

# Simulation Summary

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```
library(tidyverse)
```

```
## -- Attaching packages ----- tidyverse 1.3.1 --
```

```
## v ggplot2 3.3.6      v purrr  0.3.4
## v tibble  3.1.8      v dplyr  1.0.9
## v tidyr   1.2.0      v stringr 1.4.0
## v readr   2.1.2      v forcats 0.5.1
```

```
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
simres <- readRDS("simresults.rds")
```

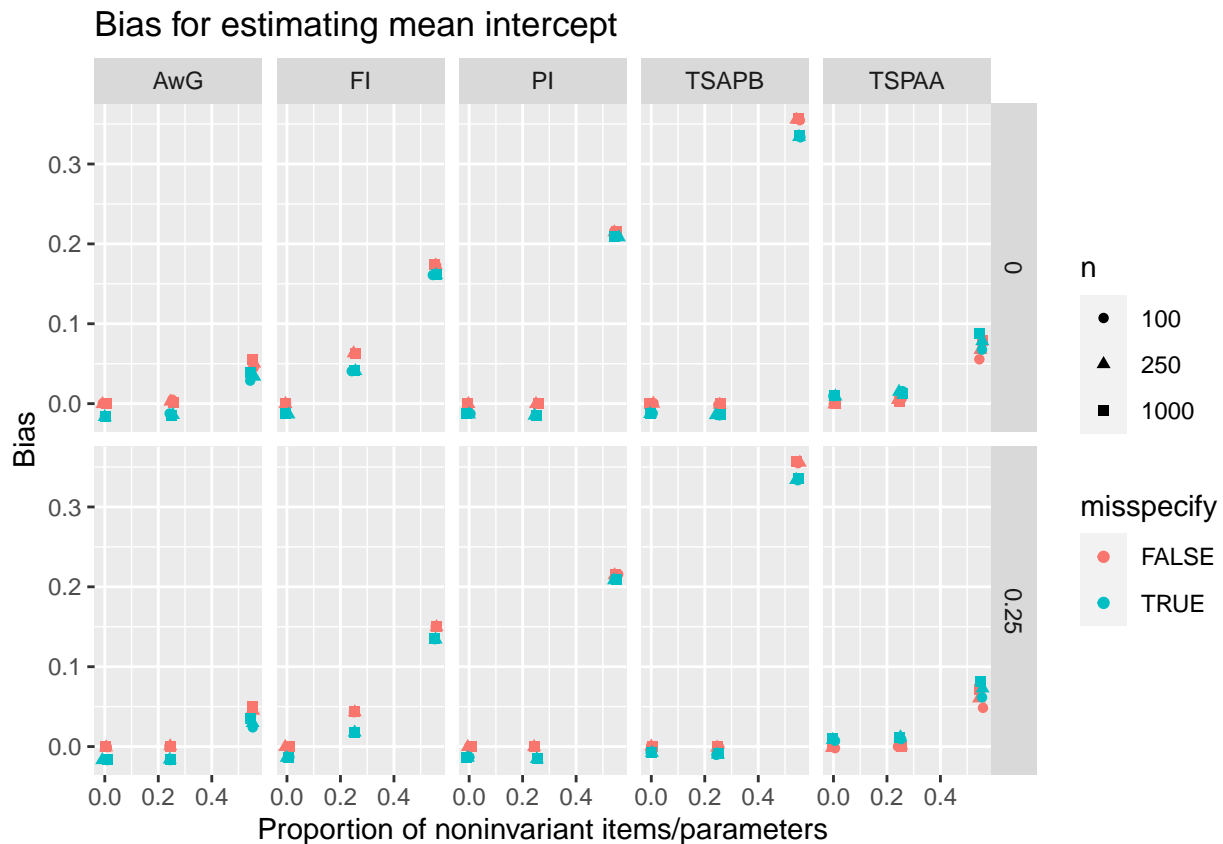
```
simres_long <- simres %>%
  tibble::rowid_to_column("cond") %>%
  pivot_longer(
    bias.est_PI_meani:coverage.ci_TSAPB_vars,
    names_to = c("criteria", "method", "stat", "par"),
    values_to = "value",
    names_pattern = "(.*)_(.*)_(.*)_(.)"
  )
```

## Bias

```

simres_long %>%
  filter(criteria == "bias.est", stat == "mean",
    par == "i") %>%
  mutate(n = as.factor(n)) %>%
  ggplot(aes(x = r_ni, y = value)) +
  geom_point(aes(shape = n, col = misspecify),
    position = position_jitter(width = .01)) +
  # geom_line(aes(shape = n, col = misspecify)) +
  facet_grid(kappa2 ~ method) +
  # ylim(-.05, .2) +
  labs(x = "Proportion of noninvariant items/parameters",
    y = "Bias", title = "Bias for estimating mean intercept")

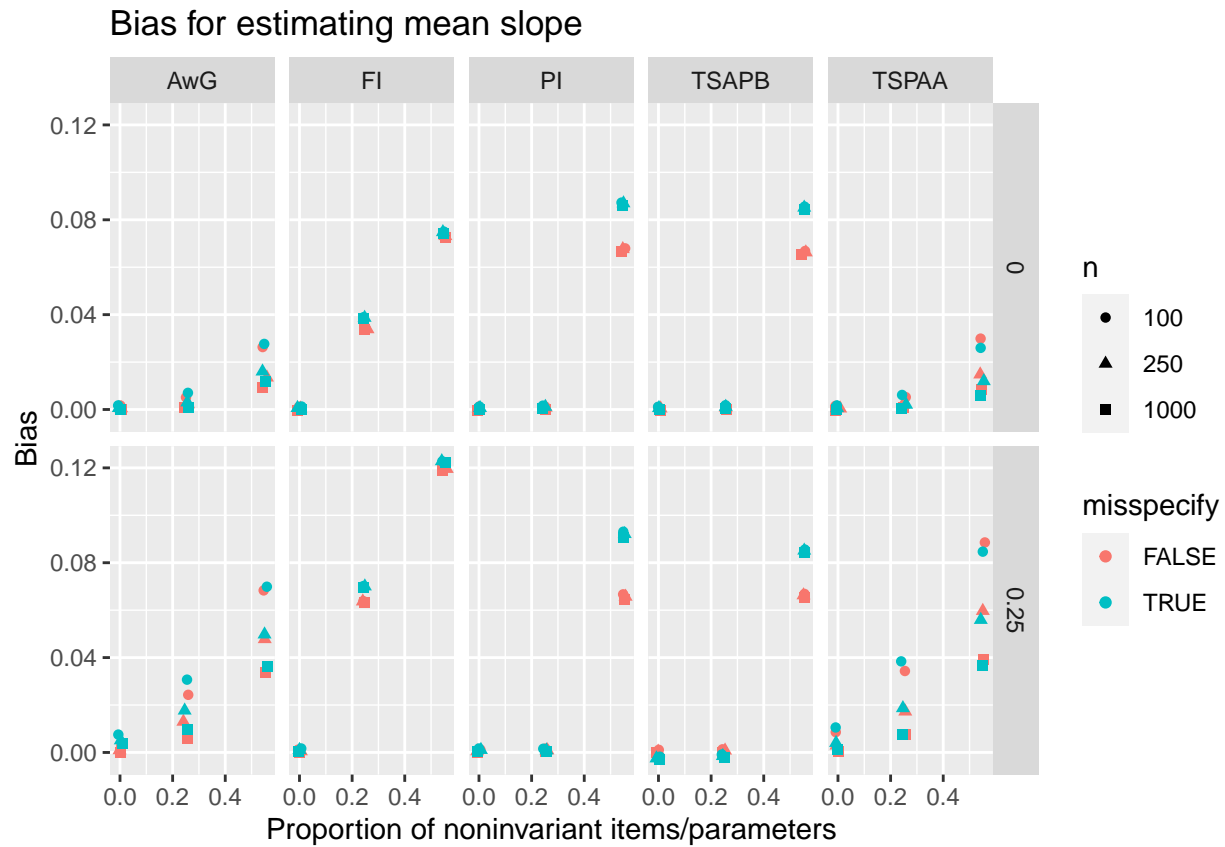
```



```

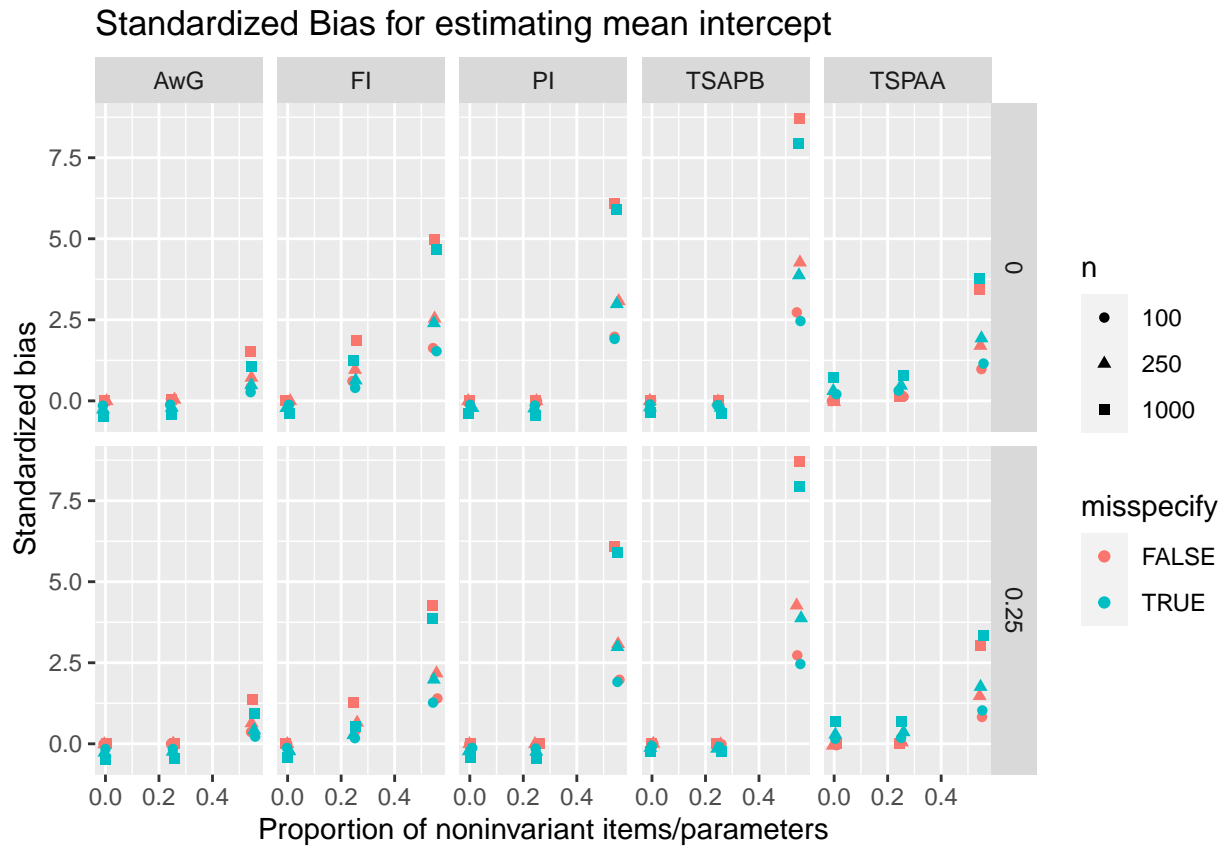
simres_long %>%
  filter(criteria == "bias.est", stat == "mean",
    par == "s") %>%
  mutate(n = as.factor(n)) %>%
  ggplot(aes(x = r_ni, y = value)) +
  geom_point(aes(shape = n, col = misspecify),
    position = position_jitter(width = .01)) +
  # geom_line(aes(shape = n, col = misspecify)) +
  facet_grid(kappa2 ~ method) +
  labs(x = "Proportion of noninvariant items/parameters",
    y = "Bias", title = "Bias for estimating mean slope")

```



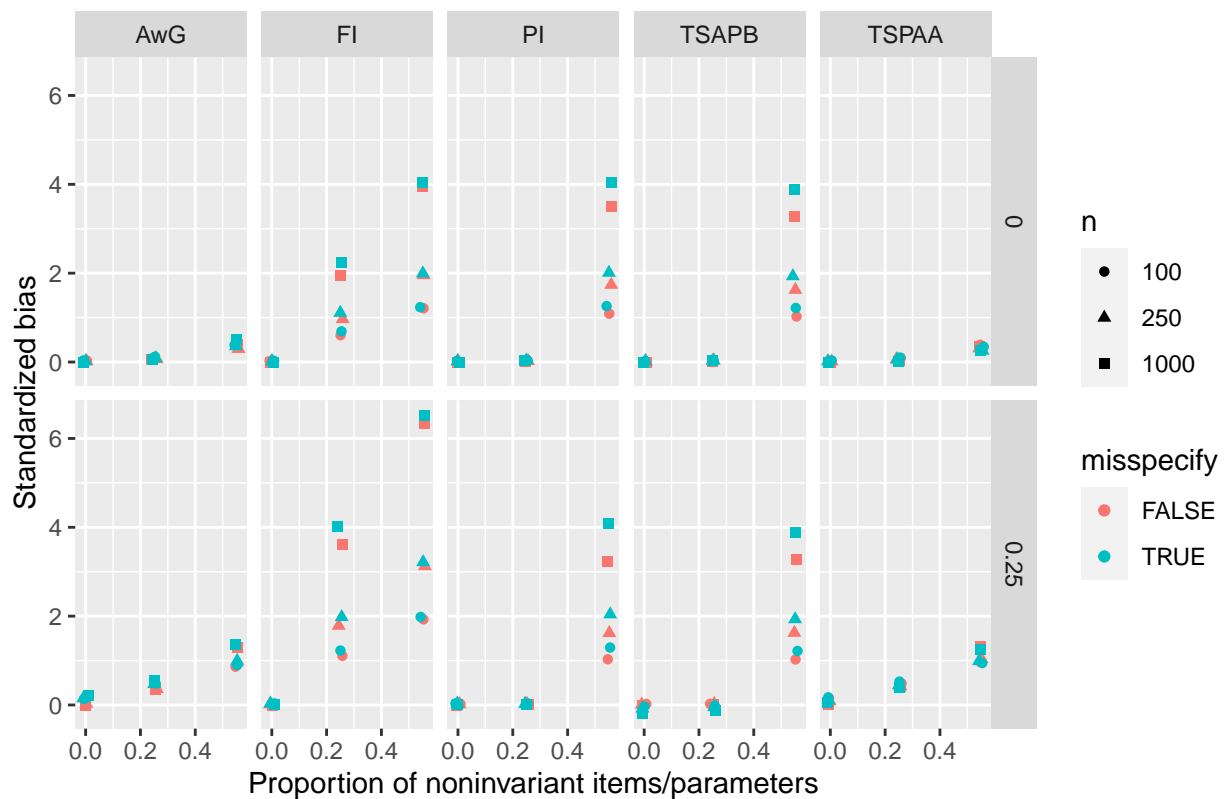
## Standardized Bias

```
simres_long %>%
  filter(criteria == "std_bias.est", stat == "mean",
         par == "i") %>%
  mutate(n = as.factor(n)) %>%
  ggplot(aes(x = r_ni, y = value)) +
  geom_point(aes(shape = n, col = misspecify),
            position = position_jitter(width = .01)) +
  # geom_line(aes(shape = n, col = misspecify)) +
  facet_grid(kappa2 ~ method) +
  labs(x = "Proportion of noninvariant items/parameters",
       y = "Standardized bias",
       title = "Standardized Bias for estimating mean intercept")
```



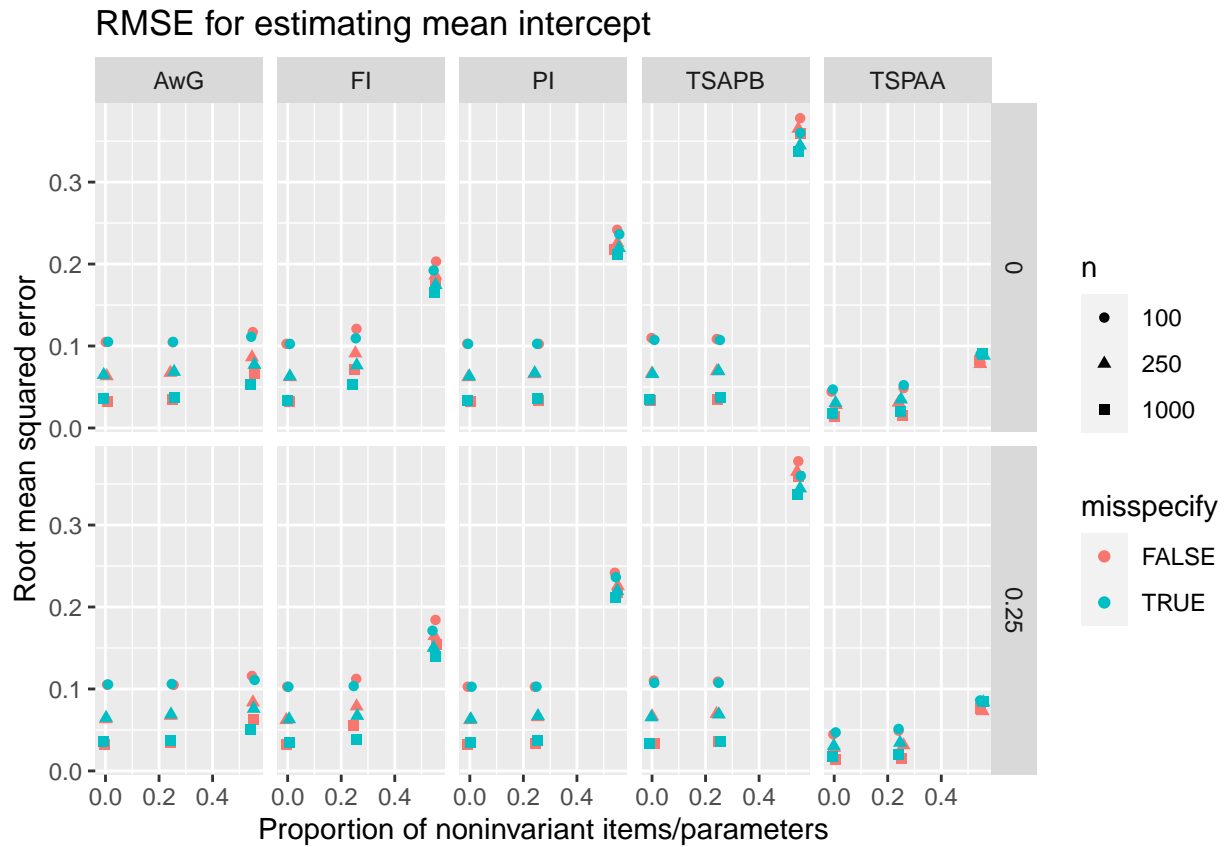
```
simres_long %>%
  filter(criteria == "std_bias.est", stat == "mean",
    par == "s") %>%
  mutate(n = as.factor(n)) %>%
  ggplot(aes(x = r_ni, y = value)) +
  geom_point(aes(shape = n, col = misspecify),
    position = position_jitter(width = .01)) +
  # geom_line(aes(shape = n, col = misspecify)) +
  facet_grid(kappa2 ~ method) +
  labs(x = "Proportion of noninvariant items/parameters",
    y = "Standardized bias",
    title = "Standardized Bias for estimating mean slope")
```

## Standardized Bias for estimating mean slope



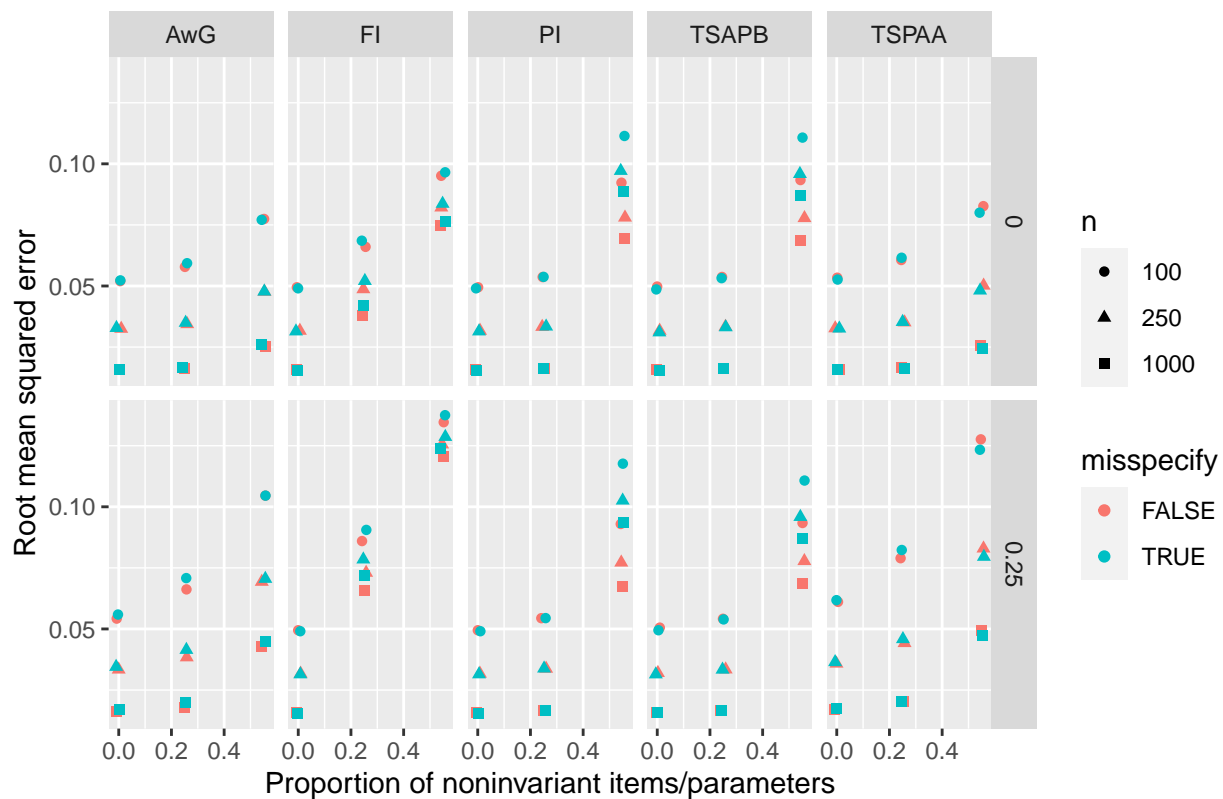
## RMSE

```
simres_long %>%
  filter(criteria == "rmse.est", stat == "mean",
         par == "i") %>%
  mutate(n = as.factor(n)) %>%
  ggplot(aes(x = r_ni, y = value)) +
  geom_point(aes(shape = n, col = misspecify),
            position = position_jitter(width = .01)) +
  # geom_line(aes(shape = n, col = misspecify)) +
  facet_grid(kappa2 ~ method) +
  labs(x = "Proportion of noninvariant items/parameters",
       y = "Root mean squared error",
       title = "RMSE for estimating mean intercept")
```



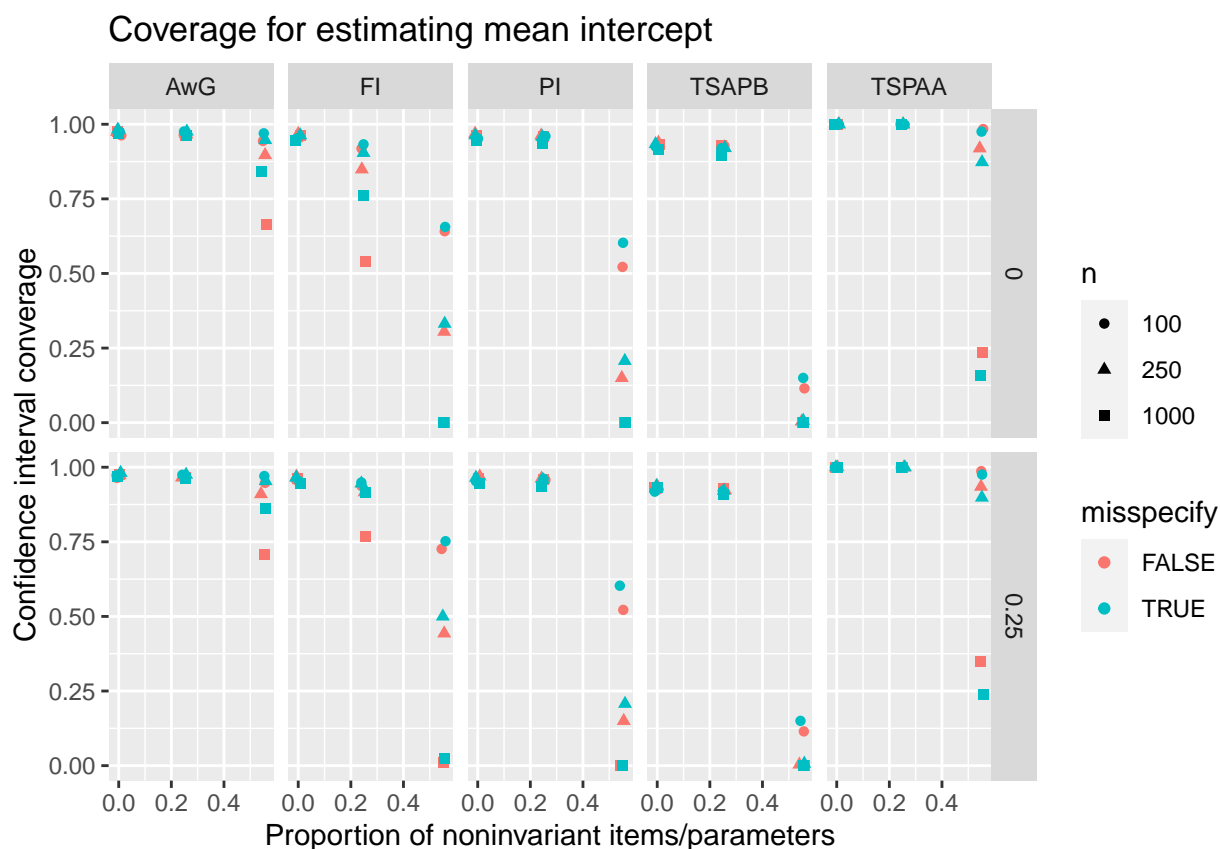
```
simres_long %>%
  filter(criteria == "rmse.est", stat == "mean",
    par == "s") %>%
  mutate(n = as.factor(n)) %>%
  ggplot(aes(x = r_ni, y = value)) +
  geom_point(aes(shape = n, col = misspecify),
    position = position_jitter(width = .01)) +
  # geom_line(aes(shape = n, col = misspecify)) +
  facet_grid(kappa2 ~ method) +
  labs(x = "Proportion of noninvariant items/parameters",
    y = "Root mean squared error",
    title = "RMSE for estimating mean slope")
```

## RMSE for estimating mean slope



## Confidence Interval Converge

```
simres_long %>%
  filter(criteria == "coverage.ci", stat == "mean",
    par == "i") %>%
  mutate(n = as.factor(n)) %>%
  ggplot(aes(x = r_ni, y = value)) +
  geom_point(aes(shape = n, col = misspecify),
    position = position_jitter(width = .01)) +
  # geom_line(aes(shape = n, col = misspecify)) +
  facet_grid(kappa2 ~ method) +
  labs(x = "Proportion of noninvariant items/parameters",
    y = "Confidence interval convergence",
    title = "Coverage for estimating mean intercept")
```



```
simres_long %>%
  filter(criteria == "coverage.ci", stat == "mean",
    par == "s") %>%
  mutate(n = as.factor(n)) %>%
  ggplot(aes(x = r_ni, y = value)) +
  geom_point(aes(shape = n, col = misspecify),
    position = position_jitter(width = .01)) +
  # geom_line(aes(shape = n, col = misspecify)) +
  facet_grid(kappa2 ~ method) +
  labs(x = "Proportion of noninvariant items/parameters",
    y = "Confidence interval coverage",
    title = "Coverage for estimating mean slope")
```



Coverage for estimating mean slope

