Fiscal Multipliers in Recessions
Appendix Not for Publications

Matthew Canzoneri
Georgetown University

Fabrice Collard
University of Bern

Harris Dellas
University of Bern

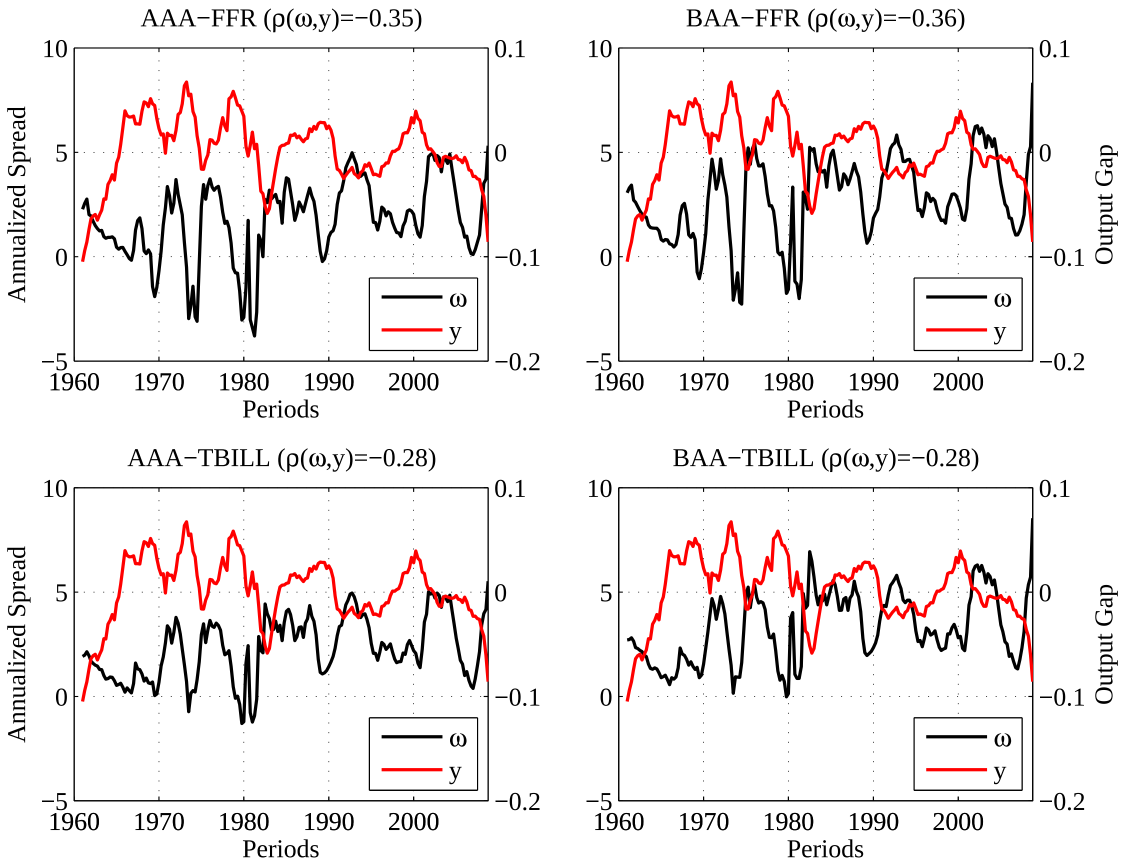
Behzad Diba
Georgetown University

June 6, 2011

In this appendix, we report additional experiments we ran.

Data: We start by reporting, in Figure 1, the evolution of spreads and the output gap. We consider the 4 definition of spread that are reported in the paper. Each figure also report the correlation between the spread and the output gap for each measure. We start

Figure 1: Spread–Output Gap Evolution



by reporting, in Table 1, estimated values of η and α when we vary the definition of loans. We find that the values for both η and α are in the vicinity of the values we obtain in our benchmark estimates. It is however worth noting that the value of the parameter driving the countercyclicality of the spread is larger when business loans are used.

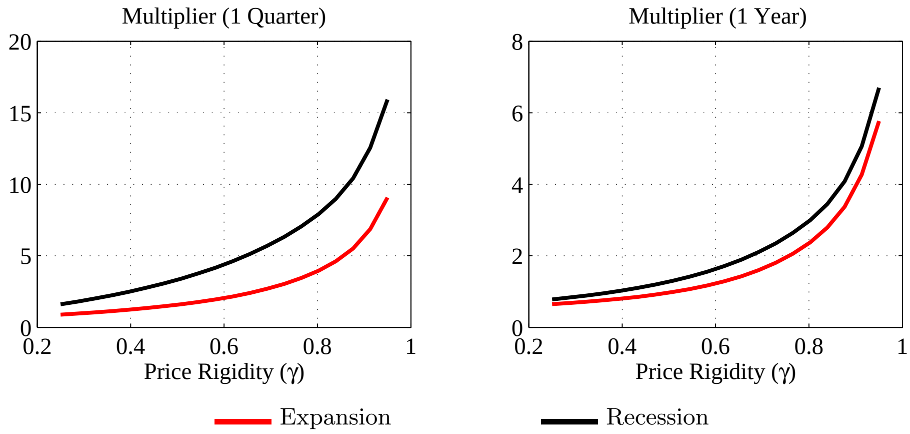
Table 1: Spread Regressions

	Consumer Loans: 1960Q1–2008Q4			
	AAA-FFR	BAA-FFR	AAA-TBILL	BAA-TBILL
η	2.43	3.09	2.70	3.29
	(3.08)	(2.04)	(1.99)	(1.51)
α	30.85	22.79	16.68	14.40
	(12.32)	(8.10)	(7.78)	(5.80)
Lags	2	2	4	4
$\overline{R}^2$	0.83	0.82	0.85	0.86
D.W.	1.94	1.88	1.95	1.87
	Business Loans:1960Q1–2008Q4			
	AAA-FFR	BAA-FFR	AAA-TBILL	BAA-TBILL
η	6.68	5.92	6.40	5.09
	(3.31)	(1.89)	(2.27)	(1.32)
α	50.27	32.79	30.55	21.21
	(17.71)	(9.26)	(10.94)	(6.20)
Lags	2	2	2	2
$\overline{R}^2$	0.83	0.84	0.86	0.87
D.W.	1.95	1.89	1.95	1.87

Note: Standard deviations between parenthesis. The number of lags was determined relying on a likelihood ratio test.

Nominal rigidities: One fact that the paper reveals is that monetary policy interacts a great deal with the level of price rigidity for the size of the fiscal multiplier. Figures 2 reports fiscal multipliers as the degree of nominal rigidity increases when the weight assigned on the output gap is set to zero in the interest rate rule. As can be seen from the

Figure 2: Price Rigidity $\kappa_y = 0$

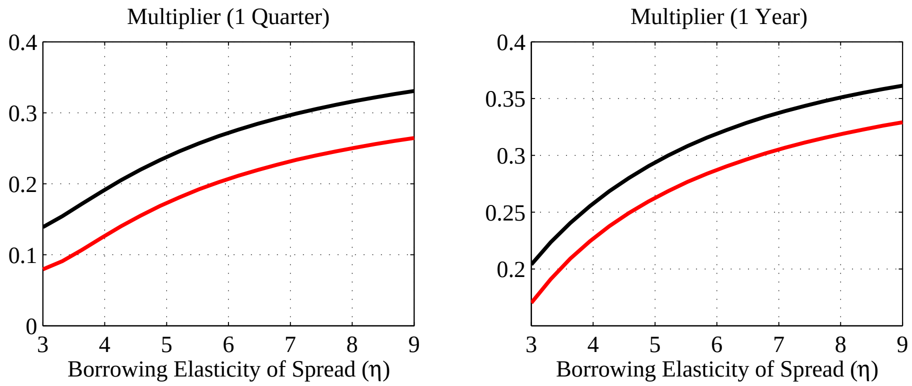


figure, as soon as monetary policy does not try to stabilize the output gap, the output gap is not close by monetary policy anymore. Therefore, the spread remains high. Then two observations follow: *i)* multipliers are bigger than in the case of active monetary policy and *ii)* multipliers increase even for high degrees of price rigidity.

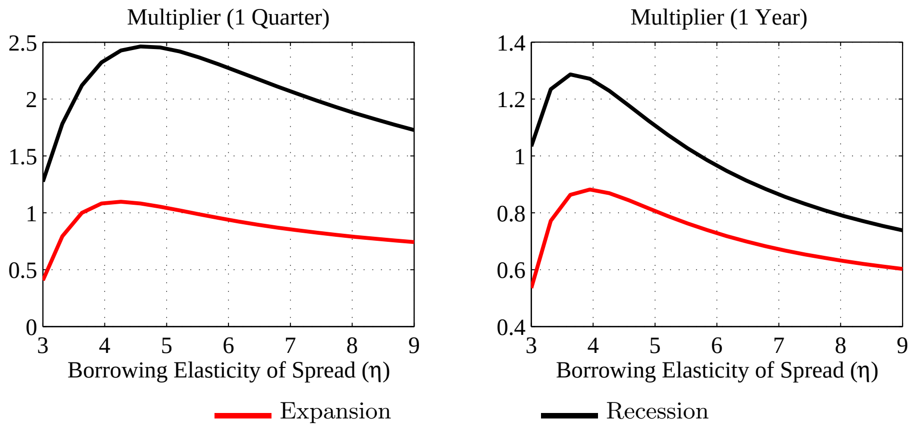
Borrowing Elasticities: We now vary the elasticity of borrowings in the financial cost function. We conduct 2 experiments. One with $\alpha = 0$, which allows us to isolate the very effect of this elasticity (Panel (a) of Figure 3), and one with our benchmark calibration (Panel (b) of Figure 3). Panel (a) shows that the very effect of η. First of all, note that

Figure 3: Borrowing Elasticity

(a) Absence of countercyclical component in financial cost



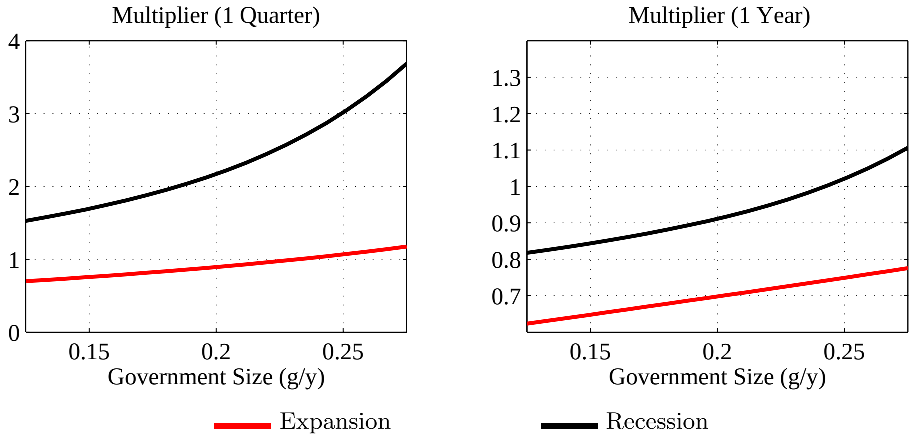
(b) Presence of countercyclical component in financial cost



absent any countercyclical elements in the financial costs, fiscal multipliers are much lower —something we establish in the paper. Second, it is clear that an increase in the elasticity of the spread to borrowings makes the multipliers bigger. The reason is due to the fact that an increase in η increases the spread between the lending and the deposit rates, which magnifies the wealth effects that give rise to an increase in borrowers' consumption. Panel (b) then shows that the interaction between η and α (and monetary policy) is rather complicated and can give rise to reversals in the role of η in generating big multipliers.

The size of the government: Figure 4 reports the evolution of the fiscal multiplier as the size of the government increases. As can be seen from the figure, increasing the size of the government exacerbates the potency and effectiveness of fiscal policy. Indeed, in this case, a 1% shock corresponds to a more sizable level of government spending. On the one

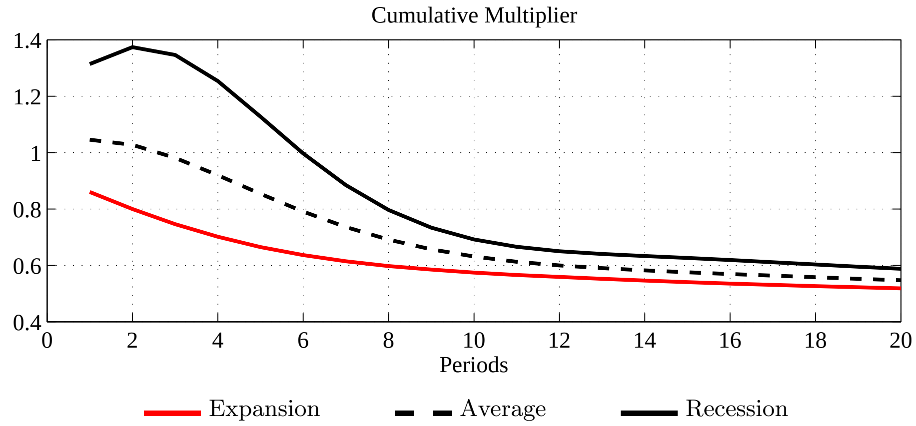
Figure 4: Government Size



hand, because it raises aggregate demand by a larger size, this magnifies the multiplier. On the other hand, because more debt is issued to finance the stimulus, the wealth effect created by the departure from Ricardian equivalence is bigger. Larger multipliers obtain.

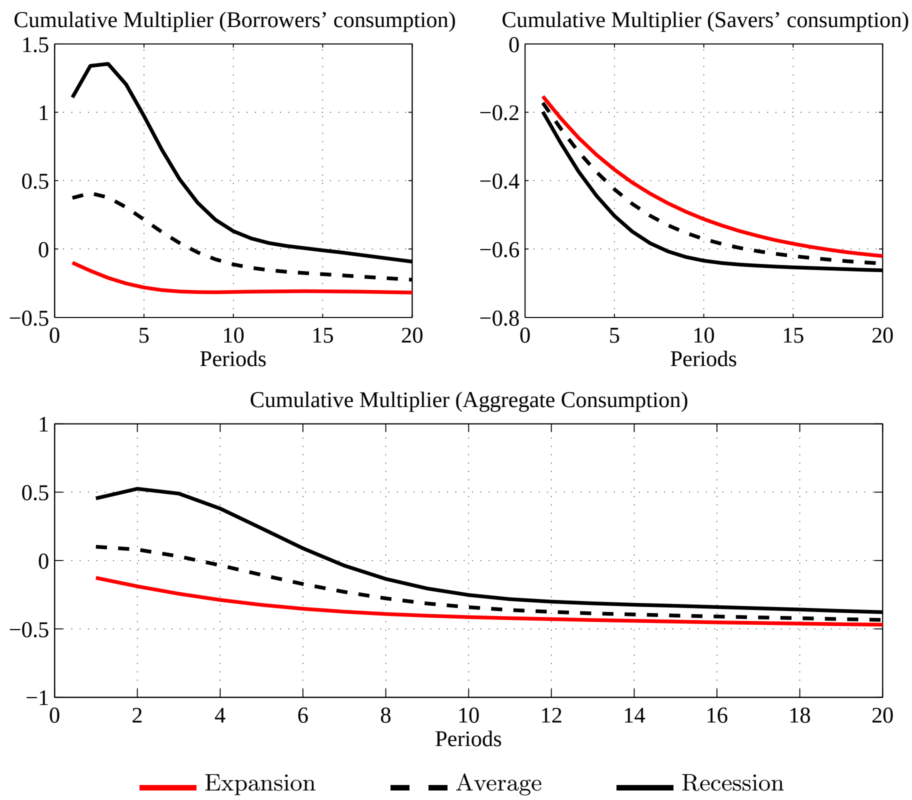
Dynamic aspects: One caveat of our simple framework is that the maximal effect of government spendings is found in the initial period. Figure 5 reports the multipliers in a model featuring habit persistence (habit parameter=0.8) and full backward indexation in aggregate prices. As can be seen from the figure, hump shaed multipliers can easily

Figure 5: Richer Dynamics



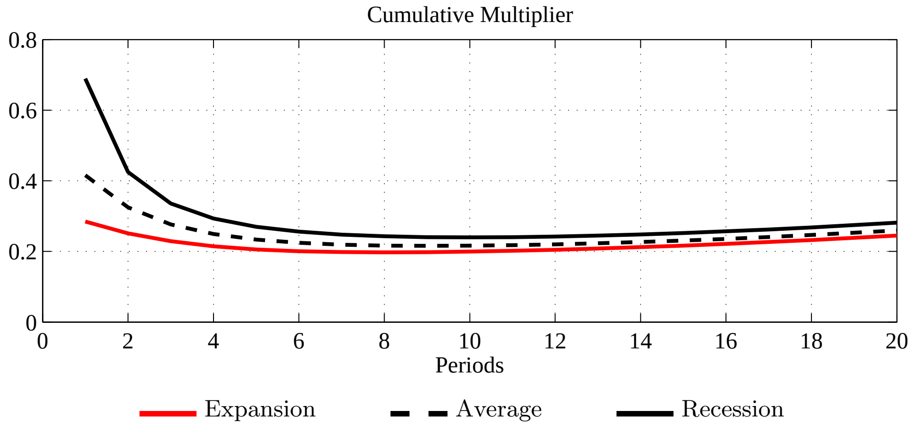
be obtained in the model. However, introducing habit persistence has a cost. Because it exacerbates consumption smoothing, this limits the potency of fiscal policy, which reduces the level of the multiplier. This can be seen from Figure 6 that reports consumption multipliers. Compare to our benchamrk experiments,a s reported in the paper, tconsumption of borrowers responds to a lesser extent to a government spending, which curtails aggregate demand relative to our benchmark situation.

Figure 6: Richer Dynamics: Consumption



Tax Cuts: Figure 7 reports the multipliers associated with a tax cut of 1% rather than a 1% increase in government spendings. Qualitatively, the results are very similar to those obtained in the case of an increase in governement spendings. The multiplier is larger in recession than in a boom. However, from a quantitative point of view, the extent to

Figure 7: Tax Cut



which a tax cut raises output is much lower, certainly below unity even in the case of a recession. The reason is that a tax cut by itself does not directly contribute to raising aggregate demand, and the governement can only count on its ability to raise aggregate consumption. The effect is therefore lower.

Figure 8: Impulse Response Functions: Shock to $\xi^b_{c,t}$

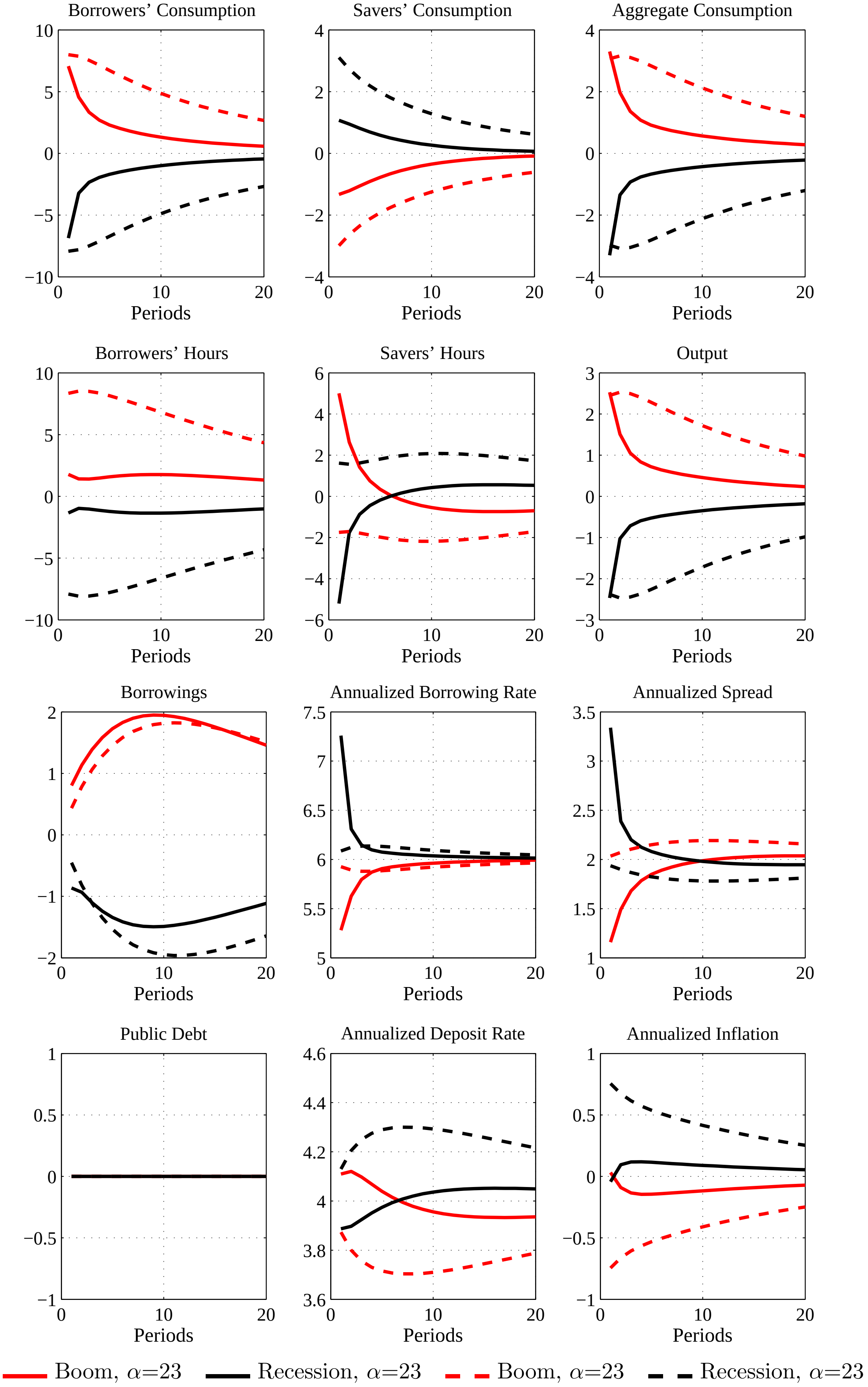


Figure 9: Impulse Response Functions: Shock to $\xi^s_{c,t}$

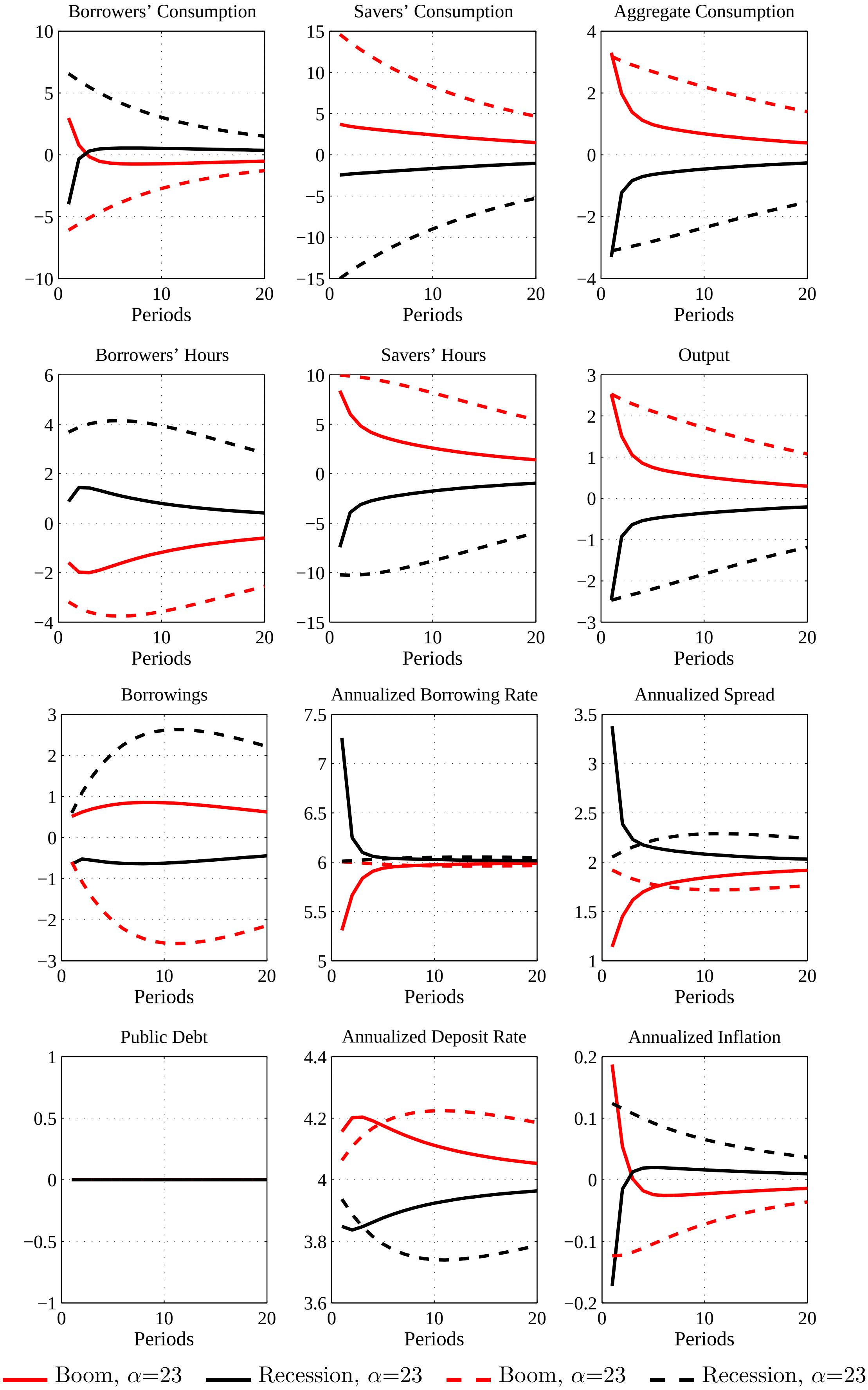


Figure 10: Impulse Response Functions: Shock to $\xi_{g,t}$

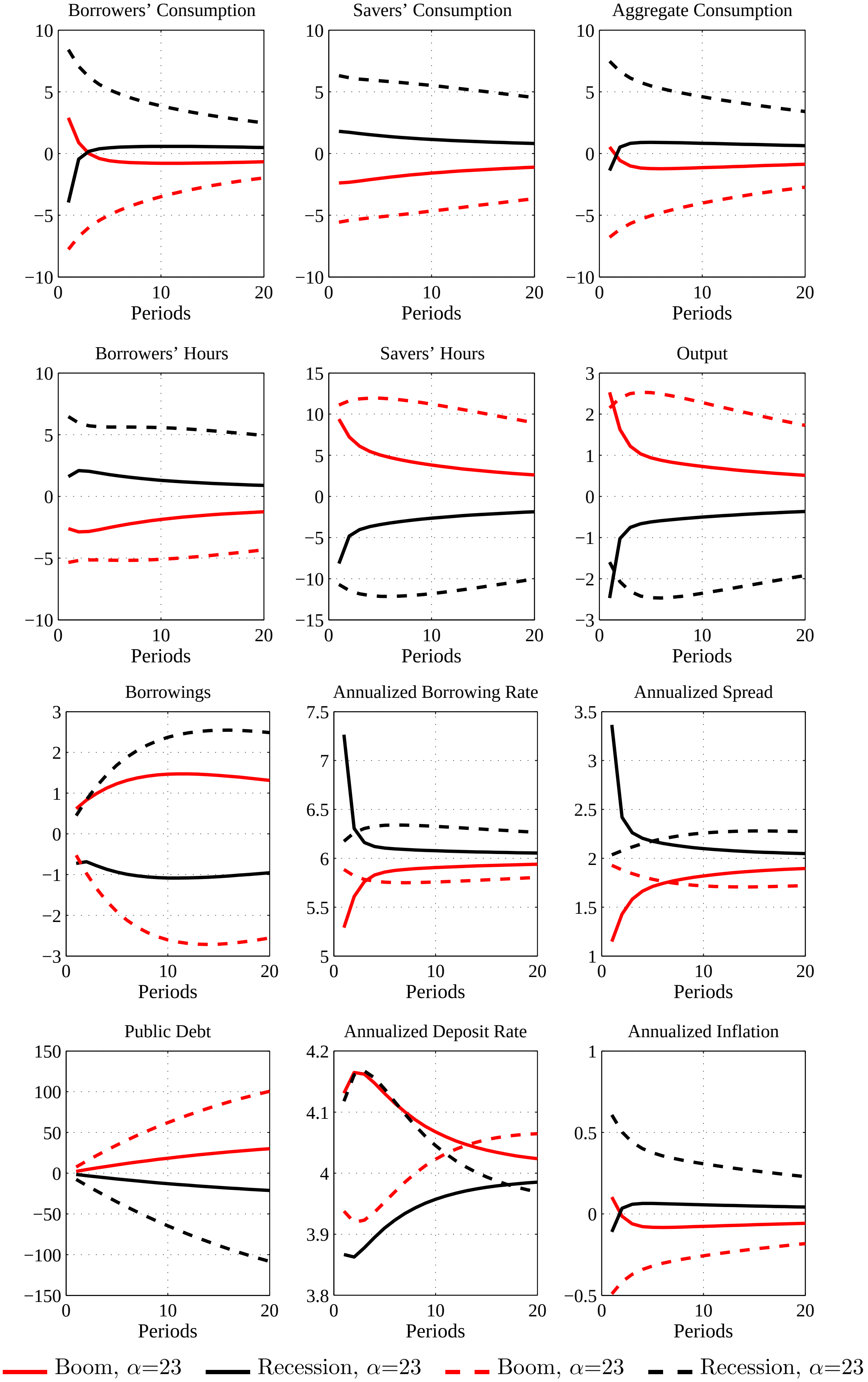


Figure 11: Impulse Response Functions: Shock to $\xi_{h,t}$

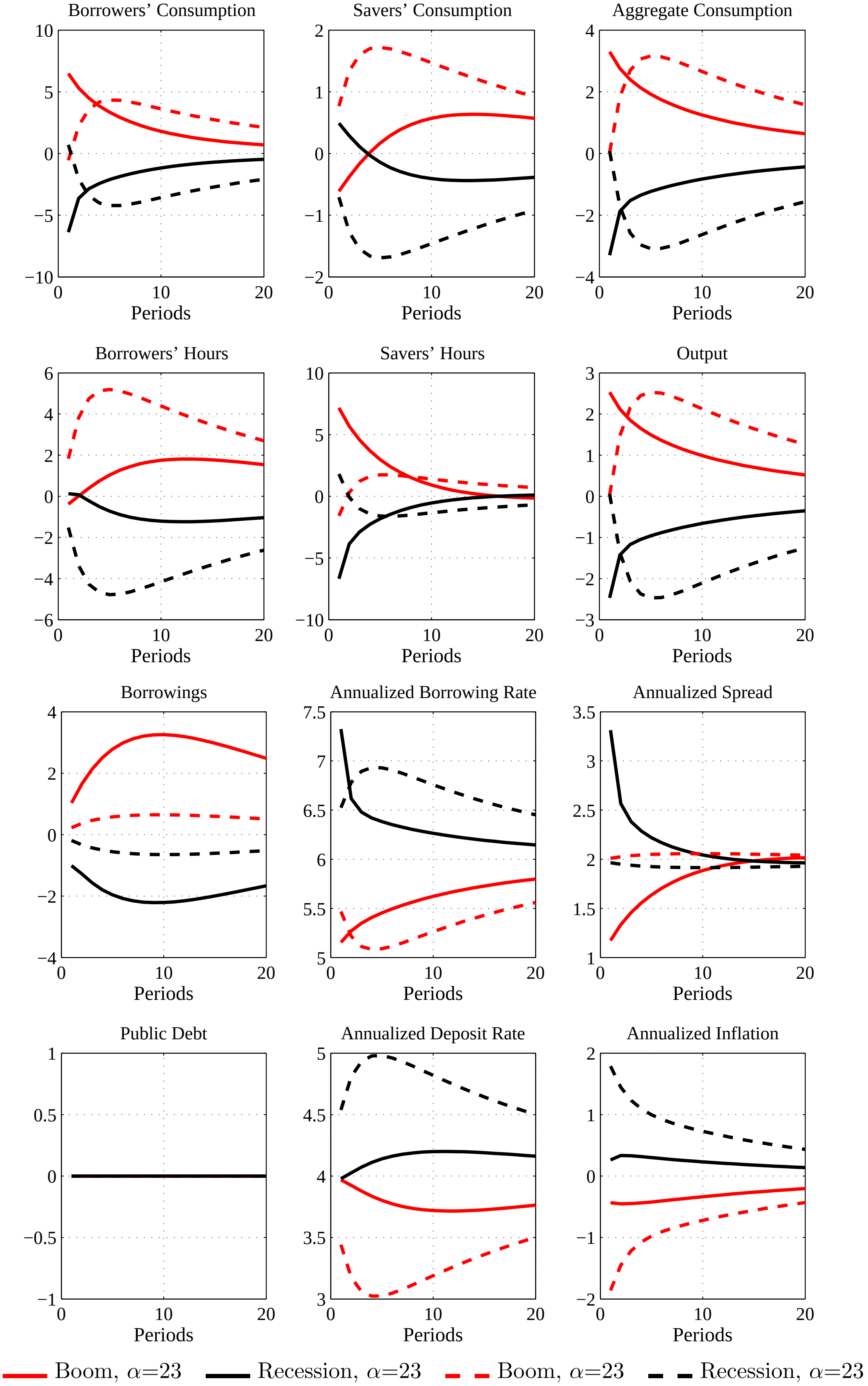


Figure 12: Impulse Response Functions: Shock to $\xi_{\Psi,t}$

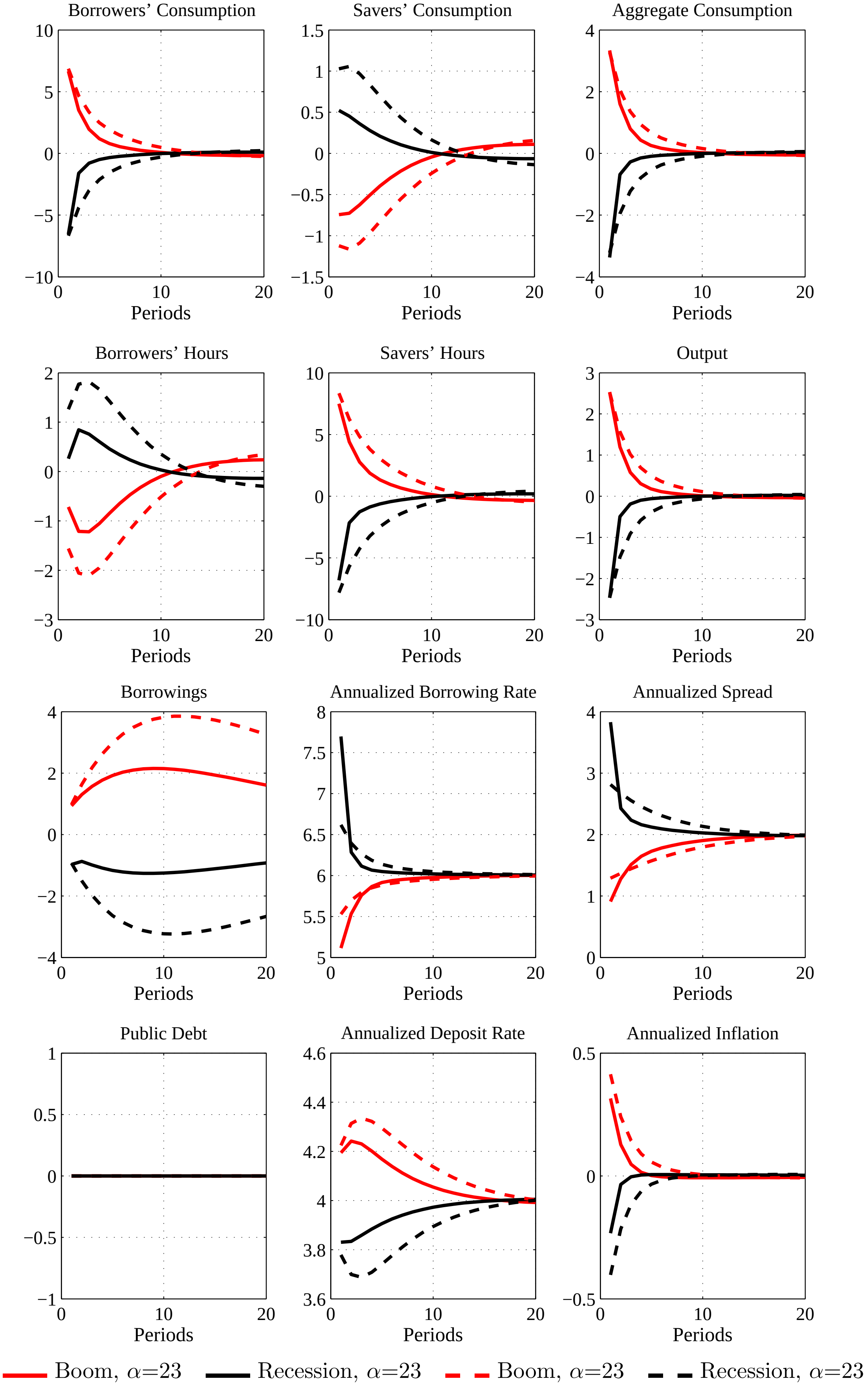


Figure 13: Impulse Response Functions: Shock to $\xi_{y,t}$

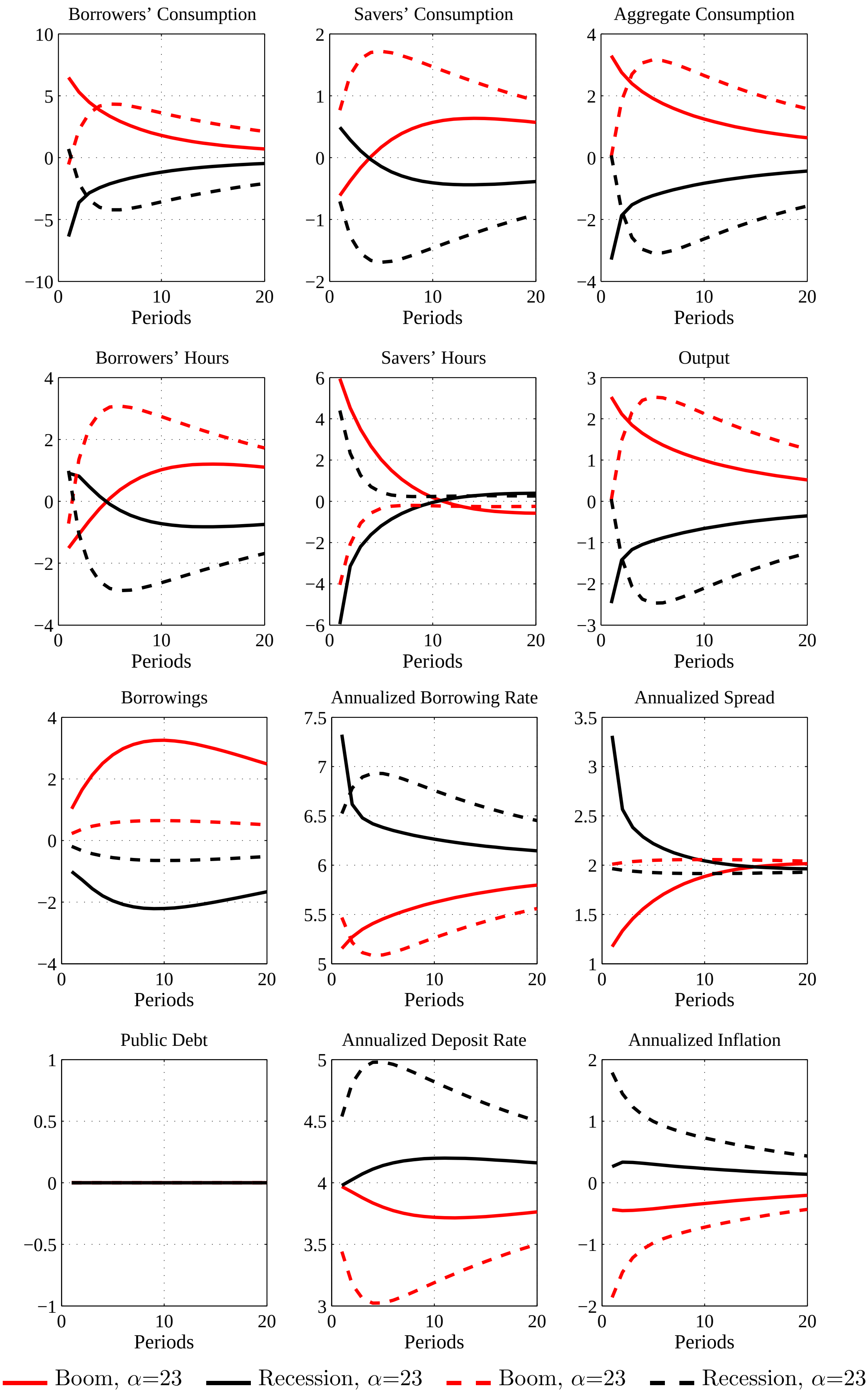
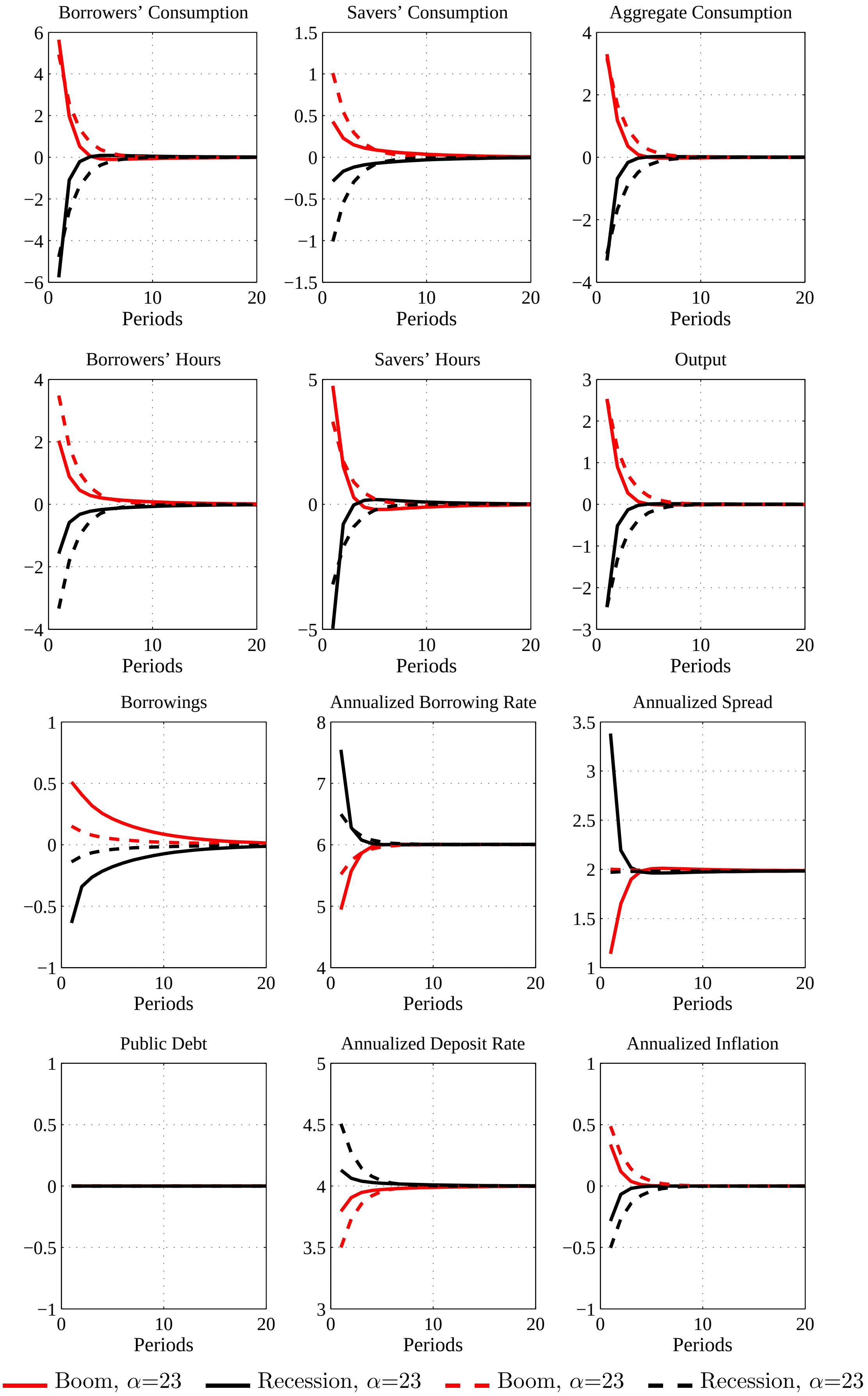
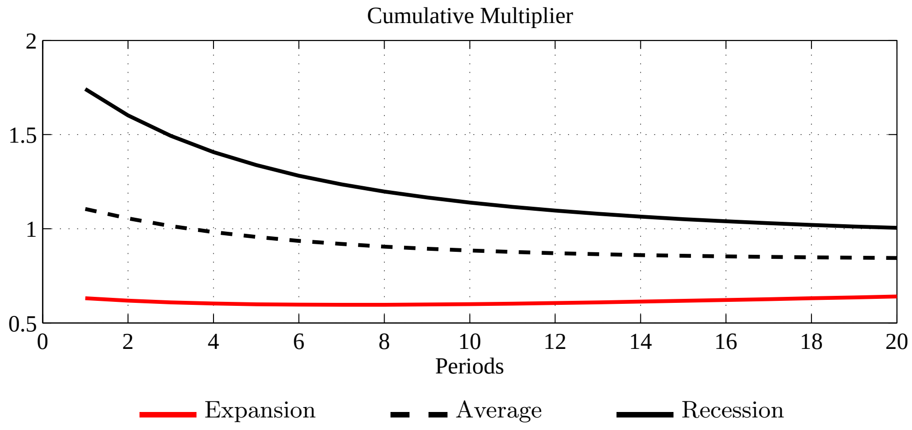


Figure 14: Impulse Response Functions: Shock to $\xi_{i,t}$



Alternative calibration of Utility: In the paper, we rely on Curdia and Woodford parametrization of the utility function. One may however be concerned by the robustness of our results if we were to use a standard parametrization of the utility function. In order to assess the robustness of our results, we set $\overline{\sigma} = 0.75$ and $\nu = 1$, which correspond to more "standard" values of these parameters. The results are reported in Figure 15 and indicate that our results are preserved. More specifically, the impact multiplier associated to a 1% increase in government expenditures is 1.75 in a 2.5% recession. while it is only 0.63 in a boom.

Figure 15: Alternative Calibration of the Utility Function

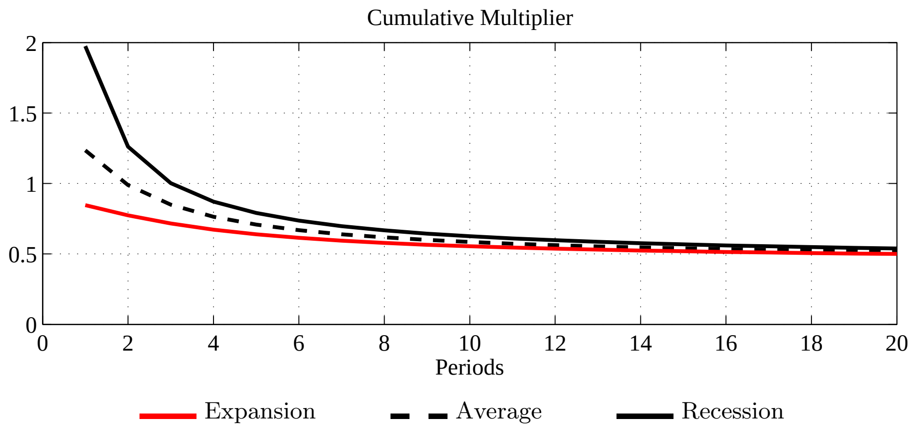


Financial Cost: We now consider the impact of specifying the financial cost in terms of leverage (b/y) rather than in levels of borrowings (b). We now specify the financial cost as

$$\Psi_t\left(\frac{b_t}{y_t}, y_t\right) = \xi_{\Psi,t}\left(\frac{b_t}{y_t}\right)^{\eta} \exp\left(-\alpha\widetilde{y}_t\right) \text{ with } \eta \geqslant 1, \alpha \geqslant 0$$

where we set $\eta = 6.5$ and $\alpha = 16.5$.[1] The results are displayed in Figure 16, and show that the multiplier in a recession is 2, while in a boom it remain below unity (0.84).

Figure 16: Alternative Specification of the Financial Cost



[1]The parameter α is set as its benchmark value (23) minus η.