

Audit trail – Investment analyst Pay Rises

The following audit trail should be read alongside the model provided.

Objective

The management of InvestX, an investment company, are reviewing how trainee investment analysts are rewarded for passing investment exams. Each year the Investment Analyst Institute publishes data on the salaries of trainee investment analysts from a number of different firms. The management of InvestX are concerned that this data suggests that their recently qualified investment analyst salaries for trainees who have passed all 8 investment exams, have fallen behind their competitors.

The purpose of the model is to perform the following:

- Calculation of the mean trainee salary after each exam pass, observed in industry survey data.
- Calculation of the trainee salary after each exam pass based on
 - the current fixed pay rises.
 - A fixed increase to pay rises to achieve a recently qualified trainee salary equal to the mean salary for students who have passed all 8 exams observed in the survey data.
 - A percentage increase to salary for each exam to achieve a recently qualified trainee salary equal to the mean salary for students who have passed all 8 exams observed in the survey data.
- For each of the above scenarios the calculation of the proportion of the total salary increase awarded for passing all 8 exams between the technical, specialist and final exams.
- A graphical comparison of the salary after passing each exam for each scenario considered
- A graphical comparison of proportion of the total salary increase awarded for passing all 8 exams between the technical, specialist and final exams for each scenario considered

Assumptions

The following assumptions were made in the model:

- Assume that all trainees start on the same starting salary
- Assume trainees do not receive any other pay adjustments other than for passing exams
- Assume all trainees in survey data are full time employment (no adjustments made for part time hours)
- Assume that the salaries included in the survey data are relevant to the InvestX business, relate to a similar work location for example.
- Assume investment exams must be taken in order, first passing the 5 technical exams, then the 2 specialist exams followed by the final exam.

“Data” worksheet

This worksheet contains the raw data and performs some simple checks on it.

The data was provided by the Investment Analyst Institute and trainee investment analyst salaries at each stage through the investment analyst qualification from 0 to 8 exams. The cells C5 to E305 in this worksheet hold this information.

In column “I” checks are included to ensure:

- 300 rows of data are included, as we are told this is the number of trainees included in the survey data.
- Minimum salary in the survey data is equal to the starting salary for all trainees, \$20,000.
- Maximum salary in the survey data is reasonable, less than \$50,000 or 2.5 times the starting salary.
- Mean and Median salary are close indicating the survey data reasonably symmetric which might be expected if exam pay rises result in a smooth progression.

A graphical representation of the data is produced to check that there are no obvious outliers. Salaries appear to be evenly spread within maximum and minimum values.

“Parameters” worksheet

This sheet sets out all the parameters used within the calculations, including:

- Starting salary for all new trainee investment analyst trainees (\$20,000)
starting_salary
- The current pay rises applied at InvestX for passing each exam. At InvestX, for passing each technical exam students receive a raise of \$500, an additional \$1000 for each specialist exam and an additional \$2000 for passing the final exam.
pay_raise_lookup
- The target salary, calculated in the “Data Analysis” as the mean salary in survey data for students who have passed all 8 exams *target_salary*
- A table of exam types relating to the number of exams passed. Exams 1 to 5 are technical exams, 6 to 7 are specialist exams and exam 8 is a final exam.

“Data Analysis” worksheet

In this worksheet we calculate the mean trainee salary after each exam pass, observed in industry survey data and the proportion of the total salary increase awarded for passing all 8 exams between the technical, specialist and final exams.

Cells C5 to E305 in this worksheet are linked to the salary information in the “Data” tab.

The mean salary for students who have passed “x” exams is determined by dividing the total salary for all students who have passed “x” exams (determined using a SUMIF function on the survey data) by the total number of students who have passed “x” exams (determined using a COUNTIF function on the survey data).

A check is included in column J to ensure that the mean salary increases as students pass additional exams (i.e. the mean salary for passing “x+1” exams is greater than the mean salary for passing “x” exams).

Cells H24 to I27 summarise the proportion of mean salary increases attributable to each of the technical, specialist and final exams.

The salary increase attributed to passing the 5 technical exams is calculated as the difference between the mean salary for 0 exam passes and the mean salary for 5 exam passes.

The salary increase attributed to passing the 2 specialist exams is calculated as the difference between the mean salary for 5 exam passes and the mean salary for 7 exam passes.

The salary increase attributed to passing the 1 final exam is calculated as the difference between the mean salary for 7 exam passes and the mean salary for 8 exam passes.

The total salary increase attributed to passing all the exams is calculated as the sum of the pay increases attributed to the 3 exam types (technical, specialist and final). A check is included in cell I28 to ensure this is equal to the as the difference between the starting salary and mean salary for 8 exam passes.

The proportion of the total exam pay raise for each exam type (technical, specialist and final) is calculated as the salary increase attributed to passing the exam type, as described above, divided by the total salary increase for passing all the exams.

A check is included to ensure the proportion of the total pay rise attributed to each of the exam types add to 100%.

“Base” worksheet

In this worksheet we calculate the trainee salary after each exam pass, based on InvestX’s current fixed pay rises for passing each exam.

Cells B7 to E16 summarise the salary by number of exam passed from 0 to 8.

Column C contains the exam type based on the number of exams passed, taken from the parameters tab using a VLOOKUP function. This categorises exams 1 to 5 as technical, 6 to 7 as specialist and exam 8 as final.

Column D contains the pay raise based on the exam type in column C, taken from the parameters tab using a VLOOKUP function (for passing each technical exam students receive a raise of \$500, an additional \$1000 for each specialist exam and an additional \$2000 for passing the final exam).

In column E the salary after passing each exam is calculated. Starting with the starting salary, taken from the parameters tab, the salary after each pay raise is calculated as the salary after the last exam pass plus the pay raise for the exam.

Cells C21 to E24 summarise the proportion of salary increases attributable to each of the technical, specialist and final exams. These calculations are the same as those described above for the proportion of salary increases described for the “Data Analysis” worksheet above.

“Fixed Increase” worksheet

In this worksheet we calculate the trainee salary after each exam pass, based on adjusting InvestX's current fixed pay rises for passing each exam and increasing each pay raise by a fixed amount so that the salary after passing all 8 investment exams is equal to the mean salary calculated from the survey data provided.

Cells B7 to F16 summarise the salary by number of exam passed from 0 to 8.

Column C contains the exam type based on the number of exams passed, taken from the parameters tab using a VLOOKUP function. This categorises exams 1 to 5 as technical, 6 to 7 as specialist and exam 8 as final.

Column D contains the current pay raise based on the exam type in column C, taken from the parameters tab using a VLOOKUP function (for passing each technical exam students receive a raise of \$500, an additional \$1000 for each specialist exam and an additional \$2000 for passing the final exam).

In column E the salary after passing each exam is calculated. Starting with the starting salary, taken from the parameters tab, the salary after each pay raise is calculated as the salary after the last exam pass plus the revised pay raise for the exam.

The Goalseek function is used to determine the fixed increase to exam pay rises (cell D4) required such that the difference between the salary after passing the final exam and the mean salary after passing the final exam in the survey data (cell F18) is zero.

Cells C21 to E24 summarise the proportion of salary increases attributable to each of the technical, specialist and final exams. These calculations are the same as those described above for the proportion of salary increases described for the "Data Analysis" worksheet above.

As a reasonableness check, setting the fixed increase to pay rises to zero, the salary after each pay raise should be equal to the figures on the "Base" worksheet.

"Percentage Increase" worksheet

In this worksheet we calculate the trainee salary after each exam pass, based on a series of pay rises expressed as a percentage of salary so that the salary after passing all 8 investment exams is equal to the mean salary calculated from the survey data provided.

Cells B7 to F16 summarise the salary by number of exam passed from 0 to 8.

Column C contains the exam type based on the number of exams passed, taken from the parameters tab using a VLOOKUP function. This categorises exams 1 to 5 as technical, 6 to 7 as specialist and exam 8 as final.

Column D contains the current pay raise multiplier based on the exam type in column C, taken from the parameters tab using a VLOOKUP function (a multiplier of 1 is applied to each technical exam, 2 for each specialist exam and 4 for the final exam).

In column E the pay rises for each exam pass is calculated as the product of the pay raise multiple from column D with the percentage increase to pay raise in cell D5.

In column F the salary after passing each exam is calculated. Starting with the starting salary, taken from the parameters tab, the salary after each pay raise is calculated as the salary after the last exam multiplied by $(1 + \text{percentage increase in pay from column E})$.

The Goalseek function is used to determine the percentage increase in pay raise (cell D5) required such that the difference between the salary after passing the final exam and the mean salary after passing the final exam in the survey data (cell F18) is zero.

Cells C21 to E24 summarise the proportion of salary increases attributable to each of the technical, specialist and final exams. These calculations are the same as those described above for the proportion of salary increases described for the “Data Analysis” worksheet above.

“Results” worksheet

This sheet summarises the results of the analysis in the above worksheets.

The salary after each exam pass for each scenario considered is summarised in cells B6:F15, linked to values in each of the underlying scenario tabs.

These rates are used to produce a bar chart which shows how salaries after each exam pass vary between the 4 scenarios modelled.

Checks are included in column H to confirm:

- The starting salary for all scenarios is equal to £20,000.
- The total salary for each scenario increases with each exam pass.
- Total salary after passing all 8 exams in the survey mean, fixed increase and percentage increase scenarios all match.

The proportion of the salary increases attributed to each exam type (technical, specialist and final) for each scenario considered is summarised in cells B30:F34, linked to values in each of the underlying scenario tabs.

These rates are used to produce a bar chart which shows how salaries after each exam pass vary between the 4 scenarios modelled.

A check is included to ensure the proportion of pay rises attributed to each exam type add up to 100% for each scenario.