

# Some insights into monetary and fiscal policy interactions in the Czech Republic

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## Abstract

The global financial and debt crisis highlights the need for a better understanding of how fiscal and monetary policies interact. This article examines three aspects of these interactions, as seen from the perspective of the Czech National Bank. It first looks at the effects of fiscal policy on the interest rate channel in the Czech Republic, where long-term government bond yields are an important determinant of market interest rates. Second, it reviews alternative methods for the cyclical adjustment of the fiscal balance, which might provide different assessments of the fiscal policy stance. Finally, it describes how fiscal policy is included in the Czech National Bank forecast.

Keywords: Monetary policy, fiscal policy, interactions, transmission, Czech Republic

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## 1. Introduction

In recent years, policymakers have responded aggressively with monetary and fiscal measures to counteract the macroeconomic consequences of the economic and financial crisis. Central banks have massively reduced interest rates. In many cases, they have resorted to unconventional monetary policies. Fiscal authorities have run up high budget deficits as revenues have declined and expenditures have been kept high in efforts to safeguard the financial sector and to stimulate the demand side of the economy.

The Czech National Bank (CNB) started to cut interest rates in summer 2008, reaching a record low level (a two-week repo rate of 0.75%) in May 2010. However, unlike many other central banks that were pushed by unfavourable circumstances into using unconventional monetary policy tools, the CNB was able to rely largely on standard policy instruments. It is worth noting in this context that a marked depreciation of the koruna exchange rate in late 2008 also helped the bank substantially in terms of monetary loosening. Thus, the floating exchange rate regime proved to be an efficient adjustment mechanism. In parallel, the Czech government in 2009 approved an anti-crisis package of fiscal measures, which were aimed at cushioning the impact of the crisis on Czech households and businesses.

The energetic response of central banks and governments around the globe has focused the interest of researchers on the topic of the mutual interactions between monetary and fiscal policy and the impact on the economy. The issue of monetary and fiscal policy interaction has been examined in a vast number of research papers, the seminal ones being Barro (1979), Lucas and Stokey (1983), Chari et al (1991). The more recent literature includes Schmitt-Grohe and Uribe (2004) and Davig and Leeper (2011), and is based on micro-based analysis of jointly optimal monetary and fiscal policies in economies featuring nominal inertia, taxation and imperfect competition.

A consensus seems to have emerged among researchers (Kirsanova et al 2009) that monetary policy should normally focus on business cycle stabilisation and inflation control, and that fiscal policy should focus on the control of government debt or deficits. However, if monetary policy is constrained in some way – either by design (eg for a monetary union member subject to asymmetric shocks) or by circumstance (interest rates hit the zero lower bound), fiscal policy should be used for business cycle stabilisation and inflation control. This is in line with empirically observed patterns in recent years, when fiscal policy has gained in importance for smoothening the business cycle and avoiding deflation, notably in the countries hitting the zero lower bound for interest rates. From this perspective, purchases of government securities conducted by some central banks might be considered as a monetary policy tool that supports the fiscal stimulus with a view to stabilising output and inflation. The other view could be, however, that such operations are a kind of monetary financing and that these central banks have subjected themselves to fiscal dominance.

Monetary and fiscal policies interact in many ways, both nationally and internationally. The vast number of interactions in the economy make it difficult to determine the specific influence of each policy with any certainty. Research on monetary and fiscal policy interactions can be divided into three strands. The first strand of research (for example, Blinder (1982) and Tabellini (1986)) focuses on the effect of interaction of fiscal and monetary policies using a formal game-theoretical approach. The second strand (notably Lucas and Stokey (1983), Chari et al (1991) and Woodford (2003)) has analysed the interactions using sophisticated macroeconomic models and has attempted to derive optimal monetary and fiscal policy strategies. Finally, the third strand of literature is more data-driven; using various econometric techniques (usually VaR), it investigates the impact of policy interactions on the transmission mechanism.

This article falls into the third strand of research and outlines several issues in fiscal and monetary policy interaction using the experience of the Czech Republic. In the second chapter, we discuss the effects of fiscal policy on the transmission of monetary policy. The

third chapter presents two alternative methods for the cyclical adjustment of the fiscal balance used for obtaining economically meaningful estimates of the fiscal stance. Based on these estimates, we analyse the cyclicity of the Czech fiscal policy. The methods by which fiscal policy is forecast and included in the CNB macroeconomic predictions is described in the fourth chapter. The fifth chapter concludes.

## 2. The effects of fiscal policy on monetary policy transmission

Fiscal policy is an important determinant of economic developments and, as such, it affects monetary policy through several channels. Some fiscal measures (such as introducing or changing a consumption tax or value added tax) have a direct effect on inflation. Other fiscal measures have indirect effects on inflation through their impact on aggregate demand. Furthermore, fiscal policy influences other economic variables that are important in monetary policy transmission, notably interest rates, interest rate spreads and exchange rates. In the extreme case known as fiscal dominance, monetary policy might even become subordinate to fiscal policy. As Sargent and Wallace (1981) first pointed out, this situation might emerge if the fiscal authority sets its budget independently of public sector liabilities so that the fiscal expansion eventually needs to be monetised, giving rise to high inflation and inflation expectations.

In this chapter, we focus on the impact of fiscal policy on financial market interest rates and consequently on commercial interest rates. A description of other channels through which fiscal policy influences the monetary policy transmission is provided, for example, in Zoli (2005).

A consensus exists that under most circumstances an expansionary fiscal policy is associated with higher medium-term and long-term interest rates, ie that it crowds out private investment. This is supported by many empirical studies. Most recently, López et al (2011), using panel data of the long-term interest rate for the period 1990–2009 in 54 emerging and developed countries, find that when the fiscal deficit expands by 1% long-term interest rates rise between 10 and 12 basis points.

Similarly, a broad agreement exists on the role of public debt in determining long-term interest rates. Higher public indebtedness increases the risk of default on sovereign debt, which ultimately translates into higher spreads on government bonds (see, eg, Ferrucci (2003)). The current situation in the European market is a clear reminder about the importance of this mechanism.

Focusing on the Czech Republic, several studies estimate the effects of fiscal policy on long-term interest rates. Alexopoulou et al (2009) assess the role of fundamentals in driving long-term sovereign bond spreads in the new EU countries, including the Czech Republic, over the period 2001–08. They find, inter alia, that an adverse 10% shock to external indebtedness ratio shifts the long-run equilibrium spreads by 5 basis points in the Czech Republic. Baldacci et al (2008) on a panel of 30 emerging market economies conclude that an improvement in the primary budget balance by 1% of GDP helps to reduce spreads by about 30–40 basis points. Dumičić and Ridzak (2011) use panel data for eight central and eastern European countries and find that, if general government debt-to-GDP ratio increases by 5 percentage points, spreads increase by 19 basis points.

Wider spreads consequently lead to higher yields on government bonds and to higher commercial interest rates. The analysis of client interest rates on loans and deposits in the Czech Republic in the period between January 2004 and December 2009 shows that 10-year government bond yields might be used as a benchmark rate for client long-term interest rates (with maturity of more than one year in the case of loans and more than two years in the case of deposits). The sensitivity of selected client interest rates to 10-year government bonds as estimated by an error correction model is shown in Table 1.

Table 1

**Transmission of changes in 10-year government bond yields into client rates**

	Immediate pass-through $\alpha_0$	Final pass-through $\beta_1$	Speed of adjustment $\beta_0$	Adjustment speed in months $(\beta_1 - \alpha_0)/\beta_0$
Loans to small corporations, fixed for more than 1Y	0.33(0.27) ↓	1.19 <sup>***</sup> (0.15)	-0.4 <sup>**</sup> (0.11)	3m
Loans to large corporations, fixed for more than 1Y	0.67 (0.99)	0.83 <sup>***</sup> (0.11)	-0.64 <sup>***</sup> (0.13) ↓	2m
Loans to households - mortgage loans	-0.09(0.07)	0.91 <sup>**</sup> (0.04) ↑	-0.28 <sup>***</sup> (0.03)	3m
Deposits with maturity longer than 2Y	-0.04(0.26)	0.73 <sup>***</sup> (0.07) ↓	-0.47 <sup>***</sup> (0.09) ↓	2m

Note: estimated equation  $Dbr_{i,t} = \hat{\alpha} \sum_{l=0}^g a_{il} Dmr_{t-l} + \hat{\alpha} \sum_{k=1}^p a_{ki} Dbr_{i,t-k} + b_{0,i}(br_{i,t-1} - b_1 mr_{t-1} - m) + e_{it}$ , where  $br_{it}$  denotes the  $i$ -th bank interest rate at time  $t$ ,  $mr_t$  represents the (bond) market rate and  $m$  is a constant that quantifies the spread of bank interest rates vis-à-vis the market rates. Symbols <sup>\*\*\*</sup>, <sup>\*\*</sup> and <sup>\*</sup> denote statistical significance of parameters at 1%, 5% and 10% significance level. Standard errors are in parentheses. The symbol  $\hat{\alpha}$  denotes parameters that are statistically significantly lower (in absolute value at the 10% significance level) than estimated parameters in the 2004–08 data sample. The symbol  $\hat{\alpha}$  denotes the parameter that is statistically significantly higher (at the 10% significance level) than the parameter estimated in the 2004–08 sample. Other parameters are not statistically significantly different. The speed of adjustment was rounded to entire months.

Although the immediate (ie within one month) pass-through of government bond yields into client rates is not statistically significant, the long-run pass-through is significant for all interest rates shown in the table. A complete long-run pass-through is observed for loans to small corporations with terms of more than one year and for mortgages.

During the financial crisis, the transmission of government bond yields into client interest rates has slowed in the case of loans to large corporations and deposits. On the contrary, the relationship between mortgage interest rates and the yield on long-term government bonds has strengthened in the crisis period.

### 3. Two alternative methods for cyclical adjustment of fiscal balance

When assessing the fiscal policy stance, it is necessary to adjust the fiscal balance for its cyclical component. The fiscal balance is affected by fluctuations in the economy, as an expanding economy raises tax revenues and lowers social transfers (and vice versa). Rather than looking at the overall balance, it is thus more appropriate to disregard this cyclical component and focus on the structural balance. A structural, cyclically adjusted balance is defined as the excess of public spending over revenues (or vice versa) that would persist if the economy were near its potential.

The estimates of cyclically adjusted budget balances are routinely used by the European Commission, the ECB, IMF, OECD and other institutions. The cyclically adjusted budget balance (CAB) is one of the key indicators for the analysis and conduct of fiscal policy in the EU fiscal surveillance framework. In this framework, the structural balance abstracts away

from cyclicality as well as from one-off and other temporary measures.<sup>2</sup> The long-term EU fiscal targets to be met by Member States under the provisions of the Stability and Growth Pact are expressed and assessed net of cyclical conditions and one-off and other temporary measures.

Several methods can be used to derive the cyclically adjusted balance. In this chapter, we discuss two alternative methods as applied by the European Commission (EC) and the European System of Central Banks (ESCB). Both these methods are calculated routinely at the CNB. In the above-mentioned EU fiscal surveillance framework, cyclically adjusted balances are estimated using the EC method and published in Stability and Convergence Reports. The ESCB method is used by the ECB and other national banks within the ESCB as an additional analysis and presented in two internal documents – the Public Finance Report and the Autumn Fiscal Policy Note. The main difference between the two methods is that, while the EC method is based on output gap calculations, the ESCB approach to cyclical adjustment takes into account the composition effects originating from the different cyclical behaviour of macroeconomic bases for the main revenue and expenditure categories. Both methods abstract away from one-off and other temporary measures:

$$CAB_t = BB_t - CC_t = BB_t - e \times OG_t$$

where  $BB_t$  is the nominal budget balance in year  $t$ ,  $CC_t$  the cyclical component in the year  $t$ ,  $e$  the budgetary sensitivity parameter and  $OG_t$  the output gap in the year  $t$ . The output gap represents an economy's cyclical position (difference between actual and potential output<sup>3</sup>).

The overall sensitivity parameter  $e$  is obtained by aggregating the elasticities of individual cyclically sensitive budgetary items<sup>4</sup>. The individual revenue elasticities ( $h_{R,i}$ ) are aggregated to an overall revenue elasticity using as weights the share of each revenue category in the total current taxes ( $R_i / R$ ):

$$h_R = \sum_{i=1}^4 h_{R,i} \frac{R_i}{R}$$

As for the expenditure elasticity ( $h_G$ ), it can be expressed as:

$$h_G = h_{G,U} \frac{G_U}{G}$$

where  $h_{G,U}$  is the elasticity of unemployment benefits and  $G_U / G$  is their share in the current primary expenditure.

The two elasticities  $h_R, h_U$  are then transformed into the overall sensitivity parameter of the budget balance ( $e$ ) used in the equation defining CAB as follows:

$$e = e_R - e_G = h_R \frac{R}{Y} - h_G \frac{G}{Y},$$

<sup>2</sup> One-off and temporary measures are measures having a transitory budgetary effect that does not lead to a sustained change in the intertemporal budgetary position (eg short-term costs emerging from natural disasters, sales of non-financial assets).

<sup>3</sup> Potential output is calculated on the basis of the Cobb-Douglas production function.

<sup>4</sup> There are four tax categories (personal and corporate income tax, indirect taxes, and social contributions) and one expenditure category (unemployment benefits).

where  $R/Y$  is the share of current taxes in GDP, and  $G/Y$  is the share of primary expenditure in GDP. For a more detailed discussion of the EC method of cyclical adjustment see Larch and Turrini (2009).

The ESCB has elaborated a different method used for estimating the cyclical component ( $CC_t$ ). In the ESCB method, the revenue and expenditure categories are adjusted individually based on the deviation from trend<sup>5</sup> of their relevant macroeconomic bases in real terms. The following main budgetary items are adjusted (with corresponding macroeconomic bases in brackets): direct taxes paid by households (average compensation of employees and employment in the private sector), direct taxes paid by corporations (operating surplus), social contributions paid in the private sector (average compensation of employees and employment in the private sector), indirect taxes (private consumption) and unemployment-related expenditure (number of unemployed persons).

The individual cyclical component of each budgetary category is calculated by applying a constant elasticity to the trend deviation and then the CAB is calculated as follows:

$$CAB_t = BB_t - CC_t = BB_t - (RHP\_C_t + RSP\_C_t + RF\_C_t + RI\_C_t - XU\_C_t)$$

where  $RHP\_C_t$  is the cyclical component of direct taxes paid by households,  $RSP\_C_t$  the cyclical component of direct taxes paid by corporations,  $RF\_C_t$  the cyclical component of social contribution paid in the private sector,  $RI\_C_t$  the cyclical component of indirect taxes and  $XU\_C_t$  the cyclical component of unemployment-related expenditure. More details of the ESCB method can be found in Bouthevillain et al (2001).

In Chart 1, the outcomes of these two methods are compared for the Czech Republic. One can see from this chart that both these methods provide very similar estimations of the cyclical component. Nevertheless, two noticeable exceptions are the years 2003 and 2009. In 2003, the ESCB method estimates a slightly positive cyclical component due to positive wage developments in that year, while the EC method takes into account a negative output gap. In 2009, the more marked decline of the cyclical component in the EC method reflects the immediate impact of the global crisis on the GDP growth, whereas the impact on wages and private consumption was somewhat delayed and hence the ESCB method shows an almost neutral cyclical position.

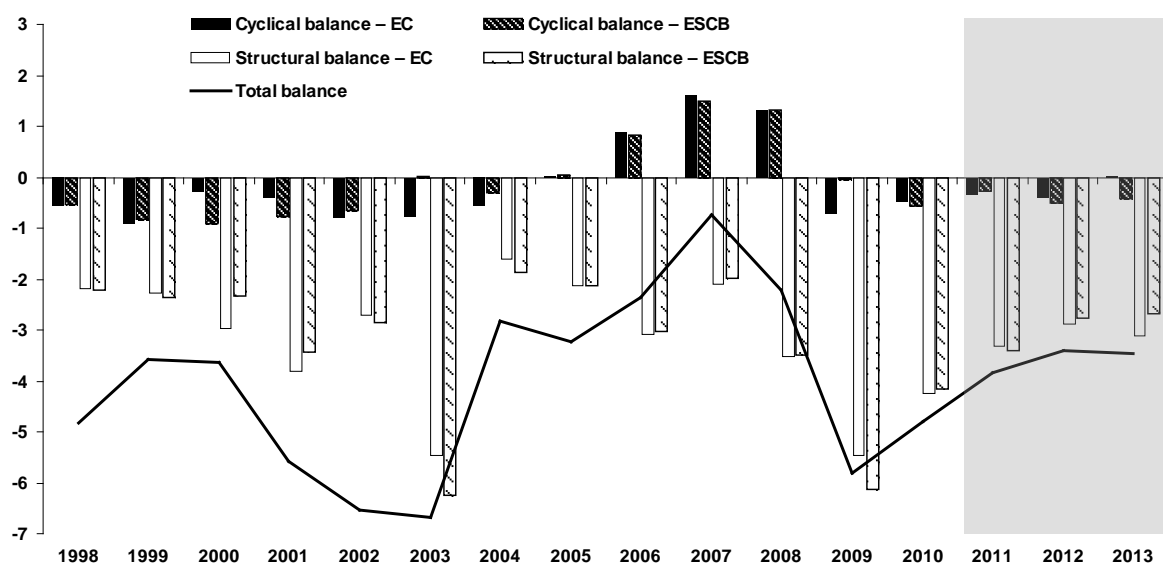
It is also evident from the chart that, before the recent crisis, structural deficits were notoriously high as a result of a loose fiscal policy conducted in the years of prosperity between 2003 and 2007. This unfavourable starting fiscal situation was subsequently aggravated after the economic crisis hit the Czech Republic, when the cyclical position of the economy sharply turned negative and automatic stabilisers came into effect.<sup>6</sup> In addition, the government approved an anti-crisis package of fiscal measures aimed at cushioning the impact of the crisis on Czech households and businesses. These measures led to a further deterioration in the public deficit.

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<sup>5</sup> Trends are estimated using the Hodrick-Prescott filter.

<sup>6</sup> It is worth mentioning that the economic and financial crisis hit the Czech economy solely via the foreign demand channel, very negatively affecting export and production performance of the Czech manufacturing sector. That said, the financial impact of the crisis on the Czech economy was modest, thanks to the resilience of the Czech banking sector, which had virtually no exposure to foreign toxic assets.

Chart 1  
**Cyclical decomposition of general government balance**  
 In % of GDP



Source: CNB; the CNB forecast is shown in the grey zone.

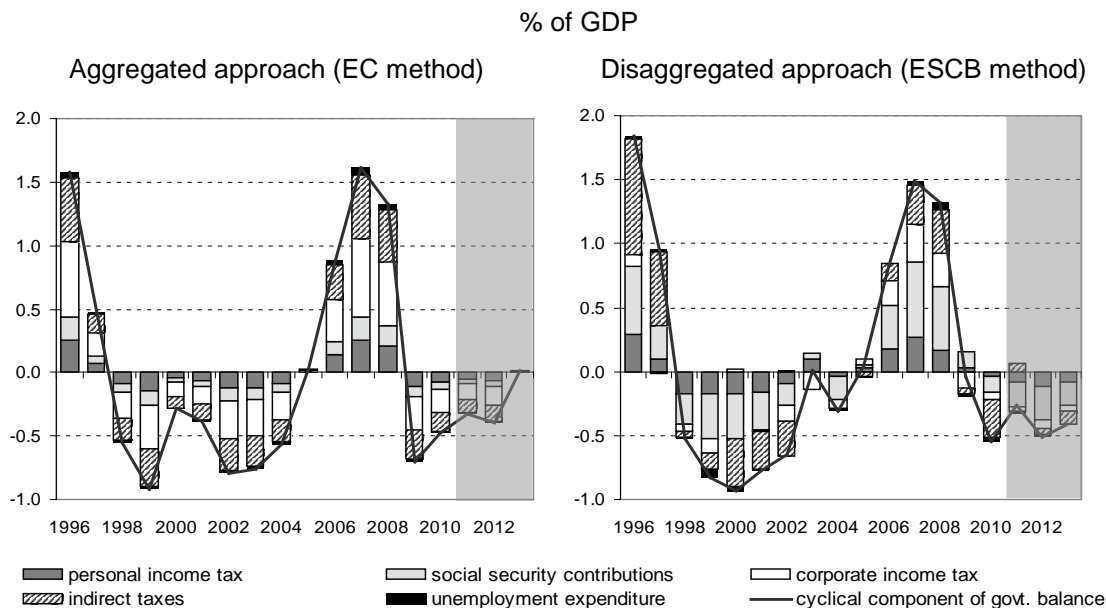
As a result, the deficit-to-GDP ratio increased by approximately 5 percentage points between 2007 and 2009. The Excessive Deficit Procedure (EDP) was opened for the Czech Republic in late 2009 (for the second time during its EU membership) with the deadline for correction of the deficit below 3% of GDP being set at 2013.<sup>7</sup> This situation called for an instant and decisive response by the Czech authorities if the deficits were to be brought back under control. Such an action came relatively soon; in late 2009 the government approved an “austerity fiscal package”.

An advantage of the ESCB method of measuring the cyclical balance is that it estimates the cyclical position separately for each revenue/expenditure item. As a result, the individual cyclical components of revenues may in this method go in both positive and negative directions within a single time period (of one year). By contrast, in the EC method, all revenue/expenditure items always move in the same direction (positive or negative). This is because, in this method, the output gap derived from a production function is a single measure of the position of the economy within the business cycle and hence the only driver of the cyclical part of the revenues/expenditures.

Chart 2 shows a decomposition of the Czech Republic’s cyclical balance into five major parts. Despite the different methodology, both approaches present roughly the same picture, indicating that the economic cycle influences the government budget balance mainly via revenues from corporate income tax and social security contributions. During the crisis, a sudden shortfall of budgeted revenues occurred especially in 2009 (with a more pronounced decline estimated by the EC method), but also in 2010.

<sup>7</sup> The EDP for the Czech Republic was opened just after the country became an EU member in 2004, and then abrogated in 2008. It is also worth noting that the Czech Republic has as yet never reached its Medium-Term Objective (MTO), which is set at 1 % of GDP for the structural deficit of public budgets.

Chart 2  
**Components of cyclical balance**



Source: CNB: the CNB forecast is shown in the grey zone.

Two important observations can be made from the cyclically adjusted developments of fiscal deficits. First, that the Czech public finances are characterised by persistent government deficits, which have a predominantly structural character. The second distinctive feature is that Czech fiscal policy has usually been procyclical, especially in the years of economic boom when extra revenues were typically spent, and unfortunately also in the current period when there is a need for fiscal consolidation during the time of economic slowdown.

#### 4. Fiscal policy in the CNB forecast

The CNB's fiscal forecast, which is independent from that of the Ministry of Finance, is an integral part of the CNB's quarterly macroeconomic forecast. The medium-term macroeconomic forecast serves as a main input into the CNB's board monetary policy decision-making.<sup>8</sup> It includes a forecast of interest rate and exchange rate trajectories. A core model plays a key role in the preparation of the forecast. Since summer 2008, the "g3" model (a structural DSGE type of model) has taken over as the CNB's core model, replacing the previously used QPM model (which was a relatively small-size gap model).<sup>9</sup>

There are several interfaces between the fiscal outlook and the core model within the projection exercise.<sup>10</sup> The process starts with the quantification of the demand-side fiscal impulse, which measures the impact of fiscal policy on GDP dynamics. The fiscal impulse is derived by fiscal experts based on government plans for both the revenue and expenditure

<sup>8</sup> See Czech National Bank (2003) or Král (2005) for more information about the organisation and properties of the CNB's forecasting and policy analysis system.

<sup>9</sup> Andrlé et al (2009) describe the implementation of the "g3" model into the CNB's forecasting process.

<sup>10</sup> The actual core model has no fully fledged fiscal block within its structure as yet and it is therefore dependent on expert inputs concerning fiscal policy.

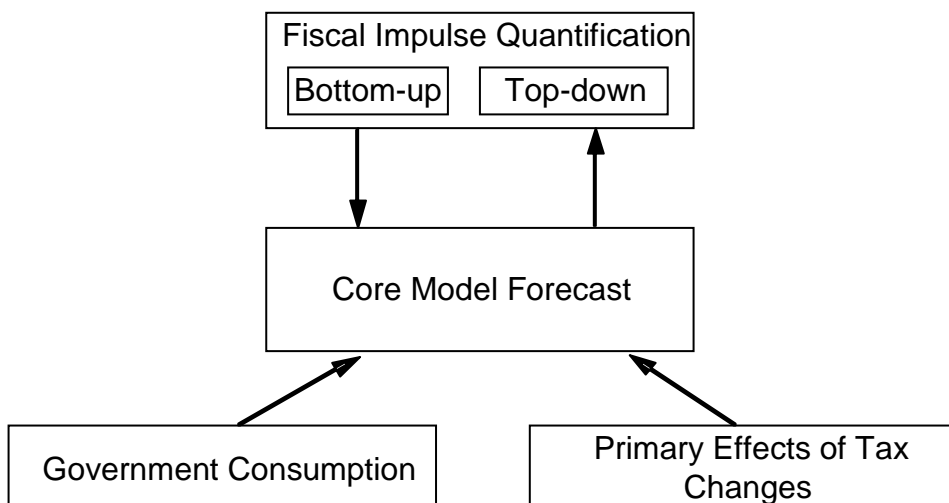


sides of the public budget using two alternative methods. The bottom-up approach derives the impulse by summarising individual revenue and expenditure budgetary measures expressed as a share of nominal GDP, which is then multiplied by the estimated value of the fiscal multiplier (at 0.6) to derive the impact on GDP growth dynamics. The top-down approach (serving as an ex post consistency check) infers the fiscal impulse from the fiscal position which is defined as a year-on-year change in the structural deficit-to-GDP ratio expressed in percentage points. The structural deficit is estimated as the average of the two methods described in the previous chapter. The fiscal impulse in this approach is then computed by multiplying the fiscal position by the fiscal multiplier.

A final estimate of the fiscal impulse is incorporated into the forecast by influencing core model mechanisms that describe the behaviour of private consumption (via the savings rate), investments (via the cost of funds), the exchange rate (reflecting the country risk premium related inter alia to public indebtedness) and trends in productivity and technology (related to preferences, institutions and rigidities with respect to the size, features and efficiency of the public sector). Government and household consumption are the most significant expenditure items that are most influenced by governmental decision-making. The core model directly incorporates the expert outlook for government consumption as well as the anticipated primary effects of indirect taxation changes on inflation (see Chart 3). The CNB distinguishes between the primary and secondary effects of taxation changes because it does not react to the primary effects when setting interest rates. Besides the government consumption forecast, the fiscal unit provides the forecasting team with its outlook for some specific items of public expenditures such as social benefits, the public sector wage bill and government investment expenditures. These figures are used in the next stages of the forecasting process when preparing the final disaggregated macroeconomic story, which contains details beyond what the core model structure makes available (eg the disposable income of households, average wage and wage bill in the non-profit sphere etc).

Chart 3

**Fiscal outlook in the CNB’s macroeconomic forecast**



The completion of the macroeconomic forecast and the fiscal outlook is an iterative process. After the (draft) macroeconomic forecast is completed (having incorporated all fiscal inputs mentioned above), the forecast of direct and indirect tax revenues and social security/public healthcare insurance contributions are computed. To do so, the fiscal experts make use of the labour market outlook, the prospect for GDP and its structure, estimated profits of firms etc. After that, the public budget deficit (and government debt) and its structural component

are derived with the latter providing an important ex post consistency check of the underlying fiscal stance arising from the mutual interaction between the fiscal side and the real economy. If necessary, a few rounds of iterations take place between fiscal and macro experts during the projection exercise to deliver a consistent economic story.

## 5. Summary and conclusions

The recent financial crisis highlighted the need for a better understanding of interactions between fiscal and monetary policy. These interactions are complex and their in-depth description and analysis is out of this paper's scope. Instead, we provide some partial insights into these interactions from the perspective of the Czech National Bank.

The first insight is on the impact of fiscal policy on the interest rate channel of monetary policy transmission. We show that government bond yields are an important determinant of client long-term interest rates in the Czech Republic. However, during the financial crisis, the relationship between the client interest rates and bond yields has weakened with the exception of interest rates on mortgage loans.

The second insight concerns alternative methods for the cyclical adjustment of the fiscal balance, which might lead to different assessments of the fiscal policy stance. We present two distinct methods, one used by the European Commission and another one used by the European System of Central Banks. The key difference between these two methods is that, while the first method is based on output gap calculations, the second takes into account the different cyclical behaviour of the main revenue and expenditure categories. Both methods provide almost identical estimations of the cyclical component when applied to the Czech data, with the exceptions being 2003 and 2009. Both methods also point to the existence of persistent government deficits that have a predominantly structural nature, and to the procyclicality of Czech fiscal policy in most years.

The final insight relates to how fiscal policy is incorporated in the CNB's forecast. The CNB fiscal forecast is an integral part of the CNB's medium-term macroeconomic forecasts. The key fiscal variable, ie the fiscal impulse, is derived using two approaches – bottom-up and top-down. The fiscal impulse influences private consumption, investments, the exchange rate and trends in productivity and technology. In addition to the fiscal impulse, the inputs to the CNB's macroeconomic forecasts include government consumption and the primary effects of indirect taxation changes on inflation.

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