Fiscal discretion, growth and output volatility in new EU member countries

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Abstract

This paper analyses the link between discretionary fiscal policy and output growth in ten CEE countries. Three aspects are considered: cyclical pattern in the fiscal discretion, contributions to GDP growth, and the link between policy aggressiveness and output volatility. Fiscal discretion is estimated from quarterly data over 2000q1 to 2014q1 using a SVAR model in GDP, net taxes and spending. Decomposition of the GDP suggests that fiscal discretion induced rather small contributions to economic growth. Correlation between fiscal policy aggressiveness and output volatility is weak to moderate positive, notwithstanding whether spending or balance is used as the underlying indicator. The cyclical pattern has identified a mix of pro- and counter-cyclical episodes in the years before the crisis, implying that governments might not have consistently used the good times to create buffers. Overall, this evidence supports the view that policy makers in the CEE countries should mainly rely on rule-based fiscal policy rather than (aggressive) fiscal discretion.
JEL: C32, E32, E61, E62
Keywords: discretionary fiscal policy, cyclicality of fiscal policy, fiscal policy aggressiveness, GDP growth, output volatility, SVAR model

1 Introduction

The literature generally favours the use of rule-based fiscal policy to policy discretion. The major argument to back that view is that aggressive use of fiscal discretion aggravates business cycle volatility (e.g. Fatas and Mihov, 2003; Afonso et al. , 2010; and Badinger, 2009). The recommendation of rule-based policy is especially relevant for emerging economies, among which also the new EU members, as they are more prone to volatility in fiscal discretion (cf. Darvas and Kostyleva, 2011; Afonso and Jalles, 2013; and Kabashi, 2014).

With the Great Recession 2008-09, however, there prevailed appeal that fiscal policy should be used to counteract the downturn, as if there was a broad agreement about its effects (cf. Ilzetzki et al. , 2013). The stimuli implemented by the governments, along with the operation of automatic stabilisers, left the budget balances of the Central and East European (CEE) countries weaker than before the crisis (e.g. IMF, 2009; Darvas, 2010; and Staehr, 2010). As a result, the room for future fiscal maneuver has considerably reduced (OeNB, 2012).

In spite of the urgency that reigned after the onset of the crisis, the available literature has barely justified the view that fiscal measures could be an effective stabilisation tool in the former transition countries. At present, consistent evidence on the extent to what fiscal discretion in the CEE countries affects the GDP growth and its volatility, seems to be lacking.

With the aim to fill that gap, this paper analyses fiscal discretion and output growth in ten CEE countries (henceforth CEE-10) using quarterly data over 2000q1 to 2014q1. The paper i) estimates fiscal discretion from a SVAR model in real GDP, net taxes and government spending, ii) constructs measures of structural balance and of fiscal policy aggressiveness, iii) maps the cyclical pattern in the discretionary policy, iv) estimates contributions of fiscal discretion to GDP growth, and iv)

estimates correlation between the fiscal policy aggressiveness and output volatility. Decomposition of the GDP suggests that fiscal discretion induced rather small contributions to economic growth. Correlation between fiscal policy aggressiveness and output volatility is weak to moderate positive, notwithstanding whether spending or balance is used as the underlying indicator. The cyclical pattern has identified a mix of pro- and counter-cyclical episodes in the years before the crisis, implying that governments might not have consistently used the good times to create buffers.

The next section summarises the previous research on fiscal discretion in the CEE countries and lists studies that provide methodological reference for this analysis. Section 3 derives a set of fiscal and business cycle indicators and discusses estimation and data related issues. Section 4 presents the empirical results and discusses their robustness to VAR identification method and alternative methodology. The final section draws concluding remarks and suggests further extensions of this work.

2 Previous research

Research on fiscal policy in the former transition countries is comparatively less extensive than for the advanced economies. The previous literature that tackled various aspects of discretionary fiscal policy in the CEE-10 can be characterised as follows:

- At present, evidence on the relationship between policy aggressiveness and output volatility seems to be lacking. The key studies, such as that of Fatas and Mihov (2003), included emerging economies, but not those from Europe. A piece of preliminary evidence for the CEE-10 is provided by Staehr (2008) who estimated the relationship between autonomous fiscal policy and variability in private sector output growth from annual data over 1995 to 2005.
- A growing body of empirical literature estimated the effects of fiscal shocks in the form of impulse response functions using vector autoregressive models. An example of a recent study for seven CEE countries is due to Dinu (2014).
- Relatively numerous papers analyse cyclical properties of fiscal discretion in one or more CEE countries, using estimates of the so-called cyclically-adjusted budget balances. Some authors make direct use of data disseminated by international institutions (e.g. Eller, 2009, for the CEE-10; Mencinger and Aristovnik, 2014, for Slovenia and Euro Area Countries; and Kabashi, 2014, for the CEE-10 and six South Eastern transition countries), or follow in their own calculation the standard methodology (e.g. Grundiza et al. , 2005, for Latvia; Dumitru and Stanca, 2010, for Romania). Other authors propose their own measure of a cyclically-adjusted balance or fiscal stance (e.g. Lewis, 2007, for eight CEE countries; Altar et al. , 2010, for Romania; Ambrisko et al. , 2012, for the Czech republic; and Marcanova and Odor, 2014, for Slovakia). Mirdala (2013) computed cyclically-adjusted balances for the CEE-10 using a VEC as the underlying model. Lewis (2013) assessed cyclicality of the fiscal policy in CEE-10 using real-time fiscal data.

To mention some of the findings that are interesting for the analysis in this paper, fiscal shocks in the CEE countries seem to yield rather small-sized effects on output (Dinu, 2014); the relationship between autonomous fiscal policy and private sector output variability is positive and more significant for the CEE-10 than for the Western EU countries (Staehr, 2008); several papers bring on the issue of pro-cyclical policy stance (cf. e.g. Eller, 2009; Dumitru and Stanca, 2010; Ambrisko et al. , 2012; and Kabashi, 2014); some authors point out that the cylical pattern might be in part driven by the estimates of potential output (e.g. Eller, 2009), or that results from real-time data would acquit policymakers of the charges of running pro-cyclical fiscal policy (e.g. Lewis, 2013).

This paper aims to deepen the knowledge about the stabilisation potential of discretionary fiscal policy in the CEE-10. To that end, the paper explicitly quantifies contributions of discretionary policy to GDP growth and estimates the relationship between policy aggressiveness and output volatility. The analysis is backed by two sorts of references:

- Estimation of discretionary fiscal policy using a SVAR approach refers to the paper of Blanchard

and Perotti (2002). The authors specified a vector autoreggressive model with quarterly distributed lags in tax receipts, government spending and output. They introduced an exogenously estimated scheme to identify structural fiscal shocks based on a detailed knowledge of the U.S. tax code. Afonso and Claeys (2008) show that estimated VAR structural shocks can be used to gauge an indicator of structural budget balance as an alternative to the cyclically-adjusted balances.

- Analysis of the relationship between aggressive use of fiscal discretion and output volatility refers to the study of Fatas and Mihov (2003). The authors construct a measure of policy aggressiveness as the standard deviation in the regression residual of government spending. More recent application of the aggressiveness concept are due to e.g. Badinger (2009) and Afonso et al. (2010). The evidence in those studies, based on large sets of advanced and developing economies, suggests that higher output volatility is associated with a more volatile use of fiscal discretion.

3 Methodological background

This section sets forth a framework to estimate fiscal discretion and derives a set of fiscal policy and business cycle indicators.

In tables, countries are henceforth labeled using the following two-letter country codes: BG Bulgaria, CZ Czech republic, EE Estonia, LV Latvia, LT Lithuania, HU Hungary, PL Poland, RO Romania, SI Slovenia, and SK Slovakia.

3.1 Fiscal policy indicators

Discretionary fiscal policy refers to those changes in the policy that are not an automatic reaction of the budget to the business cycle. The overall budget balance includes automatic stabilizers that are incorporated in the legislation and act without intervention of the policymakers. Thus by removing the cyclical effect of the stabilisers, the remaining "cyclically-adjusted" balance is a truer picture of the underlying stance of the policy.

This paper estimates individually for each of the CEE-10 the discretionary component in net taxes and government spending. It borrows from the standard macroeconomic literature the SVAR approach, proposed originally by Blanchard and Perotti (2002). The choice of the variables reflects the aim to track policy channels that are most closely associated with aggregate demand and, through aggregate demand, with output. Examples of studies that estimated fiscal discretion using vector autoregressive models include Afonso and Claeys (2008) or Caldara and Kamps (2008). The choice has a number of advantages:

- The VAR methodology conceptually matches the fiscal policy theory, in which it is thought about fiscal policy as consisting of two components, the rule-based policy and discretion (cf. Mourre et al. 2013). The rule-based policy (in practice often termed as automatic stabilisers or cyclical component) is represented by the model and discretion is estimated using the VAR structural shocks.
- The vector autoregressive model takes care of the endogeneity problem, which is important for the estimates of policy aggressiveness. In large cross-section studies as that of Fatas and Mihov (2003), the problem is overcome by dynamic panel data estimation techniques. The VAR methodology provides a possible alternative in cases the number of cross-sections is small.
- The multivariate analysis enables to estimate in a consistent way the discretionary and cyclical component both on the expenditure and revenue side of the budget, rather than focusing just on government spending.
- Given that the GDP is a part of the model, this approach does not rely on external estimates of the potential output and output gap. As such, it is not subject to drawbacks that are related

to the calculation of cyclically-adjusted budget balances (cf. e.g. Hughes Hallet et al., 2012, or Reiss, 2013).

3.1.1 VAR specification

The empirical model of fiscal policy as proposed by Blanchard and Perotti (2002) may, ignoring for ease of notation any exogenous terms, be written in the reduced form as:

$$\mathrm{A}(L)\mathrm{X}_t = U_t \tag{1}$$

where $\mathrm{A}(L)$ represents a matrix of lag polynomials in the lag operator L, X_t is a vector of endogenous variables and U_t is the vector of reduced form residuals. The vector X_t includes the logarithms of government net taxes T_t, government spending G_t and output Y_t, all in real terms. As exogenous variables, the model includes the unemployment rate, annual change in the real effective exchange rate and GDP deflator, and lagged value of real government debt. The specification also includes deterministic terms and dummy variables.

The VAR coefficients were estimated using the standard multivariate least squares estimator. The specification was tested for stability and appropriate lag length and the estimated residuals were submitted to tests for autocorrelation, heteroskedasticity and normality. In the end, a levels VAR model was estimated for each of the countries in 3 (Czech republic and Slovenia) or 2 lags (other countries). For each of the countries, the specification also includes a constant and a linear trend. The following dummies were included: 2003q1 for the Czech republic, 2008q1 to 2008q4 for Bulgaria, 2008q2 to 2008q3 for Romania and 2007q4 to 2008q4 for Slovakia.

3.1.2 Identification of structural shocks

The reduced form residuals u_t^T, u_t^G, and u_t^Y have in general non-zero cross-correlations. To uncover unobserved structural shocks ϵ_t^T, ϵ_t^G and ϵ_t^Y that are mutually uncorrelated, identification proceeds alongside two schemes:

1. A recursive identification that uses the lower Choleski factor of the residuals' variance-covariance matrix. The recursive scheme requires a causal ordering of the model variables. Government spending is ordered first, followed by the GDP and net taxes (cf. e.g. Caldara and Kamps, 2008).
2. An identification approach adapted from Blanchard and Perotti (2002), based on elasticities of the fiscal variables w.r.t. output[1].

The latter approach relies on institutional information about the tax and transfer system. The idea is to identify automatic responses of net taxes and spending to economic activity. Essential to the scheme is using quarterly data. The relationship between the reduced-form residuals and the structural disturbances reads as:

$$\begin{bmatrix} 1 & 0 & -\alpha \\ 0 & 1 & -\beta \\ -a_{31} & -a_{32} & 1 \end{bmatrix} \begin{bmatrix} u_t^T \\ u_t^G \\ u_t^Y \end{bmatrix} = \begin{bmatrix} b_{11} & b_{12} & 0 \\ b_{21} & b_{22} & 0 \\ 0 & 0 & b_{33} \end{bmatrix} \begin{bmatrix} \epsilon_t^T \\ \epsilon_t^G \\ \epsilon_t^Y \end{bmatrix} \tag{2}$$

The left hand side matrix in (2) captures the unexpected movements in the three endogenous variables to affect each other, whilst the right hand side matrix isolates the mutual effects of the structural shocks. Thus for instance the fiscal revenue shock ϵ_t^T is obtained from the reduced form residual u_t^T after subtracting the responses to unexpected movements in GDP $\alpha \cdot u_t^Y$ and to fiscal expenditure shocks $b_{12} \cdot \epsilon_t^G$.

Estimation of the two matrices proceeds in the following steps:

[1] Another interesting identification strategy could be the long-run restrictions as do e.g. Afonso and Claeys (2008). However, the possibility to use this approach for the CEE-10 is limited given the relatively small number of observations and therefore it is avoided in this paper.

- Parameters α and β denote elasticities to output of net taxes and spending, respectively. To obtain α, elasticities of the individual taxes and transfers w.r.t. output are weighted by their shares in net taxes. Given that transfers are netted out from spending, there are little reasons to think that government spending would automatically respond to GDP within a quarter; β is set zero.
- With the estimated α and β, cyclically-adjusted reduced form residuals in net taxes and spending are constructed, $\tilde{u}_t^T = u_t^T - \alpha \cdot u_t^Y$ and $\tilde{u}_t^G = u_t^G - \beta \cdot u_t^Y$. Whilst $\tilde{u}_t^T$ and $\tilde{u}_t^G$ may still be correlated with each other, they are no longer correlated with ϵ_t^Y, and thus can be used as instruments to estimate a_{31} and a_{32} in a regression of u_t^Y on u_t^T and u_t^G.
- In a last step, the right hand side coefficients are estimated, b_{12} and b_{21}, in a regression of the cyclically adjusted residuals on each other. It is difficult to decide whether net taxes respond to spending ($b_{21} = 0$) or the reverse ($b_{12} = 0$), when the government increases spending and taxes at the same time. The correlation between $\tilde{u}_t^T$ and $\tilde{u}_t^G$ turns out to be very small, thus the ordering makes little difference. The assumption is adopted that $b_{12} = 0$. The elements on the main diagonal of the right hand side matrix are the standard deviations of the structural shocks.

Table 1 reports elasticities of net taxes to output, obtained in a one-step calculation. The logarithm of each of the taxes and transfers was regressed against the logarithm of GDP. The inflation rate was used as an instrumental variable. Instrumenting for the inflation appeared important in order to obtain unbiased estimates of the slope coefficients, especially in the case of social benefits and subsidies. The resulting elasticities range from 0.7 to about 0.8, which is close to the estimates in the empirical literature (cf. e.g. Girouard and Andre, 2005, Eller et al. , 2011).

Table 1: Elasticities of net taxes to output

	BG	CZ	EE	LV	LT	HU	PL	RO	SI	SK
Direct taxes	0.66	0.75	0.66	0.69	0.69	0.75	0.75	0.70	0.72	0.69
Indirect taxes	0.78	0.77	0.73	0.74	0.74	0.81	0.82	0.77	0.78	0.75
Social contributions	0.71	0.81	0.71	0.70	0.72	0.79	0.80	0.75	0.78	0.77
Social benefits	0.75	0.82	0.71	0.70	0.74	0.81	0.84	0.76	0.80	0.79
Subsidies	0.44	0.60	0.39	0.38	0.38	0.56	0.54	0.52	0.52	0.53
Net taxes	**0.75**	**0.75**	**0.72**	**0.73**	**0.71**	**0.79**	**0.76**	**0.76**	**0.75**	**0.70**

3.1.3 Construction of fiscal indicators

Using the estimates of the VAR structural shocks, various fiscal policy indicators are constructed as follows:

- Discretionary fiscal policy, henceforth also structural balance, is the difference between the structural shocks to net taxes and spending, $\epsilon_t^{BAL} = \epsilon_t^T - \epsilon_t^G$. To be clear about the signs, a positive balance is surplus, and a positive change in the structural balance means fiscal tightening.
- Rule-based policy are those parts of net taxes and spending which were found to respond automatically to economic activity, $T_t - \epsilon_t^T$ and $G_t - \epsilon_t^G$.
- Two alternative measures of fiscal policy aggressiveness are used: the standard deviation of the discretionary spending, σ_ϵ^G (used e.g. by Fatas and Mihov, 2003), and the standard deviation of the structural balance, σ_ϵ^{BAL}.

3.2 Business cycle indicators

The business cycle is characterised using the following indicators:

- Output volatility σ^Y is the standard deviation of output growth (cf. Fatas and Mihov, 2003).
- To obtain trend and output gap, seasonally adjusted real GDP is smoothed using the Hodrick-Prescott filter with the smoothing parameter equal to 1600.

The estimated trend GDP shall serve as the reference basis to express structural fiscal indicators in GDP percentages.

The output gap estimates, along with the overall GDP growth rates, are used to isolate periods of extreme cyclical conditions. There are good reasons to believe that in periods when the economies were severely depressed or overheated, volatility in the fiscal discretion was a reaction to volatility in output in a first place. The resulting classification of the cyclical conditions is reported in Table 2. The CEE-10 experienced overheating between 2006 and 2008, and deep contraction in the two years to follow. In addition, periods between the two extremes are isolated so as to filter out times when the cycle turned. About 8 to 10 years remain that can be viewed as the usual business cycle.

As for Poland, two years fall below the 20th percentile, 2002 and 2013, with an average annual growth rate of 1.5 percent. Even though the figures were not negative, the two years were associated with high unemployment and as such they do qualify for a possible response of discretionary fiscal policy. For this reason, the two years also were cautiously classified as contractions rather than normal cyclical conditions.

Table 2: Cyclical condition in the CEE-10

	BG	CZ	EE	LV	LT	HU	PL	RO	SI	SK
2001	n	n	n	n	n	n	n	n	n	n
2002	n	n	n	n	n	n	-	n	n	n
2003	n	n	n	n	n	n	n	n	n	n
2004	n	n	n	n	n	n	n	n	n	n
2005	n	n	n	n	n	+	n	n	n	n
2006	+	+	+	+	+	+	n	+	n	n
2007	+	+	b	+	+	b	+	+	+	+
2008	b	b	b	b	b	b	+	+	b	+
2009	-	-	-	-	-	-	n	b	-	-
2010	-	n	n	n	-	n	n	-	n	n
2011	n	n	n	n	n	n	n	n	n	n
2012	n	n	n	n	n	n	n	n	n	n
2013	n	n	n	n	n	n	-	n	n	n
Normal times	8	9	9	9	8	8	9	8	10	10
Contraction	2	1	1	1	2	1	2	1	1	1
Overheating	2	2	1	2	2	2	2	3	1	2
Between	1	1	2	1	1	2	0	1	1	0

Note: As contraction and overheating periods are classified when both the output gap and the GDP growth rate were below and above the 20th and 70th percentile of their respective distributions since 2001. Abbreviations used: "n" normal times, "+" overheating, "-" contraction, "b" year between episodes of extreme cyclical condition.

3.3 Data

For each of the CEE-10, the data set used for the VAR estimation consists of quarterly data over 2000q1 to 2014q1. The data were drawn from the Eurostat database of the European Commission (Spring 2015). The series are coded as follows: Y_t is the gross domestic product at market prices (B1GM), which was also used to filter out the trend and output gap; T_t is the sum of direct taxes (D5), indirect taxes (D2) and social contributions (D611) minus social benefits (D62, D6311, D63121, D63131) and subsidies (D3); G_t is the sum of public wages (D1), government consumption (P2) and investment (P51). The exogenous variables are the unemployment rate (UNERT), real effective exchange rate to 37 trading partners (REER37CPI), the GDP price deflator (CPI05) and the government consolidated gross debt (GD). The fiscal variables and GDP were deflated by

the GDP price deflator and seasonally adjusted.

For comparison, cyclically-adjusted balances that are used for the so-called Excessive deficit procedure were drawn from the AMECO database of the European Commission (Spring 2015). The series is coded as cyclically adjusted net lending or borrowing based on potential GDP (UBLGAP).

4 Empirical results

4.1 Basic results

Table 3 reports average annual growth rates in the CEE-10 since 2001. The ten economies have enjoyed average annual growth rates between about 2 and 6 percent. In the years of overheating, the growth accelerated to about 4 to 10 percent per year. The Great Recession caused a sharp decline in the GDP, particularly in the Baltic states. The crisis revealed the vulnerability of these countries which have maintained tight financial linkages with foreign trading partners and somewhat oversized housing sectors. An exception among the new EU members is Poland, which is the only economy not to have undergone a recession since 2001. An important role in the growth success of the Polish economy have played public investment and effective use of the EU funds (e.g. Rae, 2013).

Table 3: GDP growth rates (% y-o-y)

	BG	CZ	EE	LV	LT	HU	PL	RO	SI	SK	CEE-10
Normal times	3.8	2.5	6.0	5.8	6.4	2.2	3.9	4.1	2.1	4.4	4.1
Contraction	-2.6	-4.5	-14.0	-17.8	-6.7	-6.8	1.5	-1.2	-7.9	-4.9	-6.5
Overheating	6.5	6.4	10.2	10.6	8.8	3.9	6.0	7.3	7.0	8.2	7.5

Note: Source of data is the Eurostat. Own calculation.

Turning to fiscal policy indicators, Figure 1 shows country-specific estimates of structural balances and the median computed for the CEE-10. Table 4 reports the structural balances. To get an idea how the estimates compare to headline fiscal data, the table also includes government primary balances and balances in the net taxes and spending. The bottom row of the table reports cyclically adjusted balances (CAB) calculated by the European Commission. The CAB indicates what budget balance would prevail if the economy was at its potential[2].

Table 4: Estimated structural balances

	BG	CZ	EE	LV	LT	HU	PL	RO	SI	SK	CEE-10
Structural balance											
Recursive	-0.00	-0.00	0.00	-0.01	0.00	0.00	-0.00	0.00	0.01	-0.00	-0.00
Elasticity-based	0.00	-0.00	0.00	-0.00	-0.01	-0.00	-0.01	-0.05	0.00	-0.00	-0.01
Primary balance	1.20	-2.58	0.60	-1.66	-1.84	-0.52	-2.12	-1.86	-2.32	-2.38	-1.35
Net taxes - spending	-4.73	-3.76	-3.44	-3.96	-4.89	-3.23	-5.31	-4.31	-4.24	-3.95	-4.18
CAB (Commission)	-0.51	-3.99	n.a.	-2.72	n.a.	-5.58	n.a.	-4.00	-4.24	-4.44	-3.64

Note: Reported are fiscal data in % trend GDP. The CAB are from the European Commission, in % potential output. For Estonia and Poland, the CAB were available only from 2010 to 2013, for Lithuania from 2004 to 2013.

[2] The structural balances are expressed in percent of trend GDP, the CAB are disseminated in percent of potential output. This should have little effect on the interpretation.

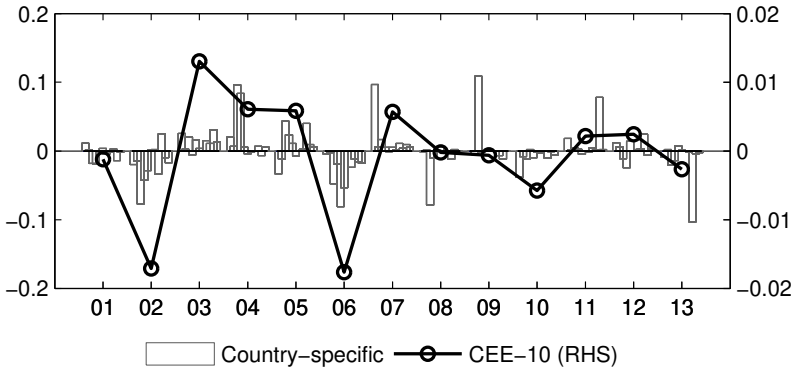

Figure 1: Structural balance ϵ^{BAL} (% trend GDP)

The estimated structural balances are very small and centered around zero, implying that the average figures are below 0.01 percent of the trend GDP. To compare the two identification schemes, the respective estimates are similar in the sense that they are medium to strongly positively correlated with each other and weakly to medium positively correlated with the CAB. The recursive identification yields somewhat larger figures for ϵ^{BAL}, the ratios of which to trend GDP are nicely proportional across the countries and over time. The elasticity-based approach yields figures of a rather implausibly small magnitude and seems to be more prone to generation of outliers. Henceforth, results obtained under the recursive scheme are presented, unless indicated otherwise.

In line with what is expected, estimates of ϵ^{BAL} are considerably smaller than the CAB. This is explained by a number of differences behind the two methodologies. The CAB are calculated from fiscal data as such, whereas ϵ^{BAL} are estimated from the VAR residuals which make to a very small share of the variables. In the CAB calculation, the fiscal variables and output gaps do not interact with each other, whereas this is the case in the SVAR model-based estimation. Another difference is that the CAB are derived from the overall government balances, whilst ϵ^{BAL} are based on net taxes and spending. The SVAR-based estimates might thus omit some budget items, that actually affect the CAB, such as interest payments or capital transfers. That being said, the estimates of structural balances presented herein are a complement rather than a fully-fledged alternative to the CAB.

4.2 Some stylised facts about fiscal discretion and GDP growth

Using the estimates of discretionary spending and balance, this section establishes some stylised facts about fiscal discretion and GDP growth in the CEE-10.

First, cyclical pattern in the discretionary policy is identified, using annual differences in the structural balance (Table 5). Gray background indicates when the discretion was counter-cyclical. Basically, this includes two situations, a positive change in the structural balance against the background of a positive GDP growth (counter-cyclical tightening) and vice versa (counter-cyclical easing). The cyclical pattern that emerges is somewhat sensitive to the identification scheme. Estimates under either of the schemes imply that episodes of pro- or counter-cyclical stance would be short to medium, lasting in the most cases for two consecutive years. To break it down further, in the good times before the crisis, shortly lasting pro- and counter-cyclical episodes could be identified in each of the countries. At the business cycle peak in 2007, structural balances would tighten in all CEE-10. The fiscal stance is found to have eased in the years of downturn, which is correct given the anti-crisis measures adopted in most of the countries (refer to e.g. Darvas, 2010, for a survey). In 2011, the structural balances have, according to the estimates, again tightened

in all ten countries. In the first case, buoyant economic conditions provided sufficient room for a fiscal restriction. The latter improvement in the structural balances is found in a context of general consolidation pressures, given the deteriorated debt outlooks (cf. e.g. MFCR, 2012; MoFSR, 2012; and Guerson, 2013).

Table 5: Cyclical properties of fiscal discretion

	BG	CZ	EE	LV	LT	HU	PL	RO	SI	SK
2002	-	-	-	-	-	-	+	-	+	+
2003	+	+	+	+	+	+	-	+	-	+
2004	-	+	+	+	-	-	-	-	-	-
2005	-	-	-	-	+	-	+	+	+	+
2006	+	+	-	-	-	-	-	-	-	-
2007	+	+	+	+	+	+	+	+	+	+
2008	-	-	-	-	+	+	-	-	-	-
2009	+	-	+	+	-	-	-	+	+	-
2010	-	-	-	+	-	-	-	+	-	+
2011	+	+	+	+	+	+	+	+	+	+
2012	-	+	-	-	+	+	+	-	+	-
2013	-	-	-	+	-	+	-	-	-	+

Note: Reported are signs of the annual change in the structural balance. Symbols used: "+" fiscal tightening, "-" fiscal easing. Gray background indicates when the fiscal stance was counter-cylical.

Table 8 in the Appendix reports average annual change in the CAB in a break-down by business cycle condition. The CAB changes, being in most of the countries positive during contraction and negative during overheating, would suggest a tendency to pro-cyclicality. The changes computed from the SVAR-based estimates do not seem to support that view. Turning to estimates in the literature, the results imply neither strong similarity nor dissonance. Examples of countries, for which cyclical profile herein considerably agrees with the previous literature, include Hungary (fiscal tightening in 2003, 2007-09, and 2011, cf. Mirdala, 2003); Slovakia (restriction in 2003 and subsequent easing in 2004 and 2006, tightening in 2010-11, cf. Marcanova and Odor, 2014); Czech republic (easing in 2008-09 and tightening toward 2011, cf. Ambrisko et al., 2012); and Estonia and Latvia (restriction in 2003-04, cf. Mirdala, 2013).

Second, contributions of fiscal discretion to GDP growth are computed (Table 6). As a general property, the VAR framework enables to decompose historical GDP series into a component driven by the levels of the variables and a component driven by the VAR residuals. The net effect of the fiscal shocks is isolated by subtracting from the historical resimulation a counterfactual scenario with only GDP shocks. The estimated contributions of the discretionary policy are rather small, mounting in normal times to about 0.1 of a percentage point in a total of 4.1 p.p.. In severe contractions, the contributions were mostly negative, on average about -0.7 p.p. in a total of -6.5 p.p. The result that, in the periods of extreme cyclical condition discretionary policy seems to have moved with the cycle, might be interpreted as that discretion in some of the CEE countries was not able to lean quite effectively against the cyclical phase. Unlike the simple look at the cyclical pattern, the decomposition takes account of the outside lags involved with the fiscal policy. In that sense, the stimulus packages aimed at curtailing the crisis, have not immediately come to full effect. Another reason might be of a technical nature. VAR residuals are a good approximation of the underlying exogenous events as long as things are quite normal. However, an abnormal drop in tax receipts, for instance, that is driven by a drastic surge in economic activity will appear in the VAR residuals, though it was not caused by fiscal discretion. It is not straightforward to overcome this issue simply by econometric methods. For an exact identification of the exogenous events, detailed historical information on the budgetary process is required. Notwithstanding that, the finding of rather small-sized contributions is in line with the previous evidence, according to

which the effectiveness of fiscal policy in small open economies is rather low (e.g. Ilzetzki et al., 2013).

Table 6: Contributions of fiscal discretion to GDP growth (p.p. GDP)

	BG	CZ	EE	LV	LT	HU	PL	RO	SI	SK	CEE-10
Normal times											
Overall GDP growth	3.8	2.5	6.0	5.8	6.4	2.2	3.9	4.1	2.1	4.4	4.1
Discretionary FP	0.4	-0.1	0.3	0.1	0.0	0.4	0.0	0.0	0.1	-0.1	0.1
Contraction											
Overall GDP growth	-2.6	-4.5	-14.0	-17.8	-6.7	-6.8	1.5	-1.2	-7.9	-4.9	-6.5
Discretionary FP	-0.3	-0.7	-3.7	0.1	0.2	-1.6	0.1	0.3	-1.0	-0.1	-0.7
Overheating											
Overall GDP growth	6.5	6.4	10.2	10.6	8.8	3.9	6.0	7.3	7.0	8.2	7.5
Discretionary FP	0.0	1.0	0.5	-0.4	-0.1	1.9	-0.2	-0.4	0.9	0.3	0.4

Third, relationship between the volatility in fiscal discretion, which Fatas and Mihov (2003) coined fiscal policy aggressiveness, and output volatility is examined. Figure 2 shows volatility of the GDP growth plotted against the fiscal policy aggressiveness. Two measures of aggressiveness are used, the standard deviation of the discretionary spending, σ_{ϵ}^{G}, and of the structural balance, σ_{ϵ}^{BAL}. There are only as few as ten observations, if the standard deviations are computed one per country. To increase the sample, additional sigmas were recursively computed moving a window of 12 quarters by 4 quarters, and of 4 quarters by 1 quarter, respectively. Given the multi-country context, the underlying units to compute the standard deviations were unified by taking percentages of the trend GDP.

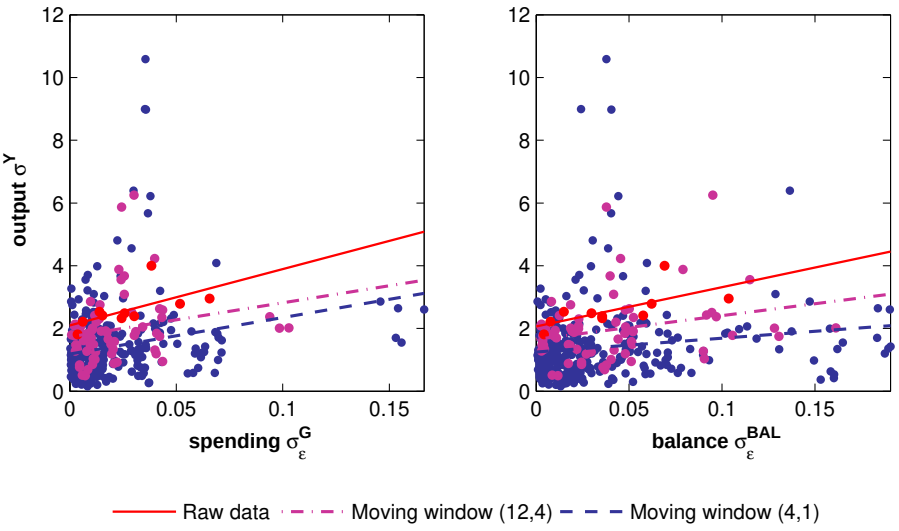

Figure 2: Fiscal aggressiveness and output volatility

Two stylised facts are observed: 1. The association between output volatility and the fiscal policy volatility is weak to moderate positive. The rank correlation coefficient amounts to 0.2-0.6 for spending and 0.1-0.6 for the structural balance (Table 9 in the Appendix). The picture conforms to empirical literature in the sense that it shows a positive relationship between higher output volatility and aggressiveness of fiscal policy (cf. Fatas and Mihov, 2003; and Badinger, 2009). 2. If also observations from downturns and overheating were to be included, the correlation coefficient would drop, to about 0.1-0.6 and 0.0-0.5, respectively. This is explained by the fact that

whilst the GDP growth was considerably more volatile during those periods, fiscal policy volatility increased to a lesser extent (Table 7). The two findings are robust to identification method. Under the elasticity-based identification, the correlation is positive and smaller. The finding of a lower correlation under extreme cyclical condition would imply that at least the excess part of output volatility had been induced by other than policy factors. Given the openness of these economies, such non-fiscal factors might have included e.g. external demand or financial stability.

Table 7: Standard deviations in fiscal discretion and GDP growth

	BG	CZ	EE	LV	LT	HU	PL	RO	SI	SK	CEE-10
Normal times											
σ_{ϵ}^{G}	0.03	0.01	0.07	0.04	0.02	0.01	0.00	0.03	0.05	0.02	0.03
σ_{ϵ}^{BAL}	0.04	0.01	0.10	0.07	0.04	0.01	0.00	0.03	0.06	0.06	0.04
σ^{Y}	2.39	2.53	2.95	4.00	2.33	2.22	1.81	2.48	2.78	2.41	2.59
All observations											
σ_{ϵ}^{G}	0.03	0.01	0.07	0.04	0.05	0.03	0.00	0.03	0.05	0.01	0.03
σ_{ϵ}^{BAL}	0.07	0.01	0.12	0.06	0.06	0.03	0.00	0.03	0.05	0.05	0.05
σ^{Y}	3.66	3.37	6.75	8.02	6.37	3.23	2.06	4.24	4.10	3.91	4.57

5 Concluding remarks and further research

This paper analyses the relationship between discretionary fiscal policy and output growth in ten CEE countries using quarterly data over 2000q1 to 2014q1. Three aspects are put forth: cyclical pattern in the discretionary policy, contributions to GDP growth, and the link between fiscal policy aggressiveness and output volatility. Policy discretion is estimated from a fiscal SVAR model following Blanchard and Perotti (2002) that is frequently used in the macroeconomic literature. The fiscal variables are net taxes and spending, which is motivated by their close association to aggregate demand and, through aggregate demand, to output. Given the narrower base, the estimates of structural balances presented herein are a complement rather than a fully-fledged alternative to cyclically adjusted balances.

The literature generally favours the use of rule-based fiscal policy to policy discretion, and even more so in emerging economies (cf. Kabashi, 2014). The empirical results from the CEE-10 in Section 4 provide the following supportive arguments for that view:

- Decomposition of the GDP suggests that fiscal discretion induced rather small contributions to economic growth. The finding is in line with the literature that finds low effectiveness of fiscal shocks in small open economies (e.g. Ilzetzki et al. , 2013).
- Correlation between fiscal policy aggressiveness and output volatility is weak to moderate positive, notwithstanding the underlying fiscal variable, spending or balance. The result agrees with the evidence of a positive relationship between fiscal policy volatility and output volatility from large panel studies (e.g. Fatas and Mihov, 2003; and Badinger, 2009).
- Inspection of the structural balance cyclical properties has identified a mix of pro-and countercyclical episodes in the years before the crisis 2008-09. Governments might have underestimated the cyclical phase of the economy and failed to fully utilise the best years to create buffers.

Overall, this evidence discourages from using fiscal discretion in the CEE countries with the aim to reverse the business cycle condition. Not so much because discretionary policy, costly in terms of fiscal sustainability, could strongly affect output, but rather the contrary. That being said, this paper supports policy recommendations for the CEE countries expressed in the recent literature. In particular, they could profit from transparent medium-term fiscal rules that would enforce building up of reserves in good times and prevent the governments from running procyclical policies (e.g. Darvas and Kostyleva, 2011; and Kabashi, 2014). Appropriate fiscal rules

should at the same time protect growth-productive spending in downturns (e.g. Klein et al. , 2013; and Barbiero and Darvas, 2014).

In further extensions of this work, the GDP growth decomposition might focus more specifically on public investment. A detailed break-down of the fiscal variables, combined with data on private investment, might improve accuracy of the estimated contributions to GDP growth. As another extension, the analysis of fiscal policy aggressiveness might include additional macroeconomic variables, such as private GDP components or inflation (e.g. Badinger, 2009). Section 4 has shown that correlation between policy aggressiveness and output volatility actually weakened in extreme cyclical condition, due to a disproportionately higher GDP volatility. It would thus be worthwhile to test on the causality between fiscal policy aggressiveness and output volatility using a theoretically underpinned model.

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Appendix

Table 8: Annual change in CAB (p.p. potential GDP)

	BG	CZ	EE	LV	LT	HU	PL	RO	SI	SK	CEE-10
Normal times	0.17	0.77	n.a.	0.34	n.a.	-0.32	n.a.	0.58	-0.76	0.68	0.21
Contraction	-1.44	-0.68	n.a.	0.50	1.28	2.50	n.a.	3.00	0.40	-1.96	0.45
Overheating	-0.41	0.47	n.a.	-1.23	-1.34	-2.06	n.a.	-2.00	-0.31	-0.27	-0.89

Table 9: Rank correlation between policy aggressiveness and output volatility

	No transformation	Moving window (12,4)	Moving window (4,1)
Normal times			
$\sigma_{\epsilon}^{\boldsymbol{G}}$	0.60	0.22	0.18
$\sigma_{\epsilon}^{\boldsymbol{BAL}}$	0.64	0.15	0.13
All observations			
$\sigma_{\epsilon}^{\boldsymbol{G}}$	0.56	0.08	0.14
$\sigma_{\epsilon}^{\boldsymbol{BAL}}$	0.51	0.02	0.08