

FISCAL CONSOLIDATIONS IN THE CENTRAL AND EASTERN EUROPEAN COUNTRIES ^{*}

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Abstract

We study fiscal consolidations in the Central and Eastern European countries and what determines the probability of their success. We define consolidation events as substantive improvements in fiscal balances adjusting for the impact of cyclical effects. We use Logit models for the period 1991–2003 to assess the determinants of the success of a fiscal adjustment. The results seem to suggest that for these countries expenditure based consolidations have tended to be more successful. By contrast, revenue based consolidations have a tendency to be less successful.

JEL Classification Numbers: C25, E62, H62.

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1. Introduction

Theoretical and empirical evidence suggests that expenditure based fiscal consolidations rather than revenue based can have more beneficial macroeconomic effects. Moreover, expenditure based fiscal consolidations tend to improve the budget balance more persistently and thus are often seen as being more successful. Available empirical evaluations of fiscal consolidations so far have concentrated on OECD and EU15 countries and evidence for the Central and Eastern Europe is lacking.

Against this background this paper aims to evaluate if and to what extent expenditure based consolidations have been more successful than other consolidations in Central and Eastern European countries. Our sample consists of eight new EU Member States from Central and Eastern Europe plus the candidate countries Bulgaria and Romania (CE10) for the period 1991–2003. In addition, we take into account the EU15 countries for the same period. This allows us to check if the success of fiscal consolidations is explained in a similar way both for the EU15 countries and for the Central and Eastern European countries.

The paper adds to a small but growing literature on fiscal policies in Central and Eastern Europe by applying to those countries concepts that have been found useful in explaining fiscal policy events in established market economies.

Based on the estimation of Logit specifications, we find that the higher the share of expenditure reduction relative to the change (improvement) in the budget balance, the higher is the probability of a fiscal consolidation being successful. However, these results differ somewhat across country groups. By contrast, revenue based consolidations seem to have a tendency to be less successful.

The paper is organised as follows. Section two discusses the motivation and briefly reviews the related literature. Section three explains our approach to assess fiscal adjustments. Section four sets up the empirical analysis framework and reports the main findings. Section five presents the conclusions of the paper.

2. Motivation and related literature

Fiscal consolidation is required in most Central and Eastern European countries in our sample. Several countries exhibit sizeable fiscal deficits, some by far exceeding the 3% of GDP reference value set by the Maastricht Treaty (see Table 1). Moreover, while public debt ratios are generally below those of the existing EU countries, debt has increased rapidly in many countries and policy discussions are starting to focus on the need to reverse those trends. Additionally, the existence of large but not yet very well assessed implicit liabilities could also be a matter of concern in these countries. Finally, as revenue ratios in many of the countries are already high compared to countries with similar levels of development, the need for expenditure reduction becomes increasingly pressing.¹

**Table 1 – Projected budget balance and debt ratios,
EU15 and CE10 in 2004 (in % of GDP)**

	Budget balance	Debt		Budget balance	Debt
BE	-0.1	95.8	BU	0.5	38.1
DK	1.0	43.4	CZ	-4.8	37.8
DE	-3.9	65.9	EE	0.5	4.8
EL	-5.5	112.2	LV	-2.0	14.6
ES	-0.6	48.2	LT	-2.6	21.1
FR	-3.7	64.9	HU	-5.5	59.7
IE	-0.2	30.7	PL	-5.6	47.7
IT	-3.0	106.0	RO	-1.6	21.8
LU	-0.8	4.9	SI	-2.3	30.9
NL	-2.9	55.7	SK	-3.9	44.2
AT	-1.3	64.0			
PT	-2.9	60.8			
FI	-2.3	44.8			
SE	0.6	51.6			
UK	-2.8	40.4			

Source: Economic Forecasts – autumn 2004, European Commission.

¹ Analysis of public finances in the EU new Member States are provided, for instance, by Sousa and Borbély (2003) and by Backé et al. (2004).

2.1. Different macroeconomic effects of consolidations

From a theoretical point of view, while in the standard Keynesian set-up with non-distortionary lump sum taxes only changes in the deficit matter for the macroeconomic outcome, the way in which such changes are achieved makes a difference if taxation induces deadweight losses. In fact, in this case the effects of fiscal policy on aggregate consumption can be non-linear because the deadweight loss of taxation rises rapidly with the extent of taxation.

An additional channel for differential effects of alternative ways of fiscal consolidation arises when models take the credibility of fiscal consolidation into account. If governments succeed in convincing markets that specific consolidation measures will improve fiscal sustainability, interest rate risk premia should fall and agents' discounted lifetime income rise, leading to higher aggregate demand. With high tax burdens, revenue based consolidations may lack credibility, as agents may correctly anticipate that additional tax increases will have to be reversed, e.g. due to their adverse impact on economic incentives. By contrast, expenditure reductions, in particular in politically sensitive areas such as household transfers, may convince agents that the consolidation effort is serious and will produce a lasting improvement in fiscal sustainability.

Finally, the design of fiscal consolidation can affect the macroeconomic outcome also via wages and investment. In particular, if expenditure cuts in the area of public employment lead to a reduction of overall wage pressure in the economy, this may induce firms to hire more workers and raise investment spending, thus driving up growth.

2.2. Literature review on the effects and success of consolidation efforts

After the initial contribution by Giavazzi and Pagano (1990), several studies have found empirical evidence supporting the importance of the composition of the fiscal adjustment for the macroeconomic outcomes, in particular those addressing the issue

of potential non-Keynesian effects of fiscal consolidations.² The probability of expansionary effects of fiscal consolidations was found to be higher for expenditure based than for revenue based consolidations. This holds in particular, if the expenditure reduction focused on public wage expenditure and government transfers.

To analyse differential composition effects in greater detail, Alesina and Perotti (1997) define two types of fiscal adjustment: Type 1 adjustments – when the budget deficit is reduced through cuts in social expenditures (unemployment subsidies, minimum income subsidies) and cuts in the public sector wages. Type 2 adjustments – when the budget deficit is reduced through the increase of taxes on labour income and through cuts in public investment expenditures. Accordingly the authors maintain that, for instance, the well-known fiscal episode of Ireland in 1987–1989 was a Type 1 adjustment. On the other hand, the fiscal episode of 1983–1986 in Denmark could be classified as a Type 2 adjustment. In general, Type 1 adjustments are expected to have more beneficial effects on economic growth as they raise labour incentives and reduce expected future tax burdens.

Additional evidence on the different effects of alternative consolidation approaches can be derived from VAR studies. Including revenue and expenditure variables in a VAR together with macroeconomic variables allows checking directly for possible differential effects of shocks to those fiscal variables. Blanchard and Perotti (2002) support the intuition that discretionary changes in taxes and expenditures have different effects on the macroeconomic variables, by finding generally stronger short run effects of expenditure measures. De Arcangelis and Lamartina (2003) go a step further and check for different effects of individual revenue and expenditure components and find differential effects of these components, while the overall impact is generally relatively small.

The composition of the adjustment has been used extensively to analyse which factors determine the success of fiscal consolidations. However, there is no consensus in the literature on how to determine if a fiscal consolidation is successful. Differences relate to the variables used, as well as to the number of periods used to “measure” successes.

² For reviews and results see, for instance, Afonso (2001), Hjelm (2002) and van Aarle and Garretsen (2003).

Commonly used explanatory variables include the size of the adjustment, its duration and also initial conditions such as the initial debt-to-GDP ratio or GDP real growth just before the adjustment.

To evaluate the success of fiscal consolidations, some authors estimate Logit and Probit specifications. For instance, McDermott and Westcott (1996) estimate Logit models for the OECD countries. The dependent variable assumes the value one if the episode is successful and the value zero if the episode is not successful. Additionally a dummy explanatory variable takes the value one if at least 60 per cent of the fiscal adjustment results from a decrease of public spending and takes the value zero otherwise. There is by now a wide range of comparable studies. Alesina and Perotti (1995, 1997), Giavazzi and Pagano (1990, 1996), McDermott and Wescott (1996), Alesina and Ardagna (1998), Perotti (1998) and Giavazzi, Jappelli and Pagano (2000), and EC (2003) present empirical results concerning the composition and size determinants of successful adjustments. On the other hand, Heylen and Everaert (2000) empirically contest the idea that current expenditure reductions are the best policy to get a successful fiscal consolidation. Von Hagen, Hughes-Hallet and Strauch (2001) and EC (2003) also provide additional descriptive analysis and case studies.

Table 2 summarises the main empirical literature using Logit and Probit analyses to assess the success of fiscal consolidations.

Table 2 – Empirical evidence on the success of fiscal consolidations

Author/date	Sample/ period	Measure for fiscal balance	Analysis	Results
McDermott and Wescott (1996)	OECD countries (1960-1994)	Structural budget balance (OECD, IMF).	Logit	A reduction in public spending is more likely to reduce the debt-to-GDP ratio.
Alesina and Ardagna (1998)	OECD countries (1960-1994)	Blanchard's fiscal impulse.	Probit	Fiscal retrenchment is more likely to be expansionist.
Zaghini (1999)	EU countries (1970-1998)	Structural primary budget balance (EC).	Probit	Fiscal contractions are more successful when there are cuts in expenditures.
Purfield (2003)	25 transition countries (1992-2000)	Primary balance (IMF).	Logit	A reduction in public spending is more successful in facing big fiscal unbalances.

The abovementioned literature uses several definitions for identifying fiscal consolidations, relying essentially on the structural budget balance concept, the balance that would arise if both expenditures and taxes were determined by potential rather than actual output. However, the structural budget does not allow the correction of all the effects on budget balance resulting from changes in economic activity such as inflation or real interest rate changes.

The usually adopted measure is the primary structural budget balance, i.e. the total balance excluding interest expenditure. This measure is used either as percentage of GDP or as a percentage of potential output. However, using the total budget balance instead of the primary budget balance may have advantages, e.g. if the consolidation leads to a lower interest rate and thus further consolidation benefits. In practice, and in the surveyed studies, the differences between using the total budget deficit or the primary budget deficit to determine the fiscal episodes are not very significant.

Besides the choice of the budget measure, there are also differences in the literature as to how to define the period of a fiscal contraction or expansion. According to the chosen definition, the number of fiscal episodes changes as well as the turning points of fiscal policy (“trigger points” in Bertola and Drazen (1993) terminology).

For instance, Alesina and Perotti (1995) use two alternative definitions for fiscal episodes: in the first one, they take into account the years where the change of the primary structural balance exceeds 1.5 percent of GDP. In the second one, they consider the years where the change of the primary structural balance deviates from the country average change by plus or minus one standard deviation.

The definition used by Giavazzi and Pagano (1996) decreases the probability of fiscal adjustment periods with only one year by using a limit of 3 percentage points of GDP for a single year consolidation. They determine a fiscal adjustment by checking whether the accumulated change in the primary structural deficit is above 5, 4 and 3 percentage points of GDP respectively in four, three and two consecutive years or the change is of 3 percentage points of potential GDP in one single year. Alternatively, Alesina and Ardagna (1998) adopted the following fiscal episode definition: the primary structural balance increases at least 2 percentage points of GDP, in one year,

or, increases 1.5 percentage points of GDP on average in two consecutive years. This allows for instance that some stabilisation periods may have only one year.

3. Assessing fiscal adjustments

3.1. Determining fiscal episodes

We are interested in the evolution of the budget balance as a ratio of GDP, and also in the fraction of that change that may be attributed to discretionary measures taken by the fiscal authorities. In other words, we need to decompose the change of the budget balance-to-GDP ratio into its components. In order to do that, one has to compute the total derivative of the budget balance ratio.

Denoting the budget balance as B , which is equal to government revenues, T , minus government expenditures, G , and being GDP given by Y , the total derivative of B/Y is written as follows:

$$d\left(\frac{B}{Y}\right) = \frac{\partial(B/Y)}{\partial B} dB + \frac{\partial(B/Y)}{\partial Y} dY \quad (1)$$

$$d\left(\frac{B}{Y}\right) = \frac{1}{Y} dB + \left(-\frac{B}{Y^2}\right) dY \quad (2)$$

$$d\left(\frac{B}{Y}\right) = \frac{dB}{Y} - \frac{B}{Y} \frac{dY}{Y}, \quad (3)$$

or, for small changes in the variables,

$$\Delta\left(\frac{B}{Y}\right) = \frac{\Delta B}{Y} - \frac{B}{Y} \frac{\Delta Y}{Y}. \quad (4)$$

Defining $b = B/Y$, and since $B=T-G$, we can write

$$\Delta b = \frac{\Delta T - \Delta G}{Y} - b \frac{\Delta Y}{Y}. \quad (5)$$

Following for instance von Hagen et al. (2001) we can define a neutral fiscal policy stance as resulting in identical changes in both government expenditures and government revenues. This implies that we have $\Delta T = \Delta G$ in (5), which results in

$$\Delta b^y = -b \frac{\Delta Y}{Y}, \quad (6)$$

where Δb^y is then the contribution of economic growth to the change in the budget balance.³ This growth effect should now be deducted from the actual change in the budget balance in order to proxy the discretionary change in the budget balance Δb^* :

$$\Delta b^* = \Delta b - \Delta b^y. \quad (7)$$

We can now proceed with the explanation of the criteria that we used to determine the so-called fiscal consolidation events and the success of those events.

Our definition of an event, E , in period t , is as follows:

$$E_t = \begin{cases} 1, & \text{if } \Delta b_t^* > [\mu + \gamma\sigma] \\ 0, & \text{otherwise} \end{cases}, \quad (8)$$

where Δb^* was defined previously in (7), and μ and σ are respectively the average and the standard deviation for all discretionary changes in the budget balance in the entire sample, while γ is applied to determine a multiple of the standard deviation as commonly used in the literature.⁴

A fiscal adjustment is defined as successful if the general government balance improves by α -times the standard deviation of all discretionary changes in the balance

³ Alternatively, one can notice that a more demanding definition, without assuming that $\Delta T = \Delta G$, would imply a contribution of economic growth to the change in the budget balance given by $\Delta b^y = (t - b) \frac{\Delta Y}{Y}$, where $t = \Delta T / T$ and supposing also that $\Delta G = 0$.

⁴ As in all the related literature, here there is also an element of arbitrariness.

for two consecutive years (rather like what was proposed by Alesina and Perotti (1995)):

$$SU_t = \begin{cases} 1, & \text{if } \sum_{i=0}^1 \Delta b_{t+i}^* > \alpha \sigma \\ 0, & \text{otherwise} \end{cases}, \quad (9)$$

and we use, for simplicity, $\alpha=1$ in (9).

In order to control for the composition of the adjustment, i. e. whether or not the change in expenditure is significant vis-à-vis the change in the budget balance, we construct the dummy variable *EXP*, to be used as an explanatory variable in the subsequent Logit analysis. For the cases where a successful consolidation can be found, variable *EXP*, as a percentage of GDP, is defined as follows

$$EXP_t = \begin{cases} 1, & \text{if } (\Delta \exp_t / \Delta b_t^*) > \lambda \\ 0, & \text{otherwise} \end{cases}, \quad (10)$$

where *exp* is the value for total expenditure in year *t*.

3.2. Descriptive data for fiscal episodes

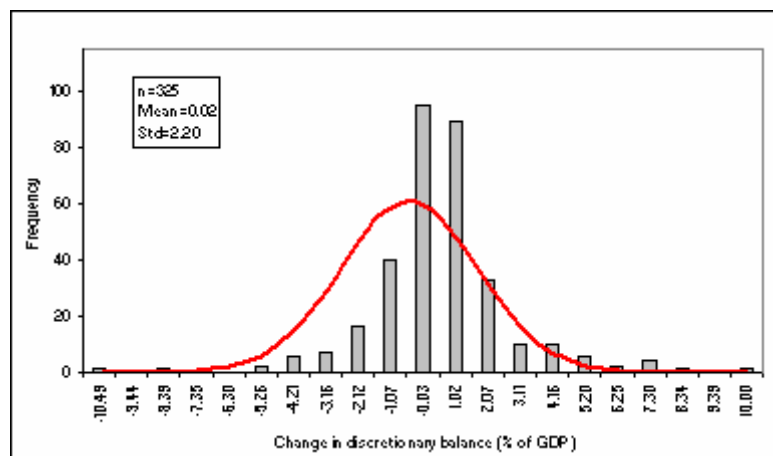
As data sources the AMECO database of the EC is used for the EU15 countries, while for the CE10 countries the WEO database is used.⁵ To have a view of how the changes in discretionary fiscal balances are spread across countries and years, Figure 1 depicts the results of calculations for equation (7), using the total balance and $\lambda=2/3$

⁵ The relevant codes used for the data are as follows:

	<u>Ameco</u>	<u>WEO</u>
- total budget deficit	1.0.319.0.UBLGE	GGB
- primary budget deficit	1.0.319.0.UBLGIE	GGBXI
- total expenditure	1.0.319.0.UUTGE	GGENL
- total revenue	1.0.319.0.URTG	GGRG
- interest expenditure	1.0.319.0.UYIGE	GGEI
- real GDP	1.1.0.0.OVGD	NGDP_R

as our benchmark.⁶ As can be seen, the distribution is centred around zero and has a higher kurtosis than the normal distribution.

Figure 1 – Changes in total “discretionary” balance, CE10, and EU15, 1991-2003



Moreover, Table 3 presents all the individual events identified for each country. Almost all CE10 countries implemented fiscal consolidations according to our definition during the first half of the nineties with 1993 being the year with the largest number of consolidations. This might reflect that governments at that time used a window of opportunity for fiscal consolidation as economic output bottomed out after the drop in the early transition period and the growth outlook improved. Another spike in the number of countries is 1997 with four observations after which the number of events declines and remains equal or below two for the remainder of the observation period. The only year where no fiscal consolidation is recorded in any of the CE10 countries is 2002.⁷

By contrast, fiscal consolidations in the EU15 are concentrated in the years 1995 through 1997 with more than half of all observations occurring in this period. Another

⁶ For instance, McDermott and Westcott (1996) use a 60 per cent threshold. In section 4.2 we perform some sensitivity analysis to check the impact of changing our chosen threshold from 2/3 to 1/2 and to 3/4.

⁷ One has to mention that in order to determine whether a success occurs in 2003, forecasts for 2004 from the relevant sources were used.

local maximum occurs in the year 2000 after which fiscal consolidation events are rare and unsuccessful (cfr. lower panel of Table 3).⁸

Table 3 – Fiscal adjustment events and successes (using a 2/3 threshold), CE10, and EU15, 1991-2003

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total
													e s
Bulgaria	e s		e s			e s	e						4 3
Czech Republic		e											1 0
Estonia			e			e			e s				3 1
Hungary				e s	e							e s	3 2
Latvia		e			e s	e							3 1
Lithuania						e			e s				2 1
Poland		e s											1 1
Romania		e s					e						2 1
Slovak Republic		e s	e s										4 4
Slovenia										e s		e s	0 0
Events	1	5	3	1	2	4	1	1	2	1	0	2	23
Successes		1	3	2	1	1	0	0	2	1	0	2	14
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total
													e s
Austria						e				e			2 0
Belgium			e s			e s							2 2
Denmark								e					1 0
Finland				e s		e s	e s		e s				4 4
France													0 0
Germany													0 0
Greece			e s		e s	e s							3 3
Ireland					e s				e				2 1
Italy						e s							1 1
Luxembourg									e s				1 1
Netherlands					e s								1 1
Portugal	e										e		2 0
Spain					e s	e		e					3 1
Sweden				e s	e s		e s		e s				4 4
United Kingdom						e s	e s						2 2
Events	1	0	2	2	5	7	3	2	4	1	1	0	28
Successes		0	0	2	2	5	3	0	3	0	0	0	20

Note: e – event; s – success.

⁸ The differences in the occurrence of fiscal consolidations might also be explained by the considerable differences in the business cycles of the EU15 and the CE10 (see Frenkel and Nickel (2005)).

The number of events, successes and the occurrences of the expenditure dummy composition are reported in Table 4 (also for alternative expenditure thresholds).⁹ With a less (more) demanding limit, one naturally gets more (less) fiscal events. For instance, with a less demanding limit one also gets a few more successes and a decrease in the success rate.

Table 4 – Events, successes and expenditure composition for the total balance
CE10 and EU15, 1991-2003

	expenditure dummy threshold: $\lambda=2/3$			
	Events	Success	Success rate *	Expenditure Dummy
CE10	23	14	61%	12
EU15	28	20	71%	15
CE10; EU15	51	34	67%	27
	expenditure dummy threshold: $\lambda=1/2$			
	Events	Success	Success rate *	Expenditure Dummy
CE10	25	14	56%	13
EU15	44	28	64%	31
CE10; EU15	69	42	61%	44
	expenditure dummy threshold: $\lambda=3/4$			
	Events	Success	Success rate *	Expenditure Dummy
CE10	23	14	61%	11
EU15	24	18	75%	11
CE10; EU15	47	32	68%	22

Notes: The expenditure dummy means that there was a decrease in expenditures of at least λ of the improvement in the budget balance, see (10). * - Successes/ Events.

3.3. Comparison of expenditure based adjustments

Table 5 presents some characteristics of different consolidations. There seems to be some evidence that in Central and Eastern Europe expenditure based consolidations tend to be somewhat larger than the average size of all consolidations. Similarly, it would seem that Central and Eastern Europe expenditure based consolidations start out from a higher overall deficit situation in the preceding year. With regard to the growth rate in the period prior to the consolidation event, by contrast, there seems to be no major difference.

⁹ Tondl (2004) also computes fiscal episodes for Eastern European countries, using an approach inspired on Blanchard's fiscal impulse. Our approach determines rather similar fiscal episodes for those countries.

Table 5 – Size of consolidations, total deficit
EU15 and CE10, 1991-2003

	Size of consolidation (in % of GDP)		Average fiscal balance prior to consolidation (in % of GDP)		Average growth prior to consolidation (in %)	
	All events	Expenditure based consolid.	All events	Expenditure based consolid.	All events	Expenditure based consolid.
Total deficit						
CE10	3.8	4.2	-6.4	-7.8	-1.6	-1.6
EU15	2.5	2.0	-3.9	-3.1	3.5	4.2

For the EU15 countries, the evidence is somewhat different since expenditure based consolidations tend to be somewhat smaller than average (although the difference is negligible when looking at primary deficits). Also in contrast to Central and Eastern Europe, expenditure based consolidations tend to start out from lower deficits and higher growth rates in the preceding period.

Overall, this evidence would support the notion that expenditure based consolidations are perceived differently by policy makers in Central and Eastern Europe and in the EU15. In Central and Eastern Europe expenditure based consolidations may be seen as a more drastic tool for consolidation in times of greater fiscal distress. Conversely, in the EU15, expenditure reduction might be perceived as more of a fiscal “luxury” that can be implemented in times of stronger growth and less pressing consolidation requirements. One possible explanation for the different perceptions could lie in different administrative capacity between the two country groups. While generally well developed tax administrations in the EU15 allowed those countries to implement revenue increases in times of consolidation, a lack of such capacity may have driven the Central Eastern European countries to resort to expenditure reductions during the observation period. The importance of administrative capacity for the development of fiscal policies those countries has been highlighted by Purfield (2003) and Gupta et al. (2001).

4. Analytical framework

4.1. Estimation results and discussion

In this section we assess whether the relative share of expenditure changes in the consolidation affects the success of fiscal consolidations. To answer those questions a Logit model was estimated, defining

$$P_i = E[S = 1 | Z_i] = \frac{e^{Z_i}}{1 + e^{Z_i}}, \quad (11)$$

where $E[S=1/Z_i]$ is the conditional expectation of the success of a fiscal consolidation, given Z_i , with

$$S = \begin{cases} 1, & \text{if the consolidation is successful,} \\ 0, & \text{if the consolidation is not successful;} \end{cases} \quad (12)$$

One can interpret (11) as the conditional probability that a successful consolidation occurs given Z_i , and

$$Z_i = \alpha + \beta B_i + \delta EXP_i, \quad (13)$$

where B is the “discretionary change” in the primary budget balance (computed via (7)). The dummy variable EXP was defined in (10), and assumes the value one when the change in the primary expenditure is at least two thirds of the change in the primary budget balance, and zero otherwise.

In order to assess whether there is a different behaviour between the EU15 countries and the CE10 countries, the following modified version of (13) was also estimated:

$$Z_i = (\alpha_1 + \alpha_2 D_i) + \beta_1 B_i + \beta_2 (D_i B_i) + \delta_1 EXP_i + \delta_2 (D_i EXP_i), \quad (14)$$

where D is a dummy variable that takes the value one if a country belongs to the EU15 group and the value zero if the country belongs to the CE10 country group. On

the other hand, α_2 is the difference to the intercept and β_2 and δ_2 are the slope differences of one group of countries vis-à-vis the other group.

The results for the estimation of equations (13) and (14) are reported in Table 6, using the total budget balance.

Table 6 – Estimation results (using a 2/3 threshold) for total balances, EU15 and CE10, 1991-2003

	EU15, CE10		EU15	CE10
	No group dummy, eq. (13)	With group dummy, eq. (14)	eq. (13)	eq. (13)
α (constant)	-2,48 ** (-2,09)		-2,97 (-1,44)	-3,11 * (-1,87)
α_1		-3,11 * (-1,87)		
α_2		0,14 * (2,65)		
β (B)	0,83 ** (2,15)		1,42 * (1,75)	0,60 (1,33)
β_1		0,60 (1,33)		
β_2		0,82 (0,88)		
δ (EXP)	1,89 *** (2,57)		1,19 (1,18)	3,38 ** (2,52)
δ_1		3,38 ** (2,52)		
δ_2		-2,20 (-1,31)		
McFadden R ²	0,29	0,30	0,14	0,48
N° of observations	51	51	28	23
dP/dZ:				
B	0,14	0,09 0,12	0,24	0,06
EXP	0,32	0,48 -0,31	0,20	0,36

Notes: The t statistics are in brackets. *, **, *** - Significant at the 10, 5 and 1 per cent level respectively. The effect in the probability of success from a change in a continuous variable Z, is approximated by $dP/dZ \cong \beta[P_i(1 - P_i)]$.

Table 6 (first column) shows that the size of the discretionary change in total balance is statistically significant to explain the success of a fiscal consolidation, and this has the expected sign. This means, the larger the size of the initial fiscal adjustment, the higher is the probability that the improvement will last over two periods. However, that effect is not significant when only the CE10 country group is considered (last column).

For the CE10 sub-set of countries, only the dummy variable, *EXP*, that reflects the size of change in expenditures relative to the change in the total budget balance, is significant. In other words, for the CE countries the composition of the adjustment seems relevant – expenditure-based adjustments have a higher probability to succeed.¹⁰

The advantage of the dummy variable approach (i. e. estimating the pooled equation (14)) is that one gets more insights than by just doing a simple Chow test (i. e. estimating equation (13) for the three sub-samples). Indeed, from Table 6, the fact that the differential intercept coefficient α_2 is statistically significant, allows accepting that the separate regressions for the EU15 and CE10 countries have a different intercept. Moreover, one can also see that the differential slope for the expenditure dummy is statistically different between the two groups of countries.

Given that the results using the expenditure dummy are not entirely unambiguous the results from the opposite approach may be instructive. In particular, instead of including an expenditure dummy in the regression we include a revenue dummy, which is defined in the analogous way:

$$REV_t = \begin{cases} 1, & \text{if } (\Delta rev_t / \Delta b_t^*) > \lambda \\ 0, & \text{otherwise} \end{cases} \quad (15)$$

In line with our expectations, Table 7 (also with $\lambda=2/3$ in (15)) reveals that the presence of the revenue dummy in the estimation has a significantly negative impact on the likelihood of a successful consolidation. The details of the table reveal that this effect is driven by the behaviour of the CE10, whereas the dummy remains insignificant for the EU15. This result supports the notion discussed above, that tax increases in the CE10 are less likely to contribute to sustainable fiscal consolidation.

¹⁰ On the other hand, if one considers the primary balance (cfr. Appendix A), only the coefficient of the variable that models the “discretionary” change in the primary budget balance is statistically different from zero. This is true both for the EU15 countries and for the CE10 countries. Indeed, a discretionary improvement in the primary budget balance of one percentage point of GDP is related to an increase in the probability of success of the fiscal consolidation of 17 and 24 per cent respectively for the CE10 and for the EU15 countries.

Table 7 – Estimation results (using a 2/3 threshold) for total balances and with revenue dummy, EU15 and CE10, 1991-2003

	EU15, CE10		EU15	CE10
	No group dummy, eq. (13)	With group dummy	eq. (13)	eq. (13)
α (constant)	-0,08 (-0,09)		-1,29 ** (-0,78)	0,16 (0,09)
α_1		0,16 (0,09)		
α_2		-1,45 (-0,62)		
β (B)	0,44 (1,38)		1,03 (1,40)	0,32 (0,79)
β_1		0,32 (0,79)		
β_2		0,71 (0,84)		
δ (REV)	-1,88 ** (-2,35)		-0,79 (-0,69)	-2,69 * (-1,93)
δ_1		-2,69 * (-1,93)		
δ_2		1,90 (1,05)		
McFadden R^2	0.19	0.23	0.11	0.34
N° of observations	51	51	28	21
dP/dZ: B	0,08	0,05 0.11	0,18	0.04
REV	-0,32	-0,43 0.30	-0,14	-0.37

Notes: The t statistics are in brackets. *, **, *** - Significant at the 10, 5 and 1 per cent level respectively. The effect in the probability of success from a change in a continuous variable Z , is approximated by $dP/dZ \cong \beta[P_i(1 - P_i)]$.

4.2. Alternative specifications

To test for the robustness of the reported results, we tried several alternative approaches of our model. All in all, the results presented in the following show that these alternatives seem to give some robustness to the results reported for specifications initially chosen.

First we tested an alternative approach for the expenditure dummy variable in (10). Instead of checking for the change of public expenditure in relation to the improvement of the budget balance, one can be more lenient and take into account the cumulative change of both period t and period $t-1$. For instance, and for the cases

where a successful consolidation can be found, a variable $EXPDUR$, as a percentage of GDP, can be defined as follows

$$EXPDUR_t = \begin{cases} 1, & \text{if } (\sum_{i=0}^1 \Delta \exp_{t-i} / \Delta b_{t-i}^*) > \lambda \\ 0, & \text{otherwise} \end{cases}, \quad (16)$$

where \exp is still the value for total expenditure in year t .

Therefore, specifications (13) and (14) can be estimated as equations (13') and (14') using the alternative dummy expenditure duration variable. These results are presented in the Appendix B.

For the total balance, our results seem to indicate that a more durable expenditure-based adjustment is more relevant in explaining the success of fiscal consolidations in the CE10 countries than in the EU15 countries. Indeed, it can be seen that the differential slope for the duration expenditure dummy, δ_2 , is statistically different between the two groups of countries. Since the two regressions have, statistically speaking, the same intercept, but different slopes, we may assume that these two concurrent regressions do portray different reaction functions for the EU15 and for the CE10 countries. In other words, the idea of some persistence of an expenditure-based adjustment seemed to be more relevant in explaining the success of fiscal consolidations in the CE10 countries than in the EU15 countries.

Additionally, the general specification (13) was also used with a multiplicative expenditure dummy instead of an additive dummy, that is,

$$Z_i = \alpha + \beta B_i + \delta (EXP_i \times B_i). \quad (17)$$

However, the estimation results for (17) were rather similar to the ones already obtained with the additive expenditure dummy, without any relevant gains in terms of significance levels, and therefore are not reported in the text.

Some sensitivity analysis was performed in order to assess whether changing the 2/3 threshold for the setting up of the fiscal events, the γ factor in equation (8), and also for the attribution of values to the dummy expenditure variable in (10), would impinge significantly on the results. Alternative thresholds 1/2 and 3/4 were then used, and the results reported respectively in Tables 8 and 9, are rather similar to the ones already presented for the initial case with the 2/3 threshold.

Table 8 – Estimation results (using a 1/2 threshold) for total balances, EU15 and CE10, 1991-2003

	EU15, CE10		EU15	CE10
	No group dummy, eq. (13)	With group dummy, eq. (14)	eq. (13)	eq. (13)
α (constant)	-1,63 ** (-2,25)		-1,45 (-1,30)	-2,97 ** (-2,16)
α_1		-2,97 ** (-2,16)		
α_2		1,52 (0,86)		
β (B)	0,59 ** (2,22)		1,05 * (1,90)	0,58 (1,50)
β_1		0,58 (1,50)		
β_2		0,47 (0,69)		
δ (EXP)	1,06 * (1,91)		0,00 (0,01)	2,54 ** (2,24)
δ_1		2,54 ** (2,24)		
δ_2		-2,53 * (-1,88)		
McFadden R ²	0,14	0,22	0,10	0,51
Nº of observations	69	69	44	25
dP/dZ:				
B	0.12	0.10 0.08	0.22	0.07
EXP	0.21	0.45 -0.45	0.00	0.32

Notes: The t statistics are in brackets. *, **, *** - Significant at the 10, 5 and 1 per cent level respectively. The effect in the probability of success from a change in a continuous variable Z, is approximated by $dP/dZ \cong \beta[P_i(1 - P_i)]$.

Additional control variables such as GDP real growth rate and inflation were used under several alternative specifications of the Logit model. However, results were not improved.

We also allowed for a longer time lag for assessing the success of a consolidation effort, namely using the average of the two years following the fiscal consolidation to

evaluate the success, or not, of the effort. In other words, instead of using two consecutive years in the determination of the successes in (9), we used three consecutive years. Nevertheless, and since the resulting dummy variable is highly correlated with the one we already used (correlation is around 0.90), the results were broadly unchanged. Moreover, there was even a small decrease in the number of successes since in some cases, to apply this longer span, an additional observation would be needed.¹¹

Table 9 – Estimation results (using a 3/4 threshold) for total balances, EU15 and CE10, 1991-2003

	EU15, CE10		EU15	CE10
	No group dummy, eq. (13)	With group dummy, eq. (14)	eq. (13)	eq. (13)
α (constant)	-2,40 * (-1,95)		-2,84 (-1,30)	-3,39 * (-1,81)
α_1		-2,39 ** (-1,81)		
α_2		0,54 (0,19)		
β (B)	0,81 ** (2,06)		1,35 (1,58)	0,77 (1,48)
β_1		0,77 (1,48)		
β_2		0,58 (0,56)		
δ (EXP)	2,11 *** (2,59)		1,47 (1,33)	3,14 ** (2,33)
δ_1		3,14 ** (2,33)		
δ_2		-1,67 (-0,96)		
McFadden R ²	0,23	0,32	0,16	0,44
N° of observations	47	47	24	23
dP/dZ: B	0.13	0.11 0.08	0.21	0.09
EXP	0.34	0.43 -0.23	0.23	0.37

Notes: The *t* statistics are in brackets. *, **, *** - Significant at the 10, 5 and 1 per cent level respectively. The effect in the probability of success from a change in a continuous variable Z, is approximated by $dP/dZ \cong \beta[P_i(1 - P_i)]$.

¹¹ Additionally, using the expenditure dummy as the ratio of the change in primary expenditure to the change in total balance, the results are broadly in line with those presented in the baseline table. Coupling this alternative dummy variable with the successes determined by the average of the two years following the fiscal consolidation, the expenditure dummy only turns out as significant for the CE10 country group.

Finally, instead of using a dummy variable to capture the dimension of the change in expenditures vis-à-vis de improvement of the budget balance, we used the change itself, namely for the 2/3 threshold for the expenditure dummy variable. Again there was no enhancement in the results, which were also in line with the results already presented, but now with lower statistical significance. All in all, these alternative approaches seem to give some robustness to the results reported for our initially chosen specification.

Table 10 summarises the several sets of results for the alternative limits, and one can notice that with the 1/2 threshold the expenditure dummy variable also becomes significantly different from zero for the group of EU15 countries when the primary balance is used.

The evidence regarding expenditure-based adjustments is weak for the EU15 country group, also compared to the literature presented above. Here, one has to bear in mind that due to the limited available data for the CEE country group, starting only in 1991, this implies excluding from the sample a significant number of consolidations that occurred in the 1980s and before in the EU15 countries. On the other hand, the limited time span precludes using longer periods to assess the successes, as already mentioned above.

Table 10 – Summary of statistical significance findings

	Total balance			Primary balance		
	EU15, CE10	EU15	CE10	EU15, CE10	EU15	CE10
Expenditures (revenues) decrease (increase) by at least 2/3 of the improvement in the budget balance						
“discretionary change” β (<i>B</i>)	yes	yes	no	yes	yes	yes
Expenditure dummy δ (<i>EXP</i>)	yes	no	yes	yes*	no	no
Revenue dummy δ (<i>REV</i>)	yes	no	yes	no	no	no
Expenditures (revenues) decrease (increase) by at least 1/2 of the improvement in the budget balance						
“discretionary change” β (<i>B</i>)	yes	yes	no	yes	yes	yes
Expenditure dummy δ (<i>EXP</i>)	yes	no	yes	no	yes	no
Revenue dummy δ (<i>REV</i>)	yes	no	yes	no	no	no
Expenditures (revenues) decrease (increase) by at least 3/4 of the improvement in the budget balance						
“discretionary change” β (<i>B</i>)	yes	no	no	yes	yes	yes
Expenditure dummy δ (<i>EXP</i>)	yes	no	yes	yes	no	no
Revenue dummy δ (<i>REV</i>)	yes	no	yes	no	no	no

Note: the full set of results for the revenue dummy with the alternative thresholds of 1/2 and 3/4 are not reported in the paper, but are available from the authors on request.

* After accounting for border line cases: Bulgaria 1994 and Finland 1994.

5. Conclusion

Many of the CE10 countries will have to undertake fiscal consolidation in the near future to reverse the trend of rising debt ratios and comply with the EU fiscal framework. Thus the question of how to design fiscal consolidations is of imminent interest.

The theoretical and empirical literature shows that basing fiscal consolidation on expenditure reduction can have beneficial macroeconomic effects and raise the probability of success. However, conclusive evidence for the CE10 has so far been lacking.

This paper shows that since the early 1990's expenditure based consolidations have indeed tended to be more successful in Central and Eastern Europe. The reverse is also true, namely that revenue based consolidations have tended to reduce the likelihood of success. The results are robust to alternative thresholds for the identification of fiscal events and the composition dummies. Using primary balances we find some support for a significant role of the expenditure dummy when estimating the effect for the EU15 and the CE10 combined, but not at the disaggregated level.

The results differ from those for the EU15 countries, where both composition dummies remain generally insignificant. The dominance of expenditure based consolidations in Central and Eastern Europe could be explained by an inability to increase revenue ratios above already high levels due to a lack of administrative capacity. But further research in this area would be necessary.

Appendix A – Primary balance results

Table A1 – Fiscal adjustment events and successes (using a 2/3 threshold), primary balance, CE10, and EU15, 1991-2003

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total
Bulgaria			e s										e s
Czech Republic													1 1
Estonia						e			e s				0 0
Hungary			e s	e s	e s							e s	2 1
Latvia		e		e s	e s	e							4 4
Lithuania						e			e s				4 2
Poland		e s											2 1
Romania		e s				e		e					3 1
Slovak Republic		e s	e s										4 2
Slovenia										e		e	0 0
Events	0	4	3	2	2	4	0	1	2	1	0	2	21
Successes	0	3	3	2	2	0	0	0	2	0	0	1	13
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total
Austria						e				e			e s
Belgium			e										2 0
Denmark								e					1 0
Finland			e s			e s	e		e s				1 0
France					e								4 3
Germany													1 0
Greece			e s		e s								0 0
Ireland					e				e				2 2
Italy	e			e		e							2 0
Luxembourg						e			e s				3 0
Netherlands													2 1
Portugal	e				e								0 0
Spain					e						e		2 0
Sweden			e s	e s	e s								1 0
United Kingdom					e s	e s	e		e				5 3
Events	2	0	4	2	7	5	3	1	4	1	1	0	30
Successes	0	0	3	1	3	2	0	0	2	0	0	0	11

Notes: e – event; s – success. We use here $\alpha=1.5$ in (9).

Table A2 – Events, successes and expenditure composition, primary balance, CE10, and EU15, 1991-2003

	expenditure dummy threshold: $\lambda=2/3$			
	Events	Success	Success rate *	Expenditure Dummy
CE10	21	13	62%	12
EU15	30	11	37%	15
CE10; EU15	51	24	47%	27
	expenditure dummy threshold: $\lambda=1/2$			
	Events	Success	Success rate *	Expenditure Dummy
CE10	24	14	58%	15
EU15	48	12	25%	28
CE10; EU15	72	26	36%	43
	expenditure dummy threshold: $\lambda=3/4$			
	Events	Success	Success rate *	Expenditure Dummy
CE10	20	12	60%	11
EU15	27	11	41%	11
CE10; EU15	47	23	49%	22

Notes: Exp. Dummy - means that there was a decrease in expenditures of at least 2/3 of the improvement in the budget balance, see (10). * - Successes/ Events.

**Table A3 – Estimation results (using a 2/3 threshold) for primary balances,
EU15 and CE10, 1991-2003**

	EU15, CE10		EU15	CE10
	No group dummy, eq. (13)	With group dummy, eq. (14)	eq. (13)	eq. (13)
α (constant)	-3,82 *** (-3,23)		-4,06 ** (-2,36)	-3,54 * (-1,89)
α_1		-3,54 * (-1,89)		
α_2		-0,52 (-0,20)		
β (B)	1,24 *** (2,98)		1,37 ** (2,03)	1,10 * (1,87)
β_1		1,10 * (1,87)		
β_2		0,27 (0,30)		
δ (EXP)	0,86 (1,23)		0,77 (0,86)	1,07 (0,95)
δ_1		1,07 (0,95)		
δ_2		-0,30 (-0,21)		
McFadden R^2	0,27	0,28	0,19	0,32
N° of observations	51	51	30	21
dP/dZ: B	0,21	0,18 0,04	0,24	0,17
EXP	0,14	0,18 0,05	0,14	0,16

Notes: The t statistics are in brackets. *, **, *** - Significant at the 10, 5 and 1 per cent level respectively. The effect in the probability of success from a change in a continuous variable Z , is approximated by $dP/dZ \cong \beta[P_i(1 - P_i)]$.

**Table A4 – Estimation results (using a 1/2 threshold) for primary balances,
EU15 and CE10, 1991-2003**

	EU15, CE10		EU15	CE10
	No group dummy, eq. (13)	With group dummy, eq. (14)	eq. (13)	eq. (13)
α (constant)	-4,00 *** (-4,25)		-5,76 *** (-3,09)	-2,50 * (-1,94)
α_1		-2,50 * (-1,94)		
α_2		-3,27 (-1,44)		
β (<i>B</i>)	1,24 *** (3,43)		1,51 ** (2,20)	1,03 ** (2,15)
β_1		1,03 ** (2,15)		
β_2		0,48 (0,58)		
δ (<i>EXP</i>)	0,91 (1,38)		2,27 * (1,91)	-0,32 (-0,30)
δ_1		-0,32 (-0,30)		
δ_2		2,59 (1,62)		
McFadden R^2	0,32	0,36	0,33	0,27
Nº of observations	72	72	48	24
dP/dZ: <i>B</i>	0.18	0.14 0.07	0.18	0.17
<i>EXP</i>	0.13	-0.04 0.35	0.28	-0.05

Notes: The t statistics are in brackets. *, **, *** - Significant at the 10, 5 and 1 per cent level respectively. The effect in the probability of success from a change in a continuous variable Z , is approximated by $dP/dZ \cong \beta[P_i(1 - P_i)]$.

**Table A5 – Estimation results (using a 3/4 threshold) for primary balances,
EU15 and CE10, 1991-2003**

	EU15, CE10		EU15	CE10
	No group dummy, eq. (13)	With group dummy, eq. (14)	eq. (13)	eq. (13)
α (constant)	-4,52 *** (-3,24)		-3,87 ** (-2,26)	-7,59 ** (-1,98)
α_1		-7,58 ** (-1,98)		
α_2		3,72 (0,89)		
β (<i>B</i>)	1,41 *** (3,01)		1,28 ** (1,98)	2,15 * (1,95)
β_1		2,15 * (1,95)		
β_2		-0,87 (-0,68)		
δ (<i>EXP</i>)	1,38 * (1,77)		1,08 (1,16)	2,43 (1,41)
δ_1		2,43 (1,41)		
δ_2		-1,34 (-0,69)		
McFadden R^2	0,32	0,38	0,17	0,52
Nº of observations	47	47	27	20
dP/dZ: <i>B</i>	0.22	0.32 -0.13	0.24	0.23
<i>EXP</i>	0.22	0.37 -0.21	0.20	0.25

Notes: The t statistics are in brackets. *, **, *** - Significant at the 10, 5 and 1 per cent level respectively. The effect in the probability of success from a change in a continuous variable Z , is approximated by $dP/dZ \cong \beta[P_i(1 - P_i)]$.

Appendix B – Expenditure duration dummy results

Table B1. Estimation results, expenditure duration dummy (using a 2/3 threshold) for total balances, EU15 and CE10, 1991-2003

	EU15, CE10		EU15	CE10
	No group dummy, eq. (13')	With group dummy, eq. (14')	eq. (13')	eq. (13')
α (constant)	-1.36 (-1.48)		-0.67 (-0.37)	-3.2 ** (-1.99)
α_1		-3.2 ** (1.99)		
α_2		2.5 (1.03)		
β (B)	0.56 * (1.83)		1.15 (1.54)	0.55 (1.54)
β_1		0.55 (1.54)		
β_2		0.59 (0.72)		
δ ($EXPDUR$)	0.70 (1.03)		-1.29 (-1.06)	2.57 ** (2.07)
δ_1		2.57 ** (2.07)		
δ_2		-3.86 ** (-2.22)		
McFadden R^2	0.11	0.25	0.14	0.35
Nº of observations	51	51	28	23
dP/dZ: B	0.11	0.09 0.09	0.20	0.08
$EXPDUR$	0.14	0.40 -0.60	-0.22	0.35

Notes: The t statistics are in brackets. *, **, *** - Significant at the 10, 5 and 1 per cent level respectively. The effect in the probability of success from a change in a continuous variable Z , is approximated by $dP/dZ \cong \beta[P_i(1 - P_i)]$.

Table B2. Estimation results, expenditure duration dummy (using a 2/3 threshold) for primary balances, EU15 and CE10, 1991-2003

	EU15, CE10		EU15	CE10
	No group dummy, eq. (13')	With group dummy, eq. (14')	eq. (13')	eq. (13')
α (constant)	-3.52 *** (-3.25)		-3.43 **	-3.86 ** (-2.04)
α_1		-3.86 ** (-2.04)		
α_2		0.43 (0.17)		
β (B)	1.16 *** (2.98)		1.25 ** (1.97)	1.00 * (1.84)
β_1		1.00 (1.83)		
β_2		0.25 (0.30)		
δ ($EXPDUR$)	0.52 (0.74)		0.04 (0.05)	1.61 (1.22)
δ_1		1.61 (1.22)		
δ_2		-1.57 (-0.99)		
McFadden R^2	0.31	0.28	0.17	0,34
N° of observations	51	51	30	21
F Test	0,19 ^s			
dP/dZ:				
B	0.20	0.17 0.04	0.23	0.14
$EXPDUR$	0.09	0.27 -0.26	0.01	0.23

Notes: The t statistics are in brackets. *, **, *** - Significant at the 10, 5 and 1 per cent level respectively. \$ - At the 5 or 10 per cent level it is not possible to reject the hypothesis that the structure is equal for the separate regressions for each country group. The effect in the probability of success from a change in a continuous variable Z , is approximated by $dP/dZ \cong \beta[P_i(1 - P_i)]$.

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