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ATHANASIOS TAGKALAKIS

BADIA FIESOLANA, SAN DOMENICO (FI)

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Badia Fiesolana
I-50016 San Domenico (FI)
Italy

The Asymmetric Effects of Fiscal Policy on Private Consumption over the Business Cycle*

Athanasios Tagkalakis†

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Abstract

This paper explores on a yearly panel of nineteen OECD countries from 1970-2001 the effects of fiscal policy on private consumption in recessions and expansions. In the presence of binding liquidity constraints on households, fiscal policy is more effective in boosting private consumption in recessions than in expansions. The effect is more pronounced in countries characterized by a less developed consumer credit market. This happens because the fraction of individuals that face binding liquidity constraints in a recession will consume the extra income generated following a tax cut or government spending increase.

JEL: E62, E21, E32.

Keywords: Fiscal policy, liquidity constraints, consumption, recessions.

1 Introduction

Several recent studies[1] have examined the effects that fiscal policy has on private consumption and investment, identifying the government spending multiplier on output. However, what is not accounted for by this literature is the possibility that fiscal policy can have different effects over the business cycle. It can be less or more effective as a policy instrument depending on the state

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†Address for Correspondence: Department of Economics, European University Institute, Villa San Paolo, Via della Piazzuola 43, 50133 Florence, Italy. *email:* `athanasios.tagkalakis@iue.it`

[1]For example, Blanchard and Perotti (2002), Fatas and Mihov (2001), Perotti (2002), Mountford and Uhlig (2000).

of the economy. For example, fiscal policy might be more effective in mitigating economic slumps than in muting booms[2], alternatively it might be less effective at lenghtening expansions than at shortening recessions. Liquidity constraints can explain the asymmetric effects of fiscal policy over the business cycle. In recessions liquidity constraints become binding across a wider range of households and firms (the opposite in booms). This will affect fiscal policy actions, and their propagation and transmission in the economy.

As Gali, Lopez-Salido and Valles (2003) point out there is a consensus in the empirical literature that government purchases have positive effects on aggregate output; what has not been dealt with is the size of the fiscal multiplier, i.e. whether it is above or below unity. To determine this, it is the effect of fiscal policy on private consumption (the bigger component of aggregate demand) that has to be examined. Private consumption behaves in a quite different manner depending on whether or not liquidity constraints bind.

Standard Real Business Cycle models predict that the wealth effect of fiscal policy generates adverse effects on private consumption[3]. The presence of binding liquidity constraints alters the implications of fiscal policy actions on private consumption. The wealth effect of fiscal policy weakens, because fewer people have access to credit markets. Thus, it is likely that private consumption is increased after a fiscal expansion, amplifying the effects of government spending on output. This effect is strengthened further in recessions when liquidity constraints affect a larger fraction of the population. Hence, fiscal policy could have Keynesian effects (Gali et al (2002))[4], particularly in downturns of economic activity. In periods of expansion, liquidity constraints are less likely to bind or bind for a smaller fraction of the population. Households prefer to save if they are uncertain about their future income. Hence, a fiscal contraction, to avoid inflationary pressure in the economy, would lead to stronger positive reaction of private consumption (because of the stronger positive wealth effect of lower future taxation, or because income uncertainty is reduced as in Barsky et al (1986)[5]), cancelling the contractionary effects of fiscal policy on aggregate demand.

[2] Sorensen and Yosha (2001) study whether state fiscal policy in the U.S. is asymmetric over the business cycle. Their finding indicate that tax revenue increases more than spending in booms; whereas in slowdowns both revenue and spending decline, but revenue remain at low levels for more time. The implication of their analysis is that state fiscal policy (procyclical budget surpluses) mutes economic expansions to the same extent as it mitigates downturns.

[3] An increase in government spending, that has to be financed by current and future taxes, will decrease private consumption because the present discounted value of disposable income will be reduced by the higher taxation (negative wealth effect of taxation).

[4] Moreover, as long as a fiscal expansions lead to higher interest rates and lower asset prices, and people have access to a whole range of interest bearing assets, then the wealth effect could be even weaker in recessions (the opposite in booms).

[5] In Barsky et al (1986) a decrease in distortionary taxation in the present period to be financed by higher taxes in the future will lead to an increase in consumption is future income is uncertain and individuals have a precautionary

After presenting our motivation and a short discussion of relevant literature, we present a stylized two period theoretical framework, where three types of individuals coexist. Neoclassical consumers that can "borrow and save", Keynesian that can only save and rule-of-thumb (ROT) consumers. We employ the assumption that government spending has a positive effect on disposable income. This is the case when government spending has a positive impact on output in the presence of nominal or real rigidities. We study the effect of fiscal policy in two cases of a two period model. In the first, liquidity constraints do not bind in the first period; we refer to this as "Good times". Whereas, in the second, liquidity constraints bind, and this case is characterized as "Bad times". The main implication of the simple theoretical framework is that, under certain assumptions, a fiscal expansion will generate a stronger response of private consumption in Bad times compared to Good times. This effect will be bigger, the larger the fraction of liquidity constrained individuals

Turning to the empirical estimations, we use an unbalanced yearly panel data set (1970-2001) of nineteen OECD countries. Periods of recession (Bad times) are characterized for each of the countries, several alternative definitions are considered. Following work the by Jappelli and Pagano (1994) and Perotti (1999), we use as a proxy of the degree of credit constraints, the maximum ratio of loan to the value of house in housing mortgages (LTV ratio), and we assign pairs of country-decades into high and low LTV groups. The next step is to extract the spending and tax shocks that are affecting private consumption in each state of nature and to categorize them into expansionary and contractionary.

The empirical evidence confirms the theoretical predictions suggesting that both a government spending and a tax shock have a stronger positive effect on private consumption in recessions than in expansions. The effect is more pronounced in countries characterized by less developed consumer credit markets that are more likely to have a larger group of liquidity constrained individuals. Furthermore, in countries with less developed consumer credit markets consumption is affected the most by expansionary spending shock and contractionary tax shocks in Bad times, while in more financially developed economies the effects on private consumption are driven by contractionary spending and tax shocks in Bad times, and by expansionary tax shocks in Good times.

2 Motivation and Related Literature

The motivation for this paper comes from two adjacent fields of research. The first is related with the theoretical and empirical literature on the assessment of fiscal policy shocks, and its effects on

saving motive.

private spending. The second one investigates the conditions under which fiscal policy can have Non-Keynesian effects, and implicitly or explicitly introduces a role for liquidity constraints in the analysis.

As discussed above, following a government spending shock that is financed by future lump-sum taxes RBC models predict, through the negative wealth effect, a decline in consumption and an increase in employment that raises the return to capital and boosts investment. On the other hand, the keynesian analysis predicts that private consumption will increase after a government spending shock financed by future lump-sum taxes, because disposable income increases. Investment may be crowded out because the increase in consumption could raise the interest rate; though this depends on monetary policy. Both models' prediction could be in line with a fiscal multiplier bigger or smaller than one. Nevertheless much of the empirical studies seem to confirm the traditional Keynesian view, finding a non-negative or positive response of private consumption to government spending (e.g. Blanchard and Perotti (2002), Perotti (2002), Fatas and Mihov (2001)[6]).

In a recent contribution to the literature, Gali et al (2003), very elegantly, bring the above approaches together by developing a dynamic general equilibrium model with sticky prices and infinite horizon optimizing, as well as, rule-of-thumb consumers (ROT)[7]. Conditional on having a large fraction of ROT consumers (around fifty percent of the population), and a high degree of price stickiness (average price duration of about four quarters) they conclude that a government spending shock generates an increase in aggregate consumption only if it is not very persistent; otherwise the negative wealth effect of higher taxation dominates. However, Gali et al (2003) do not consider the possibility of having asymmetric effects over the business cycle; which as we claim will be driven by the presence of (binding) liquidity constraints.

The second field of research relates fiscal policy outcomes to borrowing constraints. Several papers (Perotti (1999), Giavazzi and Pagano (1990, 1996)) implicitly or explicitly add the assumption that there exist credit market imperfections; hence both constrained and unconstrained individuals coexist in the economy[8]. This implies that the wealth effect of fiscal policy will be stronger when the fraction of unconstrained individuals is high enough, so that fiscal consolida-

[6] However, Burnside, Eichenbaum and Fisher (2002) extending the standard RBC model with habit formation and investment adjustment costs confirm its predictions.

[7] Keynesian effects of fiscal policy are possible when some individuals are not optimizing fully over long horizons when choosing consumption, but follow "rules of thumb" that place a lot of weight on current income. It that case, e.g. a bond-financed tax cut will make them increase their consumption despite the fact that their lifetime budjet constraint is not affected.

[8] Studies of consumption behavior have suggested that the excess sensitivity of consumption growth to labor income is an indication of liquidity constraints (Attanasio 1999).

tions (by reducing tax burden[9] and boosting private consumption) can be expansionary. On the contrary, if the fraction of constrained agents is large enough, the wealth effect weakens and fiscal policy has Keynesian effects [this effect is stronger especially when the present discounted value of future taxation is quite high (convex tax distortions)]. These Non-Keynesian effects of fiscal policy are more likely in cases of bad initial conditions[10] i.e. high or growing debt-to-GDP-ratio (Perotti 1999), when the fiscal correction is large and persistent (Giavazzi and Pagano 1990, 1996). Crucial is also the composition of fiscal consolidation (Alesina and Perotti 1995, 1997); an expenditure cut has higher probability of success than a consolidation based on tax increases[11]. Nevertheless, so far there has not been established a link between borrowing constraints that bind depending on the state of the economy and fiscal policy actions that generate Keynesian or non-Keynesian effects.

3 Theoretical framework

Consider a simple two period theoretical frameowork (t=1, 2). Suppose that there exits three types of individuals. Rule-of-thumb (ROT) consumers that consume their disposable income in each period, LC type (Keynesian individuals) who are supposed to be liquidity constrained (can save, but cannot borrow) and the U type (neoclassical individual) who are unconstrained (can borrow and save). Following Perotti (1999) we assume the presence of nominal or real rigidities so that fiscal policy has a positive effect on output. With respect to timing we assume that production takes place at the beginning of each period, while consumption and investment decisions take place at the end.

We examine two cases. In the first case, if the economy is in a Good state (expansion) in t=1, it will pass to a Bad state in period t=2. In the second case if the economy is in a Bad state (recession) in t=1, it will switch to a Good state in period t=2. The transition probabilities are assumed to be 1, and are supposed to be known by all individuals at the beginning of period t=1. During an expansion all individuals (except of ROT consumers) want to save, while during a recession all (except of ROT consumers) want to borrow, though this is not possible for the LC type of individuals. This way we abstract, for simplicity, from the real life phenomenon of

[9] Conditional on having a small expected increase in future taxes.

[10] Crucial is the assumption that politicians discount the future more than consumers, so that consumers perceive the future tax burden as higher.

[11] Giavazzi, Jappelli and Pagano (2000) find that non-keynesian effects are more likely when taxes and transfers change (however they focus on national savings). Moreover non-keynesian responses appear asymmetric and stronger for fiscal contractions rather than expansion. Tax increases have no effect on saving during periods of large fiscal contractions.

having liquidity constraints binding under both states of nature (though in Bad times they will be affecting more people). However, incorporating both ROT and LC type consumers in the analysis we can replicate some of the real life phenomena, because even in Good times a fraction of the population will not have access to financial markets, while in Bad times this fraction will increase. Moreover, this will be relevant both for more and less financially developed economies.

3.1 Individuals

There exists a continuum of individuals indexed by $i \,\epsilon[0, 1]$. A fraction λ_1 of them is of the ROT type, λ_2 are LC type individuals, whereas the rest $(1 - \lambda_1 + \lambda_2)$ are of the U type[12]. The U type individuals have full access (can save and borrow) to credit markets under all states of nature at the going interest rate r. When savings are positive (in Good times), both U and LC types invest in government securities and earn gross return equal to $(1 + r)$. In Bad times, only the U type individuals can borrow, and they repay in the second period. The LC types are constrained to consume their disposable income. The ROT individuals at all times consume their disposable income.

Both types of individuals own one unit of labor which they supply inelastically. In the first period individuals receive a real wage w_1^G or w_1^B depending on whether they are in a Good or Bad state, moreover $w^G > w^B$, this assumption is considered to be a real life phenomenon since wages are mildly procyclical. If in Good state at time t=1, then next period they receive w_2^B. Analogously, if in Bad state at time t=1 then next period they receive w_2^G.

Each U type individual maximizes expected utility

$$EU(C_1, C_2) \tag{1}$$

where C_1 and C_2 are first and second period consumption respectively and E denotes expectations conditional on information available at the beginning of period 1. $U(.)$ is a von Neuman-Morgenstern utility function. The government imposes lump-sum taxes (T) on all individuals, except of the ROT consumers, in both periods.

The intertemporal budget constraint of the U type individuals when moving from Good to Bad times can be written as:

$$c_1^U + Rc_2^U = w_1^G + Rw_2^B - T_1 - RT_2 \tag{2}$$

$R = \frac{1}{1+r}$ where $(1 + r)$ is the real rate of return on savings[13].

[12] We assume that total population is $L = \bar{L} = 1$, i.e there is no population growth.

[13] For simplicity we assume that the rate of time preference equals the market rate of return.

When switching from Bad to Good times the intertemporal budget constraint for the U type of individuals is:

$$c_1^U + Rc_2^U = w_1^B + Rw_2^G - T_1 - RT_2 \tag{3}$$

When moving from Good to Bad times, the LC type individuals maximize a function like (1) with respect to the following intertemporal budget constraint:

$$c_1^{LC} + Rc_2^{LC} = w_1^G + Rw_2^B - T_1 - RT_2 \tag{4}$$

analogously with the U types when considering the switch from Bad to Good times. Furthermore, the LC type individuals face the following complementary slackness condition:

$$\begin{aligned} \mu_1 S_1^{LC} &= \mu_1(w_1 - T_1 - c_1^{LC}) = 0 \\ \mu_1 &\geq 0 \end{aligned}$$

so when $\mu_1 = 0$ then $S_1^{LC} > 0$; the liquidity constraints[14] do not bind and people want to save i.e. we are in a situation of Good times; whereas when $\mu_1 > 0$, then $S_1^{LC} = 0$, so the liquidity constraints bind, people would like to borrow but they cannot, i.e we are in a situation of Bad Times.

The ROT consumers each period maximise[15]

$$U(C_t) \tag{5}$$

with respect to the zero saving constraint $c_t^{ROT} = w_t$, for $t = 1, 2$.

Finally aggregate consumption for $t = 1, 2$ is given by:

$$c_t = \lambda_1 c_t^{LC} + \lambda_2 c_t^{ROT} + (1 - \lambda_1 - \lambda_2) c_t^U \tag{6}$$

3.1.1 Fiscal Policy

We assume that the government "consumes" a quantity G_t, $t = 1, 2$ of the goods produced in the private sector of the economy. Implicitly we assume that the economy is characterized by real

[14] There have been several ways of introducing liquidity constraints in the literature: (i) there is a wedge between the borrowing and lending rates, (ii) the interest rate varies continuously with amount borrowed or saved, (iii) there is an exogenous limit (could be zero) to the amount that they can borrow, (iv) there can also be a "natural" debt limit which is the maximum amount that the individuals can repay, and is obtained if the consumer budget constraint is solved with respect to the asset holdings and then is iterated forward; in this case the individuals can borrow only a fraction of their natural debt limit.

[15] Alternatively, we could have assumed that the fraction λ_2 of the population is very impatient so they always prefer to consume more in the first period.

or nominal rigidities making government spending on goods and services have positive effects on labor demand and output[16]. It finances its spending by imposing lump sum taxes on the U and LC type individuals in each time period. In the first period the government budget constraint is $G_1 + B_1 = T_1$, whereas in the second $G_2 = T_2 + (1 + r)B_1$. B_1 is the stock of debt at the end of period 1 and is defined in real terms.

Next we discuss the type of discretionary fiscal policy action undertaken by the government. First keep in mind the *timing of events:* following the realization of the productivity shock (we call it A) that pushes the economy into a recession (A^{LOW}) or an expansion (A^{HIGH}), fiscal policy actions are taken, then production takes place, at the end of each period comes consumption and investment decisions. Before the government's fiscal policy decision, individuals form expectations of the government's action in light of the productivity shock. Therefore the government sets the public spending equal to

$$G_1 = \bar{G}_1 + \rho u^G_{1/A1} + \varepsilon^G_1 \tag{7}$$

and the taxes equal to

$$T_1 = \bar{T}_1 + \phi u^T_{1/A1} + \varepsilon^T_1 \tag{8}$$

Where $\bar{G}_1 = G + \eta G_0$ and $\bar{T}_1 = T + \chi T_0$, G_0 and T_0 represents beginning of period values before the productivity shock takes place. Moreover $E(G_1) = \bar{G}_1 + \rho u^G_{1/A1}$ and $E(T_1) = \bar{T}_1 + \phi u^T_{1/A1}$. This means that the individuals knowing the state of the economy correctly anticipate that the government will respond setting spending and taxation to the above stated values (which are composed of a fixed part ($\bar{G}_1$ and $\bar{T}_1$) and a part ($u^G_{1/A1}$and $u^T_{1/A1}$) that is set according to the realization of the productivity shock A), however they do not foresee ε^G_1 and ε^T_1 which represent the unanticipated component of fiscal policy actions. *Unanticipated as of the information available to individuals following the realization of the productivity shock at the beginning of period t=1.* We employ this assumption because we want to *analyze how individuals respond to fiscal shocks when already in a recession or an expansion.*

Analogously in the second period we have

$$G_2 = \bar{G}_2 + \rho u^G_{2/A2} + \varepsilon^G_2 \tag{9}$$

$$T_2 = \bar{T}_2 + \phi u^T_{2/A2} + \varepsilon^T_2 \tag{10}$$

with $\bar{G}_2 = G + \eta G_1$ and $\bar{T}_2 = T + \chi T_1$. Moreover $E_1(G_2) = \bar{G}_2 + \rho u^G_{2/A2}$ and $E_1(T_2) = \bar{T}_2 + \rho u^T_{2/A2}$, i.e. the individuals knowing the value of the productivity shock in the second period anticipate (in period 1) part of the government's actions that will be undertaken in the second period.

[16] Implicitly it is assumed that nominal rigidities faced by firms arise in an environment of monopolistic competition with downward sloping demand curves and constant elasticity of substitution among firms' products.

Higher government spending affects postively real wages in both periods depending on the severity and the type of the rigidities assumed[17], while by assuming the presence of lump-sum taxation we exclude any effects of taxation on real wages.

3.2 Implications for Private Consumption

In this section we discuss what are the implications of these unexpected government shocks on the private consumption of the three types of individuals. Keep in mind that we are examining changes in consumption in period t=1 after the fiscal policy shock has occured, compared to what would have been the case hadn't the fiscal shock occurred, conditional on knowing the realization of the productivity shock. The changes in disposable income are driven by the effects of the fiscal policy changes on real wages and taxation. The disposable income (Y) is given by[18]:

$$Y_1 = a_1 w_1 - a_2 T_1 \tag{11}$$

with $a_1, a_2 > 0$ (using lump-sum taxes can have $a_2 = 1$), while real wages are approximated by:

$$w_1 = b_1 G_1 + b_2 A_1 + b_3 \Phi_1 \tag{12}$$

we assume that $b_1 > 0$. A_1 is the productivity shock and takes a low value in Bad times and a high value in Good times, its coefficient ($b_2 > 0$) captures all the effect a productivity shock could have on wages and wage setting. $\Phi_1 = \xi\Phi_0 + \upsilon_1$ is a process that summarizes all remaining factors that affect wage setting, υ_1 is a stochastic disturbance (uncorrelated with the productivity shock and the fiscal shocks and not anticipated by individuals), Φ_0 indicates beginning of period value, prior to the realization of the productivity shock (b_3 ><0). Using equations (7)-(8) and (11)-(12) we can write the end-of-period t=1 disposable income as follows:

$$Y_1 = a_1 b_1 (G + \eta G_0 + \rho u^G_{1/A1} + \varepsilon^G_1) + a_1 b_2 A_1 + a_1 b_3 \Phi_1 - a_2 (T + \chi T_0 + \phi u^T_{1/A1} + \varepsilon^T_1) \tag{13}$$

Notice that what we want to compare the disposable income after all fiscal policy actions have taken place with the disposable income after the realization of the productivity shock but prior to any fiscal policy action. This change in disposable income in period t=1 can be separated into an anticipated and an unanticipated component. The anticipated component is $\Delta Y_{1/anticipated} = Y_{1/anticipated} - Y_{1/A1}$; where $Y_{1/anticipated}$ represents the disposable income following the anticipated

[17] We employ the assumption that the economy is characterized by an upward sloping labor supply function. As Lane and Perotti (2003) argue, an upward sloping labor supply curve arises as the equilibrium of a unionized labor market, where each union defines a sector; that is the mass of firms for which the union sets the wage (Alesina and Perotti (1999)).

[18] We assume that the lump-sum taxation does not affect real wages.

fiscal policy action, whereas $Y_{1/A}$ represents the realization of disposable income following the productivity shock but before the fiscal policy action is taken. The unanticipated component is $Y_1 - Y_{1/anticipated} = \Delta Y_{1/\varepsilon_1}$., i.e the value of disposable income at the end of period one minus the value of disposable income following the anticipated fiscal policy change, this effect is due only to the fiscal shocks ε_1^G and ε_1^T and the stochastic disturbance υ_1. Hence we can write:

$$\Delta Y_{1/\varepsilon_1} = Y_1 - Y_{1/anticipated} = a_1 b_1 \varepsilon_1^G - a_2 \varepsilon_1^T + a_1 b_3 \upsilon_1 \quad (14)$$

$$\Delta Y_{1/antic} = Y_{1/anticipated} - Y_{1/A1} = a_1 b_1 \rho u_{1/A1}^G - a_2 \phi u_{1/A1}^T \quad (15)$$

In the second period we have:

$$Y_2 = a_1 w_2 - a_2 T_2 \quad (16)$$

$$w_2 = b_1 G_2 + b_2 A_2 + b_3 \Phi_2 \quad (17)$$

A_2 is the value of the productivity shock in the second period. $\Phi_2 = \xi \Phi_1 + \upsilon_2$ is a process that summarizes all remaining factors that affect wage setting, υ_2 is a stochastic disturbance (uncorrelated with the productivity shock and the fiscal shocks and not anticipated by individuals), Φ_1 is the end of period one value prior to the adjustment of the productivity shock to its new value in the second period. What is relevant for the analysis is *not* the end of period two value of disposable income i.e. Y_2, *but the expectation in period 1 of the value in disposable income in period 2*, i.e. $E_1(Y_2) = Y_{2/1}$. This implies that the fiscal shocks ε_2^G and ε_2^T and the stochastic disturbance υ_2 are not included since they are unanticipated as of the information available to individuals in period one. Keep in mind that A_2 is included (as well as the fiscal policy actions implied by the new value of the A parameter) because we have assume that the individuals know with certainty at t=1 the value of the productivity shock in period t=2 (i.e. if it will be a Bad or Good period). Therefore compining (9)-(10) and (16)-(17) we find that:

$$E_1(Y_2) = Y_{2/1} = a_1 b_1 (G + \eta G_1 + \rho u_{2/A2}^G) + a_1 b_2 A_1 + a_1 b_3 \Phi_1 - a_2 (T + \chi T_1 + \phi u_{2/A2}^T) \quad (18)$$

substituting (7) and (8) we have:

$$\begin{aligned} E_1(Y_2) &= Y_{2/1} = a_1 b_1 G + a_1 b_1 \eta (\bar{G}_1 + \rho u_{1/A1}^G + \varepsilon_1^G) + a_1 b_1 \rho u_{2/A2}^G + a_1 b_2 A_1 + a_1 b_3 \Phi_1 \quad (19) \\ &\quad - a_2 T - a_2 \chi (\bar{T}_1 + \phi u_{1/A1}^T + \varepsilon_1^T) - a_2 \phi u_{2/A2}^T \end{aligned}$$

Similarly the change in the second period's disposable income following the shock can be separated into anticipated and unanticipated components as of the information available to individuals following the productivity shock at the beginning of the first period. So the anticipated component is $Y_{2/1antic} - Y_{2/A1} = \Delta Y_{2/1antic}$ and the unanticipated component is $Y_{2/1} - Y_{2/1unatic} = \Delta Y_{2/\varepsilon_1}$. Therefore:

$$\Delta Y_{2/\varepsilon_1} = Y_{2/1} - Y_{2/1antic} = a_1 b_1 \eta \varepsilon_1^G - a_2 \chi \varepsilon_1^T \tag{20}$$

$$\Delta Y_{2/antic} = Y_{2/1antic} - Y_{2/A1} = a_1 b_1 \eta \rho u_{1/A1}^G - a_2 \chi \phi u_{1/A1}^T + a_1 b_1 \rho u_{2/A2}^G - a_2 \phi u_{2/A2}^T \tag{21}$$

Turning now to examine the changes in consumption we know that when moving from Good to Bad times the U and LC types can save and thus smooth their consumption between the two periods; hence under a quadratic utility function[19], $\Delta C_1 = \frac{\Delta Y_{1/\varepsilon_1} + R\Delta Y_{2/\varepsilon_1}}{1+R}$, i.e. the individuals respond only to the innovations in the present discounted value of their disposable income. The same holds for the U type individuals when moving from Bad to Good times because they can smooth consumption. However, this is not the case for the LC type of individuals because of the binding liquidity constraints. Therefore the change in consumption in period t=1 due to the fiscal policy change equals the change in their disposable income in the same period: $\Delta C_1 = \Delta Y_1 = Y_1 - Y_{1/A1} = (Y_1 - Y_{1/antic}) + (Y_{1/antic} - Y_{1/A1}) = \Delta Y_{1/\varepsilon_1} + \Delta Y_{1/antic}$ i.e. it incorporates both the anticipated and unanticipated components. The ROT consumers under both states of nature will consume their disposable income in each period, therefore their change in consumption in period one will be equal to their disposable income change (following the fiscal policy action) in the same period (as for the LC types in Bad times).

Hence the simple theoretical framework employed implies that the fiscal policy actions will have a positive effect on the ROT individuals' consumption as long as the effect on real wages is positive. In addition it have a positive effect on the LC and U types' consumption, if the positive effect on real wages outweights the negative effect of higher taxation, leading to higher disposable income. In addition the effect on the LC types' consumption will be bigger in Bad times because they will face binding liquidity constraints and hence they will consume all their disposable income change. Furthermore, anticipated fiscal policy actions will have a positive effect on disposable income, if the positive effect on real wages is bigger than the negative effect of taxation. This will imply that the anticipated component of disposable income change will affect private consumption in a positive manner.

[19] This way we abstact from precautionary saving because the marginal utility is assumed to linear. However allowing for convex marginal ($U''' > 0$) utility of consumption will induce people who want to save to save more and people who want to borrow to borrow less. The simplest form of utility function assumed could be: $c_1^2 + \beta c_2^2$, where $\beta = \frac{1}{1+\rho}$, where ρ is the rate of time preference and is assumed to be equal to r, so that $R = \beta$. Note that if $\beta > R$ all individuals prefer to accumulate and consume at the very last period, since they are very patient ($\rho < r$). If $\beta < R$ ($\rho > r$) the individuals are very impatient and are disaving.

3.2.1 Implications to be tested empirically

Unanticipated fiscal policy changes are expected to have stronger effects on private consumption in Bad times when individuals face binding liquidity constraints and consume all their disposable income change (induced by the unanticipated fiscal policy change). Hence, the bigger the fraction of the liquidity constrained and ROT individuals in an economy, the more likely to have a positive effect of fiscal policy actions in recessions[20]. In addition, if a fraction of the population faces binding constraints under both states of nature (like the ROT consumers that have no access to financial markets) then fiscal policy would be always more effective in the countries having a bigger fraction of liquidity constraint agents. Furthermore, disposable income changes induced by the anticipated component of fiscal policy actions are expected to be more important in Bad times, and more pronounced in countries with less developed consumer credit markets where a bigger fraction of the population is expected to face binding credit constraints and follow a rule of thumb consumer behavior.

4 Data and Empirical Strategy

The implications of the theoretical discussion are tested using an unbalanced panel of yearly data from nineteen OECD countries[21] from 1970 to 2001. The first step in our empirical strategy is to characterize the periods of recession (Bad times) for each country in the data set. The next step is to consider the role played by credit constraints. It is expected that fiscal policy is more effective in economies with less developed consumer credit markets, with the effects being much stronger in periods of economic recession. Hence, crucial to the results obtained will be the use of the right measure of the severity of liquidity constraints.

With respect to the effects of fiscal policy in Bad and Good times, there have been several recent empirical studies[22] that have contributed to the literature. The studies by Perotti (1999) and

[20] Alternatively, the more likely to have a smaller negative effect if overall the effect of fiscal policy actions on consumption are negative.

[21] All variables are from the OECD's Economic Outlook. Our data run from 1970 to 2001 for Australia, 1970-2001 for Austria, 1970-2001 for Belgium, 1970-2002 for Canada, 1970-2001 for Germany, 1981-2001 for Denmark, 1970-2001 for Spain, 1970-2001 for Finland, 1970-2001 for France, 1970-2001 for the UK, 1970-2001 for Greece, 1970-2001 for Ireland, 1970-2001 for Italy, 1970-2001 for Japan, 1971-2001 for Netherlands, 1970-2001 for Norway, 1970-2001 for Portugal, 1970-2001 for Sweden, and 1970-2001 for the US.

[22] Gali and Perotti (2003) are examining the cyclical relation between budget variables and economic activity; to this end they estimate fiscal rules using output gap as well as squared output gap in order to test for the presence of any non-linearity on the sign and intensity of discretionary fiscal policy response. They argue that, so far, there has not been any significant change in the discretionary fiscal policy actions of the EMU members following the imposition of the Stability and Growth Pact. Lane (2003), as well, discusses the role of fiscal policy over the

Gavin and Perotti (1997) are those mostly related with the current study. Perotti (1999) analyzes the effects of fiscal shocks on private consumption, however, it considers as Bad times the periods with high or growing deficit or debt to GDP ratio and not the periods of low economic activity. Gavin and Perotti (1997) analyze the behavior of fiscal balance and government revenue and expenditure in recessions and expansions in Latin American countries. They use two definitions of recessions. Firstly, they characterize as recessions the years during which a country's growth rate is less than the average rate of growth minus one standard deviation of the growth rate series for each country. Secondly, they characterize as deep recession episodes for the OECD countries the periods where output growth is below -1. Therefore the current study differs from the above mentioned by the fact that we are analyzing the effect of fiscal policy on private consumption in recessions and expansions by using several alternative definitions of Bad times.

We consider four definitions of Bad times. The first measure of Bad times used is based on the cyclical component of real GDP and has been extracted by applying the Hodrick-Prescott filter where the lambda coefficient was set to 6. The dummy variable D1 takes the value 1 when the cyclical component is negative, while it is zero otherwise. According to D1 there are (261) cases of Bad times, and (274) cases of Good times. This is a measure of the "output gap". The second definition is the change in the cyclical component of real GDP; the dummy variable D2 takes the value 1 when the change of the cyclical component of real GDP is negative and 0 otherwise. This definition captures also cases where the cyclical component of real GDP is positive but declines from one period to the other, though the cases where the cyclical component is negative but increases (improves) from one period to the other are characterized as Good times. According to D2 there are (251) cases of Good and (285) cases of Bad times. The third measure of Bad times used is based on the cyclical component of unemployment rate, extracted as before by using the Hodrick-Prescott filter (the lambda coefficient was set to 6). The dummy variable D3 takes the value 1 when the cyclical component is positive while it is 0 otherwise; this definition generates (270) cases of Bad and (265) cases of Good times. The last definition corresponds to the change of the cyclical component of unemployment rate, so D4 takes value 1 when the cyclical component

cycle, focusing on the limitations for fiscal policy to act in a countercyclical manner in less developed economies. Perotti and Kontopoulos (2002) analyze the implication of fragmentation in determining fiscal outcomes in difficult times. To attain this they interact the political variables (number of parties, number of ministers and ideology) that determine fragmentation of the political process with the change in unemployment. This way they capture the implications of bad economic environment to the effects of political variables on fiscal variables. In addition they interact the above mentioned variables with a dummy variable that determines the state of public finances (as in Perotti (1999) in order to determine the implications of bad initial conditions in terms of the debt/GDP ratio). The results indicate that in periods of bad times,"when unemployment increases by 1%, the deficit increases by 0.08% of potential GDP more for every extra party or spending minister".

is positive and zero when it is negative; this generates (245) cases of Bad times and (290) cases of Good times. The last two definitions being related to the unempolyment rate can be characterized as a milder definitions of the cyclical economic conditions, since unemployment might be high and or increasing not only during periods with low or declining output growth.

Being constrained to used yearly data since fiscal variables are not available on quarterly frequency for most countries, we prefer to use the above described definitions of Bad times so that to generate enough Bad time data points. Using definitions analogous to Gavin and Perotti (1997) produces not enough data points to carry over the analysis in Bad times. Moreover, when output growth is negative, i.e. we are in a deep recession episode, all governments whether in a more or less financially developed economy are expected to provide a fiscal stimulus to the economy. This implies that the effect of fiscal shocks on private consumption in Bad times will be biased upwards by the fact that the fiscal impulse will be of a bigger magnitude.

The definitions used capture relatively well the economic downturns that many countries have experienced in the early 1980s, 1990s and 2000s.

TABLE 2: DEFINITIONS OF BAD TIMES

Dummy	Definition	1	0	Total
D1	Cyclical component of real GDP growth>0	261	274	535
D2	Δ(Cyclical component of real GDP growth)>0	251	285	535
D3	Cyclical component of UnRate>0	270	265	535
D4	Δ(Cyclical component of UnRate)>0	245	290	535

With respect to the role of credit constraints on the effects of fiscal policy actions on private consumption, we follow previous work by Jappelli and Pagano (1994) and Perotti (1999). We use as a proxy for credit constraints the maximum ratio of the loan to the value of the house in housing mortgages (LTV ratio). Jappelli and Pagano (1994) that have constructed this measure provide an extensive discussion of why this measure is appropriate as a proxy for liquidity constraints faced by consumers, even in countries where the credit to the private sector as a share of GDP is relatively high[23]. Following, Perotti (1999) we assign each country-decade pair in high or low LTV group, using a cutoff value of 80 % for the LTV ratio. The countries already in a high LTV group before 1994 are retained in the same group for the period from 1995 onwards, assuming (as Perotti (1999)) that the LTV ratio does not decrease over time. The countries belonging to a low

[23]As Jappelli and Pagano (1994) argue, this is the case “because there is no necessary connection between the degree to which credit is available to firms and the degree to which it is available to consumers”. Some useful comparison of the LTV ratio and credit to the private sector as a fraction of GDP, which is an index of financial intermediation for the economy as a whole, are presented at the Appendix (Table 9).

LTV ratio before 1995 are either reassigned in the high LTV ratio group or remain in the low LTV group[24].

4.1 Model Specification and Estimations

As we have discussed above the U and LC types of individuals respond to the unanticipated fiscal policy shocks. Moreover, the LC type individuals will respond also to anticipated changes in their disposable income when they face binding liquidity constraints, while the ROT consumers will respond both to unanticipated and anticipated disposable income changes under both states of nature. Therefore, we should include a proxy of the "anticipated" disposable income changes ($\Delta\tilde{Y}_{1/antic}$) that are induced by the anticipated component of fiscal policy actions. We expect that this proxy will have more important effects in Bad times than in Good times; because in Bad times it is related both to ROT and LC type consumers, while in Good times it concerns only the ROT consumers. Moreover, we expect that the proxy will have stronger effects in countries with less than with more developed consumer credit markets, because liquidity constraints will bind for a bigger fraction of the population. Notice, that even if we do not distiguish between Bad and Good times, and we consider only a categorization of more and less financially developed economies both the disposable income proxy and the unanticipated components of the fiscal variables should have more pronounced effects in the less financially developed economies because it is more likely that a bigger fraction of their population faces binding liquidity constraints in both recessions and expansions, or that a bigger fraction of their population behaves as rule-of-thumb consumers.

Keep in mind that we are analyzing consumption changes induced by fiscal policy actions conditional on the information available to consumers following the realization of the productivity shock at the beginning of period t=1 (in order to study how individuals respond to fiscal shocks when already in a recession or an expansion). Hence, the simple theoretical framework implies that the *U-type individuals* always smooth their consumption (reacting only to the unanticipated component of the fiscal policy change): $\Delta C_1^U = \frac{\Delta Y_{1/\varepsilon_1} + R\Delta Y_{2/\varepsilon_1}}{1+R}$, *this is true for the LC types only in Good times.* While *in Bad times* their consumption change equals the change in their disposable income (including both the anticipated and unanticipated component): $\Delta C_1^{LC} = \Delta Y_{1/\varepsilon_1} + \Delta Y_{1/antic}$. The

[24] Loan-to-Value Ratio: ratio of loan to value of house in average mortgage contract, from Jappelli and Pagano (1994) and Perott(1999). The country decaced characterization reported in Perotti (1999) is: (High-LTV countries-decades) Australia 1980-1994, Canada 1980-1994, Germany 1980-1994, Denmark 1970-1994, Spain 1980-1994, Finland and France 1965-1994, UK 1970-1994, Ireland 1965-1994, Norway 1980-1994, Sweden, US (1965-1994). Country-decades with LTV less than 80 percent: (low LTV): Australia 1965-1980, Austria, Belgium 1965-1994, Canada 1965-1980, Germany 1965-1980, Denmark 1965-1970, Spain 1965-1980, Greece, Italy and Japan 1965-1994, Netherlands 1965-1994, Norway 1965-1980, Portugal 1965-1994. These high and low LTV groups for the sample used in the current study are presented at the Appendix (Table 10).

same applies for the ROT consumers under both states of nature. Hence, the equation to be estimated would be composed of two components, an unanticipated component which is determined by the fiscal shocks ε_1^G, ε_1^T and the stochastic disturbance υ_1, and an anticipated component of the disposable income changes which is proxied by $\Delta\tilde{Y}_{1/antic}$. Therefore, we will estimate the following specification for the high and low LTV groups:

$$\Delta C_1 = \alpha_1(1-D_1)\varepsilon_1^G+\alpha_2(1-D_1)\varepsilon_1^T+\alpha_3(1-D_1)\Delta\tilde{Y}_{1/antic}+\alpha_4 D_1\varepsilon_1^G+\alpha_5 D_1\varepsilon_1^T+\alpha_6 D_1\Delta\tilde{Y}_{1/antic}+\upsilon_1 \tag{22}$$

D_1 is a dummy variable taking the value 1 in Bad times and 0 in Good times. ε_1^T is the spending shock and α_1 gives us its effect on consumption in Good times, while α_4 gives us its effect in Bad times. ε_1^T is the tax shock and α_2, α_5 are its effects in Good and Bad times, respectively. α_3 and α_6 are, respectively, the Good and Bad time effects of the disposable income proxy. While υ_1 is a stochastic disturbance that is uncorrelated with the fiscal shocks. Notice that the coefficients of fiscal policy variables in Good and Bad times capture the effect on private consumption for the U, LC and ROT type individuals. Whereas, the coefficient of the disposable income proxy in Good times captures the change in consumption for the ROT individuals; in Bad times the coefficient of the disposable income proxy incorporates the effect of anticipated income changes on the private consumption of the LC and ROT consumers. This setting captures in a simple way the real life fact that some people face binding constraints both in recessions and expansions, furthermore, these liquidity constraints bind for a bigger fraction of the population in recessions.

In order to construct the proxy $\Delta\tilde{Y}_{1/antic}$, and to deal with the *endogeneity* of current income changes with the fiscal variables, we predict the "anticipated" disposable income change using only lagged information. Notice that the disposable income proxy according to equation (15) should capture the anticipated fiscal policy effects on disposable income conditional on the realization of the productivity shock (i.e. knowing the state of the economy at the beginning of period one). Therefore we predict $\Delta\tilde{Y}_{1/antic}$ with the fitted values ($\Delta\hat{Y}_t$) from the regression[25]:

$$\begin{aligned}\Delta Y_t &= \Delta Y_{t-1} + \Delta Y_{t-2} + \Delta Y_{t-3} + \Delta TL_{t-1} + \Delta TL_{t-2} \\ &\quad +\Delta G_{t-1} + \Delta G_{t-2} + \Delta C_{t-2} + \Delta C_{t-2} * cdum + cdum + tdum \end{aligned} \tag{23}$$

[25] The fiscal variables used are G_t: government consumption, T_t: total tax revenues (total direct taxes, social security contributions received by the government and total indirect taxes). TL_t: income and social security taxes paid by employees. All variables are expressed in real per capita terms, for the fiscal variables we have used the GDP deflator, whereas for private consumption and household disposable income we have used the deflator of private consumption. Moreover, following Perotti (1999) we scale each variable by the lagged value of real per capita disposable income (the argument for that is that a fiscal policy change will have different effects on private consumption when government consumption or taxation is 10 percent or 40 percent of GDP).

i.e. we regress the change in households disposable income (ΔY_t) on the first, second and third lagged values of ΔY_t, on first and second lagged values of changes of government spending and cyclically adjusted labor taxation (direct taxes and social security contributions paid by households), and on the second lagged value of the change in consumption and its interaction with country specific dummies (*cdum*) (see Perotti (1999)) in order to capture country specific consumption dynamics. Finally, *tdum* are year dummies that control for global economic developments[26]. The lagged values of the change in taxation and expenditure can be thought of capturing the anticipated effects of fiscal policy changes on disposable income, while the lagged values of the disposable income change control for the state of the economy.

4.1.1 Fiscal shocks

Next we discuss the estimation of the fiscal shocks. To get consistent estimates of the coefficients of (22) we need to exclude any feedback on fiscal policy variables due to economic activity. Therefore, we should not consider the component of fiscal policy changes which is driven by cyclical movements in economic activity. The focus should be on discretionary policy changes of an unanticipated nature. Discretionary policy changes, as is discussed Gali and Perotti (2003), can be decomposed into a systematic or endogenous component (systematic responses to changes in actual or expected cyclical economic conditions) and an exogenous component (random changes in budget variables (e.g. war spending etc). Perotti (1999) provides a discussion of whether it is appropriate to talk about discretionary changes in taxation and spending with no feedback from GDP when using yearly data. He claims that the assumption that policy makers do not respond much to economic environment within a year is not unreasonable with respect to several government spending components. However, it is quite likely that such kind of feedback will exist with respect to taxation. Nevertheless, Perotti (1999) argues that "*even if the estimated surprises are not truly exogenous, this is likely to bias...the coefficients of tax surprises upwards, both in Good and Bad times,... but it is not clear why it should seriously bias their difference*"[27]. However, Bad and Good times in Perotti (1999) correspond to periods of high debt and/or deficit, not recessions and expansions as in our analysis. In our case it is likely that fiscal policy might be conducted in a countercyclical manner, being stronger in Bad times because an economic downturn is more costly to policy-makers so they will choose to respond in a more decisive manner to adverse economic conditions. This would imply that the difference between the coefficients of fiscal variables

[26] Different specifications have been examined combining the use of unadjusted and cyclically adjusted measures for ΔTL, as well as, including and excluding ΔY_{t-2} ΔY_{t-3}.

[27] To deal with the feedback from GDP to changes in taxation, Blanchard and Perotti (2002) suggest as remedy the use of quarterly data.

in recessions and expansions might be biased. Moreover, there might be strong monetary and fiscal policy interactions. This would also affect the coefficients of the fiscal variables, especially in downturns of economic activity where the fiscal and monetary authorities might coordinate to get the economy out of the recession.

To extract $\varepsilon_1^G, \varepsilon_1^T$,the fiscal policy shocks, we perform OLS on the following system of equations[28], where we are dealing with the above mentioned problems by adding two lagged values of the change in real GDP (Q), as well as, including the lagged change in short term interest rate (IRS)[29]:

$$\begin{aligned}
\Delta G_t &= a_{11} + a_{12}\Delta G_{t-1} + a_{13}\Delta T_{t-1} + a_{14}\Delta Q_{t-1} + a_{15}\Delta Q_{t-2} + a_{16}\Delta IRS_{t-1} + \varepsilon_t^G \\
\Delta TL_t &= a_{21} + a_{22}\Delta G_{t-1} + a_{23}\Delta TL_{t-1} + a_{24}\Delta Q_{t-1} + a_{25}\Delta Q_{t-2} + a_{26}\Delta IRS_{t-1} + \varepsilon_t^T \quad (24) \\
\Delta Q_t &= a_{31} + a_{32}\Delta G_{t-1} + a_{33}\Delta T_{t-1} + a_{34}\Delta Q_{t-1} + a_{35}\Delta Q_{t-2} + a_{36}\Delta IRS_{t-1} + \varepsilon_t^Q
\end{aligned}$$

Therefore in the next step of our analysis the government spending shock will be $\hat{\varepsilon}_1^G$ as estimated above, whereas the cyclically adjusted tax shock is constructed as proposed by Blanchard (1993), and it is $\hat{\varepsilon}_1^{TCA} = \hat{\varepsilon}_1^T - \phi_t \hat{\varepsilon}_t^Q TL_t$, ϕ_t is a weighted average of the GDP elasticities of direct taxes to households and social security contributions paid by employees, i.e. the components of TL. These elasticities are taken from OECD's Economic Outlook (2003), Giorno et al (1995), and Van den Noord (2002)[30].

Notice that in order to capture the effect of credit or liquidity constrained consumers we should estimate equation (22) for the two LTV groups that represent different degrees of development of consumer credit and mortgage markets. The larger the fraction of liquidity constrained individuals, the stronger the effect of fiscal policy on private consumption. Particularly in Bad times when liquidity constraints bind for more people (or when they are stricter). Hence, we expect that a government spending shock, will have positive and stronger effects on private consumption in Bad times compared to Good times in countries characterized by less developed consumer credit and mortgage markets. This happens because the liquidity constrained individuals being at a "corner"

[28] As in Perotti (1999) in each regression the constant is allowed to change in 1975. Moreover, we allow for a post-Maastricht effect on EU countries by allowing a different mean after 1992, this captures more cooperative and possibly more coordinated policies as well as trend towards fiscal consolidation in the run up to the EMU. The countries considered are: Austria, Belgium, Germany, Denmark, Spain, Finland, France, UK, Greece, Ireland, Italy, Netherlands, Portugal and Sweden.

[29] Data for real GDP and short-term interest rate are from OECD, Economic Outlook and International Financial Statistics of the IMF.

[30] Following work by Perotti (2002) we are assuming interest rate semi elasticities for taxes and spending equal to zero.

solution will consume their income increase that results as a consequence of the spending shock. In more financially developed economies, where the fraction of liquidity constraint individuals and rule-of -thumb consumers is much smaller, we would expect that a government spending shock has smaller effects on private consumption compared to the less financially developed economies. Though, even for them fiscal policy might be more effective in Bad times if the fraction of population affected by liquidity constraints increases in Bad times[31].

Similarly a tax shock is expected to have a stronger negative effect on consumption in periods of economic slowdown compared to economic expansions, in less financially developed countries. The other side of the coin would be that a tax cut could boost private demand by much more in downturns relative to upturns, in countries where access to consumer credit is limited. In countries with more developed consumer credit markets the effects should be of a smaller magnitude, still though it is possible that a tax shock might have stronger effects in a recession relative to an expansion, as long as the fraction of the population that cannot smooth consumption increases in Bad times.

Moreover, we expect that the disposable income proxy will have more pronounced effects on consumption in the low LTV rather than in the high LTV group, whereas it will be of a bigger magnitude for both of them in Bad times. The first result holds, as long as, a bigger fraction of the population does not have access in financial markets in the low LTV than in the high LTV group. In addition the second result holds if the constraints bind for more people in both LTV groups during Bad times.

4.2 Estimation Results

The analysis will be conducted in four steps. *First*, we will examine the implications of fiscal shocks on private consumption in the whole OECD sample without making use of the LTV categorization or the Bad-Good times definitions. This way we will get a better idea of what the results are for the benchmark model using the whole OECD sample, and whether the categorizations that we shall use next make sense. As a *second* step we will analyze what are the implications if we consider the two LTV groups separately (high and low), without considering the Bad times definitions. If there exist consumers that have limited access to consumer credit under all states of nature then fiscal policy will be more effective in the low LTV group. The *third* step will be to consider the fiscal policy actions taken in Bad and Good times for the whole OECD sample, without making use of

[31] We should also investigate whether fiscal policy actions have the same effect on disposable income determinants (wages, interest rates, asset prices, employment etc), on more or less financially developed economies. Additionally, the effects of fiscal policy actions on wages and employment will also depend on the extent of nominal and real rigidities in each economy, independently of the consumer credit and mortgage markets development.

the LTV index. The conclusions drawn will be related to the effectiveness of discretionary fiscal policy on affecting private demand over the business cycle, a useful benchmark for the final step of the analysis. The *fourth* and last step will be to investigate the role of liquidity constraints (as proxied by the LTV indexed) in the transmission of fiscal shocks in recessions and expansions. In all the above cases we will consider also the decomposition of fiscal innovations into expansionary (when spending shocks are positive and tax shocks negative) and contractionary (when spending shocks are negative and tax shocks positive) shocks[32].

4.2.1 Fiscal policy in OECD countries

First we present the benchmark model where we analyze the effect of spending and tax shocks on private consumption using the whole OECD sample, without incorporating the LTV categorization or the Bad time dummy variables. The model is estimated by the Prais-Winsten estimation procedure allowing for a panel-level heteroskedastic AR(1) error structure[33] with country and year dummy variables. Table 1 displays a government spending shock has a very strong positive effect on private consumption, while the tax shock has a negative effect of a smaller magnitude though. Moreover, the disposable income enters with a positive and significant coefficient, according to the theoretical discussion this should indicate the presence of liquidity constrained individuals. Overall, the effects are of a Keynesian nature. After using the categorization of fiscal shocks into expansionary and contractionary components (results are presented in the Appendix) we find that an expansionary spending shock has a positive and quite stronger effect on private consumption, while a contractionary spending shock still has a positive but very small and insignificant effect on private consumption. These results are confirmed by relevant Chi-square tests (table 11, Appendix). Both expansionary and contractionary tax shocks generate similar (negative) effects on private consumption, the contractionary tax shock has a slightly bigger and much more significant coefficient[34], though the Chi-square test performed does not reject the null of a common effect in both cases. Overall, spending shocks' effects present significant asymmetry, with the expansionary

[32] The coefficient estimate of an expansionary spending shock displays the effect on consumption from a spending increase, when fiscal policy is set in an expansionary manner. The negative of a coefficient estimate of a contractionary spending shock gives the effect in consumption following a decrease in government spending (or alternatively the effect on an increase in spending, when fiscal policy is set in a contractionary way). Similarly, the (negative of the)coefficient of an expansionary tax shock represents the effect of a tax cut on private consumption, while the coefficient of a contractionary tax shock represents the effect on private consumption following a tax hike.

[33] Alternatively, we estimated the model by pooled OLS allowing for heteroskedastic and autocorrelated of order one error structure (Newey-West standard errors). The results obtained are qualitatively similar.

[34] The results are to be read as follows: an decrease in tax burden by 1% will increase consumption by 0.528%, while an increase in tax burden will decrease consumption by 0.638%.

spending shocks having the most important effects[35].

Table 1

Variables	OECD	HLTV	LLTV
ε_t^g	2.2940(3.32)***	0.1662(1.34)	3.4499(3.63)***
ε_t^t	-0.4101(-3.14)***	-0.2070(-3.52)***	-0.5396(-.3.49)***
$\Delta\hat{Y}_t$	0.7586(2.24)**	0.4077(4.75)***	0.7475(2.07)**
Nobs	535	302	233
R^2	0.321	0.5147	0.4043
Adj R^2 1st regr.	0.873	0.873	0.873
Nobs 1st regr.	544	544	544

t-statistics in parenthesis. ***, **,* statistical significance at 1%, 5% and 10% level of significance, respectively.

The next step is to introduce the high and low LTV categorization and see whether the results change in a significant manner. The results are presented in the last two columns of Table 1 for each LTV group. The estimates after pooling the two groups are reported in Table 2. As expected spending, taxation and the disposable income proxy have bigger coefficient estimates in the case of the low LTV group. However, only the spending shock has statistically different results between the two groups. The tax shock produces different effects in the two LTV groups, though the difference between the two groups is statistically different from zero only at the 20% level of significance. Therefore, fiscal policy shocks and particularly government spending shocks have asymmetric effects in the two LTV groups, suggesting that liquidity constraints are important.

Table 2

Variables	
$\varepsilon_t^g LLTV$	3.4863(3.44)***
$\varepsilon_t^g (HLTV - LLTV)$	-3.3630(-3.30)***
$\varepsilon_t^t LLTV$	-0.5264(-3.20)***
$\varepsilon_t^t (HLTV - LLTV)$	0.2431(1.34)
$\Delta\hat{Y}_t LLTV$	0.7626(2.14)**
$\Delta\hat{Y}_t (HLTV - LLTV)$	-0.0837(-0.33)
Nobs	535
R^2	0.3755
Nobs & R^2 in the 1st regr.	544 (0.873)

t-statistics in parenthesis. ***, **,* statistical significance at 1%, 5% and 10% level of significance, respectively.

[35] Considering the two hypotheses together, we are able to reject the null of common effects when fiscal policy is contractionary and expansionary (Table 11).

In the high LTV group (table 11, Appendix), contractionary and expansionary spending shocks have a positive effect of a similar magnitude, but they are statistically insignificant. The expansionary tax shock seems to have a much bigger impact on private consumption than the contractionary tax shock, i.e. a decrease in taxation increases consumption by about the double of the absolute value of a private consumption decrease following an increase in taxation. However, relevant Chi-square tests do not confirm this results. Both spending and tax shocks of expansionary and contractionary nature are of a bigger magnitude in the low-LTV group. Expansionary spending shocks have a much more pronounced, positive and significant effect on private consumption, compared to contractionary spending shocks. While it is contractionary tax shocks that appear to have a significant impact on consumption. Though, the Chi-square tests reported support only the case of different spending effects and not tax effects. However, considering both hypotheses together we are able to reject the null of common effects when fiscal policy is expansionary and contractionary. Furthermore, after pooling all observations as table 12 (appendix) displays expansionary spending shocks in the low-LTV group are the driving force of the asymmetry between the effects of spending shocks in OECD countries (the expansionary spending shocks are of a much bigger magnitude in the low-LTV group). In addition, there is significant asymmetry in the effects of a contractionary tax shock between the two LTV groups, with the effect being almost three times bigger in absolute value in the case of the low-LTV group. Hence, an increase in spending and an increase in taxation are translated into much bigger consumption changes in the low-LTV group, that is characterized by less developed consumer credit markets, than in the high LTV group.

Before turning to examine the role of liquidity constraints in the transmission of fiscal shocks in recessions and expansions, we analyze how tax and spending shocks affect private consumption in recessions and expansions in all the nineteen OECD countries considered. This way we will get a better picture of the effectiveness of fiscal policy over the business cycle; the results will serve as a useful benchmark so as to evaluate the effect that the interaction of the degree of development of consumer credit markets (as described by the LTV ratio) with fiscal policy shocks have on private consumption in upturns and downturns of economic activity.

We estimate two versions of the model. In the first one, according to our simple theoretical framework, the proxy $\Delta\hat{Y}_t$ captures the effects of anticipated income changes on private consumption of liquidity constraited individuals. While in the second $\Delta\hat{Y}_t$ is allowed to have a different effect in Bad and Good times, i.e. allow for liquidity constraints to bind both in Good and Bad times; we expect though the result to be stronger in Bad times. In both cases we include a full set of country and year dummy variables. Tables 3 and 4 present the estimates that correspond to the four definitions of Bad times.

When examining D1, we see that spending shocks have a positive effect on private consumption which much more pronounced in Bad times. Tax shocks, have a negative effect in both states of nature with their effect being stronger and more significant in Bad times. The disposable income proxy has a bigger effect in economic recessions. Though, Chi-square tests indicate that only the effect of the spending shock has statistically different effects in Good and Bad times. The results under the second definition of Bad times (D2) follow a similar pattern. The spending shock has positive and more significant effects in Bad times, similarly for taxation, however in Good times the effect is positive, though not significant. The disposable income proxy appears to have more pronounced effects in Good times. Nevertheless, keep in mind that this definition captures the relative change compared to the last period's state of nature, i.e. when our output gap indicator (the first definition of Bad times) implies that we are in a recession for two consecutive periods, despite an improvement in the output gap measure from one period to the other, this definition evaluating the relative change of the output gap measure will classify the current period as Good times. Analogously when in Good times according to the output gap measure, with the performance of the output gap deteriorating between two consecutive periods, then this definition will classify the current state as Bad times. Therefore the estimates under this definition capture the effects of fiscal policy actions on private consumption when the state of the economy improves or deteriorates without actually being in a recession or economic expansion according to the output gap measure used.

After decompositing the fiscal shocks in expansionary and contractionary, in case of definition D1, we see (table 13 Appendix) that an expansionary spending shock generates a bigger (positive) impact effect on private consumption than a contractionary spending shock when in Bad times. So an increase in spending affects consumption (positively) by much more than a corresponding decrease in when in Bad times, this appears not to be the case in Good times as can be seen by relevant Chi-square tests that were performed. Moreover, there is a statisticallly significant and much bigger (positive) effect on private consumption following an expansionary spending shock in Bad than in Good times. An expansionary and contractionary tax shock does not produce statistically different effects in Bad times. In Good times there is an indication of asymmetric effects, with bigger coefficient (in absolute values) for the case of an expansionary tax shock, though the relavant test performed does not reject the null of a common coefficient for expansionary and contractionary tax shocks. While, contractionary tax shocks have a bigger (negative) and more significant impact effect on private consumption in Bad times, than in Good times. Whereas, for expansionary tax shocks we cannot reject the null of a common effect both in Bad and Good times.

Considering definition D2, that describes when the state of the economy improves or deteriorates without actually being in a recession or economic expansion, as table 13 (in Appendix) displays the results with respect to expansionary and contractionary shocks are qualitatively the same with those for definition D1. With respect to tax changes the most significant effect comes from contractionary tax shocks in Bad times, and expansionary tax shocks in Good times, in addition some of the other coefficient estimates alter (tables 13 and 13.1)[36].

TABLE 3

Variables	D1	D1	D2	D2
$\varepsilon_t^g Bad$	3.6949(3.62)***	3.8225(3.82)***	3.4775(3.32)***	2.9015(2.79)***
$\varepsilon_t^g Good$	0.7130(0.88)	0.3064(0.41)	0.6473(0.89)	0.9904(1.46)
$\varepsilon_t^t Bad$	-0.5711(-3.61)***	-0.6199(-3.90)***	-0.4909(-2.93)***	-0.3390(-1.97)**
$\varepsilon_t^t Good$	-0.3422(-1.00)	-0.2012(-0.62)	0.2918(1.08)	0.2468(0.94)
$\Delta\hat{Y}_t$	0.7467(2.27)**	-	0.7804(2.56)**	-
$\Delta\hat{Y}_t Bad$	-	0.8351(2.48)**		0.5679(1.88)*
$\Delta\hat{Y}_t Good$	-	0.6000(1.74)*		0.9928(3.19)***
Nobs	535	535	535	535
NofBad Times	261	261	251	251
R^2	0.368	0.386	0.402	0.471
X^2(and p-values):bg=gg	5.22(0.0224)	7.88(0.0050)	4.78(0.0288)	2.33(0.1268)
X^2 :bt=gt	0.36(0.5477)	1.32(0.2505)	6.32(0.0120)	3.50(0.0613)
$X^2 : b\Delta\hat{Y}_t = g\Delta\hat{Y}_t$	-	1.18(0.2779)	-	3.64(0.0566)
Adj.R^2 & Nobs 1st regr.	0.873 (544)		0.873 (544)	

t-statistics in parenthesis (in X^2 tests we report p-values).***, **,* statistical significance at 1%, 5% and 10% level of signif., respectively.

The D3 and D4 definitions that are based on the unemployment rate and describe milder

[36] Though the effects of the tax shocks alter. In this case a contractionary tax shock in Bad times generates a negative and significant effect on consumption as before, while the expansionary tax shock has now a positive but still not significant coefficient (i.e. an increase in taxation, as part of a contractionary policy, in Bad times decreases consumption, while a decrease in taxation in Bad times, as part of an expansionary policy, decreases consumption). As before an expansionary tax shock generates a much stronger effect than a contractionary tax shock in Bad times, i.e. a decrease in taxation as part of an expansionary policy (the point estimate times -1) increases consumption by much more (and in a more significant manner) compared to the change in consumption following a tax increase as part of a contractionary policy. Furthermore, a contractionary tax policy in Bad times decreases consumption significantly, whereas a similar policy in Good times generates positive but very insignificant effects. While an expansionary tax policy (decrease in taxation) in Good times generates a positive and significant reaction in consumption, though in Bad times the effect is of the opposite sign but not significant.

recession episodes produce analogous results for the spending variable. However the estimates are of a smaller magnitude and not as significant as before, especially with respect to the D4 definition. The effects for the tax variable are analogous to D2. The disposable income proxy, as above, produces positive and more significant effects in Bad times.

TABLE 4

Variables	D3	D3	D4	D4
$\varepsilon_t^g Bad$	1.8343(1.83)*	2.2484(2.38)**	1.0802(1.24)	1.2322(1.43)
$\varepsilon_t^g Good$	0.5958(0.73)	0.1963(0.26)	0.1103(0.15)	-0.0463(-0.07)
$\varepsilon_t^t Bad$	-0.5305(-3.77)***	-0.6185(-4.53)***	-0.5127(-3.89)***	-0.5373(-4.03)***
$\varepsilon_t^t Good$	0.0426(0.22)	0.1368(0.74)	0.2134(1.25)	0.2546(1.51)
$\Delta\hat{Y}_t$	0.6529(2.01)**	-	0.6806(2.27)**	
$\Delta\hat{Y}_t Bad$	-	0.8300(2.48)**	-	0.7232(2.34)**
$\Delta\hat{Y}_t Good$	-	0.5270(1.62)	-	0.6167(1.91)*
Nobs	535	535	535	535
NofBad Times	270	270	245	245
R^2	0.437	0.475	0.493	0.497
X^2(and p-values):bg=gg	0.89(0.3456)	2.79(0.0950)	0.71(0.3983)	1.38(0.2404)
X^2 :bt=gt	6.13(0.0133)	10.95(0.0009)	11.91(0.0006)	13.94(0.0002)
$X^2 : b\Delta\hat{Y}_t = g\Delta\hat{Y}_t$	-	2.08(0.1488)		0.28(0.5968)
Adj.R^2 & Nobs 1st regr.	0.873 (544)		0.873 (544)	

t-statistics in parethesis (in X^2 tests we report p-values).***, **,* statistical significance at 1%, 5% and 10% level of signif., respectively.

As far as definition D3 is concerned we see (table 14) that expansionary fiscal shock produce a strong and significant positive effect in Bad times, which is of a bigger magnitude and statistically different than in Good times but it is not statistically different from the effects of contractionary spending shock in Bad times. As far as taxation is concerned, both contractionary and expansionary tax shocks generate similar magnitude effects in Bad times, while the contractionary tax shock (a decrease in taxation; the negative of the coefficient) increases consumption and generates a statistically different effect compared to Good times. Notice that in this case tax shocks have insignicant effect in Good times.

In the case of definition D4, the results obtained after the decomposition of fiscal shocks into expansionary and contractionary are much less significant than before (and expansionary spending shocks in Bad times have negative sign, contrary to what we have seen so far), and as relevant Chi-square tests display only the effects of contractionary tax shocks differ significantly in Bad and Good times, i.e. in Bad times an increase in taxation decreases consumption, while in Good times it increases consumption though in a not significant manner. Expansionary tax shocks in Bad times are also significantly estimated, in this case a tax cut (the negative of the coefficient estimate) increases consumption, however as Chi-square tests suggest the effect on consumption is not statistically different in terms of magnitude from that caused by a tax hike in Bad times.

Overall fiscal policy appears to have Keynesian effects on private consumption in Bad times for the whole OECD sample. A tax cut in downturns increases private consumption more than a tax cut in upturns of economic activity, whereas a spending shock genetates much more pronounced effects in periods of reduced economic activity. Furthermore, if we consider definitions D1 and D3 that correspond solely to periods of economic recession the results obtained point to the following: Expansionary spending shocks in Bad times are more important in generating positive effects in consumption and differ significantly both with respect to the corresponding effects in Good times and the effects of a contractionary spending shock in Bad times. With respect to taxation, expansionary tax shocks in Good times (a decrease in taxation, i.e. the negative of the coefficient estimate) raise significantly consumption, mainly for D1 (though the magnitude of the effect does not differ significantly from the effect in consumption caused by a tax hike as part of a contractionary tax policy in Good times); while a contractionary tax shock in Bad times generates a significant reduction in private consumption, which is statistically different from the corresponding effect in Good times, but not stastically different from the magnitude effect of a expansionary tax shock (a tax cut) in Bad times. This implies that fiscal policy (particularly an expansionary spending shock) is more effective in mitigating economic slumps rather than in muting booms, with respect to its effect on private consumption. As far as taxation is concerned we see that tax effects on consumption are stronger in Bad times particularly because tax shocks, contractionary or expansionary, are equally important in Bad times, while contractionary shocks affect more private consumption relative to their corresponding effect in Good times. Alternatively we could say that government spending is a more effective mechanism in shortening recession episodes than lengthening expansions in OECD countries, whereas tax policy has very negative effects on private economic activity if pursued in a contractionary manner in Bad times than in Good times, whereas there are no significant indications that it produces asymmetric effects (in terms of the magnitude of the coefficient) in Bad times if pursued in a contractionary (tax hike) or expansionary (tax cut) way (in case of a tax hike consumption decreases, the opposite in case of a tax cut, but the result is of a symmetric nature.). These results can be explained by two factors. The first is that liquidity constraints bind for a fraction the population in all OECD countries during Bad times, so that unanticipated fiscal policy actions that increase or decrease disposable income will induce them to consume more or less, respectively. The second has to do with the way fiscal policy is practiced over the business cycle. Fiscal policy might be countercyclical, with its the effect being inherently stronger in recessions because downturns are more costly for policy makers, hence they are more likely to respond with a more pronounced fiscal policy action[37]. Next, we will evaluate whether the LTV categorization captures effectively the implications of credit constraints, however, there is no particular reason why fiscal policy actions (in Bad times) might be of a bigger magnitude in economies with more or less developed consumer credit markets.

4.2.1.1 The effects of credit constraints in recessions and expansions In this section we will examine the effects of consumer credit availability on the way that fiscal policy affects consumption behavior. Consumer credit availability is determined, as noted, by the LTV ratio[38].

The results presented on Table 5 make use of the D1 definition of Bad times and refer to the high and low LTV groups. A government spending shock affects in a positive and significant manner private consumption in Bad times with respect to the high LTV group; though in Good times its effect is not statistically significant, and the coefficient has a negative sign. The tax variable has a negative and significant effect which appears to be of a similar magnitude in both Good and Bad times. The disposable income proxy enters with a positive and significant coefficient both in Good and Bad times, though its effect is bigger in Good times. Fiscal policy is more effective with respect to the low LTV group. A government spending shock has a much bigger and statistically significany coefficient in Bad times, on top of that the tax shocks have a bigger effect and are statistically significant only in Bad times. The disposable income proxy has a bigger effect on private consumption in the low LTV group, with its effect being more pronounced, as expected, in Bad times. However, it is only the spending shock that appears to have statistically different effects (at conventional levels of statistical significance) on private consumption in Bad and Good times.

Therefore, spending shocks have more pronounced effects in Bad times for both LTV groups, though the magnitude of the coefficients is much bigger when considering the low LTV group. Tax shocks have a bigger coefficient for the low LTV group rather than the high LTV group, however, in both cases we cannot reject the null of a similar effect in Good and Bad times. Analogously, the

[37] However, in a recent study Perotti and Gali (2003) claim that fiscal policy has not always been conducted in a countercyclical manner for all the OECD countries.

[38] As before we estimate two versions of equation (7). The first one imposes a common $\Delta\hat{Y}_t$ in Good and Bad times, while in the second $\Delta\hat{Y}_t$ is allowed to have a different effect in upturns and downturns. A full set of country and year dummy variables have been included, and the estimation is conducted for a high and a low LTV country-year groups. The Prais-Winsten estimation procedure that allows for panel-level heteroskedastic AR(1) error structure was used. Qualitatively similar results were obtained when we estimated the model with pooled OLS with Newey-West standards errors.

effect of the disposable income proxy is bigger in the low LTV group. In addition, the disposable income proxy has a stonger effect in Good times for the high LTV group, whereas its effect is bigger in Bad times for the low LTV group (though only at the 20% percent level of significance).

TABLE 5: D1

Variables	1	2	3	4
-	H-LTV	H-LTV	L-LTV	L-LTV
$\varepsilon_t^g Bad$	0.5255(2.73)***	0.4932(2.60)***	4.7018(3.89)***	4.9059(4.12)***
$\varepsilon_t^g Good$	-0.0641(-0.040)	-0.0690(-0.44)	1.3697(1.05)	0.5108(0.39)
$\varepsilon_t^t Bad$	-0.2185(-2.47)**	-0.2327(-2.70)***	-0.7016(-3.97)***	-0.7611(-4.28)***
$\varepsilon_t^t Good$	-0.1868(-2.52)**	-0.2013(-2.78)***	-0.5507(-0.67)	-0.2401(-0.30)
$\Delta\hat{Y}_t$	0.4139(4.84)***	-	0.7589(2.15)**	-
$\Delta\hat{Y}_t Bad$	-	0.2750(2.77)**	-	0.8475(2.40)**
$\Delta\hat{Y}_t Good$	-	0.4841(5.38)***	-	0.5599(1.50)
Nobs	302	302	233	233
NofBad Times	149	149	112	112
R^2	0.528	0.535	0.443	0.465
X^2 (and p-values) for bg=gg	5.49(0.0191)	5.15(0.0232)	3.61(0.0574)	6.16(0.0131)
X^2 :bt=gt	0.08(0.7765)	0.08(0.7723)	0.03(0.8565)	0.42(0.5192)
$X^2 : b\Delta\hat{Y}_t = g\Delta\hat{Y}_t$	-	6.45(0.0111)	-	1.73(0.1883)

t-statistics in parenthesis (in X^2 tests we report p-values).***, **,* statistical significance at 1%, 5% and 10% level of signif., respectively.

Decomposing the fiscal shocks into their expansionary and contractionary components we see that with respect to the high-LTV group the contractionary spending shock produces bigger and significant effects on private consumption in Bad times, moreover its effect is statistically different from the corresponding effect in Good times, as well as the effect of the expansionary spending shock during Bad times (tables15 and 15.1, Appendix). We can interpet this result in two ways, firstly that a spending cut in Bad times reduces to a much greater extent private consumption, than the corresponding pick up in consumption following an increase in spending in Bad times. A second interpretation is that a spending increase during a period of Bad times where fiscal policy has been conducted in a contractionary way generates much bigger, positive, effects in private consumption. Contractionary tax shock in Bad times generate strong negative effects in private consumption, but they do not differ significantly in terms of magnitude from expansionary tax shocks in Bad times. Whereas, in Good times it is expansionary tax shocks that affect the significantly private consumption, though still their magnitude does not differ significantly compared to contractionary tax changes. Furthermore, there are no significant differences in terms of magnitude between contractionary and expansionary tax shocks in Bad and Good times, confirming the result obtained before.

Expansionary spending shocks in Bad times are the most important factor that affects private consumption in the low-LTV group, and it is statistically different from contractionary spending shocks in Bad times, and expansionary spending shocks in Good times. In addition, as for the high-LTV group, contractionary tax shocks in Bad times affect in a significant manner consumption changes, though its effect differs significantly from the corresponding effect of a expansionary tax shock in Bad times. Hence, a tax hike in Bad times reduces consumption, but not more that the corresponding increase in consumption following a tax cut in Bad times. Therefore, the bigger source of asymmetry comes from the spending shocks, with the contractionary component being more influential in the high LTV group and the expansionary component in the low-LTV group.

Turning now to examine the results (Table 6) obtained using the second definition of Bad times (D2), we see that with respect to the high LTV group spending shocks are not significant and have smaller coefficients. Tax shocks have significant effects of a relatively bigger size in Bad times, though relevant Chi-square test indicate that we cannot reject the null of a similar effect in Good and Bad times. The disposable income proxy appears to be more significant in Good times. When considering the low-LTV group we see that both the spending and tax shocks have much stronger effects in Bad times (only when we do not separate the effect that the disposable income proxy has on Good and Bad times), with their effects in Good times being insignificantly estimated. Contrary to what expected the disposable income proxy has a bigger effect in Bad times under the definition used.

TABLE 6: D2

Variables	1	2	3	4
-	H-LTV	H-LTV	L-LTV	L-LTV
$\varepsilon_t^g Bad$	0.1883(0.86)	0.1219(0.58)	4.2950(3.64)***	3.6482(3.06)***
$\varepsilon_t^g Good$	0.1727(1.11)	0.1800(1.21)	1.1619(0.73)	2.0767(1.37)
$\varepsilon_t^t Bad$	-0.2719(-2.99)***	-0.2482(-2.87)***	-0.5951(-3.31)***	-0.4312(-2.30)**
$\varepsilon_t^t Good$	-0.1597(-2.06)**	-0.1634(-2.23)**	0.2672(0.77)	0.1330(0.39)
$\Delta\hat{Y}_t$	0.4103(4.79)***	-	0.7982(2.48)**	-
$\Delta\hat{Y}_t Bad$	-	0.2396(2.67)***	-	0.5716(1.82)*
$\Delta\hat{Y}_t Good$	-	0.6076(6.73)***	-	1.0025(3.12)***
Nobs	302	302	233	233
NofBad Times	146	146	105	105
R^2	0.519	0.564	0.490	0.552
X^2 (and p-values) for bg=gg	0.00(0.9545)	0.05(0.8231)	2.57(0.1091)	0.66(0.4178)
X^2 :bt=gt	0.91(0.3390)	0.58(0.4461)	5.13(0.0235)	2.08(0.1488)
$X^2 : b\Delta\hat{Y}_t = g\Delta\hat{Y}_t$	-	22.06(0.0000)	-	3.84(0.0501)

t-statistics in parenthesis (in X^2 tests we report p-values).***, **,* statistical significance at 1%, 5% and 10% level of signif., respectively.

For the high LTV group the results are analogous as before, with contractionary spending shocks being more important in Bad times (table 16 and 16.1, appendix). Similarly, contractionary tax shocks in Bad times and expansionary tax shocks in Good times affect significantly private consumption expenditure, but their effects are not statistically different from the corresponding effects in cases of expansionary or contractionary tax shocks in Bad or Cood times, respectively. With regard to the low-LTV group, as before, expansionary spending shocks and contractionary tax shocks are most effective in Bad times, i.e. an increase in spending increases consumption while an increase in taxation decreases consumption to a great extent, or a tax cut in Bad times when tax policy followed is contractionary raises the most private consumption. Moreover, in Good times consumption is boosted the most by an expansionary tax shock, i.e. a tax cut.

According to the D3 definition of Bad times that makes use of the cyclical component of the unemployment rate the effects of spending shocks on private consumption for the high LTV group follow the same pattern as with the first definition of Bad times, i.e. the coefficients are much bigger and significant only in Bad times. Tax shocks appear to have a relatively stronger effect in Good times, though this is not supported by relevant Chi-square tests. The disposable income proxy has significant and positive coefficient estimates in both Good and Bad times, moreover we cannot reject the null of a similar effect in both states of nature. When examining the coefficient estimates for the low LTV group we see that spending shocks have much bigger effects compared to high LTV group, in addition the effect in Bad times is more pronounced compared to that in Good times. The tax shocks have coefficients of bigger magnitude compared to the high LTV group in Bad times, with their effect being insignificantly estimated in Good times. The disposable income proxy has a bigger effect on private consumption relative to the high LTV group, having a more pronounced effect during recessions as expected.

TABLE 7: D3

Variables	1	2	3	4
-	H-LTV	H-LTV	L-LTV	L-LTV
$\varepsilon_t^g Bad$	0.4269(2.22)**	0.4297(2.23)**	2.9340(2.00)**	3.5925(2.55)***
$\varepsilon_t^g Good$	0.0074(0.05)	0.0200(0.12)	1.1154(0.88)	0.2346(0.19)
$\varepsilon_t^t Bad$	-0.1758(-1.98)**	-0.1754(-1.96)**	-0.6162(-3.53)***	-0.7477(-4.36)***
$\varepsilon_t^t Good$	-0.2272(-2.82)***	-0.2338(-2.90)***	-0.0242(-0.09)	0.1615(0.63)
$\Delta\hat{Y}_t$	0.3971(4.60)***	-	0.6547(1.83)*	-
$\Delta\hat{Y}_t Bad$	-	0.3352(3.34)***	-	0.8843(2.42)**
$\Delta\hat{Y}_t Good$	-	0.4369(4.61)***	-	0.4907(1.37)
Nobs	302	302	233	233
NofBad Times	150	150	120	120
R^2	0.519	0.519	0.474	0.522
X^2 (and p-values) for bg=gg	2.67(0.1019)	2.57(0.1090)	0.91(0.3410)	3.12(0.0772)
X^2 :bt=gt	0.18(0.6700)	0.23(0.6307)	3.85(0.0498)	8.32(0.0039)
$X^2 : b\Delta\hat{Y}_t = g\Delta\hat{Y}_t$	-	1.25(0.2631)	-	3.33(0.0681)

t-statistics in parenthesis (in X^2 tests we report p-values).***, **,* statistical significance at 1%, 5% and 10% level of signif., respectively.

With respect to the high LTV group, as before contractionary spending shocks in Bad times affect mostly private consumption (table 17 and 17.1, Appendix). Tax shocks, contractionary or expansionary, in Good times affect in an analogous manner consumption, while only expansionary tax shocks are significant in Bad times, though the results produced are not statistically different from the effects of an contractionary tax shock. On the contrary, expansionary spending shocks generate a very pronounced effect in Bad times for the low-LTV group, which though does not differ much from the coefficient estimate of a contractionary spending action in Bad times; however it significantly different from the impact of a speding expansion on private consumption in Good times. Tax effects are mostly important in Bad times, with the expansionary and contractionary effects being of symmetric nature.

The results for the high LTV group generated using the definition D4 are analogous to those obtained when using definition D2. Similarly for the low LTV group, though the coefficients of the spending shocks in Bad times are smaller and not significant. In Good times their effects are negative. Tax shocks have negative and significant coefficients only in Bad times, moreover they are bigger than for the high LTV group. Whereas, the disposable income proxy has a stronger effect than for the high LTV group, having a relatively bigger coefficient in Bad times, however this is not supported by relevant Chi-square tests conducted.

TABLE 8: D4

Variables	1	2	3	4
-	H-LTV	H-LTV	L-LTV	L-LTV
$\varepsilon_t^g Bad$	0.1941(1.01)	0.2425(1.31)	1.6024(1.29)	1.9921(1.58)
$\varepsilon_t^g Good$	0.1805(1.07)	0.1924(1.17)	-0.1703(-0.13)	-0.6860(-0.53)
$\varepsilon_t^t Bad$	-0.3080(-3.19)***	-0.3266(-3.48)***	-0.5583(-3.78)***	-0.6113(-4.01)***
$\varepsilon_t^t Good$	-0.1515(-2.11)**	-0.1761(-2.50)**	0.2617(1.02)	0.3801(1.46)
$\Delta\hat{Y}_t$	0.4010(4.62)***	-	0.7023(2.14)**	-
$\Delta\hat{Y}_t Bad$	-	0.2768(2.92)***	-	0.7923(2.35)**
$\Delta\hat{Y}_t Good$	-	0.566(6.09)***	-	0.5984(1.75)*
Nobs	302	302	233	233
NofBad Times	136	136	109	109
R^2	0.516	0.549	0.545	0.554
X^2 (and p-values) for bg=gg	0.00(0.9584)	0.04(0.842)	1.03(0.3108)	2.22(0.1358)
X^2 :bt=gt	1.74(0.1877)	1.69(0.193)	8.44(0.0037)	10.85(0.0010)
$X^2 : b\Delta\hat{Y}_t = g\Delta\hat{Y}_t$	-	12.91(0.0003)	-	0.92(0.3378)

t-statistics in parenthesis (in X^2 tests we report p-values).***, **,* statistical significance at 1%, 5% and 10% level of signif., respectively.

Contractionary speding shocks in Bad times and expansionary spending shocks in Good times affect consumption the most and in the most significant manner (high-LTV group). Notice also that we reject the joing null hypothesis that contractionary spending shocks have same effects in Bad and Good times, and that expansionary spending shocks have the same effects in Bad and Good times (table 18 and 18.1, Appendix). Tax hikes or tax cuts have symmetric effects in Bad times, similarly for Good times. In addition the Bad time effects are analogous to the Good time effects of taxation when consider together the contractionary and expansionary tax shocks. In the low-LTV group, we obtain significant effects for the contractionary spending shock in Bad times, contrary to what we had seen so far, but the effects are not statistically different with respect to those in Good times or the expansionary speding shock in Bad times. Tax shocks appear marginally significant in Bad times. Tax hikes or tax cuts have stronger effects in Bad times than in Good times as revealed by the Wald tests performed, contrary to the case for speding shocks where we cannot reject the null of a common coefficient in Bad and Good times for contractionary and expansionary shocks, respectively. Though, one should keep in mind that this last definition of Bad times (as well as definition D2) is related more to changing economic conditions than severe recession episodes.

Overall the results obtained under both narrow (D1 and D2) and broad notions of slowdown in economic activity (D3 and D4) provide support for the presence of asymmetric effects of fiscal policy in high and low LTV groups. Under all definitions tax shocks reduce consumption the most in Bad times in the low LTV group, while it appears that they have a negative effect of a similar magnitude during both Good and Bad times when considering the high LTV group. Furthermore, the effect of a tax shock in Bad times is much bigger when analyzing the low LTV group. Moreover, after decomposing tax shock into their contractionary and expansionary part and when considering solely periods that refer to economic recessions as defined by D1 and D3, we see that tax policy appears effective both in Bad and Good times for the high-LTV group. Particularly, contractionary tax shock (i.e. a tax hike or a tax cut when tax policy was previously set in a contractionary manner) during more severe recession episodes as those described by D1 and expansionary tax shocks (tax cuts) during less severe recession episodes like those described by D3, as well as expansionary tax shocks in Good times (i.e. a tax cut). Tax shocks exert their bigger effect on private consumption in Bad times in the low-LTV group, specifically the contractionary tax component (both for narrow and broader definitions of economic recessions), i.e. a tax cut in Bad times, when policy was previously conducted in contractionary manner, boosts significantly private consumption (the opposite if we consider a tax cut). The expansionary component of tax shocks is effective in Bad times, only in cases of less severe recession episodes (like D3).

Government spending shocks appear to affect consumption expenditure the most during recessions in both LTV groups, however the effect is much more pronounced in countries with less developed financial systems as was anticipated. Additionally, in the high-LTV group it is contractionary spending shocks that affect consumption the most, i.e. a spending cut during a recession period has devastating effects on consumption, or a spending increase in a recession period, when fiscal policy was pursued in an contractionary manner boosts effectively private consumption. On the other hand, it is expansionary spending shocks that raise private consumption in Bad times for the low-LTV group, because in the presence of binding liquidity constraints an increase in spending raises disposable income encouranging people to increase their spending. The disposable income proxy has positive and significant effects in both LTV groups, with the effect being much stronger for the low LTV group as expected. In addition, there is limited evidence (based on D1, D3 and D4) that the coefficient estimates are bigger in Bad times for the low LTV group. On the contrary, when considering the high LTV group, in most cases, there is clear evidence of a bigger coefficient in Good times.

Therefore, fiscal policy has asymmetric effects over the business cycle in the two LTV groups. Spending appears to be more effective in Bad times for both LTV groups, though it is much more effective in boosting private consumption and moving the economy out of a recession in countries with less developed financial markets for consumer credit as can be judge from the magnitude of the coefficient estimates. Notice also that while spending increases are effective in Bad times in less financially developed economies in boosting private consumption, particularly when fiscal policy was conducted in a countercyclical manner (positive spending shocks), in economies where access to consumer credit is easier, spending increases are affecting the most consumption when fiscal policy was conducted before in a procyclical manner (negative spending shocks). On the other hand, tax policy is more potent in affecting private demand during severe recession episodes in less financially developed economies (particularly if tax policy was conducted before in an contractionary manner), whereas in upturns of economic activity its effect is minimal. On the contrary, in more financially developed economies the effectiveness of tax policy is equally important in upturns and downturns of economic activity (especially if initially it was conducted in a contractionary manner in Bad times, and in an expansionary manner in Good times).

In the presence of a countercyclical fiscal rule, during recession episodes fiscal policy in the low LTV group shares (or drives) the stabilization properties of the whole OECD sample case, i.e. fiscal policy (both spending and taxation) is more effective in mitigating recessions rather than muting expansions, with respect to its effect on private consumption. Alternatively, fiscal policy actions are more able in shortening recessions than lengthening expansions. Whereas, for the high LTV group, an increase in spending boosts private expenditure only in Bad times as for the low LTV group, however tax policy is equally effective under all states of nature. This is due to the fact that taxation has a direct effect on individuals' income and since most people can smooth their consumption at all times, tax changes will have similar effects under all states of nature.

4.2.1.2 Robustness Test Nevertheless, the results obtained so far might be affected by the fact that some or all the countries that have been categorized to the low-LTV group have switched status from 1995 onwards, due to financial liberalization. According to Jappelli and Pagano (1994), the LTV ratio was 60% in Austria and Japan and Portugal, 75% in Belgium and Netherlands, 50% in Greece, and 56% in Italy in 1994. We shall explore how our results change if we assign Belgium and Netherlands in the high LTV group from 1995 onwards. A similar exercise will be done for the other two groups of countries i.e. Austria, Japan and Portugal, and finally Italy and

Greece.

Under all definitions of Bad times the results remain qualitatively similar both for the high and low LTV categories, the only difference is in quantitative terms. Specifically the coefficients of all variables in most cases become bigger, in absolute terms, especially in Bad times for the low LTV group, whereas for the high LTV group the coefficient estimates do not change much or they decrease[39]. This implies that the effect of fiscal policy on private consumption is stronger in recessions in the low LTV group, when fewer countries are characterized as having less financially developed economies overtime. This is true only if OECD countries are converging in terms of the development of their financial markets, and fewer countries or none is included in the low LTV group after 1995[40][41]. Hence, in the event of convergence of financial development and harmonization of financial systems in OECD countries overtime, all or most of the low LTV group observations refer to the prior to 1995 period observations. In this case, fiscal policy (taxation and government expenditure) in the low LTV group has greater impact on consumption especially in Bad times, than if we allow the countries under consideration to be assigned to the low LTV group after 1995. An explanation for this could be that fiscal policy has become less effective in boosting output and private demand overtime in the event of finacial liberalization and abolishment of restrictions on credit availability to consumers[42].

[39] Results are available upon request.

[40] When we assign Belgium and Netherland to the high LTV countries after 1995 the high LTV observations increase from 302 to 316 and the low LTV observations decrease from 233 to 219. After including Japan, Portugal and Austria in the high LTV group the observation becomes 337 and 198, respectively for the high and low LTV countries. Finally, after including Greece and Italy in the high LTV group the observations used in the regressions are 351 and 184 respectively for the high and low LTV groups.

[41] With respect to D1, after the reassignment of Belgium and Netherlands to the high LTV group after 1995 we have 154 and 107 Bad time episodes, respectively for the high and low LTV groups. When reassigning Austria, Japan and Portugal we get 163 and 98 episodes of Bad times respecitvely in high and low LTV groups. After reassigning Greece and Italy to the high LTV group after 1995 we get 169 and 92 episodes of bad times, respectively in the two LTV groups. With respect to D2 the number of Bad times is 151 and 100 after the first reassignment, they become 159 and 92 after the second, while after the third reassignment they become 166 and 85 respectively for the high and low LTV groups. When considering D3 we have 163 and 98, then 168 and 98 and finally 176 and 90 Bad time episodes in high and low LTV groups. For D4 we have 139 and 106, then 147 and 98 after the second reassignment to the high LTV group, whereas after the third reassignment we have 152 and 92 Bad time episodes, respectively for the high and low LTV groups.

[42] Perotti (2002) examined the fiscal multiplier in the US, UK, Germany, Australia, and New Zealand and discussed the possibility of declined potency of fiscal policy after the 1980. Tagkalakis (2003) established the declining efficacy of fiscal policy in affecting output through the employment channel, in the UK over the last 20 years.

5 Conclusions and Caveats

This paper has presented in a simple theoretical framework the idea that fiscal policy can have asymmetric effects on consumption in recessions and expansions in the presence of binding liquidity constraints. Fiscal policy will be more effective in stimulating private consumption and pushing the economy out of a recession, when liquidity constraints bind for a large fraction of the population. This idea was investigated empirically on a panel of nineteen OECD countries.

Before characterizing periods of expansions and recessions using alternative definitions, we showed that, in OECD countries, fiscal policy has Keynesian effects on private consumption expenditure, i.e. a spending shock has a positive effect and a tax shock has a negative effect on private consumption, with the spending effect being more pronounced. Moreover, it is expansionary spending shocks that exert the bigger effect on private consumption rather than contractionary spending shocks, while contractionary and expansionary tax shocks affect symmetrically private consumption. After considering recession and expansion episodes, we found that both tax and spending shocks affect consumption changes in Bad times more than in Good times. This is due to the fact that expansionary spending shocks in Bad times are affecting the most private consumption, while both contractionary and expansionary tax shocks are important in Bad times.

Following Jappelli and Pagano (1994), we used as a proxy for credit constraints the maximum ratio of the loan to the value of the house in housing mortgages (LTV ratio), and we assigned country-decade observations to a high and low LTV group following the work of Perotti (1999). Using this measure we showed that fiscal policy has asymmetric effects in high and low LTV groups. Specifically, a spending shock has much more pronounced effects in the low LTV group than in the high LTV group (particularly an expansionary spending shock), similarly for the tax shock, though the results appear to be less significant (in this case the difference is statistically significant when considering the effects of a contractionary tax shock).

After introducing in the analysis the alternative recession and expansion categorizations we found that the results provide evidence for the presence of asymmetric effects of fiscal policy in upturns and downturns in countries with more and less developed consumer credit markets. In most cases considered, tax shocks reduce consumption the most in Bad times when analyzing the low LTV group (for the most imprtant recession episodes (D1) this is attributed to the contractionary tax shock component, i.e. a tax cut in Bad times, when policy was previously conducted in contractionary manner, boosts significantly private consumption (whereas a tax hike decreases consumption); while it appears that they have a negative effect of a similar magnitude during both Good and Bad times when considering the high LTV group [particularly contractionary policy in Bad times (i.e. a tax hike or a tax cut when tax policy was previously set in a contractionary manner) and expansionary policy in Good times (i.e. a tax cut) considering severe recession episodes (D1)]. Moreover, the effect of a tax shock in Bad times is much bigger in the low LTV group. Government spending shocks affect private consumption expenditure the most during recessions in both LTV groups, nevertheless the effect is much stronger in countries with less developed financial systems as was anticipated. Though this effect originates from a different components of the spending shock in the two groups, i.e. in the high-LTV group it is contractionary spending shocks that affect consumption the most, i.e. a spending cut during a recession period decreases to a great extent private consumption, alternatively a spending increase in a recession period, when fiscal policy was pursued in an contractionary manner boosts effectively private consumption. On the other hand, for the low-LTV group it is expansionary spending shocks that raise private consumption in Bad times. These hold both for narrow (D1) and broad (D3) definitions of recession episodes. This can be explained by the fact that credit constraints bind for more people in economies with less developed consumer credit markets, as well as, by the fact that during deep recession episodes credit constraints bind for a larger fraction of the population, both in more and less developed consumer credit markets.

The normative aspect of this analysis points to the need for discretionary fiscal policy actions as a way of mitigating economic slumps Both tax policy and government spending is effective in Bad times in all OECD countries no matter what the level of their financial development is, however their effects are much bigger in countries where consumers have limited access to credit markets. In addition, it appears the case that when fiscal policy is conducted in a procyclical manner, i.e. negative spending shocks and positive tax shocks in recessions then a switch to a countercyclical strategy (spending increases and tax cuts) could improve significantly consumption outcomes. Moreover, unless OECD countries (and specifically EMU countries) are converging overtime in the degree of development of their financial systems there are reasons for not impairing fiscal flexibility by stringent fiscal rules (such as the Stability and Growth Pact).

There are two caveats in our analysis that can be treated, though, as future extensions. First of all characterizing cyclical fluctuations with yearly data is clearly problematic, business cycles and recessions and expansions can be better characterized by the use of quarterly data. Nevertheless, we have decided to carry on with the analysis benefiting from the bigger information set, since yearly fiscal policy data are available for more countries. Therefore future work could be also directed towards conducting the analysis only for those countries that have fiscal policy data reported in a quarterly frequency; which will allow a better identification of the fiscal policy shocks. It is likely that our spending and tax shocks are not purified from GDP feedbacks within a year, hence fiscal shocks are not exogenous.

The second caveat is that the LTV ratio categorization although informative of the degree of consumer credit constraints (as thoroughly explained by Jappelli and Pagano (1994)) might not be valid anymore in case the nineteen OECD countries are converging in terms of their degree of financial development. This will probably affect the nature of consumption response to a change in fiscal policy. Nevertheless, we have decided to trade off this with the fact that OECD data are of higher-quality. Credit constraints are expected to be binding for more people in non-OECD countries. In that case it would be more meaningful to examine the effects of fiscal policy on consumption in a group of non-OECD countries relative to a group of OECD countries, given that the first would probably be less financially developed, with a big fraction of their population having no access to credit markets[43].

Future research, already under way, examines the effects of another big component of public policy over the business cycle i.e. government transfers. Another interesting aspect of the model that requires further investigation is the effect of fiscal policy changes of disposable income and its components, i.e. real wages, wage bill, employment, as well as, assets' rates of return. Moreover, there is scope for future research on the effectiveness of fiscal rules over the in expansions and recessions (and the evaluation of cyclical movements of government expenditure and revenue) and its interaction with monetary policy. Last but not least, there is scope for a fully developed theoretical model; this could incorporate also distortionary taxation and deficit financing of government spending.

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[43] Preliminary results for a group of fourteen non-OECD countries, with data from World Development Indicators of the World Bank, suggest that fiscal policy has stronger Keynesian effects on consumption during recessions. A crucial point is the extraction of the cyclical component of fiscal variables. We deal with it by following Gavin and Perotti (1997) and Lane (2003) in constructing elasticities of the tax and spending variables with respect to GDP. However, another drawback of using this data set is that there exits limited information with respect to real household disposable income series for these countries. Therefore the analysis so far has been condacted using real output, which however, deviates from the theoretical model specification.

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7 Appendix

7.1 Maximum LTV ratio[44] versus domestic credit to the private sector as a percent of GDP[45]

Table 9

Countries	Maximum LTV ratio	Domestic Credit to Private sector as a percentage of GDP		
	1980-1994	1980	1994	2001
Australia	high	26.279	67.897	89.765
Austria	low	73.355	91.658	106.890
Belgium	low	29.645	76.004	77.069
Canada	high	66.726	78.004	80.753
Germany	high	74.785	101.680	121.040
Denmark	high	40.808	31.128	141.790
Spain	high	67.577	74.556	105.880
Finland	high	47.485	69.759	57.672
France	high	102.130	87.906	89.813
United Kingdom	high	27.625	109.450	138.840
Greece	low	43.757	31.019	38.139
Ireland	high	29.037	45.245	111.820
Italy	low	55.991	59.527	79.978
Japan	low	131.080	203.170	186.750
Netherlands	low	90.393	88.229	142.600
Norway	high	51.386	71.445	82.840
Portugal	low	73.158	62.666	146.200
Sweden	high	75.930	108.920	104.650
United States	high	78.458	95.673	145790

Even if a country has a big domestic credit (to the private sector) to GDP ratio, i.e it is characterized by high level of financial intermediation, this does not necessarily imply that consumers will have easy access to credit; this is the case with Japan and Austria and Netherlands as can be seen in Table 9[46]. On the other hand, easier access to consumer credit, does not necessarily lead to a larger fraction of credit to the private sector as a percentage of GDP, as is the case for Australia, Finland, France and Norway. Therefore, there other factors that determine consumers' behavior towards credit, even cultural factors. Hence, the LTV ratio being a supply side factor,

[44] High indicates above 80 percent and low below 80 percent.

[45] Source: World Bank, World Development Indicators.

[46] The 2001 entry for Sweden corresponds to 1999 information.

is more appropriate than the amount of credit to the private sector as a measure that describes availability of credit to consumers, irrespective of their preferences towards credit.

However, supply determined conditions, like the maximum LTV ratio, are probably adjusted in a way that follows the cyclical economic conditions and the ability of individuals to repay their loans. So that the maximum LTV might be higher in upturns and lower in downturns, moreover they are probably adjusted in a way that takes into account the changing value of collaterals over the cycle (collateral value increases in upturns so consumers will have better terms and conditions when obtaining a loan, while the opposite might be true when the economy is down the cycle).

An other point that deserves attention is that the last twenty years are characterized by increasing financial liberalization in all OECD countries, which could be infered by comparing the 1980 and 2001 values of credit to private sector as a percent of GDP. Abolishment of credit constraints must have boosted the credit to GDP ratio if credit constraints were binding. An argument that is relevant for Austria, Italy, Netherlands and Portugal. Furthermore, if financial liberalization is the case then the country-decade categorization of the LTV measure might be very crude in capturing this effects.

TABLE 10: MAXIMUM LTV RATIO

Country	LLTV	HLTV
Australia	1970-79	1980-2001
Austria	1970-2001	-
Belgium	1970-2001	-
Canada	1970-1979	1980-2001
Germany	1970-79	1980-2001
Denmark	-	1981-2001
Spain	1970-79	1980-2001
Finland	-	1970-2001
France	-	1970-2001
UK	-	1970-2001
Greece	1970-2001	-
Ireland	-	1970-2001
Italy	1970-2001	-
Japan	1970-2001	-
Netherlands	1970-2001	-
Norway	1970-1979	1980-2001
Portugal	1970-2001	-
Sweden	-	1970-2001
USA	-	1970-2001

7.2 Fiscal shocks: Decomposition into expansionary and contractionary components

TABLE 11

Variables	OECD	HLTV	LLTV
$\varepsilon_t^g Con$	0.0425(0.04)	0.1962(0.86)	0.6147(0.39)
$\varepsilon_t^g Exp$	4.3423(3.69)***	0.1319(0.53)	5.5095(3.91)***
$\varepsilon_t^t Con$	-0.6386(-3.88)***	-0.1434(-1.45)	-0.7774(-4.12)***
$\varepsilon_t^t Exp$	-0.5286(-1.46)	-0.2750(-2.45)**	-1.0306(-1.02)
$\Delta \hat{Y}_t$	0.6182(1.93)*	0.4111(4.78)**	0.5345(1.51)
$\varepsilon_t^g Con = \varepsilon_t^g Exp$	4.70(0.0302)+	0.02(0.8747)+	4.02(0.0449)+
$\varepsilon_t^t Con = \varepsilon_t^t Exp$	0.07(0.791)+	0.56(0.4545)+	0.06(0.8120)+
Joint	5.57(0.0619)+	0.56(0.7540)+	4.99 (0.0824)+
Nobs	535	302	233
R^2	0.376	0.515	0.460

t-statistics in parenthesis. ***, **,* statistical significance at 1%, 5% and 10% level of significance, respectively.

+Chi-square tests, p-values in parenthesis

TABLE 12

Variables	
ε_t^gLLTV(Con)	.6793(0.40)
ε_t^gLLTV(Exp)	5.623(3.76)***
ε_t^tLLTV(Con)	-.776(-3.89)***
ε_t^tLLTV(Exp)	-.766(-0.79)
ε_t^g(HLTV-LLTV)Con	-.829(-0.50)
ε_t^g(HLTV-LLTV)Exp	-5.260(-3.54)***
ε_t^t(HLTV-LLTV)Con	.453(0.46)
ε_t^t(HLTV-LLTV)Exp	.538(2.06)**
$\Delta\hat{Y}_t$LLTV	.565(1.62)
$\Delta\hat{Y}_t$(HLTV-LLTV)	.131(0.50)
ε_t^gLLTV(Con)=ε_t^gLLTV(Exp)	3.70(0.0544)+
ε_t^tLLTV(Con)=ε_t^tLLTV(Exp)	0.00(0.9922)+
Joint for LLTV ($X^2(2)$)	4.20(0.1225)+
ε_t^g(HLTV-LLTV)Con=ε_t^g(HLTV-LLTV)Exp	3.11(0.0780)+
ε_t^t(HLTV-LLTV)Con=ε_t^t(HLTV-LLTV)Exp	0.01(0.9363)+
Joint for HLTV-LLTV ($X^2(2)$)	3.54(0.1702)+
Nobs	535
R^2	0.424

t-statistics in parenthesis. ***, **,* statistical significance at 1%, 5% and 10% level of significance, respectively, +Chi-square tests, p-values in parenthesis.

TABLE 13

Variables	D1	D1	D2	D2
$\varepsilon_t^g Bad(Exp)$	5.842(4.04)***	5.730(3.96)***	5.466(3.68)***	5.690(4.08)***
$\varepsilon_t^g Bad(Con)$	0.903(0.59)	1.147(0.74)	0.525(0.34)	-1.027(-0.67)
$\varepsilon_t^g Good(Exp)$	0.715(0.77)	1.111(1.30)	1.410(1.25)	0.345(0.34)
$\varepsilon_t^g Good(Con)$	0.191(0.14)	-0.546(-0.44)	0.018(0.01)	1.692(1.43)
$\varepsilon_t^t Bad(Exp)$	-0.606(-1.07)	-0.470(-0.85)	0.666(0.90)	0.271(0.39)
$\varepsilon_t^t Bad(Con)$	-0.842(-4.33)***	-0.846(-4.38)***	-0.712(-3.53)***	-0.642(-3.40)***
$\varepsilon_t^t Good(Exp)$	-0.701(-2.13)**	-0.686(-2.08)**	-1.563(-4.33)***	-1.471(-4.43)***
$\varepsilon_t^t Good(Con)$	-0.033(-0.08)	0.0417(0.10)	0.316(1.06)	0.375(1.35)
$\Delta\hat{Y}_t$	0.642(2.07)**	-	0.624(2.19)**	-
$\Delta\hat{Y}_t Bad$	-	0.705(2.16)**	-	0.291(1.00)
$\Delta\hat{Y}_t Good$	-	0.522(1.58)	-	0.891(3.13)
Nobs	535	535	535	535
R^2	0.428	0.435	0.468	0.539

t-statistics in parenthesis (in X^2 tests we report p-values).***, **,* statistical significance at 1%, 5% and 10% level of signif., respectively.

TABLE 13.1

Wald tests corresponding to Table 13	D1	D1	D2	D2
ε_t^gBad(Exp)=ε_t^gBad(Con)	4.52(0.033)	3.73(0.053)	4.50(0.033)	8.60(0.003)
ε_t^gGood(Exp)=ε_t^gGood(Con)	0.08(0.775)	1.03(0.309)	0.45(0.503)	0.53(0.465)
ε_t^gBad(Con)=ε_t^gGood(Con)	0.15(0.694)	0.82(0.366)	0.08(0.783)	2.20(0.138)
ε_t^gGood(Exp)=ε_t^gBad(Exp)	10.23(0.001)	8.53(0.003)	5.52(0.018)	11.15(0.000)
ε_t^tBad(Exp)=ε_t^tBad(Con)	0.14(0.705)	0.38(0.540)	3.09(0.079)	1.57(0.210)
ε_t^tGood(Exp)=ε_t^tGood(Con)	1.49(0.222)	1.78(0.182)	11.59(0.000)	12.80(0.000)
ε_t^tBad(Con)=ε_t^tGood(Con)	2.69(0.100)	3.18(0.074)	8.55(0.003)	9.60(0.001)
ε_t^tGood(Exp)=ε_t^tBad(Exp)	0.02(0.881)	0.12(0.728)	7.28(0.007)	5.27(0.021)
ε_t^gBad(Con)=ε_t^gGood(Con) & ε_t^gGood(Exp)=ε_t^gBad(Exp)	10.82(0.004)	10.10(0.006)	6.02(0.049)	11.87(0.002)
ε_t^tBad(Con)=ε_t^tGood(Con) & ε_t^tGood(Exp)=ε_t^tBad(Exp)	2.70(0.259)	3.25(0.196)	12.81(0.001)	11.98(0.002)
$\Delta\hat{Y}_t$Bad=$\Delta\hat{Y}_t$Good	-	0.61(0.433)	-	7.04(0.008)

p-values in parenthesis

TABLE 14

Variables	D3	D3	D4	D4
$\varepsilon_t^g Bad(Exp)$	4.207(2.49)**	3.882(2.34)**	-0.207(-0.29)	-0.264(-0.36)
$\varepsilon_t^g Bad(Con)$	1.031(0.70)	1.610(1.09)	1.749(1.31)	1.946(1.45)
$\varepsilon_t^g Good(Exp)$	0.303(0.27)	0.987(1.02)	0.026(0.02)	0.425(0.38)
$\varepsilon_t^g Good(Con)$	0.587(0.41)	-0.508(-0.38)	0.019(0.01)	-0.923(-0.63)
$\varepsilon_t^t Bad(Exp)$	-1.010(-2.89)***	-0.839(-2.50)**	-1.289(-1.86)*	-1.14(-1.68)*
$\varepsilon_t^t Bad(Con)$	-0.731(-3.93)***	-0.743(-4.11)***	-0.379(-3.11)***	-0.393(-3.28)***
$\varepsilon_t^t Good(Exp)$	-0.365(-0.65)	-0.445(-0.84)	-0.373(-1.42)	-0.378(-1.46)
$\varepsilon_t^t Good(Con)$	0.130(0.59)	0.051(0.26)	0.255(1.15)	0.222(1.02)
$\Delta\hat{Y}_t$	0.642(2.06)**	-	0.650(2.20)**	-
$\Delta\hat{Y}_t Bad$	-	0.792(2.41)**	-	0.714(2.34)**
$\Delta\hat{Y}_t Good$	-	0.470(1.46)	-	0.517(1.61)
Nobs	535	535	535	535
R^2	0.449	0.475	0.500	0.509

t-statistics in parenthesis (in X^2 tests we report p-values).***, **,* statistical significance at 1%, 5% and 10% level of signif., respectively.

TABLE 14.1

Wald tests corresponding to Table 14	D3	D3	D4	D4
ε_t^gBad(Exp)=ε_t^gBad(Con)	1.49(0.222)	0.76(0.383)	1.18(0.277)	1.46(0.226)
ε_t^gGood(Exp)=ε_t^gGood(Con)	0.02(0.891)	0.68(0.409)	0.00(0.997)	0.37(0.540)
ε_t^gBad(Con)=ε_t^gGood(Con)	0.06(0.809)	1.31(0.252)	0.90(0.342)	2.46(0.116)
ε_t^gGood(Exp)=ε_t^gBad(Exp)	4.61(0.031)	2.78(0.095)	0.05(0.823)	0.40(0.529)
ε_t^tBad(Exp)=ε_t^tBad(Con)	0.41(0.521)	0.05(0.819)	1.68(0.195)	1.19(0.275)
ε_t^tGood(Exp)=ε_t^tGood(Con)	0.59(0.442)	0.65(0.420)	2.23(0.135)	2.08(0.149)
ε_t^tBad(Con)=ε_t^tGood(Con)	9.87(0.001)	9.62(0.001)	7.05(0.007)	6.80(0.009)
ε_t^tGood(Exp)=ε_t^tBad(Exp)	0.88(0.347)	0.39(0.534)	1.60(0.206)	1.16(0.281)
ε_t^gBad(Con)=ε_t^gGood(Con) & ε_t^gGood(Exp)=ε_t^gBad(Exp)	4.98(0.083)	4.79(0.091)	0.90(0.636)	2.48(0.289)
ε_t^tBad(Con)=ε_t^tGood(Con) & ε_t^tGood(Exp)=ε_t^tBad(Exp)	12.98(0.001)	12.63(0.001)	11.13(0.003)	10.63(0.004)
$\Delta\hat{Y}_t$Bad=$\Delta\hat{Y}_t$Good	-	1.89(0.169)	-	0.76(0.384)

p-values in parenthesis

TABLE 15: D1

Variables	1	2	3	4
-	H-LTV	H-LTV	L-LTV	L-LTV
$\varepsilon_t^g Bad(Exp)$	0.040(0.12)	0.092(0.28)	6.746(4.32)***	6.646(4.27)***
$\varepsilon_t^g Bad(Con)$	0.954(2.87)***	0.890(2.62)***	2.221(1.17)	2.402(1.25)
$\varepsilon_t^g Good(Exp)$	0.002(0.01)	-0.036(-0.12)	1.049(0.62)	1.917(1.13)
$\varepsilon_t^g Good(Con)$	-0.118(-0.46)	-0.087(-0.34)	0.165(0.08)	-1.301(-0.51)
$\varepsilon_t^t Bad(Exp)$	-0.091(-0.58)	-0.105(-0.66)	-2.343(-1.32)	-1.914(-1.06)
$\varepsilon_t^t Bad(Con)$	-0.342(-2.33)**	-0.335(-2.27)**	-0.951(-4.57)***	-0.952(-4.59)***
$\varepsilon_t^t Good(Exp)$	-0.317(-2.37)**	-0.317(-2.38)**	-0.765(-1.01)	-0.897(-1.25)
$\varepsilon_t^t Good(Con)$	-0.088(-0.81)	-0.097(-0.88)	-0.244(-0.22)	-0.159(-0.14)
$\Delta\hat{Y}_t$	0.383(4.44)***	-	0.536(1.53)	-
$\Delta\hat{Y}_t Bad$	-	0.342(3.38)***	-	0.604(1.67)*
$\Delta\hat{Y}_t Good$	-	0.406(4.22)***	-	0.371(0.97)
Nobs	302	302	233	233
R^2	0.545	0.543	0.512	0.517

t-statistics in parenthesis (in X^2 tests we report p-values).***, **,* statistical significance at 1%, 5% and 10% level of signif., respectively.

TABLE 15.1:D1

Wald tests corresponding to Table 15	HLTV	HLTV	LLTV	LLTV
ε_t^gBad(Exp)=ε_t^gBad(Con)	2.83(0.092)	2.05(0.152)	2.92(0.087)	2.53(0.111)
ε_t^gGood(Exp)=ε_t^gGood(Con)	0.07(0.796)	0.01(0.915)	0.07(0.789)	0.76(0.382)
ε_t^gBad(Con)=ε_t^gGood(Con)	7.69(0.005)	5.95(0.014)	0.58(0.445)	1.39(0.238)
ε_t^gGood(Exp)=ε_t^gBad(Exp)	0.01(0.926)	0.09(0.762)	6.23(0.012)	4.20(0.040)
ε_t^tBad(Exp)=ε_t^tBad(Con)	0.98(0.322)	0.80(0.371)	0.58(0.446)	0.27(0.605)
ε_t^tGood(Exp)=ε_t^tGood(Con)	1.33(0.249)	1.22(0.269)	0.14(0.707)	0.28(0.595)
ε_t^tBad(Con)=ε_t^tGood(Con)	2.36(0.124)	2.01(0.156)	0.40(0.526)	0.49(0.483)
ε_t^tGood(Exp)=ε_t^tBad(Exp)	1.40(0.237)	1.20(0.273)	0.68(0.408)	0.29(0.592)
ε_t^gBad(Con)=ε_t^gGood(Con) & ε_t^gGood(Exp)=ε_t^gBad(Exp)	8.27(0.016)	7.03(0.029)	8.32(0.015)	8.15(0.017)
ε_t^tBad(Con)=ε_t^tGood(Con) & ε_t^tGood(Exp)=ε_t^tBad(Exp)	2.95(0.228)	2.48(0.289)	1.10(0.578)	0.83(0.658)
$\Delta\hat{Y}_t$Bad=$\Delta\hat{Y}_t$Good	-	0.44(0.509)	-	0.73(0.393)

p-values in parenthesis

TABLE 16: D2

Variables	1	2	3	4
-	H-LTV	H-LTV	L-LTV	L-LTV
$\varepsilon_t^g Bad(Exp)$	-0.590(-1.58)	-0.431(-1.16)	6.370(4.43)***	6.559(4.72)***
$\varepsilon_t^g Bad(Con)$	0.789(2.32)**	0.584(1.71)*	-0.535(-0.31)	-1.555(-0.89)
$\varepsilon_t^g Good(Exp)$	0.357(1.25)	0.282(1.00)	1.600(0.76)	-0.105(-0.05)
$\varepsilon_t^g Good(Con)$	-0.002(-0.01)	0.085(0.33)	1.042(0.43)	4.075(1.64)
$\varepsilon_t^t Bad(Exp)$	-0.1767(-1.04)	-0.243(-1.43)	2.497(1.53)	1.587(1.01)
$\varepsilon_t^t Bad(Con)$	-0.222(-1.75)*	-0.189(-1.52)	-0.848(-4.41)***	-0.790(-4.23)***
$\varepsilon_t^t Good(Exp)$	-0.303(-2.30)**	-0.279(-2.16)**	-4.721(-4.68)***	-4.009(-4.46)***
$\varepsilon_t^t Good(Con)$	0.0674(0.48)	0.008(0.06)	0.259(0.69)	0.392(1.10)
$\Delta\hat{Y}_t$	0.428(5.27)***	-	0.625(2.12)**	-
$\Delta\hat{Y}_t Bad$	-	0.318(3.52)***	-	0.327(1.05)
$\Delta\hat{Y}_t Good$	-	0.554(5.90)***	-	0.891(3.01)***
Nobs	305	305	233	233
R^2	0.571	0.582	0.577	0.622

t-statistics in parenthesis (in X^2 tests we report p-values).***, **,* statistical significance at 1%, 5% and 10% level of signif., respectively.

TABLE 16.1:D2

Wald tests corresponding to Table 16	HLTV	HLTV	LLTV	LLTV
ε_t^gBad(Exp)=ε_t^gBad(Con)	5.76(0.016)	3.07(0.079)	8.08(0.004)	11.02(0.000)
ε_t^gGood(Exp)=ε_t^gGood(Con)	0.61(0.433)	0.18(0.667)	0.02(0.880)	1.25(0.263)
ε_t^gBad(Con)=ε_t^gGood(Con)	3.79(0.051)	1,46(0.227)	0.34(0.559)	3.49(0.061)
ε_t^gGood(Exp)=ε_t^gBad(Exp)	4.78(0.028)	2.67(0.102)	3.61(0.057)	7.51(0.006)
ε_t^tBad(Exp)=ε_t^tBad(Con)	0.04(0.848)	0.05(0.821)	4.00(0.045)	2.17(0.140)
ε_t^tGood(Exp)=ε_t^tGood(Con)	2.56(0.109)	1.57(0.209)	18.07(0.000)	16.57(0.000)
ε_t^tBad(Con)=ε_t^tGood(Con)	2.50(0.113)	1.18(0.278)	6.85(0.008)	8.53(0.003)
ε_t^tGood(Exp)=ε_t^tBad(Exp)	0.38(0.536)	0.03(0.864)	14.10(0.000)	9.88(0.001)
ε_t^gBad(Con)=ε_t^gGood(Con) & ε_t^gGood(Exp)=ε_t^gBad(Exp)	7.02(0.029)	3.32(0.190)	3.64(0.161)	8.85(0.012)
ε_t^tBad(Con)=ε_t^tGood(Con) & ε_t^tGood(Exp)=ε_t^tBad(Exp)	2.51(0.284)	1.23(0.540)	17.80(0.000)	14.74(0.000)
$\Delta\hat{Y}_t$Bad=$\Delta\hat{Y}_t$Good	-	6.67(0.009)	-	6.20(0.012)

p-values in parenthesis

TABLE 17: D3

Variables	1	2	3	4
-	H-LTV	H-LTV	L-LTV	L-LTV
$\varepsilon_t^g Bad(Exp)$	0.215(0.60)	0.306(0.86)	7.742(2.75)***	7.184(2.63)***
$\varepsilon_t^g Bad(Con)$	0.676(2.06)**	0.601(1.84)*	2.686(1.47)	3.218(1.76)*
$\varepsilon_t^g Good(Exp)$	0.066(0.22)	0.024(0.08)	-0.372(-0.16)	1.614(0.72)
$\varepsilon_t^g Good(Con)$	-0.058(-0.21)	-0.004(-0.02)	1.426(0.66)	-1.002(-0.42)
$\varepsilon_t^t Bad(Exp)$	-0.329(-2.16)**	-0.365(-2.33)**	-2.721(-2.64)***	-2.458(-2.46)**
$\varepsilon_t^t Bad(Con)$	-0.004(-0.02)	0.040(0.24)	-1.039(-3.67)***	-1.027(-3.75)***
$\varepsilon_t^t Good(Exp)$	-0.273(-1.74)*	-0.250(-1.58)	-0.316(-0.25)	-1.011(-0.89)
$\varepsilon_t^t Good(Con)$	-0.185(-1.60)	-0.211(-1.80)*	0.273(0.65)	-0.003(-0.01)
$\Delta\hat{Y}_t$	0.409(4.72)***	-	0.609(1.84)*	-
$\Delta\hat{Y}_t Bad$	-	0.325(3.19)***	-	0.733(2.15)**
$\Delta\hat{Y}_t Good$	-	0.460(4.54)***	-	0.340(0.97)
Nobs	302	302	233	233
R^2	0.522	0.518	0.520	0.542

t-statistics in parenthesis (in X^2 tests we report p-values).***, **,* statistical significance at 1%, 5% and 10% level of signif., respectively.

TABLE 17.1:D3

Wald tests corresponding to Table 17	HLTV	HLTV	LLTV	LLTV
ε_t^gBad(Exp)=ε_t^gBad(Con)	0.66(0.416)	0.27(0.601)	1.80(0.179)	1.15(0.284)
ε_t^gGood(Exp)=ε_t^gGood(Con)	0.07(0.794)	0.00(0.952)	0.21(0.645)	0.43(0.512)
ε_t^gBad(Con)=ε_t^gGood(Con)	3.44(0.063)	2.33(0.126)	0.24(0.621)	1.98(0.159)
ε_t^gGood(Exp)=ε_t^gBad(Exp)	0.12(0.728)	0.42(0.516)	4.89(0.027)	2.47(0.115)
ε_t^tBad(Exp)=ε_t^tBad(Con)	1.50(0.221)	2.16(0.142)	2.15(0.142)	1.65(0.198)
ε_t^tGood(Exp)=ε_t^tGood(Con)	0.16(0.692)	0.03(0.861)	0.17(0.684)	0.56(0.455)
ε_t^tBad(Con)=ε_t^tGood(Con)	0.91(0.340)	1.61(0.204)	6.46(0.011)	4.41(0.035)
ε_t^tGood(Exp)=ε_t^tBad(Exp)	0.07(0.787)	0.29(0.591)	2.36(0.124)	1.03(0.309)
ε_t^gBad(Con)=ε_t^gGood(Con) & ε_t^gGood(Exp)=ε_t^gBad(Exp)	4.06(0.131)	3.48(0.175)	6.53(0.038)	7.01(0.030)
ε_t^tBad(Con)=ε_t^tGood(Con) & ε_t^tGood(Exp)=ε_t^tBad(Exp)	0.91(0.634)	1.63(0.441)	12.08(0.002)	8.88(0.011)
$\Delta\hat{Y}_t$Bad=$\Delta\hat{Y}_t$Good	-	1.61(0.204)	-	2.42(0.119)

p-values in parenthesis

TABLE 18: D4

Variables	1	2	3	4
-	H-LTV	H-LTV	L-LTV	L-LTV
$\varepsilon_t^g Bad(Exp)$	-0.393(-1.03)	-0.270(-0.72)	-1.394(-0.91)	-1.491(-0.98)
$\varepsilon_t^g Bad(Con)$	0.552(1.99)**	0.543(2.01)**	3.019(1.70)*	3.125(1.76)*
$\varepsilon_t^g Good(Exp)$	0.496(1.70)*	0.407(1.42)	-1.187(-0.53)	-0.363(-0.16)
$\varepsilon_t^g Good(Con)$	-0.301(-0.90)	-0.132(-0.39)	0.126(0.05)	-1.371(-0.53)
$\varepsilon_t^t Bad(Exp)$	-0.322(-1.87)*	-0.409(-2.29)**	-3.052(-1.82)*	-2.557(-1.54)
$\varepsilon_t^t Bad(Con)$	-0.242(-1.65)*	-0.206(-1.42)	-0.267(-1.63)	-0.283(-1.74)*
$\varepsilon_t^t Good(Exp)$	-0.265(-2.09)**	-0.250(-1.99)**	-0.277(-0.34)	-0.384(-0.48)
$\varepsilon_t^t Good(Con)$	-0.075(-0.66)	-0.110(-0.96)	0.463(1.19)	0.365(0.94)
$\Delta\hat{Y}_t$	0.425(5.07)***	-	0.617(1.88)*	-
$\Delta\hat{Y}_t Bad$	-	0.329(3.43)***	-	0.685(2.03)**
$\Delta\hat{Y}_t Good$	-	0.536(5.52)***	-	0.457(1.26)
Nobs	305	305	233	233
R^2	0.553	0.563	0.559	0.566

t-statistics in parenthesis (in X^2 tests we report p-values).***, **,* statistical significance at 1%, 5% and 10% level of signif., respectively.

TABLE 18.1:D4

Wald tests corresponding to Table 18	HLTV	HLTV	LLTV	LLTV
ε_t^gBad(Exp)=ε_t^gBad(Con)	3.17(0.074)	2.48(0.115)	2.34(0.126)	2.54(0.111)
ε_t^gGood(Exp)=ε_t^gGood(Con)	2.28(0.130)	1.04(0.307)	0.12(0.731)	0.06(0.809)
ε_t^gBad(Con)=ε_t^gGood(Con)	4.46(0.034)	2.83(0.092)	1.26(0.262)	2.21(0.136)
ε_t^gGood(Exp)=ε_t^gBad(Exp)	4.16(0.041)	2.44(0.118)	0.01(0.930)	0.20(0.657)
ε_t^tBad(Exp)=ε_t^tBad(Con)	0.10(0.754)	0.59(0.440)	2.56(0.109)	1.74(0.187)
ε_t^tGood(Exp)=ε_t^tGood(Con)	0.93(0.335)	0.50(0.478)	0.50(0.480)	0.52(0.472)
ε_t^tBad(Con)=ε_t^tGood(Con)	0.94(0.332)	0.30(0.583)	3.39(0.065)	2.58(0.108)
ε_t^tGood(Exp)=ε_t^tBad(Exp)	0.09(0.770)	0.61(0.435)	2.26(0.133)	1.45(0.228)
ε_t^gBad(Con)=ε_t^gGood(Con) & ε_t^gGood(Exp)=ε_t^gBad(Exp)	7.24(0.026)	4.36(0.113)	8.08(0.017)	2.27(0.321)
ε_t^tBad(Con)=ε_t^tGood(Con) & ε_t^tGood(Exp)=ε_t^tBad(Exp)	1.19(0.552)	1.21(0.545)	1.35(0.508)	5.93(0.051)
$\Delta\hat{Y}_t$Bad=$\Delta\hat{Y}_t$Good	-	4.73(0.029)	-	0.82(0.365)

p-values in parenthesis