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

Preliminary Version

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Abstract

This paper explores on a panel of nineteen OECD countries the effects of fiscal policy over the business cycle. Following a fiscal policy shock, the presence of binding liquidity constraints on households can boost private consumption in recessions more than in expansions, in countries characterized by a less developed consumer credit markets. This happens because the higher the fraction of individuals that face binding liquidity constraints the weaker the negative wealth effect of higher taxes and the higher the consumption expenditure.

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 of the economy. For example, fiscal policy might be more effective at mitigating economic slumps than at muting booms[2], alternatively it might be less effective at lenghtening expansions than

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

[2]Sorensen and Yosha (2001) study whether state fiscal policy in the U.S. is asymmetric over the business cycle. They conclude that state revenue and expenditure display significant asymmetry over the business cycle, that is

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 its propagation and transmission in the economy.

As Gali, Lopez-Salido and Valles (2002) 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 (e.g. a G decrease or T increase), generates adverse effects on private consumption (C increase). In a recession, a countercyclical fiscal policy rule will lead to higher spending in order to boost aggregate demand. However, the increase in government consumption (financed by current or future taxes) has a negative wealth effect. This would reduce consumption, producing non-keynesian effects, or very weak reaction of output. In booms, the same countercyclical rule would induce a reduction in spending so that "over-heating" of the economy is avoided. In this case the positive wealth effect due to lower current and future taxes could lead to opposite effects, increasing private consumption. Aggregate demand might be further increased; which could generate inflationary pressure in the economy.

The presence of binding liquidity constraints alters the implications of fiscal policy actions in recessions. The wealth effect of fiscal policy weakens, because less 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 and driving the economy out of the recession. Hence, fiscal policy will have Keynesian effects (Gali et al (2002))[3]. In periods of expansion, liquidity constraints are less likely to bind. 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 a stronger wealth effect, or because income uncertainty is reduced as in Barsky et al (1986)), cancelling the contractionary

associated with balanced budget rules (procyclical budget surpluses). In booms, tax revenue increases more than spending, 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 mutes economic expansions to the same extent it mitigates downturns.

[3]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 would be even weaker (the opposite in booms).

effects of fiscal policy on aggregate demand.

After presenting our motivation and a short discussion of relevant literature, we analyze a simple two period model, where two types of individuals coexist. A neoclassical that can "borrow and save", and a keynesian that can only save. Following Perotti (1999) we assume that government spending has a positive effect on disposable income. This is the case when government spending has 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 at time t; we refer to this as "Good Times". Whereas in the second liquidity constraints bind, and this case is characterized as "Bad Times". The main implications of this paper is that, under certain assumptions, a fiscal expansion will generate a stronger response of private consumption in bad times compared to good times.

We test our theoretical predictions using an unbalanced yearly panel data set of nineteen OECD countries. Periods of recessions are characterized for each of the countries, several alternative definitions are considered. Following work 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 ration), and we assign country-decade pairs into high and low LTV groups. The empirical evidence confirms the theoretical predictions suggesting that a government spending expansion in recession years has a strong positive effect on private consumption in countries characterized less developed consumer credit markets. Moreover, a tax hike (or tax cut) appears to generate negative (positive) effects on both groups of countries in both Bad and Good Times. However, the negative (positive) effect on private consumption is much stronger in recessions relative to expansions in the low LTV group. Therefore the presence of a larger group of liquidity constrained individuals is more likely to generate Keynesian effects of fiscal policy during deep recession episodes that are characterized by negative output growth. In the final section we summarize our findings and discuss caveats of our analysis and possible extensions.

2 Motivation and Related Literature

The motivation for this paper comes from three 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 private spending. The second one investigates the conditions under which fiscal policy can have Non-Keynesian effects. Finally, the last one suggests liquidity constraints as an explanation for actual consumption behavior.

As discussed above, following a government spending shock that is financed by 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 boost investments. On the other hand, the keynesian analysis predicts that private consumption will increase after a government spending shock, because disposable income increases. Investment will be crowded out because the increase in consumption will raise the interest rate. 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)[4]).

In a recent contribution to the literature, Gali et al (2002), 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)[5] that are not taxed. 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 fiscal policy 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 (2002) 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 with borrowing constraints. In several papers (Perotti (1999), Giavazzi and Pagano (1990, 1996)) implicitly or explicitly hinges the assumption that there exist credit market imperfections, hence both constrained and unconstrained individuals coexist in the economy. This implies that the wealth effect of fiscal policy will be stronger when the fraction of unconstraint individuals is high enough, so that fiscal consolidations (by reducing tax burden[6] 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[7] i.e. high or growing debt-to-GDP-ratio (Perotti

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

[5]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.

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

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

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[8]. 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.

The third field of research rationalizes our belief that liquidity constraints are a real life situations which alters consumption behavior and the implications of fiscal policy actions in a significant manner. Studies of consumption behavior[9] have suggested that the excess sensitivity of consumption growth to labor income is an indication of liquidity constraints. Hence, fiscal policy actions will have much stronger effects in recessions if they increase disposable income; because the marginal utility of an extra unit of income will be much higher in the presence of binding liquidity constraints[10]. Nevertheless, individuals consume their disposable income only when the constraints actually bind. In a general equilibrium framework, if individuals are identical there is no borrowing, and depending on the "storing" technology, interest rates and asset prices adjust. Hence nobody is constraint at the equilibrium interest rates, and the effects of liquidity constraints are reflected on asset prices and interest rates. If agents are heterogeneous, though, it is possible that, in equilibrium, some will want to save and others to borrow.

3 A Simple Model

Consider a two period model (t=1, 2). Suppose that there are two types of individuals. The LC type (keynesian individuals) that are supposed to be liquidity constraint (can save, but cannot borrow) and the U type (neoclassical individual) that 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. We assume that production takes place at the beginning of each period, while consumption and investment decisions at the end.

We examine two cases. In the first case if the economy is in a Good state (expansion) in t=1,

[8] 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.

[9] See Attanasio (1999) for a nice overview of the literature.

[10] Notice that in the presence of liquidity constraints, if a goverment issues a bond to a household that is to be repaid in the future, it is as if it lends money to the household, or borrows on behalf of the household. In this case, the household will increase its consumption only if faces higher interest rates than the goverment when borrowing.

it will pass in a Bad or Normal 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 or Normal state in period t=2.

3.1 Individuals

There exists a continuum of individuals indexed by $i \ \epsilon[0,1]$. A fraction λ of them is of the LC type, whereas the rest $(1-\lambda)$ are of the U type[11]. The U type individuals are assumed to own an asset at the beginning of period 1; holding the asset from period 1 to period 2 provides a return to them equal to $(1+r)$. When savings are positive, both types of individuals use one part of their income to buy consumption goods and an other part for "home production" of the asset (which we assume to be eatable). When the individuals need to borrow (in Bad times) i.e. consume more than their income, they "eat" part of their asset holdings in period 1. However, this is possible only for the U-type individuals, the LC type individuals cannot "borrow".

Both types of individuals own one unit of labor which they supply inelastically. At the beginning of period 1 (whether it is a Bad or a Good state), a fraction of individuals is employed x_1, while the rest are unemployed $(1-x_1)$, i.e. both types of individuals face the same opportunities in the labor market independently of their wealth levels[12]. A reasonable assumption at this point is that more people are unemployed in a Bad time or recession ($x_1^G > x_1^B$). When employed the individuals receive a real wage w_1^G or w_1^B depending on whether they are in a Good or Bad state, moreover $w_1^G > w_1^B$. Both these assumptions are considered to be real life phenomena, with wages being acyclical or mildly procyclical, while unemployment is clearly procyclical. Finally, unemployed individuals receive unemployment benefits equal to B, assumed for simplicity to be the same in every period and state of nature.

We assume that individuals know at the beginning of t=1 whether they will be employed or unemployed in the current period (this implies that in a multiperiod setting individuals' information set incorporates all past information available in the economy), however, they do not know their employment status in the second period. If employed (E) in a Good state then in the next period which is a Bad or Normal state they will remain employed with probability 1-p, whereas they will switch to being unemployed (Un) with probability p. If unemployed in a Good state, then in the Bad state the individual will remain unemployed. Furthermore, if employed in a Bad state then in the next period which will be a Good or Normal state an individual will remain employed, whereas if unemployed in a Bad state, then when the economy moves into a Good state in period t=2 the individuals will remain unemployed with probability 1-p, and they will switch to being

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

[12] In real life however, more wealthy individuals probably hold jobs that are less exposed to unemployment than liquidity constraint agents.

employed with probability p. This setting captures in a simplified way the overall employment and unemployment dynamics over the business cycle, i.e. it is an empirical fact that unemployment increases when the economy moves into a recession and decreases when the economy expands. For simplicity we have assumed that the transition probability is the same both when moving into and out of a recession. Notice that despite that individuals face uncertainty regarding their future labor income, we assume that there is no aggregate uncertainty in the economy.

Each 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 expecations conditional on information available at the beginning of period 1. $U(.)$ is a von Neuman-Morgenstern utility function.

The intertemporal budget constraint of the U type individuals that are employed (fraction x_1) at t=1 when moving from Good to Bad times can be written as:

$$c_1^U + Rc_2^U = w_1^G + R[(1-p)w_2^B + pB] + (1+r)d_1 - T_1 - R(1-p)T_2 \tag{2}$$

$R = \frac{1}{1+r}$ where $(1+r)$ is the real rate of return of holding the asset d_1.[13]. Notice that the individuals employed are taxed by means of lump sum taxes, therefore in the second period the individuals are taxed only if they remain employed. The intertemporal budget constraint of the U type individuals that are unemployed at t=1(fraction $1-x_1$) when moving from Good to Bad times can be written as:

$$c_1^U + Rc_2^U = B + RB + (1+r)d_1 \tag{3}$$

When switching from Bad to Good times an employed U type individual will have the following intertemporal budget constraint:

$$c_1^U + Rc_2^U = w_1^B + Rw_2^G + (1+r)d_1 - T_1 - RT_2 \tag{4}$$

while if the U type individuals are unemployed at t=1 we have:

$$c_1^U + Rc_2^U = B + R[(1-p)B + pw_2^G] + (1+r)d_1 - RpT_2 \tag{5}$$

The LC type individuals maximize a function like (1) with respect to:

$$\begin{aligned} d_2^{LC} + c_1^{LC} &= w_1 - T_1 \\ c_2^{LC} &= w_2 - T_2 + (1+r)d_2^{LC} \end{aligned}$$

[13]For simplicity we assume that the rate of time preference equals the rate of return from holding the asset d_1.

that can be written as:

$$c_1^{LC} + Rc_2^{LC} = w_1 + Rw_2 - T_1 - RT_2 \tag{6}$$

the accumulation equation: $S_1^{LC} = d_2^{LC}$, and the complementary slackness conditions:

$$\begin{aligned} \mu_1 d_2^{LC} &= \mu_1(w_1 - c_1^{LC}) = 0 \\ \mu_1 &\geq 0 \end{aligned}$$

so when $\mu_1 = 0$ then $S_1^{LC} > 0$, whereas when $\mu_1 > 0$, then $S_1^{LC} = d_2^{LC} = 0$. Notice that this individual can only save i.e accumulate asset d, not "borrow" because he or she has no initial wealth[14]. The intertemporal budget constraint for the LC types that are employed at t=1, when moving from Good to Bad times is:

$$c_1^{LC} + Rc_2^{LC} = w_1^G + R[(1-p)w_2^B + pB] - T_1 - R(1-p)T_2 \tag{7}$$

if unemployed at t=1 we have:

$$c_1^{LC} + Rc_2^{LC} = B + RB \tag{8}$$

The intertemporal budget constraint for the LC types that are employed at t=1, when moving from Bad to Good times is:

$$c_1^{LC} + Rc_2^{LC} = w_1^B + Rw_2^G - T_1 - RT_2 \tag{9}$$

if unemployed at t=1 we have:

$$c_1^{LC} + Rc_2^{LC} = B + R[pw_2^G + (1-p)B] - RpT_2 \tag{10}$$

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

$$c_t = \lambda c_t^{LC} + (1-\lambda)c_t^U \tag{11}$$

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 or nominal rigidities making government spending on goods and services to have positive effects on

[14] There have been several ways of introducing the 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 (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 it is iterated forward.

labor demand and output[15]. Moreover, the government has to pay at each period unemployment benefits which equal B times the number of unemployed individuals. It finances its spending by imposing lump sum taxes to the individuals employed at each time period. We abstract from government debt, assuming that the government budget is always balanced, and is define in real terms. Therefore, when in Good times at time t=1 and moving in Bad times at t=2, the number of unemployed individuals will increase, leading to higher spending on unemployment benefits. This is consider to be the automatic response of government budget to the cyclical economic conditions. The amount spend on benefits has to be financed by more taxes which are to be paid by less employed people in Bad Times, hence the taxes per employee to finance the benefit component of spending is higher in Bad Times. The opposite is true in Good Times.

Next we discuss the type of (temporary) discretionary action undertaken by the government. Suppose that the government decides and the beginning of time t=1 (be it a Good or a Bad State), before production takes place but after individuals have been assigned to employment or unemployment status, to raise government spending from the pre-announced level of, say, $G_1 = 0$ to $G_{1/\Delta G_1}$ i.e. $\Delta G_{1/\varepsilon_1^G} = G_{1/\Delta G_1} - G_1 = \varepsilon_1^G$, where ε_1^G represents the unanticipated component of fiscal policy action[16]. The government finances this extra purchases by means of higher lump-sum taxes to be imposed to employed individuals at time t=1. This higher government spending generates two effects, given the assumption that the economy is characterized by an upward sloping labor function[17]. By increasing the demand for labor, it leads to more people becoming employed at time t=1 as well as to higher real wages. These effects will be present in period t=2, depending on the severity and the type of the rigidities assumed. In the second period we assume that the government spending is set to the pre-shock levels, i.e. the amount of taxation needed to be raised will equal the amount of unemployment benefits that have to be paid in the second period, if $G_2 = G_1 = 0$. Notice that a fiscal impulse in the first period reduces unemployment in period t=1 therefore the economy when switching state in period t=2 i.e. going to Bad or Good state, it will find itself with lower unemployment compared to what would have been the case without the discretionary fiscal policy action in period t=1. Therefore $Unemployment_{2/\varepsilon_1^G} < Unemployment_2$. Hence the amount of taxation per capita in period 2 will be lower to what would have been the case without the fiscal impulse in period 1. This holds even if $G_2 = G_1 \neq 0$.

[15] 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.

[16] Unanticipated as of the information available in the begining of period 1.

[17] As Lane and Perotti (2003) discuss 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)).

3.1.2 Good and Bad times

In what follows we provide a short discussion of the "Good and Bad Times" concepts that we use in the theoretical model. We examine two case. The first one corresponds to the situation where the liquidity constraints do not bind $\mu_t = 0$,(Good Times). Whereas in the second case $\mu_t > 0$, the liquidity constraints bind (Bad Times). We assume that the production function is of the form $Y = AF(L, .)$, hence when period 1 is characterized as good times with respect to period 2, the productivity parameter A has a higher realization in period 1, while it returns to normal at time 2. This resembles to a case where the economy is hit by a positive temporary productivity shock in period t, (as if it follows an AR(1) process with the persistence parameter ρ_A being (close to) zero), so that the value of A is smaller next period (it will return to its pre-shock level). When period 1 is considered to be a Bad time so that liquidity constraints bind, and 2 is a "normal" or good time, the productivity parameter has a lower value at 1 compared to the period 2. This resembles the case where the economy is hit by a negative temporary productivity shock in period t=1 (which follows an AR(1) process with persistence parameter (close to) zero); hence its value next period will be higher (or it will return to the pre-shock level).

The positive productivity shock at time t=1, raises labor productivity and thus labor demand. The labor demand curve shifts up and to the right leading to higher employment and real wages[18]. In the second period, the productivity parameter A returns (decreases) to its pre-shock level, so labor will be less productive, and the demand for labor will be reduced generating lower real wages[19]. Notice, however, that in real life, over the cycle, employment (hours worked) is procyclical driven mainly by unemployment changes whereas real wages are acyclical or slightly procyclical. The consumers prefer to have a smoothed consumption profile, to achieve that they take into account the fact that their income is higher in the first period[20], this induces them to save, devote

[18] In an environment of monopolistic competition with price rigidities, the higher realization of A in period 1 leads to a reduction in real marginal cost, which make firms reduce their prices (the fraction of firms that can reset prices), and thus the aggregate price level.

[19] Furthermore, the lower realization of A will lead to higher marginal costs, and higher aggregate price level.

[20] As well as the movement of the aggregate price level in the two periods, and the movement of the real interest rate, which we do not consider in order to keep the analysis as simple as possible.

However, if we had consider capital investment to be the only storing technology and capital to be the outcome of home production, as well as, that it is "eatable" when there is need for borrowing then the capital income will vary as described as follows in this two period model, since supply and demand (by firms) for capital would change. Notice that regarding capital income, in the first period capital is predetermined but will earn higher interest rate due to the sudden jump after the productivity shock. In the second period, people will supply more capital but will earn lower interest rate (due to the combined effect of the rightward movement of the capital supply curve and the downward shift in capital demand due to lower productivity in period t=2). Notice that the elasticity of capital demand with respect to the real interest rate increases with the capital stock. So it is quite likely that the

more money for the home production of their "asset", enjoying higher asset (capital) income in the second period.

In Bad times, where a negative productivity shock occurs the analysis is similar but the effects are in the opposite direction. The consumers will face lower income in the first period compared to the second, they have an incentive to borrow. Hence, consume part of their asset (only the U-type individuals), enjoying smaller asset (capital) income in the second period. Real wages and employment will be lower in the first period compared to the second[21]. Notice, however, that the LC type individuals having no assets will find themselves facing binding liquidity constraints in period t=1 and they will have to consume their disposable income[22].

3.2 Implications for Private Consumption

In this section we discuss what are the implications of this unexpected government spending shock on both types of individuals in both periods and states of nature. First, we analyze the case of Good times in period t=1 which is followed by a Bad period in period t=2. The individuals, before the fiscal policy shock, belong to the following categories: U-type employed (U_E), U-unemployed (U_{Un}), LC-type employed (LC_E) and LC-type unemployed (LC_{Un}). Given that B, the unemployment benefit, is assumed to be the same in Bad or Good times and in both periods, it does not change after the fiscal policy shock (we do not consider a replacement ratio related to the level of wage, and treat changes in B as independent fiscal policy actions). Therefore, the only changes in disposable income come from the effect on real wages and higher taxation (we shall consider employment effects later on). Keep in mind that we are examining changes in consumption in period t=1 after the fiscal policy shock occurring at the beginning of period t=1, i.e. $\Delta C_{1/\varepsilon_t^G} = C_{1/\varepsilon_t^G} - C_1$.Therefore, we examine changes in disposable income, as a function of

capital income is lower in the second period. The wage bill is unabiguously higher in the first period where both employment and wages increase.

[21]The wage bill is unabiguously lower in the first period because both wages and employment decrease, whereas in the second period it takes place exactly the opposite.

If the interest rate could adjust, capital income would be reduced because the interest rate would jump down, despite the fact that at time t=1 the capital stock is predetermined. At time t=2, the capital supply decreases, pushing the interest rate up, this is further boost by the fact that capital demand shifts upwards due to the higher realization of A at time t=2.

[22]The above discussion is specific to the two-period setting, useful insights that can be drawn in an multiperiod setting regarding the impact effects and transitional paths lack from the analysis. Specifically with respect to the adjustment of the interest rate. In a multiperiod model, the real interest rate, after its positive jump at impact, will fall below its steady state and it will then gradually return to its steady state, this would produce a positive impact effect on investment. While from the second period on it will follow the same path as the real interest rate. Hence, the consumption chosen by the individuals will have a downward sloping profile.

the unanticipated fiscal policy shock, that induce changes in private consumption.

For an individual belonging in the U_E group the PDV of the expected disposable income in given by the left hand side of equation 2. The change in expected disposable income equals:

$$\begin{aligned}\Delta Y^{U_E}_{\varepsilon^G_1} &= \Delta w^G_{1/\varepsilon^G_1} - \Delta T_{1/\varepsilon^G_1} + R(1-p)[\Delta w^G_{2/\varepsilon^G_1} - \Delta T_{2/\varepsilon^G_1}] \\ &= (w^G_{1/\varepsilon^G_1} - w^G_1) - (T_{1/\varepsilon^G_1} - T_1) + R(1-p)[(w^G_{2/\varepsilon^G_1} - w^G_2) - (T_{2/\varepsilon^G_1} - T_2)] \qquad (12)\end{aligned}$$

The individuals belonging in the U_{Un} group being unemployed in period t=1 will remain unemployed in period t=2 when moving from Good to Bad times. Therefore, their disposable income will be unaffected given that B is assumed not to be affected by the fiscal policy action. The change in the expected disposable income of the individuals in the LC_E and LC_{Un} groups will be analogous to the U_E and U_{Un} groups respectively.

Next we consider the case of Bad times at t=1 which is followed by Good times in period t=2. For an individual belonging in the U_E group the PDV of the expected disposable income in given by the left hand side of equation 4. The change in expected disposable income equals:

$$\begin{aligned}\Delta Y^{U_E}_{\varepsilon^G_1} &= \Delta w^B_{1/\varepsilon^G_1} - \Delta T_{1/\varepsilon^G_1} + R[\Delta w^G_{2/\varepsilon^G_1} - \Delta T_{2/\varepsilon^G_1}] \\ &= (w^B_{1/\varepsilon^G_1} - w^B_1) - (T_{1/\varepsilon^G_1} - T_1) + R[(w^G_{2/\varepsilon^G_1} - w^G_2) - (T_{2/\varepsilon^G_1} - T_2)] \qquad (13)\end{aligned}$$

The people that are at the U_{Un} group are will face the following change in their expected disposable income:

$$\Delta Y^{U_{Un}}_{\varepsilon^G_1} = Rp[\Delta w^G_{2/\varepsilon^G_1} - \Delta T_{2/\varepsilon^G_1}] = Rp[(w^G_{2/\varepsilon^G_1} - w^G_2) - (T_{2/\varepsilon^G_1} - T_2)] \qquad (14)$$

The change in the PDV of the expected disposable income for the LC_E and theLC_{Un} is analogous to the U_E and U_{Un} groups respectively. However, keep in mind that these last two group of people cannot pool the change in their income in the two period, because in Bad times they face binding liquidity constraints.

Let us now discuss the individual components of the change in expected disposable income. According to the assumptions used in the model we expect $\Delta w_{1/\varepsilon^G_1} > 0$ and $\Delta w_{2/\varepsilon^G_1} > 0$ whether in Bad or Good times; $\Delta T_{1/\varepsilon^G_1} > 0$, however, the increase in taxation per capita in period t=1 is smaller than the increase in government spending per capita because the decrease in the number of unemployed people in period t=1, following the government spending increase, lowers the amount of taxation per capita that has to be raised to finance the unemployment benefits. Hence $\Delta T_{1/\varepsilon^G_1} < \Delta G_{1/\varepsilon^G_1}$. Additionally $\Delta T_{2/\varepsilon^G_1}$ could even be negative in the case that second period government consumption is assumed to be zero and more people are employed relative to what would have been employed without the fiscal policy change; i.e. this implies that the benefits to be paid to unemployed are lower and have to be financed by smaller per capita taxes. In absolute terms

when moving from Good to Bad times employed people have to pay more taxes per capita, because unemployment is higher and the number of employees that pay the taxes has increased. However, taxes per employee are lower to what would have been the case without the fiscal impulse, because the switch from Good to Bad times is thought of taking place from a more favorable position for the economy as a whole (lower unemployment) after the fiscal expansion.

Turning now to examine the changes in consumption we know that when moving from Good to Bad times both types of individuals employed can save and thus smooth their consumption between the two periods; hence under a quadratic utility function[23], $\Delta C_{1/\varepsilon_1^G} = \frac{\Delta Y_{\varepsilon_1^G}}{1+R}$. The same holds for the U_E type of individuals when moving from Bad to Good times. However, this is not the case of the LC type of individuals whether employed or not because of the binding liquidity constraints. Therefore the change in consumption in period t=1 equals the change in their disposable income in the same period $\Delta C_{1/\varepsilon_1^G} = \Delta Y_{1/\varepsilon_1^G}$.

So far we have examined only the effect of the government spending increase on the PDV of the expected disposable income on both types of individuals. As we mention before, there are employment effects as well. So at time t=1, after the shock has taken place more people will find themselves employed. The increase in the number of employed is given by: $\Delta x_{1/\varepsilon_1^G} = x_{1/\Delta G_1} - x_1 = x_{1/\varepsilon_1^G}$ and is assumed to be symmetrically distributed among U and LC type individuals. Therefore consumption will increase by:

$$(1-\lambda)x_{1/\varepsilon_1^G}(\Delta C^{U_E}_{1/\varepsilon_1^G} - \Delta C^{U_{Un}}_{1/\varepsilon_1^G}) + \lambda x_{1/\varepsilon_1^G}(\Delta C^{LC_E}_{1/\varepsilon_1^G} - \Delta C^{LC_{Un}}_{1/\varepsilon_1^G}) \tag{15}$$

the $\Delta C^{j_E}_{1/\varepsilon_1^G} - \Delta C^{j_{LC}}_{1/\varepsilon_1^G}$ where $j = U, LC$, captures the fact that people consume more when employed. As we have seen above when switching from Good to Bad times: $\Delta C^{U_{Un}}_{1/\varepsilon_1^G} = \Delta C^{LC_{Un}}_{1/\varepsilon_1^G} = 0$, because the fiscal policy shock is not assumed to change the PDV of the expected disposable income of people that are unemployed at t=1. When switching from Bad to Good times $\Delta C^{U_{Un}}_{1/\varepsilon_1^G} \neq 0$ because the fiscal policy shock in period 1 changes the expected disposable income at time t=2; according to the assumptions used so far we anticipate that $\Delta C^{U_{Un}}_{1/\varepsilon_1^G} > 0$. However, still $\Delta C^{LC_{Un}}_{1/\varepsilon_1^G} = 0$, because liquidity constrained people cannot smooth their consumption between the two periods, recall that $\Delta C^{LC_{Un}}_{2/\varepsilon_1^G} \neq 0$ as for the U_{Un} group of people.

Overall when moving from Good to Bad times consumption changes by:

$$\Delta C_{1/\varepsilon_1^G} = x_1[(1-\lambda)\Delta C^{U_E}_{1/\varepsilon_1^G} + \lambda \Delta C^{LC_E}_{1/\varepsilon_1^G}] + x_{1/\varepsilon_1^G}[(1-\lambda)\Delta C^{U_E}_{1/\varepsilon_1^G} + \lambda \Delta C^{LC_E}_{1/\varepsilon_1^G}] \tag{16}$$

i.e. it equals the change in consumption for the individuals already employed, plus the change in

[23] This way we abstact for the moment from precautionary saving because the marginal utility is assumed to linear. However, allowing for a convex marginal utility of consumption will induce people who want to save to save more, and people who want to borrow to borrow less.

consumption for the individuals that got employed after the fiscal policy change, whereas when moving from Bad to Good Times consumption changes by:

$$\Delta C_{1/\varepsilon_1^G} = x_1[(1-\lambda)\Delta C^{U_E}_{1/\varepsilon_1^G}+\lambda\Delta C^{LC_E}_{1/\varepsilon_1^G}]+x_{1/\varepsilon_1^G}[(1-\lambda)\Delta C^{U_E}_{1/\varepsilon_1^G}+\lambda\Delta C^{LC_E}_{1/\varepsilon_1^G}]+(1-\lambda)(1-x_{1/\Delta G_1})\Delta C^{U_{Un}}_{1/\varepsilon_1^G} \tag{17}$$

i.e. in the second case besides the fact that the LC types can change their consumption only by the increase in their disposable income in period t=1 due to binding liquidity constraints, there is an extra difference which has to do with the term $(1-\lambda)(1-x_{1/\Delta G_1})\Delta C^{U_{Un}}_{1/\varepsilon_1^G}$, and represents the fact that even the people in U_{Un} group that remain unemployed after the fiscal policy shock will face a change in their consumption (assumed to be positive in this setting), because the value of expected disposable income increases in the second period. Notice, that so far we have assumed that taxation falls on all employed individuals, alternatively we could have assumed that the government taxes only the asset (or property) holders, in this case the increase in LC type consumption would have been much bigger, while the U-type individuals would be unlikely to enjoy a big increase (if any) in their expected disposable income that would make them consume more in the period of the fiscal policy action[24].

What needs to be specified next is how disposable income in each period is affected by government spending and taxation. The main assumption with respect to the change in disposable income in the economy is that it is affected positively by government spending, leading both to higher real wages and employment (or lower unemployment), and in a negative manner by taxation[25]. Overall the effect is positive leading to higher consumption. Moreover, the increase in consumption will be stronger in Bad times due to the fact that liquidity constrained individuals will consume all the increase in their disposable income in period t=1. This would be the case if the effect of government spending on wages and employment (unemployment) is analogous when moving from Good to Bad times and the opposite. The implications of the above discussion will be tested empirically in the next section.

[24] Alternatively, we could have assumed that the increase in public spending is directed towards increasing public employment. Then we could have: $\Delta G_{1/\varepsilon_1^G} = (x_{1/\varepsilon_1^G})[w^{G,B}_{1/\varepsilon_1^G} + F]$, with F being a fixed cost of hiring new employees and the rest representing the size of the extra wage bill required in period t=1. In that case public spending in the second period would have been higher by $\Delta G_{2/\varepsilon_1^G} = (x_{1/\varepsilon_1^G})w^{G,B}_{2/\varepsilon_1^G}$, i.e the size of the wage bill in period t=2 for the people employed in t=1. Hence in that case $\Delta T_{2/\varepsilon_1^G} = T_{2/\varepsilon_1^G} - T_2 > 0$, people would have to pay higher taxes to finance the bigger government budget. In the main text we discuss a case where the extra employment will come from the private sector.

[25] Perotti (1999), for example, assumes that the process of disposable income is affected (among other things) positively by government spending and negatively by taxation, with the latter capturing also the distortions is causes on pre-tax income. To keep the analysis simple we abstract from the last effect.

4 Data and Empirical Strategy

The implication of the theoretical discussion are tested using an unbalanced panel of yearly data from nineteen OECD countries[26] starting in 1970 until 2001. The first step in our empirical strategy is to characterize the periods of recession (Bad times) for each country in the data set. Several specifications are used. However, the use of yearly data is an important limitation since recessions and expansion periods are reported on a quarterly frequency. However, we decide to carry on with the analysis benefiting from the bigger information set, since yearly fiscal policy data are available for more countries. The next step in the analysis is to consider the role played by credit constraints. It is expected that fiscal policy is more effective in Bad times in countries characterizing by credit or liquidity constraints. Hence, crucial to the results obtained will be the use of the right measure of the severity of liquidity constraints. Notice, however, that there is a second caveat in the analysis, i.e. credit constraints, if any, will have a decreasing importance in OECD countries overtime. Credit constraints are expected to be binding for more people in non-OECD countries. This will probably affect the nature of consumption response to a change in fiscal policy. Nevertheless, we decide to trade off this with the fact that OECD data are of higher-quality. A future extension would be to compare results obtained from the OECD data set with those from a group of non-OECD countries.

With respect to the effect of fiscal policy over the business cycle, there have been several recent empirical studies that have contributed to the literature. Gali and Perotti (2003) discuss whether the potency of discretionary fiscal policy during recessions has altered for the EMU countries after the imposition of the Stability and Growth Pact[27]. The authors 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 the presence of any non-linearity on the sign and intensity of discretionary fiscal policy response[28]. 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

[26] These are Australia, Austria, Belgium, Canada, Germany, Denmark, Spain, Finland, France, UK, Greece, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Sweden, US.

[27] They conclude that, so far, there has not been any significant change in the discretionary fiscal policy actions of the EMU members.

[28] Lane (2003), as well, discusses the role of fiscal policy over the cycle, focusing on the limitations for fiscal policy to act in a countercyclical manner in less developed economies.

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% deficit increases by 0.08% of potential GDP more for every extra party or spending minister". Finally Gavin and Perotti (1997) analyze the fiscal properties of fiscal policy in Latin American countries. Their focus is on the behavior of fiscal balance and government revenue and expenditure in recessions and expansions.

These last two studies are closest to what we are planning to investigate, however, we will use several definitions of recessions or Bad times. The first definition of Bad times describes a mild slowdown in economic activity, i.e. a country is in Bad time in year t if its real GDP growth is less than one percent. Therefore we define the first dummy variable D1 which takes the value 1 if a country faces a slowdown in economic activity and 0 otherwise. Out of total 477 observations D1 takes the value 1 in 98 cases, 0 in the rest 379. The second definition used is related to periods of severe recession, hence real GDP growth is below zero. Hence D2 takes the value 1 in case of zero or negative growth in real GDP and zero otherwise (Gavin and Perotti (1997)). This definition generates 50 country-year observations of severe recession and 427 cases of normal or good times. The third measure used D3 is related to the change in unemployment rate. It equals 1 when the change in unemployment is greater or equal to zero, and zero otherwise. Unemployment rate is know to be affected the most during upturns and downturns of economic activity, therefore it is more likely that its changes provide us a better picture of the cyclical conditions of the economy. As expected this definition produces more country-year observations that are characterized as slowdowns. Specifically we have 247 periods of Bad times and 230 periods of normal or Good times. The next measure used is based on the cyclical component of real GDP and has been extracted by applying the Hodrick-Prescott filter (it is a measure of output gap). The dummy variable D4 takes the value 1 when the cyclical component is negative, while it is zero otherwise. According to D4 there are 255 cases of Bad times and 22 cases of normal or Good times. A similar methodology has been applied to unemployment rate series, generating the variable D5. It takes the value 1 in Bad times (when the cyclical component of the unemployment rate is positive), i.e. 256 times and 0 in Normal or Good times, i.e 221 times. The next measure is D6 and takes the value 1 when the change in the output gap is negative, and zero otherwise. It generates 219 cases of Bad times and 258 observations of Normal or Good times. The output gap measure is taken from OECD, Economic Outlook and the potential output measure used is constructed by a standard production function approach. Finally, the last definition D7 is taken from Gavin and Perotti (1997) and specifies as Bad times 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. This definition generates 94 Bad time and 383 Normal or Good time observations. These alternative measures used capture relatively well the economic downturns that many countries have experienced in the early 1980s, 1990s and 2000s.

With respect to the role of credit constraints on the effects of fiscal policy actions on private consumption, we follow previous work done 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. A limitation that we currently face with respect to this measure is that it is available only until 1994[29]. 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 in a low LTV ratio before 1995 are either reassigned in the high LTV ratio group or remain in the low LTV group. Both cases are examined until new information is available[30].

4.1 Model Specification and Estimations

The benchmark model specification that will be tested is related to the work of Perotti (1999) and Attanasio and Browning (1995). Our first attempt will be to extract the unanticipated component of fiscal policy change. In principle we would expect the U-type individuals to react only to unanticipated changes in fiscal policy, whereas the LC type individuals are expected to change their consumption both after anticipated and unanticipated changes in their disposable income. However, a fraction of both types of individuals switches from unemployment to employment after the fiscal policy change, facing a different future than before. This implies that the fraction of individuals belonging to this group should be thought of reacting to anticipated (and unanticipated)

[29] Effort has been put in updating the information available.

[30] 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 are adjusted to the sample used in the current study.

fiscal policy changes that makes them switch status, and alters their PDV of expected disposable income. Therefore the change in the present discounted value of expected disposable income should be included in the regressions to pick up these effects. Note that the change in the PDV of the expected disposable income incorporates the knowledge available to the consumer until the time of the fiscal change. Hence the benchmark model specification that should be estimated is:

$$\Delta C_t = \alpha_1 \varepsilon_1^G + \alpha_2 \Delta T_1 + \alpha_3 \Delta Y_{1/PDV} + \alpha_4 D_1 \varepsilon_1^G + \alpha_5 D_1 \Delta T_1 + \alpha_6 D_1 \Delta Y_{1/PDV} \tag{18}$$

ε_1^G is the fiscal shock and α_1 gives us the effect on consumption in Good or Normal times. D_1 is a dummy variable taking the value 1 in Bad times and 0 in Good times, hence α_4 gives us the effect on Bad times. ΔT_1 i.e. the change in taxation following the spending shock decided in period t=1 can be written as $\Delta T_1 = \beta_1 \Delta T_{1/\varepsilon_1^G} + \varepsilon_1^T$, where $\Delta T_{1/\varepsilon_1^G}$ represent changes in taxation following ε_1^G, i.e. the indirect effect of taxation on consumption, and ε_1^T is the direct effect of any discretionary tax change, it is thought of being a tax shock (we exclude cyclical movements in taxation). In that case substituting the new expression for ΔT_1 in equation 18 we see that the effect of the fiscal shock in Good times would be $\alpha_1 + \alpha_2 \beta_1$, in Bad times it would be $\alpha_4 + \alpha_5 \beta_1$; while the effect of any tax shock would be given by α_2 and α_5 in Good and Bad times, respectively. The $\Delta Y_{1/PDV}$ component represents the change in PDV of disposable income of both U and LC type of individuals that is driven by changes in their employment status, netting out any change in the value of consumption of employed and unemployed individuals following the fiscal shock, i.e. we can write it as $\Delta Y_{1/PDV} = x_{1/\varepsilon_1^G}(Y^E_{1/PDV} - Y^{Un}_{1/PDV})$, and this is the effect captured by α_3 in Good times and by α_6 in Bad times. Therefore, we are assuming that the changes in the value of consumption (i.e real wage and tax effects) for individuals that change employment status in time t=1: $x_{1/\varepsilon_1^G}(\Delta Y^E_{1/PDV} - \Delta Y^{Un}_{1/PDV})$ are picked up by ε_1^G and ε_1^T, whereas the net employment effect should be captured by α_3 or α_4, respectively in Good and Bad Times. However, it is difficult to separate these effects in practice. Therefore the equation to be estimated would look like:

$$\Delta C_t = (\alpha_1 + \alpha_2 \beta_1)\varepsilon_1^G + (\alpha_4 + \alpha_5 \beta_1) D_1 \varepsilon_1^G + \alpha_2 \varepsilon_1^T + \alpha_5 D_1 \varepsilon_1^T + \alpha_3 \Delta Y_{1/PDV} + \alpha_6 D_1 \Delta Y_{1/PDV} + u_1 \tag{19}$$

so the coefficients of ε_1^G and ε_1^T should capture any unanticipated effects of fiscal policy changes, while the coefficients of $\Delta Y_{1/PDV}$ in Good or Bad times will capture the anticipated fiscal policy changes that increase disposable income[31].

In order to construct the variable used to proxy $\Delta Y_{1/PDV}$, and to deal with the endogeneity of current income changes with the fiscal variables, we follow Perotti (1999) and Attanasio

[31] Keep in mind that we have abstracted from defining a specific process that describes how disposable income evolves over time, avoiding to explicitly state how disposable income is affected by fiscal policy and other control variables. Therefore, all the effects driven by variables not incorporated in the analysis that affect economic activity and private consumption could be summarized by adding to the above equation an additional (error) term like u_1.

and Browning (1995) in predicting the change in the PDV of expected disposable income using only lagged information. Therefore we predict $\Delta Y_{1/PDV}$ with the fitted values ($\Delta \hat{Y}_t$) from the regression[32]:

$$\begin{aligned}\Delta Y_t &= dum_{t-1} + dum_{t-1} * \Delta Y_{t-1} + \Delta Y_{t-1} + dum_{t-2} + dum_{t-2} * \Delta Y_{t-2} + \Delta Y_{t-2} + \Delta TL_{t-1} + \Delta TL_{t-2} \\ &+ \Delta G_{t-1} + \Delta G_{t-2} + \Delta C_{t-2} + \Delta C_{t-2} * cdum + cdum + tdum \end{aligned} \quad (20)$$

i.e. we regress the change in households disposable income (ΔY_t) on main and interacted effects of the first and second lagged values of ΔY_t with dummy variables (dum) indicating the state of the economy, 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)[33], and on second lagged value of the change in consumption and its interaction with country specific dummies ($cdum$) (following Attanasio and Browning (1995), in order to capture country specific consumption dynamics). Finally, $tdum$ are year dummies that control for global economic developments[34].

To get consistent estimates of the coefficients of 19 we need to exclude any feedback on fiscal policy variables due to economic activity. Therefore, we should not consider the autonomous component of fiscal policy changes driven by cyclical movements in economic activity. The focus should be on discretionary policy changes of unanticipated nature. Discretionary policy changes, as is discussed in 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

[32] The fiscal variables used are G_t: current government disbursments, excluding interest, T_t: current government receipts, excluding interest. 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 changes will have different effects in private consumption when government consumption or taxation is 10 percent or 30 percent of GDP). All variables are from OECD, Economic Outlook.

[33] 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.

[34] Four different specifications have been examined combining the use of unadjusted and cyclically adjusted measures for ΔTL, as well as, including and exluding $\Delta Y_{t-1}$and dum_{t-1} and all the interaction terms related with them.

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*"[35].

In order to extract $\varepsilon_1^G, \varepsilon_1^T$,the fiscal policy shocks, following Perotti (1999) we perform OLS on the following system of equations[36]:

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

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 Perotti (1999), 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 Economic Outlook (2003), Giorno et al (1995), and Van den Noord (2002).

Notice that in order to capture the effect of credit or liquidity constrained consumers we should estimate 19 for the two groups of country-decades observation, that are characterized by different degrees of development of consumer credit and mortgage markets. The larger the fraction of liquidity constrained individuals, the weaker the wealth effect of the PDV of future taxation, particularly in Bad times when liquidity constraints bind (especially in the case than the LC-type individuals are not paying taxes). Hence, we expect that a government spending shock would have positive and stronger effect on private consumption in Bad times in countries characterized by less developed consumer credit and mortgages markets. In addition, in more financially developed countries a government spending shock could even have negative, Non-Keynesian effects on private consumption, if the negative wealth effects on taxation is very strong. Similarly, a tax shock is expected to have a stronger negative effect on consumption in periods of economic slowdown, especially 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

[35] Bad and Good times in Perotti (1999) correspond to periods of high debt and deficit, not recession and expansions (or normal times) as in our analysis. To deal with the feedback from GDP to changes in taxation, Blanchard and Perotti (2002) suggest as remedy the use of quarterly data.

[36] As in Perotti (1999) in each regression the constant is allowed to change in 1975.

access to consumer credit is limited.

4.2 Estimation Results[37]

4.2.1 Bad versus Good times

Before turning to examine the role of liquidity constraints in the transmission of fiscal shocks in recessions and expansions, we analyze first 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 effect that the interaction of the degree of developments of consumer credit markets (as described by the LTV ratio) with fiscal policy shock has on private consumption in upturns and downturns of economic activity.

We estimate two versions of the model. The first one forces a common coefficient for the proxy $\Delta\hat{Y}_t$ in Good and Bad times, while in the second $\Delta\hat{Y}_t$ is allowed to have a different effect in Bad and Good times. In both cases we include a full set of country and year dummy variables Both versions of the model are estimated by the Prais-Winsten estimation procedure allowing for panel-level heteroskedastic AR(1) error structure[38]. Table 1 presents the estimates when using the D1 and D7 definitions of Bad times[39]. Both describe a mild slowdowns in economic activity rather than recession episodes; the first one applies to all countries in the sample, whereas the second one is country specific. Under both definitions a government spending shock has a positive Keynesian effect on private consumption in Normal or Good times and negative non-Keynesian effect in Bad Times. This asymmetric response in expansions and contractions of economic activity is puzzling, it might be the case that government spending affects in a different manner, in recessions and expansions, the determinants of disposable income, i.e. real wages, employment, asset returns etc., providing different incentives for consumers to adjust their consumption. For example, if in a recession period higher spending leads to a higher rate of return, then consumers that do not face credit constraints might be willing to postpone consumption for the future pe-

[37] Our data run from 1975 to 2001 for Australia, 1972-2001 for Austria, 1972-2001 for Belgium, 1982-2002 for Canada, 1970-2001 for Germany, 1982-2001 for Denmark, 1979-2001 for Spain, 1975-2001 for Finland, 1971-2001 for France, 1970-2001 for the UK, 1975-2001 for Greece, 1979-2001 for Ireland, 1981-2001 for Italy, 1970-2001 for Japan, 1972-2001 for Netherlands, 1976-2001 for Norway, 1977-2001 for Portugal, 1970-2001 for Sweden, and 1970-2001 for the US.

[38] 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.

[39] The "Bad time" effect of the spending shock is given by: bg= $\hat{\varepsilon}_1^G * dum1$. The "Normal or Good time" spending shock is given by ng= $\hat{\varepsilon}_1^G * (1 - dum1)$. Analogously for the case of tax shocks: bt= $\hat{\varepsilon}_1^{TCA} * dum1$, and nt= $\hat{\varepsilon}_1^{TCA} * (1 - dum1)$. Similarly b$\Delta\hat{Y}_t = dum1 * \Delta\hat{Y}_t$, and n$\Delta\hat{Y}_t = (1 - dum1) * \Delta\hat{Y}_t$.

riod; however the other side of the coin should be that fiscal policy does not have this kind of effect in Good times and it is not clear why it should be so. Tax shocks have negative effects on private consumption, being bigger in periods on economic expansion. A tax cut in normal times increases more private consumption than a tax cut during a recession (or a tax hike in Good times reduces consumption more than it increases following a tax cut in Bad times). There is clearly an expectational mechanism working in this case. As was shown by Gavin and Perotti (1997) when industrial economies are in recession, fiscal balances move towards a deficit (mainly due to higher spending though). It might be the case that during Bad times individuals will not consume their extra income increase due to the expectation that they might need it in the future, in case that the economy fails to move out of the recession (or that they will have to pay even higher taxes in the future if the fiscal balances have deteriorated and the economy is still in recession). Notice, that both with respect to taxation and spending, in Bad times, there might at work an expectational mechanism similar to the one described by Bertola and Drazen (1993)[40]. The proxy of the change in the PDV of expected disposable income enters significantly in all versions of the model, being much more important in normal times. Using yearly data it is possible that we have not managed to extract the unanticipated component of fiscal policy actions. Nevertheless, the theoretical model predicts both an effect from the unanticipated and the anticipated component (though the disposable income variable) of fiscal policy actions, though the second one might be biased by all other factors affecting disposable income.

[40] Bertola and Drazen (1993) show that an increase in goverment spending may be expansionary (boost private spending) if agents' behavior is based on the expecatition that high levels of goverment spending is unsustainable and will be cut as soon as it reached a given threshold. However, if the expected stabilization does not take place when the threshold is reached then a small increase in goverment spending can lead to a large reduction of private demand.

Table 1

Variables	D1	D1	D7	D7
bg	-0.1687(-1.17)	-0.2637(-2.34)**	-0.1809(-1.59)	-0.2009(-1.75)*
ng	0.1526(2.40)**	0.1697(2.73)***	0.1408(2.15)**	0.1531(2.34)**
bt	-0.2954(-2.41)**	-0.1786(-1.51)	-0.2389(-1.88)*	-0.2199(-1.72)*
nt	-0.5652(-13.41)***	-0.5379(-13.64)***	-0.5527(-13.75)***	-0.5602(-14.18)***
$\Delta\hat{Y}_t$	0.1687(2.90)***	-	0.1949(3.33)***	-
b$\Delta\hat{Y}_t$	-	0.1134(1.90)*	-	0.1434(2.34)**
n$\Delta\hat{Y}_t$	-	0.2194(3.86)***	-	0.2068(3.65)***
Nobs	477	477	477	477
NofBad Times	98	98	94	94
R^2	0.662	0.677	0.658	0.671
X^2(and p-values):bg=ng	4.76(0.029)	11.56(0.0007)	6.12(0.0134)	7.28(0.0070)
bt=nt	4.21(0.0403)	8.22(0.0041)	5.44(0.0197)	6.40(0.0114)
$b\Delta\hat{Y}_t = n\Delta\hat{Y}_t$	-	10.19(0.0014)	-	2.70(0.1002)
Adj.R^2 of first regres.	0.886		0.882	

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

Nevertheless, our analysis has not focus exclusively on recession periods where output is declining. Therefore the next step is to examine the case of negative output growth country-years observations (D2). Though, as can be seen in Table 2 the estimates of the fiscal variables do not change much; tax shocks appear to become more important in Bad Times, but they are still lacking behind their Good times effect on consumption.

Next we consider the D6 definition of Bad times (Table 2), i.e. the years during which a country's change in output gap is negative. This includes both periods of negative real GDP growth and positive changes in the unemployment rate, however it also captures periods where real GDP growth (change in the unemployment rate) is positive (negative) but declines (increases) with respect to the previous period. Therefore this definition produces more country-year observations of Bad times than before. This broader notion of economic slowdown generates a similar reaction of private consumption following a tax shock in Bad and Good Times. Moreover, it raised slightly the effect of a spending shock in Good times (in Bad times it is not significant) and reduces the importance of the disposable income proxy, especially in Good times[41]. When considering D3

[41] The D4 and D5 definitions of Bad times (255 and 256 number of Bad time episodes, respectively) generated a similar pattern of consumption responses following a tax shock and disposable income changes as the D1 and D2 definitions. The spending variables were insignificantly estimated.

which tracks cyclical fluctuations in unemployment rate (it generates 247 year country observations of Bad times), a tax shock produces strong, negative and significant effects only in Bad times, while spending affects positively private consumption both in Bad and Good times but it is insignificantly estimated. Finally the proxy of disposable income changes enters with a positive sign but it is much less important, especially in Good or Normal times[42].

Table 2

Variables	D2	D2	D6	D6
bg	-0.1597(-1.25)	-0.1757(-1.35)	0.0214(0.24)	-0.0021(-0.02)
ng	0.1434(2.30)**	0.1574(2.53)**	0.1836(2.19)**	0.1937(2.33)**
bt	-0.3674(-2.31)**	-0.3613(-2.27)**	-0.5659(6.27)***	-0.5608(-6.16)***
nt	-0.5412(-13.35)***	-0.5527(-13.91)***	-0.5453(-12.23)***	-0.5316(-11.37)***
$\Delta\hat{Y}_t$	0.1930(3.18)***	-	0.1416(2.34)**	-
b$\Delta\hat{Y}_t$	–	0.1373(2.17)**	-	0.1306(2.06)**
n$\Delta\hat{Y}_t$	-	0.1980(3.44)***	-	0.1657(2.52)**
Nobs	477	477	477	477
NofBad Times	50	50	219	219
R^2	0.655	0.669	0.651	0.653
X^2(and p-values):bg=ng	4.72(0.0298)	5.51(0.0190)	1.75(0.1855)	2.56(0.1093)
bt=nt	1.12(0.2900)	1.35(0.2447)	0.05(0.8304)	0.09(0.7642)
$b\Delta\hat{Y}_t = n\Delta\hat{Y}_t$	-	2.24(0.1345)	-	0.85(0.3577)
Adj.R^2 of first regres.	0.882		0.886	

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

There is clearly an asymmetric effect of fiscal policy actions over the business cycle for the countries under consideration. Tax surprises appear to affect consumption changes in Bad times equally or more than in Normal or Good times, when the definition of Bad times used refers to cyclical fluctuations in economic activity (to the extent that these can be captured by the use of yearly data). When examining cases of deep recession episodes, with negative output growth, the tax effects are stronger in Normal or Good times. A spending shock affects private consumption positively and significantly only in Good times. In several cases the spending shock has a negative effect in private consumption in periods of low economic activity.

Hence, if a country's discretionary fiscal policy actions follows a countercyclical rule, then, roughly speaking, a tax cut during a severe recession will increase consumption by less than the

[42] Results for D3, D4 and D5 definitions of Bad times are not presented here for brevity, though they are available upon request.

reduction of consumption following a tax increase during an upturn. Furthermore, a spending cut in Good times will exert a further stabilizing force (more than the spending cut itself) by curbing back private demand, whereas a spending increase in Bad times will not manage to boost private consumption expenditure. This implies that fiscal policy is more effective in muting booms rather than mitigating economic slumps, as long as the effect on private consumption is concerned. Alternatively, fiscal policy is a more effective mechanism in lengthening expansions than shortening recessions in OECD countries.

4.2.2 The Effect of Credit Constraints

Now we turn to 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[43].

The results presented in Table 3 make use of the first definition of Bad times D1 The benchmark estimations are based on the Perotti (1999) country-year high and low LTV groups[44]. As we see from columns 1 and 2 of Table 3 the estimates for the high LTV group are analogous to those for the whole OECD sample. Specifically, a government spending shock has a positive and significant effect on the change in private consumption expenditure in normal times in high LTV countries, on the contrary its effect is negative but not significant in Bad times. Moreover the effects are statistically different in the two states of nature as we see from the relevant X^2 tests. Tax effects are of a Keynesian nature both in upturns and downturns, with its impact being stronger in periods of robust economic expansion. Disposable income affects positively private consumption expenditure. In addition, column 2 indicates that the a spending shock has a negative, non-Keynesian, and statistically significant effect on private consumption; this points to the presence of a "crowding out" effect in private consumption during slowdowns following a spending shock in countries characterized by more developed consumer credit markets. Furthermore, it appears that an increase in (expected) disposable income leads to stronger and more significant increases in private consumption in periods of economic expansion. The other side of the coin is that a decline in disposable income generates a bigger negative effect in consumption in Good rather than in

[43] As before we estimate two versions of equation 19. 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 contacted 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.

[44] Adjusted $R^2 = 0.886$ from the regression that was estimated in order to get the predicted value of household disposable income.

Bad times, because individuals smooth their consumption by using part of their savings in Bad times.

Table 3: D1

Variables	1	2	3	4
-	H-LTV	H-LTV	L-LTV	L-LTV
bg	-.1484 (-1.14)	-.2781 (-2.20)**	.0777(0.50)	.0276 (0.19)
ng	.2110 (2.69)***	.2291 (3.00)***	-.0652 (-0.66)	-.0934 (-1.03)
bt	-.2699 (-1.76)*	-.1579 (-1.06)	-.3170 (-2.27)**	-.0527 (-0.40)
nt	-.6355 (-16.24)***	-.6025 (-15.92)***	-.0612 (-0.70)	-.1019 (-1.26)
$\Delta\hat{Y}_t$	.1066 (2.20)**	-	.3238 (3.28)***	-
$b\Delta\hat{Y}_t$	-	.0763 (1.48)	-	-.3274 (-2.35)**
$n\Delta\hat{Y}_t$	-	.1608 (3.12)***	-	.4526 (4.81)***
Nobs	224	224	253	253
NofBad Times	45	45	53	53
R^2	0.804	0.803	0.4617	0.5677
X^2 (and p-values) for bg=ng	5.78 (0.0162)	12.04(0.0005)	0.61(0.4354)	0.49(0.4827)
bt=nt	5.24(0.0220)	8.41(0.0037)	2.30 (0.1297)	0.09(0.7597)
$b\Delta\hat{Y}_t = n\Delta\hat{Y}_t$	-	8.04(0.0046)	-	39.41(0.0000)

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

In the low-LTV group a spending shock generates positive effects in Bad times and negative effect in Good times, however in both cases they are not statistically significant. A tax shock reduces private consumption. Column 2 suggests that its effect is much stronger in recessions. This implies that a tax cut can boost private consumption especially in Bad times where a larger fraction of the individuals faces binding liquidity constraints. However, as we see in column 4 the tax effect in bad times is much smaller when we distinguish between the effect of a change in disposable income in upturns and downturns. Disposable income has a positive and significant effect as expected for countries with limits in consumer credit availability. Hovever, in Bad times its effect is negative, it appears to pick up part of the negative effect induced on consumption by the tax shock Hence, an increase in taxation seems to decrease disposable income and consumption, implying that the unanticipated component of the tax shock is much smaller than initially thought. Therefore a tax cut, even if it is anticipated will boost private consumption by increasing disposable income for households that face binding liquidity constraints. Furthermore, this might be due to the fact that the estimated tax surprises are not truly exogenous, being biased more in Bad times,

thus affecting their difference. Nevertheless, as we see in both cases (columns 3 and 4) we cannot reject the null hypothesis: bt=nt.

The results obtained so far might be biased, though, because the definition of Bad times used captures slowdowns in economic activity and not severe recession episodes. Next we examine D7, which is less broad definition, plus country specific[45] This definition generates only 4 less country-year observations of Bad time episodes than before for the high LTV group, therefore it is not surprising that it produces roughly similar results as we see from Table 4. Notice once again that the coefficient estimates for the high LTV group resemble those in the whole sample case when using the D7 definition, or better, actually drive the results of the whole OECD sample.

Table 4: D7

Variables	1	2	3	4
-	H-LTV	H-LTV	L-LTV	L-LTV
bg	-.2145 (-1.67)*	-.2356 (-1.82)*	.0782 (0.50)	.0688 (0.46)
ng	.2076 (2.65)***	.2211 (2.82) ***	-.0516 (-0.53)	-.0728 (-0.80)
bt	-.1821 (-1.02)	-.1767 (-0.99)	-.3228 (-2.29)**	-.0835 (-0.61)
nt	-.6212 (-16.55)***	-.6263 (-17.02)***	-.0653 (-0.76)	-.1059 (-1.31)
$\Delta\hat{Y}_t$	.1279 (2.53)**	-	.3150 (3.51)***	-
$b\Delta\hat{Y}_t$	-	.0927 (1.80)*	-	-.2461 (-1.84)*
$n\Delta\hat{Y}_t$	-	.1409 (2.86)***	-	.4470 (5.16)***
Nobs	224	224	253	253
NofBad Times	41	41	53	53
R^2	0.8013	0.8091	0.4603	0.5502
X^2 (and p-values) for bg=ng	8.16 (0.0043)	9.30 (0.0023)	0.51 (0.4736)	0.68 (0.4086)
bt=nt	5.82 (0.0158)	6.11 (0.0134)	2.33 (0.1267)	0.02 (0.8911)
$b\Delta\hat{Y}_t = n\Delta\hat{Y}_t$	-	2.14 (0.1433)	-	30.39 (0.0000)

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

Therefore, despite the fact that fiscal policy appears to have asymmetric effects in recessions and expansion in high and low LTV countries, the results for low LTV countries are not statistically significant. Moreover, private consumption changes are affected mostly by disposable income changes, (that incorporate anticipated fiscal policy actions that affect household's disposable income). Nevertheless, our analysis has not focus exclusively on severe recession periods where output is declining, so the next step will be to examine the case of negative output growth recession episodes D2.

[45] Adjusted $R^2 = 0.8824$ for the regression that was estimated to get $\Delta\hat{Y}_t$.

Table 5: D2

Variables	1	2	3	4
-	H-LTV	H-LTV	L-LTV	L-LTV
bg	-.2141 (-1.61)	-.2327 (-1.71)*	.3302 (1.73)*	.3675 (1.94)*
ng	.2158 (2.88)***	.2322 (3.09) ***	-.0505 (-0.56)	-.0649 (-0.76)
bt	-.2247 (-1.11)	-.2412 (-1.19)	-.7646 (-4.56)***	-.4681 (-2.85)***
nt	-.6192 (-16.51)***	-.6278 (-17.10)***	-.0219 (-0.29)	-.0498 (-0.70)
$\Delta\hat{Y}_t$	.1263 (2.48)**	-	.3316 (3.72)***	-
$b\Delta\hat{Y}_t$	-	.0866 (1.68)*	-	-.3277 (-2.08)**
$n\Delta\hat{Y}_t$	-	.1359 (2.79)***	-	.4233 (4.78)***
Nobs	224	224	253	253
NofBad Times	21	21	29	29
R^2	0.8004	0.8103	0.4983	0.5550
X^2 (and p-values) for bg=ng	8.40 (0.0038)	9.38 (0.0022)	3.27 (0.0705)	4.38 (0.0364)
bt=nt	3.70 (0.0543)	3.53 (0.0604)	16.43	5.36 (0.0205)
$b\Delta\hat{Y}_t = n\Delta\hat{Y}_t$	-	2.12 (0.1458)	-	22.93 (0.0000)

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

The results obtained for the low LTV group, in periods of deep recessions become more significant as shown in Table 5[46]. Fiscal policy actions, tax or expenditure changes have strong Keynesian effects on private consumption in Bad times. Additionally, disposable income changes have a big effect on consumption, picking up part of the negative effect of a tax hike on consumption expenditure in Bad Times, through the reduction of disposable income as a consequences of a (partly anticipated) fiscal policy action. Therefore, given that an economic slump might be economically and politically more costly in a country where consumers have limited access to credit (possibly because it lengthens the period of slowdown in economic activity), fiscal policy actions that increase consumers' disposable income might be warranted in order to drive the economy out of the recession by boosting private demand. The results obtained for high LTV countries are similar as for the previous two cases considered (as well as the whole sample case)[47].

Next we examine broader and milder notions of Bad times based on output gap and cyclical fluctuations in real output and unemployment rate. Next (Table 6) we examine the implications

[46] The results remain qualitatively the same when estimating with pooled OLS and using Newey-West corrected standard errors (bg coefficients are more significant), as well as, when including not cyclically adjusted tax measures in the equation for predicting the PDV of change in expected disposable income.

[47] Adjusted $R^2 = 0.8824$ from the regression ran in order to get the proxy of PDV of expected disposable income.

of using the D6 definition of Bad time episodes. With respect to the high LTV countries[48] there are two differences, the first one that disposable income becomes marginally insignificant, and the second that tax effects on private consumption become equally important for Good (Normal) and Bad times. Government spending is insignificant both in Bad and Good times in low-LTV group, though it enters each regression with positive sign in Bad and negative in Good times. Tax surprises affect private consumption negatively in the low LTV group, especially in Bad times. Disposable income enters with a positive sign both in Bad and Good times, though it appears to be significant only in periods of economic expansion[49].

Table 6: D6

Variables	1	2	3	4
-	H-LTV	H-LTV	L-LTV	L-LTV
bg	.0611 (0.63)	.0530 (0.54)	.0331 (0.26)	.0043 (0.03)
ng	.2808 (2.51)**	.2873 (2.58)**	-.0620 (-0.56)	-.1009 (-0.92)
bt	-.6269 (-6.21)***	-.6258 (-6.20)***	-.3232 (-2.71)***	-.2106 (-1.76)*
nt	-.6162 (-14.59)***	-.6118 (-13.96)***	-.0267 (-0.29)	-.0489 (-0.54)
$\Delta\hat{Y}_t$	.0866 (1.65)	-	.3290 (3.59)***	-
$b\Delta\hat{Y}_t$	-	.0837 (1.56)	-	.1311 (1.21)
$n\Delta\hat{Y}_t$	-	.0950 (1.62)	-	.4778 (5.05)***
Nobs	224	224	253	253
NofBad Times	104	104	115	115
R^2	0.7927	0.7925	0.4717	0.5148
X^2 (and p-values) for bg=ng	2.30 (0.1294)	2.58 (0.1082)	0.32 (0.5709)	0.40 (0.5279)
bt=nt	0.01 (0.9169)	0.02 (0.8933)	3.78 (0.0520)	1.11 (0.2930)
$b\Delta\hat{Y}_t = n\Delta\hat{Y}_t$	-	0.11 (0.7451)	-	13.83 (0.0002)

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

Therefore, even when using this broader notion of slowdown in economic activity there are indications of asymmetric effects of fiscal policy in upturns and downturns between countries characterized by different degree of developments of credit markets, with the low-LTV group being affected mostly in Bad times. However when examining other definitions of Bad times that characterize movements in economic activity over the cycle, such as the change in unemployment rate D3, it appears that both groups of countries respond more in downturns, especially with respect to tax surprises. Government spending changes are stronger in Bad times for the low LTV

[48] High LTV group estimates are analogous to the whole sample case.

[49] Adjusted $R^2 = 0.9055$ from the regression estimated in order to get the proxy of PDV of expected disposable income.

group but still not significant; with respect to high LTV group, spending shocks have positive but not significant effects in both cases. Note that this definition produces 112 and 135 observations of Bad times, respectively for the high and low LTV group. When considering instead the cyclical component of unemployment rate D5 or the cyclical component of real GDP D4, both extracted by applying a Hodrick-Prescott filter, as measures of cyclical variation of economic activity we get 120 and 126 data points of Bad times in the high LTV group and 136 and 129 observations in low LTV group, respectively for D5 and D4. In both cases the spending shocks do not produce significant effects for high and low LTV categorizations. Whereas tax shocks are more significant and have bigger negative effects in Good times for high LTV group. In low LTV group, tax shocks have bigger negative effects in Bad times when the D4 definition is used, while they are slightly bigger in Good times, though insignificantly estimated, under the D5 definition[50].

Hence, fiscal policy has asymmetric effects over the business cycle. In addition, fiscal policy actions appear to be more effective in boosting private consumption and moving the economy out of a recession in countries with less developed financial markets for consumer credit. This happens because the larger fraction of liquidity constrained individuals for whom constraints become binding, the smaller the negative wealth effect of a spending shock. Nevertheless, this holds only for deep recession episodes. Unexpected fiscal policy policy changes undertaken following cyclical movements in economic activity, such as those described by variations in the cyclical component of the unemployment rate, that do not necessarily correspond with declining output, generate similar patterns of consumption responses in both groups of countries, i.e consumption is affected more by tax shocks in Good or Normal times. Notice, though, that, even in low LTV countries, credit constraints become binding for a larger fraction of the population during deep recession episodes rather than when the unemployment rate increases.

In the presence of countercyclical fiscal rule, during severe recession episodes fiscal policy in the high LTV group shares the stabilization properties of the whole sample case, i.e. fiscal policy is more effective in muting booms rather than mitigating economic slumps, as long as the effect on private consumption is concerned. Alternatively, fiscal policy actions are more able in lengthening expansions than shortening recessions. Whereas, in the low LTV group, an increase in spending boosts private expenditure in Bad times, but it will practically leave unaffected private consumption in Good times. A tax cut in Bad times increases consumption, while a tax hike in Good or Normal times will not have any effects on private consumption expenditure. This suggests that fiscal policy is more effective in boosting private demand and pushing the economy

[50]In all these cases, the high LTV group consumption responses to fiscal variables' changes resemble those of the whole sample. Results for D3, D4, and D5 definitions of Bad times are not presented here for brevity, but are available upon request.

out of a recession in countries where consumer access to credit is limited. Whereas, in periods of high economic activity it is much less effective. Put it differently, fiscal policy is more potent in shortening recessions rather than in enhancing economic expansions.

4.2.2.1 Robustness Test However, 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. 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. Next step 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.

Examining the D1 and D7 definitions of Bad times we see that results remain qualitatively similar both for the high and low LTV categories, the only difference is in quantitative terms. Specifically the coefficients of all fiscal variables become bigger, in absolute terms, during Bad times in low LTV group. This implies that the effect of fiscal policy on private consumption is stronger in recessions in the low LTV group, when less 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 less than before or no countries are included in the low LTV group after 1995[51]. When consider the case of D2 definition of Bad times[52] we realize the effects remain qualitatively similar in case we reassign the above stated groups of countries from low to high LTV categorization after 1995[53].

When analyzing the implications for the D3 definition of Bad times the results are analogous as before after excluding Belgium and Netherlands from the low LTV group. When repeating the same exercise for the other two groups of countries we find that fiscal policy affects in similar manner private consumption in Bad times, however it is much stronger especially when considering

[51] When we assign Belgium and Netherland to the high LTV countries after 1995 the high LTV observations increase from 224 to 231 and the low LTV move from 253 to 246. After including Japan, Portugal and Austria in the high LTV group after 1995 the observation become 252 and 225 respectively in high and low LTV countries. Finally, after including Greece and Italy in the high LTV group the observations used in the regressions are 259 and 218 respectively for the high and low LTV groups. Notice that this way we increase the number of Bad times assigned in the high LTV countries.

[52] Notice that the number of Bad times for high and low LTV countries will not change after assigning Belgium and Netherlands to the high LTV group. But it will become 22 and 28, respectively for high and low LTV countries when reassigning Belgium, Portugal and Japan, this due to Japan having a negative output growth for the 1998 time period. Reassigning Greece and Italy to the high LTV group does not have any effect on the number of Bad times in the two LTV groups. The results are available upon request.

[53] Similarly when examining the case of D6.

tax changes for the low LTV group, i.e the coefficient changes from -.2327 (t-stat: -2.51) to -.2457 (-2.63) when the second group is added, then it becomes: -.4140 (-3.68) after adding Japan, Portugal and Austria in the high LTV group for the period after 1995; finally after adding the last two countries it changes to: -.4428472 (-3.79)[54]. Notice that at the same time high LTV results remain practically the same[55]. Hence in the event of convergence of financial development and harmonization of financial systems in OECD countries overtime, fiscal policy (tax changes) in the low LTV group seems to have had greater impact on consumption in Bad times, and this is driven mainly by the prior to 1995 observations in the low LTV group[56]. An explanation for these could be that fiscal policy has become less effective in boosting output and private demand overtime, an argument in line with empirical evidence presented by Perotti (2002)[57].

Nevertheless, our result might be affected by several factors, the most important is that cyclical fluctuations in the unemployment rate do not always correspond to severe economic slumps. Moreover, business cycles and recessions and expansions can be better characterized by the use of quarterly data. It might be the case that the categorization in high and low LTV countries is not that important in terms of describing liquidity constraints, because OECD countries are converging in terms of credit availability to consumers, however, there might be other factors, even cultural factors, that determine consumers behavior towards credit so that the LTV ratio is not that important.

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,

[54] The coefficients reported are from the regression that allow for different effect of disposable income in Bad and Good times (B. The corresponding values for the coefficients of $b\Delta\hat{Y}_t$ and $n\Delta\hat{Y}_t$ are: [0.0517 (t-stat:0.54), 0.497 (5.65)], [0.0541 (0.56), 0.514 (5.77)], [0.032(0.34), 0.514(5.78)] and [0.024(0.25), 0.495(5.36)], respectively for each case considered.

[55] Similar is the pattern of results when considering D4 and D5 definitions of Bad times. In the case of D5 tax surprises have stronger negative effects in Good times in the benchmark model and after adding Belgium and Netherlands in the high LTV group. However, when reassigning the rest of the countries to the high LTV group tax changes appear to be stronger and more significant in Bad times in low LTV countries (Note that disposable income enters with positive and significant coefficient both in Good and Bad times).

[56] This point needs to be verified with the use of new data on financial institutions and consumer access to credit.

[57] Perotti (2002) examined the fiscal multiplier in the US, UK, Germany, Australia, and New Zealand and first discussed the possibility of declined potency of fiscal policy overtime. Tagkalakis (2003) established the declined efficacy of fiscal policy in affecting output in the UK.

implying that the wealth effect of taxation will be weak. This idea was investigated empirically on a panel of nineteen OECD countries.

After characterizing periods of expansions and recessions using alternative definitions, we showed that, in OECD countries, tax surprises affect consumption changes in Bad times equally or more than in Normal or Good times, when the definition of Bad times used refers to mild cyclical fluctuations in economic activity. While, in deep recession episodes, the tax effects are stronger in Normal or Good times. A spending shock affects private consumption positively and significantly only in Good times. In several cases the spending shock has a negative effect on private consumption in periods of low economic activity.

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 in upturns and downturns. With respect to the high LTV group, the results obtained resemble (or drive) those of the whole OECD sample. Therefore, fiscal policy actions are more effective in boosting private consumption and moving the economy out of a recession in countries with less developed consumer credit markets. This happens because a fiscal policy change (anticipated or unanticipated) that increases disposable income is translated into higher consumption, the larger the fraction of credit constrained individuals for whom constraints are binding in Bad times, and the smaller the negative wealth effect of a spending shock that would discourage consumption changes. Nevertheless, this holds only for episodes of severe recession. Unexpected fiscal policy changes taken after cyclical variation of economic activity, such as those described by variations in the cyclical component of the unemployment rate, that do not necessarily correspond with declining output, generate similar patterns of consumption responses in both LTV groups, i.e consumption is affected more by tax shocks in Good or Normal times. This can be explained by the fact that, even in low LTV countries, credit constraints become binding for a larger fraction of the population during deep recession episodes rather than following the cyclical movements of the unemployment rate.

Fiscal policy, in the high LTV group, has been more effective in lengthening expansions rather than in mitigating economic slumps, with respect to its effects on private consumption expenditure. On the contrary, in the low LTV group, fiscal policy has been more effective in boosting private demand and pushing the economy out of a recession. In periods of high economic activity it has been much less effective.

The normative aspect of this analysis points to the need for discretionary fiscal policy actions

in countries where consumers have limited access to credit markets. 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 several caveats in our analysis that can be treated, though, as future extensions. First of all characterizing cyclical fluctuations with yearly data is clearly problematic, therefore future work should be directed towards conducting the analysis with quarterly data. Moreover, quarterly data will allow a better identification of the fiscal policy shocks. It is quite likely that our spending and tax shocks are not purified from GDP feedbacks within a year. The LTV ratio[58] categorization although informative of the degree of consumer credit constraints (as thoroughly explained by Jappelli and Pagano (1994) and Perotti (1999)) might not be valid anymore in case the nineteen OECD countries are converging in terms of their degree of financial development. 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[59].

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. Last but not least, there is scope for a fully developed theoretical model; this could incorporate also distortionary taxation and debt financing of government spending.

6 References

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[58] Keep in mind that the LTV ratio is available to us is until 1994, effort has been put in updating the information, as well as using alternative measures of financial development, such as credit to the private sector.

[59] 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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