening in case of Czech municipalities. While the rational behavior in case of worse economic and fiscal situation of a municipality does not confirm this suspicion, the confirmation of the political business cycle does. Therefore we intend to continue this research by exploring additional factors and possibly prolonging the time series so that also the election year 2002 is included.

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Appendix: List of variables and data sources

BAL_{i,t} is the budget balance as a share of total revenues, i.e., difference between total revenues and total expenditures divided by total revenues, definition of total revenues complies with Czech budget classification class 1-4, definition of total expenditures complies with Czech budget classification total expenditures class 5-6, data source: Automated budget information system (ARIS) and Accounting and financial information system (ÚFIS), Ministry of Finance, <http://wwwinfo.mfcr.cz/aris/> and <http://wwwinfo.mfcr.cz/ufis/>, 2 June 2012

BI-REV_{i,t} is the budget inaccuracy of the total revenues calculated based on formula (1), definition of total revenues complies with Czech budget classification class 1-4, data source: Automated budget information system (ARIS) and Accounting and financial information system (ÚFIS), Ministry of Finance, <http://wwwinfo.mfcr.cz/aris/> and <http://wwwinfo.mfcr.cz/ufis/>, 2 June 2012

BI-TAX_{i,t} is the budget inaccuracy of the tax revenues calculated based on formula (1), definition of tax revenues complies with Czech budget classification class 1, data source: Automated budget information system (ARIS) and Accounting and financial information system (ÚFIS), Ministry of Finance, <http://wwwinfo.mfcr.cz/aris/> and <http://wwwinfo.mfcr.cz/ufis/>, 2 June 2012

CAPREV_{i,t} is the share of capital revenues in total revenues, capital revenues comply with Czech budget classification class 3-41, total revenues complies with Czech budget classification class 1-4, data source: Automated budget information system (ARIS) and Accounting and financial information system (ÚFIS), Ministry of Finance, <http://wwwinfo.mfcr.cz/aris/> and <http://wwwinfo.mfcr.cz/ufis/>, 2 June 2012

ELECTION_t is a dummy variable that takes the value 1 in election years (i.e., 2006 and 2010) and 0 in other years

ENT_{i,t} is the share of individual income tax paid by entrepreneurs and corporate income tax paid by the particular municipality in tax revenues, definition of the individual income tax paid by entrepreneurs complies with Czech budget classification line 1112, definition of the corporate income tax paid by the particular municipality complies with Czech budget classification line 1122, definition of tax revenues complies with Czech budget classification class 1, data source: Automated budget information system (ARIS) and Accounting and financial information system (ÚFIS), Ministry of Finance, <http://wwwinfo.mfcr.cz/aris/> and <http://wwwinfo.mfcr.cz/ufis/>, 2 June 2012

GDPT is the annual change in the gross domestic product expressed in the real terms, data source: Czech Statistical Office, <http://www.czso.cz/eng/redakce.nsf/i/statistics>, 2 June 2012

INFL_t is the yearly average inflation rate, data source Czech Statistical Office, <http://www.czso.cz/eng/redakce.nsf/i/statistics>, 2 June 2012

POP_{i,t} is the number of inhabitants, data source: Czech Statistical Office, <http://www.czso.cz/csu/2012edicniplan.nsf/p/1301-12>, 2 June 2012

REVI_t are total municipal revenues per capita, definition of total revenues complies with Czech budget classification class 1-4, data source: Automated budget information system (ARIS) and Accounting and financial information system (ÚFIS), Ministry of Finance, <http://wwwinfo.mfcr.cz/aris/> and <http://wwwinfo.mfcr.cz/ufis/>, 2 June 2012

UNEMPI_t is the unemployment rate, i.e., number of registered unemployed divided by number of economically active inhabitants, in December, data source <http://portal.mpsv.cz/sz/stat/nz/uzem>, 15 June 2012