SF2942: Assignment 2
Guide to the Quantlab workspace

This document is intended to assist you with the Quantlab workspace used in the assignment on immunization, providing short descriptions of the different parameters and data fields. Figure 1 shows a screen shot of the workspace as it looks when you open it the for the first time.
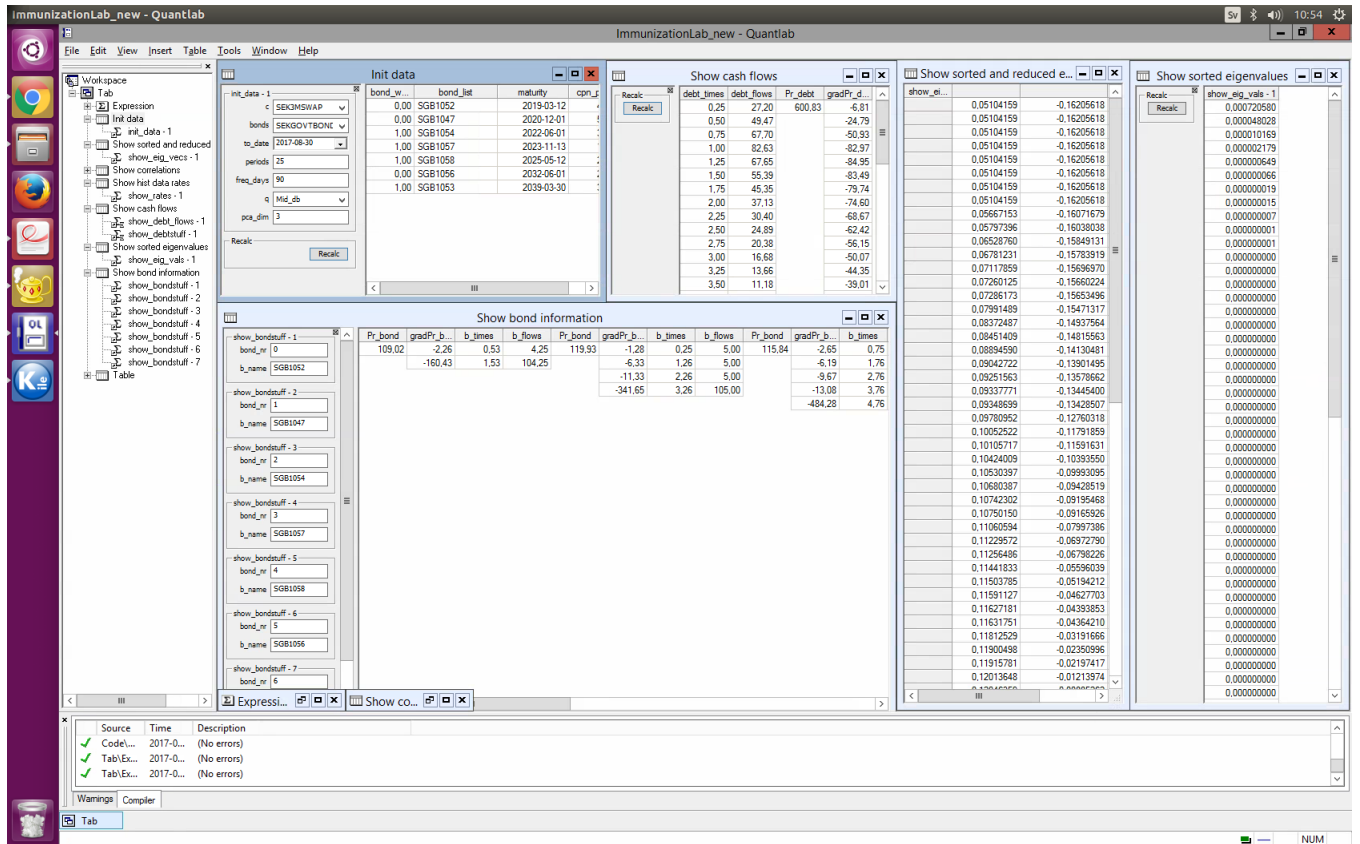

Figure 1: View of the freshly opened workspace.

All your actions will be performed in the "Init data" window, shown in Figure 2. In the drop down table **c** you pick the instrument class used to construct a zero-rate curve (use the default: SEK3MSWAP). In **bonds** you choose the instrument class you want to use as hedging instruments (use the default: SEK-GOVTBOND). By setting the values in the column **bond_weights** to 0 (1 or any other non-zero number) the bond will be excluded (included) in the immunization. In Figure 2 four bonds are selected; SGB1054, SGB1057, SGB1058 and SGB1053.
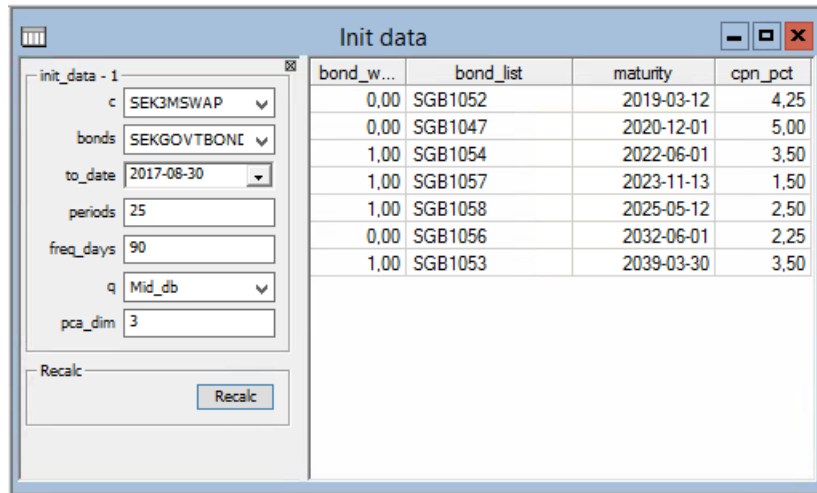
Figure 2: A zoom on the "Init data" window.

In the "Show cash flows" window you will find information about your liability. In the `debt_times` column the 40 dates at which you make a payment are listed and in the column `debt_flows` are the corresponding 40 amounts. In the third column you are given the present value of the liability and the gradient of the present value with respect to the zero-rate curve.

In the "Init data" window you select the current date in the tab `to_date`. In the field `freq_days` the time interval between observations of the zero-rate changes is set. The number of historical observations of the zero-rate curve is determined in `periods` and are presented in the window "Show hist data rates". Note that if some of the dates you selected, i.e. some of

$$\{\texttt{to\_date - } i \cdot \texttt{freq\_days}\}_{i=0}^{\texttt{periods}},$$

happen to be non-business days (weekends, holidays, etc.), you will lack observation of the corresponding zero-rate curves. 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 principle components you want the program to display.

In the window "Show correlations" the covariance matrix $\text{Cov}(\Delta \mathbf{r})$ for your observations of Δr is presented (cf. *Risk and Portfolio Analysis*, page 74). The window "Show sorted eigenvalues" displays the eigenvalues of $\text{Cov}(\Delta \mathbf{r})$ sorted in descending order. "Show sorted and reduced eigenvectors" tables the eigenvectors corresponding to the `pca_dim` largest eigenvalues.

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).