

SF2980: Assignment 2

Guide to the Quantlab workspace

This document is intended to assist you with the Quantlab workspace used in the assignment on scenario-based risk analysis, providing short descriptions of the different parameters and data fields. Figure 1 shows a screenshot of the workspace as it looks when you open it the for the first time. All your actions

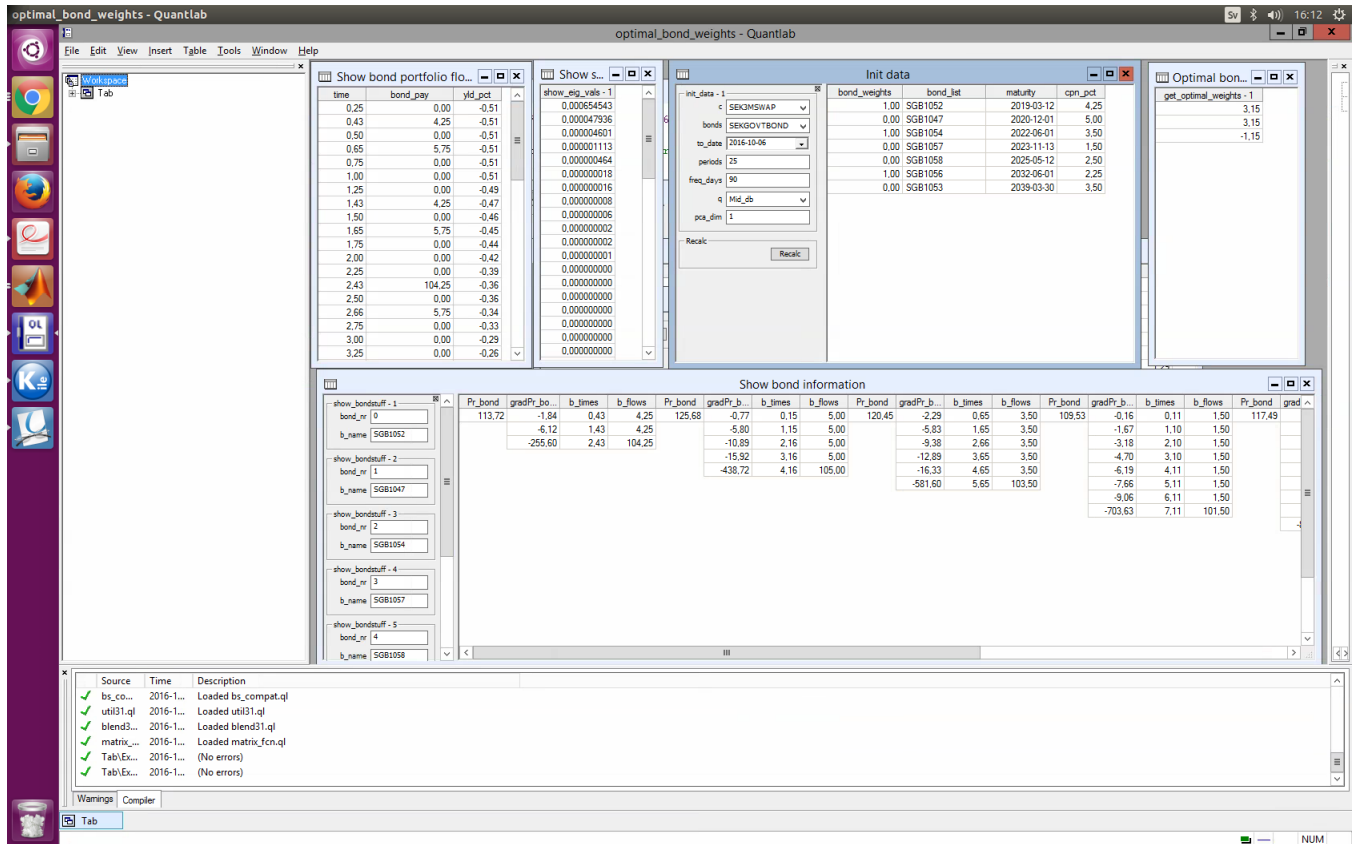


Figure 1: View of the freshly opened workspace.

will be performed in the “Init data” window, shown in Figure 2. This part of the workspace contains the information about the data you pick as input. The selection in *c* determines what instrument is used to produce the zero-rate curve (use the default: SEK3MSWAP). By the selection in *bonds* you choose what instruments you want to use for your hedge (use the default: SEKGOVTBOND). Once you made a selection, setting a “0” or a “1” in the “bond weights” column decides whether a specific bond will be included or not. In Figure 2 three bonds are selected, namely SGB1052, SGB1054 and SGB1056. In the “Init

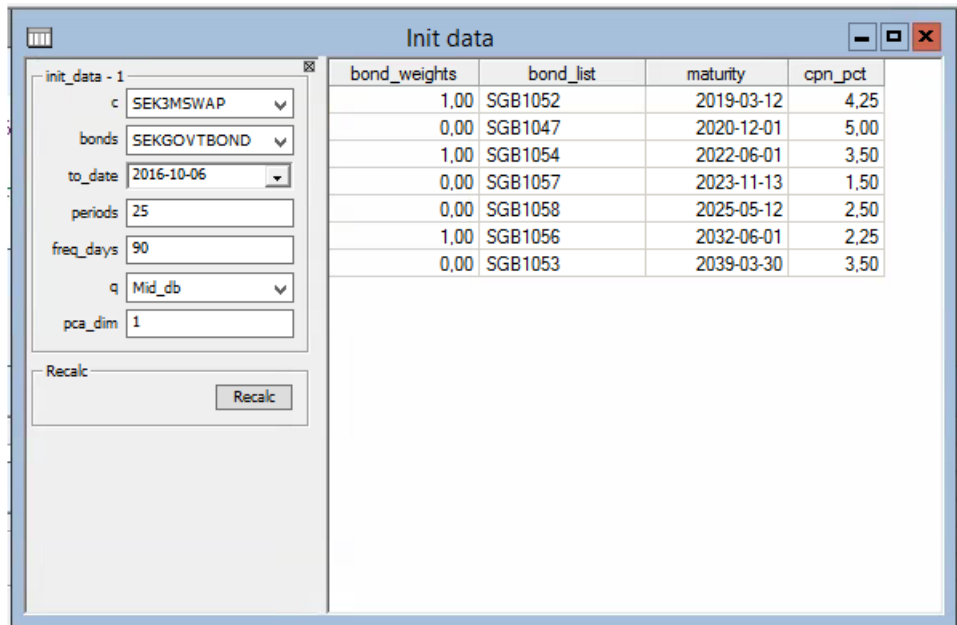


Figure 2: A zoom on the “Init data” window.

data” window, **freq days** sets the length you want to use to compute changes in the zero rates, observations of Δr . This is combined with the parameter value in **periods** to create your historical data, i.e., your “sample” of Δr over a certain time period. The current setting is 90 days to compute changes in the zero rates and we use 25 such periods to create our data. In the tab **to_date**, the current date is selected. The tab **q** determines which quotes that are used (use the default: **Mid_db**). The final parameter you need to consider in “Init data” is **pca_dim**, the number of eigenvectors used in the analysis. In order to calculate immunization weights, **pca_dim** has to be set smaller than the number of selected bonds. If this is not the case, you will receive a warning message in the tab “Warnings” which you find in the lower right corner, see Figure 3.

The information in the window “Show bond information” is divided into sequences of four tabs for the bonds selectable in “Init data”. For each bond you are given the present price, non-zero entries of the gradient with respect the underlying interest rates, cash-flow times and cash amounts (in that order). The window “Show sorted eigenvalues” displays the sorted eigenvalues.

The window “Show bond portfolio flows and rates” is an analog Table 9.1 in *Risk and Portfolio Analysis* (the course literature) for the bonds selected. In the column **time** all times (years) at which an amount is payed or received are listed. Note that the times at which a coupon is received are not necessarily a subset of the times at which the liability is paid! Columns **bond_pay** and **yld_pct** lists the payments from selected bonds and simulated zero rates (%).

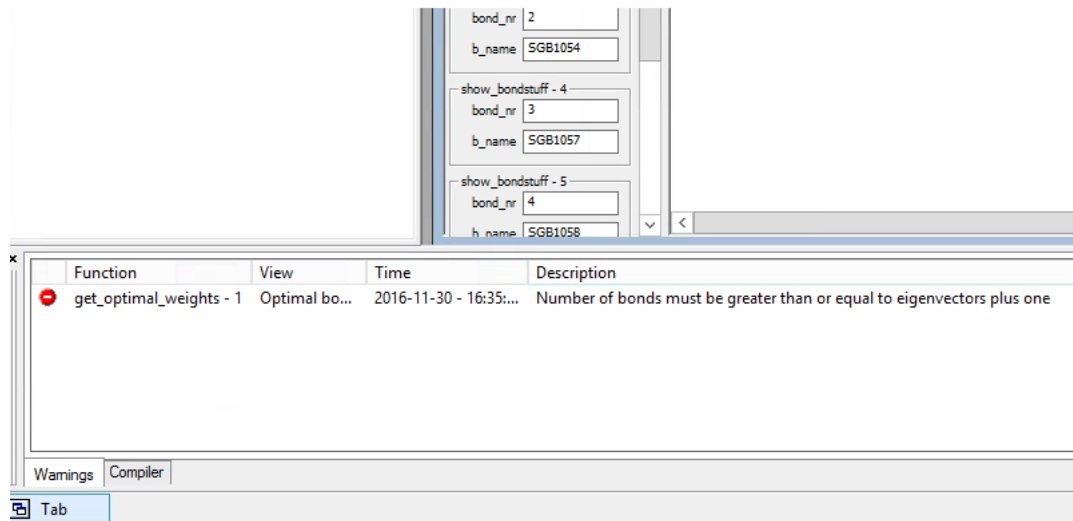


Figure 3: The program warns the user that it needs more bonds selected to properly execute its task.

In the window “Optimal bond weights” the weights for the bond portfolio are listed. The order of the selected bonds in “Init data” is the order of the weights in `get_optimal_weights-1`. If the solution to the immunization is not unique, the set of weights with minimal largest position (in absolute terms) among the possible solutions are returned. To calculate the weights, click the button `Recalc` in the “Init data” window. An example can be seen in Figure 4.

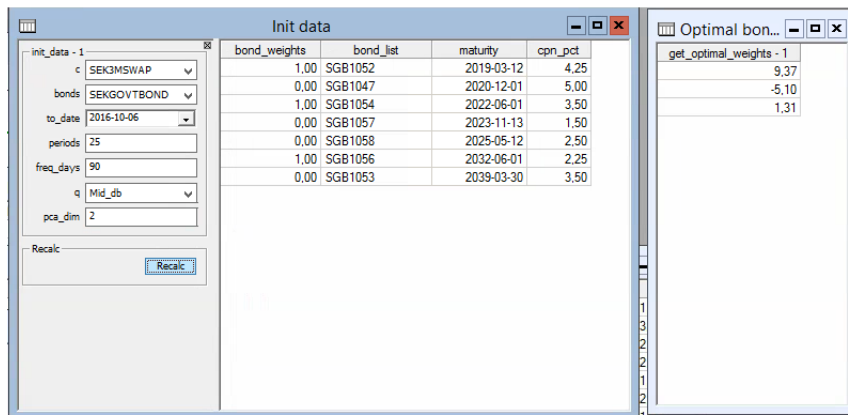


Figure 4: The program successfully returns portfolio weights.