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Abstract

There is growing evidence that fiscal consolidation may contribute to economic growth even in the short term. In this paper we review recent research on such non-Keynesian fiscal policy effects and apply panel data econometric techniques to examine the consequences of fiscal consolidation in the EU New Member States. We extend the analysis to test potential channels through which non-Keynesian effects may operate. The results confirm that composition of the consolidation determines the output response. Moreover, we find evidence that all types of fiscal consolidations stimulate private investments, while export acceleration is observed only when consolidations involve mostly expenditure curtailment. Private consumption reaction to fiscal policy shows signs of nonlinearity - in the case of minor adjustments Keynesian effects dominate, but they are cancelled out when sizable consolidations are considered.

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Keywords: fiscal consolidation, non-Keynesian effects, New Member States, panel data

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1 Introduction

Since the work of Giavazzi and Pagano in 1990, there has been an ongoing argument in the economic profession about potential consequences of fiscal consolidations. It seems that the idea of consolidation accelerating rather than hampering output growth in the short term is less and less controversial. In June 2010, Jean-Claude Trichet, President of the European Central Bank pointed that 'the idea that austerity measures could trigger stagnation is incorrect.(...)I firmly believe that in the current circumstances, confidence-inspiring policies will foster and not hamper economic recovery'.[1] Nevertheless, the discussion is hardly over and it concerns both research methodology and the validity of the results, for example, regarding conditions that are necessary for fiscal adjustment to result in output acceleration.

As far as methodology is concerned, a key point of any work on the topic is the decision how to solve the problem of endogeneity between growth and fiscal deficit. It is clear that, while changes in fiscal deficit may affect GDP growth, economic conditions are also important determinants of both government spending and revenues. Having that in mind, one should look for a proxy for fiscal stance that is exogenous to GDP growth. We have counted more than six different approaches widely used in the literature to cope with this problem. Obviously, the results often differ substantially when different methods are applied. The debate on the methods used to separate discretionary changes in fiscal policy attracted some attention in media (which is not very usual for discussions concerning methodology). In the article 'Cutting Edge' published in the Economist of 10th September 2010, authors called the standard techniques like the CAPB (cyclically adjusted primary balance) to be 'seriously flawed' referring to the conclusions of the IMF (2010) work. However, the article was soon criticized by Alberto Alesina of Harvard University,[2] who applied the CAPB in one of his recent papers (Alesina and Ardagana, 2010). The relevant aspects of this discussion will be addressed in more detail hereinafter.

Even when using the same or similar methods for identification of fiscal impulses, researchers come up with different and often contradictory results concerning the pattern of the relation between output growth and fiscal policy stance in the short term. This is because of the different datasets (developed versus emerging economies), different methods of analysis (descriptive statistics versus econometric studies or DSGE models) and other factors. As far as econometric studies are concerned, other factors mentioned above involve, inter alia, the selection of control variables allowing to obtain a more detailed picture of conditions necessary for the occurrence non-Keynesian effects.

In this paper we compare a number of different approaches used to separate non-cyclical changes in fiscal deficit. Then, we estimate a range of panel data models in order to determine what is the expected response of real GDP growth

[1] An interview given to La Republica on Wednesday 16 June 2010, conducted by Elena Polidori

[2] Complete response of Alberto Alesina to the Economist article can be found on his Harvard University website

to discretionary changes in fiscal policy. Having that, we extend our regression analysis by assessing the channels through which non-Keynesian effects may occur.

We use data not on developed countries as it is done in most works, but on the EU New Member States (NMS), that is Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia. Our motivation for selecting these countries was threefold. Firstly, the European Union membership and the perspective of joining the euro-area imposed more discipline on authorities with regard to fiscal policy. Hence, last decade provided us with a substantial number of fiscal consolidation cases in NMS countries that may represent an important lesson for the future. Secondly, in 7 out of 10 countries mentioned above a substantial improvement in cyclically-adjusted primary balance (CAPB) in years 2009 and 2010 was observed. Moreover, despite the current adjustments, in most NMS countries fiscal deficits are still higher than in pre-crisis period and more effort to curtail government expenditure or rise taxes is needed. In such circumstances, the question which fiscal reforms may be least detrimental to the economic performance in the short term is of great practical importance. Thirdly, one may find arguments in the literature that countries in transition seems to be especially prone to experience expansionary fiscal consolidations. Thus, if the non-Keynesian effects were not observed in such countries, it would be reasonable not to expect them to occur in more developed economies.

This article differs from most of the existing literature in three respects. First, we have not encountered any other works on the topic which test the robustness of econometric analysis by applying different methods to identify fiscal impulses as we do. Second, one of the methods we use - the underlying fiscal balance - is still surprisingly unpopular, despite its potential for correcting the biases of the standard CAPB approach. To our best knowledge, this is the first article discussing the impact of CAPB correction on the results concerning relation between fiscal policy and growth. Third, most of the existing papers focus on developed countries while analyzing the possible non-Keynesian effects.

The rest of the paper is organized as follows. In the second section, theoretical explanations of non-Keynesian effects of fiscal consolidations are systematized. In the section three, we review current empirical research devoted to validation of theoretical channels and conditions for the occurrence of non-Keynesian effects. In the fourth section we discuss methodological aspects of the research and describe the results of panel data regressions analysis. We separately trace the response of output to changes in fiscal policy and the possible channels (private consumption, export and private investment)that make up this response. Section five summarizes the main conclusions.

2 A Survey of Existing Theories

In the Keynesian approach, fiscal contraction is said to reduce aggregate demand and, as a result, output. In the simplest case, a given improvement in the fiscal balance leads to a decline in aggregate demand that may be considerably larger. The decline consists of: the original reduction in public expenditure (or in private consumption, if the improvement in fiscal balance is achieved through tax increases or transfer cuts), plus secondary falls in private consumption, resulting from diminished flow of total income from enterprises to households and households' allocation of a fixed percentage of additional income to consumption. One may derive the general definition of non-Keynesian effects from that of Keynesian ones: an improvement in the fiscal balance is said to lead to a non-Keynesian effect, if that improvement causes an increase in aggregate demand and output.

However, this kind of division of the effects of fiscal contraction into Keynesian and non-Keynesian is imprecise. Using even the simplest textbook Keynesian model (that is, the Samuelson model), one can easily show that fiscal contraction may under certain circumstances raise aggregate demand. Since tax and transfer multipliers are smaller than the public expenditure multiplier, as far as the modules are concerned, a sufficient condition for an increase in aggregate demand is to increase taxes or to cut transfers, provided that those measures are eased by an adequate increase in public expenditure on goods and services. So it is clear that to assess the effects of fiscal contraction, one needs to know the mechanisms that have driven them.

Models explaining non-Keynesian effects of fiscal contraction can be divided into two groups. This division is presented in Figure 1. The first group attributes the source of non-Keynesian effects to the concerns of private agents about government's solvency. According to the models of the second group, these non- Keynesian effects are caused by positive supply shocks, induced by fiscal impulses.[3]

According to the first type of explanation, the strength and sign of the relation between aggregate demand and fiscal impulses both depend on the expectations of private agents. In the aftermath of fiscal contraction, households may reach the conclusion that they have had over-pessimistic expectations as to the course of public expenditure and cumulated tax burdens (factors which influence the distribution of income between consumption and savings). In that case, adjustment of these expectations may result in an increase in private expenditure that more than offsets the direct negative impact of fiscal adjustment on aggregate demand. The sign of the relationship between aggregate demand and negative fiscal impulse will be positive, if, in the opinion of households, a reduction in the budget deficit considerably raises the cumulated flow of disposable income in their horizon of utility maximization.

The occurrence of non-Keynesian effects of fiscal contraction is more likely when public debt is high and growing. In such circumstances, households are more

[3]Similar division of channels leading to expansionary effects of fiscal consolidation was proposed by Alesina (2010)

likely to expect to be soon burdened with the repayment of a part of the debt accumulated by previous generations (see, for example, Sutherland, 1995). Besides, when public debt is high and growing, a rise in taxation to a level causing serious distortions is more and more likely (see, Blanchard, 1990). A sufficiently large reduction in fiscal deficit would dispel both of these concerns.[4]

Fiscal impulses may also lead to non-Keynesian effects due to their influence on interest rates and, thus, on interest rate-sensitive private expenditure - this influence being stronger than predicted in the standard Keynesian approach (with regard to the latter one see, for example, Hicks, 1937). With public debt, there is always the risk that the government will attempt to decrease its real value with higher inflation, or that the government will become insolvent or illiquid. That risk is reflected in interest rate premiums. When the state of public finances raises concerns of economic agents, reduction of fiscal deficit, by substantially decreasing the previously high currency and country risk premium, may crowd in private expenditure (which is sensitive to changes in interest rates) much more strongly than in 'normal' times (see, for example: Miller, Skidelsky and Weller, 1990).

Let us now turn to the second type of explanation for non-Keynesian effects. Fiscal impulses may cause supply shocks which lead to changes in output,in particular they may have an impact on real wages. This kind of supply shock spills over into the economy more quickly than other kinds of supply shock as it is more easily perceived by economic agents.

Generally speaking, the sign of the shock caused by the reduction of fiscal deficit cannot be unambiguously determined. It depends on the way fiscal policy is tightened. Deficit can be reduced either by cuts in spending or through tax increases. Reducing expenditure, particularly on wages and salaries, eases wage pressure in the whole economy, while higher taxes boost the pressure. Wage expenditure constitutes the main cost of enterprises en masse. A fall in real wage dynamics increases the price competitiveness of businesses on the international market. The more open the economy, the more important the wage dynamics for the economic performance of the country in question. Strengthened wage

[4] Conversely, an increase in fiscal deficit, by accelerating the pace at which public debt grows, hastens the moment when fiscal policy must be changed, thus strengthening pessimistic expectations of households.

The influence of fiscal policy on aggregate demand may also depend on the level of public expenditure to output ratio. If the ratio is low, then the increase of public expenditure is - to a considerable degree - offset by the decrease of private consumption, because households are aware that the government is unlikely to cut public expenditure until its financing becomes a problem, and thus, they consider the increase to be permanent. Each subsequent increase in government spending leads to an ever weaker decrease of private consumption and, in effect, a stronger increase in aggregate demand because the higher the level of current expenditure, the greater the proportion of households thinking that the increase of public expenditure is temporary. If public expenditure exceeds a certain threshold - and despite this is not reduced - households cease to believe in the temporary nature of its previous increase. As the value of the cumulated tax burden expected by households goes up sharply, households considerably reduce their consumption. In effect, the increase of public expenditure is associated with a decrease of aggregate demand (see, for example Bertola and Drazen, 1993). Thus, the failure to reduce the budget deficit may, if announced, result in a sharp fall in private consumption, leading to a decrease in aggregate demand

discipline may also raise enterprises' profits, which affect both their capacity and their propensity to invest.[5] Accelerating wage momentum has precisely opposite effects.

It follows that a reduction in deficit, depending on how it is implemented, could either boost, or diminish domestic business profitability and domestic business competitiveness in the international markets. The increase in competitiveness occurs if the deficit is reduced by curtailing expenditure on wages and salaries, and the opposite happens if taxes are raised. All this means that, with regard to the short-term impact of fiscal impulses on output, they should have a composition exactly opposite to that suggested by the standard Keynesian approach (see, for example, Alesina, Ardagna, Perotti, Schiantarelli, 1999 or Lane, Perotti, 2001).

To sum up: according to the first explanation, non-Keynesian effects should occur only if a government, facing the spectre of a fiscal crisis, decides to implement credible fiscal consolidation - consolidation strong enough to stop the growth of public debt. The origin of non-Keynesian effects in this view is the dispelling of the uncertainty left in the public mind by the government's previous policy. Such an explanation can be called quasi-Keynesian, since, on the one hand, it is close to Keynes' conviction (1936, chapters 5 and 12) about the role played by the changing expectations of private agents in causing fluctuations in aggregate demand, and, on the other hand, those effects are only considered likely in the case of deep initial fiscal imbalance.

In the second explanation, the occurrence of non-Keynesian effects depends on the composition of fiscal contraction rather than on the scale of the initial fiscal imbalance. The source of non-Keynesian effects is a positive supply shock, whose nature is exclusively determined by the manner in which current fiscal policy is tightened - not by the manner in which it was conducted in the past.

However, it should be pointed out that these explanations are not mutually exclusive - various mechanisms described in them seem to be independent of each other. In that sense, contrary to what is sometimes stated in the literature (see, for example, Giavazzi, Jappelli, Pagano, 2000), different views are not competing, but rather complementary.

At the end of this section it is worth noting that non-Keynesian effects of fiscal contraction may be easily shown using the slightly modified textbook IS-LM model (see, for example, Silber, 1970; Mankiw and Summers, 1984 or Rzońca, 2005,2007), which itself has largely contributed to the widespread view that the only possible change of output during fiscal consolidation is its decline.

[5] A fall in real wage dynamics raises (ceteris paribus) capital remuneration, but has no impact on depreciation of capital. Thus, the increase in capital remuneration is tantamount to a rise of rate of return from investment

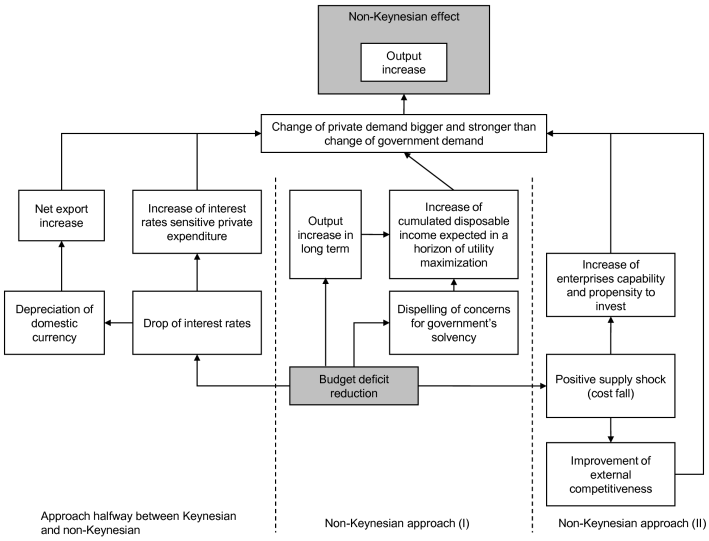

Figure 1: Types of Explanation of Non-Keynesian Effects of Fiscal Contraction

3 Review of empirical studies

The experience of Denmark in 1983-1986 and Ireland in 1987-1989 triggered numerous empirical research on circumstances where a reduction in public spending or a rise in taxes leads to a growth in output - even in the short term. The experience of these two countries was thoroughly analysed in the seminal paper by Giavazzi and Pagano (1990). Many more episodes of non-Keynesian effects of fiscal contraction have since been identified and discussed. Yet, case studies have usually been treated as a mere starting point for research into those effects. The next step - analysis of the experience of a wide group of countries - has been undertaken. At first, this analysis came down to the quoting of descriptive models which focused on the issue of the persistence of fiscal adjustment (see, for instance, McDermott and Wescott, 1996). Gradually, as more emphasis was put on estimating private consumption or investment equations - researchers were able to quantitatively determine the channels through which fiscal tightening leads to non-Keynesian effects. In most cases single equations, constructed on an ad hoc basis, were estimated (see, for example, Giavazzi, Jappelli and Pagano, 1999), but the multi-equation approach, in the form of the structural VAR framework, has also been applied (among others in Perotti, 2002). Recent economic developments in developed economies triggered new wave of research concerning macroeconomic effects of fiscal adjustments.

Several works investigated the effects of fiscal policy in a DSGE framework. Most of them concentrated on assesing spending/tax multipliers in different

conditions concerning monetary policy rules (Davig and Leeper, 2009), time-to-build lag of government investment (Leeper, Walker and Yang, 2009) or limited access to asset markets for households. Overview of the effects of fiscal stimulus predicted by DSGE policy models used in international economic organization-slike IMF, ECB or OECD can be found in Laxton et al. (2010). What is important, most papers assume that in the long term on average government deficit must be balanced and any fiscal stimulus must be followed by an appropriate adjustment in the form of spending or distortionary tax change. In general, in most cases the calculated spending multipliers are higher than one, however, their exact value may depend on additional assumptions concerning for example chosen method of debt stabilization (Leeper, Walker and Yang, 2009). Nevertheless, one may have certain doubts about the usefulness of the above-mentioned DSGE models in veryfing the existence of non-Keynesian effects. One of the crucial assumptions of these models is the availability of perfect knowledge about present and future policy rules governing changes in public expenditure and taxes. As already mentioned, one of the channels for non-Keynesian effects occurrence is a change in public expectations about public debt sustainability, so grasping these effects is impossible in models that do not even allow for government defaults. A step toward accounting for this omission was made in Clinton et al. (2010) by introducing an assumption that the government need time to convince other economic agents that the consolidation program is credible, so they could adjust their expectations (three years in basic scenario). Prior to that time agents expect that the program will be abandoned in the following year. The study concludes that budget consolidations are 'long-term gains' but 'short-term pain' in terms of their impact on GDP growth. Nevertheless another conclusion is that credibility of the adjustment is crucial to minimize short-term output losses. Another way to account for the impact of deficits on the public expectations in DSGE framework is to expand the model by introducing direct relation between the long term interest rate and the public debt level (see Carvalho, 2009). In such augmented model, a fiscal consolidation based on a spending adjustment may prove expansionary, especially (but not necessarily) if the adjustment coincides with 'a structural change in the fiscal budget in favor of more productive spending'.
The following conclusions from the empirical studies on non-Keynesian effects of fiscal contraction may be drawn up:

1. Episodes of fiscal tightening are very often accompanied by an acceleration of output momentum. This acceleration is driven by both private consumption and investment. However, the growth rate of the latter one increases much more than that of the former one (see, for example, Alesina, Perotti and Tavares, 1998 or Broadbent and Daly, 2010). The acceleration of investment momentum is preceded by an increase in the share of capital remuneration in output (see Alesina and Ardagna, 1998).

2. One of the key channels through which non-Keynesian effects may occur is the increase (drop) in interest rates following fiscal expansion (contraction). Recent work of Baldacci and Kumar (2010) confirms that long-term

bond yields are to significant extent determined by changes in fiscal policy stance. The relation is robust, nonlinear and dependent on initial conditions (like public debt level) or global factors (like investors risk aversion or global bond supply). These results are generally consistent with previous works like Engen and Hubbard (2004) or Laubach (2009).

3. Non-Keynesian effects of fiscal contraction are more plausible in open economies rather than in closed ones (see, for example Hemming, Mahfouz and Schimmelpfennig, 2002).

4. Non-Keynesian effects occur mainly when the external economic conditions are favorable (McDermott and Wescott, 1996). However, an unfavorable domestic economic situation in the period preceding fiscal adjustment, does not present an obstacle (Alesina and Perotti, 1996) and may even favour the occurrence of these effects (Segura-Ubiergo, Simone and Gupta, 2006). Consolidations started under bleak domestic and external circumstances are more often based on expenditure reduction and more persistent than adjustments occurring in favorable conditions (see Von Hagen and Strauch, 2001)

5. It follows from most studies that non-Keynesian effects occur more often when fiscal adjustment is lasting (see, for example Alesina and Perotti, 1996) and large (Giavazzi and Pagano, 1996). Some of those studies point out that probability of the non Keynesian effects occurrence is greater when public debt is high (Bhattacharya, 1999) or fast growing (see, for example, Giavazzi, Jappelli and Pagano, 2000), rather than low and, at most, slowly growing.

6. Fiscal adjustments are more lasting and lead more often to non-Keynesian effects if they are caused by curtailment of expenditure rather than by tax increases (see, for example, Alesina, Perotti and Tavares, 1998 or Tsibouris et al., 2006). Some works show an opposite relationship, but they mainly concern the response of private consumption to negative fiscal impulses (see, for instance, Giavazzi, Jappelli and Pagano, 1999).

7. Recents works (IMF, 2010 or Christiano, Eichenbaum, Rebelo, 2009) suggest that in periods when the zero-interest rate is binding fiscal consolidations tend to have contractionary effects on output. This observation proves that real interest rate behavior plays an important role in the mechanism of non-Keynesian effects.

8. The manner of fiscal policy tightening is of far greater importance in terms of its consequences than the scale of deficit reduction. Among expansionary and successful (in terms of debt reduction) adjustments, those that focus on transfers to households are particularly frequent (see, for example, Alesina and Ardagana, 2010). However as far as only consumption (and thus saving) channel for non-Keynesian effects occurrence is concerned, size of the adjustment plays a crucial role (Giavazzi et al., 2005).

9. Most of empirical studies base on data samples from developed countries. However, countries in transition seem to be especially prone to experience expansionary fiscal consolidations, because ofhigh level of uncertainty about their future fiscal position (Mulas-Granados et al. 2002). Countries of this group often experienced a substantial duress at debt levels that would be perceived as manageable in more developed economies (see, Reinhart, Rogoff and Savastano, 2003). At the same time, countries that have managed to credibly stabilize public debt and have achieved fiscal sustainability are less likely to get large benefits in terms of growth by pursuing additional fiscal adjustment (Segura-Ubiergo, Simone and Gupta, 2006). Several descriptive analyses of fiscal policy in Central European countries confirm that the composition and the size of the adjustment strongly affect the probability that consolidation proves expansionary (for example Horváth et al., 2006 or Neicheva, 2007). Finally, the argument that expenditure-based consolidations are more successful in debt reduction seems to hold as far as Central European countries are concerned (see, for instance, Alfonso, Nickel and Rother, 2005).

In closing this section it should be emphasized that none of the aforementioned studies considers the acceleration in output as a result of fiscal tightening to be certain. In the literature, the view still prevails that the Keynesian reaction of output to budget deficit reduction is more plausible than the non-Keynesian one. But then that response is at most of modest scale. Most empirical studies on the effectiveness of fiscal policy in stimulating aggregate demand show that the tax multiplier hardly exceeds one half and that of public expenditure hardly exceeds one (see, for example, Blanchard and Perotti, 2002; Hall, 2009;Barro and Redlick, 2009 or Ramey, 2011).

4 Econometric analysis

In this section we used panel data estimation techniques to verify whether fiscal policies in the New Member States in 1995-2010 resulted in non-Keynesian effects. First, we briefly describe the methods we used to obtain measures of discretionary fiscal policy. Then, we present the data, the specification of the equations and estimation techniques used. Lastly, we provide results of the estimation.

4.1 Fiscal impulses

To evaluate the effects of fiscal policy on economic performance, discretionary changes in this policy should be separated from changes induced by cyclical fluctuations in macroeconomic variables. There are several ways of achieving that, although the most popular is the cyclically adjusted primary balance (CAPB). The CAPB is used as the main indicator of the fiscal policy stance by international institutions like the OECD and the European Commission. The CAPB estimation process involves three steps:

1. The first step is to calculate changes in the output gap - percentage deviation of the actual GDP from its potential or trend. The potential (trend) is, of course, unobservable so one needs additional assumptions about production process. One way is to simply treat the observed GDP series with one of commonly used filters (like Hodrick-Prescott) to distinguish its deviations from the trend. Second way is to assume that production process may be described by some functional form (like Cobb-Douglass) and calculate derivations of production factors volumes from their potential levels. Commonly, the TFP (Total Factor Productivity) is decomposed into potential and cyclical part using the Hodrick-Prescott filter, capital is assumed to stay at the potential constantly in time and labor deviations are calculated using the NAWRU concept (Non-Accelerating Wage Rate of Unemployment).

2. The next step is to estimate elasticities of different expenditure and revenues types with respect to economic fluctuations. The expenditure sensitivity is usually restricted only to outlays on unemployment benefits as they are the only category that is assumed to move automatically along with the output gap. The revenue sensitivity is often a weighted average of four revenue type elasticities (personal income taxes, corporate taxes, social contributions and indirect taxes) with weights set according to the relative share of each category in the total government revenue.

3. Finally, one needs to apply changes in the output gap from the first step to marginal rate of change of different taxes and government expenditure measures with respect to GDP obtained in the second step. The result of this operation is a cyclical component of the budget balance. By subtracting it from the observed values of the budget balance one gets a structural part, whose changes should reflect the government policy actions.

In this paper we decided to apply the CAPB with the output gap calculated using the production function (PF) approach as it is much better anchored in the economic theory. The PF approach constitutes a reference method used by the European Commission to asses the stability and convergence program, while the approach based on the H-P filter serves as a backup method. Nevertheless, this choice reduces the number of observations as output gap data according to the production function method are not always available, in contrast to GDP deviations from the H-P trend which are easily obtainable for all cases.
The CAPB method is conceptually simple and allows to account for the differences in country government revenue and expenditure structure in a consistent way, giving comparable results. Yet, this method should be used with certain reservations, as noticed by the IMF (2010). IMF study argues that this strategy biases the analysis toward downplaying contractionary effects [of fiscal consolidation] and overstating expansionary ones'. Firstly, in the years preceded by one-off government transfers the CAPB shows significant improvement in balance, what is clearly unfounded. These one-off transfers may include, for instance, sales of mobile telecom licenses or subsidies to an insolvent government

enterprise. Secondly, the CAPB may be biased toward detecting consolidations in the peak of business cycle due to changes in the asset value affecting the budget balance and recorded in the CAPB structural part.[6] The IMF gives certain examples of such misspecification cases. Problems mentioned in the IMF study already identified a few years before, for example, in Girouard and André (2005) and significant progress has been made to improve CAPB estimates.

In Joumard et al. (2008) the authors come up with a concept of underlying fiscal balance - the CAPB corrected by changes in net capital transfers that stands for a proxy of the government one-off transfers. The idea is that, by definition, one-off transfers are events with direct effects restricted to short period. Thus, such one-offs are an instantaneous deviation of a variable from its normal path, which may be captured by the Hodrick-Prescott filter. Net capital transfers were chosen as a variable that reflects one-off government transactions and is easily accessible. Such adjusted underlying balance performs significantly better in cases pointed by the IMF to prove inaccuracy of the CAPB to separate one-offs from fiscal policy changes, for example Germany (1996), Japan (1999 and 2006). Moreover, the correction is easy to apply and it ensures consistency in one-off identification across time and countries. Of course, the method has some limitations. It does not identify one-offs that are not included in capital transfers and rely on the Hodrick-Prescott filter that raises end-of-sample problem, namely, the identified trend depends heavily on net transfers data at the ends of the sample period. It also should be mentioned that capital transfers may include volatile components other than one-offs and these components will also be excluded from the underlying balance. However this may not be problematic, as these volatile factors are rarely structural in nature. Another step to improve CAPB reliability would be to adjust it to deficit changes driven by asset prices movements, the effect not considered in CAPB estimates provided by the OECD or the EC. Tagkalakis (2009) finds that a pick up in asset prices increases the likelihood of fiscal consolidation defined as an improvement in the CAPB by at least 1.5 percent of GDP.Yet, this problem has not been addressed so far. It is worth noting that even if corrected for one-offs and asset prices changes, the CAPB may fail to provide accurate estimate of fiscal stance in the periods of aggregate shocks or recession when values of certain taxes or expenditure elasticities may differ from these estimated for 'normal' times.

Another approach to separate structural balance changes, which represents a philosophy different from the methods presented above, is a method based on a simplified growth accounting proposed by von Hagen (2002). This approach is one of the easiest to apply. It assumes that change in the primary fiscal balance to GDP ratio (Δs_t) can be decomposed into three components: change due to economic growth (Δs_t^G), change due to 'neutral' fiscal policy (Δs_t^N) and, finally, change that can be attributed to government active policy (Δs_t^p). The author defines 'neutral' policy as one that keeps tax rate and government spending ratio to trend GDP constant. The change due to economic growth is a change that would occur if the government allowed expenditure to vary with difference

[6] An observation made also by Morris and Schuknecht (2007)

between GDP growth rate and its trend. According to the author's equations specification this gives us a surprisingly simple formula for discretionary change in fiscal stance (GDP means real product):

$$s_t^p = \Delta s_t - s_{t-1}\frac{\Delta GDP_t}{GDP_{t-1}}$$

Thus, a positive number means fiscal consolidation and a negative one - fiscal expansion. On the one hand, this approach is easy to apply and does not require estimates of government spending or tax elasticities and potential GDP. This feature is very important if one needs to analyze countries that undergone economic transition and have not completed enough business cycles to provide reliable estimates of abovementioned elasticities. On the other hand, this method assumes that aggregate government expenditures and revenues react to business cycle fluctuations in the same way. This may be a serious oversimplification if one notices that volatility of aggregate government expenditures and revenues depends on their composition. There are countries in which gross of public expenditure is rigid (for example, spending on education or public pensions), while other countries are characterized by a high share of more flexible government spending (for example unemployment benefits). Similarly, different taxes have different elasticities to business cycle fluctuations. One may expect capital income taxes to be more volatile than consumption taxes.

As argued in the World Economic Outlook 2010 issued by IMF, methods described above may lead to substantial errors, identifying consolidations that had not occurred or omitting some relevant ones. To solve this problem, the IMF proposes an 'action-based' approach that concentrates on actions (legislation changes implemented in order to reduce the deficit) not results (changes in cyclically adjusted budget balance).[7] Methodology similar to the one applied by the IMF was used in work of Romer and Romer (2007) in order to identify large discretionary changes in U.S. fiscal policy. The main advantage of action-based approach is that, in theory, it allows to select cases of fiscal consolidations without a risk of misspecification. Consolidation is defined as a period when the government takes actions aimed to reduce the budget deficit, regardless of their consequences (recorded changes in the deficit). It means that the fiscal impulses are identified ex ante, not ex post, as in the case of other methods. However, in practice this method requires great amount of subjectivity while determining the fiscal policy stance in subsequent periods as it is rare that detailed and coherent data on the planned effects of fiscal actions and policy-makers' intensions behind them is reported in IMF or OECD surveys prepared on annual basis.[8] This problem is even more sever while this method

[7]The IMF study, firstly, points out that fiscal consolidations have contractionary effects on output in the short run, regardless of their size, whereas in the long term contractions through their effects on the debt level stimulate the economy. Secondly, it confirms that the composition of the adjustment and external conditions are of importance (factors like monetary policy, country default risk, performance of other countries) in mitigating contractionary effects on GDP

[8]This was noted by Alberto Alesina in his response to the Economist article mentioned in the introduction of this paper

is applied to emerging countries that are not members of the OECD or joined it only recently. For example, in our country sample we were not able to use this method for most periods before the year 2000 because of the absence of appropriate data. At the same time, studies quoted in the previous section show that occurrence of non-Keynesian fiscal policy effects is more likely in countries in transition or countries with low debt tolerance which are mainly emerging markets. Moreover, the method proposed by the IMF implicitly assumes that households and firms make decisions based on the government's plans rather than on the basis of the observed effects of the actions (like changes in the deficit). This may be not true as governments tend to withdraw or modify their plans along the budget year, so final effects of fiscal policy may be as important in the process of formulating expectations by economic agents as government's reforms announcements. Finally, if the consolidation size is assessed only on the basis of government estimates of fiscal reform effect we may miss some channels important for the occurrence of non-Keynesian effect, for example - realized (not planned) reduction in transfers to households may result in higher labor supply and, consequently, GDP growth.
In this article we decided to restrict ourselves to three methods of fiscal impulses identification: CAPB, CAPB corrected for one-offs (underlying balance) and von Hagen method.[9] We have not applied the action-based approach proposed by the IMF due to problems with access to data that could produce series of accuracy and length appropriate for econometric estimation. Nevertheless, we perceive the IMF work as an important voice of criticism that should stimulate further works on developing statistical techniques to distinguish cyclical and discretionary movements in the fiscal policy stance.

4.2 Data

We used panel data recorded on an annual basis for the EU New Member States (namely Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) in the period from 1995-2010. Relevant data was obtained from a variety of sources. Fiscal data (including CAPB estimates) and national account data were taken from the European Commission's AMECO database. Data concerning real and nominal effective exchange rates originate from Eurostat database, domestic credit to private sector - from the World Bank and lastly, Consumer Price Index - from IMF's IFS database. Detailed description of each variable used can be found in the appendix. The data do not cover the whole period for all countries, hence the estimated models

[9] Of course, there are other methods used to determine the fiscal policy stance, like the method proposed by Blanchard (1990 b) or Stock-Flow Adjustment (SFA, described in Eurostat methodology papers). While the first one is widely known, the second needs some comments. According to this approach, while thinking about fiscal policy sustainability one should follow not only changes in the deficit figures but also changes in the debt stock, which are not the same. Nevertheless, factors that influence the debt stock that are not included in the deficit are rarely structural in nature, so we would rather like to ignore them in our calculations of deficit adjusted for business cycle impact. Because of that, we do not apply the SFA method in our analysis

are based on an unbalanced panel.

4.3 Specification of Equations

In order to validate theoretical possibility for the occurrence of non-Keynesian effects we, at first, estimated the effect of changes in the government structural balance on GDP growth. By structural balance we mean general government primary balance adjusted for the impact of macroeconomic fluctuations, according to three different methods outlined in subsection 4.1 - growth accounting proposed by von Hagen, the CAPB and the underlying fiscal balance (that is, the CAPB adjusted for one-offs). In our regression specification we include both current and lagged fiscal impulse. We also included lagged real GDP growth in order to capture the conventional persistence of this variable caused by the business cycle. We also control the effects of inflation, changes in the levels of nominal interest rates and external conditions reflected in the growth rate of total imports in EU27 countries. Finally, we added artificial variable *art_exp* distinguishing between impulses relying on tax and government spending changes. The variable *art_exp* is equal to the *impulse* variable if the contribution of government expenditure reduction (increase) in fiscal tightening (loosening) is greater than 50 percent and otherwise it is equal to 0. Hence, we estimated the following equation:[10]

$$gdp_{it} = \mu + \delta_1\ gdp_{it-1} + \sum_{k=0}^{k=1} \beta_k\ impulse_{it-k} + \sum_{k=0}^{k=1} \gamma_k\ art\_exp_{it-k}$$
$$+ \sum_{k=0}^{k=1} \phi_k n\_m_{it-k} + \sum_{k=0}^{k=1} \rho_k\ imp\_eu27_{it-k} + \sum_{k=0}^{k=1} \omega_k\ cpi_{it-k} + \alpha_i + \epsilon_{it} \qquad (1)$$

where *gdp* is real GDP growth, *impulse* - fiscal impulse resulting from a change in structural balance, *art_exp* - artificial variable that controls for composition of the impulse (spending versus tax based), *n_m* - nominal money market interest rate, *imp_eu27* - growth rate of total imports in EU27 countries, *cpi* - growth of consumer price index; α represents a time-invariant country-specific disturbance (individual effect) and ϵ is a random noise. Variables subscripts i and t mean respectively - country number (from 1 to 10) and year (from 1 to 16). According to the theoretical assumptions described in section two of this paper, non-Keynesian effects in the analyzed economies should appear in output expansions (contractions) when fiscal policy is tightened (loosened). This means that in equation (1) at least one of the estimated coefficients β_k should be positive and statistically significant. However, output response may depend also on the composition of the impulse. This effect should manifest itself by the sign (and

[10] We realize that subsequent models presented in this section may seem oversimplified. However, the short time dimension of the analyzed panel prevents us from using more sophisticated methods such as, for example, panel VAR models or including a greater range of explanatory variables

significance) of γ_k parameters. To present the overall two-period impact of a spending based adjustment we test linear restriction where $\beta_0+\beta_1+\gamma_0+\gamma_1=0$. If the null hypothesis is rejected and the obtained statistic proves positive, the result will be consistent with the theory of non-Keynesian effects.
As the next step of the analysis, we tried to identify the channels through which non-Keynesian effects occur. Firstly, we tried to confirm the existence of the export channel. If it really does operate, the reduction in fiscal deficit obtained by cuts in expenditure should boost exports more than a reduction obtained by tax increases, as described in section two. To verify this hypothesis we once again included the variable *art_exp*, present in the regression explaining GDP growth. Hence, the estimated equation has the following form:

$$export_{it} = \mu + \lambda_1\ export_{it-1} + \sum_{k=0}^{k=1} \delta_k\ gdp_{it-k} + \sum_{k=0}^{k=1} \beta_k\ impulse_{it-k}$$
$$+ \sum_{k=0}^{k=1} \gamma_k\ art\_exp_{it-k} + \sum_{k=0}^{k=1} \phi_k\ reer_{it-k} + \sum_{k=0}^{k=1} \rho_k\ imp\_eu27_{it-k} + \alpha_i + \epsilon_{it} \quad (2)$$

We added the real effective exchange rate (*reer*) and a set of other variables like GDP growth or growth rate of imports in UE27 in order to capture main determinants of export performance (variable abbreviations as in 1). If an export channel exists, parameters of at least one of the pairs β_0 and γ_0 or β_1 and γ_1 should be positive and statistically significant. To put it in a different way, statistic of linear restriction test for joint significance of *impulse* and *art_exp* parameters (both current and lagged) should be significantly higher than zero.
Secondly, we examined the existence of the private investment channel. In order to do so, we estimated the following equation:

$$pinv_{it} = \mu + \lambda_1\ pinv_{it-1} + \sum_{k=0}^{k=1} \delta_k\ gdp_{it-k} + \sum_{k=0}^{k=1} \beta_k\ impulse_{it-k}$$
$$+ \sum_{k=0}^{k=1} \gamma_k\ r\_m_{it-k} + \sum_{k=0}^{k=1} \phi_k\ gov\_inv_{it-k} + \alpha_i + \epsilon_{it} \quad (3)$$

where *pinv* stands for real growth of private investment. In this regression, apart from controlling for GDP growth (and investment accelarator effect), we included real interest rate and government investment growth in order to capture the changes in the cost of capital and 'crowding-out' effect respectively. Like in previous regressions we look not only at parameters β_k but also test their joint significance assuming in the null hypothesis of linear restriction test that $\beta_0+\beta_1=0$. We assumed that the main channel through which non-Keynesian effects could operate in the case of private investment is potential relaxation of pecuniary and non-pecuniary constraints put on external finance availability. Thus, we abstained from adding additional variables controlling for the impulse composition.
Lastly, we explore the relation between fiscal policy changes and private consumption growth. According to non-Keynesian effects theory, fiscal adjustment

should accelerate rather than hamper consumption growth if it is lasting and sizable. To validate this hypothesis we include a new artificial variable in the regression - *art_high* which takes the value of the fiscal impulse variable if the latter exceeds the threshold of 1,5 percent of GDP in one year, or 1 percent in two successive years, otherwise the variable is equal to zero.[11] Hence, the regression specification is as follows:

$$pcon_{it} = \mu + \lambda_1\ pcon_{it-1} + \sum_{k=0}^{k=1} \delta_k\ gdp_{it-k} + \sum_{k=0}^{k=1} \beta_k\ impulse_{it-k} + \sum_{k=0}^{k=1} \gamma_k\ art\_high_{it-k} + \sum_{k=0}^{k=1} \phi_k\ pcredit_{it-k} + \alpha_i + \epsilon_{it} \quad (4)$$

where GDP growth and growth rate of credit to the private sector as a share of GDP (*pcredit*) are included as control variables. In such way, we control for the impact of personal income fluctuations and potential liquidity constraints on consumption growth. The non-Keynesian effects theory predicts that at least one pair of the parameters β_0 and γ_0 or β_1 and γ_1 should be significantly higher than 0. Once again we examine the overall two-period impact of the impulse by testing validity of the restriction $\beta_0 + \gamma_0 + \beta_1 + \gamma_1 = 0$.
What is important is the fact that in three out of four equations presented above, interest rates and exchange rates are included as control variables, despite the fact that non-Keynesian effects are expected to operate through a fall in interest rate and currency depreciation in response to diminishing government financing requirements. This means that, the models presented below may underestimate the strength of non-Keynesian effects. However, monetary variables may be driven not only by the fiscal policy stance thus excluding these variables might lead to omitted variables bias.

4.4 Methodological issues

Estimation of the equations described in the previous subsection may pose a problem for several reasons. First of all, the equations are dynamic in nature so the standard panel data estimators like fixed effects (FE) and random effects (RE) are biased. One way to tackle the problem is to apply the Instrumental Variables Generalized Method of Moments estimators (GMM). These estimators are asymptotically consistent, yet their properties may be unsatisfactory in case of short samples as ours. As Kiviet (1995) pointed out, it is possible to correct the bias resulting from using the standard LSDV estimator (the least square dummy variable, estimator that gives identical results as the FE estimator) without affecting its efficiency. In our paper we apply such corrected LSDV estimator (LSDVC) following the procedure proposed by Bun and Kiviet (2002) and then modified for the analysis of unbalanced panels by Bruno (2005). Secondly, the reggresors used in the equations may be exposed to endogeneity

[11] Similar thresholds were applied in, for example, Ciżkowicz and Rzońca (2005), Alesina and Ardagana (2010) or the IMF (2010)

problem. It is controlled to some extent by using fiscal impulses rather than changes in the level of the general government deficit, howevever, it may be insufficient to fully eliminate the endogeneity bias. Once more, the solution is to apply the GMM estimators - one proposed by Arellano and Bond (1991) - the so-called *difference estimator*, or the estimator proposed in Arellano and Bover (1995) - the so-called *system estimator*. Still, both estimators use lags of endogenous variables as instruments and they exhibit severe bias when applied to short samples. These obstacles prevented us from using the GMM estimators in this research. Thirdly, the abscence of sufficient number of observations makes it impossible to allow for heterogeneity of the estimated parameters in our models. If the estimated parameters varied across the countries, standard approach would be to estimate separately the model for each country with the OLS and average the parameters obtained in such a way.[12] In our case each of country-separate regressions would be based on at most 16 observations, which make the estimates clearly unreliable. The fourth problem that could affect our results is a possible panel-level (or group) heterogeneity and a contemporaneous correlation of error terms. In the model analyzed this is equivalent to the assumption that there is a connection between individual states in the range of effects not included in the model. If such an assumption was true, the model can be estimated using the OLS estimator with the panel corrected standard errors proposed by Beck and Katz (1995). In our models we use the Prais-Winsten transformed regression estimator for additional correction of the first-order serial-correlation of residuals.

Taking into account all the above-mentioned restrictions, we analyzed relations we have formulated using four types of panel data estimators: fixed effects (FE), random effects (RE), Prais-Winsten with panel corrected standard errors (PW-PCSE) and biased-corrected least square dummy variable (LSDVC). At the same time, we do realize that the obtained results could be affected by some of the abovementioned problems and that conclusions drawn on their basis should be taken with caution.

4.5 Estimation results

According to the above presented description of equations we estimated the impact of discretionary fiscal policy changes on GDP growth. Table 1 presents a range of estimates varying by the type of estimator applied and method used to identify structural changes in the fiscal balance.[13] Regardless of the estimator, in the case of impulses identified by the CAPB and the underlying fiscal balance, the obtained GDP growth response to fiscal policy changes has rather Keynesian flavor - parameter related to *impulse* variable is negative and significant.

[12] The Mean Group estimator was first proposed by Pesaran and Smith (1995)

[13] There are two common features of the results presented in this subsection. Firstly, in all of the estimated specifications, tests for the individual effects (in random and fixed effects models) indicate that models could be estimated using the OLS. Secondly, Breusch-Pagan test for RE indicates that estimated variance of individual effects is close to zero, which means that the obtained estimates should be equal to the results using the OLS estimator. This observation allows us to give up from presenting OLS estimator results

However, the situation changes if we restrict ourselves to adjustments based on expenditure reduction - in the case of two out of three impulse identification methods (von Hagen's and the underlying fiscal balance) the total two-period impact of curtailment of government expenditure on GDP growth is positive and statistically significant on 5 percent significance level (10 percent in the case of the LSDVC estimator with the impulse calculated according to the von Hagen method). Having in mind potential problems with regression estimation and identification of the fiscal policy stance outlined in the previous subsection, we argue that most of the attention should be drawn to the LSDVC estimates with fiscal impulses calculated as changes in the underlying fiscal balance. The estimated coefficients indicate that a discretionary improvement in the fiscal balance by 1 percent of GDP caused mainly by expenditure reduction raises the output momentum rate by about 0.50 p.p. Thus, we find the evidence supporting the hypothesis that non-Keynesian effects may outweigh Keynesian ones as far as consolidations relying on government expenditure curtailment are concerned.

Next, we tried to verify the channels through which non-Keynesian effects operate. Firstly, we used equation (2) in order to examine the export channel. The main result we obtained (see Table 2) does not confirm the existence of the export channel: the coefficients on the current and lagged *impulse* are negative, however, in most cases significant on a 10 percent level, but not on a 5 percent one. Still when the impulse is identified according to the underlying balance approach, the composition of consolidation has significant impact on the growth of exports - coefficient on *art_exp* is significantly higher than zero, regardless of the estimator used. The overall two-period effect of expenditure-based fiscal tightening on export growth seems to support the non-Keynesian effects hypothesis to a certain degree - statistics of linear restriction test are mainly positive and significant on a 10 percent level, but not on a 5 percent one.

Secondly, using the empirical specification given by equation (3), we attempted to examine the potential investment channel. The results of the estimation (see Table 3) indicate that discretionary changes in the fiscal deficit have positive and significant impact on private investment growth regardless of the estimator used. The impact is the strongest when the fiscal policy stance is measured by the underlying balance - a fiscal tightening equal to 1 percent of GDP contributes to acceleration of private investment by about 1.4 percent according to the LSDVC estimator. The estimates of current GDP growth are significant and, in accordance with the conventional accelerator effect, act positively on dependent variable. Other control variables remain insignificant in most cases.

Lastly, we estimated equation (4) in order to find evidence of a consumption channel for non-Keynesian effects (Table 4). The obtained estimates indicate that there is no straightforward and significant relation between private consumption growth and discretionary fiscal policy changes. This manifests itself in coefficients on the current *impulse* variable -they are negative but not significant. If the lagged impulse is concerned the situation changes a bit - in most cases (including the most reliable LSDVC estimator) the parameter is still negative, but significant on a 10 percent level. However, we find partial support

for the consumption channel when only substantial consolidations are considered. The parameters concerning the lagged variable *art_high* are positive with significance varying across the models. The LSDVC estimator with the impulse calculated according to the underlying balance concept gives estimates that are significant on 10 percent level. Still, the overall two-period effect of sizable fiscal consolidation remains insignificant, regardless of the estimator and impulse identification method.
To sum up, we find some evidence of non-Keynesian effects in the countries analyzed. We confirm the results already established in the literature, that the output response to fiscal adjustment depends on the composition of the latter. According to the results of the estimation, fiscal consolidations tend to be accompanied by private investment acceleration. However, only consolidations driven by government expenditure reduction prove to be expansionary, which is an effect of their additional positive impact on export momentum, apart from stimulation of private investment growth. We also find that in the case of sizable contractions, non-Keynesian effects may cancel out the Keynesian ones when private consumption growth is analyzed. What is worth mentioning that in most of the regressions presented above we included control variables through which non-Keynesian effect could occur. This refers mainly to interest rate and exchange rates variables. Excluding them may lead to results more favorable for the non-Keynesian notion, but probably biased, as we would loose the control of theoretically important determinants of economic performance that are driven not only by factors central to theory of the non-Keynesian effects.

5 Conclusions

In this article we have analyzed the relation between fiscal policy and economic performance in 10 NMS countries in the years 1995-2010. Before presenting the relevant results, we reviewed both theoretical and empirical literature devoted to the topic of non-Keynesian effects of fiscal policy. We paid particular attention to the ongoing debate on the accuracy of different methods used to separate discretionary fiscal balance changes. The main conclusion from the analysis are as follows:

1. Theoretical models explaining non-Keynesian effects of fiscal contraction can be divided into two groups. The first group attributes the source of non-Keynesian effects to the concerns of private agents about the government solvency. It is argued that strong fiscal consolidation should stimulate private expenditure by dispelling the uncertainty about the outlook for public debt. According to models of the second group, non- Keynesian effects are caused by positive supply shocks, induced by fiscal impulses. In this channel, the composition, not the size of the impulse plays a crucial role - reducing expenditure, particularly on wages and salaries, eases wage pressure in the whole economy, while higher taxes boost the pressure.

2. The existing empirical works indicate that, consistently with the the-

ory, non-Keynesian effects of fiscal contraction are most plausible in open economies, where external environment is favorable and consolidation is large and based on expenditure curtailment. These results were primarily obtained for developed countries but they are also confirmed when countries in transition are considered.

3. It is possible that standard methods used to determine the fiscal stance may be biased towards detecting non-Keynesian effects when they did not occur (for example, by treating cyclical changes in capital tax revenues as structural). However, the alternative 'action-based' approach proposed by the IMF to eliminate this bias suffers from the implementation problems and, moreover, it did not allow to analyze the full range of channels through which non-Keynesian effect may operate. At the same time, the CAPB based methods are continuously improved - for example by allowing for 'one-off' operations correction.

4. The most robust result of our econometric analysis is that composition of the fiscal impulse is crucial for non-Keynesian effects to occur. We find that fiscal contractions that rely on expenditure reductions are accompanied by GDP and exports growth acceleration even in the short term. On the contrary, consolidations based on tax increases seems to hamper GDP growth in line with the Keynesian theory.

5. Substantial evidence has been found for the existence of investment channel - the reaction of private investment growth to fiscal policy changes is quite strong and takes direction consistent with the non-Keynesian effects theory. According to the estimator we find the most reliable (LSDVC), fiscal tightening equal to 1 percent of GDP contributes to an acceleration of private investment of about 1.4 percent.

6. We have not found convincing evidence of the existence of consumption channel, although there are certain signs that private consumption reaction to fiscal tightening may be nonlinear - as far as only sizable contractions are concerned Keynesian effects are cancelled out by the non-Keynesian ones.

7. We test robustness of the results by comparing the relevant regression coefficients when different methods to separate discretionary changes in fiscal policy are applied. We find that most of the results remain qualitatively unchanged regardless of the impulse identification method used. What is important is the fact that non-Keynesian effects are the most visible when the concept of underlying fiscal balance is used - the method we find the most reliable.

The results presented above should be treated with caution because of the estimation problems typical for panel data models, notably in the case of the limited number of available observations. Nevertheless, they constitute further, even if only partial, support for the already quoted Jean-Claude Trichet statement that 'the idea that austerity measures could trigger stagnation is incorrect'.

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7 Data Appendix

Variables presented in order as they appear in equations presented in section 'Econometric analysis':

- gdp - annual growth of real Gross Domestic Product
  Source: AMECO database
- impulse - annual change of primary general government balance (as a share of GDP) adjusted for cyclical factors. Three different ways of adjustment were applied - method proposed by von Hagen (2002), CAPB and underlying fiscal balance (CAPB corrected for one-offs).Positive number of the variable means narrowing of the deficit, while negative - its deterioration
  Source: CAPB estimates - AMECO database; other methods - own calculation based on AMECO data
- art_exp - artifical variable that takes the value of the impulse variable(as defined above) if the government expenditure change accounts for at least 50% of the impulse, otherwise it is equal to 0.
  Source:Own calculation based on AMECO database
- n_m - nominal short-term (3-month) interest rate
  Source: AMECO database
- imp_eu27 - annual growth of the total of imports of goods and services in 27 EU countries at 2000 constant prices
  Source: AMECO database
- cpi - annual growth of Consumer Price Index
  Source: International Finance Statistics database of IMF
- export - annual growth rate of exports of goods and services at 2000 constant prices
  Source: AMECO database
- reer - real effective exchange rate deflated by nominal unit labour costs (total economy) and consumer prices (CPI/HICP).
  Source: Eurostat database
- pinv - annual growth rate of private investment at 2000 constant prices
  Source: AMECO database
- r_m - real short-term (3-month) interest rate
  Source: AMECO database
- gov_inv - annual growth rate of general government investment at 2000 constant prices
  Source: AMECO database
- pcon - annual growth of private consumption at 2000 constant prices
  Source: AMECO database

- art_high - artificial variable that takes the value of the impulse if its size exceeds 1,5% GDP in one year, or 1% in two successive years, otherwise the art_high variable is equal to 0
  Source: Own calculations based on AMECO database
- pcredit - annual change of credit to private sector as a percentage of GDP
  Source: World Bank database

8 Tables

Table 1. The Effects of Fiscal Deficit Impulses on GDP Growth

	RE			FE			PCSE			LSDVC		
	UB	H	CAPB	UB	H	CAPB	UB	H	CAPB	UB	H	CAPB
gdp_1	0.467***	0.493***	0.442***	0.544***	0.573***	0.510***	0.446***	0.526***	0.438***	0.581***	0.617***	0.442***
	[5.27]	[5.78]	[4.78]	[6.49]	[7.54]	[6.06]	[3.78]	[4.69]	[3.47]	[7.35]	[8.21]	[4.70]
art_exp	1.481***	0.408	1.152***	1.245***	0.318	1.073***	1.481***	0.379	1.137***	1.476***	0.399	1.136*
	[3.95]	[1.17]	[3.50]	[3.59]	[0.97]	[3.55]	[4.84]	[1.33]	[4.19]	[3.63]	[1.03]	[1.79]
art_exp_1	0.752*	-0.00664	0.189	0.446	-0.113	0.0698	0.709**	-0.16	0.196	0.635**	-0.0485	0.184
	[1.90]	[-0.02]	[0.56]	[1.22]	[-0.34]	[0.23]	[2.33]	[-0.58]	[0.73]	[2.20]	[-0.13]	[0.30]
impulse	-0.940***	0.139	-0.959***	-0.836***	0.244	-0.881***	-0.975***	0.182	-0.961***	-0.924***	0.173	-0.945*
	[-3.32]	[0.42]	[-3.40]	[-3.10]	[0.77]	[-3.33]	[-4.60]	[0.71]	[-4.25]	[-3.27]	[0.48]	[-1.87]
impulse_1	-0.0331	0.106	-0.132	0.0881	0.146	-0.0454	-0.106	0.207	-0.18	0.0688	0.109	-0.128
	[-0.11]	[0.32]	[-0.46]	[0.32]	[0.47]	[-0.17]	[-0.48]	[0.79]	[-0.79]	[0.26]	[0.32]	[-0.27]
n_m	0.125	-0.174***	0.0971	0.108	-0.166***	0.0836	0.128	-0.195***	0.0913	0.13	-0.182***	0.0972
	[1.33]	[-3.14]	[0.98]	[1.20]	[-3.06]	[0.91]	[1.39]	[-3.28]	[1.00]	[1.41]	[-2.79]	[0.56]
n_m_1	-0.0558	0.0746	-0.0449	-0.0142	0.104*	-0.0185	-0.0311	0.135**	-0.0194	-0.0585	0.0928	-0.0474
	[-0.85]	[1.22]	[-0.65]	[-0.23]	[1.84]	[-0.29]	[-0.50]	[2.19]	[-0.33]	[-0.90]	[1.42]	[-0.39]
imp_eu27	0.526***	0.493***	0.548***	0.533***	0.486***	0.549***	0.518***	0.475***	0.541***	0.530***	0.494***	0.548***
	[11.11]	[9.32]	[11.05]	[11.30]	[9.41]	[11.35]	[9.08]	[7.66]	[9.02]	[10.89]	[8.80]	[5.92]
imp_eu27_1	-0.054	-0.0307	-0.0448	-0.108	-0.0828	-0.0887	-0.054	-0.0469	-0.0549	-0.123**	-0.101	-0.0446
	[-0.77]	[-0.43]	[-0.61]	[-1.61]	[-1.27]	[-1.31]	[-0.63]	[-0.59]	[-0.64]	[-2.15]	[-1.45]	[-0.51]
cpi	-0.158***	-0.00301	-0.135***	-0.142***	-0.00476	-0.126***	-0.151***	-0.00673*	-0.129***	-0.160***	-0.00277	-0.136*
	[-3.64]	[-0.61]	[-3.07]	[-3.47]	[-1.14]	[-3.09]	[-3.61]	[-1.70]	[-3.04]	[-3.95]	[-0.61]	[-1.72]
cpi_1	-0.0386	-0.00125	-0.0162	-0.0268	-0.00137	-0.00651	-0.0327	-0.00375	-0.0123	-0.0288	-0.0008	-0.0167
	[-1.02]	[-0.27]	[-0.43]	[-0.77]	[-0.31]	[-0.19]	[-0.96]	[-0.94]	[-0.34]	[-0.91]	[-0.17]	[-0.28]
Constant	1.100**	0.562	0.613	0.456	0.169	0.215	0.88	0.285	0.426	NA	NA	NA
	[2.04]	[1.01]	[1.12]	[0.95]	[0.33]	[0.44]	[1.39]	[0.41]	[0.65]			
Observations	123	134	123	123	134	123	123	134	123	123	134	123
R-squared	0.73	0.67	0.70	0.70	0.67	0.63	0.73	0.68	0.70	NA	NA	NA
Wald test for joint significance (p-value)	0	0	0	0	0	0	0	0	0	NA	NA	NA
Wald test for joint significance of fixed effects (p-value)	NA	NA	NA	0.3617	0.7751	0.4467	NA	NA	NA	NA	NA	NA
Breusch-Pagan Lagrangian multiplier test for random effects (p-value)	0.5613	0.2236	0.2474	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sum of fiscal variables coefficients (current and lagged)[a]	0.944	0.595	0.216	1.259	0.647	0.250	1.110	0.607	0.192	1.255	0.632	0.269
Test for joint significance of of fiscal variables coef. (p-value)[b]	0.007	0.004	0.381	0.001	0.004	0.348	0.001	0.002	0.404	0	0.01	0.339

Note. The dependent variable is the annual real growth rate of GDP. Explanatory variables definitions are reported in the Appendix. The first row of the table lists estimators used in the subsequent regressions, while the second row describes methods used to calculate fiscal impulses. Fiscal impulses used in regressions are obtained in line with three different approaches: Underlying Balance (column UB), von Hagen decomposition (column H) and Cyclically Adjusted Primary Balance (column CAPB).Standard errors are reported in parenthesis. Stars denote estimates significance at 1 (***), 5 (**) and 10 (*) percent levels.

[a] Sum of coefficients related to variables *impulse*, *impulse_1*, *art_exp*, *art_exp_1*

[b] Test of linear restriction that sum of coefficients related to variables *impulse*, *impulse_1*, *art_exp*, *art_exp_1* equals zero

Table 2. The Export Channel - the effects of fiscal impulses on export growth

	RE			FE			PCSE			LSDVC		
	UB	H	CAPB	UB	H	CAPB	UB	H	CAPB	UB	H	CAPB
export_1	-0.215**	-0.189**	-0.168*	-0.126	-0.127	-0.104	-0.108	-0.0438	-0.0627	-0.163*	-0.137	-0.111
	[-2.37]	[-2.22]	[-1.86]	[-1.41]	[-1.51]	[-1.17]	[-0.69]	[-0.31]	[-0.42]	[-1.71]	[-1.61]	[-1.15]
gdp	0.774***	0.767***	0.689***	0.714***	0.684***	0.642***	0.689***	0.653***	0.622***	0.767***	0.761***	0.680***
	[3.83]	[3.64]	[3.32]	[3.49]	[3.26]	[3.10]	[3.28]	[2.93]	[2.70]	[4.09]	[3.77]	[3.50]
gdp_1	-0.109	-0.0422	-0.182	-0.256	-0.136	-0.293	-0.205	-0.0726	-0.277	-0.139	-0.07	-0.215
	[-0.48]	[-0.20]	[-0.80]	[-1.13]	[-0.65]	[-1.33]	[-0.94]	[-0.29]	[-1.19]	[-0.57]	[-0.34]	[-0.86]
impulse	-1.137*	-0.422	-1.08	-0.938	-0.452	-1.008	-1.241*	-1.112	-1.283*	-1.150*	-0.438	-1.1
	[-1.69]	[-0.51]	[-1.59]	[-1.44]	[-0.56]	[-1.57]	[-1.78]	[-1.43]	[-1.87]	[-1.72]	[-0.55]	[-1.56]
impulse_1	-1.327*	-1.254	-1.232*	-1.008	-1.297	-1.104*	-1.136	-1.516*	-1.289*	-1.294*	-1.26	-1.198*
	[-1.96]	[-1.51]	[-1.82]	[-1.52]	[-1.60]	[-1.70]	[-1.57]	[-1.88]	[-1.83]	[-1.93]	[-1.52]	[-1.66]
art_exp	2.719***	0.438	1.249	2.203***	0.578	1.204	2.668***	1.283	1.440*	2.724***	0.472	1.285
	[3.11]	[0.49]	[1.56]	[2.70]	[0.68]	[1.61]	[3.08]	[1.62]	[1.93]	[2.98]	[0.53]	[1.48]
art_exp_1	1.378	1.342	1.008	0.716	1.464*	0.848	0.921	1.626**	0.932	1.258	1.328	0.955
	[1.51]	[1.52]	[1.27]	[0.83]	[1.73]	[1.15]	[0.98]	[1.97]	[1.20]	[1.45]	[1.59]	[1.12]
imp_eu27	0.675***	0.711***	0.767***	0.719***	0.759***	0.800***	0.752***	0.840***	0.832***	0.678***	0.712***	0.769***
	[4.10]	[4.10]	[4.55]	[4.30]	[4.39]	[4.74]	[4.77]	[5.31]	[5.12]	[3.76]	[5.21]	[4.09]
imp_eu27_1	0.185	0.135	0.136	0.179	0.152	0.147	0.158	0.0332	0.119	0.152	0.102	0.0987
	[1.11]	[0.76]	[0.79]	[1.08]	[0.88]	[0.88]	[0.89]	[0.18]	[0.66]	[0.99]	[0.65]	[0.63]
reer	-0.0252	-0.0885	-0.0571	-0.00299	-0.0675	-0.028	-0.015	-0.0431	-0.0286	-0.0289	-0.0905	-0.0596
	[-0.31]	[-1.10]	[-0.69]	[-0.04]	[-0.87]	[-0.35]	[-0.24]	[-0.62]	[-0.44]	[-0.38]	[-0.99]	[-0.77]
reer_1	0.0751	0.121	0.0876	0.0509	0.12	0.0732	0.0486	0.0946	0.0634	0.0781	0.123	0.0906
	[0.83]	[1.38]	[0.96]	[0.57]	[1.39]	[0.82]	[0.70]	[1.21]	[0.88]	[0.88]	[1.28]	[1.05]
Constant	-1.918	-0.611	0.175	-1.915	-2.962	-1.653	-0.919	-3.998	-1.061	NA	NA	NA
	[-0.36]	[-0.11]	[0.03]	[-0.41]	[-0.57]	[-0.35]	[-0.27]	[-0.95]	[-0.30]			
Observations	128	140	128	128	140	128	128	140	128	128	140	128
R-squared	0.60	0.50	0.57	0.55	0.45	0.53	0.66	0.55	0.63	NA	NA	NA
Wald test for joint significance (p-value)	0	0	0	0	0	0	0	0	0	NA	NA	NA
Wald test for joint significance of fixed effects (p-value)	NA	NA	NA	0.119	0.238	0.296	NA	NA	NA	NA	NA	NA
Breusch-Pagan Lagrangian multiplier test for random effects (p-value)	0.447	0.762	0.861	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sum of fiscal variables coefficients (current and lagged)[a]	0.973	0.293	-0.060	1.632	0.105	-0.056	1.213	0.282	-0.200	1.539	0.102	-0.057
Test for joint significance of of fiscal variables coef. (p-value)[b]	0.217	0.564	0.916	0.057	0.842	0.925	0.101	0.519	0.686	0.076	0.861	0.925

Note. The dependent variable is the annual real growth rate of goods and services export. Explanatory variables definitions are reported in the Appendix. The first row of the table lists estimators used in the subsequent regressions, while the second row describes methods used to calculate fiscal impulses. Fiscal impulses used in regressions are obtained in line with three different approaches: Underlying Balance (column UB), von Hagen decomposition (column H) and Cyclically Adjusted Primary Balance (column CAPB).Standard errors are reported in parenthesis. Stars denote estimates significance at 1 (***), 5 (**) and 10 (*) percent levels.

[a] Sum of coefficients related to variables *impulse*, *impulse_1*, *art_exp*, *art_exp_1*

[b] Test of linear restriction that sum of coefficients related to *impulse*, *impulse_1*, *art_exp*, *art_exp_1* equals zero

Table 3. The Investment Channel - the effects of fiscal impulses on private investment growth

	RE			FE			PCSE			LSDVC		
	UB	H	CAPB	UB	H	CAPB	UB	H	CAPB	UB	H	CAPB
pinv_1	0.0331	0.119	0.0712	0.133	0.185**	0.144	0.144	0.251*	0.191	0.109	0.201**	0.153
	[0.35]	[1.28]	[0.74]	[1.47]	[2.06]	[1.53]	[1.04]	[1.92]	[1.38]	[1.15]	[2.45]	[1.59]
gdp	2.356***	2.217***	2.469***	2.239***	2.143***	2.336***	2.260***	2.183***	2.371***	2.356***	2.211***	2.468***
	[11.71]	[9.82]	[12.48]	[11.39]	[9.68]	[12.00]	[10.86]	[9.61]	[11.49]	[11.89]	[9.52]	[11.99]
gdp_1	0.656**	0.3	0.463	0.353	0.106	0.199	0.367	-0.0518	0.117	0.457*	0.117	0.259
	[2.05]	[1.07]	[1.47]	[1.15]	[0.39]	[0.65]	[0.88]	[-0.14]	[0.28]	[1.68]	[0.44]	[0.92]
impulse	1.356**	0.685	0.782*	1.410**	0.672	0.747*	1.479***	0.697*	0.840**	1.359**	0.721**	0.818*
	[2.37]	[1.55]	[1.79]	[2.49]	[1.53]	[1.71]	[3.31]	[1.88]	[2.25]	[2.41]	[2.01]	[1.94]
impulse_1	1.030*	0.217	0.229	0.885	0.152	0.165	1.071**	0.156	0.267	0.935	0.162	0.19
	[1.74]	[0.60]	[0.55]	[1.55]	[0.44]	[0.40]	[2.30]	[0.52]	[0.71]	[1.59]	[0.47]	[0.45]
r_m	-0.174	-0.00105	-0.196*	-0.12	-0.00249	-0.154	-0.172*	-0.00441	-0.184*	-0.174	-0.00121	-0.197
	[-1.57]	[-0.09]	[-1.74]	[-1.14]	[-0.23]	[-1.44]	[-1.88]	[-0.37]	[-1.87]	[-1.32]	[-0.11]	[-1.53]
r_m_1	-0.147	-0.0261**	-0.177		-0.0272**	-0.0955	-0.0613	-0.0336**	-0.0801	-0.131	-0.0279**	-0.159*
	[-1.36]	[-2.13]	[-1.61]		[-2.33]	[-0.93]	[-0.72]	[-2.56]	[-0.86]	[-1.41]	[-2.55]	[-1.70]
gov_inv	-0.0508	-0.0815**	-0.0644	-0.0463	-0.0710*	-0.0539	-0.0635	-0.0899**	-0.0764	-0.0491	-0.0791*	-0.0619*
	[-1.18]	[-1.98]	[-1.50]	[-1.11]	[-1.76]	[-1.26]	[-1.30]	[-2.03]	[-1.59]	[-1.39]	[-1.75]	[-1.78]
gov_inv_1	-0.0328	0.00375	-0.0626	-0.00646	0.00824	-0.0387	-0.00198	0.0117	-0.0249	-0.0279	0.00519	-0.0551
	[-0.76]	[0.28]	[-1.48]	[-0.15]	[0.62]	[-0.93]	[-0.04]	[1.30]	[-0.53]	[-0.60]	[0.35]	[-1.24]
Constant	-6.333***	-4.828***	-6.080***	-5.730***	-4.397***	-5.301***	-5.958***	-4.212***	-5.564***	NA	NA	NA
	[-5.20]	[-3.84]	[-4.95]	[-4.80]	[-3.61]	[-4.38]	[-4.92]	[-3.39]	[-4.54]			
Observations	123	134	123	124	134	123	123	134	123	123	134	123
R-squared	0.71	0.69	0.70	0.68	0.67	0.67	0.74	0.72	0.73	NA	NA	NA
Wald test for joint significance (p-value)	0	0	0	0	0	0	0	0	0	NA	NA	NA
Wald test for joint significance of fixed effects (p-value)	NA	NA	NA	0.282	0.437	0.405	NA	NA	NA	NA	NA	NA
Breusch-Pagan Lagrangian multiplier test for random effects (p-value)	0.8939	0.692	0.995	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sum of current and lagged impulse variables coefficients	2.330	0.823	0.912	2.386	0.902	1.011	2.549	0.853	1.108	2.293	0.883	1.008
Test for joint significance of of impulse variables coef. (p-value)[a]	0.007	0.174	0.174	0.008	0.149	0.136	0	0.101	0.072	0.009	0.124	0.151

Note. The dependent variable is the annual real growth rate of private investment. Explanatory variables definitions are reported in the Appendix. The first row of the table lists estimators used in the subsequent regressions, while the second row describes methods used to calculate fiscal impulses. Fiscal impulses used in regressions are obtained in line with three different approaches: Underlying Balance (column UB), von Hagen decomposition (column H) and Cyclically Adjusted Primary Balance (column CAPB).Standard errors are reported in parenthesis. Stars denote estimates significance at 1 (***), 5 (**) and 10 (*) percent levels.

[a] Test of linear restriction that sum of coefficients related to variables *impulse*, *impulse_1* equals zero

Table 4. The Consumption Channel - the effects of fiscal impulses on private consumption growth

	RE			FE			PCSE			LSDVC		
	UB	H	CAPB	UB	H	CAPB	UB	H	CAPB	UB	H	CAPB
pcon_1	0.153	0.152	0.154	0.280***	0.283***	0.284***	0.177	0.187	0.19	0.257***	0.262***	0.264***
	[1.55]	[1.52]	[1.53]	[3.02]	[2.99]	[2.99]	[1.29]	[1.34]	[1.36]	[2.84]	[2.98]	[2.95]
gdp	0.874***	0.859***	0.863***	0.863***	0.849***	0.850***	0.868***	0.866***	0.854***	0.867***	0.853***	0.857***
	[10.38]	[8.70]	[9.98]	[10.36]	[8.88]	[9.97]	[8.89]	[8.02]	[8.35]	[9.33]	[7.42]	[9.00]
gdp_1	-0.04	0.0876	0.0143	-0.213*	-0.108	-0.165	-0.124	-0.0233	-0.0867	-0.13	0.00205	-0.0742
	[-0.31]	[0.65]	[0.11]	[-1.75]	[-0.84]	[-1.35]	[-0.84]	[-0.15]	[-0.57]	[-0.93]	[0.02]	[-0.61]
pcredit	0.183***	0.172***	0.173***	0.157***	0.142**	0.146***	0.149***	0.133***	0.139***	0.187***	0.176***	0.177***
	[3.25]	[3.05]	[3.04]	[2.85]	[2.54]	[2.60]	[2.95]	[2.58]	[2.68]	[3.21]	[3.01]	[3.01]
pcredit_1	0.00979	0.017	0.0154	-0.0407	-0.0348	-0.0328	-0.0265	-0.0201	-0.0169	-0.00291	0.00413	0.00252
	[0.17]	[0.29]	[0.26]	[-0.72]	[-0.60]	[-0.56]	[-0.48]	[-0.36]	[-0.30]	[-0.06]	[0.08]	[0.05]
impulse	-0.015	-0.0159	0.00865	-0.0789	-0.0494	-0.0713	-0.0925	-0.108	-0.128	-0.028	-0.0173	0.0115
	[-0.09]	[-0.10]	[0.05]	[-0.49]	[-0.31]	[-0.43]	[-0.58]	[-0.78]	[-0.91]	[-0.16]	[-0.08]	[0.05]
impulse_1	-0.358**	-0.331*	-0.226	-0.406**	-0.283	-0.249	-0.425***	-0.319*	-0.277	-0.367*	-0.340*	-0.225
	[-2.17]	[-1.73]	[-1.16]	[-2.44]	[-1.46]	[-1.27]	[-2.78]	[-1.71]	[-1.51]	[-1.75]	[-1.83]	[-1.23]
art_high	-0.0596	-0.285	-0.242	0.0406	-0.156	-0.0926	0.07	-0.0813	-0.00795	-0.0536	-0.29	-0.248
	[-0.31]	[-0.97]	[-0.81]	[0.21]	[-0.54]	[-0.32]	[0.49]	[-0.32]	[-0.03]	[-0.27]	[-0.95]	[-0.79]
art_high_1	0.318	0.626**	0.513	0.393**	0.598**	0.587*	0.429***	0.688***	0.664**	0.327*	0.641**	0.517
	[1.62]	[2.11]	[1.65]	[2.06]	[2.11]	[1.95]	[2.74]	[2.60]	[2.42]	[1.82]	[2.09]	[1.64]
Constant	-0.515	-1.109	-0.758	-0.129	-0.56	-0.374	-0.198	-0.75	-0.478			
	[-0.73]	[-1.38]	[-1.04]	[-0.22]	[-0.87]	[-0.61]	[-0.31]	[-1.14]	[-0.74]	NA	NA	NA
Observations	106	106	106	106	106	106	106	106	106	106	106	106
R-squared	0.72	0.71	0.71	0.70	0.69	0.69	0.68	0.68	0.68	NA	NA	NA
Wald test for joint significance (p-value)	0	0	0	0	0	0	0	0	0	NA	NA	NA
Wald test for joint significance of fixed effects (p-value)	NA	NA	NA	0.107	0.068	0.097	NA	NA	NA	NA	NA	NA
Breusch-Pagan Lagrangian multiplier test for random effects (p-value)	0.649	0.501	0.633	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sum of fiscal variables coefficients (current and lagged)[a]	-0.051	0.110	0.174	-0.115	-0.006	0.054	-0.018	0.180	0.251	-0.122	-0.007	0.054
Test for joint significance of of fiscal variables coef. (p-value) [b]	0.864	0.697	0.527	0.719	0.983	0.855	0.956	0.474	0.303	0.712	0.981	0.844

Note. The dependent variable is the annual real growth rate of private consumption. Explanatory variables definitions are reported in the Appendix. The first row of the table lists estimators used in the subsequent regressions, while the second row describes methods used to calculate fiscal impulses. Fiscal impulses used in regressions are obtained in line with three different approaches: Underlying Balance (column UB), von Hagen decomposition (column H) and Cyclically Adjusted Primary Balance (column CAPB).Standard errors are reported in parenthesis. Stars denote estimates significance at 1 (***), 5 (**) and 10 (*) percent levels.

[a] Sum of coefficients related to variables *impulse*, *impulse_1*, *art_high*, *art_high_1*

[b] Test of linear restriction that sum of coefficients related to variables *impulse*, *impulse_1*, *art_high*, *art_high_1* equals zero