…I found that the interaction between the different predictors has a significant impact on the salary of engineers. Is the significance of the interactions on wages unique to engineers or are there similar correlations in other occupational groups?

We start by examining the interaction between age, year, gender.

The F-value from the Anova table is used as the single value to discriminate how much education and salary correlates. For exploratory analysis, the Anova value seems good enough.

First, define libraries and functions.

```
library (tidyverse)

## -- Attaching packages ------------------------------------- tidyverse 1.2.1
--

## v ggplot2 3.2.0     v purrr   0.3.2
## v tibble  2.1.3     v dplyr   0.8.3
## v tidyr   1.0.0     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.4.0

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

library (broom)
library (car)

## Loading required package: carData

##
## Attaching package: 'car'

## The following object is masked from 'package:dplyr':
##
##     recode

## The following object is masked from 'package:purrr':
##
##     some

library(sjPlot)
readfile <- function (file1){
  read_csv (file1, col_types = cols(), locale = readr::locale (encoding =
"latin1"), na = c("..", "NA")) %>%
    gather (starts_with("19"), starts_with("20"), key = "year", value = salary)
%>%
    drop_na() %>%
    mutate (year_n = parse_number (year))
}
```

The data table is downloaded from Statistics Sweden. It is saved as a comma-delimited file without heading, 000000D2.csv, http://www.statistikdatabasen.scb.se/pxweb/en/ssd/.

The table: Average basic salary, monthly salary and women´s salary as a percentage of men´s salary by sector, occupational group (SSYK 2012), sex and age. Year 2014 – 2018 Monthly salary All sectors

I will use a continuous predictor, a polynomial of degree three, to fit the contribution of age to the salary.

In the plot and tables, you can also find information on how the increase in salaries per year for each

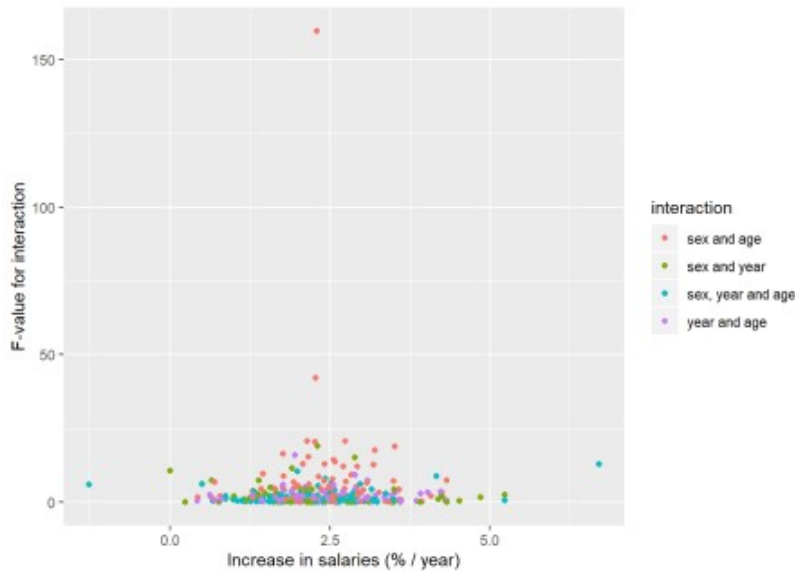occupational group is affected when the interactions are taken into account.

```
tb <- readfile("000000D2.csv") %>%
  rowwise() %>%
  mutate(age_l = unlist(lapply(strsplit(substr(age, 1, 5), "-"), strtoi))[1])
%>%
  rowwise() %>%
  mutate(age_h = unlist(lapply(strsplit(substr(age, 1, 5), "-"), strtoi))[2])
%>%
  mutate(age_n = (age_l + age_h) / 2)

summary_table = vector()
anova_table = vector()
for (i in unique(tb$`occuptional  (SSYK 2012)`)){
  temp <- filter(tb, `occuptional  (SSYK 2012)` == i)
  if (dim(temp)[1] > 30){
    model <-lm (log(salary) ~ year_n + sex * poly(age_n, 3), data = temp)
    summary_table <- bind_rows (summary_table, mutate (tidy (summary (model)),
ssyk = i, interaction = "sex and age"))
    anova_table <- bind_rows (anova_table, mutate (tidy (Anova (model, type =
2)), ssyk = i, interaction = "sex and age"))

    model <-lm (log(salary) ~ year_n * sex + poly(age_n, 3), data = temp)
    summary_table <- bind_rows (summary_table, mutate (tidy (summary (model)),
ssyk = i, interaction = "sex and year"))
    anova_table <- bind_rows (anova_table, mutate (tidy (Anova (model, type =
2)), ssyk = i, interaction = "sex and year"))

    model <-lm (log(salary) ~ sex + year_n * poly(age_n, 3), data = temp)
    summary_table <- bind_rows (summary_table, mutate (tidy (summary (model)),
ssyk = i, interaction = "year and age"))
    anova_table <- bind_rows (anova_table, mutate (tidy (Anova (model, type =
2)), ssyk = i, interaction = "year and age"))

    model <-lm (log(salary) ~ sex * year_n * poly(age_n, 3), data = temp)
    summary_table <- bind_rows (summary_table, mutate (tidy (summary (model)),
ssyk = i, interaction = "sex, year and age"))
    anova_table <- bind_rows (anova_table, mutate (tidy (Anova (model, type =
2)), ssyk = i, interaction = "sex, year and age"))
    }
}

## Note: model has aliased coefficients
##       sums of squares computed by model comparison
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## Note: model has aliased coefficients
##       sums of squares computed by model comparison
```

```r
anova_table <- anova_table %>% rowwise() %>% mutate(contcol = str_count(term,
":"))

summary_table <- summary_table %>% rowwise() %>% mutate(contcol =
str_count(term, ":"))

merge(summary_table, anova_table, by = c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (contcol.y > 0) %>%
  # only look at the interactions between all three variables
  filter (!(contcol.y == 1 & interaction == "sex, year and age")) %>%

  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  ggplot () +
    geom_point (mapping = aes(x = estimate, y = statistic.y, colour =
interaction)) +
    labs(
      x = "Increase in salaries (% / year)",
      y = "F-value for interaction"
    )
```

Figure 1: The significance of the interaction between age, year, sex on the salary in Sweden, a comparison between different occupational groups, Year 2014 – 2018

The tables with all occupational groups sorted by F-value in descending order.

```
merge(summary_table, anova_table, c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (contcol.y > 0) %>%
  filter (interaction == "sex and age") %>%
  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  select (ssyk, estimate, statistic.y, interaction) %>%
  rename (`F-value for age` = statistic.y) %>%
  rename (`Increase in salary` = estimate) %>%
  arrange (desc (`F-value for age`)) %>%
  knitr::kable(
    booktabs = TRUE,
    caption = 'Correlation for F-value (sex and age) and the yearly increase in
salaries')
```

Table 1: Correlation for F-value (sex and age) and the yearly increase in salaries

ssyk	Increase in salary	F-value for age	interaction
335 Tax and related government associate professionals	2.2959882	159.4793522	sex and age
331 Financial and accounting associate professionals	2.2766227	42.0381959	sex and age
241 Accountants, financial analysts and fund managers	2.7431544	20.6684827	sex and age
531 Child care workers and teachers aides	2.1421968	20.6043679	sex and age
242 Organisation analysts, policy administrators and human resource specialists	2.2640553	20.5912541	sex and age
234 Primary- and pre-school teachers	3.5160288	18.7575727	sex and age
713 Painters, Lacquerers, Chimney-sweepers and related trades workers	3.1994881	17.5772847	sex and age
911 Cleaners and helpers	1.7714885	16.3428281	sex and age
227 Naprapaths, physiotherapists, occupational therapists	2.1685852	15.4642863	sex and age
151 Health care managers	2.5609524	14.4293656	sex and age
231 University and higher education teachers	2.5810115	13.7386699	sex and age
533 Health care assistants	2.0794512	13.0025749	sex and age
541 Other surveillance and security workers	2.4232740	12.9292988	sex and age
267 Religious professionals and deacons	3.1863563	12.7247444	sex and age

ssyk	Increase in salary	F-value for age	interaction
321 Medical and pharmaceutical technicians	2.9289943	12.1381897	sex and age
522 Shop staff	2.7119318	12.0951539	sex and age
213 Biologists, pharmacologists and specialists in agriculture and forestry	1.4590279	9.6061073	sex and age
821 Assemblers	2.8365295	9.2734220	sex and age
422 Client information clerks	1.7743297	8.7718831	sex and age
262 Museum curators and librarians and related professionals	2.3203065	8.5847669	sex and age
159 Other social services managers	2.5439991	7.8781716	sex and age
123 Administration and planning managers	4.3275243	7.3452011	sex and age
161 Financial and insurance managers	3.4953296	7.2879455	sex and age
818 Other stationary plant and machine operators	2.4062997	7.1387013	sex and age
333 Business services agents	2.7489045	6.9293991	sex and age
722 Blacksmiths, toolmakers and related trades workers	1.9353634	6.8656109	sex and age
511 Cabin crew, guides and related workers	0.6997964	6.7913009	sex and age
261 Legal professionals	3.0821252	6.6602603	sex and age
311 Physical and engineering science technicians	2.1777128	6.2915291	sex and age
816 Machine operators, food and related products	2.0069383	5.6187226	sex and age
814 Machine operators, rubber, plastic and paper products	2.4830804	5.3245175	sex and age
336 Police officers	2.9217134	5.3169761	sex and age
812 Metal processing and finishing plant operators	1.7680426	5.1597022	sex and age
351 ICT operations and user support technicians	2.1345745	4.8748330	sex and age
411 Office assistants and other secretaries	2.5356754	4.7575794	sex and age
741 Electrical equipment installers and repairers	2.4746226	4.7218323	sex and age
342 Athletes, fitness instructors and recreational workers	1.6415741	4.6480979	sex and age
819 Process control technicians	2.3555614	4.6407029	sex and age
214 Engineering professionals	1.9299724	4.5859413	sex and age
228 Specialists in health care not elsewhere classified	2.7352142	4.5394356	sex and age
962 Newspaper distributors, janitors and other service workers	1.4297059	4.5028895	sex and age
312 Construction and manufacturing supervisors	3.5808422	4.3879763	sex and age
232 Vocational education teachers	3.0245050	4.0584628	sex and age
212 Mathematicians, actuaries and statisticians	2.4369530	3.9838403	sex and age
211 Physicists and chemists	2.0943491	3.9727058	sex and age
334 Administrative and specialized secretaries	2.9702746	3.6129743	sex and age
222 Nursing professionals	4.2511717	3.5676086	sex and age
121 Finance managers	3.2704547	3.3530172	sex and age
243 Marketing and public relations professionals	1.4890095	3.2225018	sex and age
932 Manufacturing labourers	2.6991481	3.1523625	sex and age
817 Wood processing and papermaking plant operators	2.9341892	3.1259551	sex and age
532 Personal care workers in health services	2.8944753	3.0544887	sex and age
217 Designers	2.5526515	3.0235916	sex and age
136 Production managers in construction and mining	2.7406649	2.5807238	sex and age
732 Printing trades workers	1.9355361	2.3243296	sex and age
534 Attendants, personal assistants and related workers	1.9366235	2.2843662	sex and age
441 Library and filing clerks	2.1267903	2.2496759	sex and age
235 Teaching professionals not elsewhere classified	2.4893302	2.1506250	sex and age

ssyk	Increase in salary	F-value for age	interaction
131 Information and communications technology service managers	4.0848134	2.1380093	sex and age
834 Mobile plant operators	2.5374407	2.0839971	sex and age
611 Market gardeners and crop growers	0.7905144	2.0157799	sex and age
223 Nursing professionals (cont.)	3.0862129	1.9488266	sex and age
512 Cooks and cold-buffet managers	2.8246521	1.9384343	sex and age
352 Broadcasting and audio-visual technicians	0.6430997	1.9263743	sex and age
264 Authors, journalists and linguists	1.6003330	1.8718057	sex and age
221 Medical doctors	1.4464671	1.8334236	sex and age
133 Research and development managers	1.3868102	1.8214105	sex and age
432 Stores and transport clerks	2.2008861	1.7861746	sex and age
523 Cashiers and related clerks	0.4338337	1.7438312	sex and age
132 Supply, logistics and transport managers	1.2583558	1.7194546	sex and age
216 Architects and surveyors	2.4463103	1.6944331	sex and age
137 Production managers in manufacturing	2.5139252	1.6853597	sex and age
813 Machine operators, chemical and pharmaceutical products	2.5781771	1.6607729	sex and age
332 Insurance advisers, sales and purchasing agents	1.7769452	1.6356527	sex and age
515 Building caretakers and related workers	2.0061217	1.5892818	sex and age
266 Social work and counselling professionals	3.2075276	1.5751088	sex and age
815 Machine operators, textile, fur and leather products	1.2919985	1.5542036	sex and age
251 ICT architects, systems analysts and test managers	2.5274101	1.4087670	sex and age
125 Sales and marketing managers	1.9020892	1.3550073	sex and age
134 Architectural and engineering managers	2.4540118	1.2227887	sex and age
961 Recycling collectors	2.2632593	1.1906325	sex and age
723 Machinery mechanics and fitters	2.0663308	1.1041179	sex and age
344 Driving instructors and other instructors	2.8774550	1.0799384	sex and age
833 Heavy truck and bus drivers	1.9017745	1.0503103	sex and age
122 Human resource managers	3.6123261	0.9673152	sex and age
226 Dentists	2.2610744	0.9612771	sex and age
224 Psychologists and psychotherapists	2.7435122	0.9185294	sex and age
711 Carpenters, bricklayers and construction workers	1.8248715	0.9020636	sex and age
761 Butchers, bakers and food processors	1.6307538	0.8629405	sex and age
141 Primary and secondary schools and adult education managers	3.5738599	0.8021870	sex and age
831 Train operators and related workers	1.7928726	0.7956301	sex and age
179 Other services managers not elsewhere classified	2.7619304	0.7557586	sex and age
218 Specialists within environmental and health protection	2.6146940	0.7229000	sex and age
516 Other service related workers	2.1156393	0.7101924	sex and age
524 Event seller and telemarketers	2.0545466	0.5044158	sex and age
752 Wood treaters, cabinet-makers and related trades workers	2.6808750	0.4777104	sex and age
265 Creative and performing artists	2.5614482	0.4592989	sex and age
912 Washers, window cleaners and other cleaning workers	2.5642100	0.3968101	sex and age
153 Elderly care managers	3.3657167	0.3924072	sex and age
343 Photographers, interior decorators and entertainers	3.4433785	0.3697008	sex and age
513 Waiters and bartenders	2.1711800	0.2718709	sex and age
129 Administration and service managers not elsewhere classified	2.2086175	0.2151892	sex and age

ssyk	Increase in salary	F-value for age	interaction
941 Fast-food workers, food preparation assistants	2.0158249	0.2048116	sex and age
233 Secondary education teachers	2.9895590	0.1966141	sex and age
152 Managers in social and curative care	3.9369039	0.1858560	sex and age
341 Social work and religious associate professionals	2.5917033	0.1642278	sex and age

```
merge(summary_table, anova_table, c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (contcol.y > 0) %>%
  filter (interaction == "sex and year") %>%
  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  select (ssyk, estimate, statistic.y, interaction) %>%
  rename (`F-value for age` = statistic.y) %>%
  rename (`Increase in salary` = estimate) %>%
  arrange (desc (`F-value for age`)) %>%
  knitr::kable(
    booktabs = TRUE,
    caption = 'Correlation for F-value (sex and year) and the yearly increase in
salaries')
```

Table 2: Correlation for F-value (sex and year) and the yearly increase in salaries

ssyk	Increase in salary	F-value for age	interaction
131 Information and communications technology service managers	2.3096913	18.9885627	sex and year
741 Electrical equipment installers and repairers	2.8954090	15.1782057	sex and year
813 Machine operators, chemical and pharmaceutical products	1.9077963	11.5897622	sex and year
151 Health care managers	0.0045519	10.7526199	sex and year
211 Physicists and chemists	1.3915123	7.4977359	sex and year
221 Medical doctors	0.6538773	7.3600653	sex and year
816 Machine operators, food and related products	1.5717231	4.9339943	sex and year
235 Teaching professionals not elsewhere classified	2.0310346	4.5698800	sex and year
524 Event seller and telemarketers	3.5081268	4.4316751	sex and year
711 Carpenters, bricklayers and construction workers	2.2254597	4.4174399	sex and year
932 Manufacturing labourers	2.1290954	4.1545847	sex and year
262 Museum curators and librarians and related professionals	1.7899210	4.1395912	sex and year
227 Naprapaths, physiotherapists, occupational therapists	1.2922853	3.7328350	sex and year
441 Library and filing clerks	1.6621943	3.1588539	sex and year
732 Printing trades workers	1.4914084	2.9105428	sex and year

ssyk	Increase in salary	F-value for age	interaction
611 Market gardeners and crop growers	1.3821474	2.7246518	sex and year
266 Social work and counselling professionals	2.9450799	2.6820347	sex and year
123 Administration and planning managers	5.2325129	2.4711124	sex and year
422 Client information clerks	1.3545144	2.2011024	sex and year
261 Legal professionals	2.2865093	2.1206991	sex and year
214 Engineering professionals	1.5742827	2.0990600	sex and year
815 Machine operators, textile, fur and leather products	1.0046815	2.0981886	sex and year
267 Religious professionals and deacons	4.2599077	1.9296670	sex and year
218 Specialists within environmental and health protection	2.2923893	1.9224272	sex and year
122 Human resource managers	4.8586001	1.7650927	sex and year
251 ICT architects, systems analysts and test managers	2.1136658	1.7424405	sex and year
534 Attendants, personal assistants and related workers	1.8244819	1.7041840	sex and year
232 Vocational education teachers	2.7671447	1.4897367	sex and year
134 Architectural and engineering managers	2.0704051	1.3888211	sex and year
333 Business services agents	3.0955032	1.3284140	sex and year
834 Mobile plant operators	2.8742266	1.2866972	sex and year
814 Machine operators, rubber, plastic and paper products	2.2917499	1.2780326	sex and year
121 Finance managers	2.5063899	1.2719390	sex and year
511 Cabin crew, guides and related workers	1.2549099	1.2614665	sex and year
137 Production managers in manufacturing	2.3152928	1.2488175	sex and year
819 Process control technicians	2.5792156	1.2321895	sex and year
752 Wood treaters, cabinet-makers and related trades workers	2.3616877	1.2158818	sex and year
311 Physical and engineering science technicians	2.5830714	1.1623245	sex and year
264 Authors, journalists and linguists	1.1529306	1.1155040	sex and year
343 Photographers, interior decorators and entertainers	4.1985542	1.1106546	sex and year

ssyk	Increase in salary	F-value for age	interaction
243 Marketing and public relations professionals	0.9815532	1.0732378	sex and year
541 Other surveillance and security workers	2.5761973	1.0256130	sex and year
336 Police officers	3.1412715	1.0138419	sex and year
216 Architects and surveyors	2.9471943	0.9876359	sex and year
233 Secondary education teachers	2.7734258	0.9441665	sex and year
351 ICT operations and user support technicians	1.9038540	0.7819692	sex and year
132 Supply, logistics and transport managers	1.9099255	0.7677975	sex and year
342 Athletes, fitness instructors and recreational workers	1.9068283	0.7090386	sex and year
912 Washers, window cleaners and other cleaning workers	2.8087342	0.7016091	sex and year
321 Medical and pharmaceutical technicians	3.1597738	0.6977518	sex and year
962 Newspaper distributors, janitors and other service workers	1.1887397	0.6955963	sex and year
818 Other stationary plant and machine operators	2.6877777	0.6820875	sex and year
432 Stores and transport clerks	2.3817426	0.6776753	sex and year
411 Office assistants and other secretaries	2.2627780	0.6775943	sex and year
341 Social work and religious associate professionals	2.7258687	0.6031036	sex and year
153 Elderly care managers	3.1660345	0.5974951	sex and year
129 Administration and service managers not elsewhere classified	2.5786963	0.4952633	sex and year
723 Machinery mechanics and fitters	2.2281119	0.4619171	sex and year
265 Creative and performing artists	2.8167822	0.4064823	sex and year
161 Financial and insurance managers	4.5271109	0.3869820	sex and year
513 Waiters and bartenders	2.4344083	0.3385613	sex and year
761 Butchers, bakers and food processors	1.5483458	0.3298306	sex and year
179 Other services managers not elsewhere classified	3.0293121	0.3105108	sex and year
831 Train operators and related workers	1.6824270	0.3089261	sex and year
133 Research and development managers	1.1872438	0.2947620	sex and year

ssyk	Increase in salary	F-value for age	interaction
961 Recycling collectors	2.1940100	0.2898964	sex and year
213 Biologists, pharmacologists and specialists in agriculture and forestry	1.6757443	0.2654079	sex and year
722 Blacksmiths, toolmakers and related trades workers	1.7877696	0.2513383	sex and year
224 Psychologists and psychotherapists	2.5048041	0.2303968	sex and year
231 University and higher education teachers	2.4211367	0.2112476	sex and year
817 Wood processing and papermaking plant operators	2.8257298	0.2058922	sex and year
212 Mathematicians, actuaries and statisticians	2.1580785	0.1932679	sex and year
331 Financial and accounting associate professionals	1.8922388	0.1893544	sex and year
335 Tax and related government associate professionals	2.1448303	0.1877449	sex and year
136 Production managers in construction and mining	2.9832656	0.1877118	sex and year
941 Fast-food workers, food preparation assistants	2.1405063	0.1755668	sex and year
234 Primary- and pre-school teachers	3.4559768	0.1540937	sex and year
222 Nursing professionals	4.3218411	0.1292660	sex and year
241 Accountants, financial analysts and fund managers	2.9051016	0.1277434	sex and year
533 Health care assistants	2.0375910	0.1236315	sex and year
312 Construction and manufacturing supervisors	3.4952751	0.1144032	sex and year
332 Insurance advisers, sales and purchasing agents	1.6955017	0.0981232	sex and year
217 Designers	2.3869024	0.0963789	sex and year
159 Other social services managers	2.6064759	0.0820633	sex and year
352 Broadcasting and audio-visual technicians	0.7640921	0.0744931	sex and year
532 Personal care workers in health services	2.9147895	0.0673681	sex and year
334 Administrative and specialized secretaries	2.8414994	0.0628304	sex and year
821 Assemblers	2.7912579	0.0461133	sex and year
523 Cashiers and related clerks	0.2414249	0.0391983	sex and year
516 Other service related workers	2.1949695	0.0374522	sex and year

ssyk	Increase in salary	F-value for age	interaction
242 Organisation analysts, policy administrators and human resource specialists	2.3180587	0.0370499	sex and year
515 Building caretakers and related workers	1.8961579	0.0213149	sex and year
911 Cleaners and helpers	1.6893962	0.0203530	sex and year
512 Cooks and cold-buffet managers	2.7763370	0.0188044	sex and year
223 Nursing professionals (cont.)	3.1057971	0.0161602	sex and year
226 Dentists	2.2246798	0.0121797	sex and year
833 Heavy truck and bus drivers	1.8878919	0.0062890	sex and year
141 Primary and secondary schools and adult education managers	3.6011327	0.0059097	sex and year
812 Metal processing and finishing plant operators	1.7636861	0.0046745	sex and year
228 Specialists in health care not elsewhere classified	2.8440246	0.0042559	sex and year
344 Driving instructors and other instructors	2.8525929	0.0037639	sex and year
152 Managers in social and curative care	3.9152106	0.0030755	sex and year
522 Shop staff	2.5756910	0.0016560	sex and year
531 Child care workers and teachers aides	2.1809614	0.0010117	sex and year
713 Painters, Lacquerers, Chimney-sweepers and related trades workers	2.8325569	0.0006941	sex and year
125 Sales and marketing managers	1.9006017	0.0000073	sex and year

```
merge(summary_table, anova_table, c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (contcol.y > 0) %>%
  filter (interaction == "year and age") %>%
  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  select (ssyk, estimate, statistic.y, interaction) %>%
  rename (`F-value for age` = statistic.y) %>%
  rename (`Increase in salary` = estimate) %>%
  arrange (desc (`F-value for age`)) %>%
  knitr::kable(
    booktabs = TRUE,
    caption = 'Correlation for F-value (year and age) and the yearly increase in
salaries')
```

Table 3: Correlation for F-value (year and age) and the yearly increase in salaries

ssyk	Increase in salary	F-value for age	interaction
515 Building caretakers and related workers	1.9559116	15.9023802	year and age

ssyk	Increase in salary	F-value for age	interaction
821 Assemblers	2.8879833	9.2570096	year and age
223 Nursing professionals (cont.)	3.0862129	7.5229917	year and age
812 Metal processing and finishing plant operators	1.7681082	5.9064137	year and age
912 Washers, window cleaners and other cleaning workers	2.5642100	5.6899347	year and age
516 Other service related workers	2.1152246	5.2080039	year and age
264 Authors, journalists and linguists	1.6003330	4.9115575	year and age
235 Teaching professionals not elsewhere classified	2.4893302	4.7634036	year and age
251 ICT architects, systems analysts and test managers	2.5274101	4.4833008	year and age
532 Personal care workers in health services	2.8944753	4.3339760	year and age
441 Library and filing clerks	2.1267903	4.2334206	year and age
333 Business services agents	2.3588054	4.1952156	year and age
332 Insurance advisers, sales and purchasing agents	1.7769452	4.1089082	year and age
132 Supply, logistics and transport managers	1.6502566	3.9217350	year and age
833 Heavy truck and bus drivers	1.9017745	3.6601456	year and age
932 Manufacturing labourers	2.6991481	3.6464745	year and age
432 Stores and transport clerks	2.2008861	3.5354072	year and age
222 Nursing professionals	4.2308421	3.4741301	year and age
818 Other stationary plant and machine operators	2.4062997	3.4540268	year and age
161 Financial and insurance managers	4.0364493	3.3856627	year and age
233 Secondary education teachers	2.9895590	3.1794015	year and age
234 Primary- and pre-school teachers	3.5160288	3.1553505	year and age
228 Specialists in health care not elsewhere classified	2.8875413	3.1501241	year and age
152 Managers in social and curative care	3.9235201	2.8784925	year and age
137 Production managers in manufacturing	2.6954172	2.6701651	year and age
352 Broadcasting and audio-visual technicians	0.6216704	2.5914276	year and age

ssyk	Increase in salary	F-value for age	interaction
334 Administrative and specialized secretaries	2.8445143	2.5139090	year and age
815 Machine operators, textile, fur and leather products	1.2919985	2.4449179	year and age
941 Fast-food workers, food preparation assistants	2.0158249	2.4202939	year and age
266 Social work and counselling professionals	3.2170157	2.4011601	year and age
216 Architects and surveyors	2.6170069	2.3614098	year and age
343 Photographers, interior decorators and entertainers	3.4645037	2.2302218	year and age
533 Health care assistants	2.0794512	2.1161718	year and age
961 Recycling collectors	2.2500279	1.9762282	year and age
211 Physicists and chemists	2.0943491	1.9599317	year and age
342 Athletes, fitness instructors and recreational workers	1.6415741	1.7856668	year and age
761 Butchers, bakers and food processors	1.6561457	1.6846191	year and age
214 Engineering professionals	1.9496371	1.6729919	year and age
153 Elderly care managers	3.3564767	1.6605420	year and age
411 Office assistants and other secretaries	2.5356754	1.6094669	year and age
534 Attendants, personal assistants and related workers	1.9366235	1.5775466	year and age
336 Police officers	2.8967989	1.5454215	year and age
541 Other surveillance and security workers	2.4232740	1.5351778	year and age
232 Vocational education teachers	3.0621355	1.5199772	year and age
513 Waiters and bartenders	2.1711800	1.3797110	year and age
212 Mathematicians, actuaries and statisticians	2.3025215	1.3794017	year and age
531 Child care workers and teachers aides	2.1977955	1.3438941	year and age
134 Architectural and engineering managers	2.4421872	1.3309754	year and age
732 Printing trades workers	1.9468028	1.2928325	year and age
344 Driving instructors and other instructors	3.0880108	1.2771979	year and age
831 Train operators and related workers	1.7390209	1.2652502	year and age

ssyk	Increase in salary	F-value for age	interaction
351 ICT operations and user support technicians	2.1345745	1.2472259	year and age
713 Painters, Lacquerers, Chimney-sweepers and related trades workers	2.7921442	1.2381889	year and age
261 Legal professionals	3.0754624	1.2256187	year and age
159 Other social services managers	2.5439991	1.2079146	year and age
136 Production managers in construction and mining	2.6565246	1.1618915	year and age
611 Market gardeners and crop growers	0.8091723	1.1274767	year and age
813 Machine operators, chemical and pharmaceutical products	2.5686676	1.1016766	year and age
722 Blacksmiths, toolmakers and related trades workers	1.9484997	1.0809628	year and age
241 Accountants, financial analysts and fund managers	2.7431544	1.0545884	year and age
133 Research and development managers	1.3880860	1.0327136	year and age
711 Carpenters, bricklayers and construction workers	1.7284301	0.9998010	year and age
819 Process control technicians	2.3555614	0.9854613	year and age
814 Machine operators, rubber, plastic and paper products	2.4830804	0.9597551	year and age
179 Other services managers not elsewhere classified	2.7619304	0.9365528	year and age
524 Event seller and telemarketers	2.0545466	0.9061984	year and age
752 Wood treaters, cabinet-makers and related trades workers	2.7414213	0.8802318	year and age
817 Wood processing and papermaking plant operators	2.9341892	0.8608835	year and age
331 Financial and accounting associate professionals	2.1684226	0.8564160	year and age
962 Newspaper distributors, janitors and other service workers	1.4297059	0.8546703	year and age
341 Social work and religious associate professionals	2.5900830	0.8191473	year and age
217 Designers	2.5526515	0.7984661	year and age
741 Electrical equipment installers and repairers	2.2566285	0.7858381	year and age
311 Physical and engineering science technicians	2.1298064	0.7798156	year and age
511 Cabin crew, guides and related workers	0.6997964	0.7635704	year and age
123 Administration and planning managers	4.3275243	0.7609043	year and age

ssyk	Increase in salary	F-value for age	interaction
512 Cooks and cold-buffet managers	2.8246521	0.6943099	year and age
265 Creative and performing artists	2.5485214	0.6640336	year and age
312 Construction and manufacturing supervisors	3.6001239	0.6252099	year and age
221 Medical doctors	1.4542955	0.6061171	year and age
131 Information and communications technology service managers	4.2967213	0.6059112	year and age
243 Marketing and public relations professionals	1.4435592	0.5717083	year and age
122 Human resource managers	3.8549956	0.5660338	year and age
321 Medical and pharmaceutical technicians	2.8974259	0.5491370	year and age
151 Health care managers	2.2391207	0.5385478	year and age
226 Dentists	2.2660904	0.5172035	year and age
218 Specialists within environmental and health protection	2.6146940	0.4971584	year and age
816 Machine operators, food and related products	2.0069383	0.4950654	year and age
224 Psychologists and psychotherapists	2.7435122	0.4914927	year and age
121 Finance managers	3.2407711	0.4712382	year and age
227 Naprapaths, physiotherapists, occupational therapists	2.1711768	0.4559658	year and age
523 Cashiers and related clerks	0.4288843	0.4465303	year and age
422 Client information clerks	1.7743297	0.4222086	year and age
911 Cleaners and helpers	1.7149158	0.4213080	year and age
834 Mobile plant operators	2.5488197	0.3653360	year and age
522 Shop staff	2.5915625	0.3222133	year and age
125 Sales and marketing managers	1.9745892	0.3192256	year and age
242 Organisation analysts, policy administrators and human resource specialists	2.2640553	0.2791956	year and age
262 Museum curators and librarians and related professionals	2.3543764	0.2615687	year and age
141 Primary and secondary schools and adult education managers	3.6123368	0.2597121	year and age
231 University and higher education teachers	2.5810115	0.2269531	year and age

ssyk	Increase in salary	F-value for age	interaction
723 Machinery mechanics and fitters	2.0728261	0.2269456	year and age
335 Tax and related government associate professionals	2.2959882	0.2050003	year and age
213 Biologists, pharmacologists and specialists in agriculture and forestry	1.4590279	0.1806503	year and age
267 Religious professionals and deacons	3.1655046	0.1747193	year and age
129 Administration and service managers not elsewhere classified	2.1762142	0.0684575	year and age

```
merge(summary_table, anova_table, c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (contcol.y > 1) %>%
  filter (interaction == "sex, year and age") %>%
  filter (!(contcol.y == 1 & interaction == "sex, year and age")) %>%
  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  select (ssyk, estimate, statistic.y, interaction) %>%
  rename (`F-value for age` = statistic.y) %>%
  rename (`Increase in salary` = estimate) %>%
  arrange (desc (`F-value for age`)) %>%
  knitr::kable(
    booktabs = TRUE,
    caption = 'Correlation for F-value (sex, year and age) and the yearly
increase in salaries')
```

Table 4: Correlation for F-value (sex, year and age) and the yearly increase in salaries

ssyk	Increase in salary	F-value for age	interaction
161 Financial and insurance managers	6.7014383	12.8607103	sex, year and age
212 Mathematicians, actuaries and statisticians	1.9911366	10.4095062	sex, year and age
267 Religious professionals and deacons	4.1658118	8.7837115	sex, year and age
227 Naprapaths, physiotherapists, occupational therapists	2.4303726	8.1151159	sex, year and age
152 Managers in social and curative care	2.5213877	6.6049915	sex, year and age
713 Painters, Lacquerers, Chimney-sweepers and related trades workers	2.9730902	6.1709248	sex, year and age
343 Photographers, interior decorators and entertainers	0.5060734	6.1295901	sex, year and age
151 Health care managers	-1.2649194	5.9426940	sex, year and age
261 Legal professionals	2.3125463	5.5530411	sex, year and age
216 Architects and surveyors	3.1604358	4.3669656	sex, year and age
341 Social work and religious associate professionals	2.5727375	4.1594012	sex, year and age

ssyk	Increase in salary	F-value for age	interaction
441 Library and filing clerks	1.3204015	3.5932816	sex, year and age
833 Heavy truck and bus drivers	1.8961398	3.4082814	sex, year and age
432 Stores and transport clerks	2.1649036	3.3329059	sex, year and age
344 Driving instructors and other instructors	2.4848718	3.3062803	sex, year and age
342 Athletes, fitness instructors and recreational workers	1.9068283	3.2624869	sex, year and age
741 Electrical equipment installers and repairers	2.8664232	3.1590750	sex, year and age
235 Teaching professionals not elsewhere classified	2.0310346	3.1408651	sex, year and age
228 Specialists in health care not elsewhere classified	3.3736609	2.9090416	sex, year and age
711 Carpenters, bricklayers and construction workers	2.1627237	2.7534146	sex, year and age
961 Recycling collectors	2.1566912	2.7467393	sex, year and age
911 Cleaners and helpers	1.7263476	2.4634242	sex, year and age
262 Museum curators and librarians and related professionals	2.3015865	2.3970735	sex, year and age
222 Nursing professionals	4.2407032	2.3527290	sex, year and age
213 Biologists, pharmacologists and specialists in agriculture and forestry	1.6757443	2.3028311	sex, year and age
334 Administrative and specialized secretaries	2.7956288	2.2055190	sex, year and age
513 Waiters and bartenders	0.8749792	2.1159294	sex, year and age
523 Cashiers and related clerks	2.8459448	2.0567141	sex, year and age
534 Attendants, personal assistants and related workers	1.8244819	1.9933909	sex, year and age
816 Machine operators, food and related products	1.5717231	1.9024147	sex, year and age
817 Wood processing and papermaking plant operators	2.8257298	1.8237211	sex, year and age
242 Organisation analysts, policy administrators and human resource specialists	2.3180587	1.7886047	sex, year and age
332 Insurance advisers, sales and purchasing agents	1.7859408	1.7585242	sex, year and age
515 Building caretakers and related workers	2.0556672	1.7184190	sex, year and age
132 Supply, logistics and transport managers	2.2475088	1.6580301	sex, year and age
241 Accountants, financial analysts and fund managers	2.9051016	1.3893091	sex, year and age

ssyk	Increase in salary	F-value for age	interaction
211 Physicists and chemists	1.3915123	1.3625703	sex, year and age
218 Specialists within environmental and health protection	2.2923893	1.3335963	sex, year and age
732 Printing trades workers	1.4520363	1.3253827	sex, year and age
818 Other stationary plant and machine operators	2.6877777	1.3237424	sex, year and age
232 Vocational education teachers	2.7950272	1.1768965	sex, year and age
541 Other surveillance and security workers	2.5928421	1.1184021	sex, year and age
834 Mobile plant operators	2.8552448	1.1025428	sex, year and age
352 Broadcasting and audio-visual technicians	0.8738449	1.0491745	sex, year and age
159 Other social services managers	2.5733968	1.0457667	sex, year and age
131 Information and communications technology service managers	2.3673892	1.0310987	sex, year and age
815 Machine operators, textile, fur and leather products	1.0046815	0.9282509	sex, year and age
941 Fast-food workers, food preparation assistants	2.4028452	0.8902366	sex, year and age
912 Washers, window cleaners and other cleaning workers	2.8087342	0.8797368	sex, year and age
524 Event seller and telemarketers	3.4988451	0.8544225	sex, year and age
121 Finance managers	2.5670784	0.8466459	sex, year and age
512 Cooks and cold-buffet managers	3.2163958	0.8442390	sex, year and age
136 Production managers in construction and mining	2.8467904	0.7932921	sex, year and age
814 Machine operators, rubber, plastic and paper products	2.2917499	0.7793006	sex, year and age
214 Engineering professionals	1.6492316	0.7761337	sex, year and age
813 Machine operators, chemical and pharmaceutical products	1.9063935	0.7563922	sex, year and age
531 Child care workers and teachers aides	2.0950582	0.7028050	sex, year and age
265 Creative and performing artists	2.9175166	0.6854106	sex, year and age
336 Police officers	3.1628844	0.6829463	sex, year and age
123 Administration and planning managers	5.2325129	0.6568238	sex, year and age
226 Dentists	2.2002919	0.6424133	sex, year and age

ssyk	Increase in salary	F-value for age	interaction
821 Assemblers	2.7298723	0.6272515	sex, year and age
266 Social work and counselling professionals	2.9030963	0.6105511	sex, year and age
333 Business services agents	3.4608843	0.6059347	sex, year and age
122 Human resource managers	2.8367433	0.6024562	sex, year and age
264 Authors, journalists and linguists	1.1529306	0.5903280	sex, year and age
134 Architectural and engineering managers	2.1160537	0.5768053	sex, year and age
153 Elderly care managers	3.0364263	0.5758293	sex, year and age
125 Sales and marketing managers	1.6739767	0.5704022	sex, year and age
133 Research and development managers	1.1597044	0.5683059	sex, year and age
932 Manufacturing labourers	2.1290954	0.5548487	sex, year and age
312 Construction and manufacturing supervisors	3.4591641	0.5377424	sex, year and age
335 Tax and related government associate professionals	2.1448303	0.5243855	sex, year and age
533 Health care assistants	2.0013978	0.4993126	sex, year and age
221 Medical doctors	0.6685600	0.4775631	sex, year and age
819 Process control technicians	2.6501438	0.4743982	sex, year and age
243 Marketing and public relations professionals	1.0617941	0.4741832	sex, year and age
611 Market gardeners and crop growers	1.4116246	0.4502343	sex, year and age
231 University and higher education teachers	2.4211367	0.4173814	sex, year and age
233 Secondary education teachers	2.7734258	0.3928290	sex, year and age
962 Newspaper distributors, janitors and other service workers	1.1318853	0.3918519	sex, year and age
137 Production managers in manufacturing	2.1660640	0.3369015	sex, year and age
141 Primary and secondary schools and adult education managers	3.4089930	0.3318747	sex, year and age
422 Client information clerks	1.3506000	0.3234139	sex, year and age
511 Cabin crew, guides and related workers	1.2549099	0.3045993	sex, year and age
179 Other services managers not elsewhere classified	3.0293121	0.3041590	sex, year and age

ssyk	Increase in salary	F-value for age	interaction
223 Nursing professionals (cont.)	2.8788243	0.2989413	sex, year and age
234 Primary- and pre-school teachers	3.4559768	0.2757739	sex, year and age
532 Personal care workers in health services	2.9147895	0.2709784	sex, year and age
722 Blacksmiths, toolmakers and related trades workers	1.8671965	0.2638641	sex, year and age
831 Train operators and related workers	1.5460450	0.2570093	sex, year and age
331 Financial and accounting associate professionals	1.8020273	0.2535867	sex, year and age
411 Office assistants and other secretaries	2.2627780	0.1869850	sex, year and age
812 Metal processing and finishing plant operators	1.7305642	0.1741774	sex, year and age
311 Physical and engineering science technicians	2.6472370	0.1720296	sex, year and age
761 Butchers, bakers and food processors	1.6172221	0.1659462	sex, year and age
224 Psychologists and psychotherapists	2.4333553	0.1445774	sex, year and age
321 Medical and pharmaceutical technicians	3.2440727	0.1215590	sex, year and age
217 Designers	2.3869024	0.1138331	sex, year and age
351 ICT operations and user support technicians	1.7567973	0.1112492	sex, year and age
516 Other service related workers	2.8434718	0.0882348	sex, year and age
129 Administration and service managers not elsewhere classified	2.6395673	0.0513667	sex, year and age
723 Machinery mechanics and fitters	2.2720551	0.0252031	sex, year and age
752 Wood treaters, cabinet-makers and related trades workers	2.2552676	0.0214662	sex, year and age
522 Shop staff	2.8964681	0.0194987	sex, year and age
251 ICT architects, systems analysts and test managers	2.2488355	0.0081645	sex, year and age

Let's check what we have found.

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "335 Tax and related government associate
professionals")

model <-lm (log(salary) ~ year_n + sex * poly(age_n, 3), data = temp)

plot_model(model, type = "pred", terms = c("age_n", "sex"))

## Model has log-transformed response. Back-transforming predictions to original
```

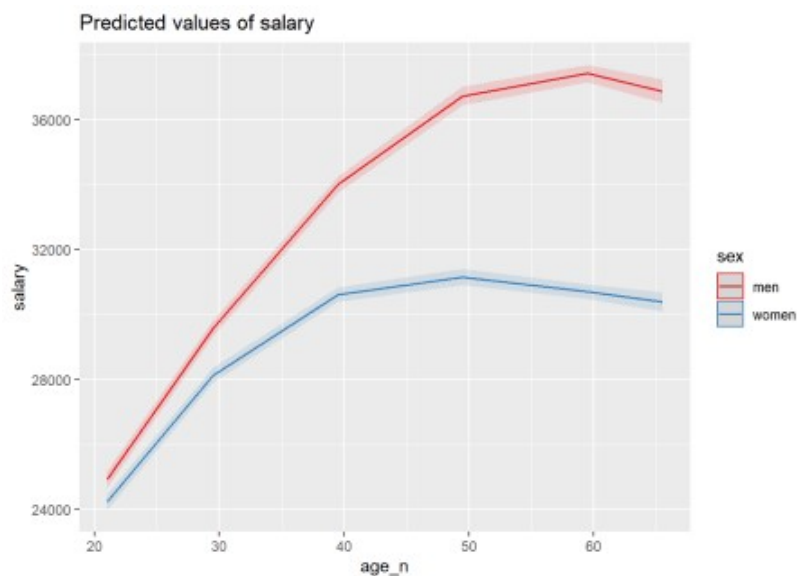response scale. Standard errors are still on the log-scale.

Predicted values of salary

Figure 2: Highest F-value interaction sex and age, Tax and related government associate professionals

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "341 Social work and religious associate
professionals")

model <-lm (log(salary) ~ year_n + sex * poly(age_n, 3), data = temp)

plot_model(model, type = "pred", terms = c("age_n", "sex"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```
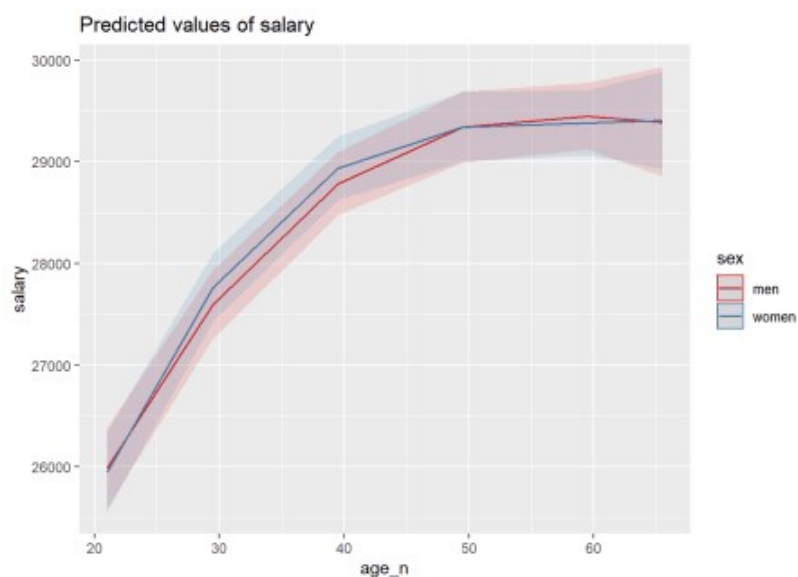

Predicted values of salary

Figure 3: Lowest F-value interaction sex and age, Social work and religious associate professionals

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "131 Information and communications
technology service managers")

model <-lm (log(salary) ~ year_n * sex + poly(age_n, 3), data = temp)
```

```
plot_model(model, type = "pred", terms = c("year_n", "sex"))
```

Model has log-transformed response. Back-transforming predictions to original
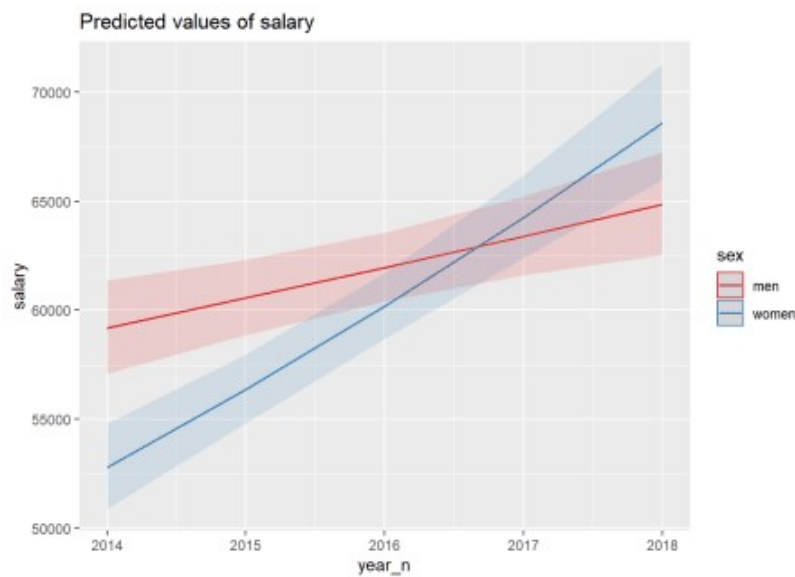response scale. Standard errors are still on the log-scale.

Figure 4: Highest F-value interaction sex and year, Information and communications technology service managers

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "125 Sales and marketing managers")

model <-lm (log(salary) ~ year_n * sex + poly(age_n, 3), data = temp)

plot_model(model, type = "pred", terms = c("year_n", "sex"))
```

Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.

Figure 5: Lowest F-value interaction sex and year, Sales and marketing managers

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "515 Building caretakers and related
```

```
workers")

model <-lm (log(salary) ~ sex + year_n * poly(age_n, 3), data = temp)

plot_model(model, type = "pred", terms = c("age_n", "year_n"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```
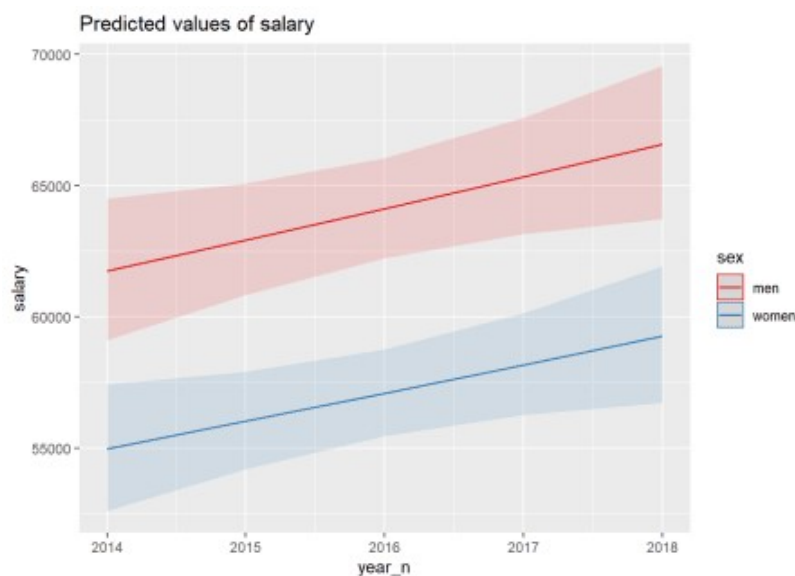

Figure 6: Highest F-value interaction year and age, Building caretakers and related workers

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "129 Administration and service managers
not elsewhere classified")

model <-lm (log(salary) ~ sex + year_n * poly(age_n, 3), data = temp)

plot_model(model, type = "pred", terms = c("age_n", "year_n"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```
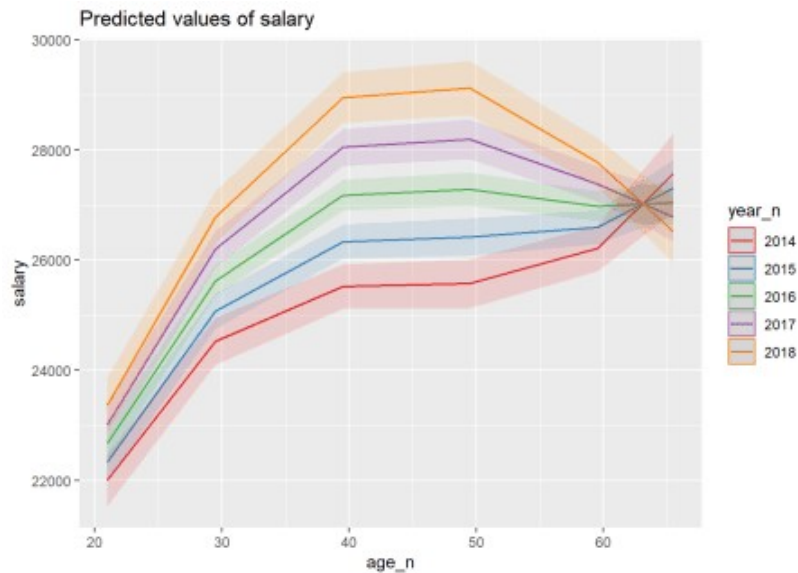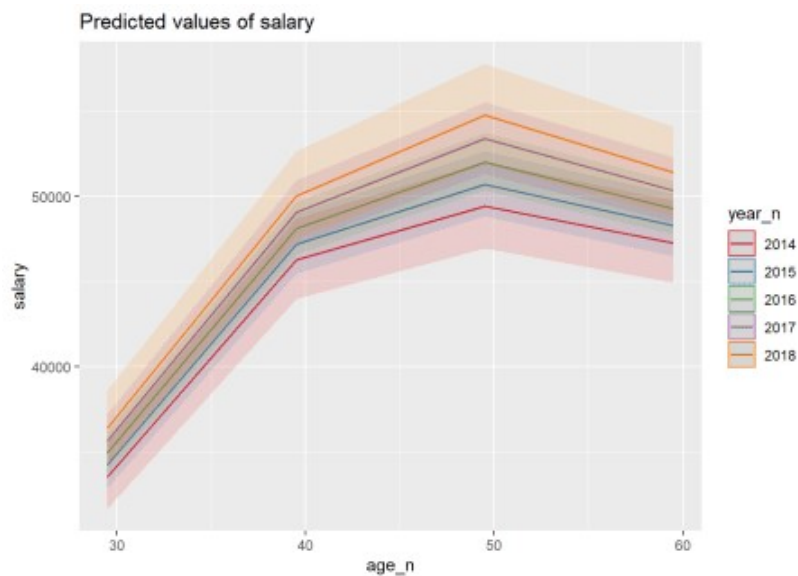
Figure 7: Lowest F-value interaction year and age, Administration and service managers not elsewhere classified

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "161 Financial and insurance managers")

model <-lm (log(salary) ~ sex * year_n * poly(age_n, 3), data = temp)

plot_model(model, type = "pred", terms = c("age_n", "year_n", "sex"))

## Warning in predict.lm(model, newdata = fitfram, type = "response", se.fit =
## se, : prediction from a rank-deficient fit may be misleading

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```


Figure 8: Highest F-value interaction sex, year and age, Financial and insurance managers

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "251 ICT architects, systems analysts and
test managers")

model <-lm (log(salary) ~ sex * year_n * poly(age_n, 3), data = temp)

plot_model(model, type = "pred", terms = c("age_n", "year_n", "sex"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```
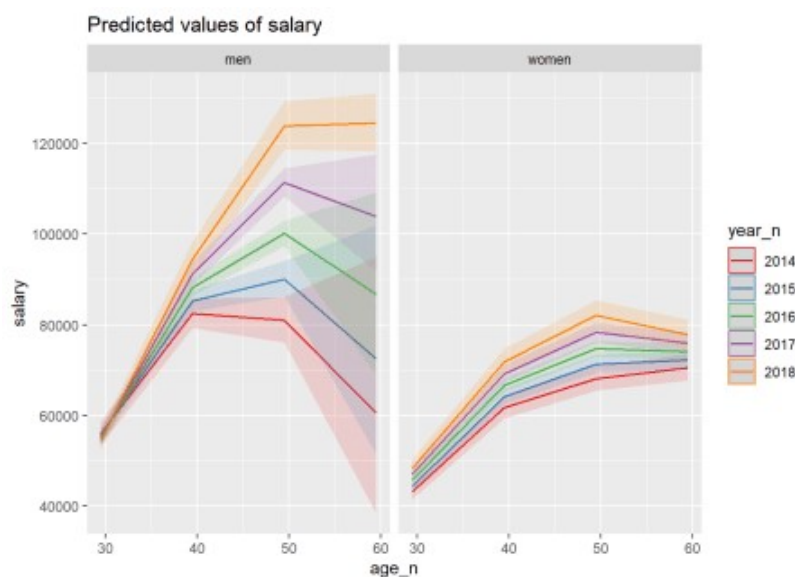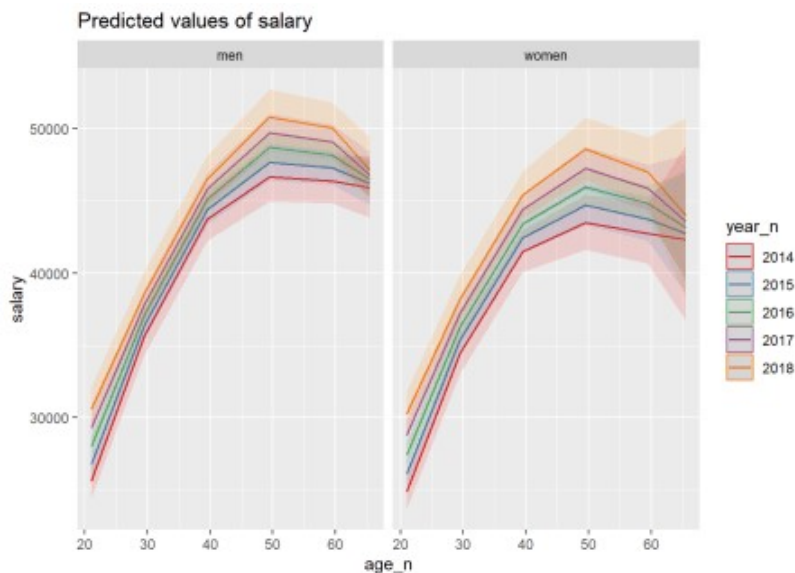
Figure 9: Lowest F-value interaction sex, year and age, ICT architects, systems analysts and test managers

We proceed by examining the interaction between education, year, gender.

The data table is downloaded from Statistics Sweden. It is saved as a comma-delimited file without heading, 000000CY.csv, http://www.statistikdatabasen.scb.se/pxweb/en/ssd/.

The table: Average basic salary, monthly salary and women´s salary as a percentage of men´s salary by sector, occupational group (SSYK 2012), sex and educational level (SUN). Year 2014 – 2018 Monthly salary All sectors

I will use a categorical predictor to fit the contribution of education to the salary.

In the plot and tables, you can also find information on how the increase in salaries per year for each occupational group is affected when the interactions are taken into account.

```
tb <- readfile("000000CY.csv") %>%
  mutate(edulevel = `level of education`)

numedulevel <- read.csv("edulevel.csv")

tbnum <- tb %>%
  right_join(numedulevel, by = c("level of education" = "level.of.education"))
%>%
  filter(!is.na(eduyears)) %>%
  mutate(eduyears = factor(eduyears))

## Warning: Column `level of education`/`level.of.education` joining character
## vector and factor, coercing into character vector

summary_table = vector()
anova_table = vector()
for (i in unique(tbnum$`occuptional  (SSYK 2012)`)){
  temp <- filter(tbnum, `occuptional  (SSYK 2012)` == i)
  if (dim(temp)[1] > 30){
    model <-lm (log(salary) ~ year_n + sex * edulevel, data = temp)
    summary_table <- rbind (summary_table, mutate (tidy (summary (model)), ssyk
= i, interaction = "sex and edulevel"))
    anova_table <- rbind (anova_table, mutate (tidy (Anova (model, type = 2)),
ssyk = i, interaction = "sex and edulevel"))

    model <-lm (log(salary) ~ year_n * sex + edulevel, data = temp)
```

```
    summary_table <- rbind (summary_table, mutate (tidy (summary (model)), ssyk
= i, interaction = "sex and year"))
    anova_table <- rbind (anova_table, mutate (tidy (Anova (model, type = 2)),
ssyk = i, interaction = "sex and year"))

    model <-lm (log(salary) ~ sex + year_n * edulevel, data = temp)
    summary_table <- rbind (summary_table, mutate (tidy (summary (model)), ssyk
= i, interaction = "year and edulevel"))
    anova_table <- rbind (anova_table, mutate (tidy (Anova (model, type = 2)),
ssyk = i, interaction = "year and edulevel"))

    model <-lm (log(salary) ~ year_n * sex * edulevel, data = temp)
    summary_table <- rbind (summary_table, mutate (tidy (summary (model)), ssyk
= i, interaction = "sex, year and edulevel"))
    anova_table <- rbind (anova_table, mutate (tidy (Anova (model, type = 2)),
ssyk = i, interaction = "sex, year and edulevel"))
    }
}

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```

```
anova_table <- anova_table %>% rowwise() %>% mutate(contcol = str_count(term,
":"))
```

```
summary_table <- summary_table %>% rowwise() %>% mutate(contcol =
str_count(term, ":"))
```

```
merge(summary_table, anova_table, by = c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (contcol.y > 0) %>%
  filter (!(contcol.y == 1 & interaction == "sex, year and edulevel")) %>%
  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  ggplot () +
    geom_point (mapping = aes(x = estimate, y = statistic.y, colour =
interaction)) +
    labs(
      x = "Increase in salaries (% / year)",
      y = "F-value for education"
    )
```
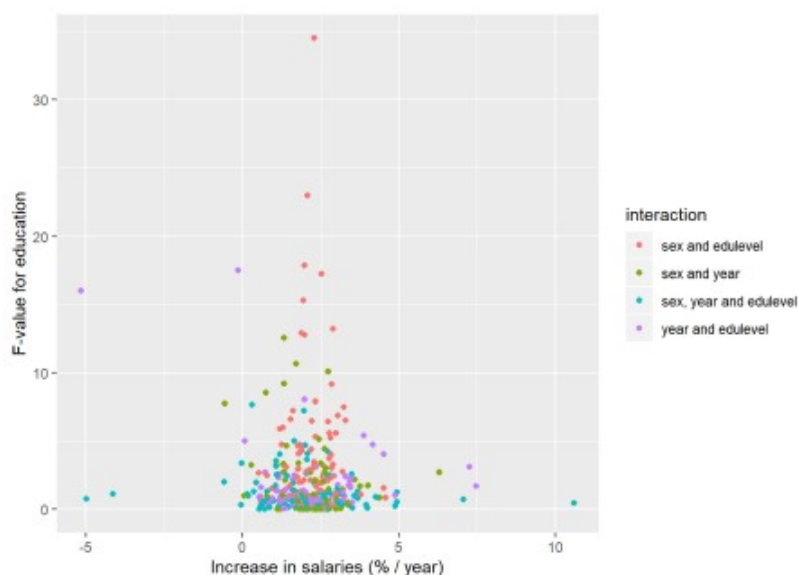

Figure 10: The significance of education, year, sex and the interaction between them on the salary in Sweden, a comparison between different occupational groups, Year 2014 – 2018

The table with all occupational groups sorted by F-value in descending order.

```
merge(summary_table, anova_table, c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
```

```
filter (contcol.y > 0) %>%
filter (interaction == "sex and edulevel") %>%
mutate (estimate = (exp(estimate) - 1) * 100) %>%
select (ssyk, estimate, statistic.y, interaction) %>%
rename (`F-value for age` = statistic.y) %>%
rename (`Increase in salary` = estimate) %>%
arrange (desc (`F-value for age`)) %>%
knitr::kable(
  booktabs = TRUE,
  caption = 'Correlation for F-value (sex and edulevel) and the yearly
increase in salaries')
```

Table 5: Correlation for F-value (sex and edulevel) and the yearly increase in salaries

ssyk	Increase in salary	F-value for age	interaction
231 University and higher education teachers	2.2958141	34.5015790	sex and edulevel
531 Child care workers and teachers aides	2.0849482	22.9893835	sex and edulevel
534 Attendants, personal assistants and related workers	1.9853599	17.8765982	sex and edulevel
159 Other social services managers	2.5200022	17.2526856	sex and edulevel
331 Financial and accounting associate professionals	1.9408245	15.3185884	sex and edulevel
232 Vocational education teachers	2.8905545	13.2302391	sex and edulevel
235 Teaching professionals not elsewhere classified	1.8910322	12.9225823	sex and edulevel
533 Health care assistants	1.9894190	12.7840342	sex and edulevel
532 Personal care workers in health services	2.8496725	9.1729109	sex and edulevel
335 Tax and related government associate professionals	2.3353756	7.9120778	sex and edulevel
151 Health care managers	2.3371897	7.8893324	sex and edulevel
312 Construction and manufacturing supervisors	3.2514155	7.5021320	sex and edulevel
221 Medical doctors	1.6287887	7.2076142	sex and edulevel
261 Legal professionals	3.0480065	6.8746713	sex and edulevel
213 Biologists, pharmacologists and specialists in agriculture and forestry	1.5450027	6.5884385	sex and edulevel
123 Administration and planning managers	3.2940731	6.5099919	sex and edulevel
332 Insurance advisers, sales and purchasing agents	2.2092499	6.4609540	sex and edulevel
218 Specialists within environmental and health protection	2.7392976	6.4333433	sex and edulevel
815 Machine operators, textile, fur and leather products	1.2987260	5.9964706	sex and edulevel

ssyk	Increase in salary	F-value for age	interaction
352 Broadcasting and audio-visual technicians	1.1989274	5.9008142	sex and edulevel
234 Primary- and pre-school teachers	2.9842522	5.5772411	sex and edulevel
179 Other services managers not elsewhere classified	2.7707830	5.5622073	sex and edulevel
818 Other stationary plant and machine operators	2.3348813	5.3288394	sex and edulevel
122 Human resource managers	2.8136311	5.2385563	sex and edulevel
831 Train operators and related workers	1.8323618	4.7619015	sex and edulevel
133 Research and development managers	1.2477491	4.7380058	sex and edulevel
242 Organisation analysts, policy administrators and human resource specialists	1.7745769	4.6468566	sex and edulevel
432 Stores and transport clerks	1.8812238	4.5189085	sex and edulevel
819 Process control technicians	2.2014594	4.3967289	sex and edulevel
441 Library and filing clerks	1.8816062	4.2560137	sex and edulevel
311 Physical and engineering science technicians	1.8230392	4.1225856	sex and edulevel
422 Client information clerks	1.8028560	4.0863532	sex and edulevel
513 Waiters and bartenders	2.8449379	3.9818863	sex and edulevel
217 Designers	2.7808393	3.7385345	sex and edulevel
125 Sales and marketing managers	2.3036799	3.4839265	sex and edulevel
214 Engineering professionals	2.2866957	3.3293074	sex and edulevel
132 Supply, logistics and transport managers	1.2954135	3.2963695	sex and edulevel
821 Assemblers	2.8859212	3.2954380	sex and edulevel
341 Social work and religious associate professionals	2.5669973	3.2470601	sex and edulevel
523 Cashiers and related clerks	1.4161452	3.1231802	sex and edulevel
161 Financial and insurance managers	2.8561469	3.0300851	sex and edulevel
411 Office assistants and other secretaries	2.2467740	2.9941491	sex and edulevel
941 Fast-food workers, food preparation assistants	1.8006179	2.9874932	sex and edulevel
342 Athletes, fitness instructors and recreational workers	1.7794145	2.9204408	sex and edulevel

ssyk	Increase in salary	F-value for age	interaction
334 Administrative and specialized secretaries	3.1996557	2.7701174	sex and edulevel
216 Architects and surveyors	2.0531986	2.7656716	sex and edulevel
511 Cabin crew, guides and related workers	0.5200769	2.6492869	sex and edulevel
812 Metal processing and finishing plant operators	0.7894188	2.4826989	sex and edulevel
251 ICT architects, systems analysts and test managers	2.5832621	2.4743375	sex and edulevel
817 Wood processing and papermaking plant operators	2.8508683	2.3671829	sex and edulevel
524 Event seller and telemarketers	1.7483645	2.3363353	sex and edulevel
121 Finance managers	2.5622573	2.3103331	sex and edulevel
522 Shop staff	2.1891308	2.1309636	sex and edulevel
723 Machinery mechanics and fitters	1.9652100	2.1236645	sex and edulevel
321 Medical and pharmaceutical technicians	2.7193546	2.0749292	sex and edulevel
911 Cleaners and helpers	1.8900136	1.9883146	sex and edulevel
137 Production managers in manufacturing	1.8204783	1.9834843	sex and edulevel
541 Other surveillance and security workers	2.4854095	1.8987495	sex and edulevel
962 Newspaper distributors, janitors and other service workers	1.5168559	1.7259970	sex and edulevel
834 Mobile plant operators	2.3493104	1.6776513	sex and edulevel
131 Information and communications technology service managers	4.5217451	1.5468919	sex and edulevel
264 Authors, journalists and linguists	0.9398759	1.5389406	sex and edulevel
732 Printing trades workers	1.3754920	1.4116364	sex and edulevel
961 Recycling collectors	2.5026241	1.3670042	sex and edulevel
333 Business services agents	2.6647133	1.2102215	sex and edulevel
932 Manufacturing labourers	2.9938554	1.1866761	sex and edulevel
241 Accountants, financial analysts and fund managers	3.0649247	1.0785958	sex and edulevel
343 Photographers, interior decorators and entertainers	3.7751554	1.0765630	sex and edulevel
512 Cooks and cold-buffet managers	2.3823637	1.0684103	sex and edulevel

ssyk	Increase in salary	F-value for age	interaction
833 Heavy truck and bus drivers	1.6067155	1.0284369	sex and edulevel
129 Administration and service managers not elsewhere classified	2.3080253	1.0114151	sex and edulevel
173 Retail and wholesale trade managers	4.5823781	0.8462927	sex and edulevel
233 Secondary education teachers	2.3727154	0.7689329	sex and edulevel
611 Market gardeners and crop growers	1.2948139	0.7273208	sex and edulevel
243 Marketing and public relations professionals	0.6033059	0.6504950	sex and edulevel
136 Production managers in construction and mining	1.9290646	0.6163258	sex and edulevel
711 Carpenters, bricklayers and construction workers	1.8229891	0.5364368	sex and edulevel
816 Machine operators, food and related products	1.7935335	0.4643469	sex and edulevel
262 Museum curators and librarians and related professionals	3.0179014	0.4478464	sex and edulevel
722 Blacksmiths, toolmakers and related trades workers	1.9606924	0.4286145	sex and edulevel
351 ICT operations and user support technicians	1.7201155	0.3979107	sex and edulevel
265 Creative and performing artists	3.0842617	0.3975144	sex and edulevel
516 Other service related workers	2.8114718	0.3611032	sex and edulevel
813 Machine operators, chemical and pharmaceutical products	2.2201342	0.3378979	sex and edulevel
515 Building caretakers and related workers	2.6332939	0.2296460	sex and edulevel
134 Architectural and engineering managers	2.8463094	0.1876642	sex and edulevel
266 Social work and counselling professionals	2.4259163	0.1355394	sex and edulevel
814 Machine operators, rubber, plastic and paper products	2.4479515	0.0917245	sex and edulevel

```
merge(summary_table, anova_table, c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (contcol.y > 0) %>%
  filter (interaction == "sex and year") %>%
  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  select (ssyk, estimate, statistic.y, interaction) %>%
  rename (`F-value for age` = statistic.y) %>%
  rename (`Increase in salary` = estimate) %>%
  arrange (desc (`F-value for age`)) %>%
  knitr::kable(
    booktabs = TRUE,
    caption = 'Correlation for F-value (sex and year) and the yearly increase in
salaries')
```

Table 6: Correlation for F-value (sex and year) and the yearly increase in salaries

ssyk	Increase in salary	F-value for age	interaction
262 Museum curators and librarians and related professionals	1.3370390	12.5685564	sex and year
813 Machine operators, chemical and pharmaceutical products	1.7231905	10.6533739	sex and year
131 Information and communications technology service managers	2.7462737	10.0982495	sex and year
151 Health care managers	1.3373535	9.1937238	sex and year
815 Machine operators, textile, fur and leather products	0.7515225	8.5275034	sex and year
243 Marketing and public relations professionals	-0.5550314	7.7320191	sex and year
932 Manufacturing labourers	2.4564479	5.1323005	sex and year
816 Machine operators, food and related products	1.4102081	4.6641162	sex and year
311 Physical and engineering science technicians	2.6295635	4.4514388	sex and year
819 Process control technicians	2.5143689	3.3882796	sex and year
533 Health care assistants	1.7959772	3.3597299	sex and year
351 ICT operations and user support technicians	1.3030832	3.3339379	sex and year
221 Medical doctors	1.0703216	3.2379210	sex and year
264 Authors, journalists and linguists	0.2830418	3.2324009	sex and year
541 Other surveillance and security workers	2.6683785	3.0177453	sex and year
511 Cabin crew, guides and related workers	1.3314937	2.7734531	sex and year
834 Mobile plant operators	2.6262371	2.7299923	sex and year
159 Other social services managers	2.1787998	2.6997604	sex and year
173 Retail and wholesale trade managers	6.2849030	2.6920564	sex and year
341 Social work and religious associate professionals	2.7993782	2.4785285	sex and year
312 Construction and manufacturing supervisors	3.5850660	2.1887133	sex and year
723 Machinery mechanics and fitters	2.3375170	2.1272013	sex and year
235 Teaching professionals not elsewhere classified	1.3782887	2.1168491	sex and year
821 Assemblers	2.5894715	2.0183158	sex and year

ssyk	Increase in salary	F-value for age	interaction
122 Human resource managers	1.6158738	1.8995024	sex and year
123 Administration and planning managers	4.0238453	1.7601948	sex and year
334 Administrative and specialized secretaries	3.7714265	1.6845647	sex and year
512 Cooks and cold-buffet managers	2.7497179	1.4835714	sex and year
179 Other services managers not elsewhere classified	3.2090223	1.4601245	sex and year
732 Printing trades workers	1.1043814	1.3695629	sex and year
432 Stores and transport clerks	1.6848001	1.3440502	sex and year
411 Office assistants and other secretaries	1.9008129	1.1244333	sex and year
814 Machine operators, rubber, plastic and paper products	2.2707050	1.0815608	sex and year
911 Cleaners and helpers	2.0298327	1.0400501	sex and year
962 Newspaper distributors, janitors and other service workers	1.2842640	1.0400405	sex and year
812 Metal processing and finishing plant operators	0.0598298	0.9982723	sex and year
321 Medical and pharmaceutical technicians	3.0095453	0.9569319	sex and year
352 Broadcasting and audio-visual technicians	0.7887304	0.9352994	sex and year
441 Library and filing clerks	1.6143560	0.9017484	sex and year
343 Photographers, interior decorators and entertainers	4.3863478	0.8400912	sex and year
817 Wood processing and papermaking plant operators	2.6936338	0.7010849	sex and year
422 Client information clerks	1.6081275	0.6920726	sex and year
333 Business services agents	3.0014789	0.6872118	sex and year
137 Production managers in manufacturing	2.2137062	0.6712665	sex and year
331 Financial and accounting associate professionals	1.6611645	0.6470988	sex and year
232 Vocational education teachers	2.6579475	0.6330528	sex and year
532 Personal care workers in health services	2.7713176	0.6314612	sex and year
121 Finance managers	2.1097794	0.6254650	sex and year
833 Heavy truck and bus drivers	1.7707251	0.5974334	sex and year

ssyk	Increase in salary	F-value for age	interaction
513 Waiters and bartenders	2.3751929	0.4976799	sex and year
265 Creative and performing artists	2.6869389	0.4912352	sex and year
161 Financial and insurance managers	3.3678037	0.4848632	sex and year
534 Attendants, personal assistants and related workers	1.7516818	0.4712625	sex and year
266 Social work and counselling professionals	2.2254012	0.4681457	sex and year
332 Insurance advisers, sales and purchasing agents	2.4028894	0.4468183	sex and year
524 Event seller and telemarketers	2.0532844	0.4218714	sex and year
242 Organisation analysts, policy administrators and human resource specialists	1.5992807	0.3854059	sex and year
711 Carpenters, bricklayers and construction workers	1.9691994	0.3716610	sex and year
941 Fast-food workers, food preparation assistants	1.6155630	0.3607242	sex and year
261 Legal professionals	3.3823847	0.3303860	sex and year
516 Other service related workers	2.5058837	0.3278309	sex and year
342 Athletes, fitness instructors and recreational workers	1.9757715	0.2936025	sex and year
134 Architectural and engineering managers	3.0210896	0.2305112	sex and year
132 Supply, logistics and transport managers	1.2733534	0.2184407	sex and year
522 Shop staff	2.0517358	0.2003355	sex and year
214 Engineering professionals	2.2103539	0.1363967	sex and year
136 Production managers in construction and mining	1.8048620	0.1361198	sex and year
129 Administration and service managers not elsewhere classified	2.3857822	0.1359729	sex and year
722 Blacksmiths, toolmakers and related trades workers	2.0295905	0.1151279	sex and year
213 Biologists, pharmacologists and specialists in agriculture and forestry	1.6901080	0.1061134	sex and year
515 Building caretakers and related workers	2.7062205	0.1013957	sex and year
611 Market gardeners and crop growers	1.3388971	0.0784413	sex and year
241 Accountants, financial analysts and fund managers	3.1531437	0.0419040	sex and year
523 Cashiers and related clerks	1.2219886	0.0365257	sex and year

ssyk	Increase in salary	F-value for age	interaction
251 ICT architects, systems analysts and test managers	2.6453968	0.0341629	sex and year
125 Sales and marketing managers	2.2616762	0.0175115	sex and year
133 Research and development managers	1.1102691	0.0171085	sex and year
217 Designers	2.7155067	0.0160870	sex and year
218 Specialists within environmental and health protection	2.5604843	0.0138650	sex and year
234 Primary- and pre-school teachers	3.0003110	0.0070748	sex and year
233 Secondary education teachers	2.3980983	0.0066879	sex and year
231 University and higher education teachers	2.2687967	0.0051000	sex and year
831 Train operators and related workers	1.8251453	0.0043574	sex and year
335 Tax and related government associate professionals	2.3241995	0.0038471	sex and year
531 Child care workers and teachers aides	2.0954991	0.0031907	sex and year
216 Architects and surveyors	2.0729695	0.0031382	sex and year
818 Other stationary plant and machine operators	2.3325473	0.0016111	sex and year
961 Recycling collectors	2.4977953	0.0008583	sex and year

```
merge(summary_table, anova_table, c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (contcol.y > 0) %>%
  filter (interaction == "year and edulevel") %>%
  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  select (ssyk, estimate, statistic.y, interaction) %>%
  rename (`F-value for age` = statistic.y) %>%
  rename (`Increase in salary` = estimate) %>%
  arrange (desc (`F-value for age`)) %>%
  knitr::kable(
    booktabs = TRUE,
    caption = 'Correlation for F-value (year and edulevel) and the yearly
increase in salaries')
```

Table 7: Correlation for F-value (year and edulevel) and the yearly increase in salaries

ssyk	Increase in salary	F-value for age	interaction
534 Attendants, personal assistants and related workers	-0.1402810	17.4936553	year and edulevel
812 Metal processing and finishing plant operators	-5.1520587	15.9949732	year and edulevel
262 Museum curators and librarians and related professionals	1.9840758	8.0470057	year and edulevel

ssyk	Increase in salary	F-value for age	interaction
234 Primary- and pre-school teachers	3.8838951	5.4208619	year and edulevel
522 Shop staff	0.0698877	5.0158953	year and edulevel
129 Administration and service managers not elsewhere classified	4.1673228	4.7271849	year and edulevel
161 Financial and insurance managers	4.5135081	4.0324041	year and edulevel
516 Other service related workers	7.2670210	3.1139823	year and edulevel
125 Sales and marketing managers	2.3472066	3.0940253	year and edulevel
131 Information and communications technology service managers	2.1201215	2.8775913	year and edulevel
243 Marketing and public relations professionals	0.7324120	2.7082606	year and edulevel
335 Tax and related government associate professionals	1.1765682	2.5942601	year and edulevel
242 Organisation analysts, policy administrators and human resource specialists	1.3687826	2.5767431	year and edulevel
511 Cabin crew, guides and related workers	1.6565700	2.4973120	year and edulevel
541 Other surveillance and security workers	2.9299467	2.4531985	year and edulevel
233 Secondary education teachers	3.2921464	2.3912796	year and edulevel
221 Medical doctors	2.6099777	2.3282085	year and edulevel
343 Photographers, interior decorators and entertainers	1.7484483	2.3120145	year and edulevel
352 Broadcasting and audio-visual technicians	1.1530191	2.3008338	year and edulevel
821 Assemblers	3.4717300	2.2599823	year and edulevel
241 Accountants, financial analysts and fund managers	1.6197117	2.2273108	year and edulevel
515 Building caretakers and related workers	3.4401456	2.1128708	year and edulevel
121 Finance managers	2.3907091	1.8807514	year and edulevel
232 Vocational education teachers	3.0442130	1.7782730	year and edulevel
218 Specialists within environmental and health protection	3.3885291	1.7324927	year and edulevel
173 Retail and wholesale trade managers	7.4640395	1.6906345	year and edulevel
266 Social work and counselling professionals	3.4582880	1.6867797	year and edulevel
524 Event seller and telemarketers	0.5903028	1.6179929	year and edulevel

ssyk	Increase in salary	F-value for age	interaction
251 ICT architects, systems analysts and test managers	3.4450065	1.5962935	year and edulevel
732 Printing trades workers	1.4035774	1.4933929	year and edulevel
151 Health care managers	1.9531112	1.4056639	year and edulevel
261 Legal professionals	2.4524403	1.3545649	year and edulevel
818 Other stationary plant and machine operators	1.1073347	1.3304879	year and edulevel
123 Administration and planning managers	1.8272030	1.3139512	year and edulevel
932 Manufacturing labourers	2.0273905	1.2593432	year and edulevel
311 Physical and engineering science technicians	1.2484897	1.2546202	year and edulevel
723 Machinery mechanics and fitters	3.1964544	1.2328322	year and edulevel
265 Creative and performing artists	1.7733798	1.2051886	year and edulevel
531 Child care workers and teachers aides	1.6218079	1.0967008	year and edulevel
411 Office assistants and other secretaries	4.8834688	1.0316452	year and edulevel
235 Teaching professionals not elsewhere classified	2.8482974	1.0232382	year and edulevel
214 Engineering professionals	2.0110404	1.0077700	year and edulevel
333 Business services agents	1.7631050	0.9966769	year and edulevel
264 Authors, journalists and linguists	1.4793444	0.9754283	year and edulevel
512 Cooks and cold-buffet managers	2.1856120	0.9514593	year and edulevel
342 Athletes, fitness instructors and recreational workers	2.1163882	0.9498070	year and edulevel
133 Research and development managers	0.5839858	0.9449465	year and edulevel
217 Designers	3.2594826	0.9229512	year and edulevel
134 Architectural and engineering managers	1.2211597	0.9193392	year and edulevel
334 Administrative and specialized secretaries	1.9614167	0.9145418	year and edulevel
961 Recycling collectors	0.5439750	0.8972133	year and edulevel
332 Insurance advisers, sales and purchasing agents	2.2720763	0.8912591	year and edulevel
137 Production managers in manufacturing	1.8909772	0.8796878	year and edulevel

ssyk	Increase in salary	F-value for age	interaction
816 Machine operators, food and related products	1.5011716	0.8683619	year and edulevel
611 Market gardeners and crop growers	0.9702078	0.7969390	year and edulevel
122 Human resource managers	1.9316303	0.7634885	year and edulevel
833 Heavy truck and bus drivers	1.2362398	0.6907621	year and edulevel
136 Production managers in construction and mining	3.2044445	0.6886988	year and edulevel
813 Machine operators, chemical and pharmaceutical products	1.6181230	0.6737919	year and edulevel
513 Waiters and bartenders	1.8661549	0.6546343	year and edulevel
711 Carpenters, bricklayers and construction workers	1.1969785	0.6416119	year and edulevel
532 Personal care workers in health services	2.8020249	0.6328864	year and edulevel
834 Mobile plant operators	2.4022634	0.6302037	year and edulevel
819 Process control technicians	1.7061994	0.6114937	year and edulevel
159 Other social services managers	3.2304608	0.5909851	year and edulevel
432 Stores and transport clerks	1.8449906	0.5743293	year and edulevel
533 Health care assistants	2.1616545	0.5736881	year and edulevel
321 Medical and pharmaceutical technicians	2.5297791	0.5488535	year and edulevel
911 Cleaners and helpers	2.2245045	0.5336872	year and edulevel
331 Financial and accounting associate professionals	1.2100081	0.5288551	year and edulevel
817 Wood processing and papermaking plant operators	3.5093276	0.5181038	year and edulevel
216 Architects and surveyors	1.9919142	0.4832745	year and edulevel
722 Blacksmiths, toolmakers and related trades workers	1.7270402	0.4520330	year and edulevel
351 ICT operations and user support technicians	2.1384843	0.4518060	year and edulevel
523 Cashiers and related clerks	0.8593031	0.4308086	year and edulevel
831 Train operators and related workers	1.9370280	0.4298998	year and edulevel
312 Construction and manufacturing supervisors	2.7306910	0.4009186	year and edulevel
941 Fast-food workers, food preparation assistants	1.6227045	0.3683117	year and edulevel

ssyk	Increase in salary	F-value for age	interaction
441 Library and filing clerks	1.5960181	0.3611492	year and edulevel
213 Biologists, pharmacologists and specialists in agriculture and forestry	0.7902735	0.3333037	year and edulevel
179 Other services managers not elsewhere classified	2.4531669	0.2396802	year and edulevel
422 Client information clerks	2.0649425	0.1625848	year and edulevel
132 Supply, logistics and transport managers	1.1893479	0.1619384	year and edulevel
341 Social work and religious associate professionals	2.4925171	0.1313061	year and edulevel
962 Newspaper distributors, janitors and other service workers	1.3746098	0.0752161	year and edulevel
231 University and higher education teachers	2.1855704	0.0653639	year and edulevel
815 Machine operators, textile, fur and leather products	1.3138483	0.0462972	year and edulevel
814 Machine operators, rubber, plastic and paper products	2.5812272	0.0446220	year and edulevel

```
merge(summary_table, anova_table, c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (contcol.y > 1) %>%
  filter (interaction == "sex, year and edulevel") %>%
  filter (!(contcol.y == 1 & interaction == "sex, year and edulevel")) %>%
  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  select (ssyk, estimate, statistic.y, interaction) %>%
  rename (`F-value for age` = statistic.y) %>%
  rename (`Increase in salary` = estimate) %>%
  arrange (desc (`F-value for age`)) %>%
  knitr::kable(
    booktabs = TRUE,
    caption = 'Correlation for F-value (sex, year and edulevel) and the yearly
increase in salaries')
```

Table 8: Correlation for F-value (sex, year and edulevel) and the yearly increase in salaries

ssyk	Increase in salary	F-value for age	interaction
311 Physical and engineering science technicians	0.3007069	7.6368150	sex, year and edulevel
261 Legal professionals	1.9749741	7.2332096	sex, year and edulevel
334 Administrative and specialized secretaries	1.6645488	4.9962163	sex, year and edulevel
151 Health care managers	2.0072983	4.6943513	sex, year and edulevel
232 Vocational education teachers	2.7387801	4.1907918	sex, year and edulevel
264 Authors, journalists and linguists	2.0863140	4.0644218	sex, year and edulevel

ssyk	Increase in salary	F-value for age	interaction
711 Carpenters, bricklayers and construction workers	1.1969785	4.0519757	sex, year and edulevel
121 Finance managers	2.0641822	3.6513567	sex, year and edulevel
122 Human resource managers	1.0779576	3.5481108	sex, year and edulevel
137 Production managers in manufacturing	-0.0152177	3.3778729	sex, year and edulevel
523 Cashiers and related clerks	1.0766683	3.1321131	sex, year and edulevel
159 Other social services managers	2.0475832	2.6301550	sex, year and edulevel
234 Primary- and pre-school teachers	3.4992304	2.5722281	sex, year and edulevel
818 Other stationary plant and machine operators	1.1073347	2.5439043	sex, year and edulevel
342 Athletes, fitness instructors and recreational workers	2.7582176	2.4744045	sex, year and edulevel
531 Child care workers and teachers aides	1.4341298	2.4314811	sex, year and edulevel
522 Shop staff	-0.5891626	1.9849918	sex, year and edulevel
331 Financial and accounting associate professionals	0.4425476	1.9602026	sex, year and edulevel
332 Insurance advisers, sales and purchasing agents	2.2947388	1.9422377	sex, year and edulevel
533 Health care assistants	1.6253210	1.9216616	sex, year and edulevel
343 Photographers, interior decorators and entertainers	1.0634866	1.7202512	sex, year and edulevel
235 Teaching professionals not elsewhere classified	3.0233562	1.4927454	sex, year and edulevel
233 Secondary education teachers	3.0407628	1.4358037	sex, year and edulevel
813 Machine operators, chemical and pharmaceutical products	1.6181230	1.3871806	sex, year and edulevel
217 Designers	3.6821293	1.2946162	sex, year and edulevel
534 Attendants, personal assistants and related workers	0.3597122	1.2943980	sex, year and edulevel
541 Other surveillance and security workers	3.1102372	1.2828090	sex, year and edulevel
125 Sales and marketing managers	0.7835022	1.2779771	sex, year and edulevel
129 Administration and service managers not elsewhere classified	4.9504748	1.2735961	sex, year and edulevel
819 Process control technicians	2.4986543	1.2299209	sex, year and edulevel
911 Cleaners and helpers	2.8014931	1.2021688	sex, year and edulevel

ssyk	Increase in salary	F-value for age	interaction
341 Social work and religious associate professionals	2.5010265	1.1808832	sex, year and edulevel
723 Machinery mechanics and fitters	3.1964544	1.1493456	sex, year and edulevel
611 Market gardeners and crop growers	0.1434970	1.1324088	sex, year and edulevel
243 Marketing and public relations professionals	-4.1275797	1.1078823	sex, year and edulevel
351 ICT operations and user support technicians	2.6270604	1.0821259	sex, year and edulevel
821 Assemblers	3.5727179	0.9895740	sex, year and edulevel
524 Event seller and telemarketers	0.1957456	0.9768868	sex, year and edulevel
335 Tax and related government associate professionals	1.6651038	0.9445517	sex, year and edulevel
242 Organisation analysts, policy administrators and human resource specialists	1.7377916	0.9296940	sex, year and edulevel
831 Train operators and related workers	1.9370280	0.9170162	sex, year and edulevel
515 Building caretakers and related workers	4.2685600	0.9019820	sex, year and edulevel
422 Client information clerks	2.6186600	0.8683975	sex, year and edulevel
512 Cooks and cold-buffet managers	1.9342162	0.8474145	sex, year and edulevel
123 Administration and planning managers	1.6423465	0.8377722	sex, year and edulevel
312 Construction and manufacturing supervisors	3.6769309	0.7940555	sex, year and edulevel
241 Accountants, financial analysts and fund managers	1.4634289	0.7813243	sex, year and edulevel
812 Metal processing and finishing plant operators	-4.9761347	0.7523221	sex, year and edulevel
516 Other service related workers	7.0743258	0.7425455	sex, year and edulevel
432 Stores and transport clerks	1.6337081	0.7279130	sex, year and edulevel
221 Medical doctors	2.5016353	0.6902677	sex, year and edulevel
134 Architectural and engineering managers	1.2211597	0.6693583	sex, year and edulevel
333 Business services agents	1.0012648	0.6482391	sex, year and edulevel
441 Library and filing clerks	0.8265796	0.6267038	sex, year and edulevel
962 Newspaper distributors, janitors and other service workers	1.6061203	0.5933810	sex, year and edulevel
941 Fast-food workers, food preparation assistants	0.6914853	0.5829709	sex, year and edulevel

ssyk	Increase in salary	F-value for age	interaction
321 Medical and pharmaceutical technicians	2.4540505	0.5434559	sex, year and edulevel
352 Broadcasting and audio-visual technicians	1.9435613	0.5379284	sex, year and edulevel
161 Financial and insurance managers	4.9347200	0.5294277	sex, year and edulevel
511 Cabin crew, guides and related workers	3.0644405	0.5132864	sex, year and edulevel
932 Manufacturing labourers	2.0273905	0.5026755	sex, year and edulevel
179 Other services managers not elsewhere classified	2.2046970	0.4872775	sex, year and edulevel
532 Personal care workers in health services	2.6931703	0.4842910	sex, year and edulevel
173 Retail and wholesale trade managers	10.5993797	0.4694386	sex, year and edulevel
133 Research and development managers	1.3071833	0.4418744	sex, year and edulevel
231 University and higher education teachers	2.0503501	0.3707303	sex, year and edulevel
834 Mobile plant operators	2.4022634	0.3545803	sex, year and edulevel
265 Creative and performing artists	1.1809261	0.3382118	sex, year and edulevel
266 Social work and counselling professionals	3.1792487	0.3328237	sex, year and edulevel
251 ICT architects, systems analysts and test managers	3.9660691	0.3290868	sex, year and edulevel
815 Machine operators, textile, fur and leather products	0.5896274	0.3224206	sex, year and edulevel
131 Information and communications technology service managers	-0.0347601	0.3179017	sex, year and edulevel
732 Printing trades workers	1.4035774	0.2933972	sex, year and edulevel
132 Supply, logistics and transport managers	1.9589258	0.2574186	sex, year and edulevel
411 Office assistants and other secretaries	4.8892850	0.2517369	sex, year and edulevel
833 Heavy truck and bus drivers	1.6848227	0.2443507	sex, year and edulevel
722 Blacksmiths, toolmakers and related trades workers	2.1732826	0.2354179	sex, year and edulevel
816 Machine operators, food and related products	0.8583028	0.1593265	sex, year and edulevel
214 Engineering professionals	1.9785162	0.1445402	sex, year and edulevel
262 Museum curators and librarians and related professionals	1.4727922	0.1389862	sex, year and edulevel
136 Production managers in construction and mining	3.9874104	0.1239311	sex, year and edulevel

ssyk	Increase in salary	F-value for age	interaction
817 Wood processing and papermaking plant operators	3.5093276	0.0936398	sex, year and edulevel
513 Waiters and bartenders	2.5267044	0.0838668	sex, year and edulevel
814 Machine operators, rubber, plastic and paper products	2.5812272	0.0552916	sex, year and edulevel
218 Specialists within environmental and health protection	2.7640467	0.0345293	sex, year and edulevel
213 Biologists, pharmacologists and specialists in agriculture and forestry	0.7145156	0.0285926	sex, year and edulevel
961 Recycling collectors	0.5439750	0.0142411	sex, year and edulevel
216 Architects and surveyors	1.9398000	0.0071724	sex, year and edulevel

```
temp <- tbnum %>%
  filter(`occuptional  (SSYK 2012)` == "231 University and higher education
teachers")

model <-lm (log(salary) ~ year_n + sex * eduyears, data = temp)

plot_model(model, type = "pred", terms = c("eduyears", "sex"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```
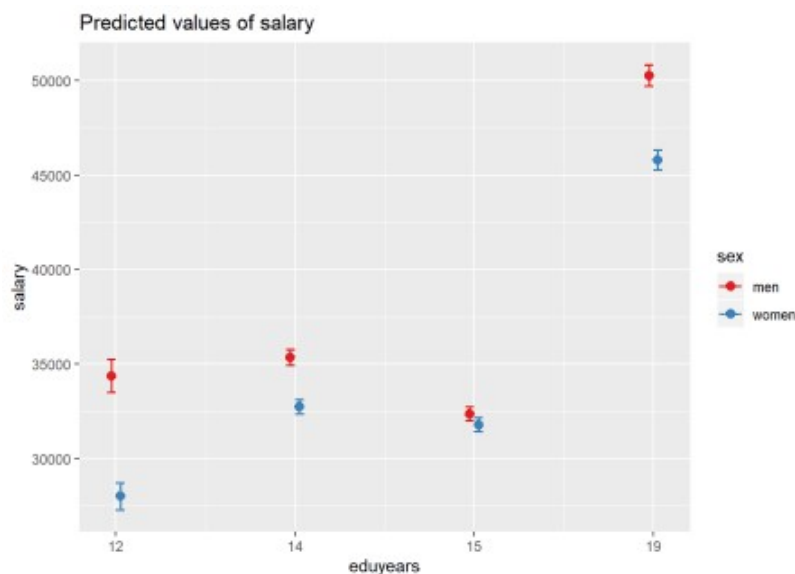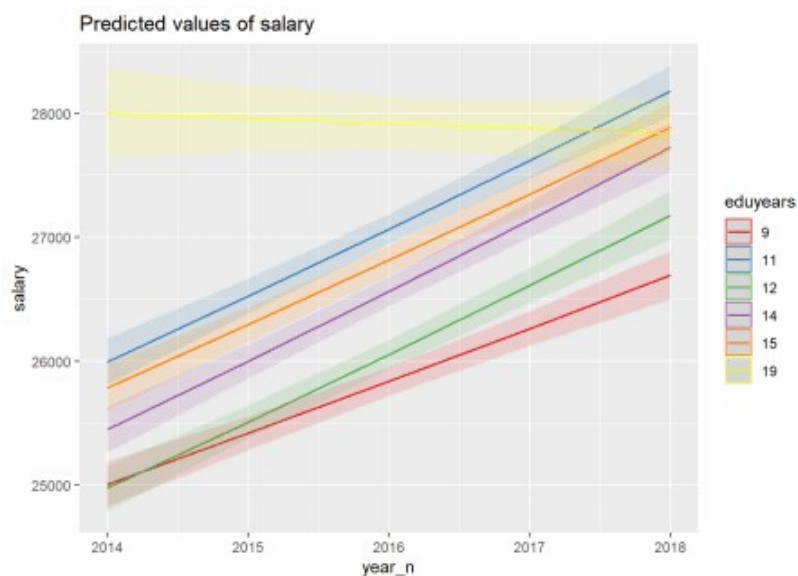

Figure 11: Highest F-value interaction sex and education level, University and higher education teachers

```
temp <- tbnum %>%
  filter(`occuptional  (SSYK 2012)` == "814 Machine operators, rubber, plastic
and paper products")

model <-lm (log(salary) ~ year_n + sex * eduyears, data = temp)

plot_model(model, type = "pred", terms = c("eduyears", "sex"))

## Warning in predict.lm(model, newdata = fitfram, type = "response", se.fit =
```

```
## se,  : prediction from a rank-deficient fit may be misleading

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```
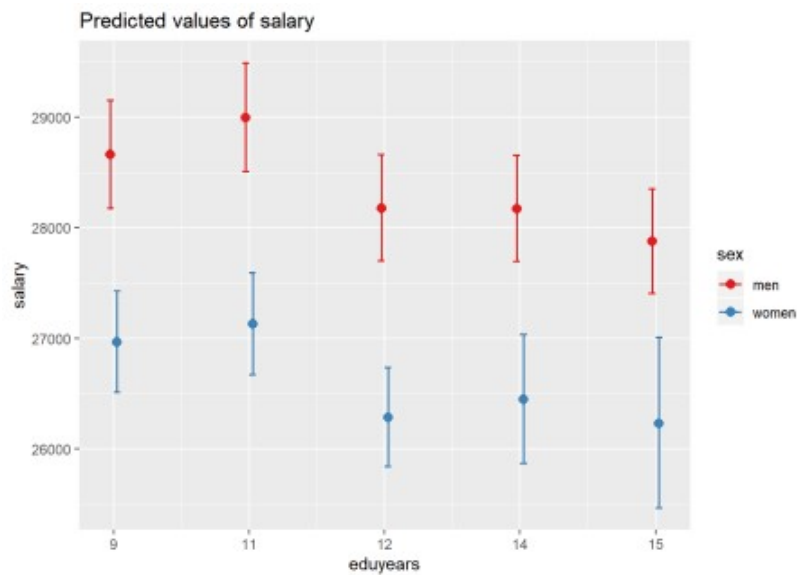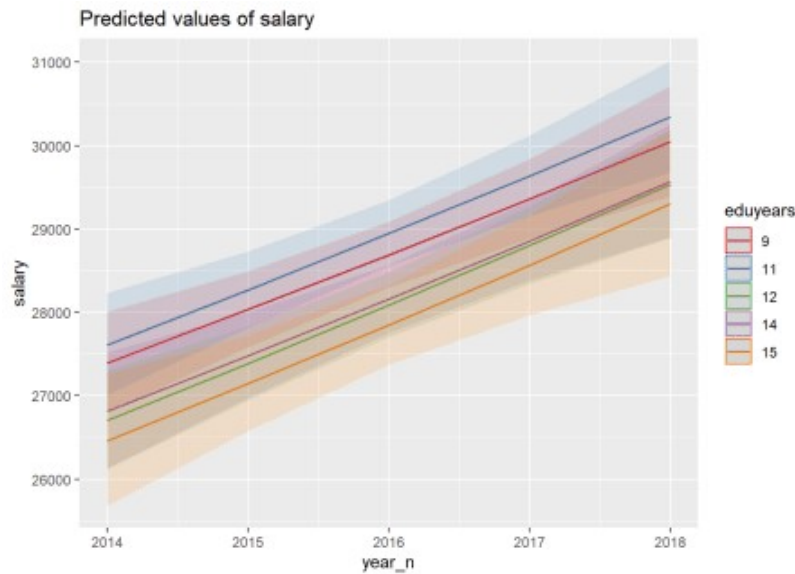

Figure 12: Lowest F-value interaction sex and education level, Machine operators, rubber, plastic and paper products

```
temp <- tbnum %>%
  filter(`occuptional  (SSYK 2012)` == "534 Attendants, personal assistants and
related workers")

model <-lm (log(salary) ~ sex + year_n * eduyears, data = temp)

plot_model(model, type = "pred", terms = c("year_n", "eduyears"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```
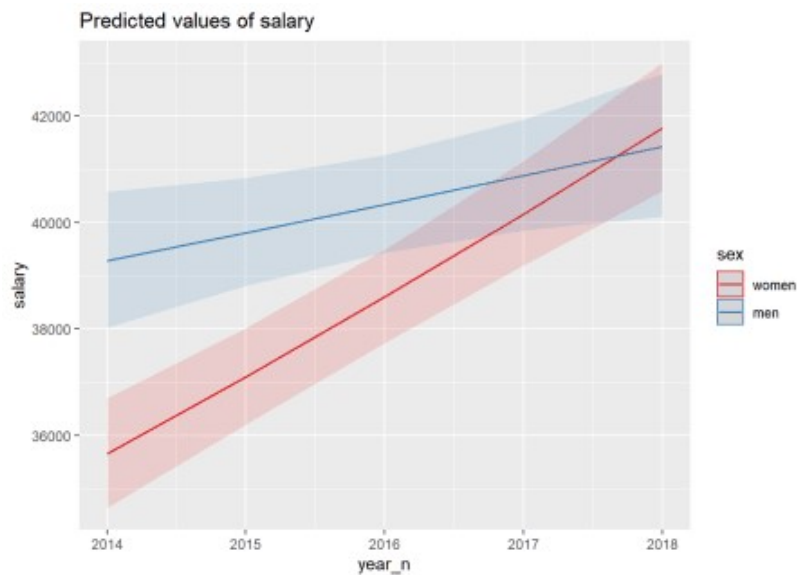

Figure 13: Highest F-value interaction year and education level, Attendants, personal assistants and related workers

```
temp <- tbnum %>%
```

```
   filter(`occuptional   (SSYK 2012)` == "814 Machine operators, rubber, plastic
and paper products")

model <-lm (log(salary) ~ sex + year_n * eduyears, data = temp)

plot_model(model, type = "pred", terms = c("year_n", "eduyears"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```


Figure 14: Lowest F-value interaction year and education level, Machine operators, rubber, plastic and paper products

```
temp <- tbnum %>%
   filter(`occuptional   (SSYK 2012)` == "262 Museum curators and librarians and
related professionals")

model <-lm (log(salary) ~ sex * year_n + edulevel, data = temp)

plot_model(model, type = "pred", terms = c("year_n", "sex"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```
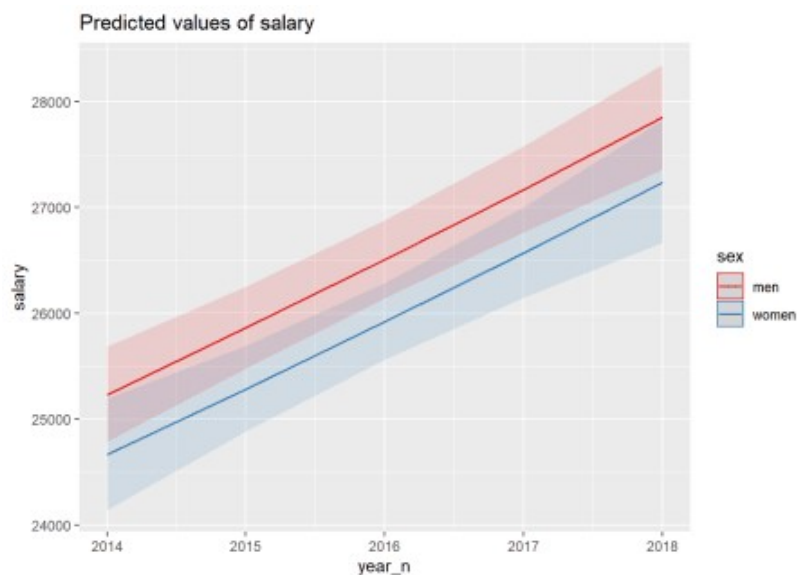
Figure 15: Highest F-value interaction sex and year, Museum curators and librarians and related professionals

```
temp <- tbnum %>%
  filter(`occuptional  (SSYK 2012)` == "961 Recycling collectors")

model <-lm (log(salary) ~ sex * year_n + edulevel, data = temp)

plot_model(model, type = "pred", terms = c("year_n", "sex"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```


Figure 16: Lowest F-value interaction sex and year, Recycling collectors

```
temp <- tbnum %>%
  filter(`occuptional  (SSYK 2012)` == "311 Physical and engineering science
technicians")

model <-lm (log(salary) ~ sex * year_n * eduyears, data = temp)

plot_model(model, type = "pred", terms = c("year_n", "eduyears", "sex"))
```

```
## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```
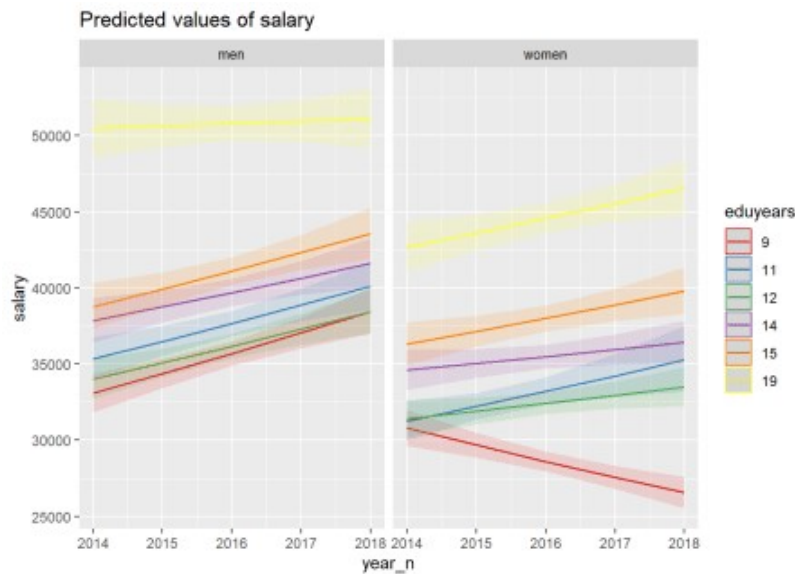

Figure 17: Highest F-value interaction sex, year and education level, Physical and engineering science technicians

```
temp <- tbnum %>%
  filter(`occuptional  (SSYK 2012)` == "216 Architects and surveyors")

model <-lm (log(salary) ~ sex * year_n * eduyears, data = temp)

plot_model(model, type = "pred", terms = c("year_n", "eduyears", "sex"))

## Warning in predict.lm(model, newdata = fitfram, type = "response", se.fit =
## se, : prediction from a rank-deficient fit may be misleading

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```
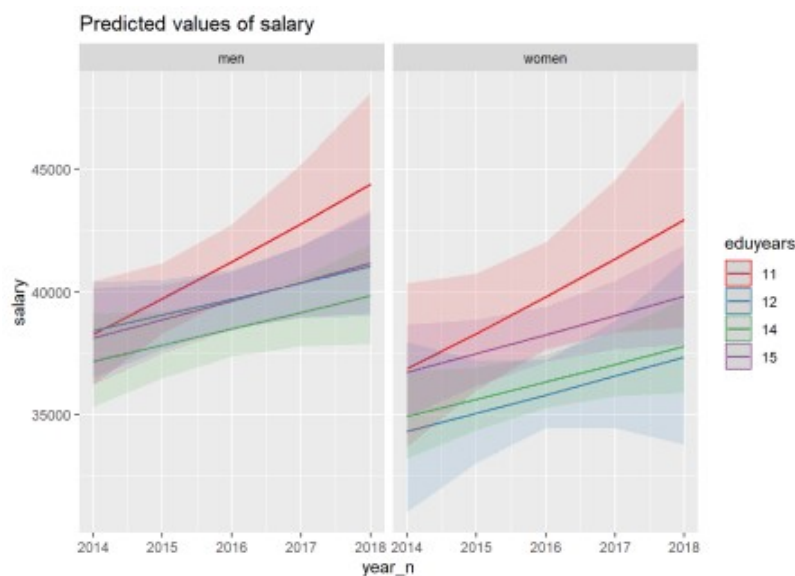

Figure 18: Lowest F-value interaction sex, year and education level, Architects and surveyors