Rescale comparisons

September 5, 2022

1 Introduction

This document studies whether setting `rescale = TRUE` helps with estimation using the same examples as described in the document titled *Matrix Decomposition Comparisons* (available here).

The `rescale` option was originally developed to address stability issues in the QCQP problem through rescaling the Gram matrix. Currently, `ivmte` only allows rescaling in the QCQP problems. I will allow rescaling in LP problems in the future.

`ivmte` performs the following procedure whenever `rescale = TRUE`. The package first rescales the variables so that the minimum magnitude of each column in the linear constraint matrix is -3. The package then rescales the variables so that the minimum magnitude of each row in the linear constraint matrix is -3.

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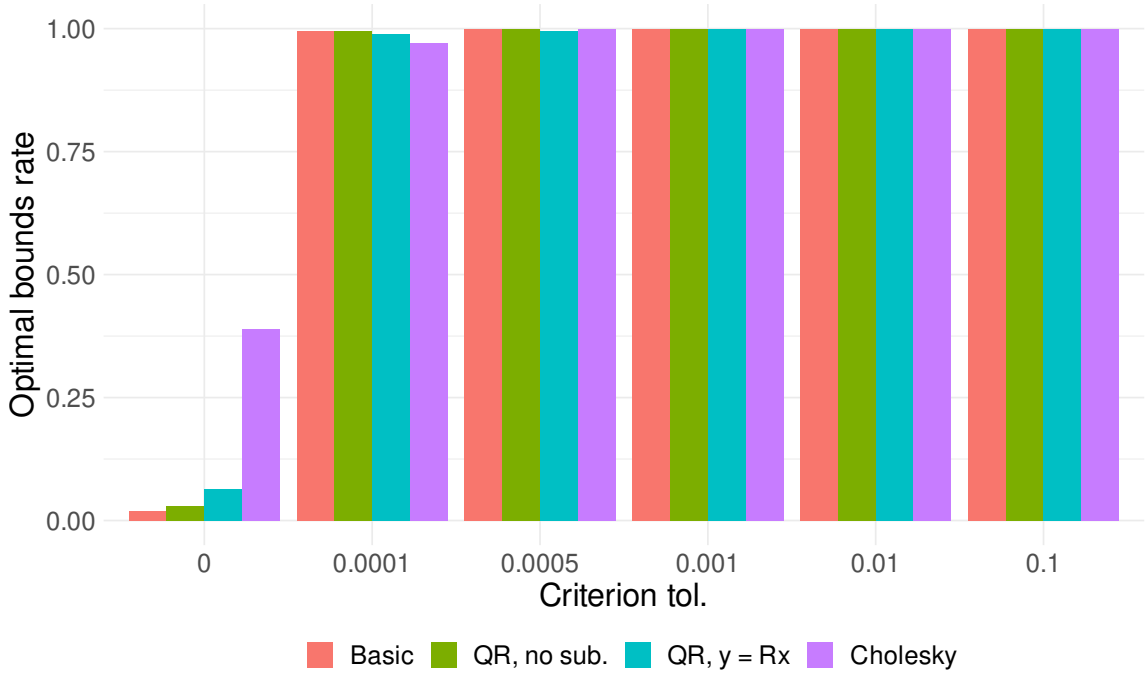
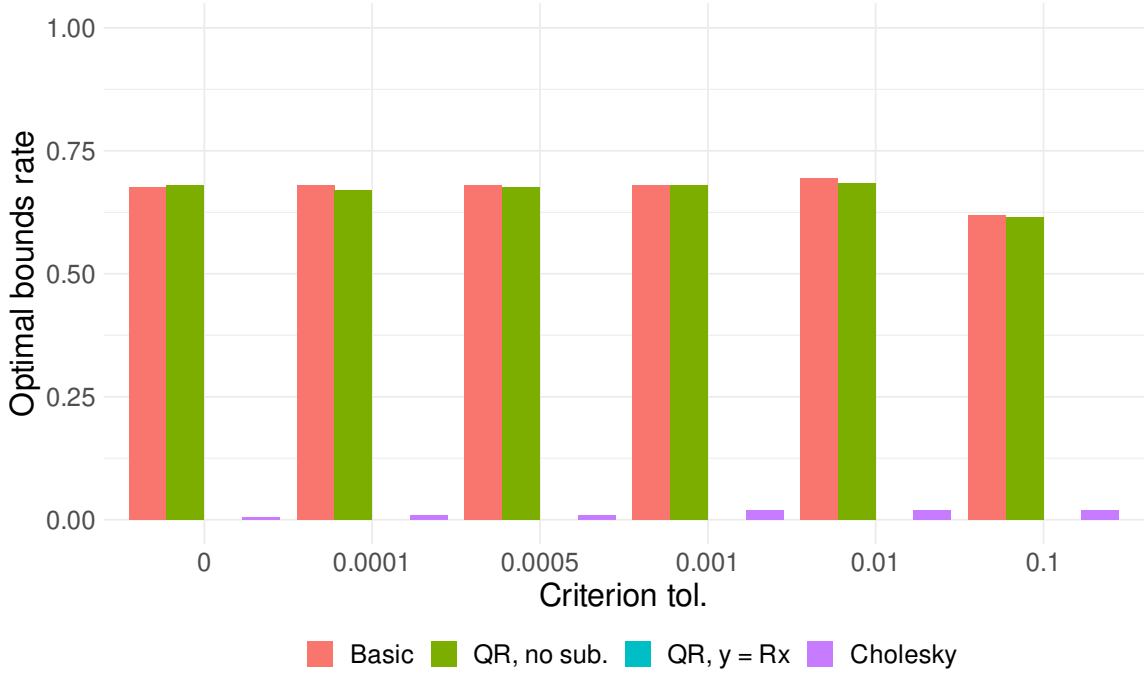
2 Optimal upper and lower bounds

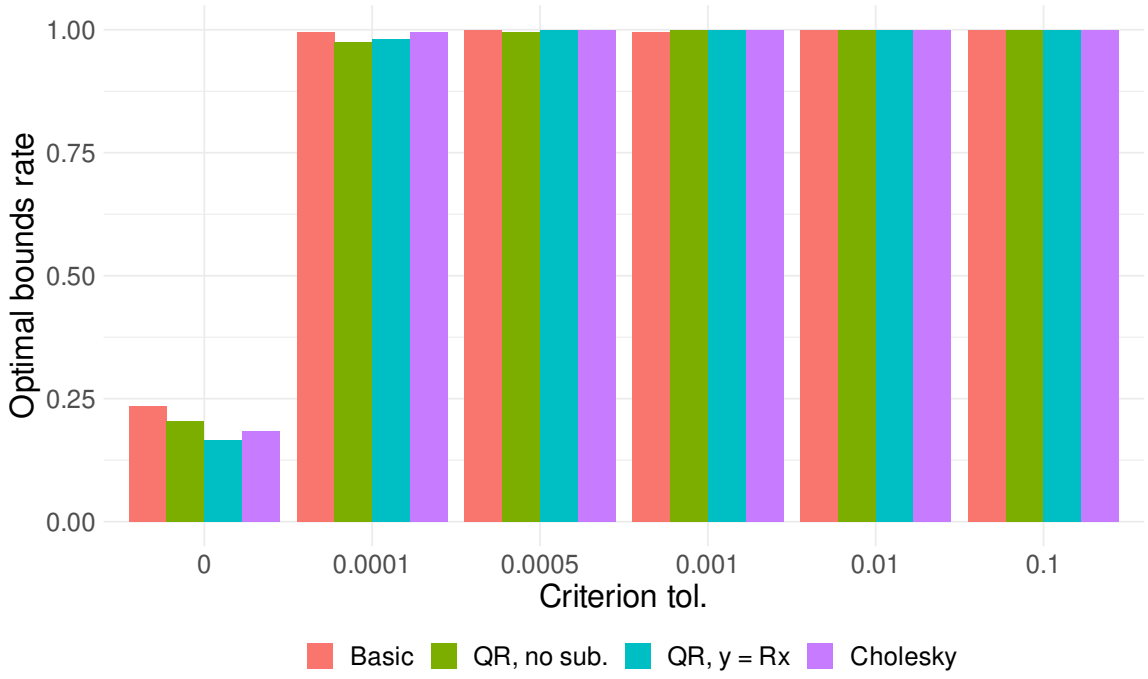
2.1 Case 1, QCQP, unscaled



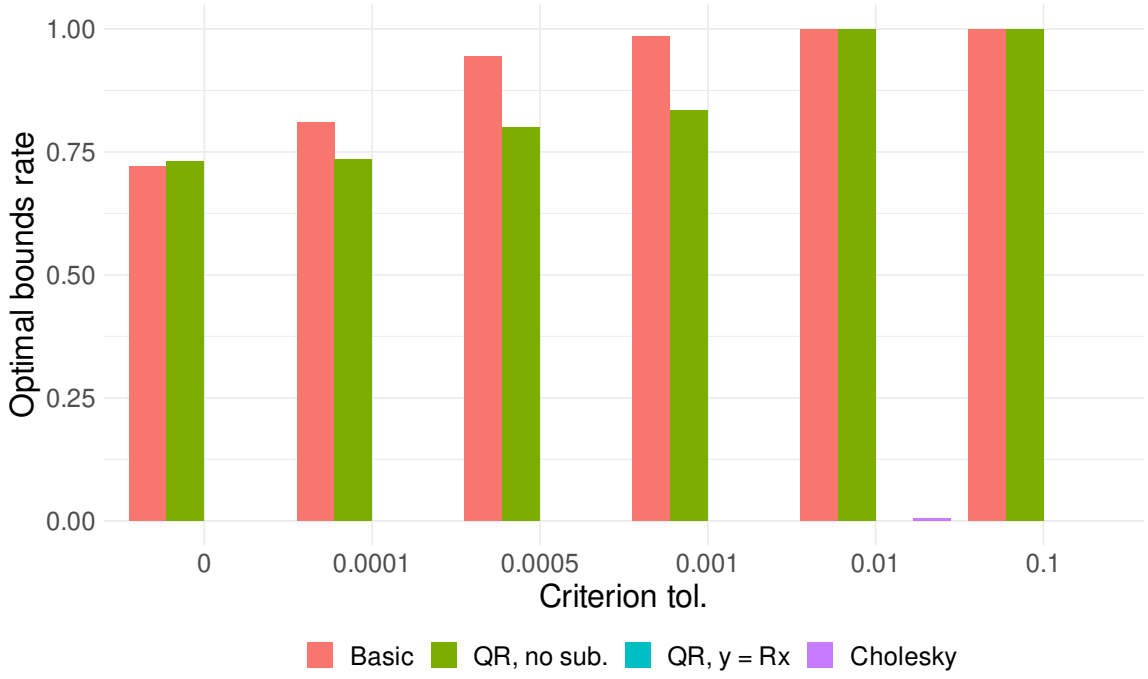
2.2 Case 1, QCQP, rescaled



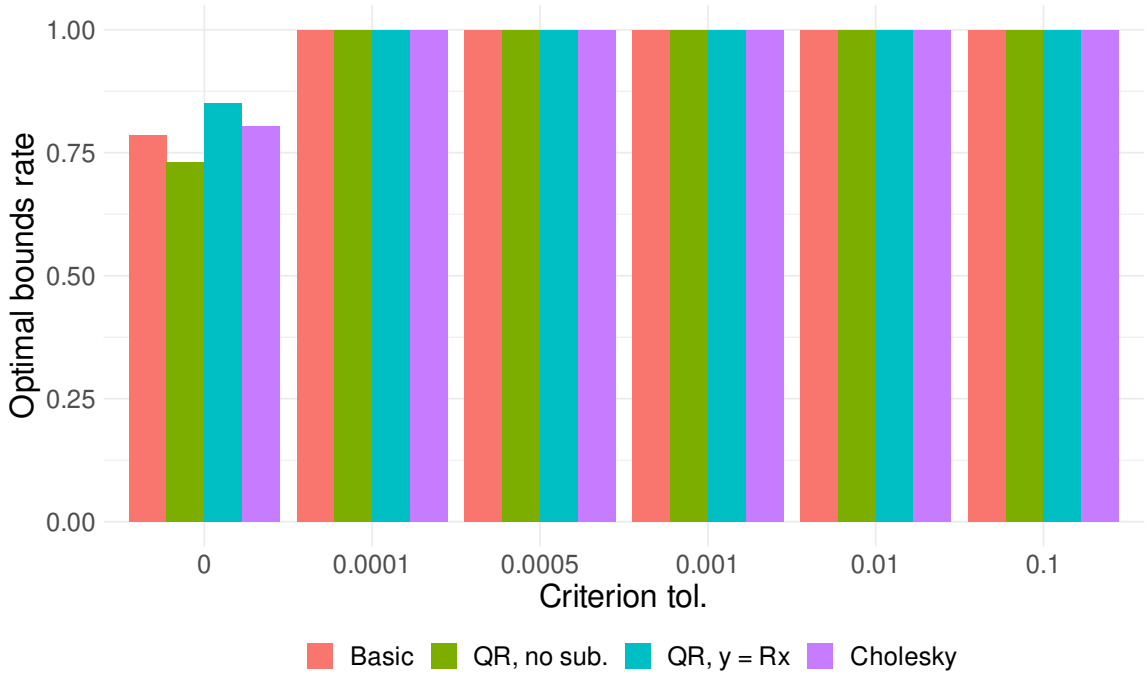
2.3 Case 2, QCQP, unscaled



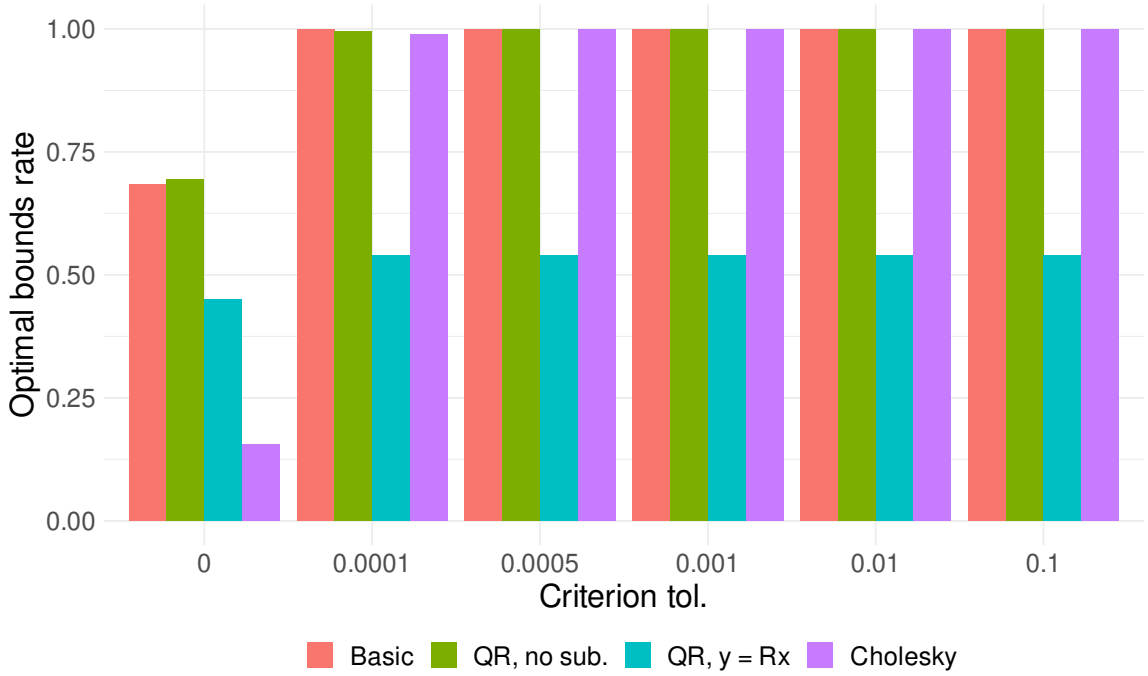
2.4 Case 2, QCQP, rescaled



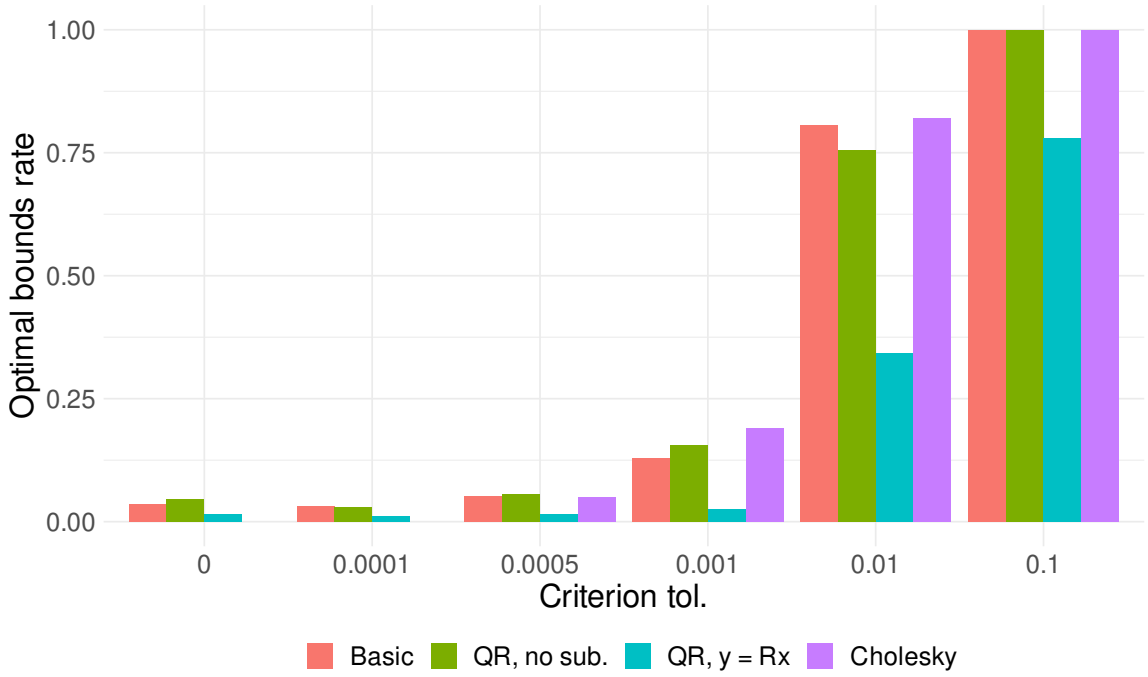
2.5 Case 3, QCQP, unscaled



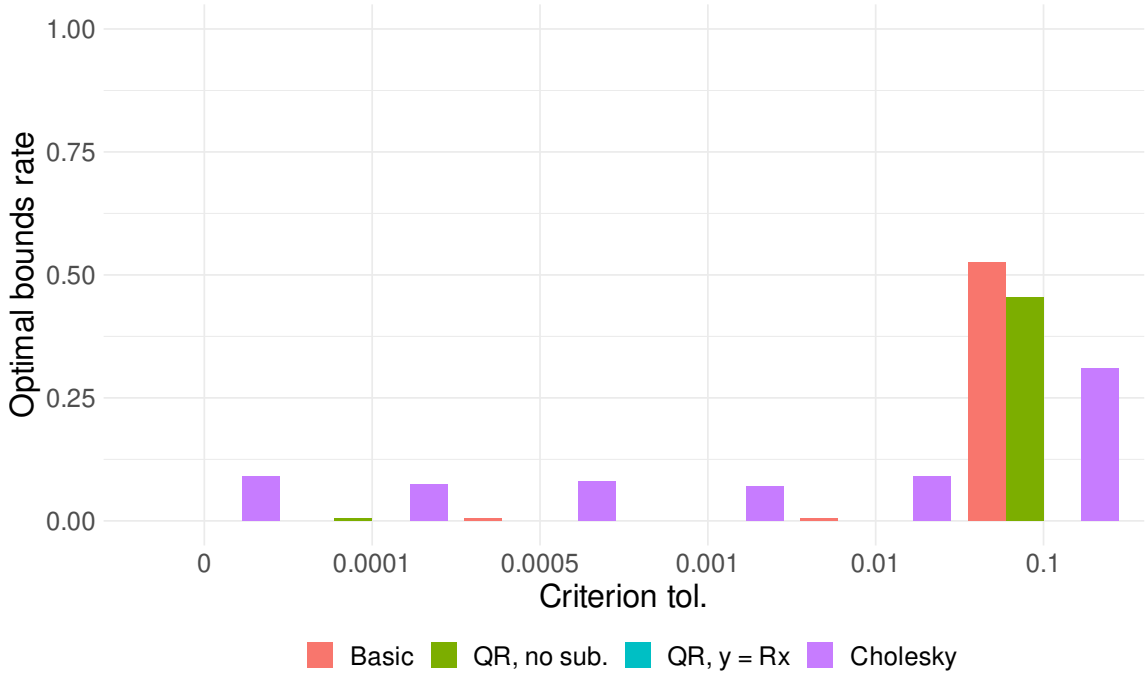
2.6 Case 3, QCQP, rescaled



2.7 Case 4, QCQP, unscaled

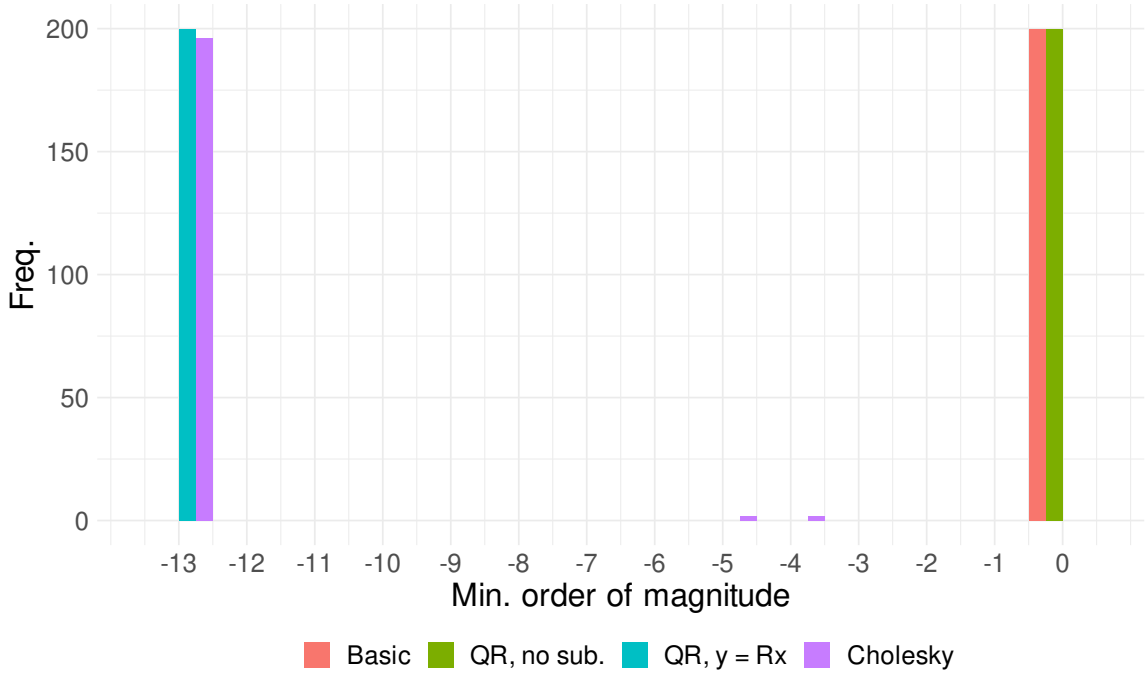


2.8 Case 4, QCQP, rescaled

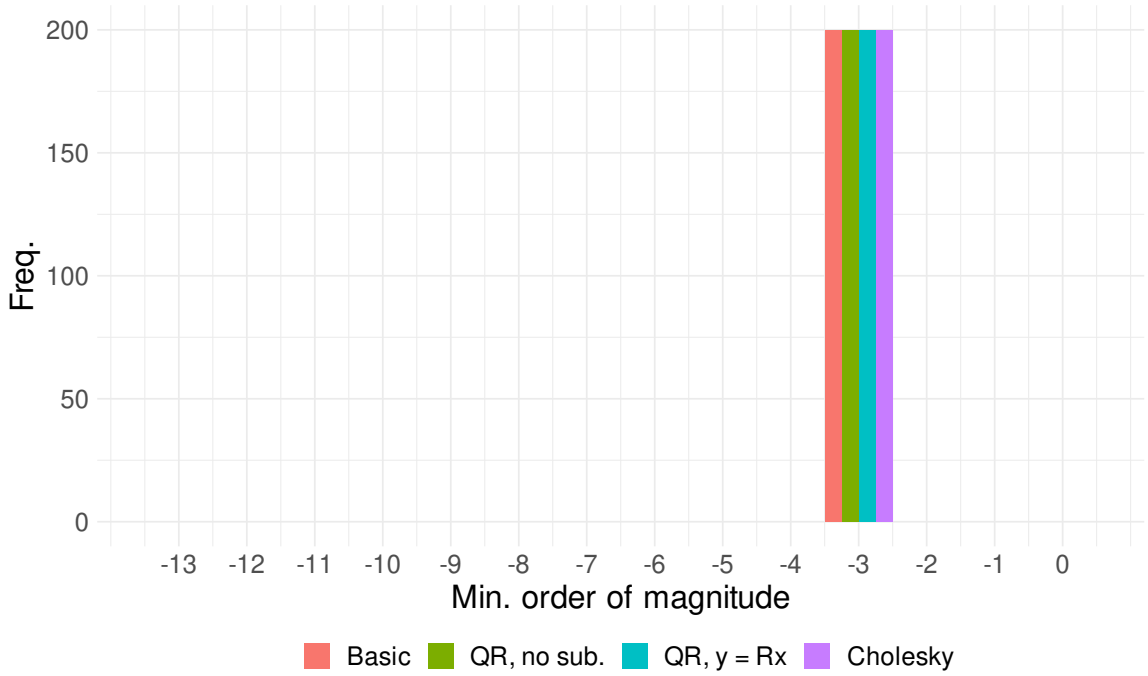


3 Min. order of mag. in linear constraint matrix

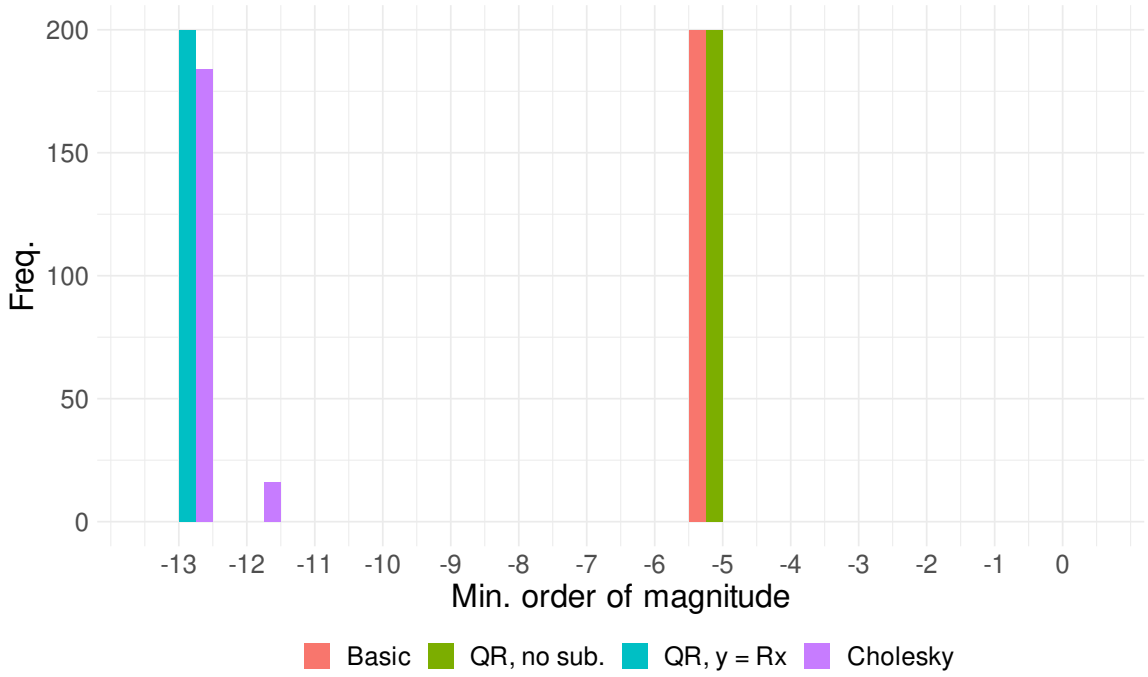
3.1 Case 1, QCQP, unscaled



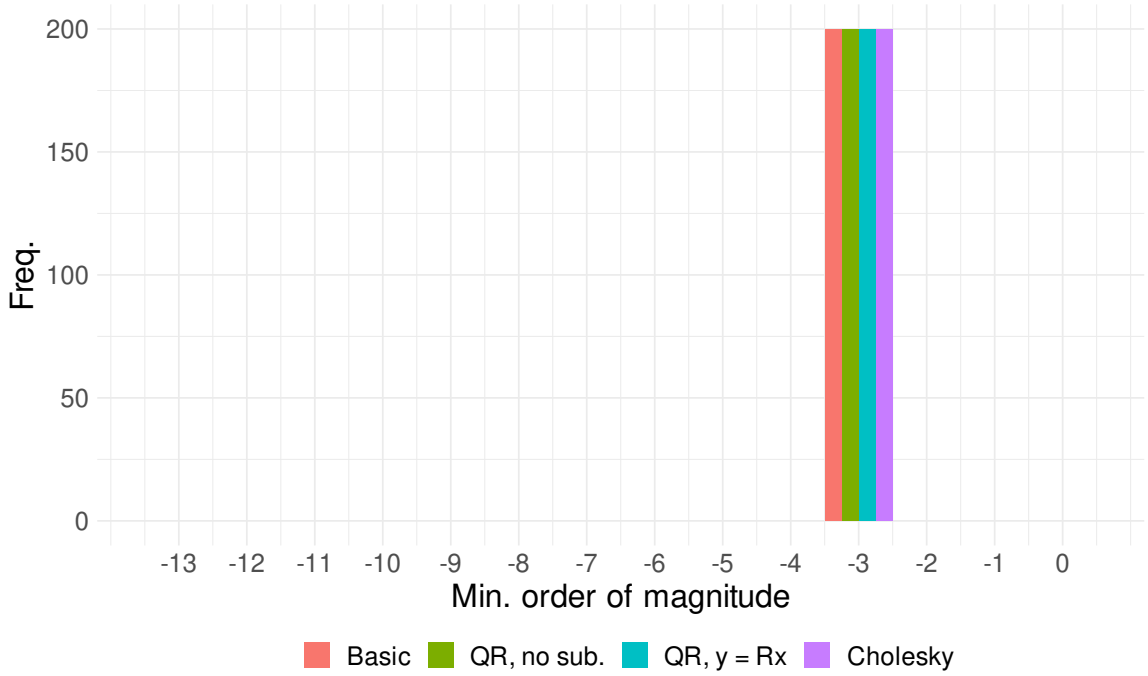
3.2 Case 1, QCQP, rescaled



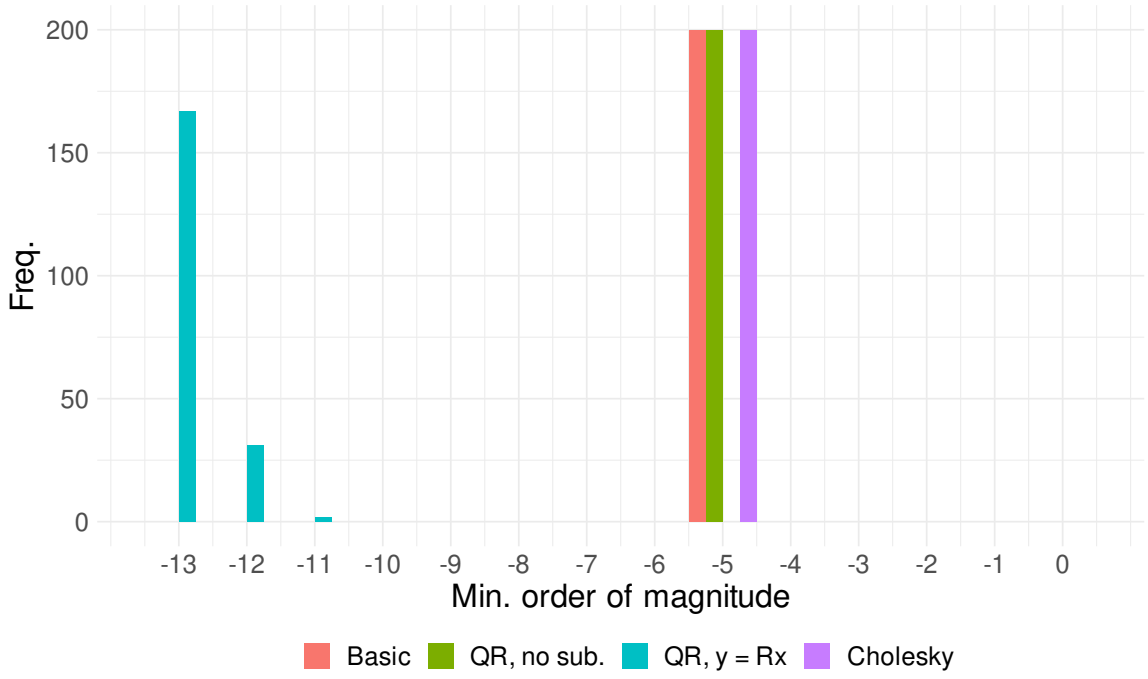
3.3 Case 2, QCQP, unscaled



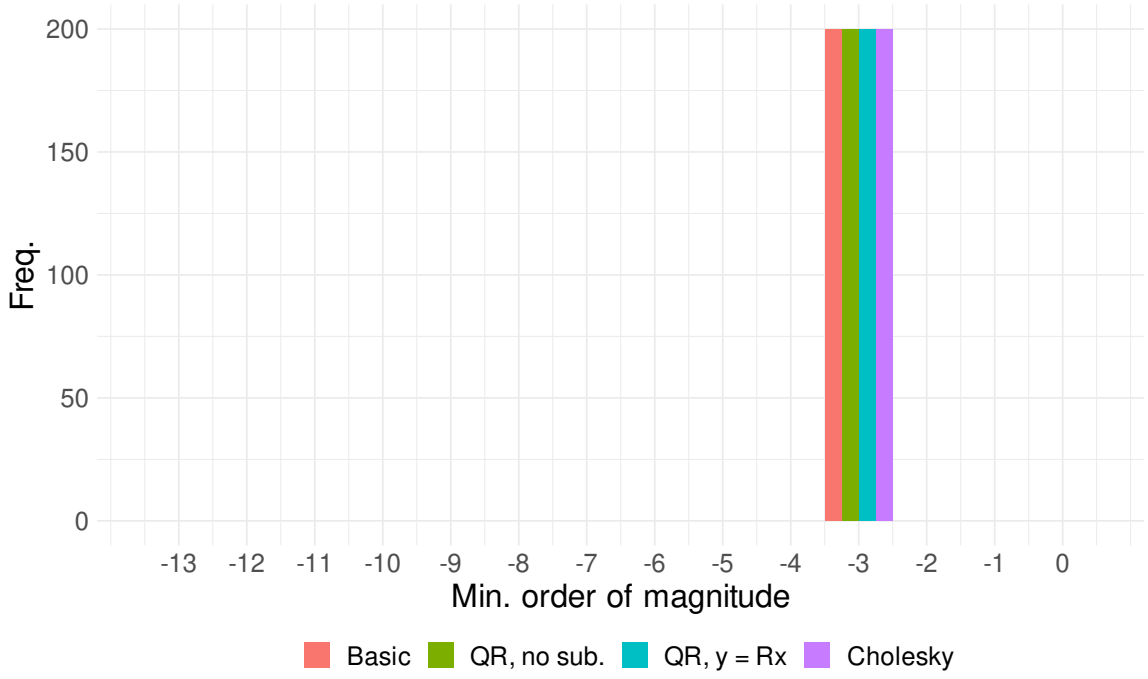
3.4 Case 2, QCQP, rescaled



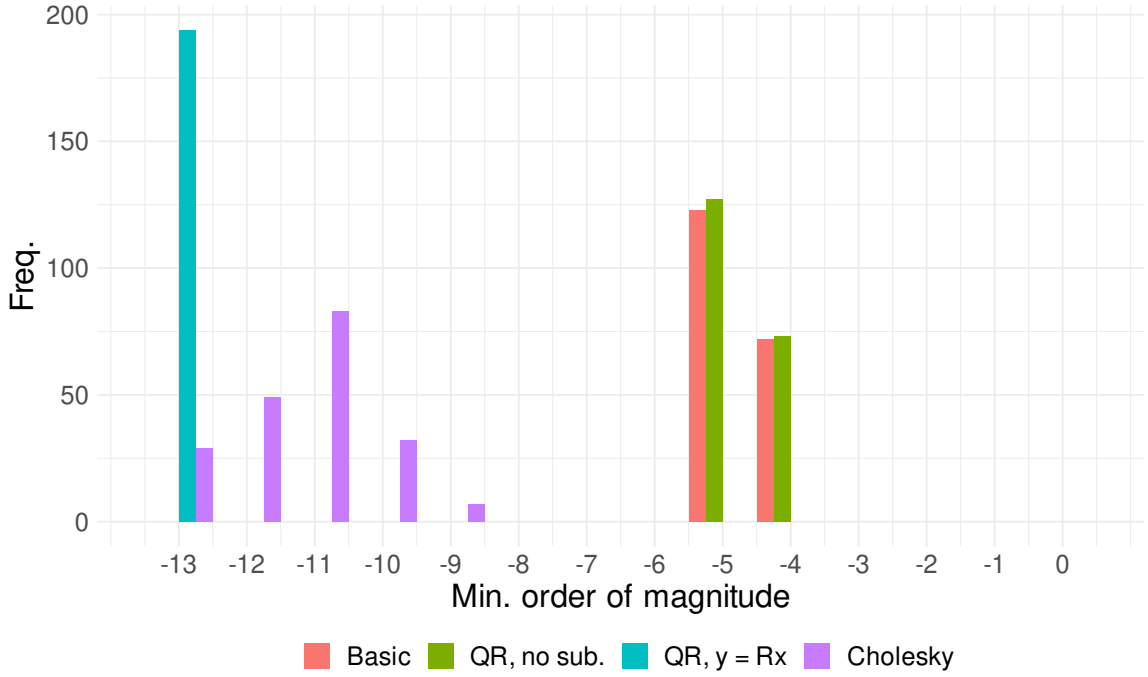
3.5 Case 3, QCQP, unscaled



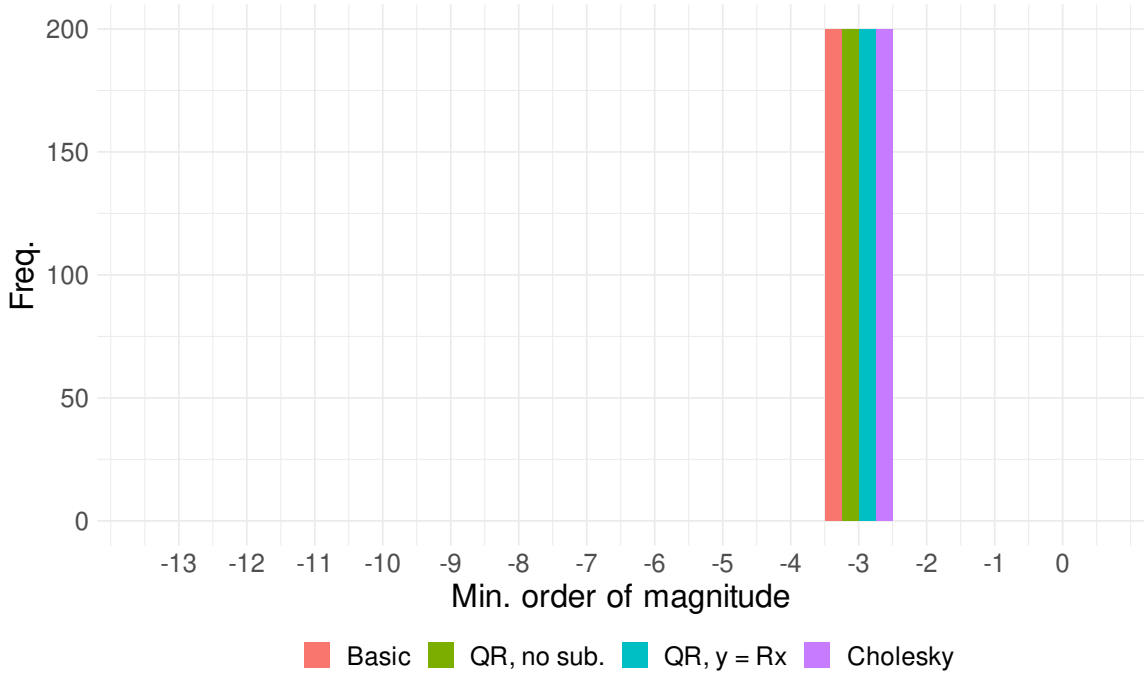
3.6 Case 3, QCQP, rescaled



3.7 Case 4, QCQP, unscaled

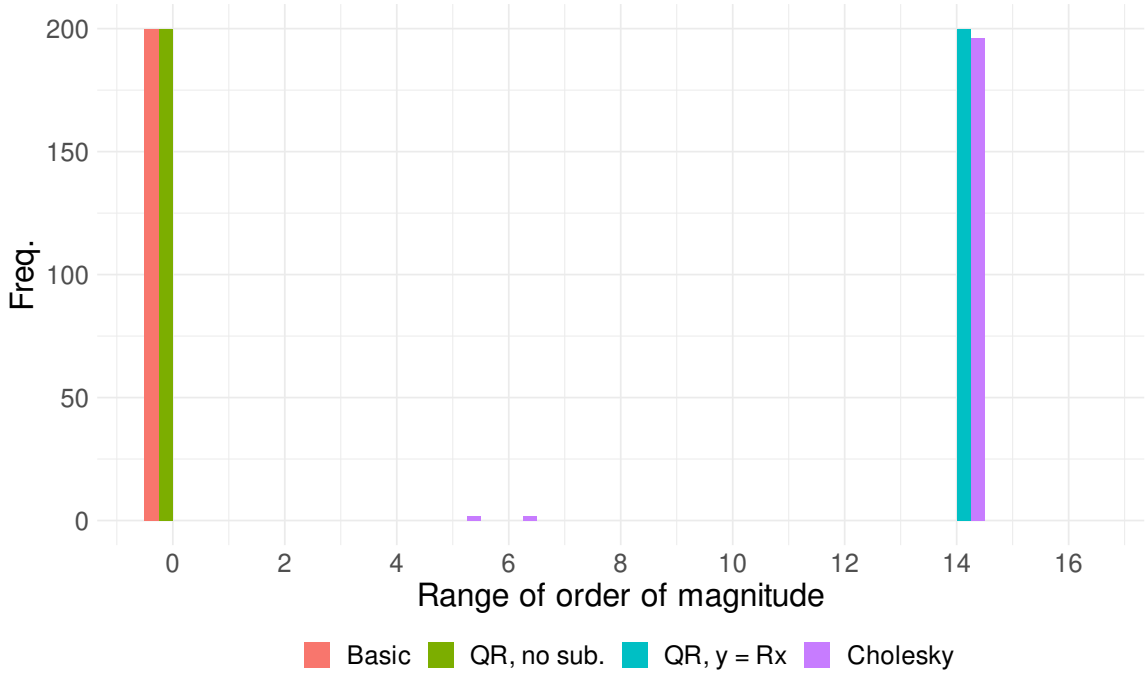


3.8 Case 4, QCQP, rescaled

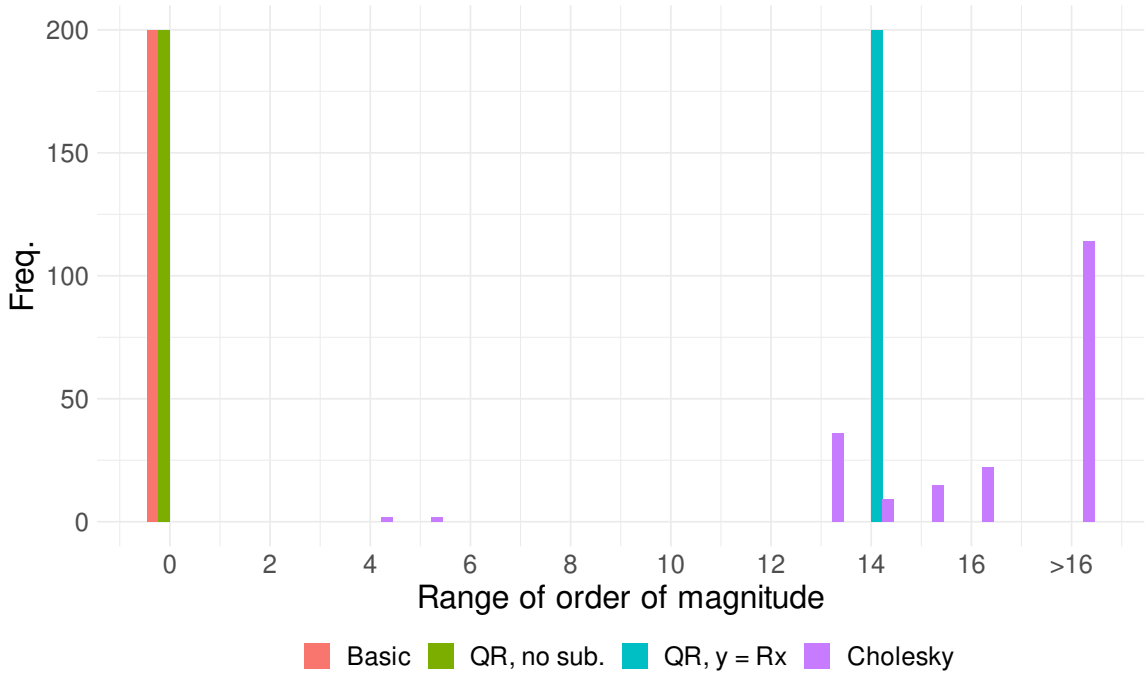


4 Range of order of mag. in linear constraint matrix

4.1 Case 1, QCQP, unscaled

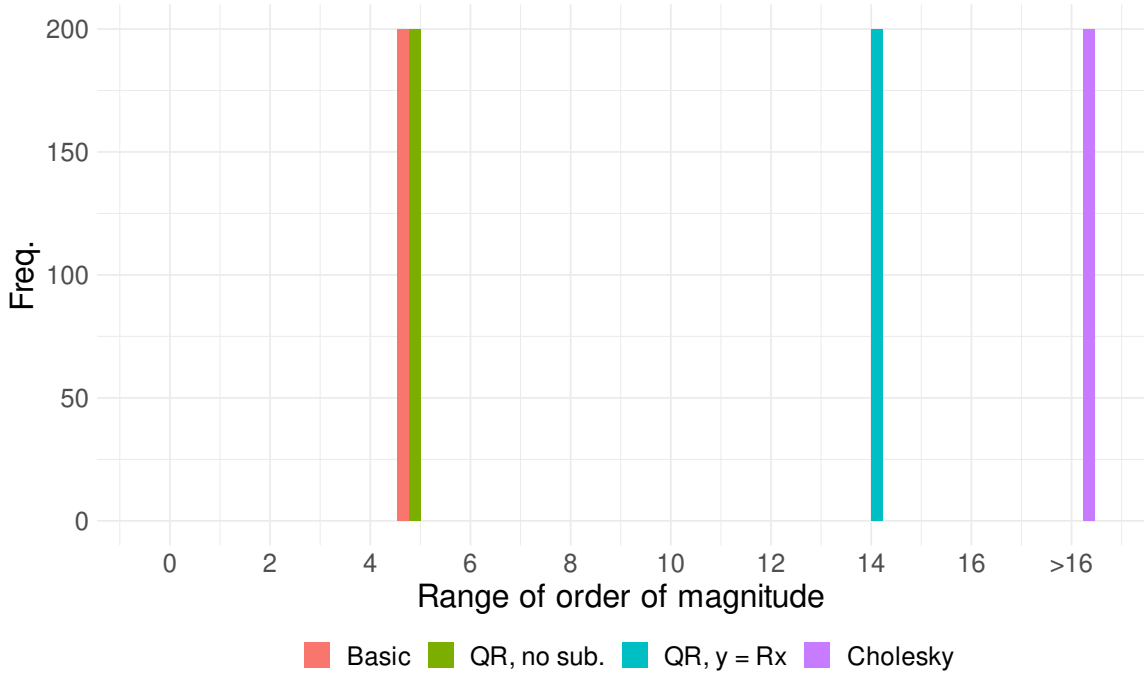


4.2 Case 1, QCQP, rescaled

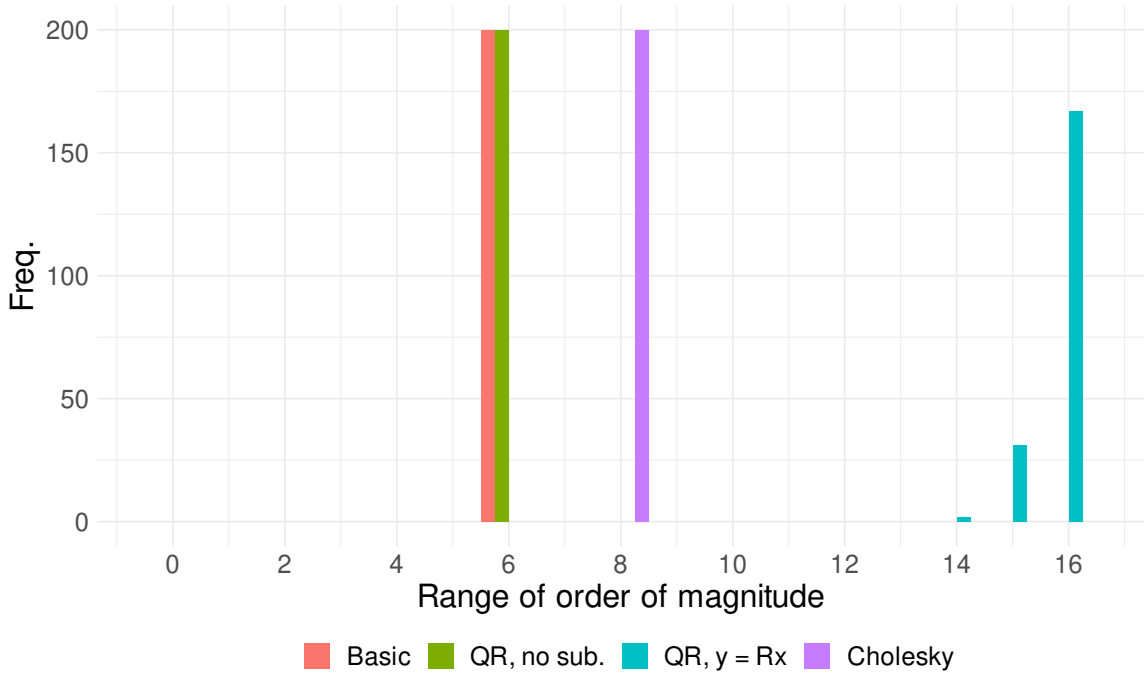


4.3 Case 2, QCQP, unscaled

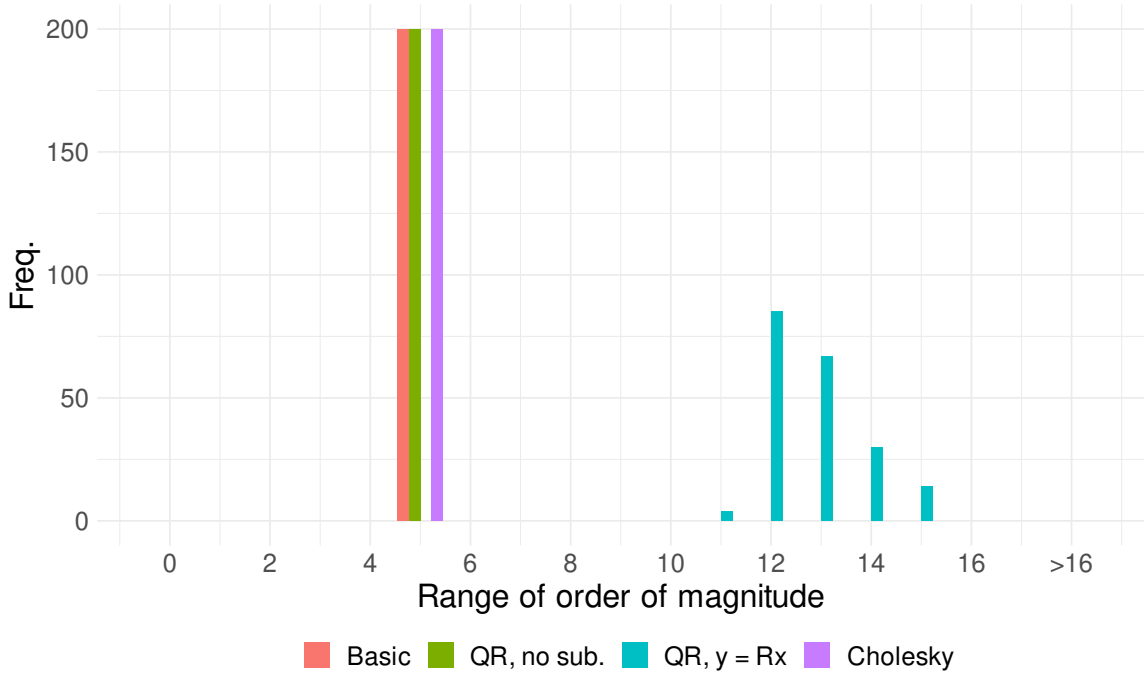
4.4 Case 2, QCQP, rescaled



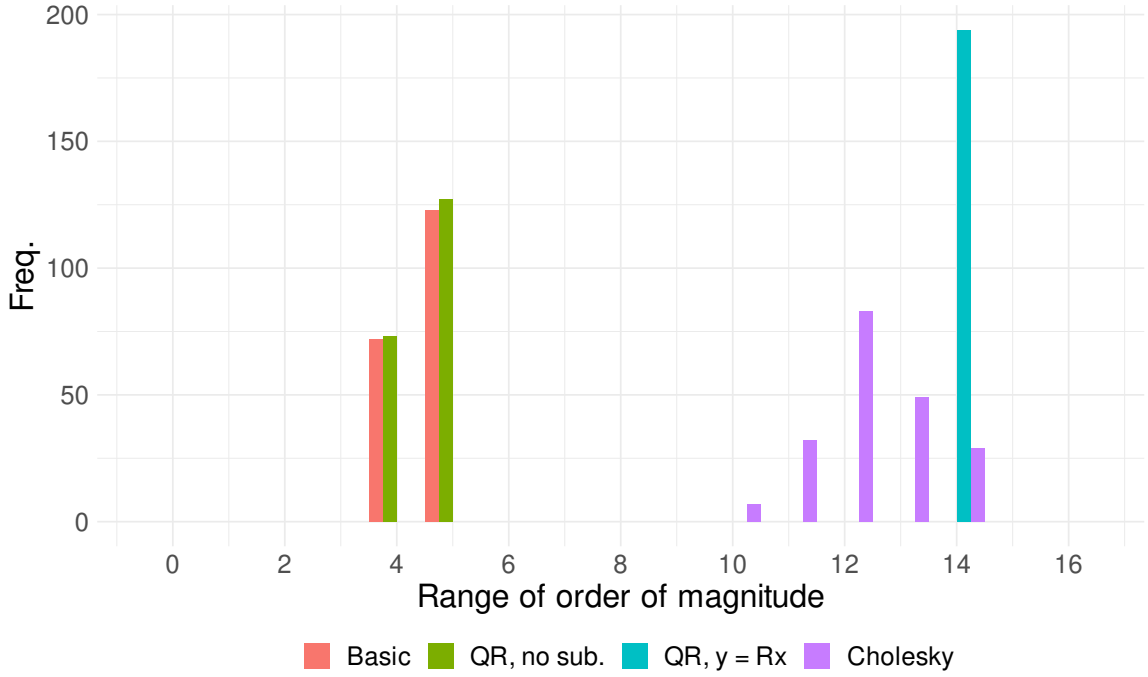
4.5 Case 3, QCQP, unscaled



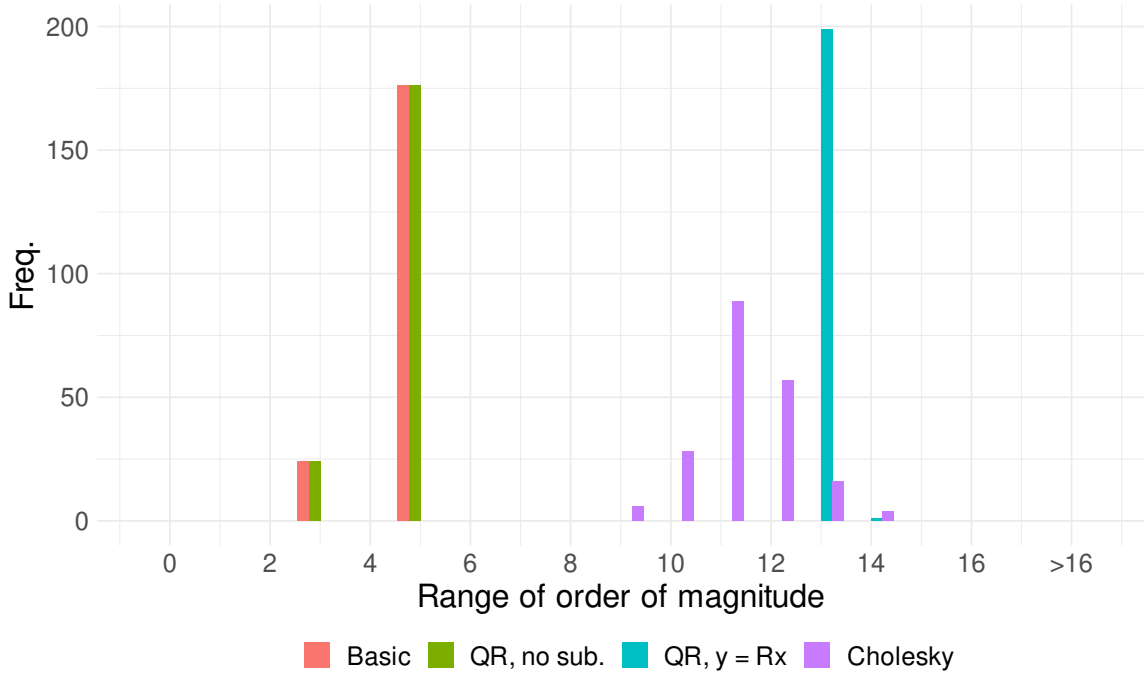
4.6 Case 3, QCQP, rescaled



4.7 Case 4, QCQP, unscaled

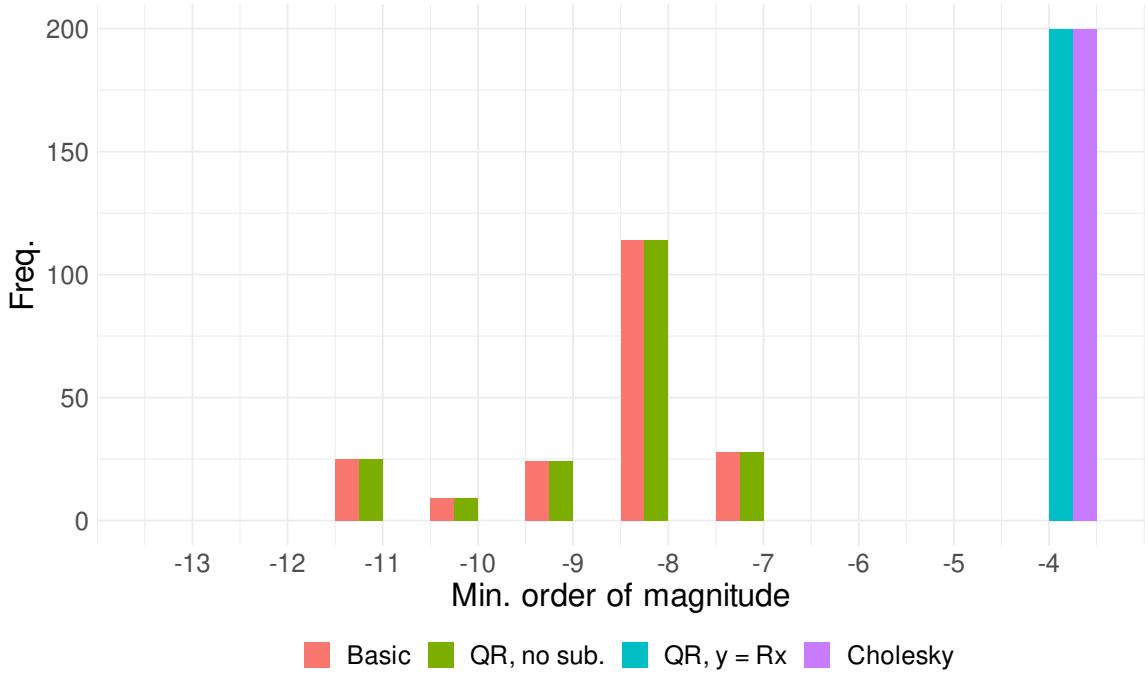


4.8 Case 4, QCQP, rescaled

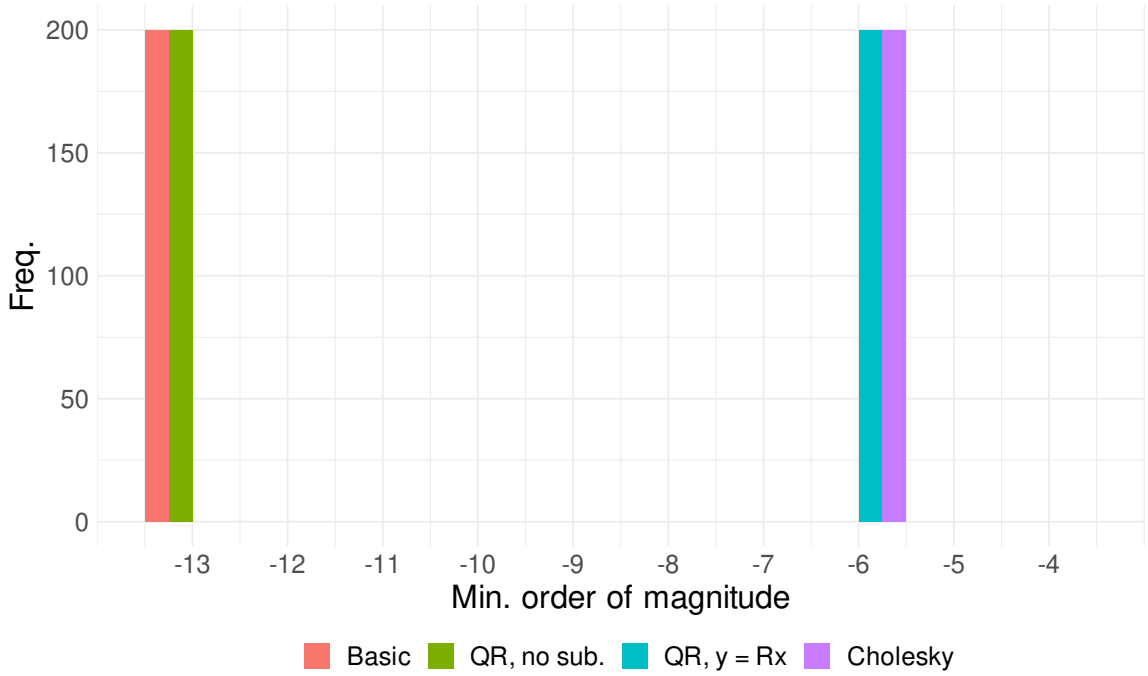


5 Min. order of mag. in quadratic constraint matrix

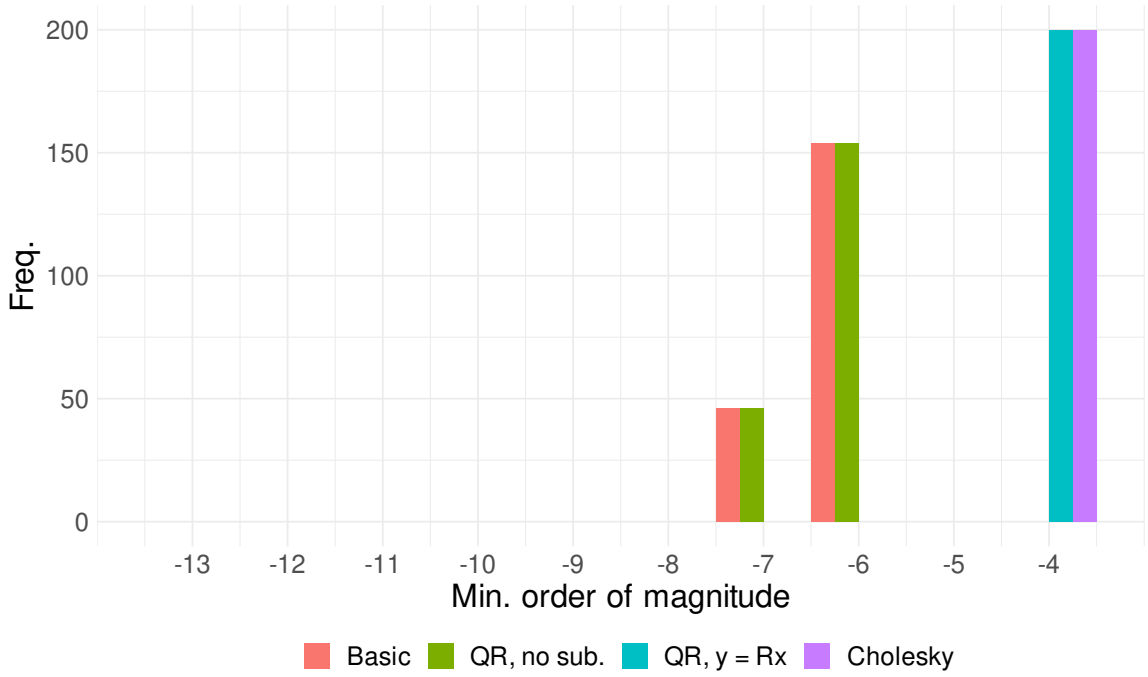
5.1 Case 1, QCQP, unscaled



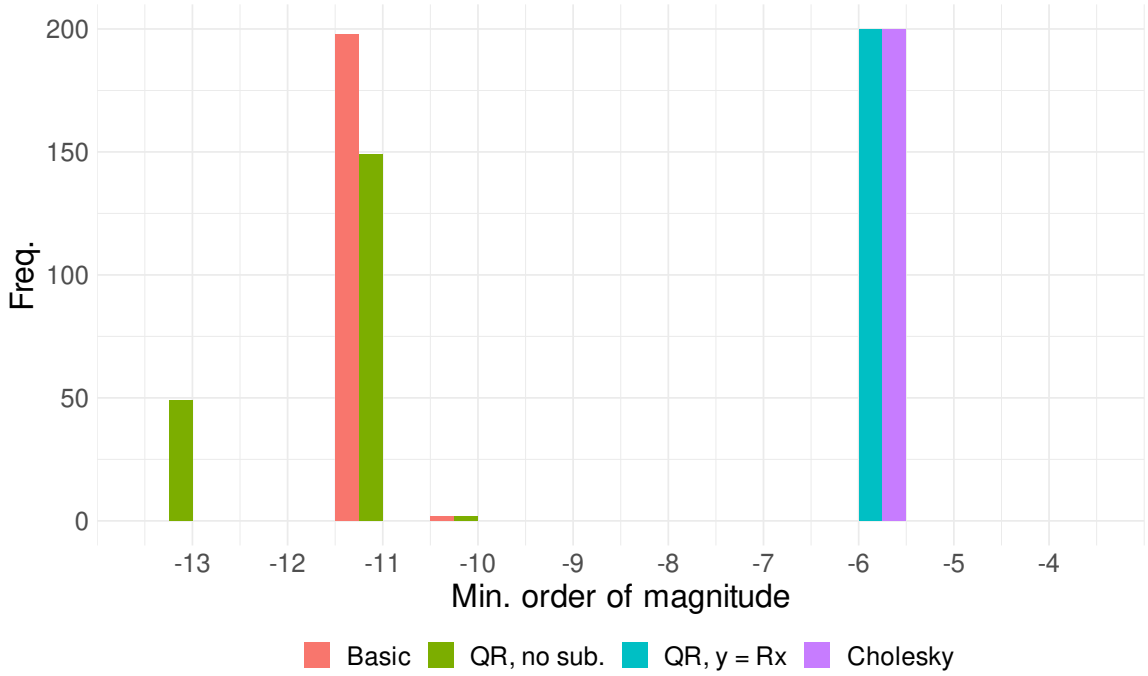
5.2 Case 1, QCQP, rescaled



5.3 Case 2, QCQP, unscaled

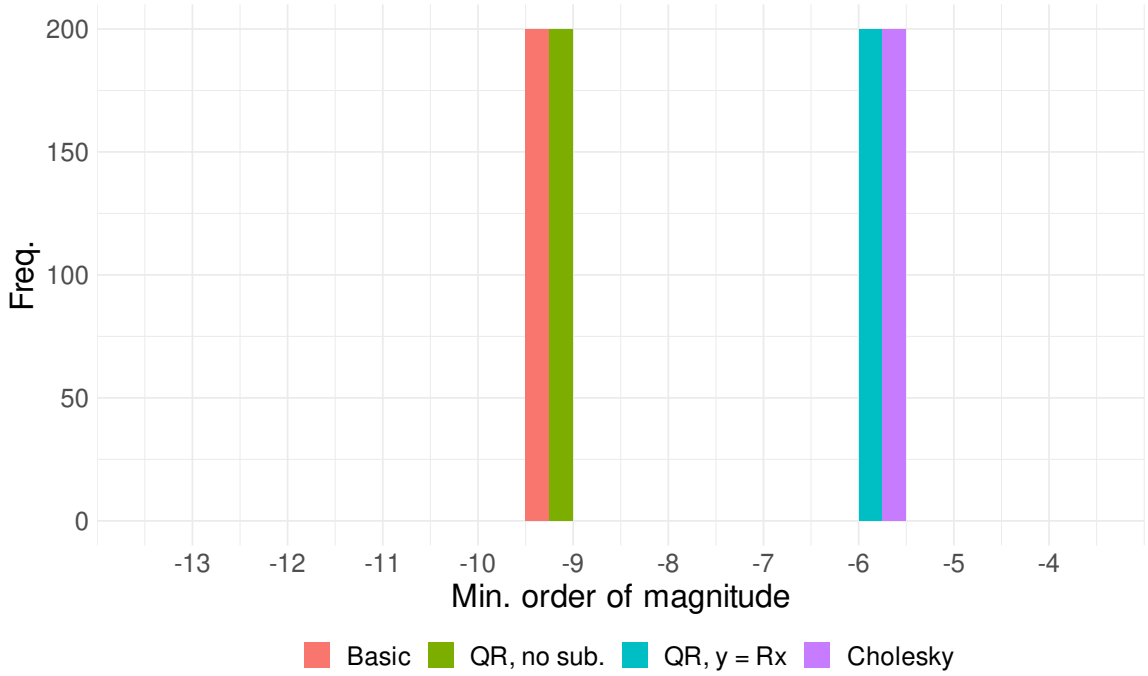


5.4 Case 2, QCQP, rescaled

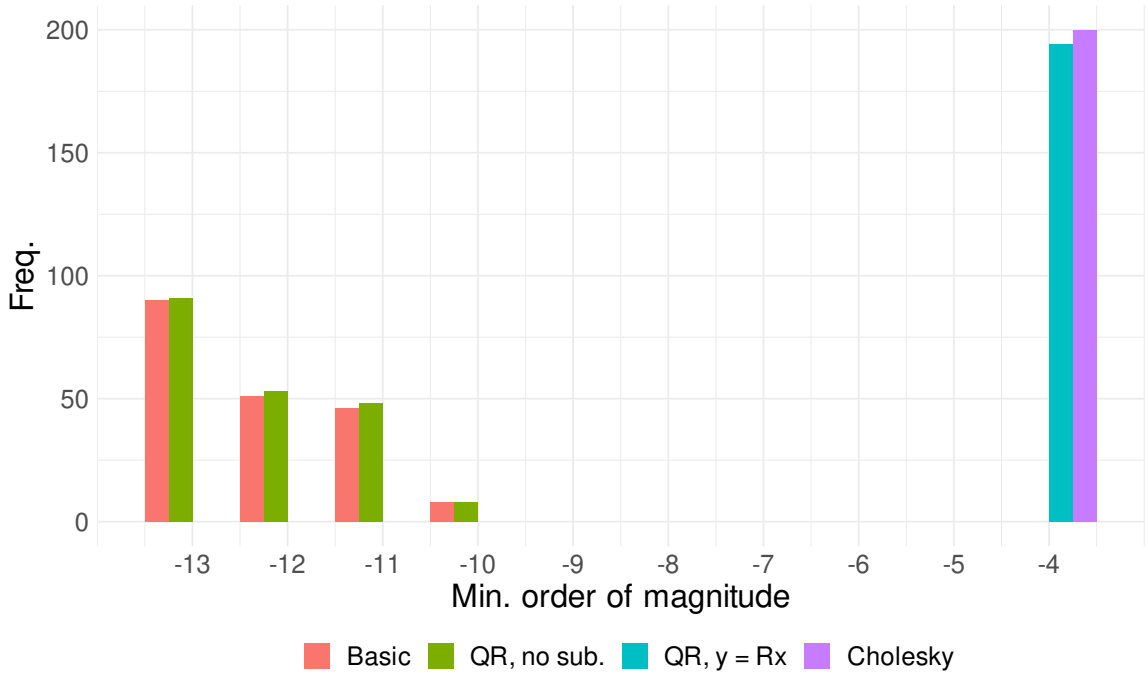


5.5 Case 3, QCQP, unscaled

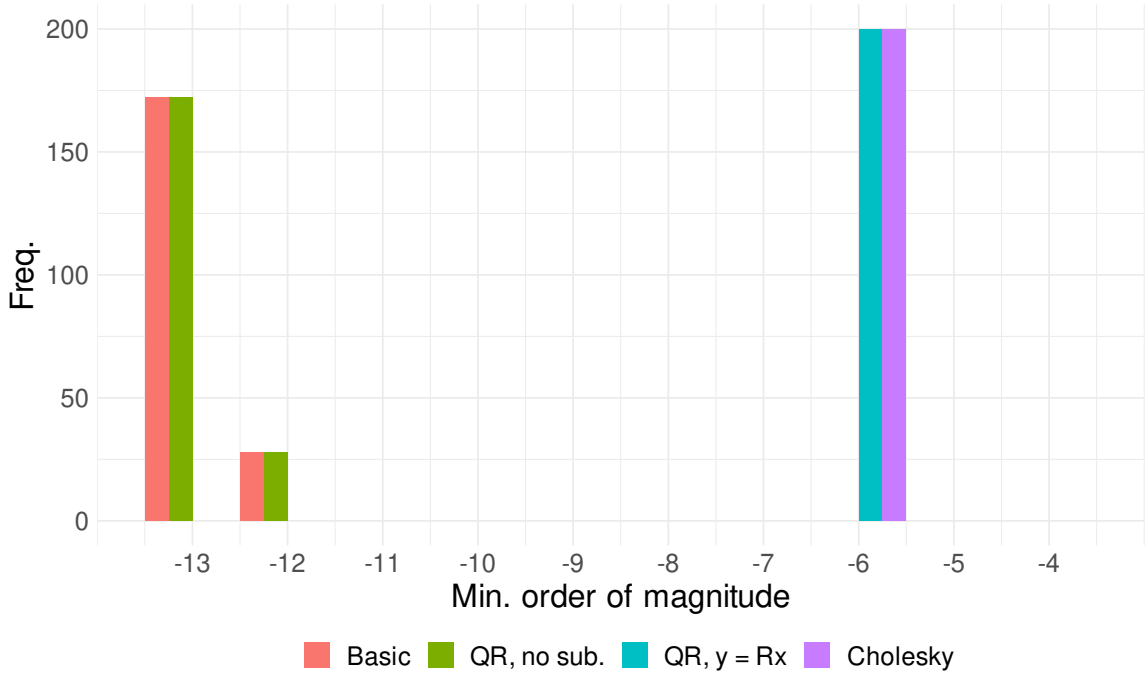
5.6 Case 3, QCQP, rescaled



5.7 Case 4, QCQP, unscaled

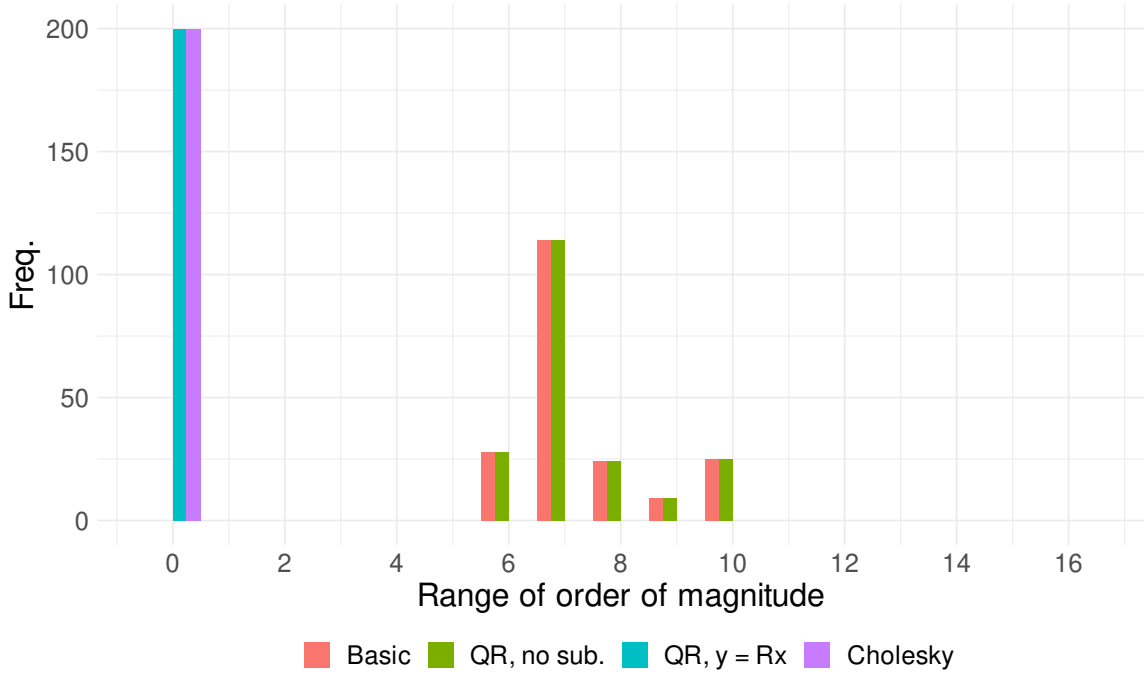


5.8 Case 4, QCQP, rescaled

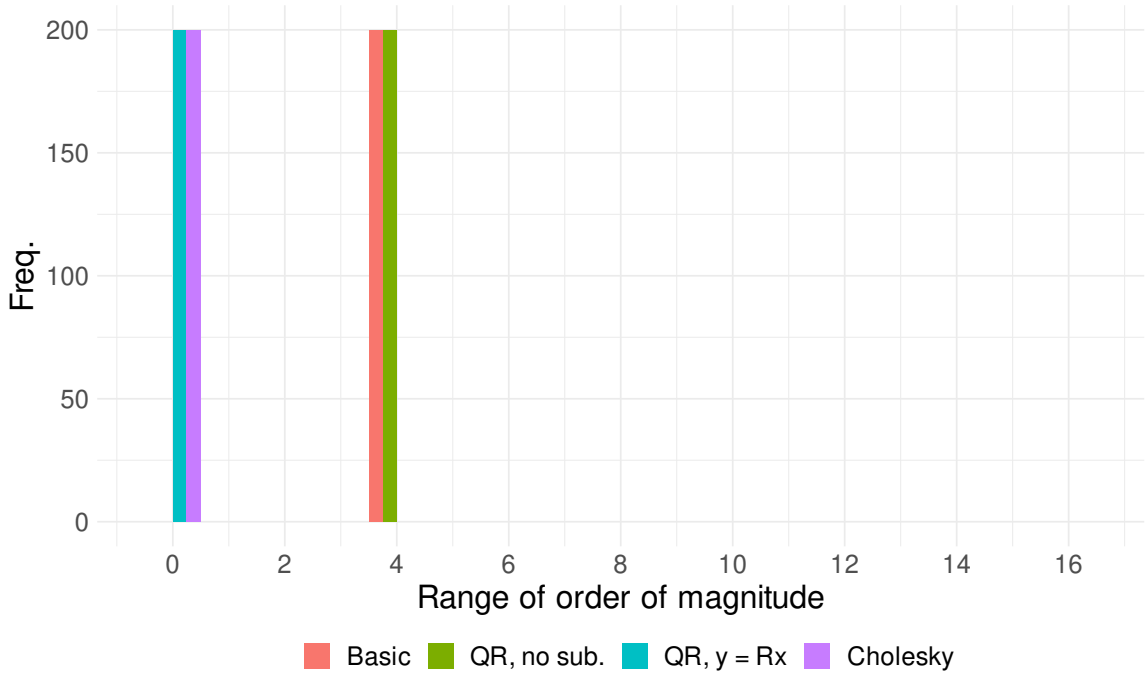


6 Range of order of mag. in quadratic constraint matrix

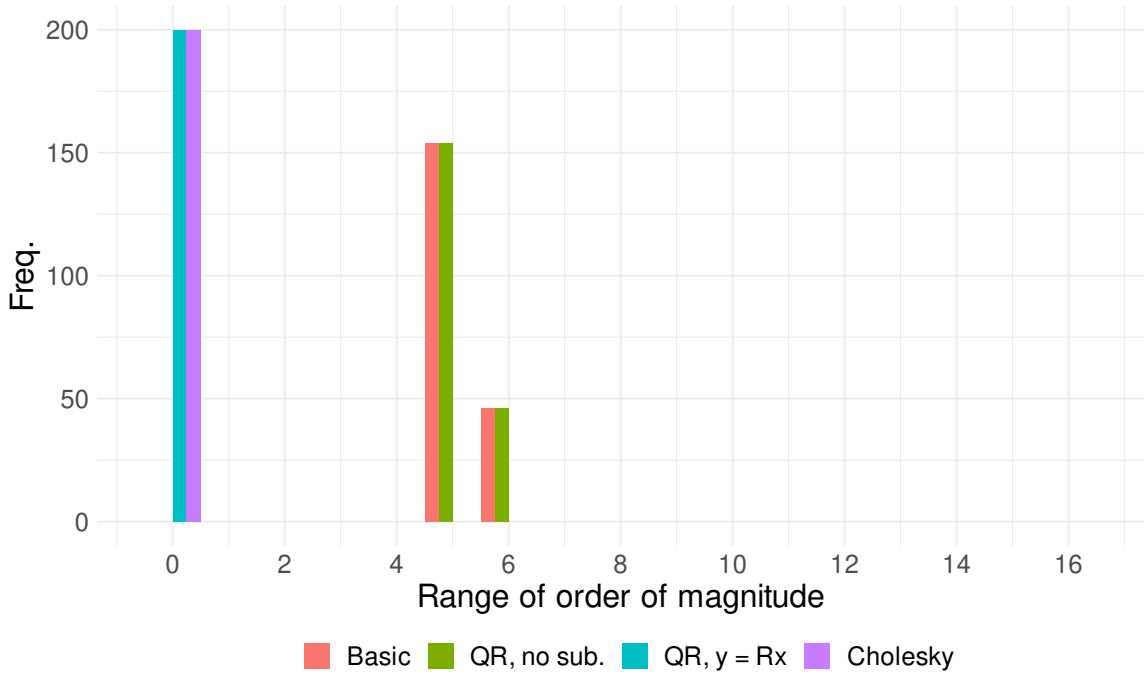
6.1 Case 1, QCQP, unscaled



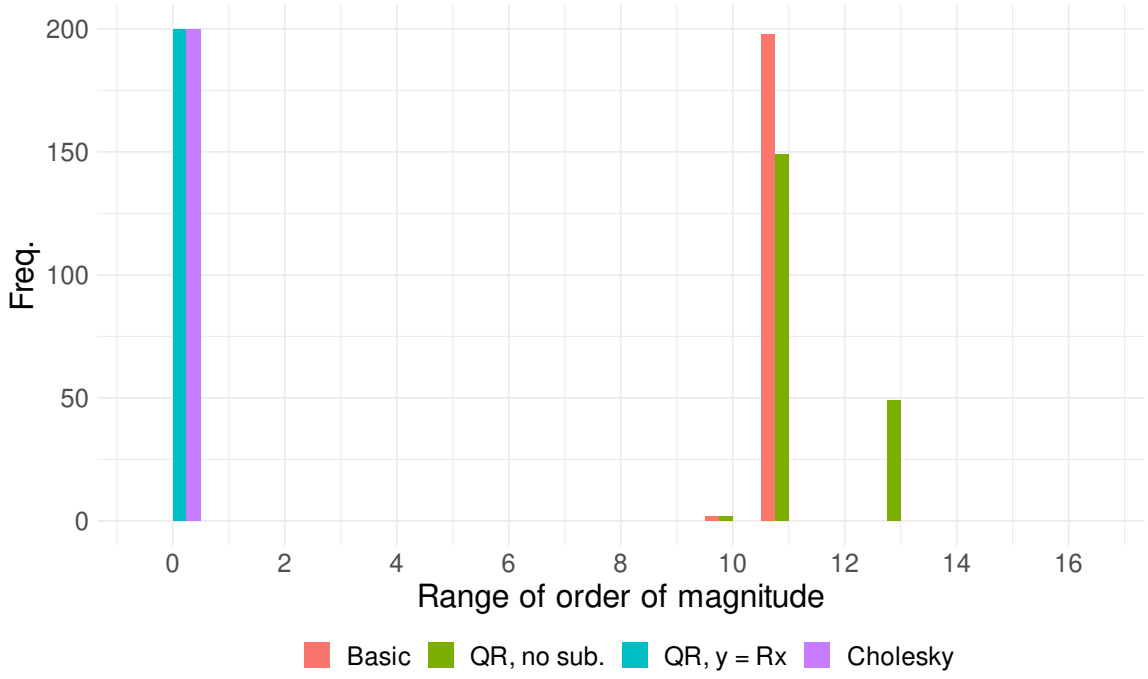
6.2 Case 1, QCQP, rescaled



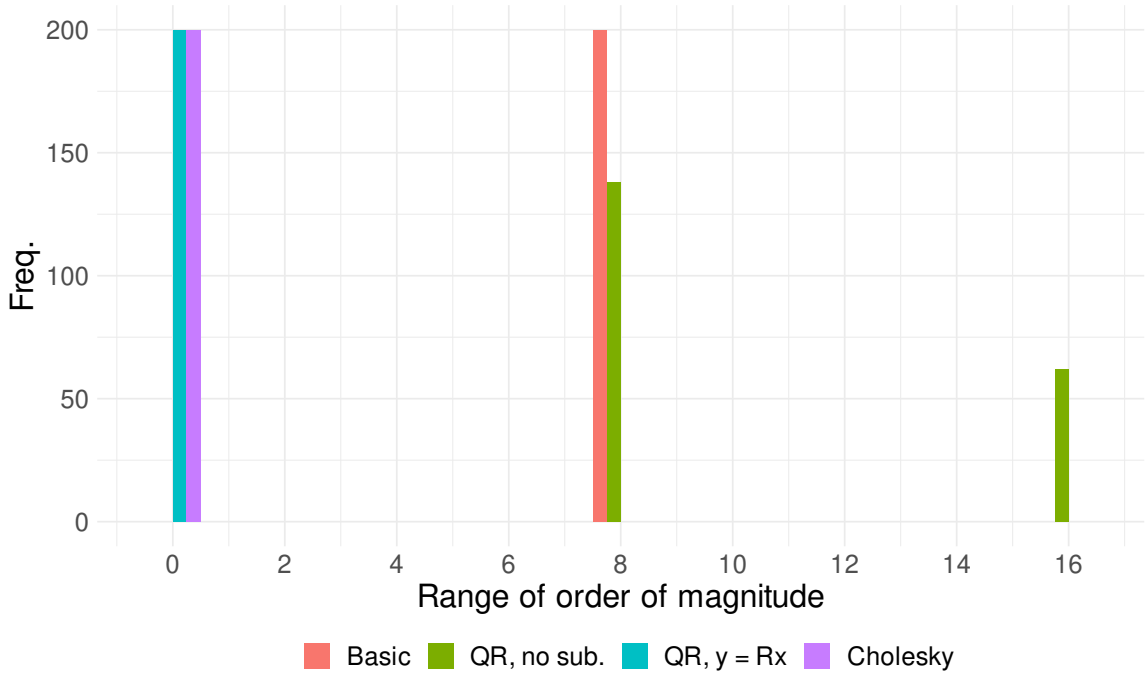
6.3 Case 2, QCQP, unscaled



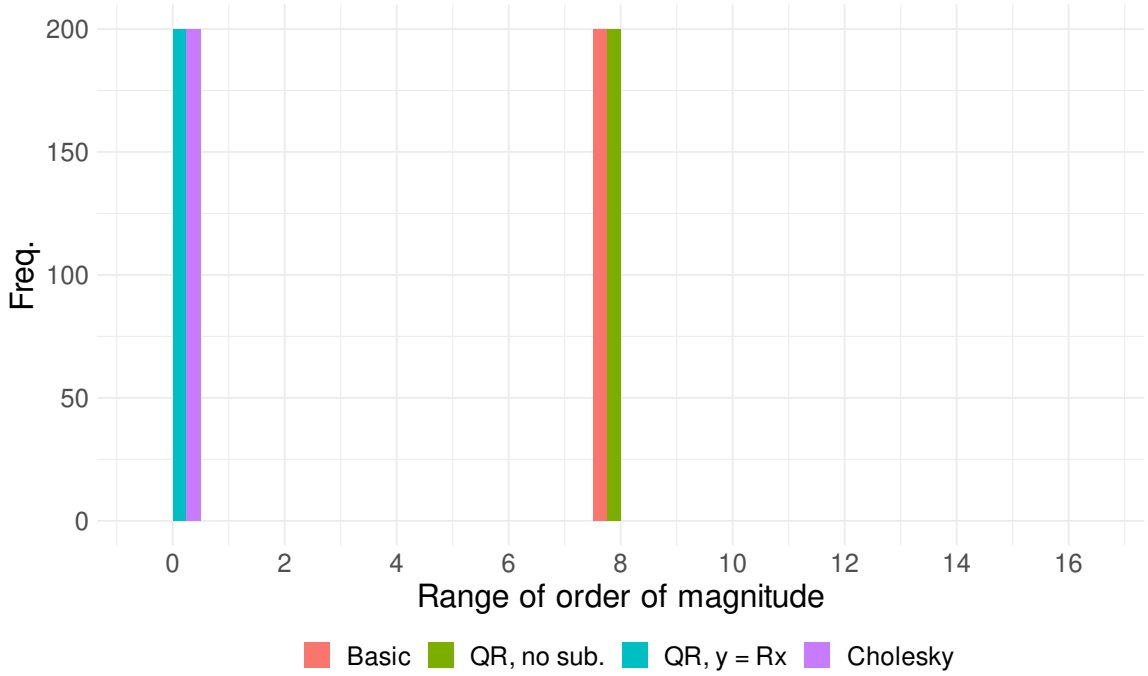
6.4 Case 2, QCQP, rescaled



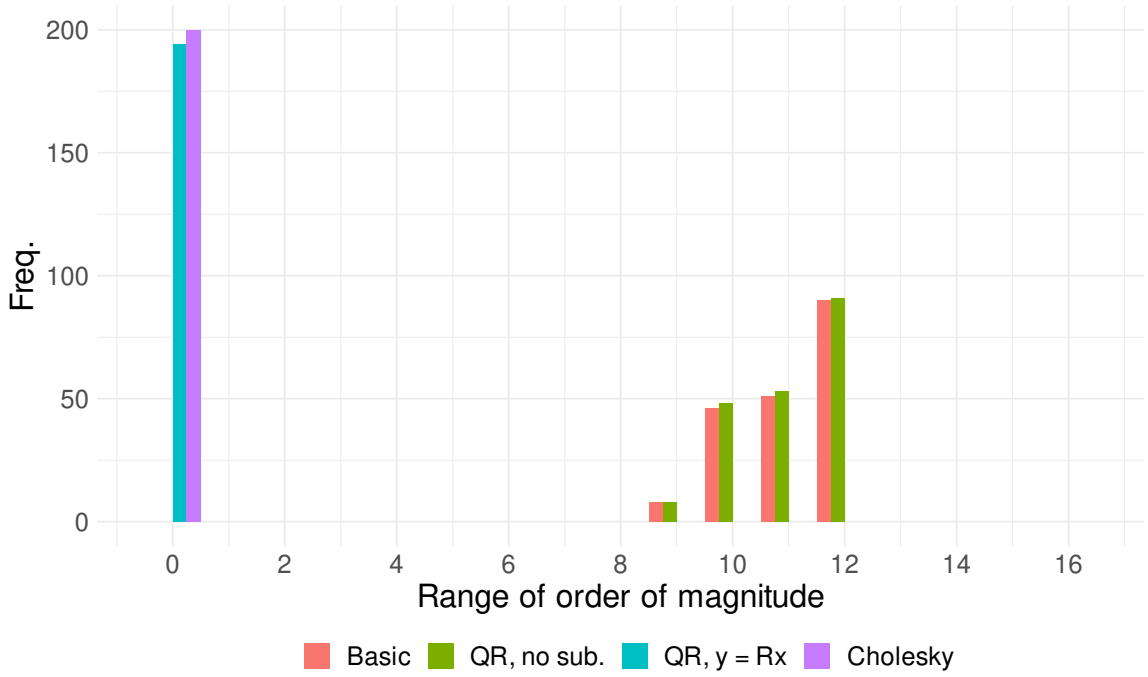
6.5 Case 3, QCQP, unscaled



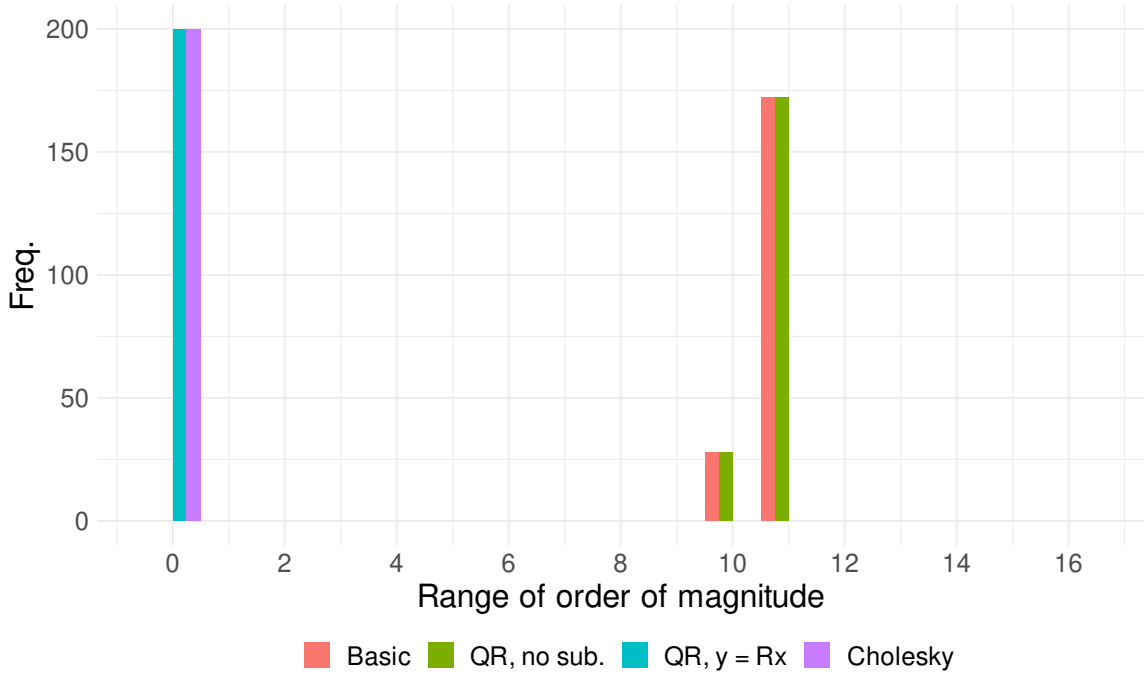
6.6 Case 3, QCQP, rescaled



6.7 Case 4, QCQP, unscaled

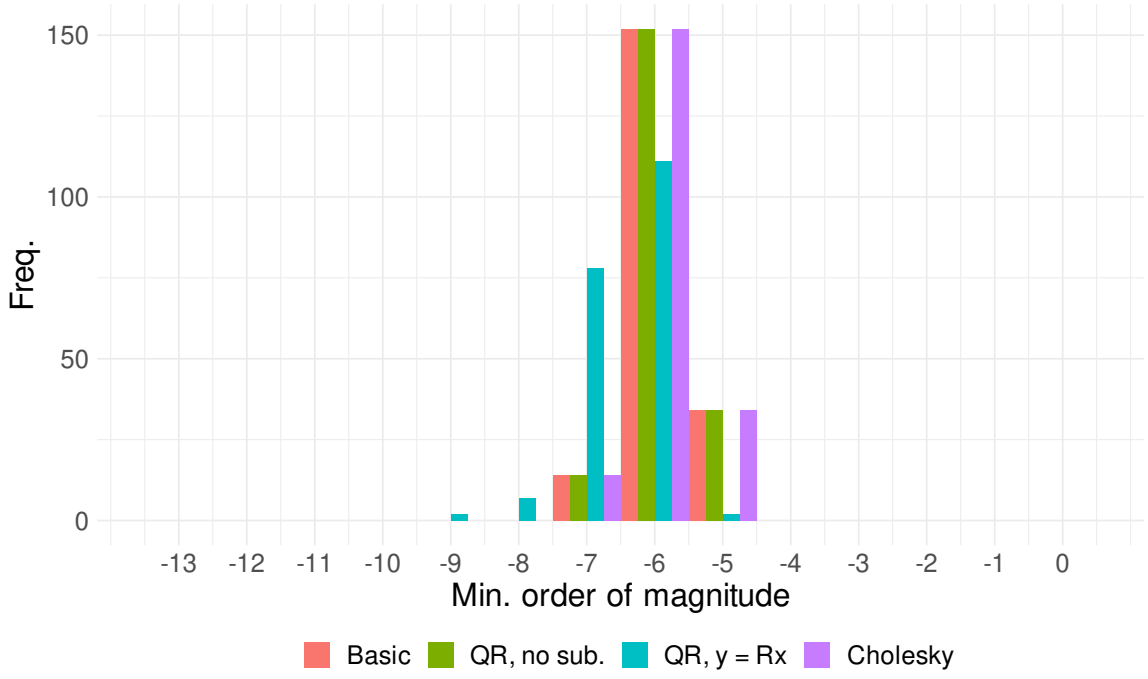


6.8 Case 4, QCQP, rescaled

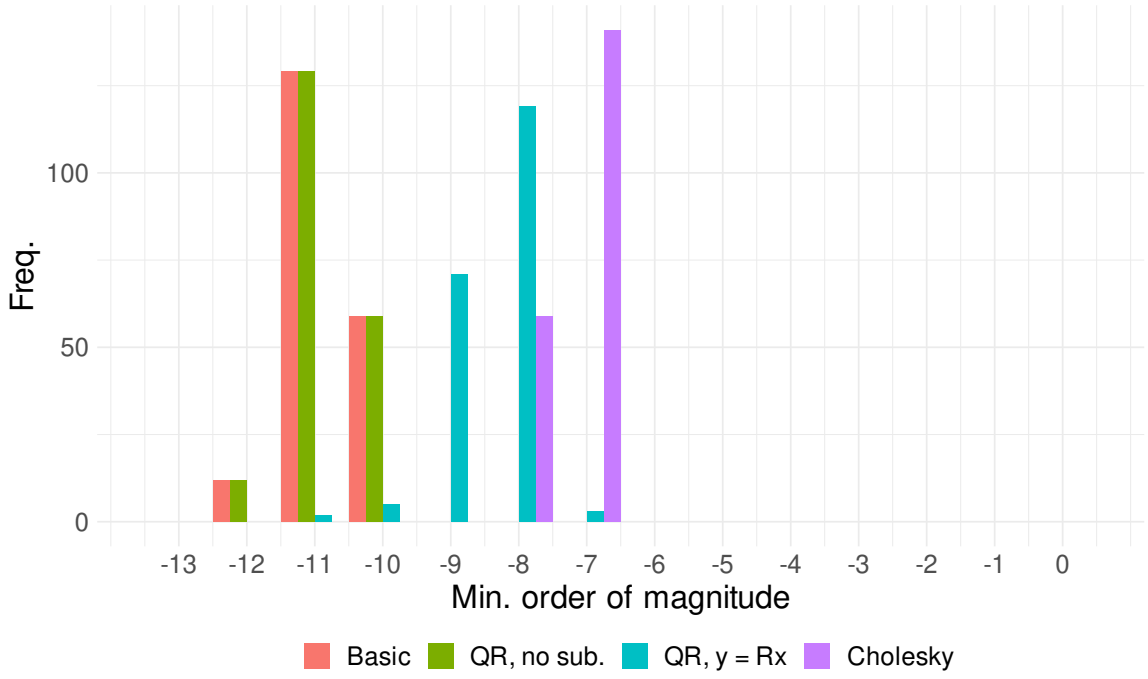


7 Min. order of mag. in quadratic constraint vector

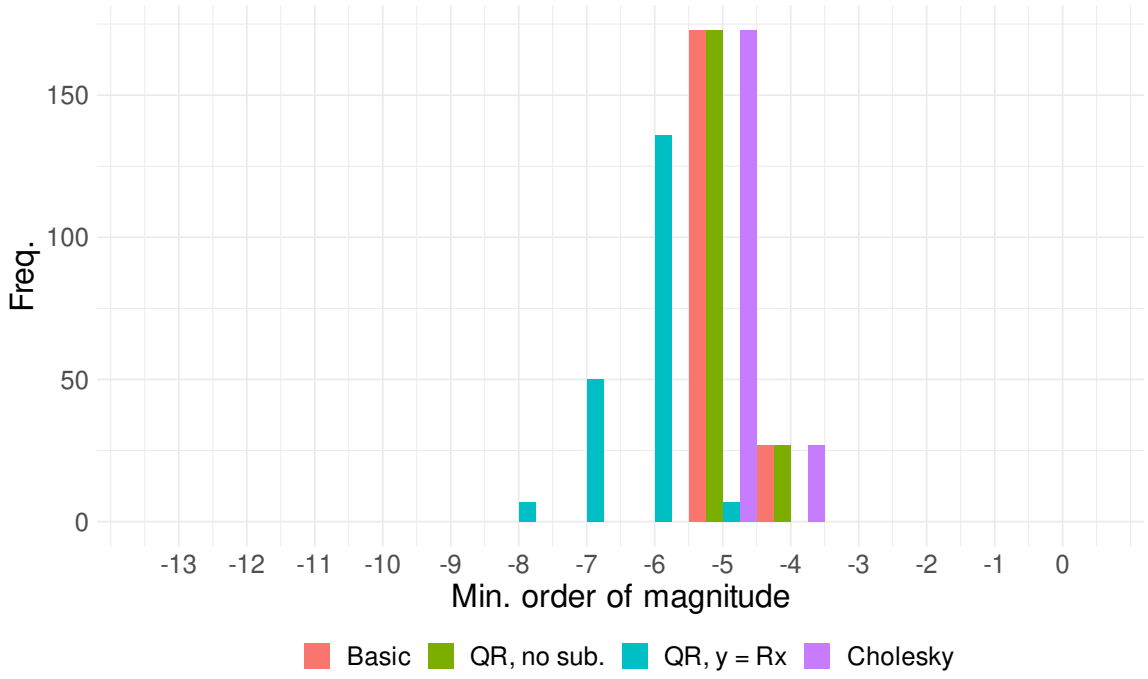
7.1 Case 1, QCQP, unscaled



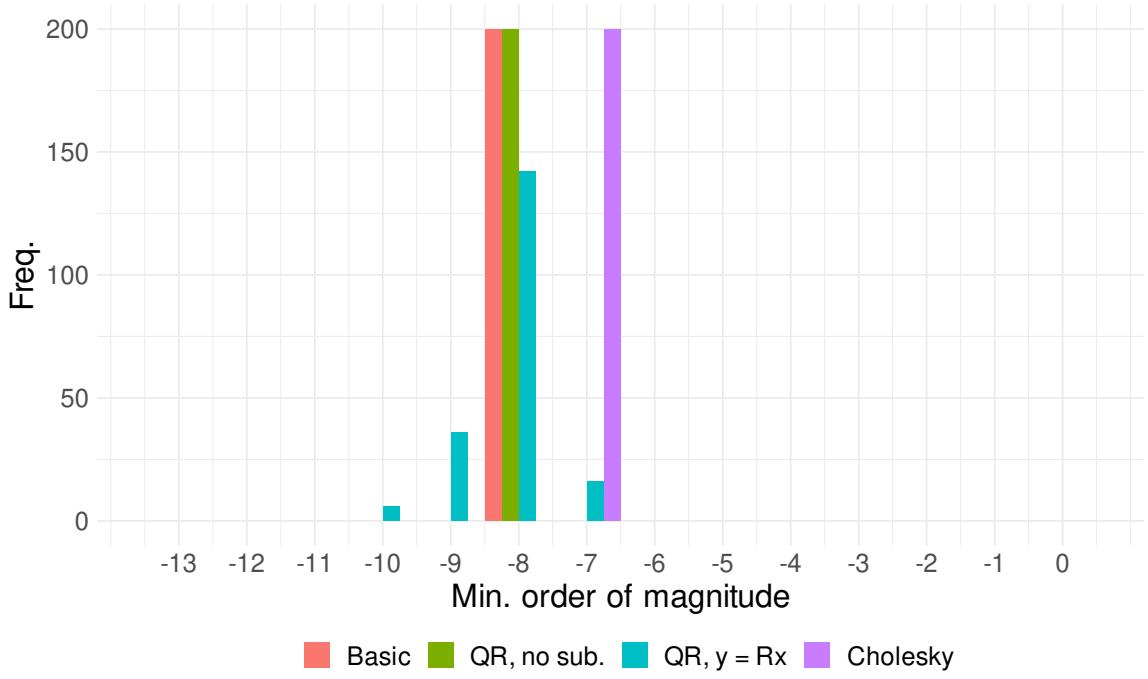
7.2 Case 1, QCQP, rescaled



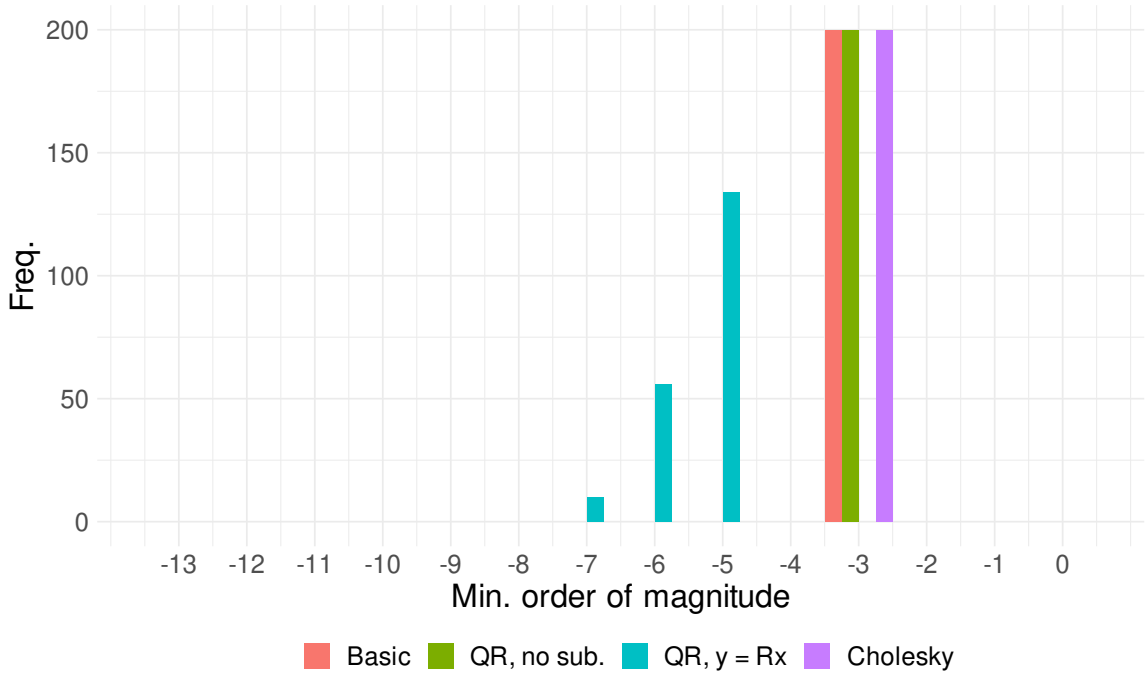
7.3 Case 2, QCQP, unscaled



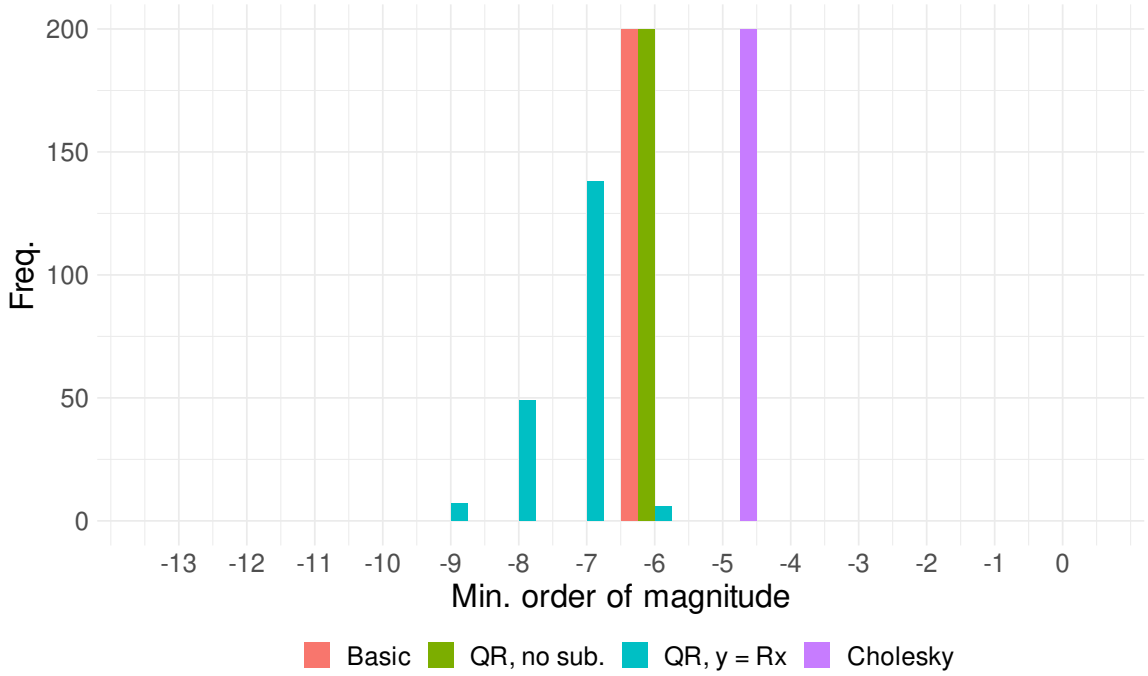
7.4 Case 2, QCQP, rescaled



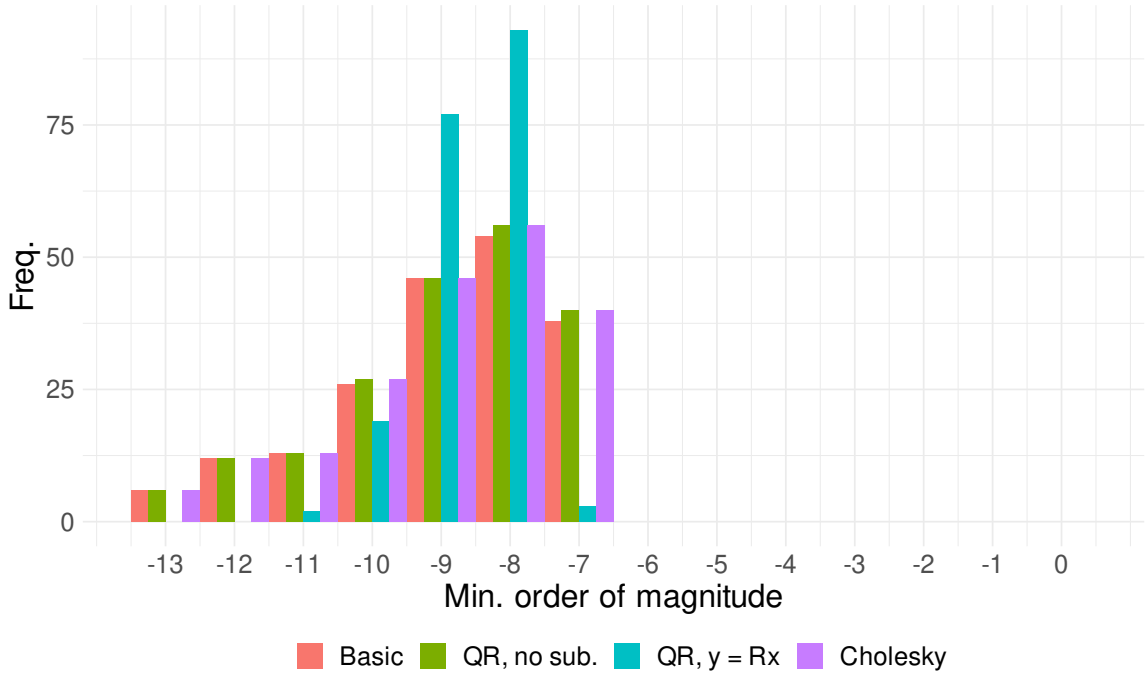
7.5 Case 3, QCQP, unscaled



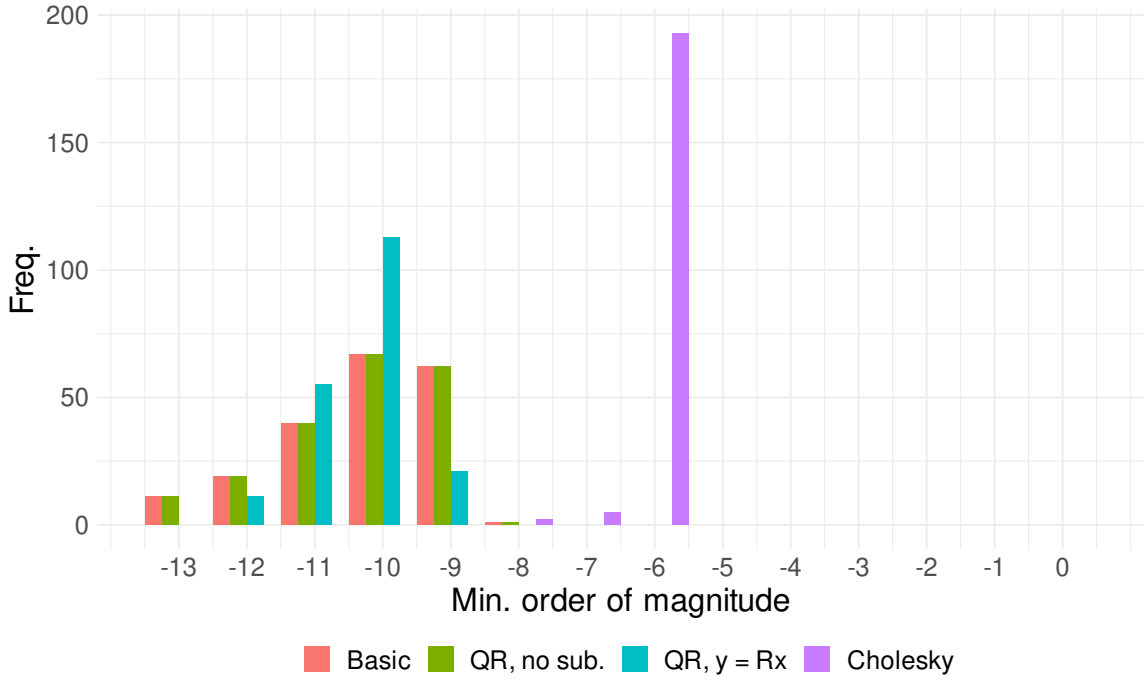
7.6 Case 3, QCQP, rescaled



7.7 Case 4, QCQP, unscaled

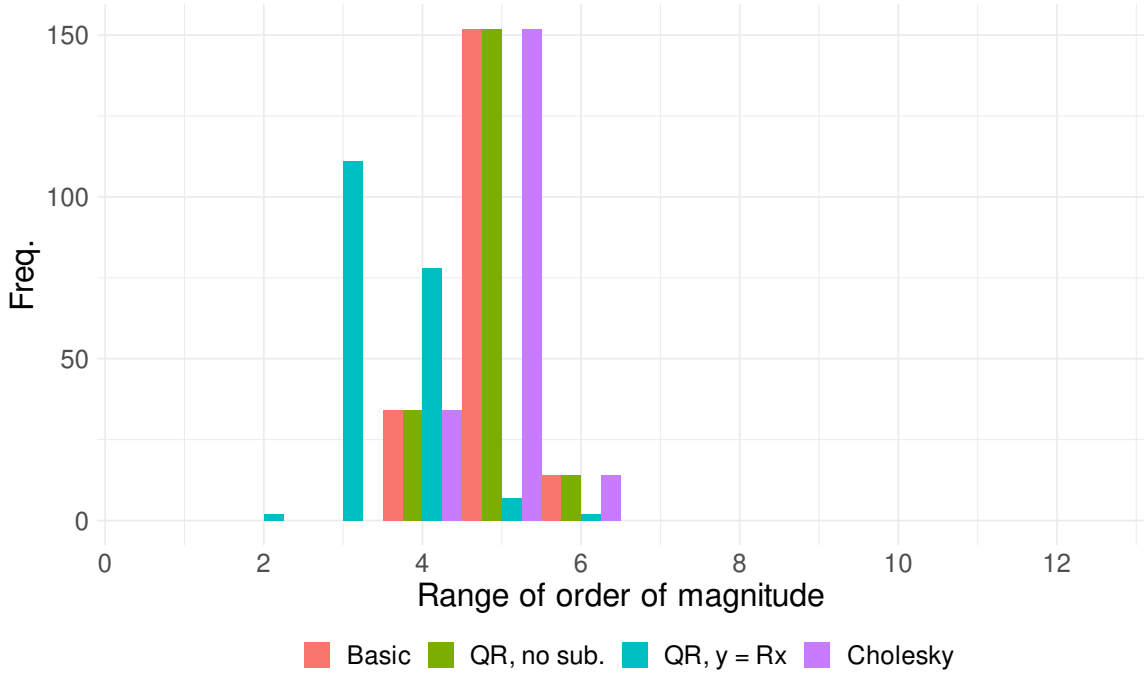


7.8 Case 4, QCQP, rescaled

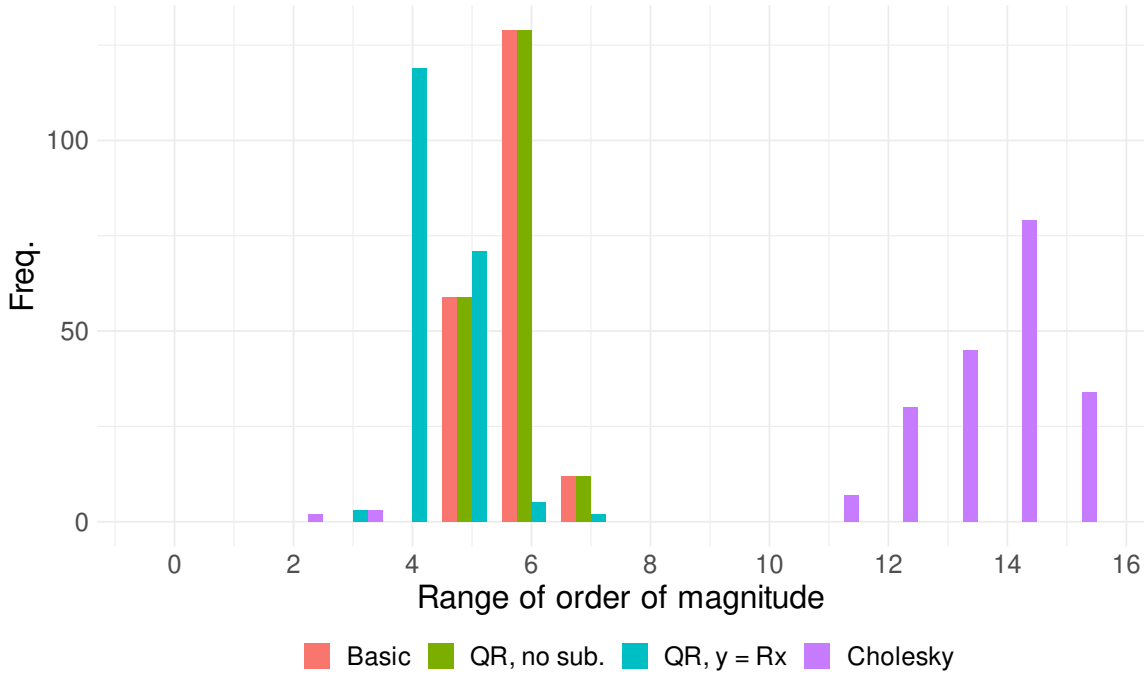


8 Range of order of mag. in quadratic constraint vector

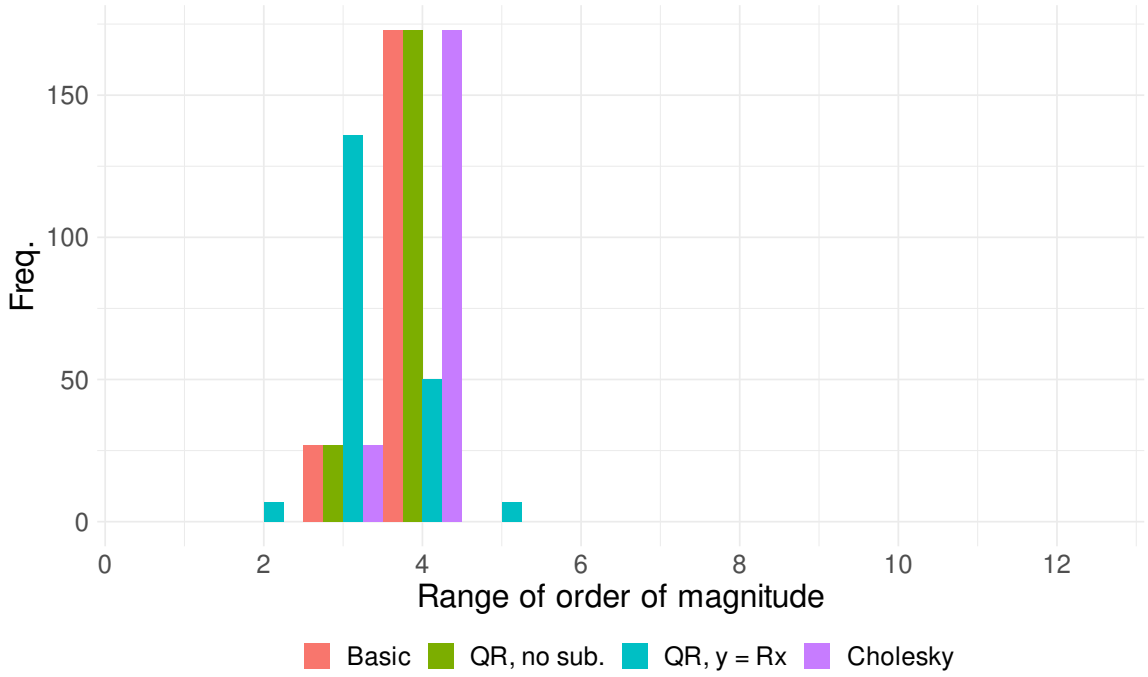
8.1 Case 1, QCQP, unscaled



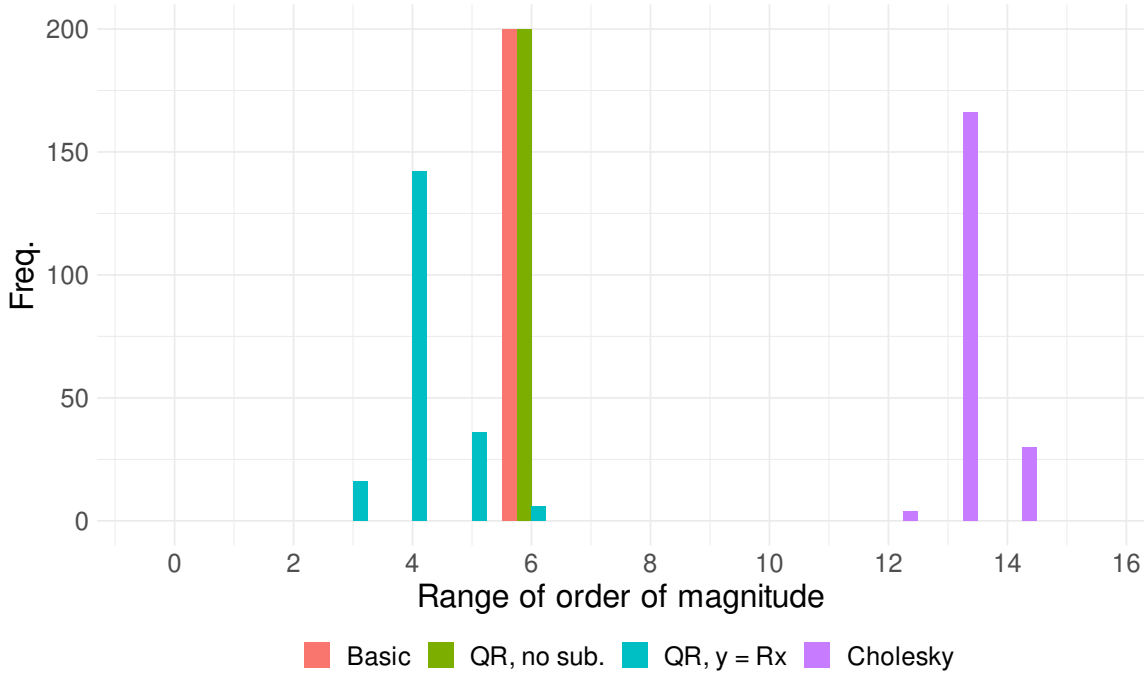
8.2 Case 1, QCQP, rescaled



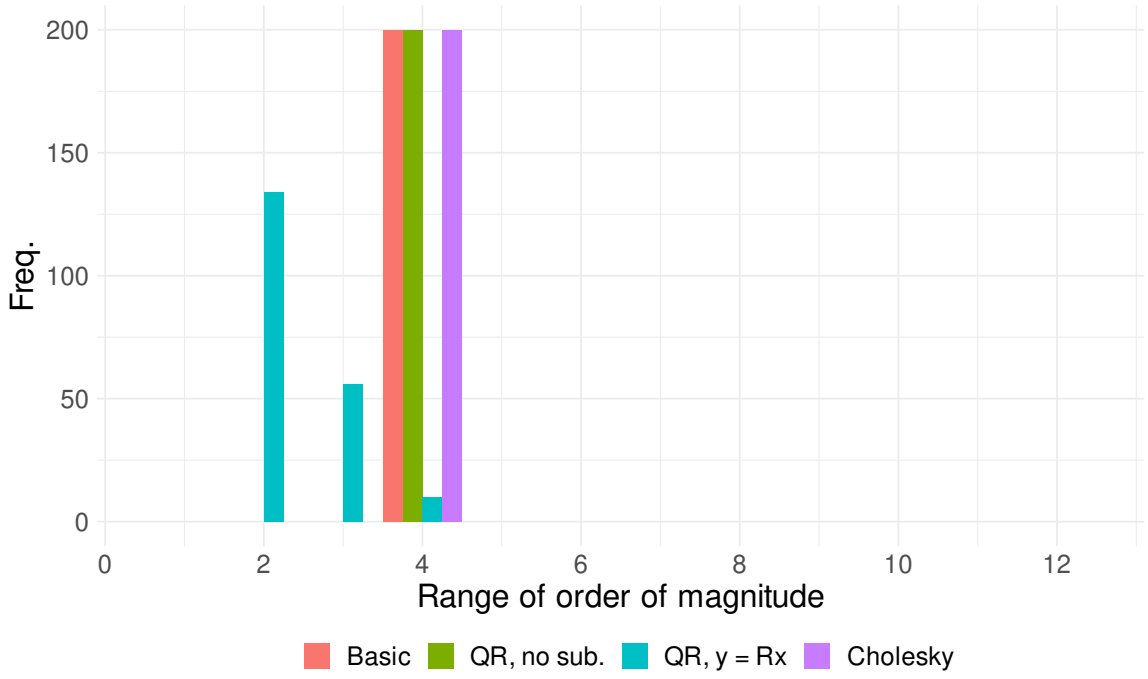
8.3 Case 2, QCQP, unscaled



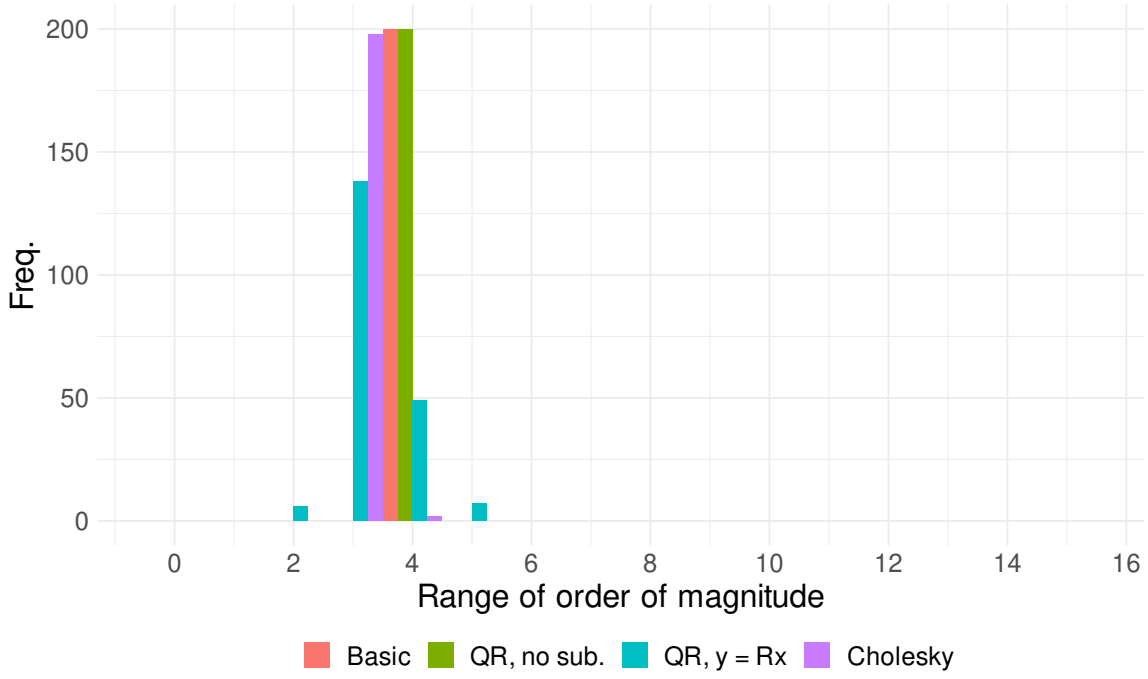
8.4 Case 2, QCQP, rescaled



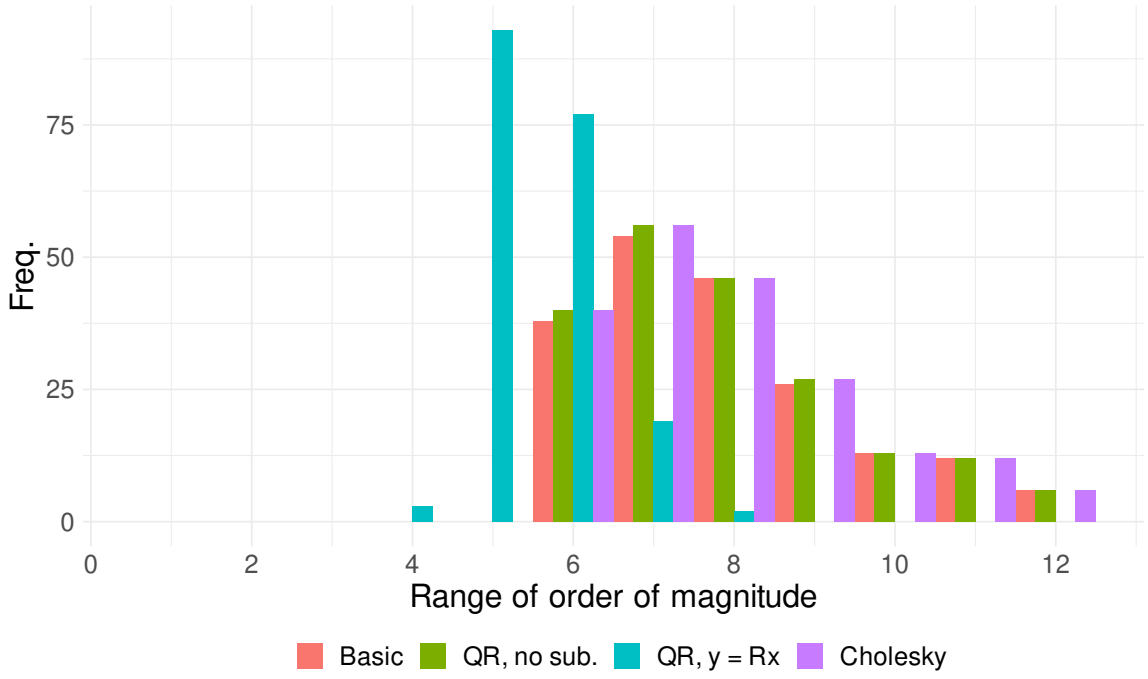
8.5 Case 3, QCQP, unscaled



8.6 Case 3, QCQP, rescaled



8.7 Case 4, QCQP, unscaled



8.8 Case 4, QCQP, rescaled