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**Short-run Macroeconomic Effects of Discretionary
Fiscal Policy Changes**

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Abstract

The standard Keynesian view of fiscal policy holds that in short-run fiscal adjustments (expansions) reduce (stimulate) aggregate demand and due to sticky wages, prices or other market rigidities, these demand shifts affect the factors of production and output. These conventional predictions have been challenged by the observation of episodes of perverse effects of fiscal policy – so called “non-Keynesian” effects.

This paper reassess the short-run consequences of fiscal policy. We provide evidence that consumption reacts in a non-linear fashion to discretionary fiscal policy changes. The results of our estimations show that households tend to behave in non-Keynesian manner when the fiscal situation of a country is bad, i.e. when public debt or fiscal deficit is large, while Keynesian behavior dominates, when the fiscal situation is sound. Our results suggest that, similarly to OECD countries, consumption function does not react in linear fashion to changes in fiscal policy also in transition economies.

Introduction

The adoption of common currency in EU countries has revived interest in the influence of fiscal policies on aggregate demand and output. However, despite the efforts of many researchers, the short as well as long run effects of fiscal policy still remain unclear.

The standard Keynesian or “conventional” view of fiscal policy holds that in the short run, fiscal adjustments (expansions) reduce (stimulate) aggregate demand and due to sticky wages, prices or other market rigidities, these demand shifts affect the factors of production and output. This proposition has been challenged by the permanent income life cycle hypothesis (PILCH) and its generalization – the Ricardo – Barro Equivalence Theorem.

The strict Ricardian approach holds that the level of aggregate demand is unaffected by the tax/debt mix or by permanent changes in government spending – the former leaves households’ consumption decisions unaffected, while the latter crowds it out. Fiscal policy is thus ineffective in stimulating or dampening output, at least in the short run¹.

“Real economic life” has, however, demonstrated that there are other options as well, and that these theories do not exhaust all the possible effects of fiscal policy. It has been well documented, that fiscal policy can have “non-Keynesian” effects, i.e. that fiscal expansion can cause a recession and fiscal retrenchments an expansion in economic activity. These effects do not fit either into Keynesian nor Ricardian tradition and although a considerable amount of research has been done concerning these phenomena, they still remain largely unexplained. Some researchers argue that fiscal policy has non-linear demand effects – while most of the time the consumers behave in a Keynesian fashion, sometimes this effect is totally reversed by a relevant “trigger factor”. Another group of researchers tries to explain the perverse effects of fiscal policy by linear supply side effects.

The main goal of this paper is to reassess the short run effects of discretionary fiscal policy. , using two data sets: a sample of OECD countries, already used in previous studies and a sample of transition economies.

The structure of the paper is the following: the first part outlines the main theories on the short-run influence of fiscal policies on economic activity, concentrating on possible explanations of the non-Keynesian effects and reviews the empirical literature. The second and third part are empirical – we run several regressions for OECD as well as transition economies to further test the proposition of non-linear effects of fiscal policy.

¹ In the long run, the composition and magnitude of government spending, taxes as well as the amount of public debt may exert significant impact on the growth rate.

The results of our research support the proposition of possible non-linearity in consumers' behavior. We find that at times when the fundamental fiscal position of a country is sound, fiscal policy has short-run Keynesian effects: fiscal expansion stimulates private consumption while fiscal contraction dampens it. In times of fiscal distress (e.g. of doubt as to the solvency of the government) this effect is reversed – loose fiscal policy dampens private consumption and vice-versa. Thus households behave in a nonlinear fashion – in “normal fiscal times” they are Keynesians, while in “bad fiscal times” they employ non-Keynesian behavior. A similar non-linear effect is also present in transition economies.

Our work is another piece in the growing evidence of the presence of non-linear effects of fiscal policy. It has to be emphasized, however, that the non-linearity of consumer behavior, which we have found, may not explain fully the perverse reaction of output to fiscal policy changes. There might be other factors at work as well – we leave this for future research.

1. Short run output effects of fiscal policy: a reminder

This section briefly outlines the main competing theories on the influence of fiscal policies on aggregate demand².

The simplest Keynesian view assumes that fiscal policy influences aggregate demand in a straightforward fashion: fiscal expansion stimulates demand, while fiscal contraction reduces it. The size of the aggregate demand stimulus is given by the Keynesian multipliers (the spending multiplier being greater than tax multiplier). In a standard closed economy extension of the model (ISLM), the crowding out mechanism, through increased interest rates, dampens the size of the multipliers; in the open economy version (the Mundell-Fleming model) the size of the multipliers is also reduced by exchange rate and income effects. In both cases however – closed and open economy - the multipliers are greater than, or in the extreme case equal to zero; they never turn negative. In the short run, due to a positively sloped aggregate supply curve, output follows aggregate demand changes. This is what Elmendorf and Mankiw (1998) call a “conventional view” of fiscal policy.

There is also another approach to fiscal policy, which challenges the conventional predictions. It is based on rational, forward-looking consumers and the permanent-income/ life-cycle hypothesis (PILCH). A “logical completion” of PILCH is Ricardian Equivalence (Seater, 1993, p. 143). As is well known, the Barro-Ricardo model assumes rational consumers with infinite lives (or rather immortal families linked by intergenerational

² Comprehensive review can be found in Hemming et al. (2002).

altruism), lump sum taxes and perfect capital markets. Under these assumptions, consumption depends only on permanent income and the interest rate. Since consumers recognize the government budget constraint, the method of public spending financing does not matter: it does not change the path of private consumption; the only effect is the altered composition of national savings. For an infinitely lived, forward looking consumer a tax cut today is equivalent to a future tax increase and thus does not change his permanent income and consumption. Holding government spending fixed, the tax/debt mix is irrelevant. That does not imply that fiscal policy as a whole is neutral, because what matters is the level of government's use of resources, i.e. government spending. Provided that government spending does not enter into consumers' utility function, a permanent rise in public expenditure means an equal decrease of permanent income, hence an increase in government spending, contrary to conventional view, makes the consumer feel less wealthy. Note that a permanent change in the path of government expenditure does not, on average, change the level of aggregate demand, as any increase in public spending is offset by a decrease in consumption (Seater, 1993; Barro, 1989). A temporary increase in public spending, holding its permanent level fixed, will not change the consumption pattern, which may imply a temporary increase in aggregate demand³.

The assumption of a forward looking consumer, not restricted by liquidity constraints, maximizing his and his descendents lifetime utility renders the Keynesian theory of fiscal policy almost completely irrelevant. Of course, if we relax any of these assumptions, the results of the PILCH/Ricardo view change – most of the time they become more Keynesian, in the sense, that fiscal policy has Keynesian effects on consumption. The results of the Barro – Ricardo model are especially vulnerable to a change in the assumption of infinite lives. Allowing for a finite time horizon (or dismissing intergenerational altruism) implies that the method of budget deficit financing does matter, as it changes the expected income of (selfish) generations. A tax cut today may raise consumption, as it is possible that this future tax increase will be borne by next generations (Blanchard, 1985): a Keynesian result in the neoclassical framework. Relaxing the assumption of lack of liquidity constraints or allowing for myopia also undermines the results of strict Ricardian Equivalence. The violation of Ricardo – Barro assumptions together with the assumption of positively sloped aggregate supply allows for short-run expansionary effects of government spending.

It is obvious that the actual impact of fiscal policy on aggregate demand and output cannot be settled on theoretical grounds alone, as there are too many unresolved questions concerning the crucial assumptions mentioned above – it has to be established

³ The consumption plans might be affected by public spending not only through the budget constraint but also through their utility, provided that government consumption enters into private utility function – if public consumption is a substitute or complement, than its increase will respectively decrease or increase private consumption.

empirically. The seminal paper by Campbell and Mankiw (1990) provides empirical evidence that consumption does not follow a random walk, as implied by PILCH, but is “excessively sensitive” to predictable changes in income and “excessively smooth” to surprise changes in income; thus “Keynes’s original consumption function starts to look more attractive” (Mankiw, 2002, p. 456).

There has been also a considerable amount of research devoted to testing Ricardian Equivalence; nevertheless this literature does not reach uniform conclusions (Seater, 1993; Elmendorf, Mankiw, 1998; Lopez, 2000). Some studies reject it; some find evidence in favor of it. Part of the reason why the results are so divergent, lies in the fact that most of these studies are very sensitive to sample selection, estimation technique and data quality. But it seems that “most economists today agree with David Ricardo and doubt that Ricardian Equivalence describes actual consumer behavior⁴”. (Elmendorf and Mankiw, 1998. p. 43). Although Ricardian Equivalence/PILCH might give an approximation to consumer behavior, these concepts do not describe economic reality fully and hence many fiscal policy actions do influence aggregate demand and short run economic activity in a Keynesian fashion.

This state of the art has been somewhat challenged in the early 1990’s, as none of these theories – neither Keynesian nor PILCH/Ricardian - could explain the phenomenon first described in a seminal paper by Giavazzi and Pagano (1990, p.81), who analyzed the effects of fiscal policy in Denmark and Ireland in, respectively, 1982 and 1987-89 and concluded that these were “...the two most striking cases of expansionary (fiscal) stabilizations in Europe”. Since then, some economists have tried to explain this apparent paradox. Below, we sketch the most influential models that explain the so called non-Keynesian effects: the models by Blanchard (1990), Bertola and Drazen (1993), Perotti (1999) and Sutherland (1997). All four models are neoclassical (i.e. based on PILCH) and each holds that expectations of future fiscal policy changes can give rise to nonlinear consumer behavior.

Blanchard’s (1990) model is based on the notion, that the larger the tax rate, the larger are the distortions in the economy. He assumes a critical level of taxation t^* , such that distortions caused by taxes, which exceed this level, imply a decrease in output. Consequently, there is also an associated critical level of debt d^* that implies, through the government budget constraint, a future tax rate above the critical level t^* and a lower output.

If consumers anticipate that this critical level of debt d^* will be reached, then a fiscal consolidation that stabilizes or lowers debt value, allows the economy to escape from the highly distortionary tax trap. Thus expected permanent income is higher and consumption

⁴ Ricardo himself did not believe in the Ricardian Equivalence (Elmendorf and Mankiw, 1998)

rises. In other words: today's tax increase, which does not exceed the critical value t^* allows a larger future increase that would exceed t^* and hence lower output to be avoided. As a result, fiscal consolidation in "bad fiscal times" can be good news and raise consumption.

Blanchard notes, that if consumers have a constant probability of death (are not Ricardian), then "in normal times" i.e. when the economy is far from the critical debt level, despite a neoclassical structure of the model, fiscal policy will have Keynesian effects. The model thus shows, that consumers behave in a non-linear fashion – in "normal times" they behave in a Keynesian way (provided they have finite horizon), in "bad times" their behavior is reversed, which gives rise to non-Keynesian effects.

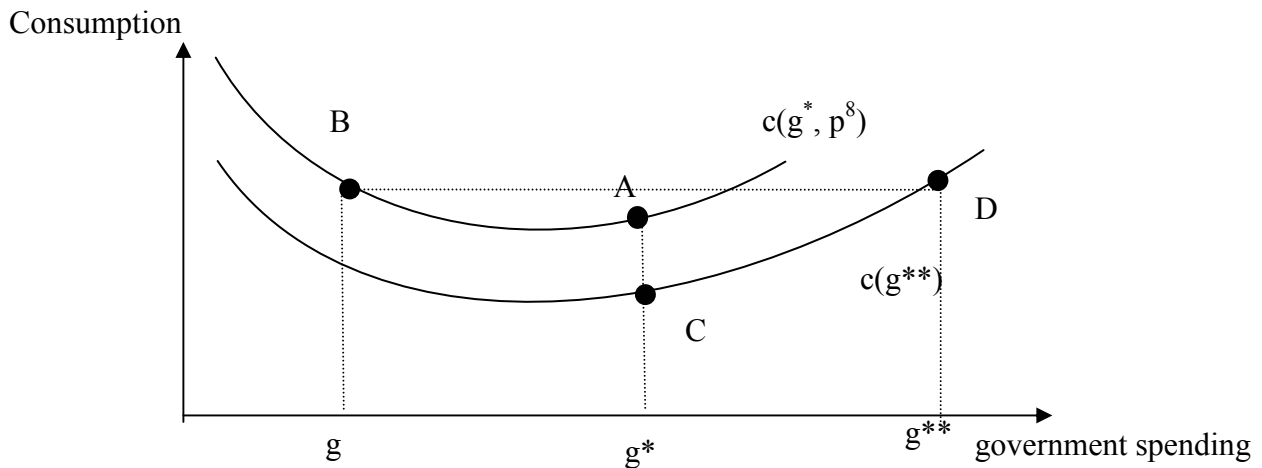
The model of Bertola and Drazen (1993) analyzes the effects of public expenditure. It assumes that government spending follows a random walk with positive drift. To satisfy budget constraint, government is forced, at some points in time, to discretionary lower expenditure. The model assumes that these fiscal stabilizations are triggered by unique levels of government spending g^* or g^{**} , which are viewed as critical: the lower value g^* triggers a stabilization (a decrease of spending to a new level g) with probability p^* , which is less than one. If g^* is surpassed then at a higher value g^{**} stabilization occurs with probability equal to one.

In "normal fiscal times", i.e. far from g^* , an increase in public expenditure usually lowers private consumption, because infinitely lived consumers correctly recognize that today's increase in public spending means increased future taxation and a lowering of their permanent income. However, the offset in consumption expenditure is not of equal size to the increase in the deficit, because agents know that sometime in the future the increase in government spending must be reversed. Hence, in general, despite the classical character of the model, fiscal policy has weak Keynesian effects.

More interesting is the behavior of consumption around the "trigger values" of government spending. When government spending approaches g^* , a discrete cut to g is possible but not certain (note, that this possibility has been included in consumers' estimate of permanent income). If the trigger value is reached and public spending is not cut, than consumption falls discretely, as consumers revise their expectations of permanent income (see Graph 1: movement from point A to C). Thus a non-linearity of the model emerges – consumption falls significantly and discretely, when government spending increases by a small amount, provided that a fiscal retrenchment was expected, but did not materialize. Another nonlinearity is present around the second "trigger value", i.e. when the level of public expenditure is close to g^{**} . Agents know that stabilization will certainly take place soon and so they increase their consumption, anticipating lower value of future taxes. When the stabilization does take place consumption is already higher (at a

level corresponding to the smaller public spending – thus a large cut in government spending leaves consumption unchanged (see Graph 1: a movement from point D to B in Graph 1) – there is a nonlinearity in consumption behavior, but aggregate demand still falls.

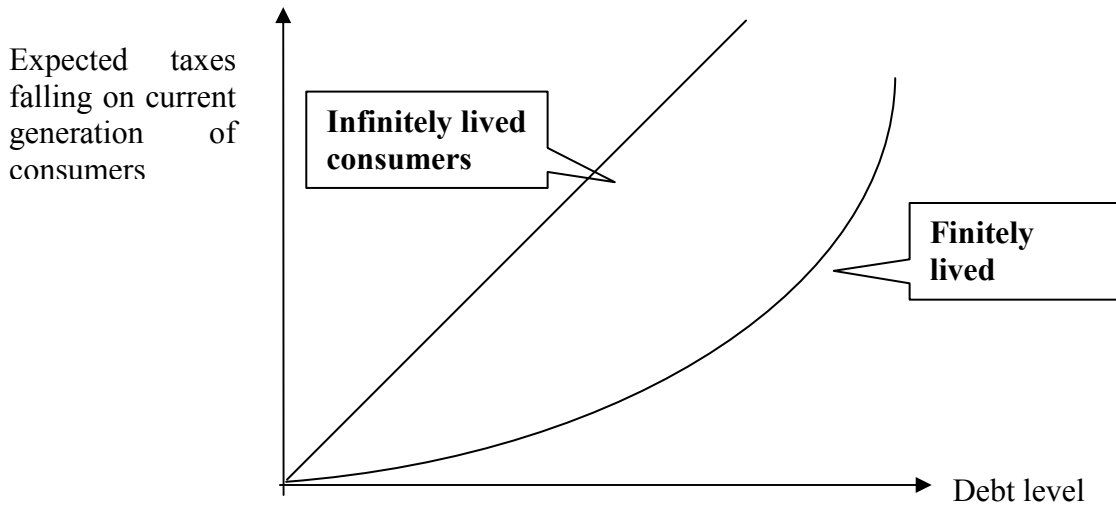
Graph 1. Public spending and private consumption



Source: Bertola and Drazen, (1993), p. 19.

The model developed by Sutherland (1997) has a similar spirit to Bertola and Drazen's model, but contrary to the latter, its results depend crucially on the assumptions of finitely lived consumer. Sutherland's model assumes, that the government implements restrictive fiscal policy, in form of a large tax hike, when public debt reaches critical levels. At low values of debt the probability of fiscal contraction is very low, thus a fiscal transfer from the government to households produces a Keynesian effect, as the probability that the future necessary increase in taxes will fall on the current consumer is low. The higher is the debt value, i.e. the closer it is to the trigger point of fiscal stabilization, then a further increase in fiscal deficit causes consumption to fall, as consumers know that there is a high probability that the stabilization – a large tax increase - will take place during their lives and that the future income loss will be much higher than today's government transfer. Again, non-linear consumer behavior gives rise to non-Keynesian effects. This effect diminishes, when consumers have infinite lives - in that case the results are Ricardian.

Graph 2. Today's debt and expected taxation.



Source: Sutherland, (1997), p. 156

Another influential model has been developed by Perotti (1999). Similarly to Cambell and Mankiw (1990), Perotti (1999) assumes that some consumers are not homogenous: one group is rational and forward looking, while the other group is either liquidity constrained or myopic, thus the consumption function of the latter group is purely Keynesian. Perotti also implicitly assumes that an increase in government expenditure stimulates pre-tax income, while taxes dampen it. The distortions caused by taxes increase in a non-linear fashion, as taxes enter the output function raised to the second power. Because policymakers do not smooth taxes out, future taxes are expected to be larger than today's.

The non-Keynesian effects of fiscal policy in the model emerge when the expectations about future disposable income of rational, unconstrained consumers change as a result of the unexpected change in public spending or taxes, mainly through alteration of the future tax path.⁵ Note, that the "Keynesian" consumers have a constant propensity to consume out of current income, and the bigger their proportion in the society, the less likely it is for the non-Keynesian effects to appear.

An unexpected increase in public expenditure may exert a positive or negative effect on the consumption of "PILCH" consumers depending on the strength of the output stimulus as opposed to the negative effect of the implied (future) tax increase. If the output stimulus outweighs tax distortions, consumption will increase as a result of the government spending shock, if the opposite is true, consumption will decrease. Therefore an increase in government spending may have perverse demand effects, provided that the share of PILCH consumers is not too low and that the effect of (expected) tax distortions outweighs

⁵ The "PILCH" consumers do not react to expected changes in fiscal policy. Consumption only changes when fiscal policy is unexpected.

the positive effects of spending. The latter effect is more likely when the present discounted value of the financing needs of the government is large – for instance when the government is struggling with a mounting debt.

Similarly, a tax increase may have different effects depending on the expected path of future taxation. An unexpected tax increase today may stimulate consumption of forward looking, unconstrained individuals, as it implies significantly lower tax distortions in the future. Again, the emergence of non-Keynesian consumers' reaction depends on the share of unconstrained consumers and on the present discounted value of the financing needs of government. In "bad fiscal times" the PDV of the financing needs of government is large, so today's tax increase implies a significant decrease in future distortions.

Perotti (1999) therefore argues that when the PDV of future government financing needs is low, fiscal policy will exert the usual Keynesian effects due to the reaction of liquidity constrained consumers (provided that the fiscal action is unexpected). When however the PDV of financing needs is high, it is possible that the unexpected fiscal policy will have perverse effects, because the PILCH consumers expect a future perverse change in income.

The four models summarized above emphasize the demand-side sources of non-Keynesian effects of fiscal policy. Some studies however, argue that the main reason of non-Keynesian effects lies on the supply side. Alesina et al. (2002) argue that fiscal policy may influence investment decisions not only thorough traditional interest rate effects, but also through the labor market. They assume that the firm's investment decision is based on maximization of expected PDV of future cash flow, which in turn depends on the marginal productivity (MP) of capital. The MP of capital is a function of capital labor ratio. A permanent increase in wages paid to public sector workers, employment benefits, or labor taxes puts upward pressure on labor costs, lowers employment and MP of capital. Thus investment demand falls as well. In this model, contrary to the demand side models, the reaction to fiscal policy is always linear.

Lane and Perotti (1999) emphasize the importance of the structure of government spending and taxes for the profitability and output of the tradable goods' sector. They argue that an increase in government spending on wages raises the wage rate and depresses employment and profitability of this sector. Again, there is no non-linearity.

It is worth noticing (Giudice et al., 2003) that the theoretical (and empirical) literature reviewed here suggests that the non-Keynesian effects stemming from the demand side should be triggered by a different set of factors than the non-Keynesian effects operating through the supply side. For the former the crucial features of fiscal policy are the ones that influence agents' expectations of future policy changes, such as initial fiscal conditions (the level of debt, the level of government expenditure) or size of fiscal adjustment. The

supply side effects depend almost entirely on the composition of fiscal policy changes, that is on relative magnitude of spending cuts (increases) as opposed to tax increases (cuts) and on structure of these changes.

The empirical literature on non-Keynesian effects, starting with the seminal contribution of Giavazzi and Pagano (1990) almost uniformly confirms the existence of nonlinear effects of fiscal policy but this is where consensus ends. The empirical evidence provides very mixed conclusions on the “trigger” factors.

Perotti (1999) finds evidence in favor of non-linear effects of fiscal policy and shows that high or growing public debt is the trigger factor. A similar, although weaker conclusion has been reached by Bhattacharya (1999). Pozzi (2001) provides additional evidence, in the spirit of Perotti’s work, based on data from Canada and Italy.

Giavazzi et al. (2000) fail to find the significance of excessive debt in triggering non-linear effects. In their estimation the relevant factor is the size of the adjustment/expansion: they find that large and persistent fiscal policy changes trigger non-linearity.

Cour et al. (1996) fail to find any strong relationship between the size of fiscal expansion/contraction and non-Keynesian effects.

Alesina et al. (1998) provide evidence that composition of fiscal policy is the factor that causes the non-Keynesian effects. Similarly, Alesina and Perotti (1997) argue that the composition of fiscal adjustment is crucial for its macroeconomic effects.

Pozzi, Heylen and Dossche (2002) find somewhat contrary evidence to the existence of demand-side non-Keynesian effects. They test the influence of rising government debt on the proportion of liquidity-constrained consumers and find that as the debt increases so do liquidity constraints⁶. Although they do not explicitly test for the non-linear effects of fiscal policy, their evidence suggests that “bad fiscal times” increase the proportion of “Keynesian” consumers, which should make the emergence of non-Keynesian effects less likely⁷.

Hence, the literature, being far from conclusive, points to the size and composition of fiscal adjustment/expansion and initial fiscal conditions (deficit and debt levels), as possible factors that influence the probability of non-Keynesian effects. However, as Giudice et al. (2003) remind us, these results as well as comparison between different works, has to be treated with caution. Most studies define fiscal expansions/adjustments based on different criteria; therefore the comparability between them is limited. The empirical work tends to skip fiscal reforms that don’t produce immediate fiscal effects, but nevertheless are very important, such as social security system reforms, what might lead

⁶ They argue that as public debt increases, banks may reduce the amount they lent to households.

⁷ Note, that non-Keynesian effect is more probable when consumers are not liquidity constrained.

to biased results. Moreover, there might be also a bias in sample selection, as most of the fiscal contraction that were aborted because of deep recession, are missing from the data.

Summing up: the effects of fiscal policies are unclear from the theoretical as well as empirical perspective. There are three distinctive theoretical views on the short run consequences of discretionary government actions: first, the Keynesian or conventional view that says that fiscal expansions or adjustment have symmetrical effects on demand and output, second, the PILCH/Ricardian view, which holds that fiscal policy is largely irrelevant and the third view – the non-Keynesian approach, that proposes that fiscal policy can have perverse effects, among others, due to non-linearities – it might be Keynesian or Ricardian (depending on assumptions) in good times, but in bad fiscal times or in the case of certain kinds of fiscal policy composition, its effects will be reversed compared to conventional expectations.

Table 1. Review of empirical literature on non-Keynesian effects.

Authors	Method of research	Sample	Results.
Afonso, 2001	Regression analysis, consumption function	EU-15	Evidence of non-linear consumer behavior around large changes in primary structural budget balance; thus <u>size of adjustment may trigger non-Keynesian effects</u> ; but the magnitude of reversal is too weak to explain non-Keynesian effects.
Alesina, Ardagna, 1998	Statistical analysis; Probit estimation	OECD	Evidence of non-Keynesian effects. <u>Size of adjustment and composition are the factors</u> that seem to influence the likelihood of emergence of these effects;
Alesina, Ardagna, Perotti, Schiantarelli, 1999	Regression analysis; dependent variable: investment, profits	OECD	Non-Keynesian effects are possible. Increases in primary government spending reduce profits and investment: the strongest effect is caused by the government wage bill; increases in taxes reduce profits and investment, but the magnitude is smaller. <u>Composition of fiscal policy is thus crucial for non-Keynesian effects.</u>
Alesina, Perotti, 1997	Statistical analysis	OECD	Evidence of Non-Keynesian effects. Composition of fiscal adjustment is important factor triggering these effects.
Bhattacharya, 1999	Regression analysis for each country plus panel data approach; dependent variable consumption,	OECD	Evidence of non-linear behavior – households move from non-Ricardian to Ricardian behavior as government debt reaches a threshold; <u>debt level and debt history is important for the effects of fiscal policy</u> ;

Table 1. Review of empirical literature on non-Keynesian effects (cont'd).

Authors	Method of research	Sample	Results.
Blanchard, Perotti, 1999	VAR; effects of fiscal variables on GDP	US, postwar period; quarterly data	Keynesian results , but the multipliers are small; increases in T and G both have strong negative effects on investment spending (Keynesian theory predicts that the signs should be opposite). Consumption is crowded in by increases in spending, but exports and imports are crowded out
Cour, Dubois, 1996	Statistical and regression analysis; dependent variable: consumption;	OECD, 1971-95	Statistical analysis: evidence of non-Keynesian effects ; large fiscal adjustments and expansions seem to be less Keynesian; and <u>anti-Keynesian episodes are specific to large scale fiscal episodes</u> ; Regression analysis: consumption behavior does account for non-Keynesian effects, <u>however it is difficult to identify factors that may be the cause of this non-linearity</u> ;
Fatas, Mihov,	VAR	USA	Keynesian results
Giavazzi, Jappeli, Pagano, 2000	Regression analysis; dependent variable: national saving	18 industrial countries 1970-1996, 150 industrial and developing countries 1960-1995 (WB dataset)	Evidence of non-linear effects of fiscal policy ; <u>the factor explaining non-linearity is the size of fiscal adjustment/expansion</u>

Table 1. Review of empirical literature on non-Keynesian effects (cont'd).

Authors	Method of research	Sample	Results.
Giavazzi, Pagano, 1995	Regression analysis; dependent variable: consumption	19 OECD countries, 1970-1992	Evidence of non-linearity: non-Keynesian reaction of consumption function emerges when changes in cyclically adjusted deficits are particularly large and persistent; <u>size of fiscal adjustment matters</u>
Giavazzi, Pagano, 1990	descriptive and regression analysis (consumption)	Denmark and Ireland	Non-Keynesian effects of fiscal consolidations; evidence of consumption boom when government cuts spending
Hemming, et al., 2002,	Authors analyze RECESSION EPISODES only; statistical and econometric analysis; dependent variable: depth of recession	29 advanced economies, 1970-99; 61 recession episodes	Statistical analysis: fiscal expansions are more effective (i.e. have Keynesian effects), when: <ul style="list-style-type: none"> • debt is low • govt. is big • are expenditure based Estimation: fiscal policies have Keynesian effects in closed economies, non-Keynesian effects in open economies; govt. size matters – big governments have more Keynesian effects (because of larger automatic stabilizers).
Lane, Perotti, 1999	Regression analysis; dependent variable: employment, real value added and profitability in manufacturing (supply side)	OECD, 1964-1994	Negative effect of government wage spending on output profitability and employment in the traded goods sector; <u>composition of fiscal policy matters for its effect</u>

Table 1. Review of empirical literature on non-Keynesian effects (cont'd).

Authors	Method of research	Sample	Results.
Miller, Russek, 2002	Regression analysis: St. Luis equation, consumption equation and growth accounting equation	OECD	St Luis equation: evidence of nonlinear effects around large and persistent fiscal expansions; Consumption equation – non-linear behavior around large fiscal expansions, but not large enough to explain non-Keynesian effects, these effects are magnified by the inclusion of “trigger points” i.e. dummies for exceptionally high and rapid growth of government consumption and primary structural deficit Growth accounting equation: no non-linearity found
McDermott, Wescott, 1996	statistical and regression analysis of fiscal adjustments	OECD 1970-1995	Non-Keynesian effects emerge during successful fiscal consolidations (i.e. consolidations that resulted in at least 3 percentage points reduction in public debt to GDP in the second year after the fiscal adjustment has ended). The success of fiscal consolidations depends on its size (bigger ones being more successful); and on composition: successful ones are achieved mainly through spending cuts
Perotti, 2002	VAR	5 OECD countries	Overall small multipliers; smaller (and in some countries negative) multipliers in the post 1980-sample, as compared to pre 1980.
Perotti, 1999	Regression analysis, dependent variable: consumption	19 OECD, 1965-1994	Evidence of non-linearity: non-Keynesian effects emerge when <u>government debt is high</u>

Table 1. Review of empirical literature on non-Keynesian effects (cont'd).

Authors	Method of research	Sample	Results.
Pozzi, 2001	Regression analysis: consumption function	semi-annual data for Italy and Canada 1960/1-1997	Evidence of non-linearity: when debt ratio raises, tax shock have non-Keynesian effects
Pozzi, Heylen, Dossche, 2002	Regression analysis: consumption function	OECD, 1990-1999	High government debt increases the share of credit- constraint consumers.

Source: Own compilation.

2. A preliminary look at the data.

In this and in the next section we try to assess how pronounced are the non-Keynesian effects and what factor might trigger them. As a pre-examination of the possible non-Keynesian effects, we perform a simple statistical analysis of the cases of significant fiscal expansions and adjustments in OECD countries in years 1975-2001. We limit our analysis to large fiscal expansions and adjustments, in order to isolate those fiscal impulses that might generate easily perceptible output consequences. Our goal in this simple statistical survey is not to gauge the effects of every fiscal adjustment or expansion but to distil the cases that may exert a strong effect, undoubtedly Keynesian or non-Keynesian (to the extent that this methodology allows for strong conclusions), and to try to assess the differences between them. We define a large fiscal expansion/adjustment as those cases when the cyclically adjusted primary government budget balance, measured as percent of potential GDP, changes by +/- 1.5 percentage point of potential GDP in at least one year.

As a measure of the output effects of fiscal policy change, we use the concept of “corrected growth” developed by Cour et al. (1996). Corrected growth of country *i* equals the actual growth of country *i* minus the average, actual growth in G7 countries and minus the difference between the potential growth rates between country *i* and G7. A “Keynesian” fiscal adjustment/expansion is an episode, during which the “corrected growth” is smaller/larger than in the preceding year. An episode is “non-Keynesian” when fiscal adjustment/expansion is coupled with a “corrected growth” which is larger/smaller than in the preceding year.

We isolated 40 cases of significant fiscal expansions and 73 cases of fiscal adjustments. Out of these 113 significant fiscal policy changes, 50 were non-Keynesian. Thus, a first conclusion emerges – non-Keynesian effects are not a random anomaly, they seem to be quite a frequent phenomenon. Table 2 gives the basic statistics.

Table 2. Keynesian and non-Keynesian episodes of fiscal policy in OECD countries in years 1976-2001.

	Keynesian expansions	Non-Keynesian expansions	Keynesian adjustments	Non-Keynesian adjustments
Number of episodes	17	23	46	27
Average change of the cyclically adjusted primary govt. balance, in % of potential GDP.	-2,47	-2,62	2,24	2,53
Average “adjusted growth”	1,58%	-1,38	-1,72	1.01

Source: own calculations, OECD database

To verify what factors might increase the probability of the occurrence of non-Keynesian episodes of fiscal policy, we estimate a logit model. The dependent variables is the occurrence of Keynesian or non-Keynesian effect of fiscal policy. The explanatory variables are the size of government debt, cyclically adjusted, in % of potential GDP and the composition of adjustment – i.e. the size of revenue and expenditure change both cyclically adjusted.

Tables 3 and 4 give the estimation results, which are not encouraging. The estimation does not identify any significant factors influencing the probability of non-Keynesian outcome in case of fiscal adjustments. In case of fiscal expansions, public revenue as well as expenditure are statistically significant, but the expenditures’ variable has the wrong sign. According to Alesina et al. (1999), a decrease in public expenditures should stimulate investment. Therefore an increase in expenditures should make a non-Keynesian effect of fiscal expansion (i.e. a GDP decline) more probable. Our estimation suggest the opposite – that the probability of non-Keynesian results decreases when expenditures are increased . Such result, together with insignificant explanatory variables in case of the regression depicted in Table 3 suggest that the estimation concerning fiscal expansions is simply spurious. Hence, the simple logit estimation has not given us any clues as to whether the non-Keynesian effects are triggered by the composition of fiscal adjustment which would point to the importance of supply side effects in explaining the non-Keynesian effects, or by the initial fiscal conditions which would indicate the importance of demand side factors.

Thus, our data does not allow us to assess which approach: demand sided or supply sided - is superior. Of course, the existence of non-Keynesian effects on the demand side do not exclude the possibility of supply side effects and vice versa.

Table 3. Probability of non-Keynesian effect of fiscal adjustment (logit estimation).

Variable	Coefficient	z-Statistic	Prob.
Δ revenue	-0,1368432	-0.44	0,663
Δ expenditure	-0,1386428	-0,42	0.674
debt	-0,0050307	-0,53	0.598
<i>Pseudo R2 = 0.0117</i>		<i>Number of obs = 64</i>	

Source: Own calculation

Table 4. Probability of non-Keynesian effect of fiscal expansion (logit estimation).

Variable	Coefficient	z-Statistic	Prob.
Δ revenue	0,9698169	2,10	0,036
Δ expenditure	-1,012933	-1,88	0.060
debt	-0,0104363	-0,57	0.568
<i>Pseudo R2 = 0.1737</i>		<i>Number of obs = 30</i>	

Source: Own calculation

In this situation, we decided to pursue further the demand side approach and leave the supply side factors for future research. As the traditional Keynesian analysis is fundamentally concerned with demand side, we wanted to verify whether it is possible that this channel could really be the source of the perverse effects. Once again, we want to emphasize, that demand-side approach does not exclude the supply side effects.

3. Empirical evidence.

Following the conclusion of Cour et al. (1996) that consumption seems to be a good candidate to explain non-Keynesian effects, we concentrate our research precisely on this component of aggregate demand. The goal of our estimation is modest – we want to verify whether there is non-linearity in consumption induced by fiscal events. Note that non-linearity does not necessarily imply a non-Keynesian output effect. As it may be too weak to offset the other effects of fiscal policy it simply signals that the overall impact of fiscal policy might not be uniform.

Our estimation is based on the methodology of Perotti (1999) and Campbell and Mankiw (1990), followed, among others by Pozzi et al. (2002).

Following Perotti (1999), we model consumption changes as a function of expected disposable income changes and unexpected fiscal policy changes. The expected income changes will give rise to a change in consumption of the liquidity constrained or myopic

consumers. Unexpected fiscal policy shocks will cause both groups of consumers to adjust their consumption path. Note that expected changes will not affect the consumption of unconstrained, forward looking consumers, and the reaction of myopic consumers to expected policy changes is already imbedded in the coefficient of disposable income changes. Since we are interested in the reaction to discretionary policy changes, we use cyclically adjusted fiscal impulses. The cyclical adjustment also allows us to avoid problems with endogeneity of fiscal variables, The fiscal impulse is measured as the change in difference between personal income together with social security taxes and primary government expenditures.

We estimate the following consumption function:

$$\Delta C_{it} = \Delta y_{it} + \Delta bal_{it} + \Delta bal_{it} * D1_{it} + e_{it} \quad (1)$$

where:

ΔC_{it} – consumption change

Δy_{it} – expected change in disposable personal income

Δbal – unexpected, cyclically adjusted fiscal impulse, defined as personal income taxes and social security contributions minus primary expenditures

$D1$ - dummy variable that equals 1, when the government debt in a country exceeds its mean plus one standard deviation computed for the period 1970- 2001 (i.e. the mean and standard deviation are computed separately for each country). To check the robustness of our results, we also employ a different definition of this variable and then denote it as $D1_{ws}$. This dummy equals one, when the government debt in a country exceeds the mean plus one standard deviation computed for the whole sample.

All the variables are in real per capita terms; consumption and income are expressed in log differences; the change in budget balance is, following Perotti (1999), expressed as a real per capita change divided by real per capita disposable income (this is done to take into account the significant cross-country differences in the size of budget deficit). All data comes from the OECD database.

Before we actually estimate equation (1) we must compute the expected changes in disposable income and the unexpected changes in fiscal policy shocks. These are calculated using a system of VAR equations:

$$X_t = \alpha + \sum_{i=1}^q \beta X_{t-i} + v_t,$$

where:

$$X_t = (\Delta c_t, \Delta y_t, \Delta bal_t)$$

The estimated error terms represent the unexpected variations in variables, while the estimated dependent variables are the expected changes.

We estimate equation (1) on panel data for OECD countries (except for Poland, the Czech Republic and Hungary) for the years 1970-2001 using a simple within-effects estimator, which is a consistent estimation procedure in the case of generated regressors (see Perotti, 1999, Pozzi, 2001).

Table 5 summarizes our results.

Table 5. Estimation results; OECD countries; dependent variable: Δc_{it} .

<i>Dependent Variable: Δc_{it}</i>									
<i>Method: Pooled Least Squares</i>									
<i>Sample (adjusted): 1973 2000, Number of cross-sections used: 19</i>									
Variable	Estimation 1			Estimation 2			Estimation 3		
	Coeff.	t-Stat.	Prob.	Coeff.	t-Stat.	Prob.	Coeff.	t-Stat.	Prob.
Δy_{it}	0.666	9.299	0.000	0.656	9.152	0.000	0.653	9.11	0.000
Δbal_{it}	-0,213	-1.725	0.085	-0.336	-2.305	0.022	-0.437	-2.474	0.013
$\Delta bal_{it} * D1$				0.428	1.575	0.116			
$\Delta bal_{it} * D1ws$							0.439	1.768	0.077
R-squared: 0.259122			R-squared: 0.253685			R-squared: 0.260527			
Adjusted R-squared: 0.213			Adjusted R-squared: 0.21			Adjusted R-squared: 0.214			
F-statistic: 59.10769			F-statistic: 115.2317			F-statistic: 59.54116			
Prob(F-statistic): 0.000000			Prob(F-statistic) 0.000000			Prob(F-statistic) 0.000000			
Durbin Watson stat.:1. 798213			Durbin-Watson stat: 1.7941			Durbin-Watson stat: 1.7688			

The coefficient signs in the estimation 1, without the dummy variable, are consistent with the Keynesian view; however the inclusion of the dummy variable for “bad fiscal times”, i.e. large government debt (estimation 2 and 3) uncovers the non-Keynesian effect: in bad fiscal times an increase in government spending dampens consumption. This non-linear effect was predicted by the Sutherland, Blanchard and Bertola and Drazen models, and empirically proven, among others, by Perotti (1999). In times of fiscal distress the households change their behavior from Keynesian to that resembling the Ricardian proposition.

We also run another set of regressions to test for the influence of the Stability and Growth Pact (Table 5, Equation 3). Fiscal rules (like the Stability and Growth Pact) should make the non - Keynesian effects more pronounced – a fiscal rule that requires a

reversion of policy, when a deficit and/or debt exceeds a certain threshold, might make an otherwise myopic consumer more aware of government budget constraint. Secondly, the adoption of fiscal rules makes a fiscal contraction more probable in the short time horizon (the issue of time horizon is discussed in Sutherland's model).

We test the influence of Stability and Growth Pact by multiplying the budget balance variable by two dummies: **D1** (or **D1_{ws}**), which as before, equals one in "bad fiscal times" and **D2** or **(1-D2)**, where **D2** = 1 for countries that have adopted Stability and Growth Pact. The variable $\Delta\text{bal}_{it} * \mathbf{D1} * \mathbf{D2}$ (which means that a country has adopted Stability and Growth Pact and was experiencing "bad fiscal times") is statistically insignificant, the variable $\Delta\text{bal}_{it} * \mathbf{D1}_{ws} * \mathbf{D2}$ (which has similar meaning, but $D1_{ws}$ is computed differently than D1) performs better. It's coefficient is larger in absolute value than the coefficient of the variable $\Delta\text{bal}_{it} * \mathbf{D1} * \mathbf{(1-D2)}$ (which means that a country is experiencing bad fiscal times but has not (yet) adopted the Stability and Growth Pact), which might suggest that the adoption of Stability and Growth Pact makes the perverse effect of fiscal policy stronger. This is a very interesting result, which should be tested in a few years time, when we have more data points available.⁸

⁸ Assuming that the SGP survives.

Table 6. Estimation results; OECD countries; dependent variable: Δc_{it}

<p style="text-align: center;"><i>Dependent Variable: $\Delta cons_{it}$</i></p> <p style="text-align: center;"><i>Method: Pooled Least Squares</i></p> <p style="text-align: center;"><i>Sample(adjusted): 1973 2000, Total panel (unbalanced) observations: 360</i></p>						
Variable	Coefficient	t-Stat.	Prob.	Coefficient	t-Stat.	Prob.
Δy_{it}	0.657	9.144880	0.000	0.654	9.117	0.000
Δbal_{it}	-0.336	2.300517	0.022	-0.433	-2.433	0.014
$\Delta bal_{it} * D1 * (1-D2)$	0.400	1.400070	0.162			
$\Delta bal_{it} * D1 * D2$	0.614	0.932356	0.352			
$\Delta bal_{it} * D1_{ws} * (1-D2)$				0.308	1.476	0.140
$\Delta bal_{it} * D1_{ws} * D2$				0.804	1.576	0.115
R-squared: 0.259335			F-statistic: 39.33208		R-squared: 0.261, F-statistic: 39.879	
Adjusted R-squared: 0.21098			Prob(F-statistic): 0.000		Adj. R-squared: 0.213, Prob(F-statistic): 0.00	
Durbin-Watson stat: 1.797959					Durbin-Watson stat: 1.776	

In the next regression we test for the presence of non-linear effect of fiscal policy in transition economies. Data availability allows us to include only the following economies in our sample: Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Moldova, Poland, Romania, Russia and Slovak Republic. The earliest data point is year 1990 and the latest is 2001.

Due to the short time dimension of the data, we decided not to estimate the VAR, thus both the changes in income as well as in fiscal shock are not divided into expected and unexpected components. All variables are in real per capita terms. The budget balance variable is scaled by real, per capita GDP, while consumption and income are log differences. The fiscal data is from GFS, while consumption and GDP is taken from World Bank Development Indicators.

Since we do not have data for disposable income, we proxy it by GDP. The budget balance data is for consolidated central government and is not cyclically adjusted. Due to unavailability of a full dataset on government debt, we use budget deficits to proxy for “bad fiscal times”; thus times of fiscal distress for a given country i (dummy $D1_{it}=1$) are defined as the mean plus one standard deviation of the budget deficit for country i over the relevant time period⁹.

⁹ We ran a regression for the very limited sample of countries, for which we had public debt data (i.e. $D1=1$ when the public debt of a country is excessively large), but then the deficit variable turned out to be not statistically significant.

Estimation of a consumption function that employs GDP and unadjusted fiscal data poses many econometric problems, one of them being the endogeneity of the right hand side variables. To (partly) account for this problem, we employ the two-step instrumental variable estimation technique¹⁰.

Table 7. Estimation results for transition economies; dependent variable: ΔC_{it}

<i>Dependent Variable: ΔC_{it}</i>										
<i>Method: Fixed effects 2stage IV regression</i>										
<i>Sample: 1990 2001, Number of cross-sections used: 14</i>										
Var.	Coefficient	t-Stat	Prob	Coefficient	t-Stat	Prob	Coefficient	t-Stat	Prob	
Δgdp	0.8795	6.42	0.000	0.8945	6.54	0.000	0.9440	3.04	0.004	
Δbal	-0.4102	-2.12	0.037	-0.6213	-2.53	0.013	-1.6625	-0.24	0,809	
$\Delta bal * D1$				0.1544	1.42	0.158	0.4251	0.04	0,971	
<i>Instrument</i>	<i>Δgdp instrumented by</i>						<i>Δgdp and Δbal</i>			
<i>s:</i>	<i>$\Delta bal \Delta gdp-1$</i>						<i>instrumented by $\Delta gdp-1$</i>			
	<i>$\Delta cons-1 \Delta def-2$</i>									
	R-sq: within = 0.60			R-sq: within = 0.61			R-sq: within = 0.3614			

The estimation results suggest that in the transition economies, non-linear reaction by consumers to changes in fiscal policy might also be present. Note however, that the coefficient of **$\Delta bal * D1$** (that is the influence of budget balance in times of fiscal distress) is smaller in absolute value than the coefficient of **Δbal** , which means that fiscal expansion in “bad fiscal times” increases consumption but this effect is much weaker than in “good fiscal times”. Thus, it seems that the consumers in transition economies do behave in a non-linear fashion but the non-Keynesian effect does not outweigh the Keynesian response, so on average there are no perverse reactions of consumption to fiscal policy.

This result is not surprising – as Perotti (1999) argues, the non-Keynesian effect depends, among others, on the proportion of myopic and liquidity constrained consumers. In transition economies liquidity constraints are probably much more pronounced due to less developed financial markets. Moreover, the proportion of myopic consumers may be also greater. The citizens of formerly centrally planned economies may still not be familiar with the concept of a government budget constraint and may not understand that the resources of government are limited. These results must, of course, be treated with skepticism, due to the short time period concerned and the poor quality of the data.

¹⁰ We also ran a regression with dummy variables for the well known output shock (Russian crisis, Bulgarian crisis, Balkan war, etc.). The dummy was not statistically significant.

4. Conclusions

The short-run effects of fiscal policy, despite the effort of many researchers, are still a matter of controversy. The compromise position held by most economists is that the strict PILCH/Ricardian view, although theoretically interesting, is empirically fairly irrelevant so fiscal policy will have Keynesian effects in the short run.

These simple predictions have been shaken by the observation of episodes of perverse effects of fiscal policy – so called “non-Keynesian” effects. These effects might be caused, among other reasons, by nonlinear consumer behavior that changes in times of fiscal distress.

The main goal of our paper was to test for the existence of this non-linearity. We found evidence that consumption reacts in a non-linear fashion to discretionary fiscal policy changes. The results of our estimations show that in “normal fiscal times” the consumers behave in Keynesian fashion. In “bad fiscal times” their behavior tends to change – an expansionary fiscal policy lowers consumption, which is definitely not a Keynesian result.

These results are not novel – they confirm the empirical conclusions reached by Perotti (1999) and are in line with the theoretical models of Sutherland (1997) and Blanchard (1990). We also found, that these non-Keynesian effects may be reinforced by the Stability and Growth Pact (but, the very limited number of data points available do not allow us to reach definite conclusions). This result is especially appealing, as it reinforces the validity of the proposition, on which the models of Blanchard (1990), Bertola and Drazen (1993) and Sutherland (1997) are based, namely that expectations of future fiscal policy changes influence today’s consumer behavior.¹¹

We have also tried to verify the presence of non-Keynesian effects in transition economies. As usual, the short time horizon and poor quality of the data are the reason that any estimation results must be treated with considerable caution. Our results suggest that in transition economies, similarly to OECD countries, the consumption function does not react in linear fashion to changes in fiscal policy. When the fiscal policy is sound, fiscal expansion stimulates consumption; this “conventional “ effect is also present in “bad fiscal times” but is much weaker – the increase in consumption is close to zero. This result is consistent with the Perotti’s (1999) model; Perotti argues that the perverse effect of fiscal policy is dependent on the fraction of myopic and liquidity constrained consumers – the bigger is this proportion the less likely the non-Keynesian effect. In transition economies this proportion is probably larger than in OECD economies for two reasons – first, financial

¹¹ As far as we know, the influence of the Stability and Growth Pact has not been so far described in the literature on non-Keynesian effects. It is certainly worthwhile to verify this result in a couple of year’s time, when more data points is available.

markets are less developed, so probably more consumers are liquidity constrained and secondly more consumers might be myopic – the consequence of many years of centrally planning and a lack of familiarity with the operation of the government budget constraint in a market-economy setting. This proportion of “Keynesian consumers” will probably have a tendency to fall over time, thus the transition economies are likely to see the non-Keynesian effects of fiscal policy grow.

Also, our findings are not very good news for those EU politicians that would like to stimulate the economy through fiscal expansion. Expansionary fiscal policy, especially in the countries which have adopted Euro, may not always have the usual effects!

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