Solution for Problem Set 1

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October 3, 2025

Basic RBC Model

Q3

Of the seven exogenous shocks simulated, the impulse response functions (IRFs) for six are consistent with the results from the lecture notes. A minor discrepancy was observed in the response to the risk premium shock. The simulation result displays a slight ”hump-shaped” response in the initial one to two quarters, whereas the corresponding plot from the lecture materials shows a more direct and monotonic decay. In addition, I find that in the replication package, the authors set the ”var eb; stderr 1.8513;” I think this is a typo since this makes the IRFs of this shock an order of magnitude larger than the it is in the lecture notes so I modified them to 0.1853 (Same for Q6 and Q7).

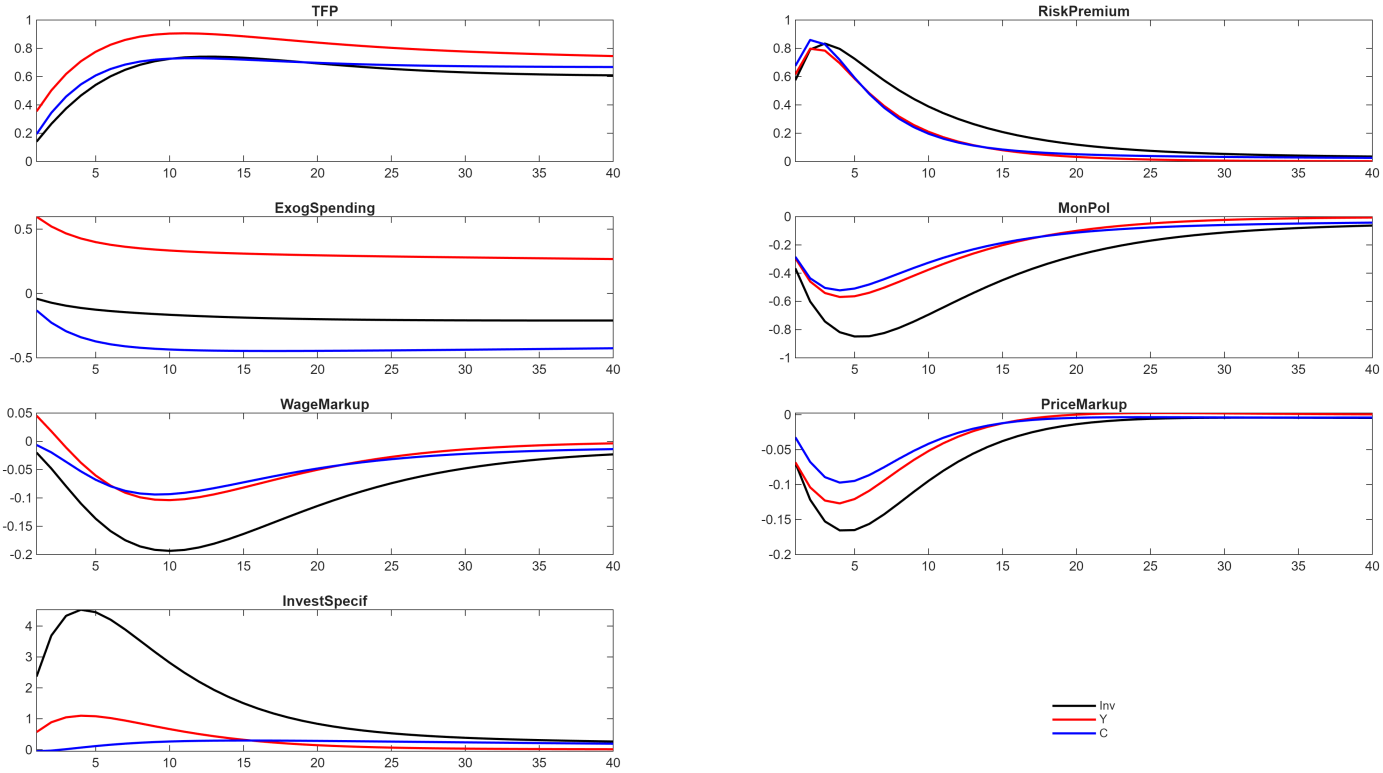

Figure 1: Responses to to all shocks – Y, C, Inv

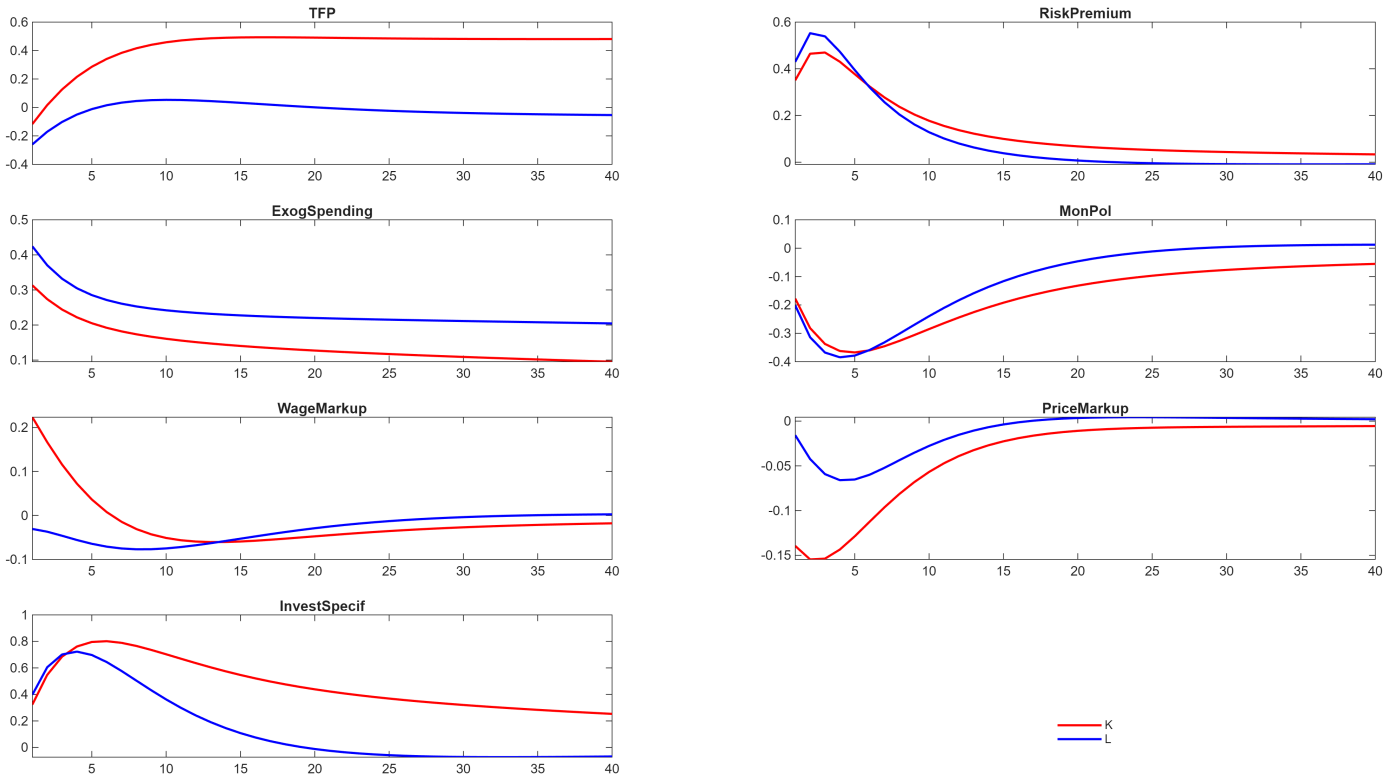

Figure 2: Responses to all shocks – Capital and Labour

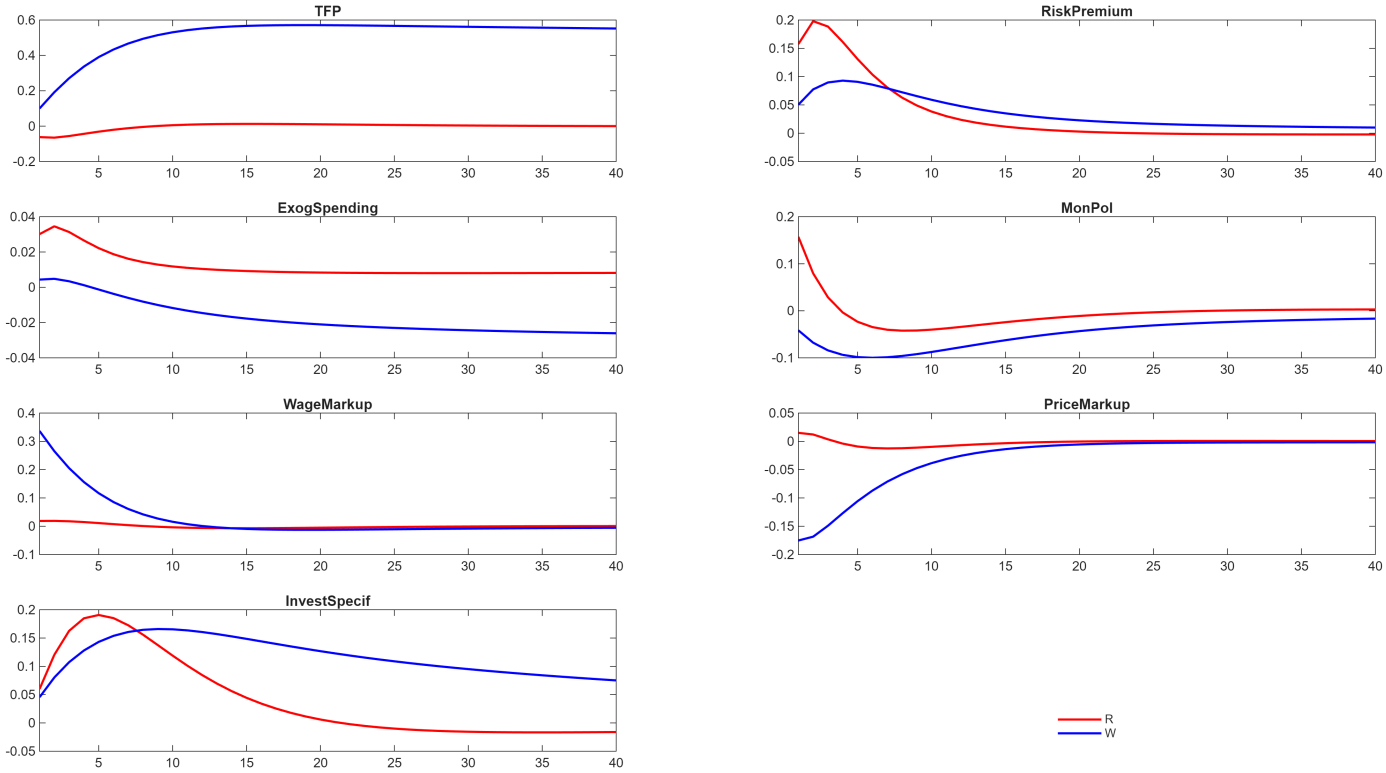

Figure 3: Responses to all shocks – Interest and Wage Rates

Q4&5

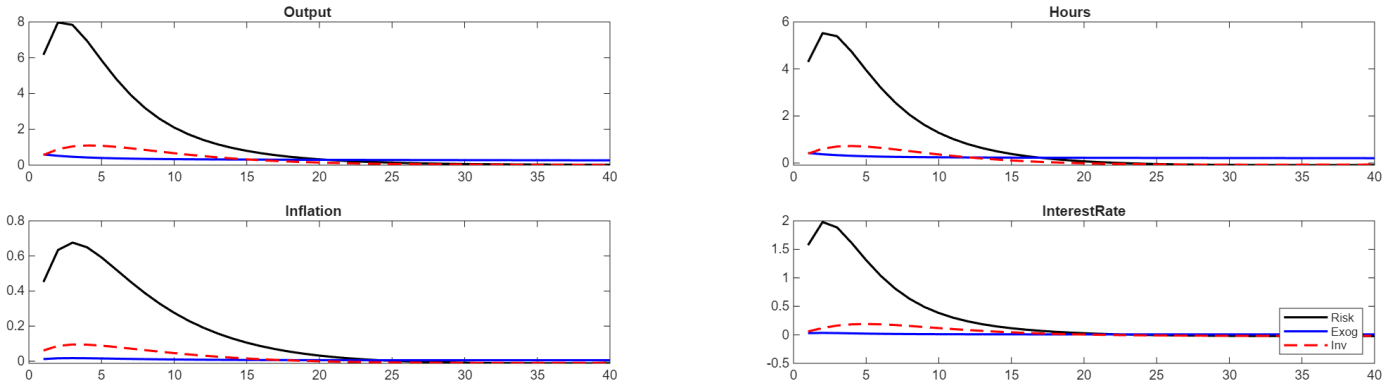

Figure 4: Reproduced Figure2 Under Q4 Specification

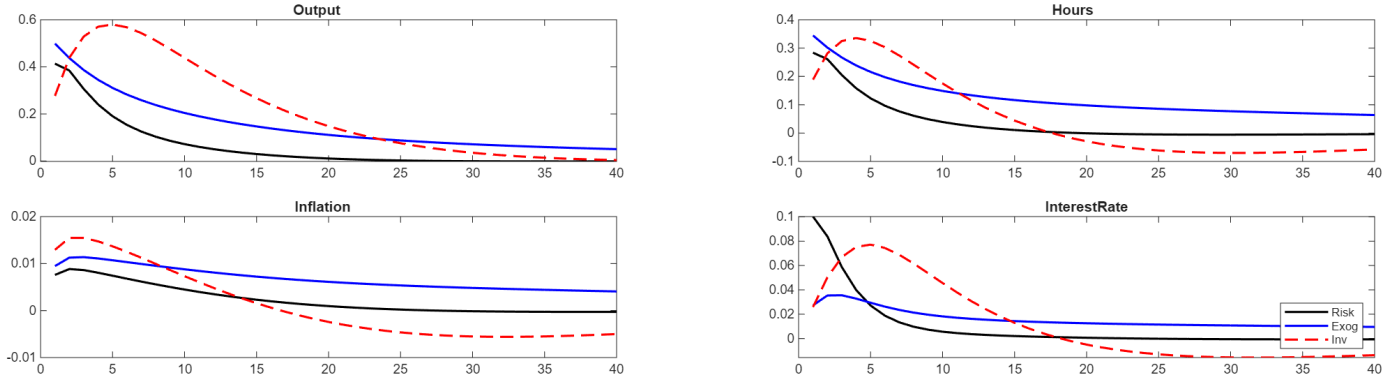

Figure 5: Reproduced Figure2 Under Q5 Specification

Q6

Relative to Q3, the impulse responses in Q6 differ almost exclusively for the ExogSpending shock. For the remaining six shocks, the shapes of the IRFs are essentially unchanged across the two specifications. This difference is a direct consequence of the model modifications. The change from a slow decay in Q3 to a rapid decay in Q6 is explained by the simplification of the shock process from a persistent autoregressive form to a temporary, one-period shock (g = eg;). More critically, the qualitative shift of the aggregate consumption response from negative in Q3 to positive in Q6 is fundamentally driven by the introduction of non-Ricardian households. While the purely Ricardian framework of Q3 generates consumption crowding-out via a negative wealth effect, the Q6 model incorporates rule-of-thumb agents whose consumption rises with current income. This crowding-in effect from the non-Ricardian cohort dominates the Ricardian response, leading to a net increase in aggregate consumption and implying a larger government spending multiplier.

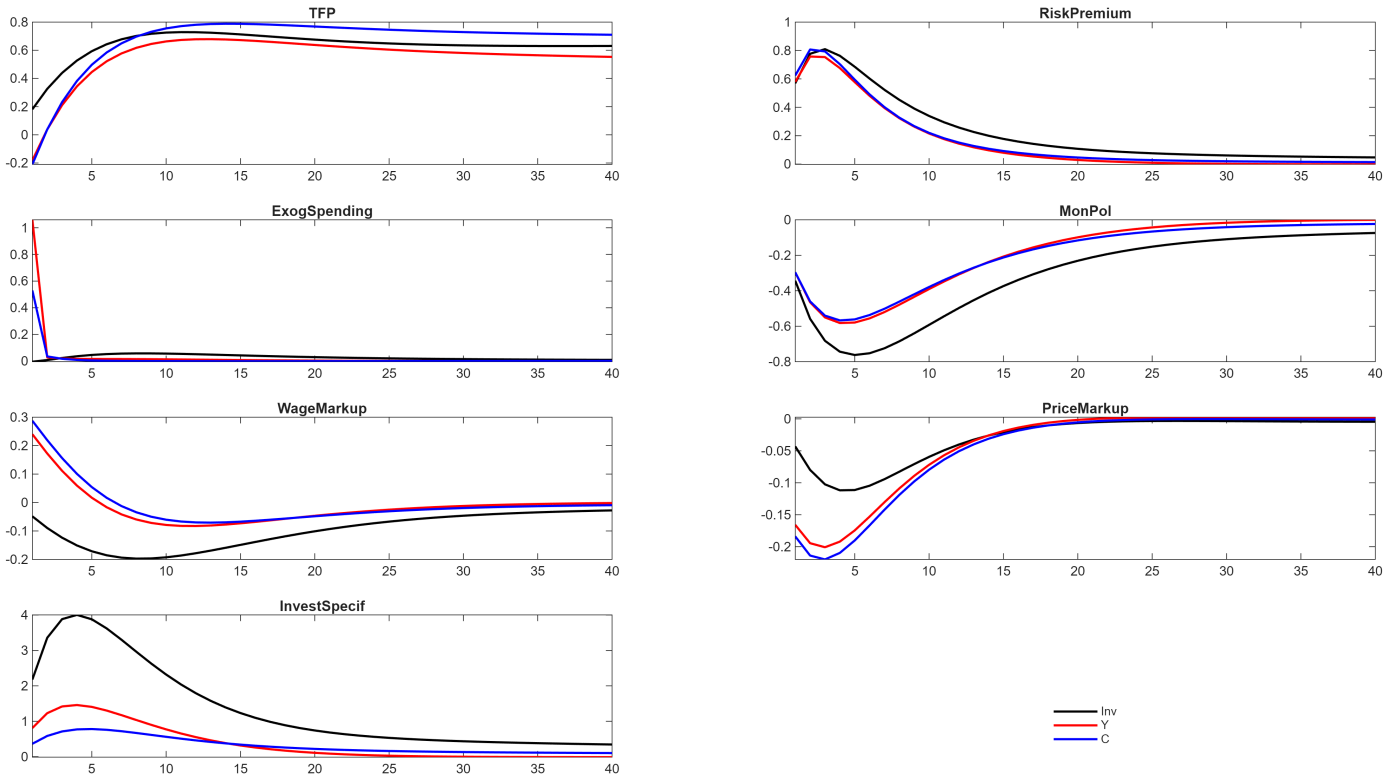

Figure 6: Responses to to all shocks – Y, C, Inv

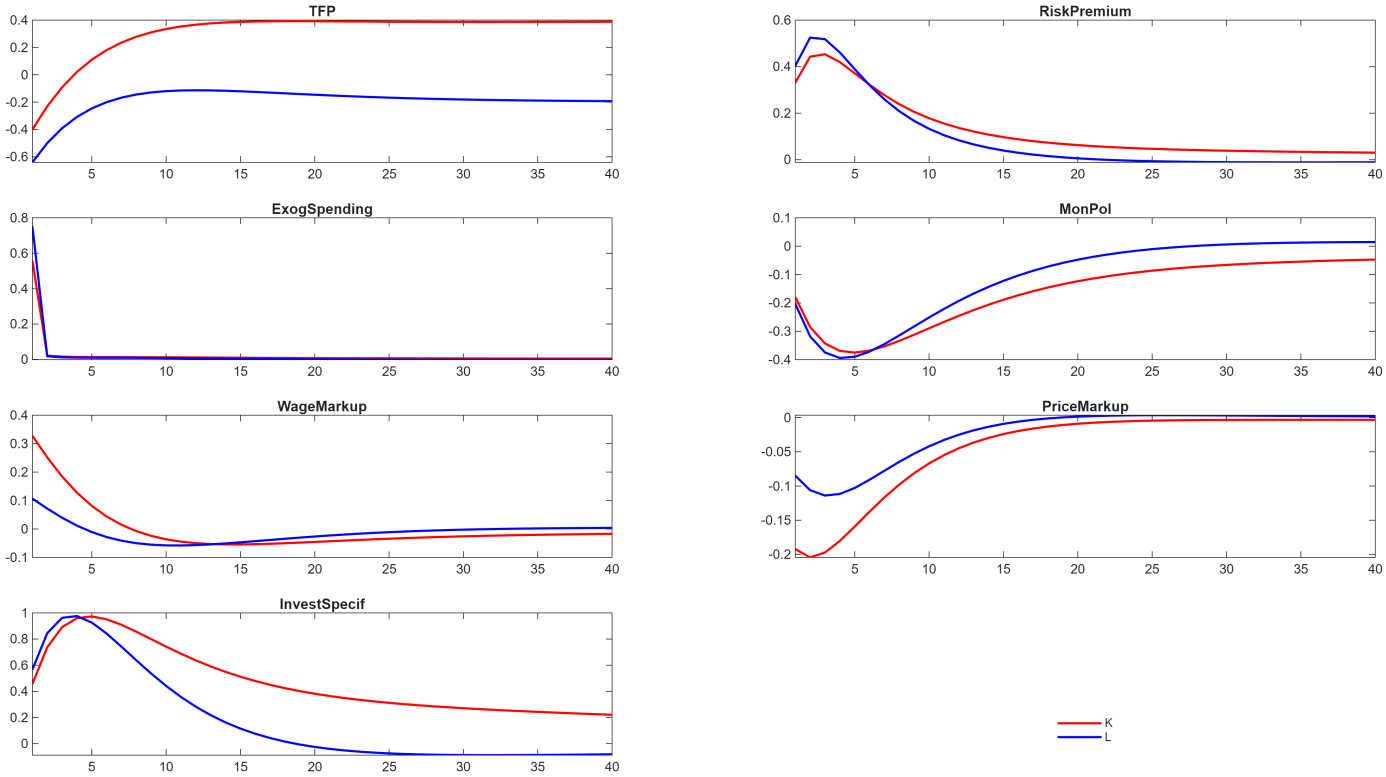

Figure 7: Responses to all shocks – Capital and Labour

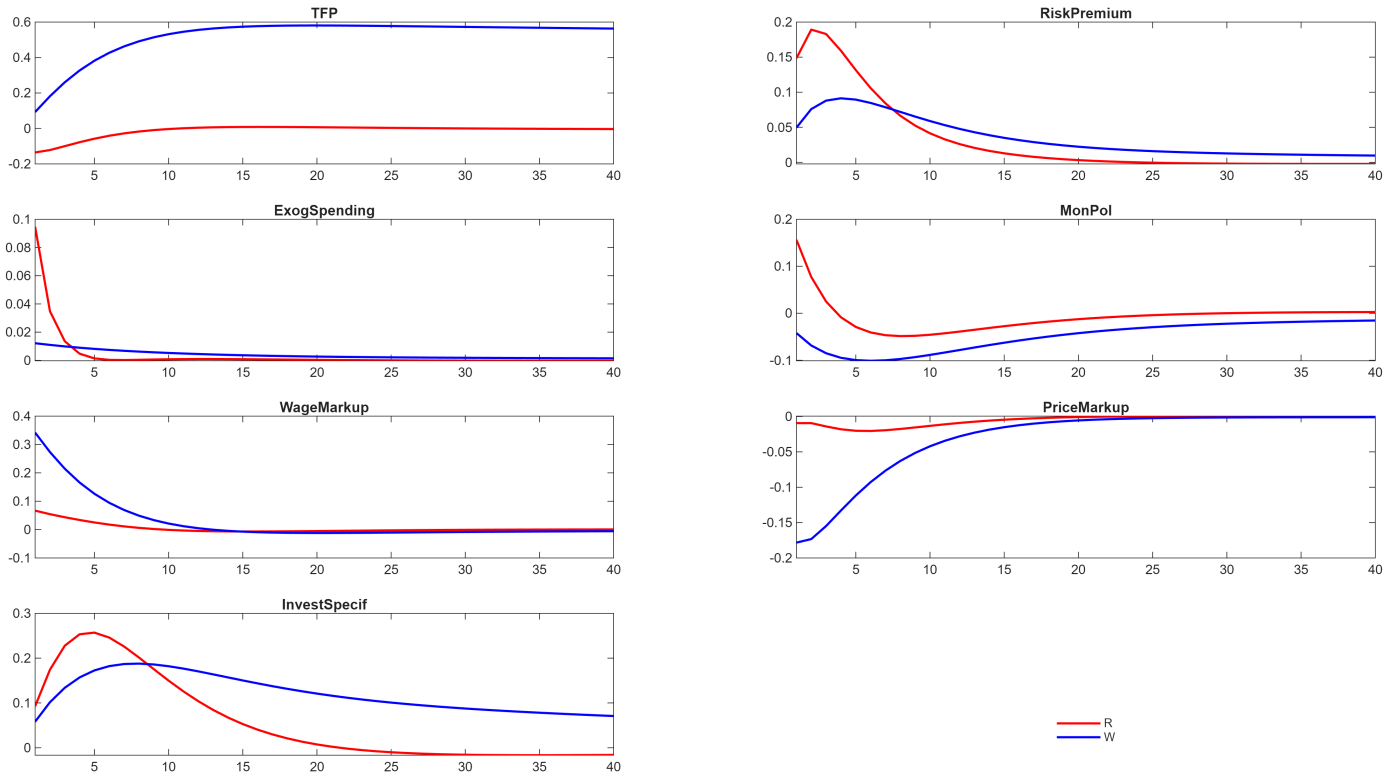

Figure 8: Responses to all shocks – Interest and Wage Rates

Q7

After reverting to the SW2007 specification for the spending shock, the IRFs revert to a slow, persistent decay similar to Q3. ggregate consumption rises on impact but turns negative in the medium to long run. The initial positive response is driven by the income effect on non-Ricardian households. However, the persistence of the fiscal stimulus leads to a much larger accumulation of government debt over time. This amplifies the negative wealth effect felt by the forward-looking Ricardian households, who anticipate a heavier future tax burden. In the medium-to-long run, this magnified negative wealth effect begins to dominate the initial income effect, pulling the aggregate consumption response below its steady state.

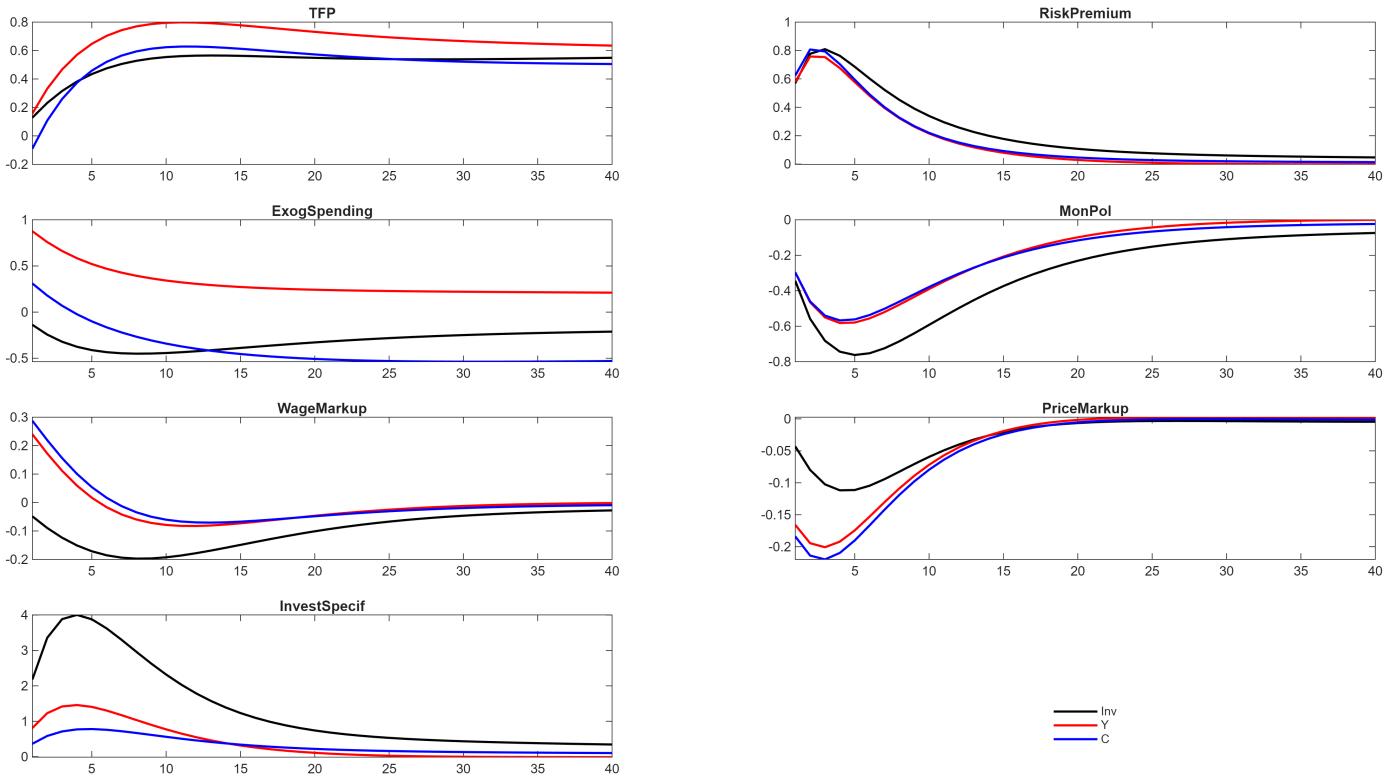

Figure 9: Responses to to all shocks – Y, C, Inv

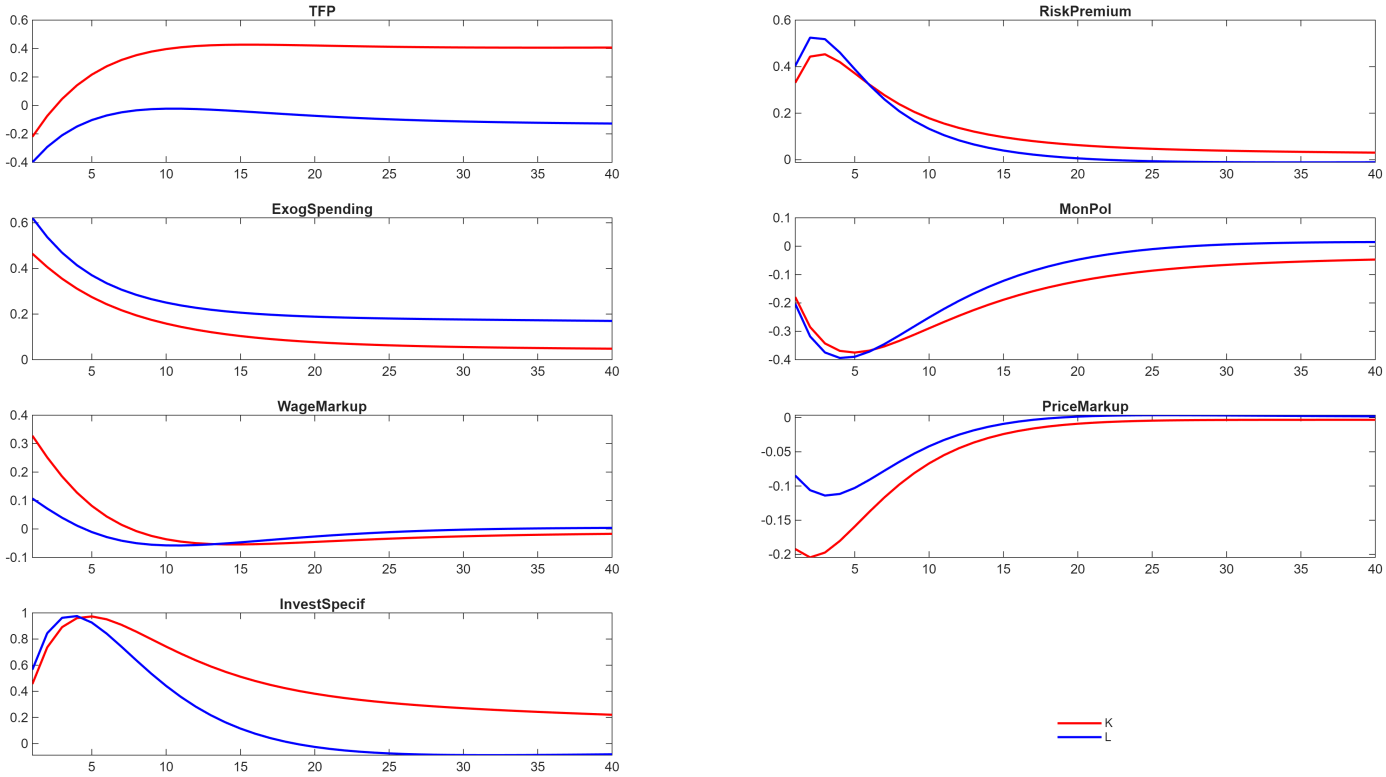

Figure 10: Responses to all shocks – Capital and Labour

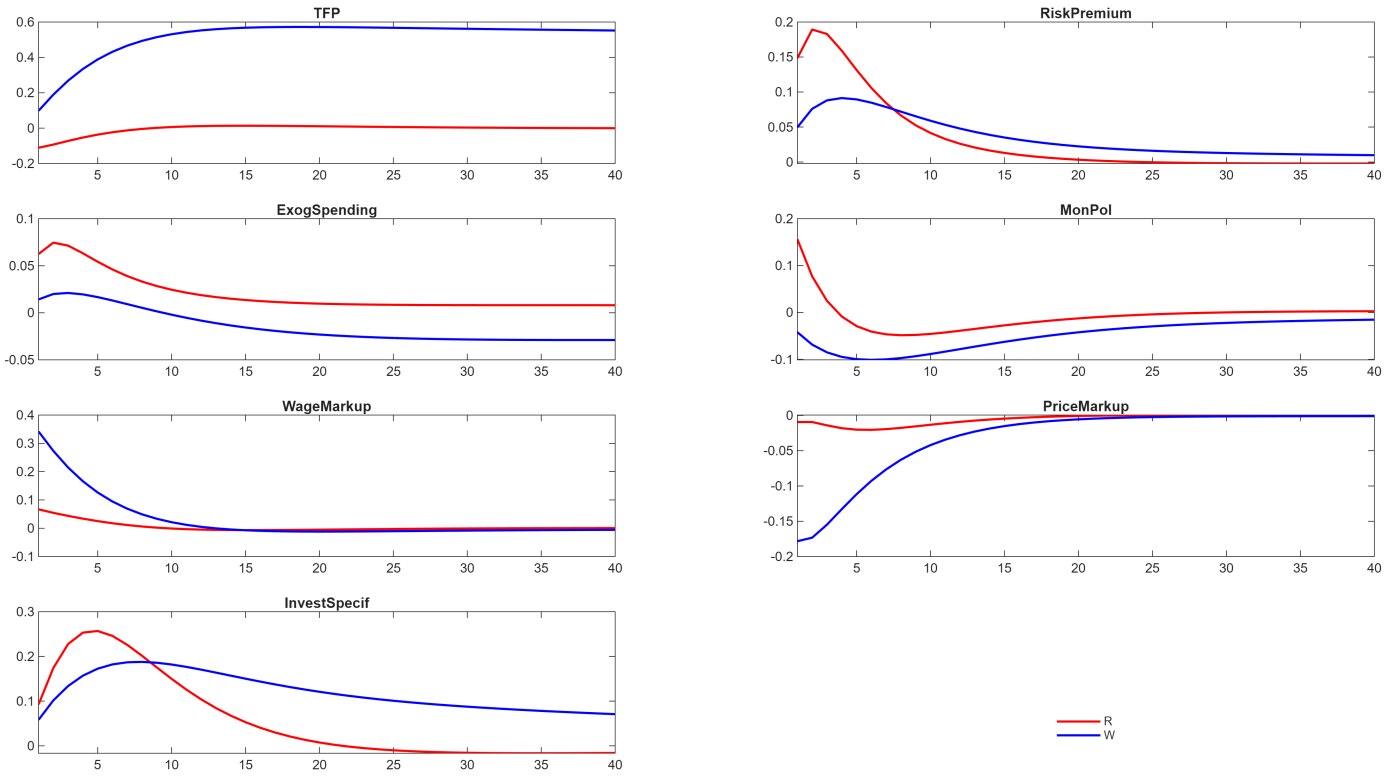

Figure 11: Responses to all shocks – Interest and Wage Rates