

THE EFFECT OF INFLATION ON HULL REPAIR COST

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DISCLAIMER

- The IUMI F&F committee is aware of the concerns raised in relation to the published index. Therefore it is important to highlight that we do not present the index as valid for all portfolios but more as an example of how one could create such an index.
- Differences between a particular portfolio and the index can be for example attributed to
 - Type of ships in the portfolios
 - Type of coverage (e.g. inclusion/exclusion of collision)
 - Geographical scope
 - Number of sizeable big claims in the portfolio
- Also the change of claim types and patterns each year and the different performance of each portfolio are not considered in the presented index.

HULL COST INFLATION INDEX: BACKGROUND

- 2010: In-depth study by Giorgia Rama, Swiss Re, on the effect of inflation on hull repair cost.
- Presented at the Facts & Figures session at the IUMI conference 2010
http://www.iumi.com/images/stories/IUMI/Pictures/Conferences/Zurich2010/Monday/ff_inflation_rama.pptx.pdf
- Benchmark data corresponds to Cefor Portfolio (= «data inflation» in model): Average hull claim cost, excluding total losses and exceptionally large losses (= «data inflation» in model), by accident year.
Source: The Nordic Association of Marine Insurers (Cefor)
- Two inflation index models (for composition details see presentation):
 - Additive model
 - Multiplicative model

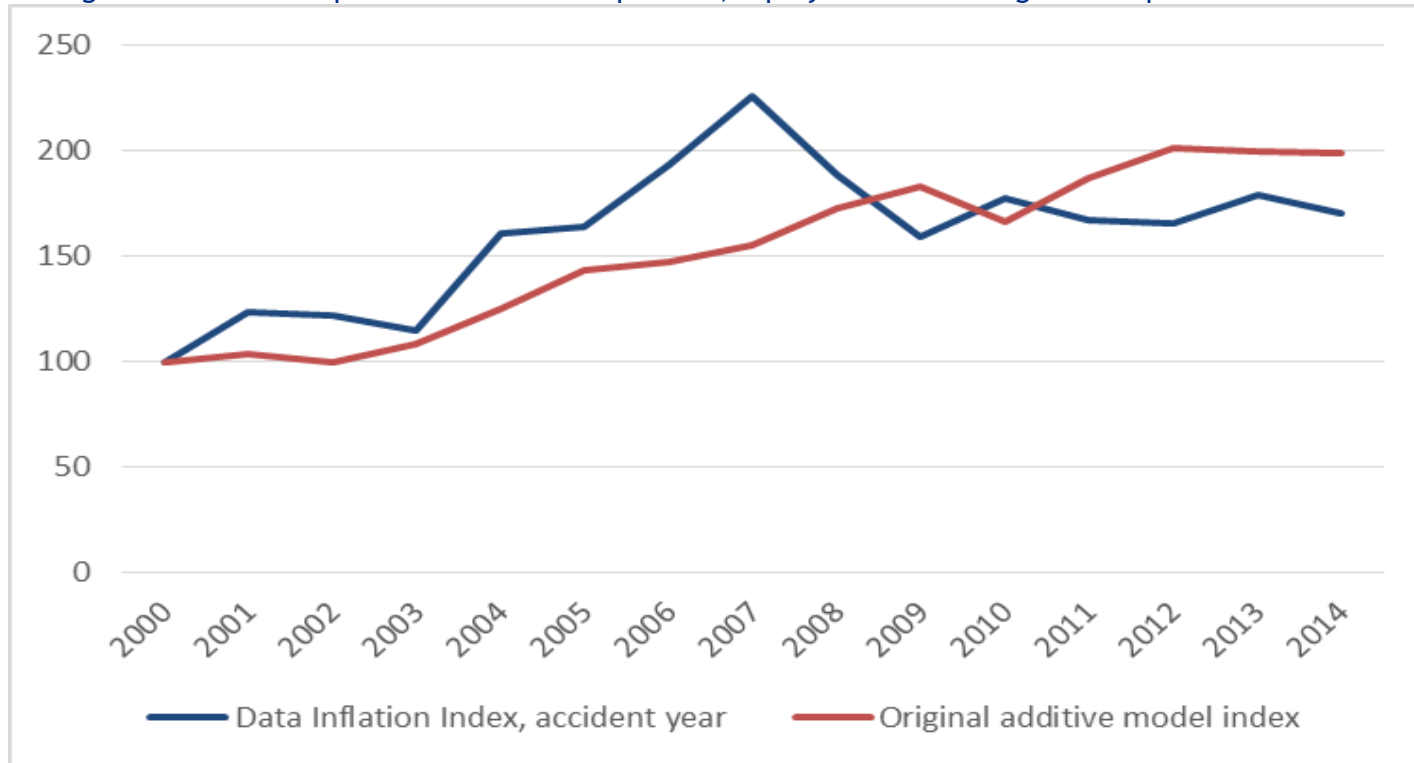
HULL COST INFLATION INDEX: BACKGROUND

- Index updates published in 2011 and 2012:
<http://www.iumi.com/images/stories/IUMI/Pictures/Committees/FactsFigures/Statistics/2011/AutumnEdition/repair%20cost%20index%20updated%202011.pdf>
<http://www.iumi.com/images/stories/IUMI/Pictures/Committees/FactsFigures/Statistics/2012/AutumnEdition/repair%20cost%20index%202012.pdf>
- In 2012, an increasing deviation between the index models (suggesting a continued increase in cost) and the benchmark data (stagnation of cost) was noted. F&F decided to re-evaluate the models, also in the light of possible effects of the financial crisis.
- By the courtesy of Studio Navale Canepa Andrea Mazza was able to analyse 40 claims in detail (which were analysed separately and are not part of the benchmark data for «data inflation»), identifying new aspects of claims cost and resulting in an alternative index model. Detailed description from slide 6 onwards.

2015 UPDATE OF THE ORIGINAL ADDITIVE MODEL

$$\text{Inflation}_i = 35\% * \text{Wage} + 50\% * \text{Steel} + 15\% \text{ Equity}$$

Wage index and Steel price as Material components; Equity index as Intangible Component

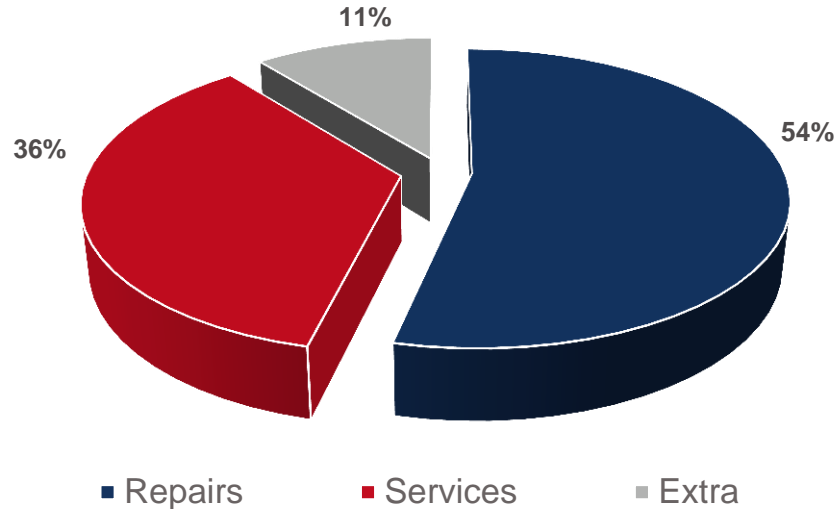


Data Inflation Index: based on average hull claim cost by accident year, excluding total losses.

Source: Cefor, The Nordic Association of Marine Insurers, <http://cefor.no/Statistics/NO MIS/2014/>

F&F ANALYSIS ON CLAIM INFLATION: CLAIM COST SPLIT

- A deep study on a random sample of about 40 claims shows that, on average, each claim is split as follows:
- Repairs cost: raw materials, supplies, yard internal costs
- Services cost: salvage services, fuel consumed, fees
- Extra cost: superintendent surveys, flights and hotels, crew wage, bonus



F&F ANALYSIS ON CLAIM INFLATION: HULL REPAIR COST INFLATION 2015

$$\text{Inflation}_i = \beta_0 + \beta_1 * \text{Steel}_i + \beta_2 * \text{Wage}_i + \beta_3 * \text{Salvage}_i$$

- Weights are calculated by linear regression, including also the constant value β_0
- The new Salvage index fits very well inflation data because it reflects correctly the salvage services discussed before (35% of total cost)

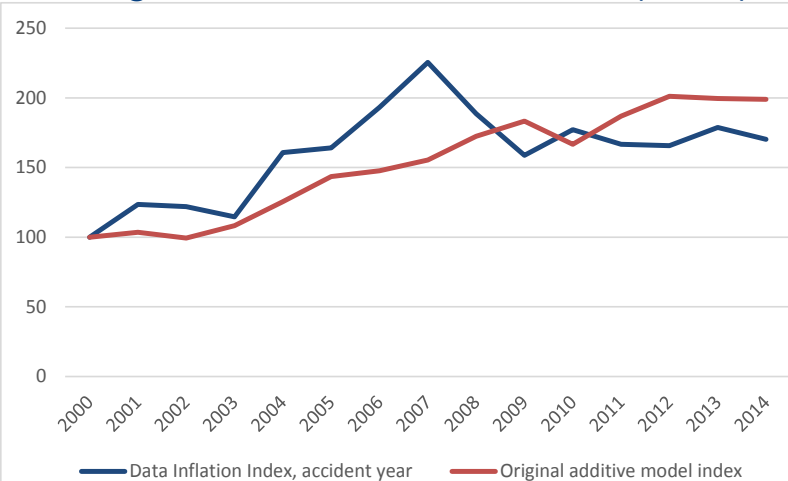
β_0	130,16
β_1	0,44
β_2	- 0,64
β_3	0,18

- β_2 is negative because it balances Steel and Salvage's effects on Inflation, otherwise they can over-estimate it.
This doesn't mean that Wage is negative correlated with Inflation (for more details, see «Multi-collinearity» issue or ask, via IUMI, directly to me)

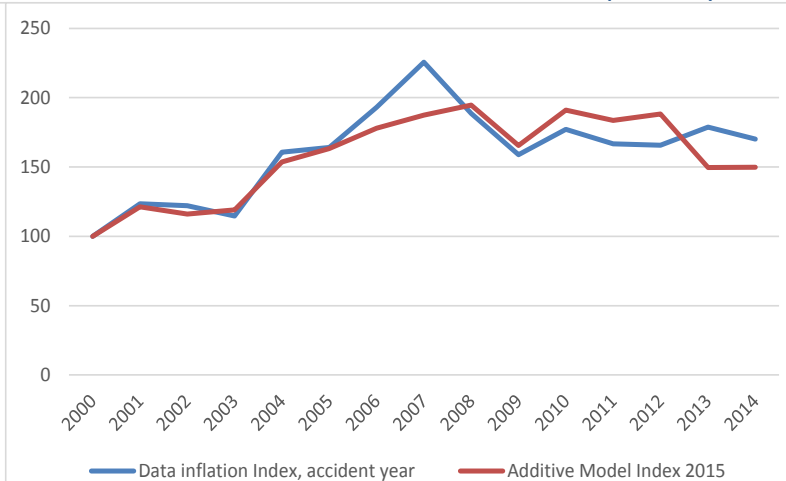
COMPARISON BETWEEN PREVIOUS ADDITIVE MODEL AND NEW ADDITIVE ONE

- Previous model shows Equity as an economic driver which has been replaced by Salvage Index. The latter is more relevant for inflation (data from International Salvage Union)
- Weights in last model were chosen by the UWs perspective of Marine Market, new ones are calculated with robust statistical techniques (linear regression), showing a better fit

Original Additive Model index (2010)



New Additive Model index (2015)

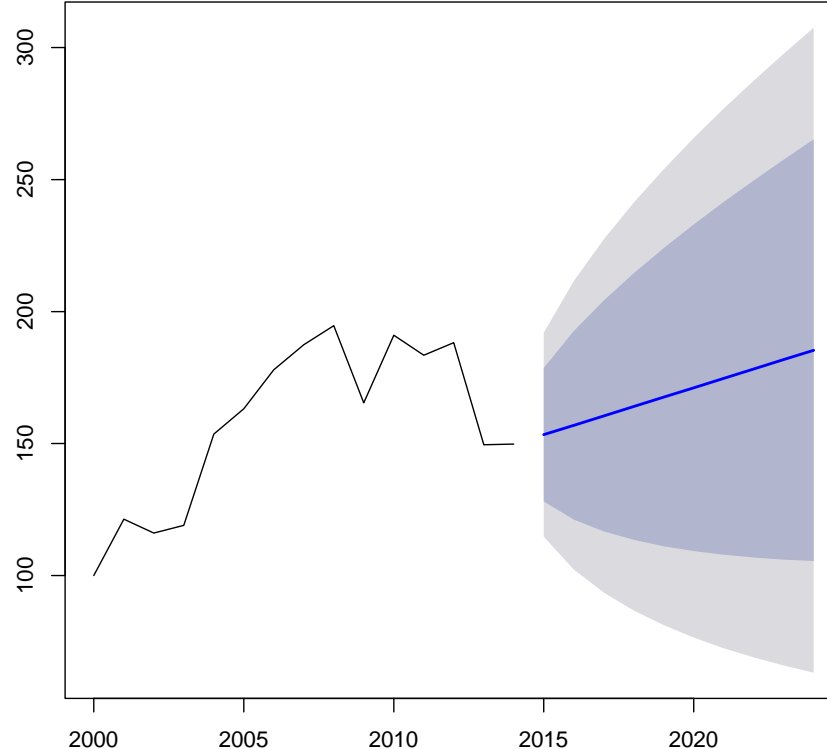


Data Inflation Index: based on average hull claim cost by accident year, excluding total losses and very large losses.
Source: Cefor, The Nordic Association of Marine Insurers, <http://cefor.no/Statistics/NO MIS/2014/>

FORECAST: EXPECTED INFLATION BY 2025

- Inflation is expected to grow for the next ten years
- This positive trend is linked to a future growth in Marine market
- Grey areas are confidence bands: they represent the uncertainty in an forecast based on limited data

Additive Model Index - Forecast



CONCLUSIONS

- Based on a random sample of 40 claims, it was possible to split the claim cost into three different areas, later studied by public economic variables
- Previous and new model show different economic drivers: Steel, Wage and Equity/Salvage indices
- Inflation and Marine Market are expected to grow for the next years pursuant to our models