Model Performance Results for Practicum: Scenarios 11 & 12

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Data Import & Wrangling

Data Processing

- Scenario 11: simple exposures, complex confounding, moderate collinearity
- Scenario 12: complex exposures, complex confounding, moderate collinearity

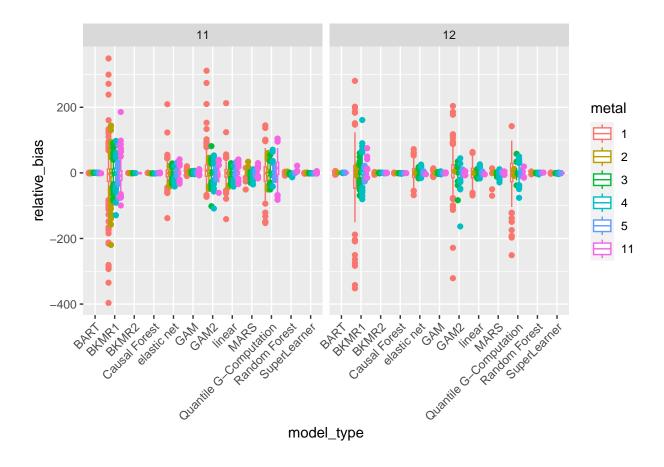
Note: besides confounders, exposure metals 1-5 are specified in the functional form for each scenario, while metals 6-10 are excluded. "Metal" 11 is the complete metal mixture.

Results

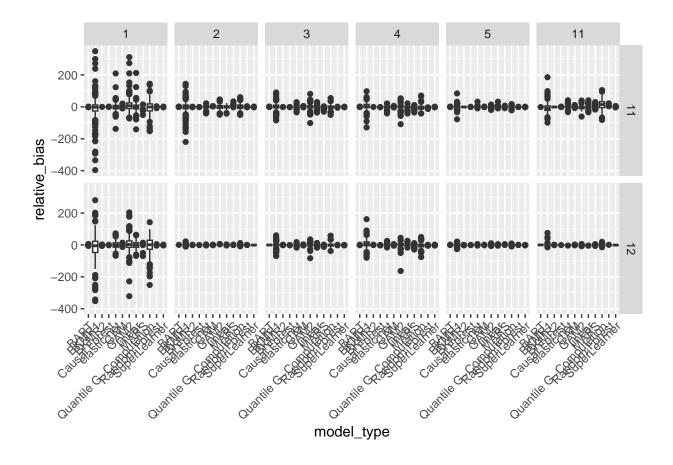
Relative Bias

Visualizations at Dataset Level

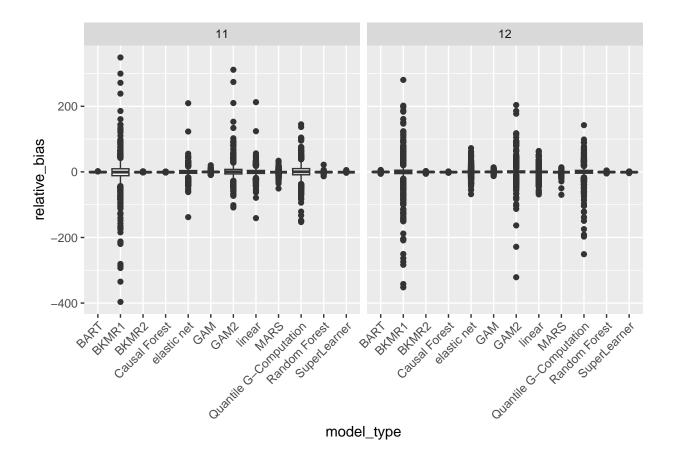
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



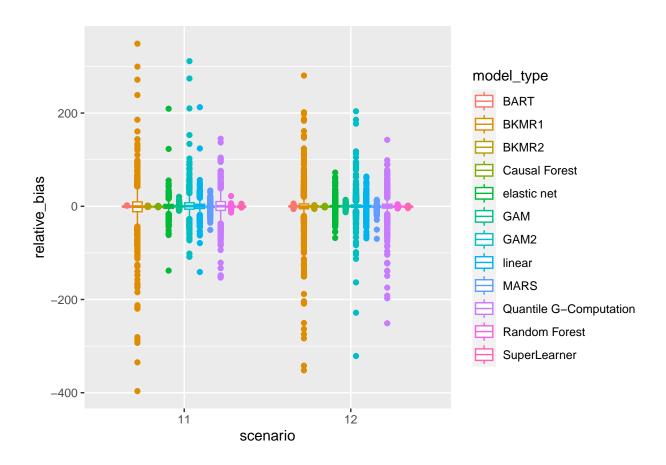
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



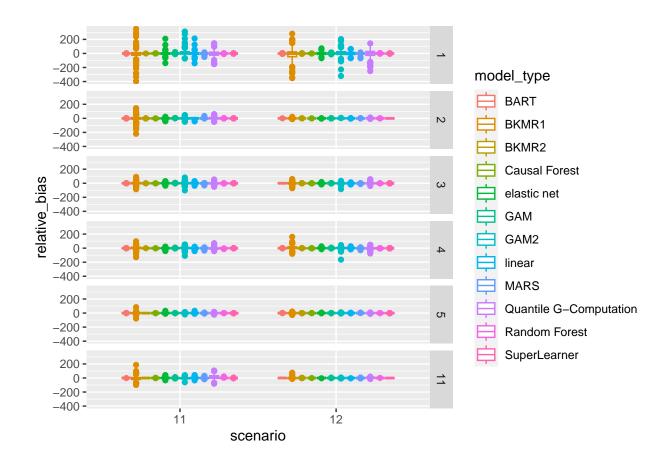
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



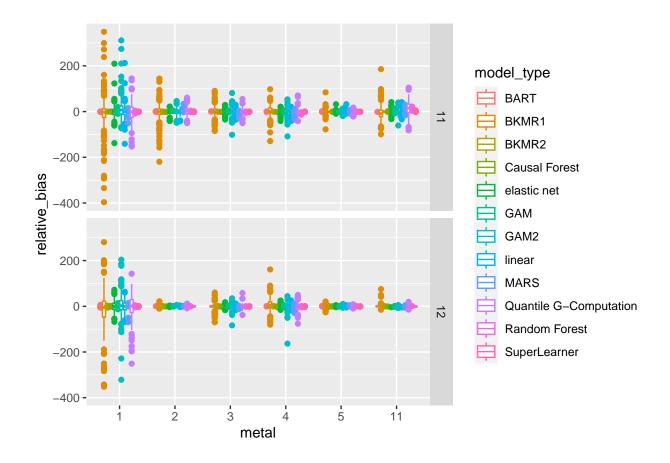
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').

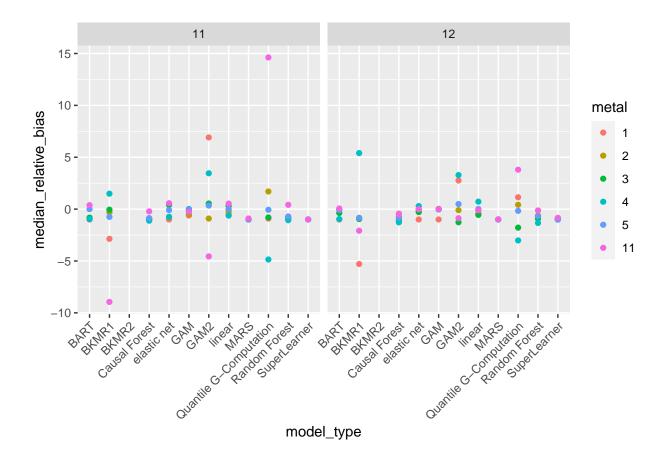


Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').

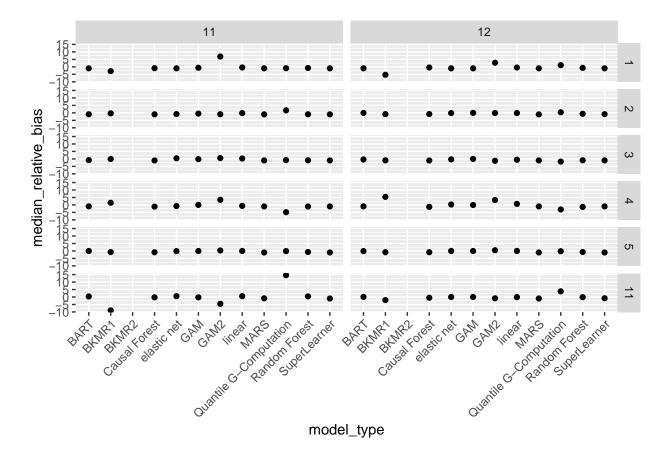


Visualizations at Scenario Level

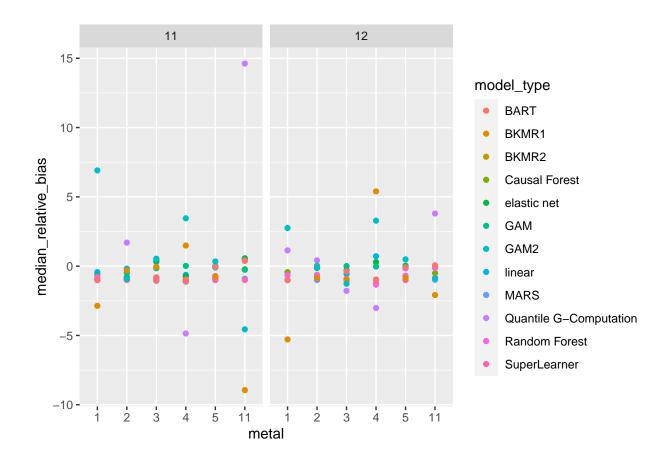
Warning: Removed 12 rows containing missing values ('geom_point()').



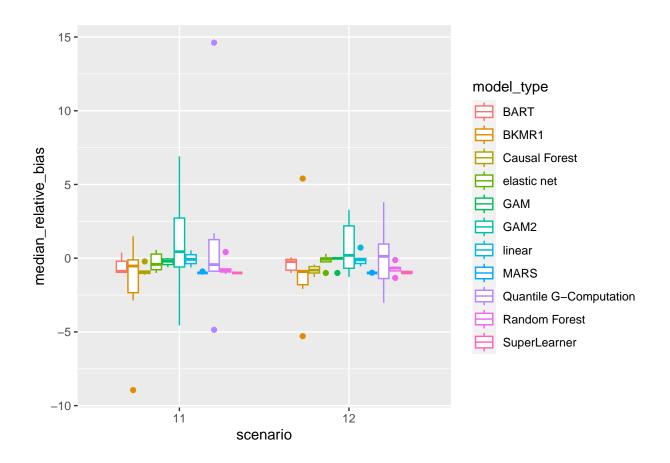
Warning: Removed 12 rows containing missing values ('geom_point()').



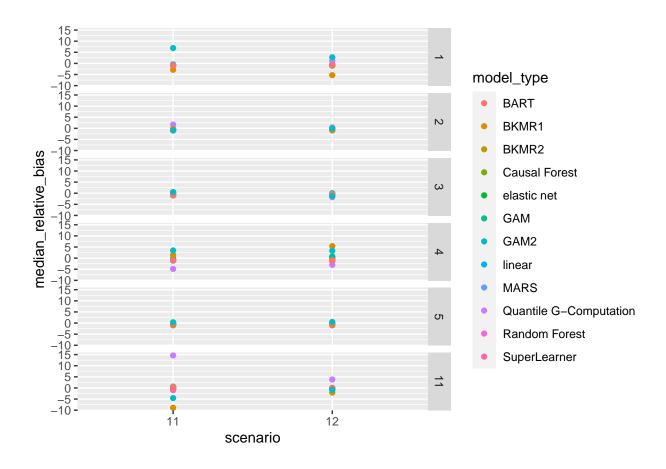
Warning: Removed 12 rows containing missing values ('geom_point()').



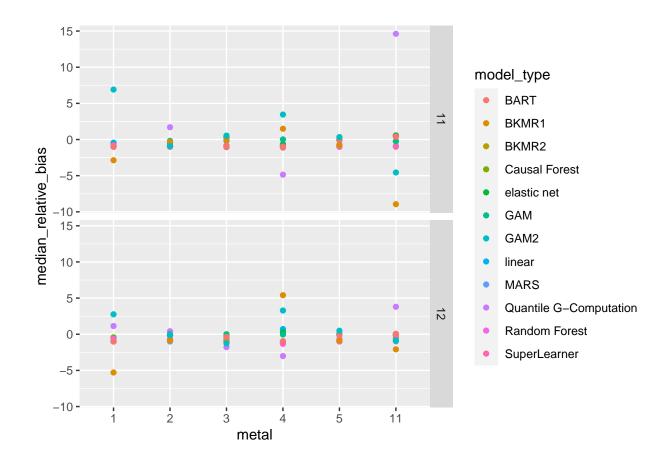
Warning: Removed 12 rows containing non-finite values ('stat_boxplot()').



Warning: Removed 12 rows containing missing values ('geom_point()').



Warning: Removed 12 rows containing missing values ('geom_point()').



```
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
## # A tibble: 6 x 4
               scenario [1]
## # Groups:
     scenario metal min_relative_bias model_type
##
##
     <fct>
              <fct>
                                <dbl> <chr>
                                   NA BKMR2
## 1 11
              1
## 2 11
                                   NA BKMR2
              2
## 3 11
                                   NA BKMR2
              3
                                   NA BKMR2
## 4 11
              4
## 5 11
              5
                                   NA BKMR2
## 6 11
              11
                                   NA BKMR2
## 'summarise()' has grouped output by 'scenario'. You can override using the
```

'.groups' argument.

```
## 2 11
                                 NA BKMR2
## 3 11
                                 NA BKMR2
             3
## 4 11
             4
                                NA BKMR2
## 5 11
             5
                                 NA BKMR2
                                 NA BKMR2
## 6 11
             11
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
## # A tibble: 6 x 4
## # Groups: scenario [1]
    scenario metal min_relative_bias model_type
   <fct> <fct>
                             <dbl> <chr>
## 1 12
                                 NA BKMR2
             1
## 2 12
             2
                                 NA BKMR2
## 3 12
             3
                                 NA BKMR2
## 4 12
                                 NA BKMR2
            4
## 5 12
             5
                                 NA BKMR2
## 6 12
             11
                                 NA BKMR2
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
## # A tibble: 6 x 4
## # Groups: scenario [1]
## scenario metal max_relative_bias model_type
                             <dbl> <chr>
## <fct>
            <fct>
## 1 12
                                 NA BKMR2
             1
## 2 12
                                 NA BKMR2
## 3 12
                                 NA BKMR2
           3
## 4 12
            4
                                 NA BKMR2
## 5 12
             5
                                 NA BKMR.2
## 6 12
            11
                                 NA BKMR2
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
## # A tibble: 6 x 4
## # Groups: scenario [1]
    scenario metal min_relative_bias model_type
   <fct> <fct>
                            <dbl> <chr>
## 1 11
                                 NA BKMR2
            1
## 2 11
            2
                                 NA BKMR2
## 3 11
                                 NA BKMR2
             3
## 4 11
             4
                                 NA BKMR2
## 5 11
             5
                                 NA BKMR2
## 6 11
                                 NA BKMR2
            11
```

'summarise()' has grouped output by 'scenario'. You can override using the

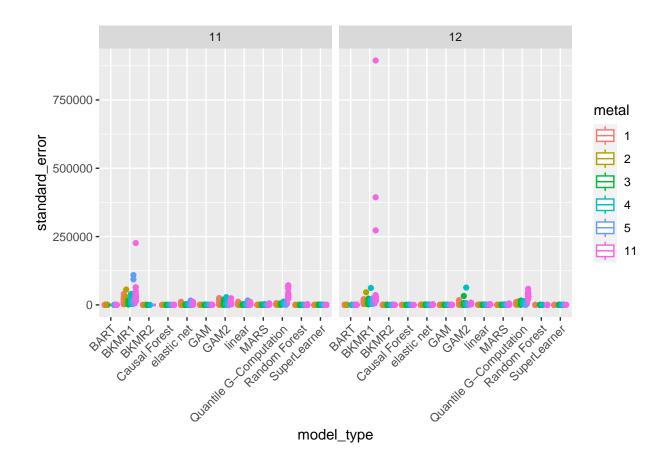
'.groups' argument.

```
## # A tibble: 6 x 4
## # Groups: scenario [1]
## scenario metal max_relative_bias model_type
##
    <fct> <fct> <dbl> <chr>
## 1 11
                                NA BKMR2
## 2 11
            2
                                NA BKMR2
## 3 11
           3
                                NA BKMR2
## 4 11
                                NA BKMR2
           4
## 5 11
            5
                                NA BKMR2
## 6 11
           11
                                NA BKMR2
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
## # A tibble: 6 x 4
## # Groups: scenario [1]
    scenario metal min_relative_bias model_type
    <fct> <fct>
                             <dbl> <chr>
## 1 12
             1
                                NA BKMR2
## 2 12
                                NA BKMR2
## 3 12
            3
                                NA BKMR2
## 4 12
            4
                                NA BKMR2
## 5 12
            5
                                NA BKMR2
## 6 12
           11
                                NA BKMR2
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
## # A tibble: 6 x 4
## # Groups: scenario [1]
## scenario metal max_relative_bias model_type
   <fct>
            <fct>
                           <dbl> <chr>
## 1 12
            1
                                NA BKMR2
## 2 12
                                NA BKMR2
            2
## 3 12
            3
                                NA BKMR2
## 4 12
            4
                               NA BKMR2
## 5 12
                               NA BKMR2
## 6 12
                                NA BKMR2
           11
```

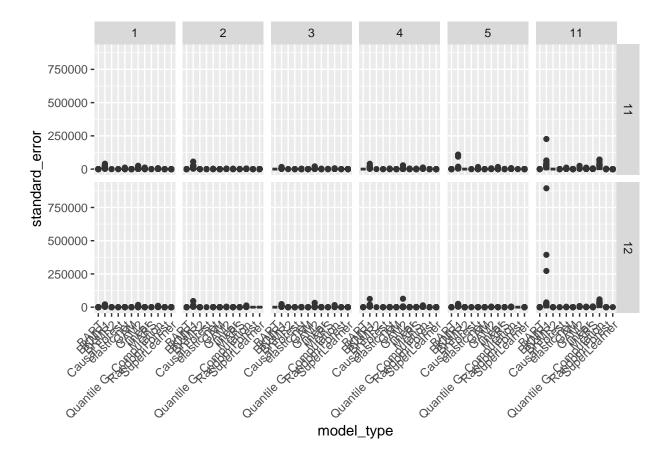
Standard Error / RMSE

Visualizations at Dataset Level

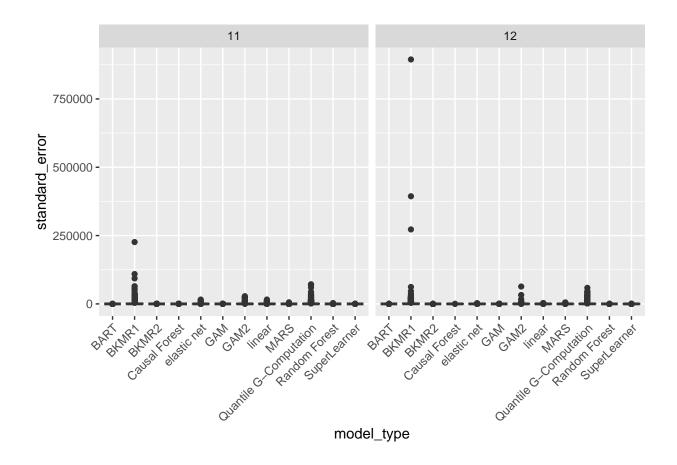
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



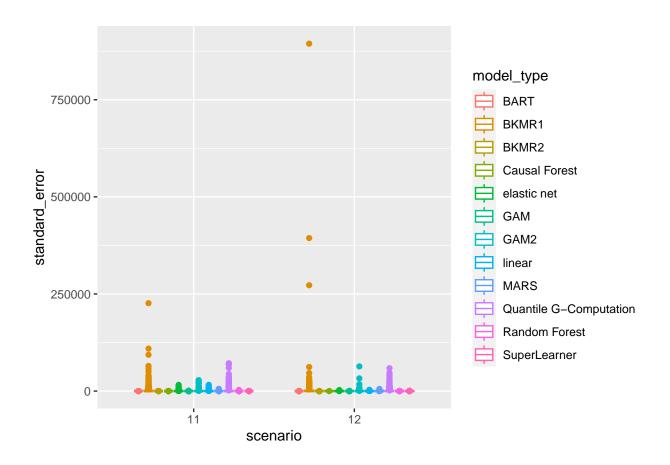
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



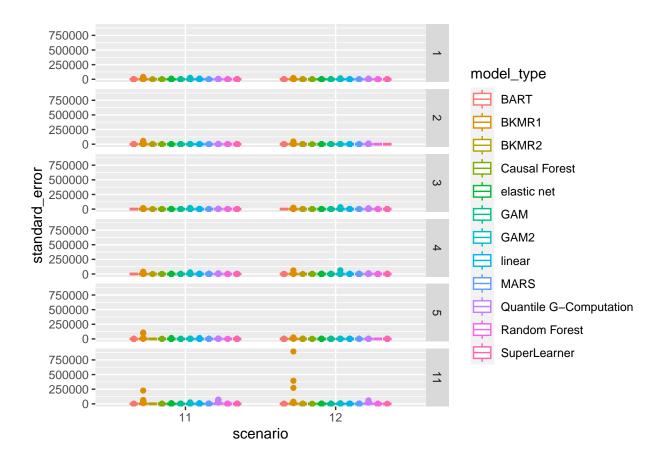
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



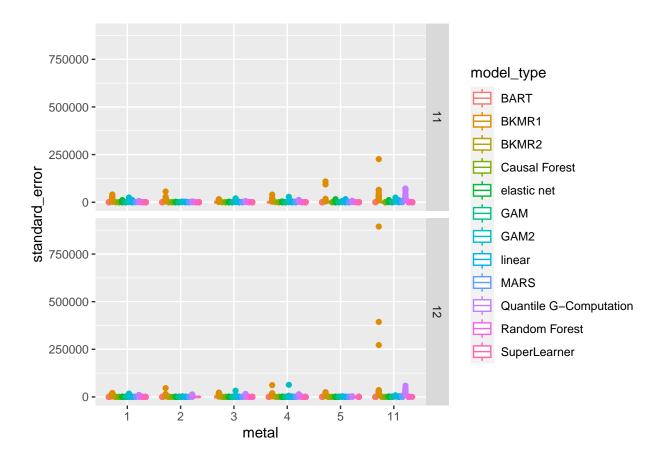
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').

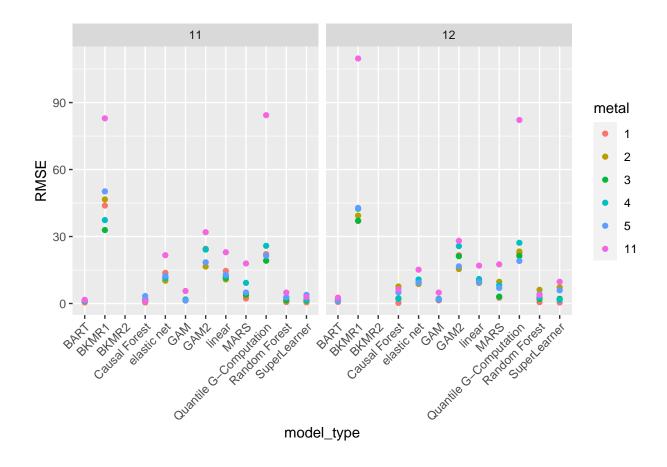


Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').

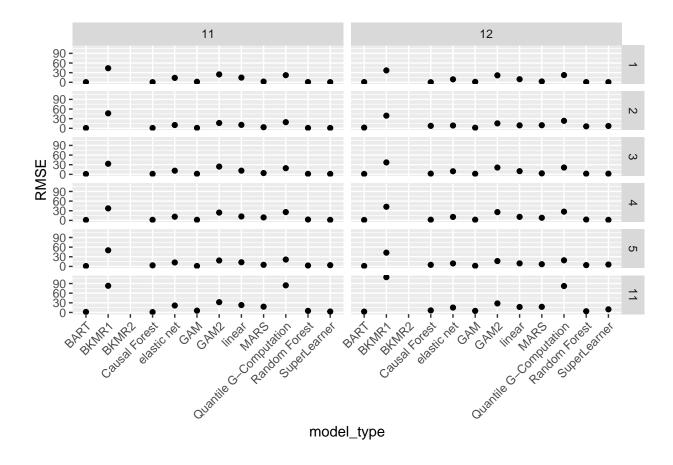


Visualizations at Scenario Level

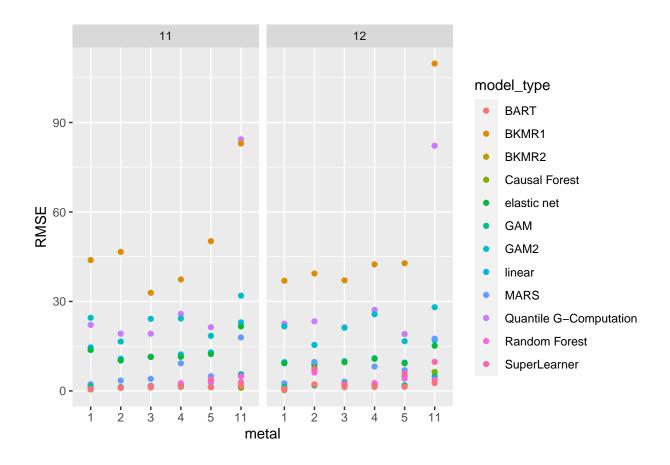
Warning: Removed 12 rows containing missing values ('geom_point()').



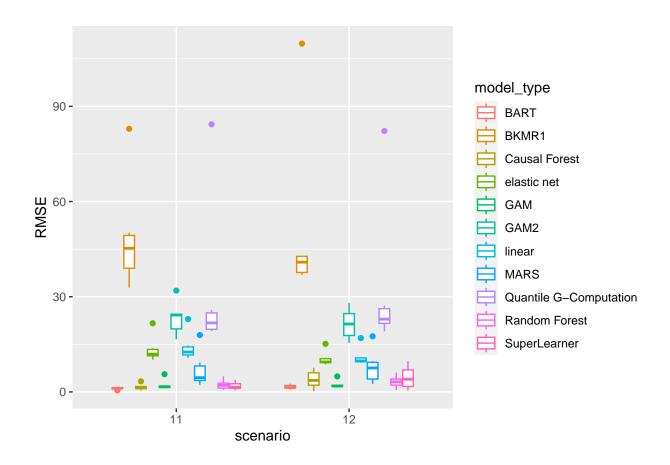
Warning: Removed 12 rows containing missing values ('geom_point()').



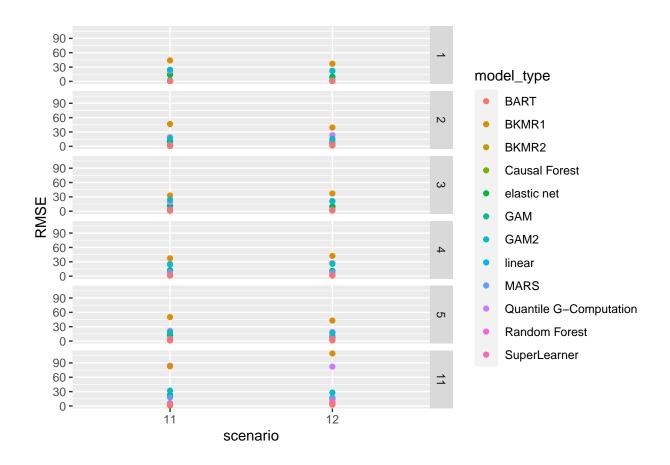
Warning: Removed 12 rows containing missing values ('geom_point()').



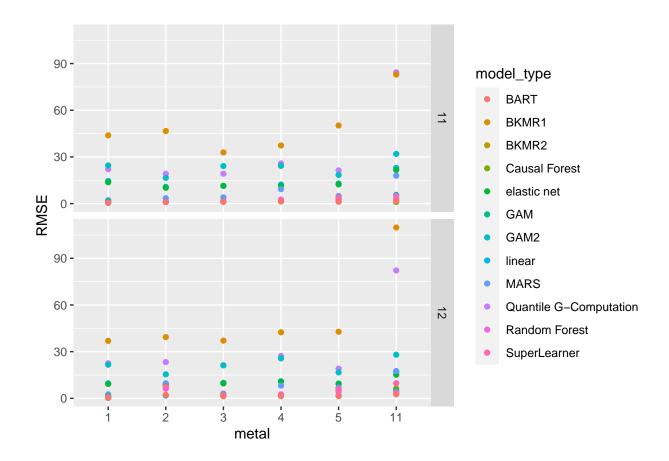
Warning: Removed 12 rows containing non-finite values ('stat_boxplot()').



Warning: Removed 12 rows containing missing values ('geom_point()').



Warning: Removed 12 rows containing missing values ('geom_point()').



```
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
## # A tibble: 6 x 4
## # Groups: scenario [1]
```

```
scenario metal min_RMSE model_type
##
##
     <fct> <fct>
                      <dbl> <chr>
                         NA BKMR2
## 1 11
              1
                         NA BKMR2
## 2 11
              2
## 3 11
                         NA BKMR2
              3
## 4 11
              4
                         NA BKMR2
## 5 11
              5
                         NA BKMR2
## 6 11
                         NA BKMR2
              11
```

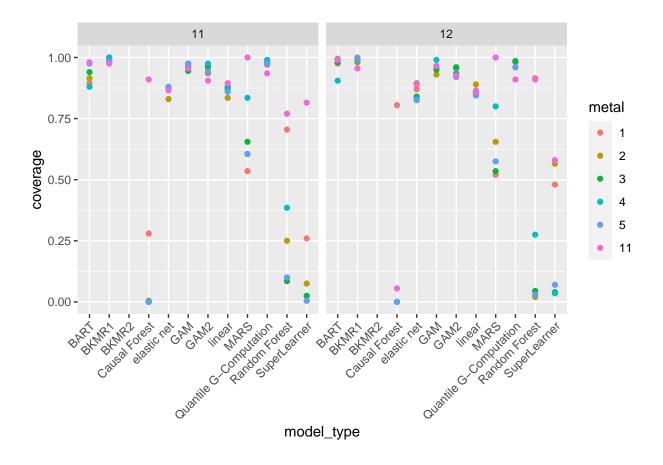
 $\mbox{\tt \#\#}$ 'summarise()' has grouped output by 'scenario'. You can override using the $\mbox{\tt \#\#}$ '.groups' argument.

```
## 2 11
                      NA BKMR2
## 3 11
            3
                       NA BKMR2
## 4 11
            4
                      NA BKMR2
## 5 11
            5
                       NA BKMR2
## 6 11
                       NA BKMR2
            11
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
## # A tibble: 6 x 4
## # Groups: scenario [1]
   scenario metal min_RMSE model_type
   <fct> <fct> <dbl> <chr>
## 1 12
                       NA BKMR2
            1
## 2 12
## 3 12
            2
                       NA BKMR2
           3
                      NA BKMR2
## 4 12
                      NA BKMR2
           4
## 5 12
                       NA BKMR2
            5
## 6 12
            11
                       NA BKMR2
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
## # A tibble: 6 x 4
## # Groups: scenario [1]
## scenario metal max_RMSE model_type
## <fct> <fct> <dbl> <chr>
## 1 12
            1
                       NA BKMR2
## 2 12
           2
                      NA BKMR2
## 3 12
           3
                      NA BKMR2
## 4 12
            4
                      NA BKMR2
## 5 12
            5
                      NA BKMR2
## 6 12
           11
                      NA BKMR2
```

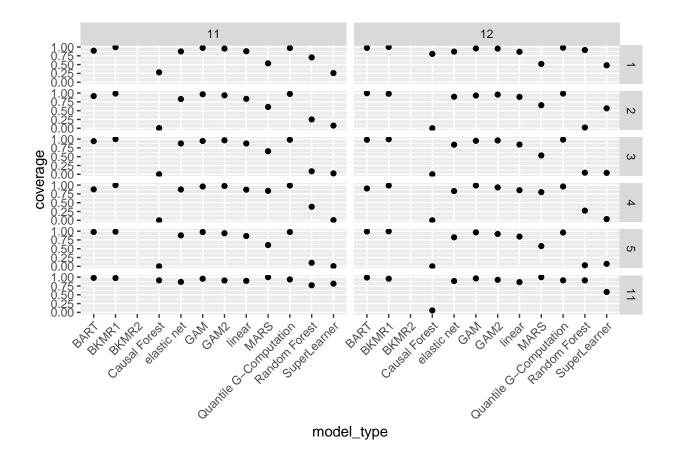
Coverage

Visualizations at Scenario Level

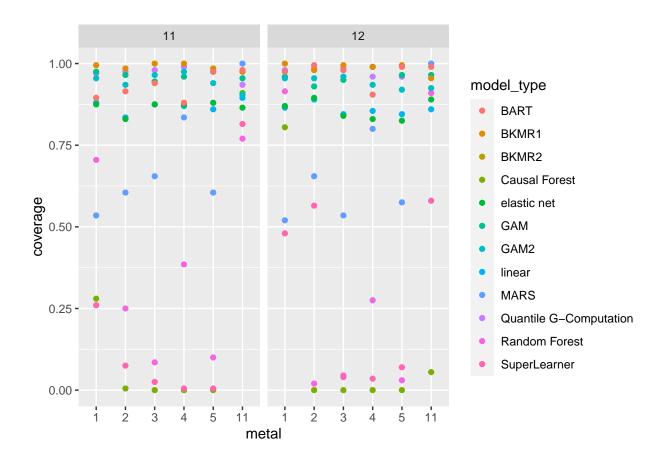
Warning: Removed 12 rows containing missing values ('geom_point()').



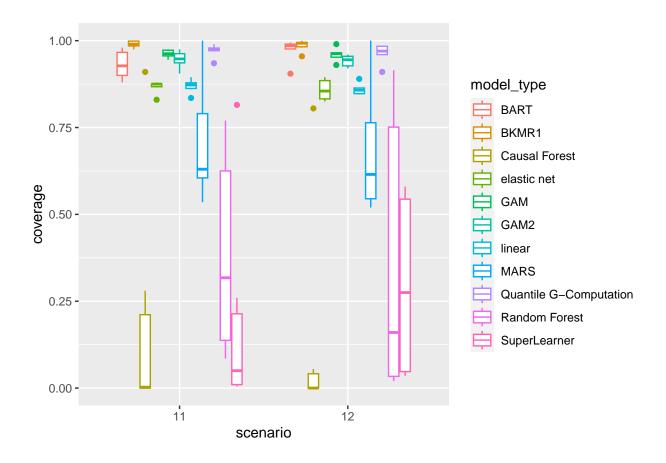
Warning: Removed 12 rows containing missing values ('geom_point()').



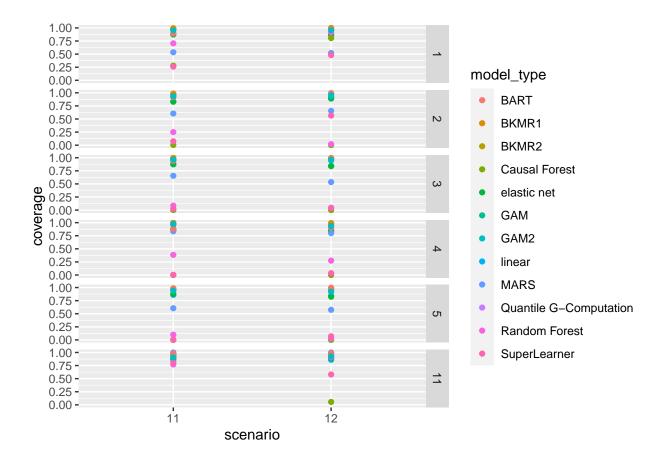
Warning: Removed 12 rows containing missing values ('geom_point()').



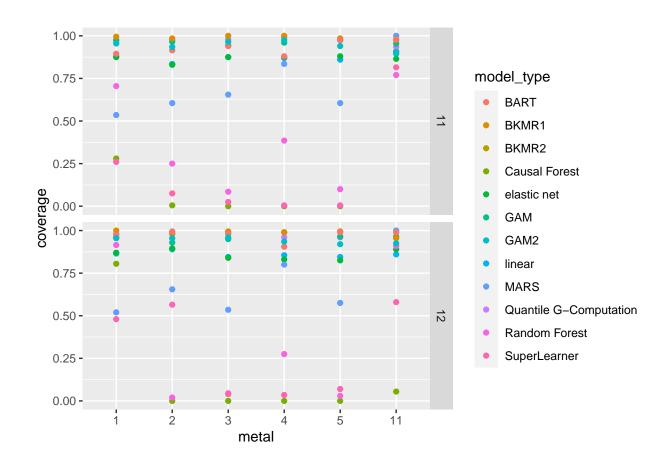
Warning: Removed 12 rows containing non-finite values ('stat_boxplot()').



Warning: Removed 12 rows containing missing values ('geom_point()').



Warning: Removed 12 rows containing missing values ('geom_point()').



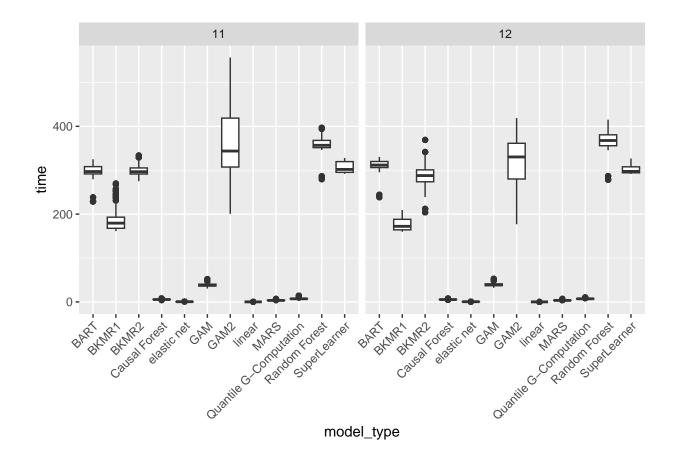
```
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
## # A tibble: 6 x 4
## # Groups: scenario [1]
     scenario metal min_coverage model_type
##
##
     <fct>
             <fct>
                           <dbl> <chr>
                              NA BKMR2
## 1 11
              1
## 2 11
              2
                              NA BKMR2
## 3 11
                              NA BKMR2
              3
## 4 11
                              NA BKMR2
              4
## 5 11
                              NA BKMR2
              5
## 6 11
                              NA BKMR2
              11
```

 $\mbox{\tt \#\#}$ 'summarise()' has grouped output by 'scenario'. You can override using the $\mbox{\tt \#\#}$ '.groups' argument.

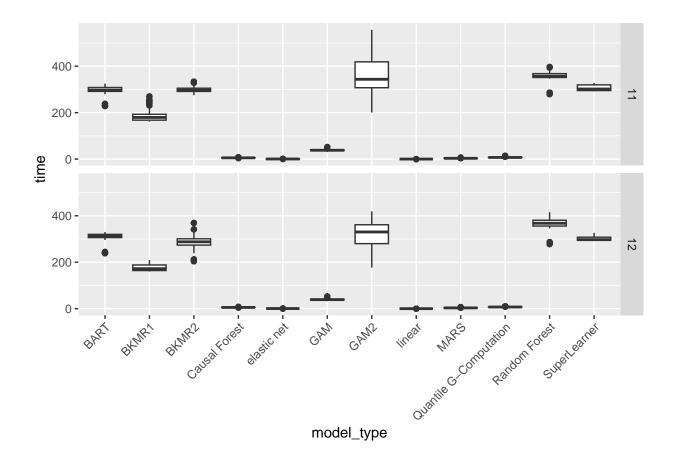
```
## 2 11
                           NA BKMR2
## 3 11
                           NA BKMR2
            3
## 4 11
            4
                          NA BKMR2
## 5 11
            5
                          NA BKMR2
## 6 11
                           NA BKMR2
            11
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
## # A tibble: 6 x 4
## # Groups: scenario [1]
   scenario metal min_coverage model_type
   <fct> <fct> <dbl> <chr>
## 1 12
                          NA BKMR2
            1
## 2 12
            2
                           NA BKMR2
## 2 12
## 3 12
           3
                          NA BKMR2
## 4 12
                          NA BKMR2
           4
## 5 12
                          NA BKMR2
            5
## 6 12
            11
                           NA BKMR2
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
## # A tibble: 6 x 4
## # Groups: scenario [1]
## scenario metal max_coverage model_type
## <fct> <fct> <dbl> <chr>
## 1 12
            1
                           NA BKMR2
## 2 12
           2
                          NA BKMR2
## 3 12
           3
                          NA BKMR2
## 4 12
           4
                          NA BKMR2
## 5 12 5
## 6 12 11
                          NA BKMR2
                          NA BKMR2
```

Time

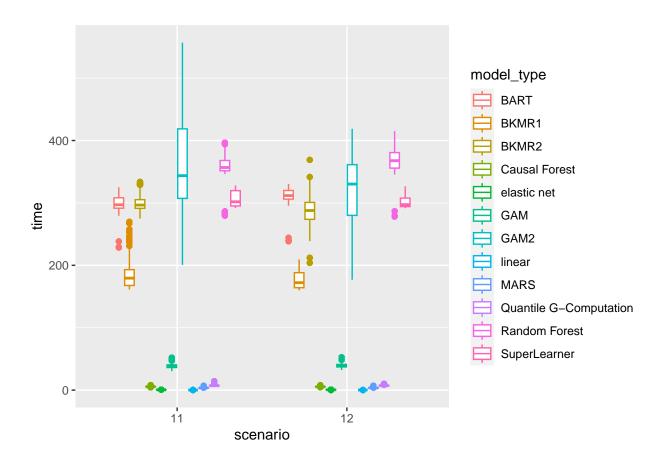
Warning: Removed 264 rows containing non-finite values ('stat_boxplot()').



Warning: Removed 264 rows containing non-finite values ('stat_boxplot()').

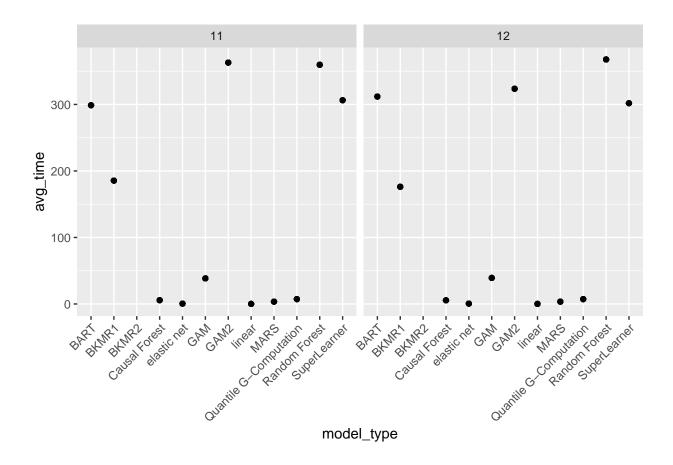


Warning: Removed 264 rows containing non-finite values ('stat_boxplot()').

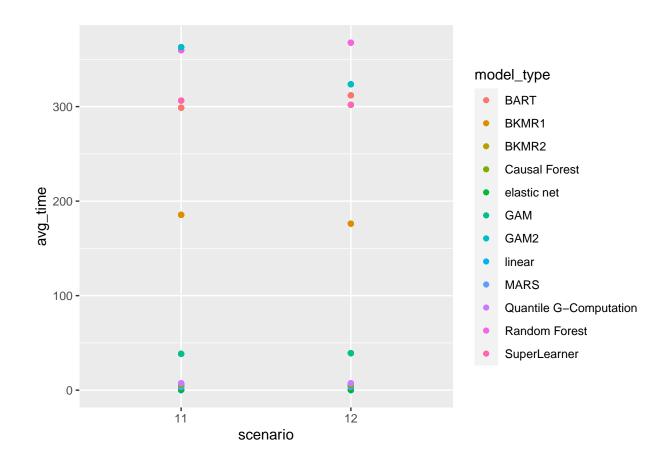


Visualizations at Scenario Level

Warning: Removed 22 rows containing missing values ('geom_point()').



Warning: Removed 22 rows containing missing values ('geom_point()').



```
## # A tibble: 4 x 4
    scenario metric
                     time model_type
##
    <fct>
            <chr>
                     <dbl> <chr>
                      NA BKMR2
## 1 11
            min time
## 2 11
            max_time
                       NA BKMR2
## 3 12
            min_time NA BKMR2
## 4 12
            \max_{time}
                     NA BKMR2
```

Appendix

```
## 'summarise()' has grouped output by 'scenario', 'metal'. You can override using
## the '.groups' argument.
## Warning: Removed 120 rows containing missing values ('geom_point()').
```

Median Relative Bias by Model and Metal, Colored by Scenario For Exposures in Functional Form (Metals 1–5)

