Our paper is based on "Precautionary Borrowing and the Credit Card Puzzle" by Druedahl and Jørgensen (2015). We have the equations:

$$
\begin{aligned}
V(\boldsymbol{S}_t) &= \max_{D_t, C_t} \frac{C_t^{1-\rho}-1}{1-\rho} + \beta \mathbb{E}[V(\boldsymbol{S}_{t+1})] \\
&\text{s.t.} \\
&W_t = (1+r_w)\, W_{t-1} + Y_t - \underbrace{D_{t-1}(r_d+\lambda)}_{\text{Interest + installment}} + \underbrace{D_t - (1-\lambda)\, D_{t-1}}_{\text{New debt}} - C_t \\
&N_t = W_t - D_t \\
&D_t \leq \max \left\{ \underbrace{(1-\lambda) D_{t-1}}_{\text{Old contract}} \;,\; \underbrace{\mathbf{1}_{x_t=0}\,(\eta \cdot N_t + \varphi \cdot P_t)}_{\text{New contract}} \right\} \\
&W_t, D_t, C_t \geq 0
\end{aligned}
$$

With "standard" gauss-hermite quaditure shocks and income growth, etc.
Currently, we solve the model by interpolating over a helper variable called M_{t+1}:

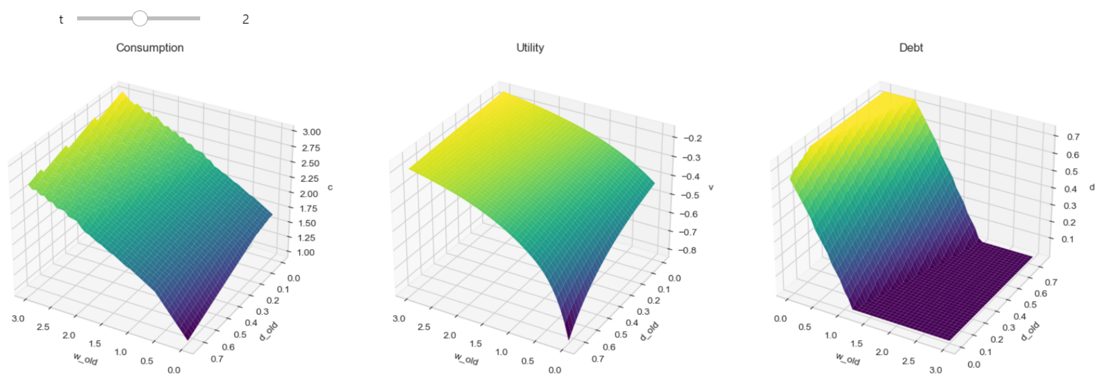
$$W_t = \underbrace{(1-r_w)W_{t-1} + Y_t - (r_d+\lambda)D_{t-1}}_{M_t} + D_t - (1-\lambda)D_{t-1} - C_t$$

$$W_t = M_t + D_t - (1-\lambda)D_{t-1} - C_t$$

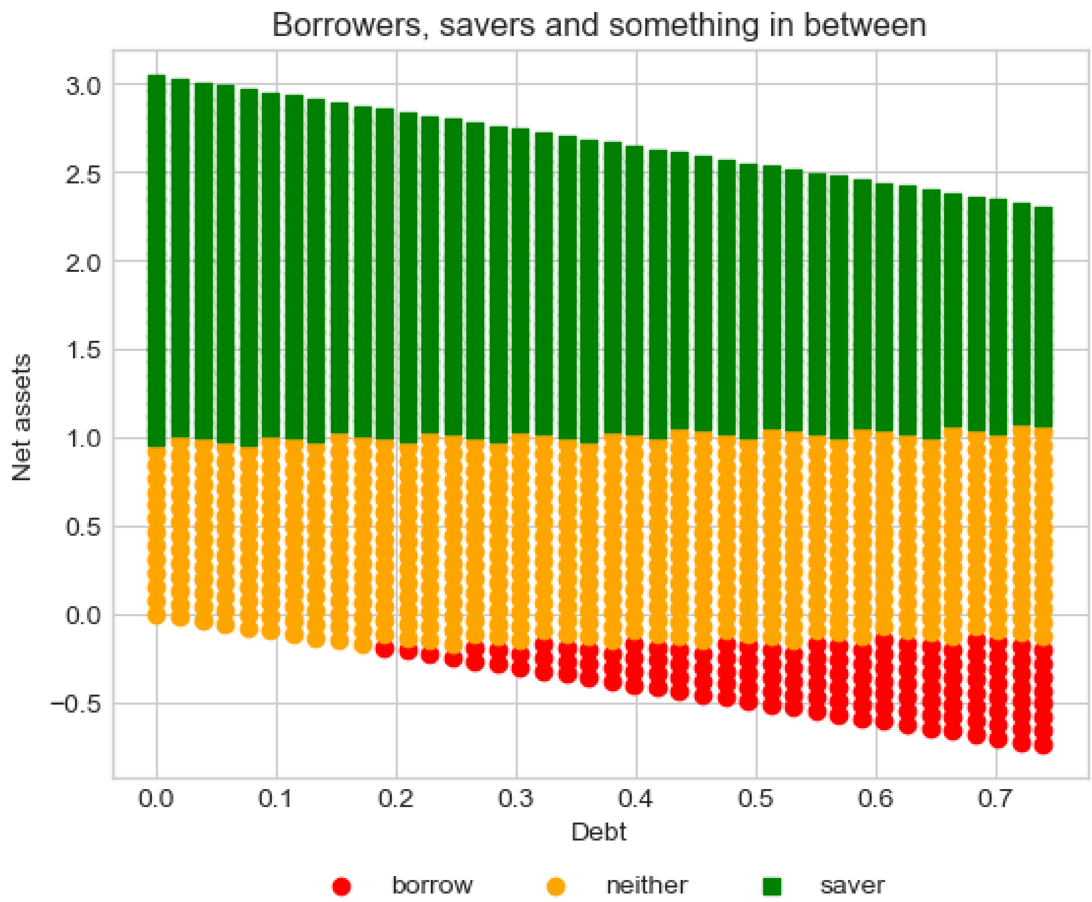
$$C \leq M_t + D_t - (1-\lambda)D_{t-1}$$

$$M_{t+1} = (1-r_w)W_t + Y_{t+1} - (r_d+\lambda)D_t$$

The optimal consumption, utility and debt at a given W_{t-1} and D_{t-1} are the following:



The results seem reasonable since consumption and utility is growing with wealth, and low income households take on more debt. Defining the "puzzle" group as households that neither fully borrow or save, we get the following figure that is like figure 6.1 in the paper:



We talked about solving the model directly by interpolating over W_{t+1}:

$$W_{t+1} = (1 - r_w)W_t + Y_{t+1} - (r_d + \lambda)D_t + D_{t+1} - (1 - \lambda)D_t - C_{t+1}$$

Is one option better or more correct than the other?

Since we have two states and two choices, we interpolate over a 2d grid, where we use the package provided in the tools-module. How much theory should we include about 2d interpolation? Is it possible to use other kinds of 2d-interpolations such as B-splines?

The paper nests the model, so a change in D_{t-1} only affects the debt choice. Is this nested VFI? And if so, is it needed to compute the post-decision states?

We found it difficult to replicate results of the paper 1-to-1. Instead, we considered doing counterfactuals on model simulations instead. Are these results economically meaningful enough for the term paper?