The standard techniques: link ratios (chain ladder), payments per claim incurred, projected case estimates, Fisher-Lange, Bornhuetter-Ferguson and Expected Loss Ratios. In these modelling frameworks you can:

Select from numerous link ratio calculation methods with a click of the mouse

Volume-weighted average, arithmetic average and many more can be selected, with different methods used in different development periods if you choose. The number of calendar periods included in the average can also be set.

Compare the different calculation methods graphically

See instantly which methods are out of line with the rest. Alter your choice by simply clicking in the table.

Allow for future inflation and discounting in forecasts

Constant or varying inflation and discount factors can be set for all future calendar periods.

See Bornhuetter-Ferguson results instantly

When you forecast with link ratios, the Expected Loss Ratio and Bornhuetter-Ferguson forecasts are also calculated.

Keep a permanent record in your database

Once you have made your selections, your choice of ratios can be saved as a model in the database. The colours of the selections indicate what method was used so next year you will be able to see how the previous year’s ratios were calculated.

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The **Extended Link Ratio Family** (ELRF) modelling framework formalizes average link ratios as regression estimators and extends them to incorporate an intercept term and a constant accident period trend for each development period. These include **Mack** (Chain ladder) and **Murphy** (link ratio with intercept).

The resultant benefits include forecast standard errors (instead of just a point value) and the ability to test whether the assumptions made by the model are carried by the data.

**Calculate the uncertainty of your forecast loss reserves**

The regression formulation of weighted average link ratios allows you to calculate the standard deviations of your forecasts, so you can quantify how “risky” each line of business is.

**Test the quality of the model**

Diagnostic plots allow you to see at a glance whether the link ratio method is appropriate for your data. The plot on the left shows trends that aren’t captured by this method. The trend assumed by the method is sharper than that in the data resulting in substantial over-forecasting.

Residuals represent the data adjusted for what has been fitted to the data. In this example, the residuals versus calendar year exhibit a strong negative trend. This means that the trend estimated by the link ratio method is greater than the trend in the data. Accordingly, the forecasts produced by the link ratio method are excessive.

**Try out the extended modelling features**

Other models in the ELRF modelling framework may be able to capture the calendar year trends in your data. Try them, and test their quality using the diagnostic plots. For the data above, a better fitting model can be found by extending the link ratio model to include a constant accident period trend for each development period. The model better captures the (true) calendar year trends in the data and results in substantially lower forecasts.

Perhaps there are changing calendar calendar period trends. Remove the earlier calendar periods with a few clicks - with a link ratio model, this is equivalent to using link over just the most recent calendar years. Then see if this new model is a better fit to the data. In many cases you will find that there is still a trend in the residuals; the model is not capturing the true trends in the data. Try the Probabilistic Trend Family (PTF) modelling framework.