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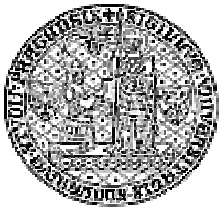

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Relation between Cyclically Adjusted Budget Balance and Growth Accounting Method of Deriving 'Net Fiscal Effort'

Jan Zápal*

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Abstract:
This paper deals with the growth accounting method used for derivation of so called net fiscal effort. Net fiscal effort can then provide a clue whether fiscal policy is expansionary or not and together with the data about economic performance can answer the question of pro- or anti-cyclicality of fiscal stance. Traditionally, answer to such questions has been provided via cyclically adjusted budget balance measure. I argue that relatively computational intensive and data demanding process of estimation of cyclically adjusted budget balance can be without significant loss of information replaced by simple growth accounting method.
I argue that in general case, answers provided via growth accounting method will not differ widely from the conclusions provided via cyclically adjusted budget balance. I then illustrate on Czech fiscal data use of growth accounting and compare the outcomes of both methods. Conclusions reached in the empirical part fit nicely conclusions of the theoretical part of the paper.

Keywords: Expansionary/Contractionary Fiscal Policy, Cyclically Adjusted Budget Balance, Growth Accounting, Net Fiscal Effort
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I. Introduction

One of the roles often ascribed to government is that it should conduct a stabilizing economic policy which would prevent periods of deep economic downturns and periods when economy is overheated. Generally, two basic tools may allow government to do so. First being monetary and second being fiscal policy. It is the fiscal part of the stabilization which concerns this paper.

Since governments in most of the developed countries redistribute through their budgets more than 40 percent of GDP, governmental decisions about the size and composition of its budget can present considerable repercussions on economic activity. In the optimal case, fiscal policy would be anti-cyclical, contracting in the periods of high economic activity and expanding in the periods of low economic activity.

Traditionally, question whether fiscal policy is expansionary or contractionary is approached via cyclically adjusted budget balance (CABB) measure and its development over the time. Increase in the CABB (higher cyclically adjusted surplus) is then associated with contractionary fiscal policy and decrease in CABB (lower surplus, i.e. higher deficit) with expansionary fiscal policy.

Estimation of CABB itself is a tedious work. Usual procedure is to take budget balance in a given year and subtract its cyclical component, usually defined as multiple of output gap with elasticity of budget balance with respect to it. Where the problem arises is the procedure for estimation of the said elasticity. This is usually done in such a way that

elasticities of different components of a budget with respect to output gap are econometrically estimated and then added together weighted by the proportion of those components in the whole budget. Such aggregate elasticity is then used in the computation of cyclical component of the budget balance and subsequently of CABB. Throughout this paper, I refer to this method as to a 'traditional method' (TM).[1]

The growth accounting method (GAM) this paper tries to introduce takes rather different approach. Originally proposed by Hagen, Hallett and Strauch (2001) and used for example in Hallett, Lewis and Hagen (2004), GAM takes observed change in government budget balance and 'corrects' it for the effect of growth of the economy and for the effect of change in monetary conditions[2] in order to derive directly net fiscal effort (NFE). NFE can then be interpreted as a measure of expansiveness or contractiveness of fiscal policy in a given country and given year.

Since GAM leads directly to NFE means that it cannot be in general used for the derivation of CABB. However, as I try to show in what follows, under certain given circumstances, even GAM can be used to derive CABB.

Therefore approach of both methods is quite different. Through GAM, NFE is directly calculated and under certain conditions even CABB can be derived. TM on the other hand derives CABB first and through its change between consecutive years arrives at NFE measure.

In what follows, I try to explain GAM more deeply and compare both methods on theoretical grounds through explicitly identifying aspect where they differ. This is the content of the part two. Third part derives NFE using Czech fiscal data and GAM and compares the results with NFE derived through TM. Since conditions under which GAM can be used to derive CABB are in fact fulfilled for the case of Czech Republic, I derive CABB using both methods and compare the outcomes in part four. Fifth part concludes the paper.

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[1] See Suyker (1999) or Noord (2000) for description of methodology and estimates of OECD, Röger and Ongena (1999) or European Commission (2000) and European Commission (2002) for approach to CABB in the context of Stability and Growth Pact (SGP), Bouthevillain et al. (2001) for methodology and estimates of European Central Bank (ECB), Hagemann (1999) for IMF's appoach and Bezděk, Dybczak and Krejdl (2003) for estimates for the case of Czech Republic.

[2] Monetary conditions, especially interest rates applied to government debt can have considerable effect on final budget balance. Thus GAM, in order to derive net fiscal effort, tries to correct observed change in budget balance for change in cost of servicing government debt which reflects change in external conditions not directly caused by relevant government.

II. Theoretical Issues

Traditional method

In this part, I try to explain how both methods under consideration actually proceed. Take the traditional method first. As the basic step, this method takes budget balance to GDP ratio in a given year, s_t (surplus as positive number and deficit as the negative number), and subtracts cyclical component calculated as the product of budget balance elasticity with respect to output gap, ε, with the output gap itself, GAP_t. More specifically,

$$CABB_t = s_t - \varepsilon \cdot GAP_t \qquad (1).$$

In such a way calculated CABB can subsequently be used to calculate NFE which has been traditionally used as the measure for expansive or contractionary fiscal policy. It is given by equation $NFE_{t+1}^{TM} = CABB_{t+1} - CABB_t$, or after substitution of (1), by

$$NFE_{t+1}^{TM} = \Delta s - \varepsilon \cdot \left(GAP_{t+1} - GAP_t\right) \qquad (2).$$

Growth Accounting method

To explain how NFE can be derived through GAM, consider budget balance to GDP ratio in a given year, s,

$$s = \frac{T-G}{Y} = \left(t - g\right) \qquad (3),$$

where T stands for government budget revenues, G for government budget expenditure and Y for GDP (all in real terms) and t and g are ratios of relevant variables to GDP. Now, change in s between consecutive years, Δs, is given as

$$\Delta s = \frac{\Delta T - \Delta G}{Y} - \frac{\Delta Y}{Y}\left(t - g\right) \qquad (4).$$

Next step in GAM is to define constant or neutral fiscal policy. One possible approach is to state that government expenditure should be kept constant in real terms, i.e. $\Delta G = 0$ and that the ratio of budget revenues to GDP, t, should be kept constant as well, implying $\Delta T = t\Delta Y$. Substituting into (4), implies[3]

$$\Delta s^C = \gamma\left(t - s\right) \qquad (5),$$

where γ denotes percentage growth of real GDP.

[3] Use of superscript 'C' means to denote change in budget balance to GDP ratio under constant fiscal policy definition.

Second possibility how to define neutral fiscal policy is to allow government to spend all additional revenues which gives $\Delta G = \Delta T$ and after substitution into (4) yields

$$\Delta s^C = -\gamma s \tag{6}.$$

Third possibility is to state that neutral fiscal policy is one which keeps ratio of revenues to output constant and at the same time to allow government to increase its expenditure in real terms only by the rate of growth of potential output, $\bar{\gamma}$. Under this definition $\Delta G = G\bar{\gamma}$ and $\Delta T = t\Delta Y$ which after substitution into (4) yields

$$\Delta s^C = g\left(\gamma - \bar{\gamma}\right) \tag{7}.$$

Since equations (5), (6) and (7) define neutral fiscal policy, they can be interpreted as the change of budget balance which stems from growth of the economy itself, in other words, in order to judge about restrictiveness or expansiveness of fiscal policy, the growth of economy should be taken into account. Therefore, taking observed change in budget balance and subtracting either equation (5), (6) or (7) expresses the change of a budget balance which is due solely to government's actions, i.e. NFE, which is thus given as

$$NFE_{t+1}^{GAM} = \Delta s - \Delta s^C \tag{8}.$$

As an illustration, suppose that the change of budget balance to GDP ration is zero between two consecutive years but over the same period, economy under consideration grows by 5 percent. This implies, that budget balance in real terms did increase by the very same 5 percent, implying, depending on the definition used, expansive or restrictive fiscal policy. Under the first definition which requires budget expenditure to be kept constant in real terms, equation (8) becomes $NFE_{t+1}^{GAM} = -0.05\left(t - s\right)$ implying expansive fiscal policy.[4]

Under the second definition of neutral fiscal policy, (8) yields $NFE_{t+1}^{GAM} = 0.05\, s$ which can be either positive or negative. When government runs two consecutive surpluses, NFE will be positive denoting restrictive fiscal policy (since budget balance to GDP ratio is being constant under growth conditions, we have increase of budget surplus in real terms). On the other hand, when government runs deficit in both years, NFE will be negative denoting expansionary fiscal policy, by the same argument as for surplus case.

Lastly, when we take into account third definition of neutral fiscal policy, equation (8) becomes $NFE_{t+1}^{GAM} = -g\left(0.05 - \bar{\gamma}\right)$ which is negative unless potential output grows faster than the actual one. If $\bar{\gamma} > 0.05$, NFE will be positive denoting fiscal contraction because

[4] Term in the brackets, i.e. difference between budget revenues to GDP ratio and budget balance to GDP ratio will under normal circumstances be positive.

government managed to keep its budget balance on the same level despite being allowed, by third definition of neutral fiscal policy, to increase its expenditure in real terms faster than growth of the real GDP, which would cause decrease in budget balance to GDP ratio.

What remains is to decide, which definition of neutral fiscal policy should be used. The first one, as our example showed, seems to be too restrictive, if not for anything else, then for the reason that such neutral fiscal policy would eventually lead to government expenditure to GDP ratio approach zero values. Second definition on the other hand seems to be too generous and has the disadvantage of sign of Δs^C being dependent on whether government runs budget surplus or deficit. The third definition, in terms of strictness, is somewhere between the two previous ones and also has the advantage of taking into account not only growth of real GDP, but also growth of potential GDP. For this reason, I shall use the third definition of neutral fiscal policy in what follows.[5] Substituting (7) into (8) then yields

$$NFE_{t+1}^{GAM} = \Delta s - g\left(\gamma - \bar{\gamma}\right) \tag{9}.$$

Comparison of both methods

To compare outcomes of both methods, let's restate two basic equations of both. In case of TM, NFE is given as

$$NFE_{t+1}^{TM} = \Delta s - \varepsilon \cdot \left(GAP_{t+1} - GAP_t\right) \tag{2}$$

and in case of GAM, NFE is given by

$$NFE_{t+1}^{GAM} = \Delta s - g\left(\gamma - \bar{\gamma}\right) \tag{9}.$$

Visual inspection of both equations reveals that there are two sources of differences between the two methods. First source of differences is use of change in output gap in TM as opposed to use of difference between growth of real and potential output in GAM. Second difference stems from the use of ε in TM as opposed to use of g in GAM. Subtracting (9) from (2), relevant expression becomes

$$NFE_{t+1}^{TM} - NFE_{t+1}^{GAM} = g\left(\gamma - \bar{\gamma}\right) - \varepsilon \cdot \left(GAP_{t+1} - GAP_t\right) \tag{10}.$$

To take a closer look, note that $GAP_t = \frac{Y_t}{\bar{Y}_t} - 1$, where Y_t and $\bar{Y}_t$ denote GDP and potential GDP in real terms respectively. In the similar spirit, $\gamma = \frac{Y_{t+1}}{Y_t} - 1$ and $\bar{\gamma} = \frac{\bar{Y}_{t+1}}{\bar{Y}_t} - 1$.

[5] In order to derive NFE, Hagen, Hallett and Strauch (2001) also subtract from observed change in budget balance effect of change in public debt and also effect of change of interest rates. I omit those two channels for the reason which should be apparent later on. See footnote 8.

Then defining $\rho = \frac{Y_{t+1}\overline{Y}_t - \overline{Y}_{t+1}Y_t}{\overline{Y}_t}$ and $g = \varepsilon + \beta$ where β is the difference between budget balance elasticity with respect to output gap and ratio of government expenditure to GDP, equation (10) can be rearranged as

$$NFE_{t+1}^{TM} - NFE_{t+1}^{GAM} = \varepsilon\rho\left(\frac{1}{Y_t} - \frac{1}{\overline{Y}_{t+1}}\right) + \beta\rho\frac{1}{Y_t} \qquad (10')$$

from which difference between the two methods is more explicit. First term on the RHS corresponds to the first source of error just mentioned and second term on the RHS corresponds to the second source of error.[6]

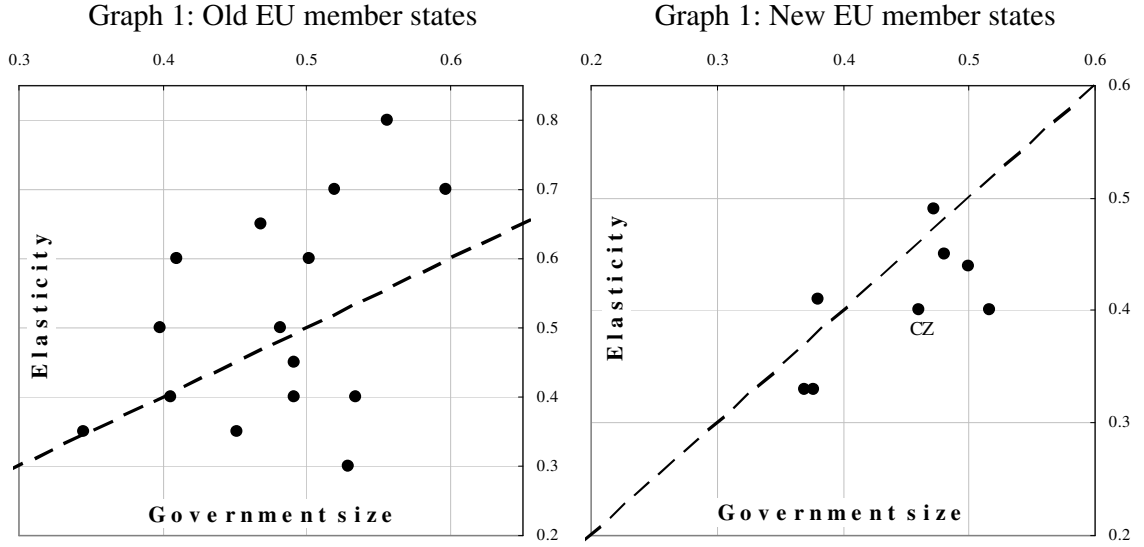
Unfortunately, we can not say anything about the sign of two terms on the RHS of (10'). All what can be said is that first term on the RHS will typically be very small (just thing about the order of actual and potential GDP in real terms, Y's)[7] , whereas second term might not. Therefore, conclusion regarding the difference between TM and GAM is that its major source lies in the use of ε as opposed to g .

Fortunately, there is a certain relation between those two variables. To give an intuition for this, it is reasonable to expect that countries with bigger size of government will experience higher elasticity of budget with respect to output gap. Next two graphs in fact confirm this intuition. They plot budget balance elasticity with respect to output gap, ε, as a function of ratio of government expenditure to GDP ratio, g, averaged over five years prior to estimation. Graph 1 plots 'old EU member states' and graph 2 plots 'new EU member countries'.

[6] Equation (10') also reveals the fact that adding effect of change in public debt and change in interest rates to GAM mentioned in footnote 7 adds another 'disturbance' which might cause further divergence of results. Unfortunately, word 'might' from the last sentence cannot in general be replaced by word 'will'. During the work on the next section where I compare outcomes of both methods for actual data, I experimented with adding those two effects to GAM and conclude that inclusion of effect of change in public debt and effect of change in interest rates does cause bigger difference of results provided by GAM and TM. Since present work is concerned with search for simple method capable of close approximation of CABB and NFE, results with additional effects are not reported (available upon request).

[7] To confirm the intuition, I calculated term $\rho\left(\frac{1}{Y_t} - \frac{1}{\overline{Y}_{t+1}}\right)$ for Czech data for the period 1997 through 2006 and the highest absolute value turned out to be 0.0014 or 0.14 %. This term subsequently enters (10') multiplied by ε which will typically be around 0.5 which even lowers the error stemming from first term on RHS of 10'. For description of source and type of data used please see next section.

Budget elasticity and size of government



Source: Author's calculation. Elasticities taken from European Commission (2002) for graph 1 and
Orban and Szapary (2004) for graph 2.

What the graphs reveal is the fact, that also not in general equal, budget balance elasticity with respect to output and government size measured as a ratio of government expenditure to GDP will not differ significantly. Especially in case of new EU member states which seem to be more clustered near the 45 degree line depicting points where both variables at hand indeed coincide.

Thus to summarize, on the first sight and based only on theoretical comparison of TM and GAM, it seems most likely that the two methods of deriving NFE will not yield significantly differing results. Major source of error lies in use of government expenditure to GDP ratio in GAM instead of need to estimate budget balance elasticity with respect to output gap in TM. Therefore, simplicity comes at a certain price.

On the other hand, when one thinks about ε as about regression coefficient estimate, at the certain point of its estimation, it must have been true that $\left|\frac{\hat{\varepsilon}}{s.e._{\hat{\varepsilon}}}\right| > t_{\frac{\alpha}{2};n-k-1}$. Adding hat above $\hat{\varepsilon}$ stresses the fact that elasticity of budget balance with respect to output gap is regression estimate and $s.e._{\hat{\varepsilon}}$ is its standard deviation.

What the inequality says is that at the certain point of estimation, in order to judge $\hat{\varepsilon}$ significant, its t-statistics must have exceeded $\alpha/2-th$ percentile of t-distribution with

$n-k-1$ degrees of freedom where n is number of observations and k number of independent variables in a model. Taking into account only positive values, approximating t-distribution with standard normal distribution[8], taking for example $\hat{\varepsilon} = 0.5$ and setting α equal to 10 %, we get $s.e._{\hat{\varepsilon}} < 0.30$ (using $z_{0.95} = 1.6$ for standard normal distribution).

But note also that for given example, 90 % confidence interval will be $(0.5 \pm 1.6 \cdot s.e._{\hat{\varepsilon}})$ bordering zero for $s.e._{\hat{\varepsilon}} = 0.30$ and being narrower for more significant estimates (lower standard deviation).

This highly stylized example tries to show that even for $\hat{\varepsilon}$ being highly significant regression estimate on 1 % level, its 90 % confidence interval just mentioned will still be (0.5 ± 0.3) because in this case $s.e._{\hat{\varepsilon}} < 0.19$ and therefore referring to the graphs above, most elasticity estimates will in its confidence interval include the 45 degree line on which $\varepsilon = g$. But in this case, second term on the RHS of 10' equals zero and the only difference between GAM and TM is the minor first term.

It is therefore natural to expect that both methods, when subject to analysis based on real data, will yield very similar conclusions. Precisely with this question for the case of Czech Republic deals the next section.

III. Empirical Comparison - NFE

Preceding section tackled the issue of similarity of GAM and TM in terms of results provided rather on theoretical grounds. This section on the other hand tries to convey the message of alikeness of both methods using Czech data.

Basic economic and fiscal data for period 1997 through 2006 come from European AMECO database and were downloaded after spring fiscal notification which implies that until year 2004, those data represent final values and for years 2005 and 2006 predictions of European Commission based on information provided by Czech authorities.

In order to compute NFE using TM against which results provided by GAM could be measured, I used elasticity of budget balance with respect to output gap from Orban and Szapary (2004) who estimated $\varepsilon = 0.4$. As an alternative estimate of ε, from Bezděk, Dybczak and Krejdl (2003) $\varepsilon = 0.35$ was taken as well as OECD $\varepsilon = 0.45$ estimate.

[8] Approximation of t-distribution with standard normal distribution is usually considered to be valid for more than 30 degrees of freedom. Since estimation of budget balance elasticity is usually done on quarterly data with k being equal typically two or three, for the approximation to be valid, estimation procedure must have been based at least on 10 years long time period, which is not unrealistic assumption.

Estimation of NFE using TM, once appropriate estimate of ε is available, means just a simple substitution of data into (2). Similarly, GAM estimates of NFE can be obtained by substitution of data into (9). Results are given in the table 1.

Table 1: Comparison of NFE computed by TM and GAM

Based on change of budget balance									
	1998	1999	2000	2001	2002	2003	2004	2005	2006
TM $\varepsilon = 0.35$	-1,64	1,44	-0,81	-2,58	-0,55	-5,23	8,30	-1,73	0,11
TM $\varepsilon = 0.4$	-1,50	1,45	-0,93	-2,63	-0,51	-5,28	8,25	-1,77	0,06
TM $\varepsilon = 0.45$	-1,37	1,46	-1,04	-2,67	-0,47	-5,32	8,20	-1,80	0,01
GAM	-1,32	1,44	-1,02	-2,68	-0,49	-5,41	8,21	-1,86	0,00
Based on change of primary budget balance									
TM $\varepsilon = 0.35$	-1,64	1,27	-0,97	-2,37	-0,13	-5,41	8,23	-1,71	0,27
TM $\varepsilon = 0.4$	-1,50	1,28	-1,08	-2,41	-0,09	-5,45	8,18	-1,74	0,22
TM $\varepsilon = 0.45$	-1,37	1,29	-1,20	-2,46	-0,05	-5,50	8,13	-1,78	0,17
GAM	-1,32	1,26	-1,18	-2,46	-0,06	-5,59	8,14	-1,84	0,16

Note: Negative entry presents fiscal expansion and positive entry fiscal contraction.
Source: Author's calculations. Estimates of ε taken from sources indicated in the text.

As is apparent from the upper part of table 1 where NFE measure is based on change in budget balance, using GAM does not provide significantly different results from those derived by TM. In 5 out of 9 cases, NFE based on GAM lies within the interval delimited by different TM results depending on ε used and in those cases when it lies outside this interval, it differs only by a small margin.

Highest divergence in absolute value of GAM based NFE is then to be found in year 1998 when compared to NFE based on TM and $\varepsilon = 0.35$.

Similar conclusions hold for the lower part of the table 1, where NFE is calculated based on primary budget balance. NFE calculated by GAM lies within the interval defined by NFE based on TM with different ε's in 5 cases, differing in remaining cases only insignificantly. Highest absolute value difference between results provided by GAM and TM is again to be found in year 1998 for $\varepsilon = 0.35$.

Thus it seems that GAM can be without chance of making great error used for estimation of NFE with the advantage of its simplicity and no need for estimation of budget balance elasticity with respect to output gap, which is virtually impossible without deep econometric knowledge and possession of relevant data. But can GAM be also used to estimate CABB? We shall see in the next section.

IV. Empirical Comparison - CABB

As already mentioned, GAM cannot be in general used for computation of CABB. The reason behind this is that in

$$\begin{aligned} NFE_{t+1}^{TM} \approx NFE_{t+1}^{GAM} &= s_{t+1} - s_t - g\left(\gamma - \bar{\gamma}\right) \\ &= CABB_{t+1} - CABB_t \end{aligned} \tag{11}$$

which is expanded version of (9), only variables in the first row are known. In order for GAM to be used to derive CABB, one of the variables in second row of (11) must be known. One possibility is to use TM and derive one of the variables in the second row. Once, however, TM is used to derive CABB in one year, then ε must be estimated and subsequent calculation of CABB's for further years becomes an easy task.

Second possibility is to determine one of the CABB's in the second row of (11) based on the inference that when economy is on its potential, $s_t = CABB_t$. This is seen easily from expression $CABB_t = s_t - \varepsilon \cdot GAP_t$ with $GAP_t = 0$. Once one of the CABB's is in this way determined, iterating (11) over time gives CABB for all subsequent and preceding years in a given time series. In other words, sufficient and necessary condition for GAM to be used for derivation of CABB is that there is a year when economy of country under consideration was on its potential.

In case of Czech Republic, condition $GAP_t = 0$ is not fulfilled as a strict equality in the data used. Luckily, Czech economy in year 2004 was only slightly below its potential with gap between actual and potential output equal to 0.3 percent of GDP. Therefore, setting $s_{2004} = CABB_{2004}$ and iterating (11) in time provides alternative, GAM derived, estimation of CABB for Czech Republic which is given in table 2.

Inspection of results in table 2 reveals that both, CABB and primary CABB estimates, based on GAM do not differ significantly from estimates provided by TM. GAM estimates lie within the interval defined by TM estimates in 6 out of 10 cases, deviating in remaining cases only discernibly. As in case of NFE, highest absolute value difference occurs in year 1998 when compared to TM with $\varepsilon = 0.35$.

Table 2: Comparison of CABB computed by TM and GAM

Cyclically adjusted budget balance										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
TM $\varepsilon = 0.35$	-1,84	-3,48	-2,03	-2,85	-5,43	-5,98	-11,21	-2,91	-4,64	-4,53
TM $\varepsilon = 0.4$	-1,76	-3,26	-1,80	-2,73	-5,36	-5,87	-11,15	-2,90	-4,66	-4,60
TM $\varepsilon = 0.45$	-1,67	-3,04	-1,57	-2,62	-5,29	-5,76	-11,08	-2,88	-4,68	-4,67
GAM	-1,75	-3,07	-1,63	-2,65	-5,33	-5,82	-11,23	-3,02	-4,88	-4,88
Cyclically adjusted primary budget balance										
TM $\varepsilon = 0.35$	-0,64	-2,28	-1,02	-1,99	-4,35	-4,48	-9,88	-1,65	-3,36	-3,09
TM $\varepsilon = 0.4$	-0,56	-2,06	-0,79	-1,87	-4,28	-4,37	-9,82	-1,64	-3,38	-3,16
TM $\varepsilon = 0.45$	-0,47	-1,84	-0,56	-1,76	-4,21	-4,26	-9,75	-1,62	-3,40	-3,23
GAM	-0,56	-1,87	-0,61	-1,79	-4,25	-4,31	-9,90	-1,76	-3,60	-3,44

Source: Author's calculations. Estimates of ε taken from sources indicated in the text.

What table 2 also reveals is the fact that GAM estimates are, in terms of squared differences between GAM and TM for the whole period, closest to TM estimates derived using $\varepsilon = 0.45$ and differ most from the TM estimates for $\varepsilon = 0.35$. This is hardly surprising since higher ε is closer to the g, which for Czech Republic and period under consideration averages at 45.3 percent. Thus table 2 empirically confirms statement from part two that biggest source of difference between the two methods lies in the use of g in GAM as opposed to ε used in TM.[9]

V. Conclusion

This paper tried to convey the message that simple solutions to complicated problems can provide results which are not inferior to results obtained by sophisticated methods. More specifically, traditional derivation of CABB using estimates of budget balance elasticity to output gap can be without significant loss replaced by GAM based estimates with the advantage of no need to estimate budget elasticity itself.

On the other hand, major disadvantage of GAM is the fact that it can in general be used only to derive directly NFE and that special circumstances, occurrence of zero output gap, are needed to compute CABB estimates. However, since the occurrence of zero output gap over sufficiently long period is very likely, this drawback of GAM seems to be outweighted by simplicity of this method.

[9] Since output gap is never exactly equal to zero in the data used, for this particular case another source of error is approximation of CABB with budget balance in (11).

Simple or not, it is natural to demand from any method results which are sufficiently close to the truth. Since CABB and NFE estimates based on TM are widely accepted means of judging expansiveness or restrictiveness of fiscal policy, what is needed is that GAM estimates follow closely those provided by TM. It has been shown that this is the case.

Theoretical comparison of both methods revealed that major source of error between them is the fact that TM uses elasticity of budget balance to output gap and GAM uses size of public sector instead. Fortunately, those two variables are linked to each other in close relationship which minimizes chances of TM and GAM to yield diverging results.

On the empirical grounds, it has been shown that for Czech economic and fiscal data, both methods deliver estimates which closely match each other despite the fact that condition for use of GAM for CABB estimation is fulfilled only approximately.

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VII. Appendix

In this appendix we provide results of similar empirical exercise we pursued in the main body of the paper for all EU member countries. Reason for that is to strengthen the argument for GA and avoid possible critique that our empirical results are Czech Republic specific.

As before, all the data come from AMECO database. Few further issues arise. Since observations for several old EU member countries span long period of time, it is often the case that we find zero output gap needed for calculation of CABB more than once. In this case we consistently use the first zero output gap found. Also, in several cases we do not use lowest output gap. This happens when lowest output gap is found in those years for which data are only preliminary or predicted. In that case we look for lowest output gap within already confirmed data.

Graphs below display NFE (left ones) and CABB (right ones) calculated by GA (termed unofficial) and calculated by TA (termed official). In general, results provided by both methods are similar, with several exceptions, particularly for Germany, Netherlands and UK. Intuitive explanation would be that those are the countries where elasticity of budget with respect to output gap and size of government differ most. However, referring back to graph 1 shows that this is not the case, certainly not for UK or Germany. We do not have meaningful explanation for this and leave investigation of these phenomena to future research.

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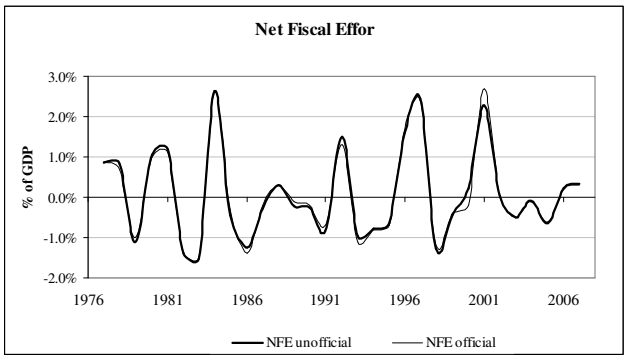

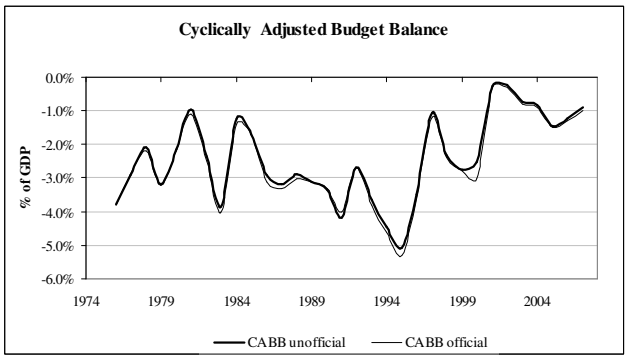

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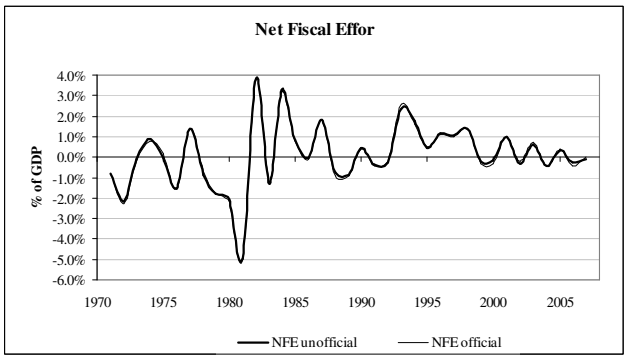

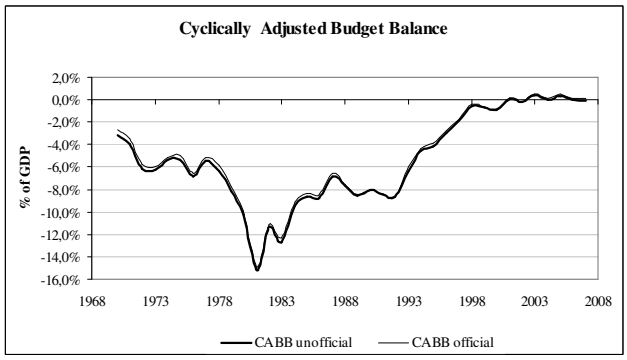

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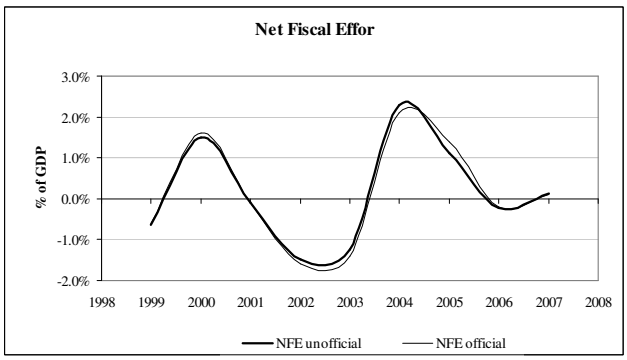

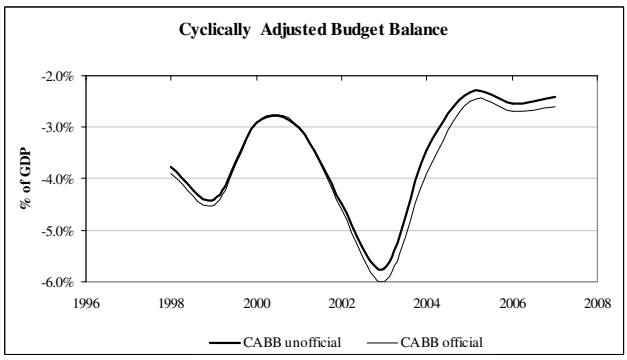

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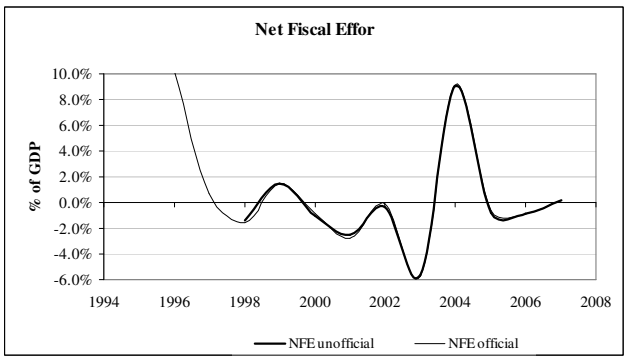

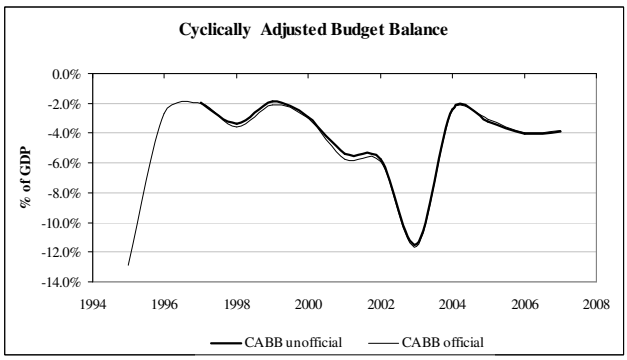

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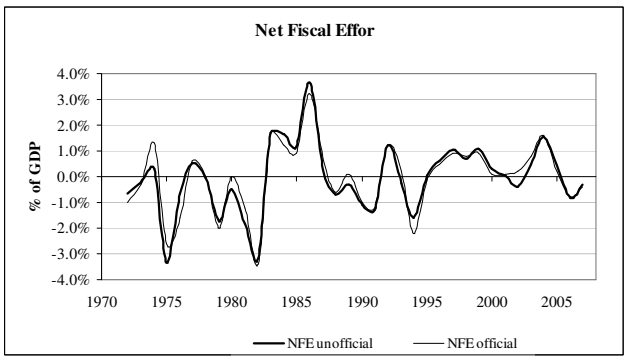

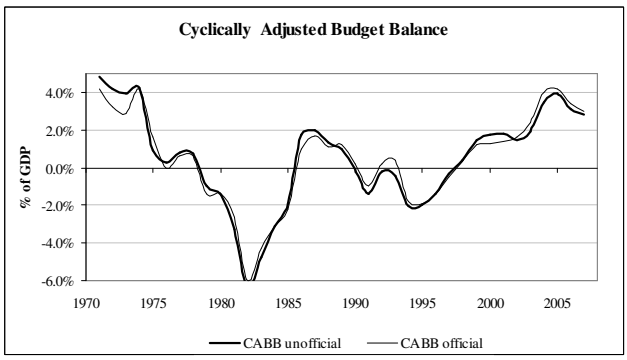

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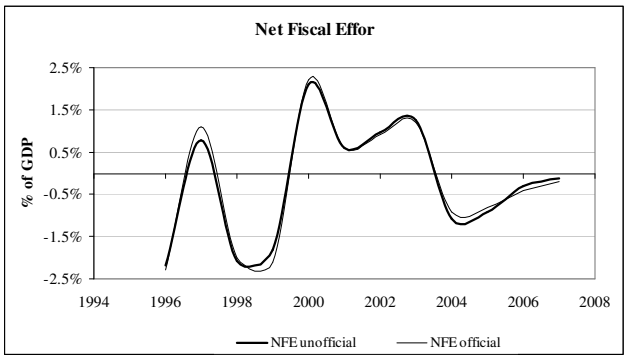

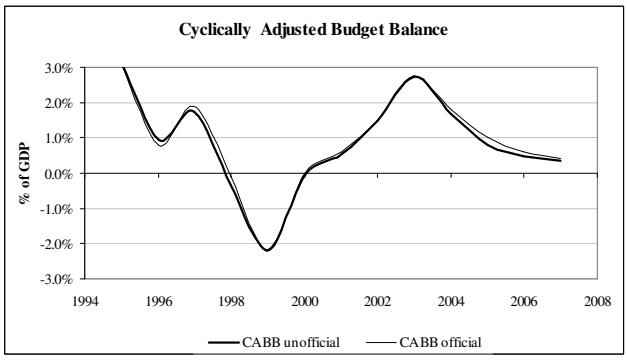

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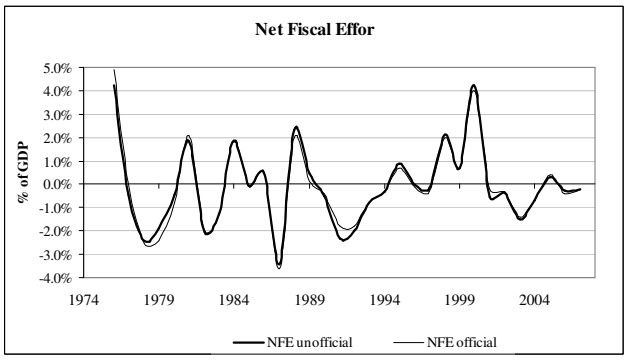

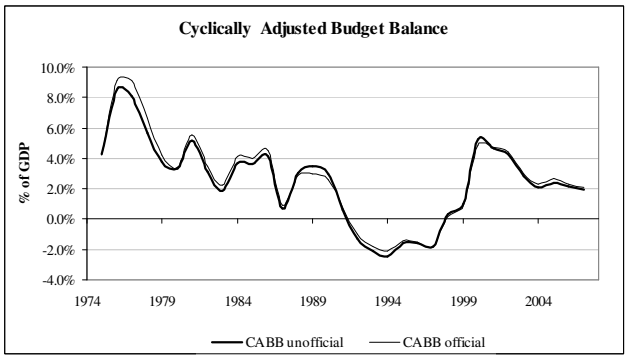

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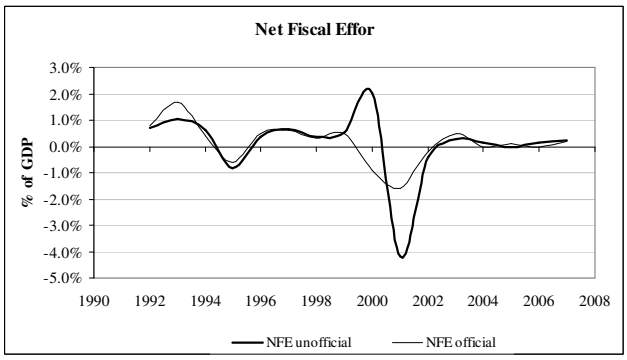

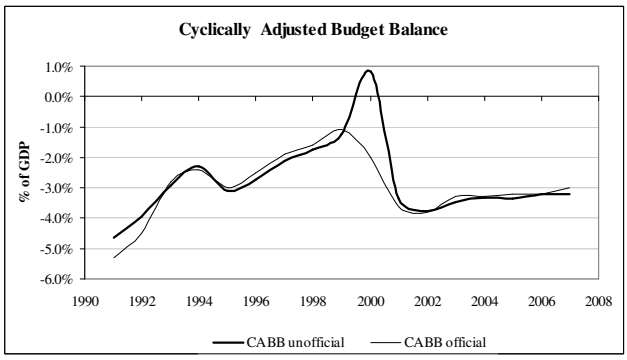

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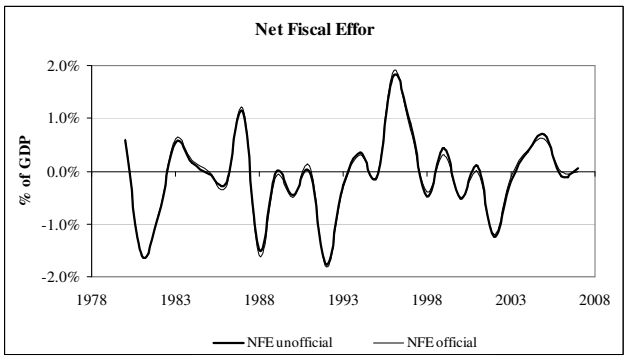

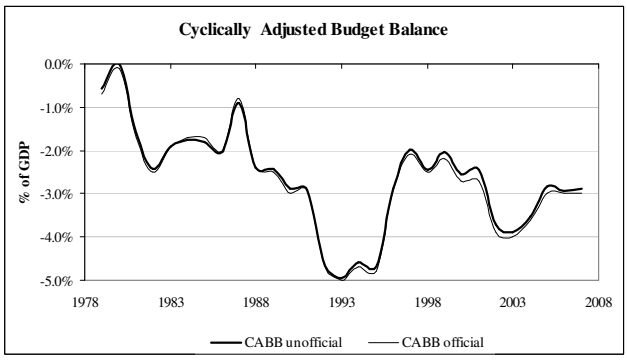

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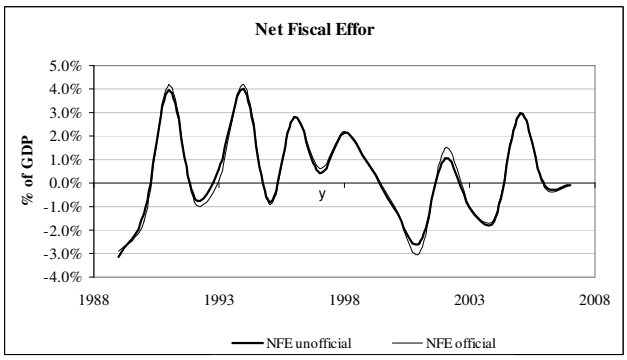

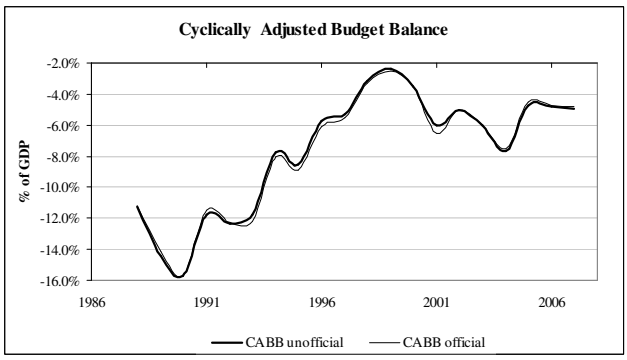

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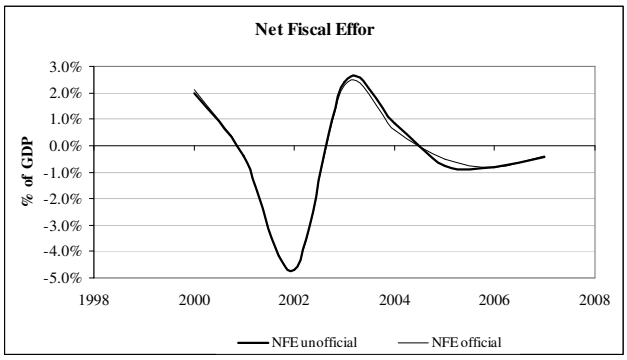

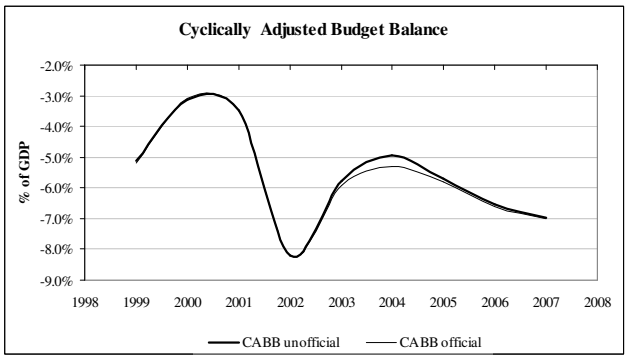

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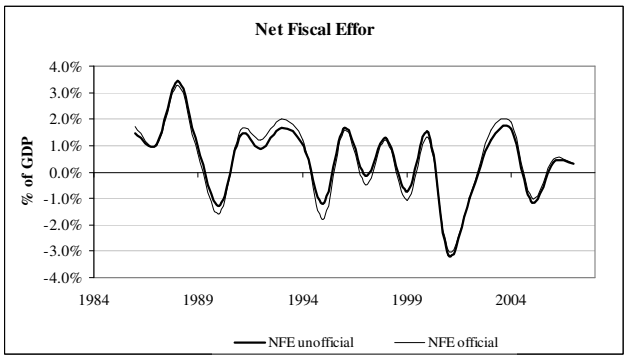

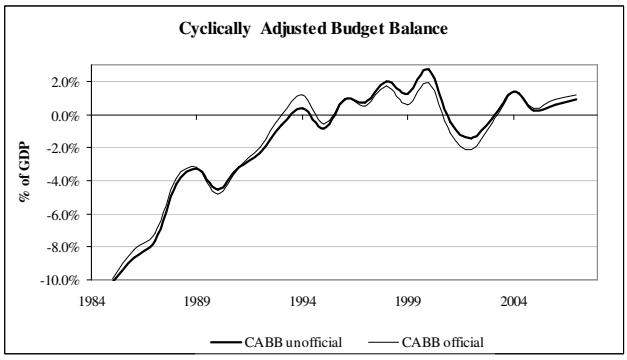

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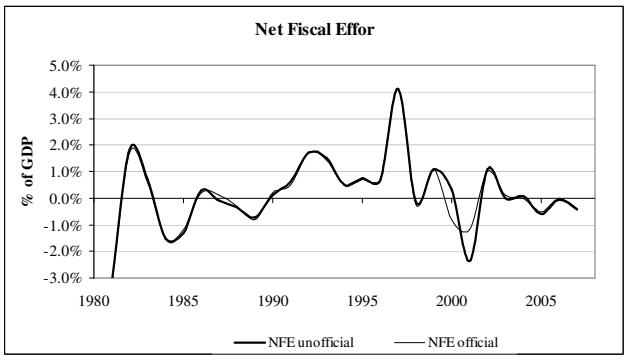

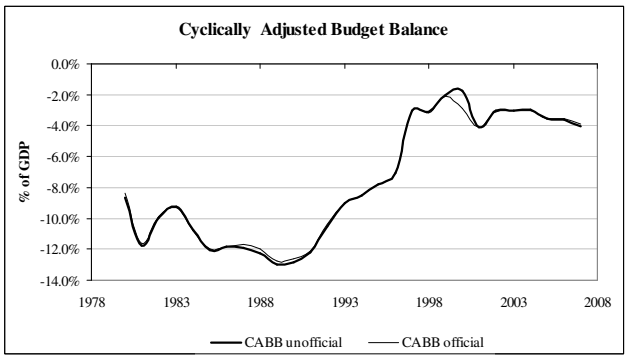

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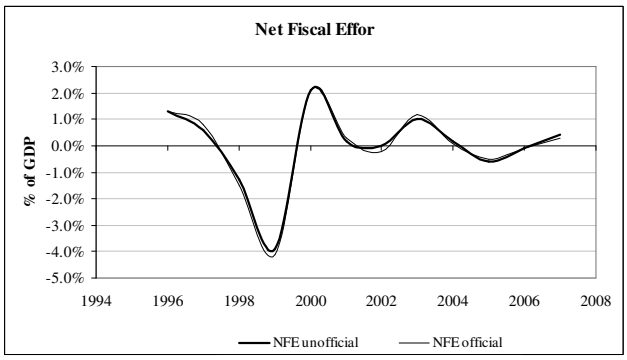

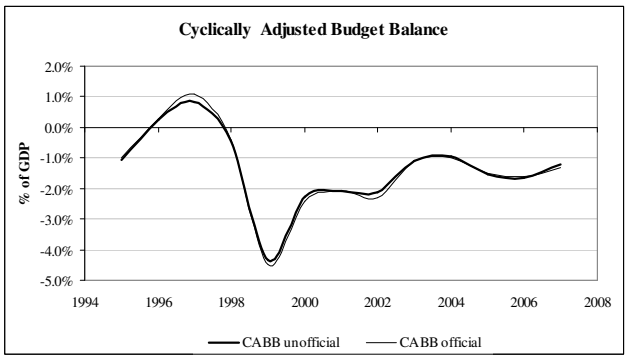

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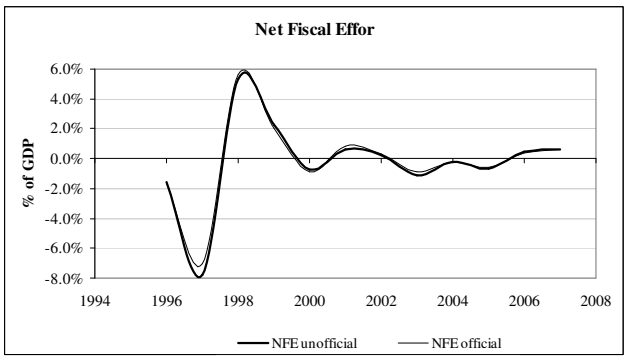

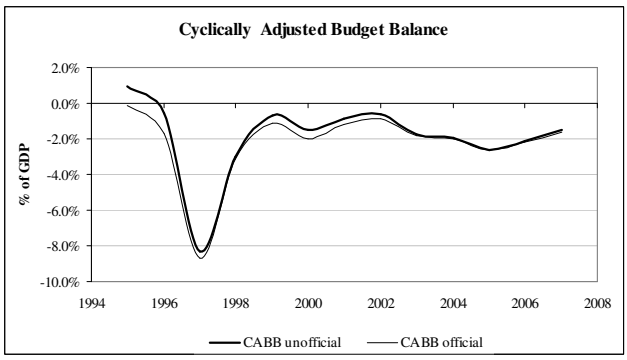

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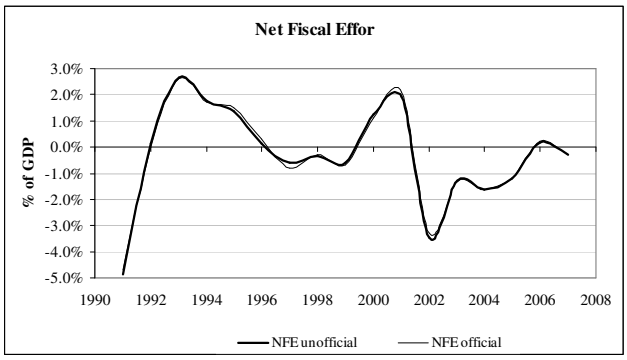

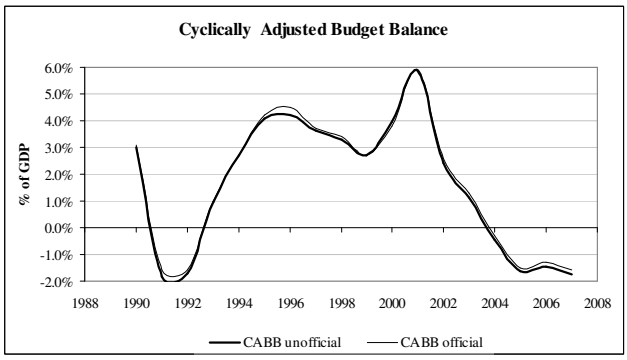

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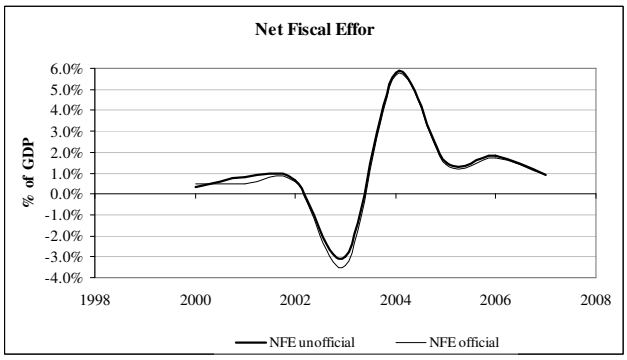

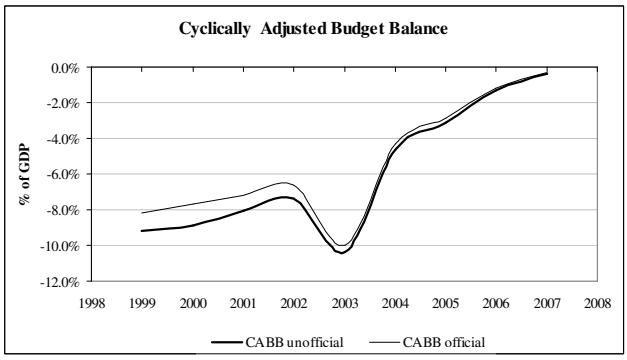

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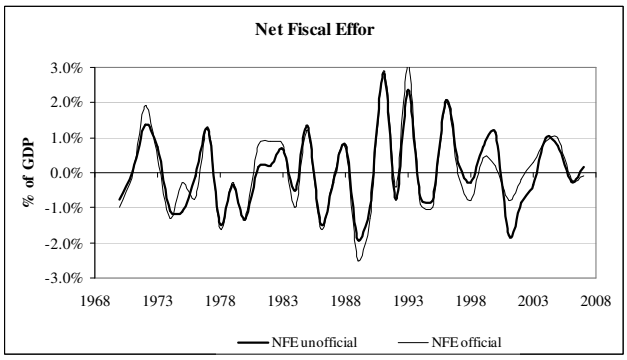

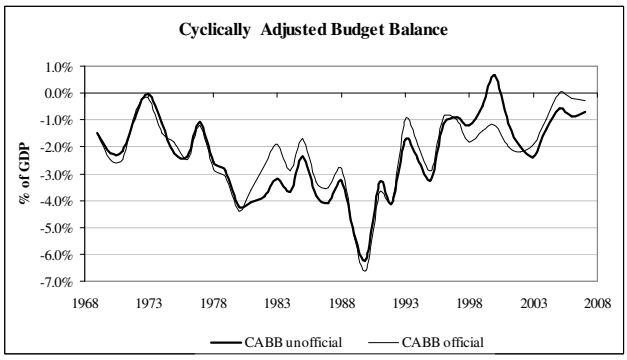

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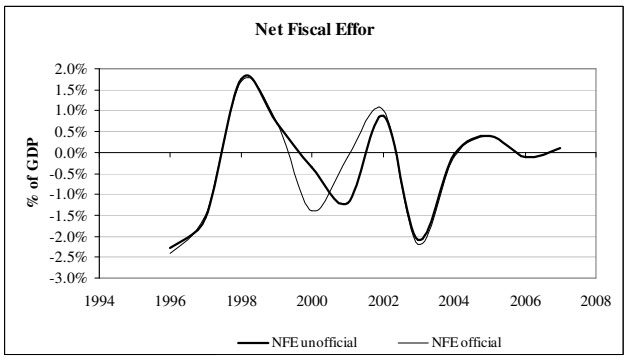

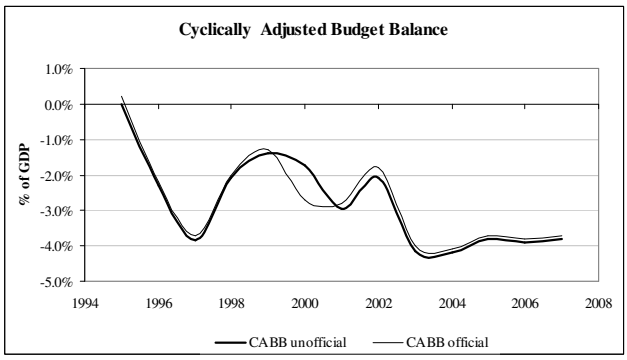

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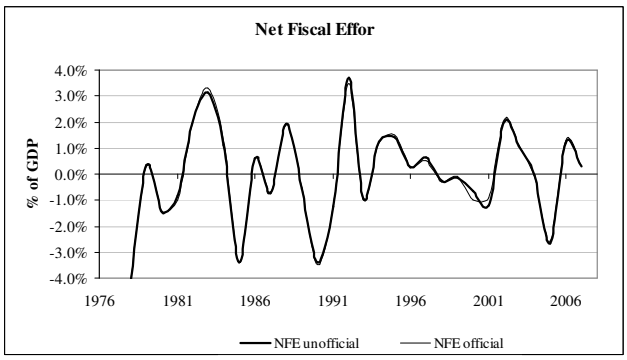

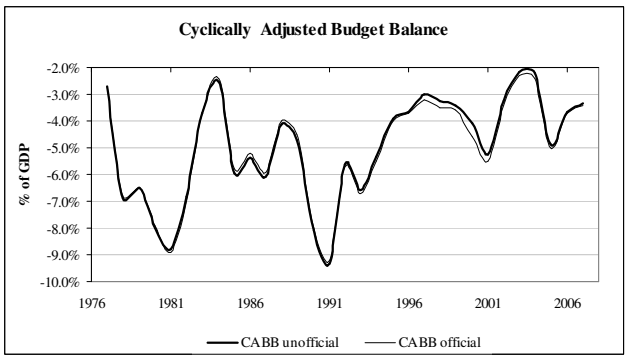

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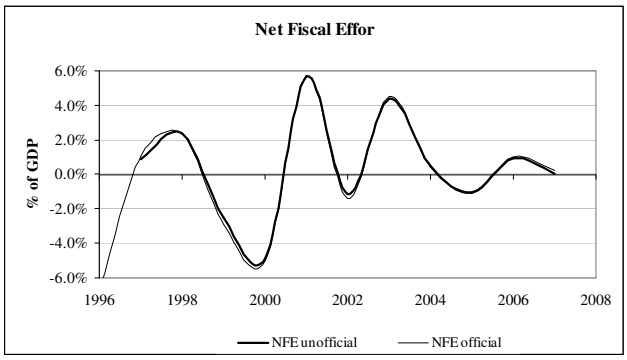

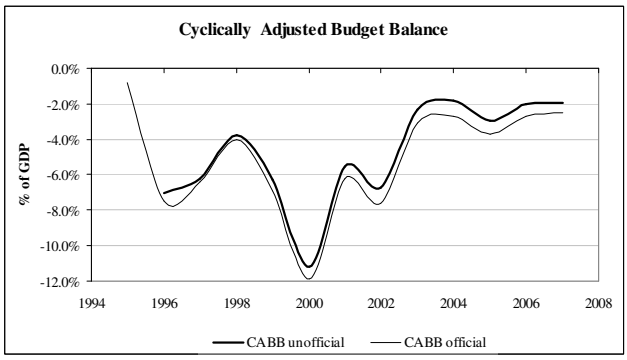

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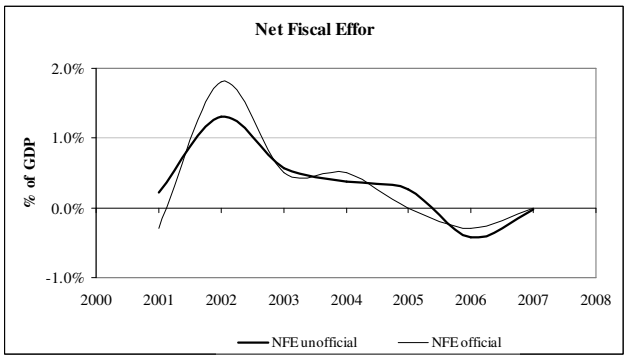

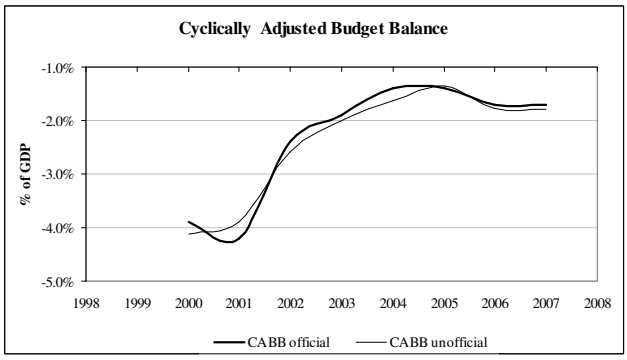

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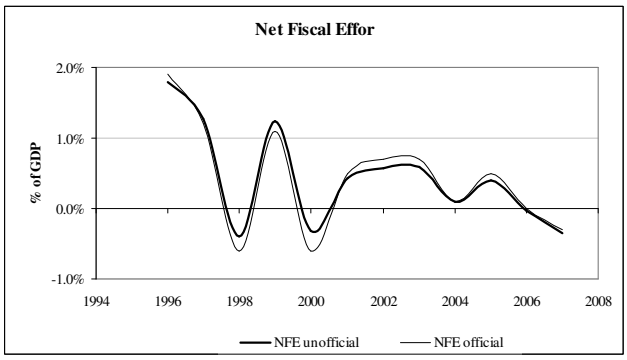

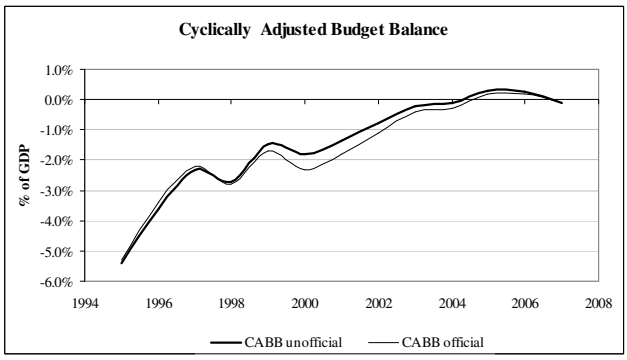

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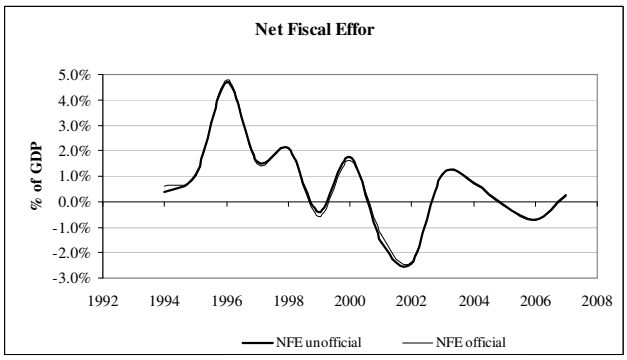

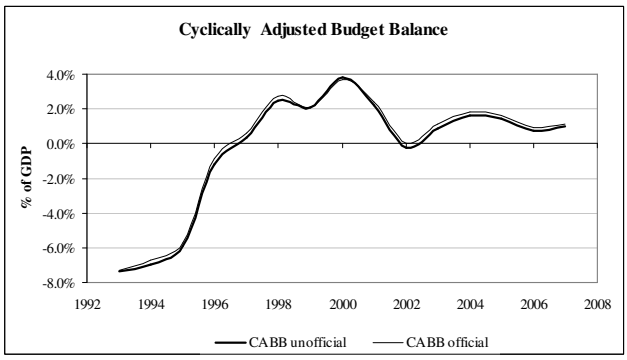

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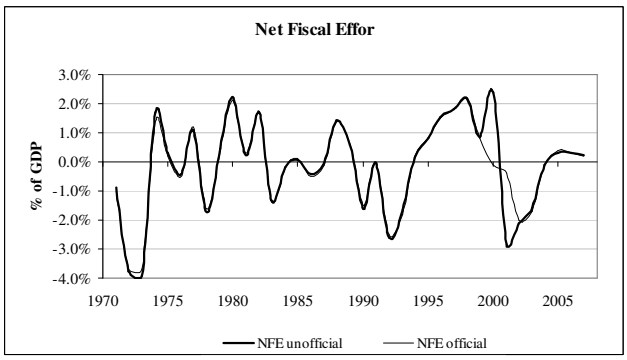

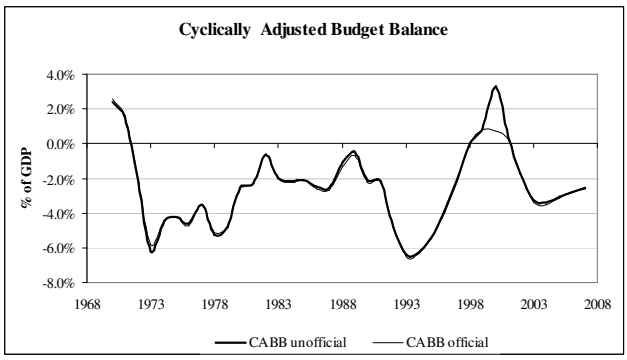

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