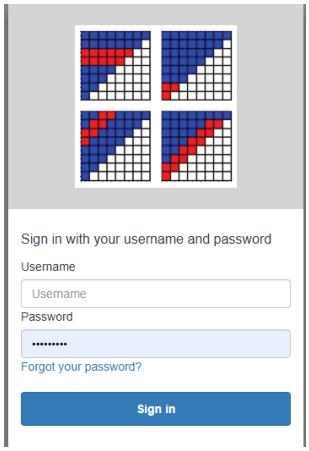
Usage Instructions

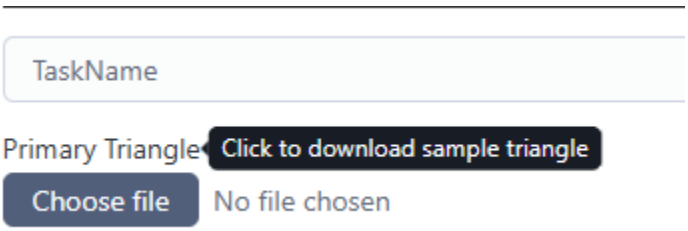
1. Go to https://predictri.com, press “Sign in” and log in with your username and password.



Log-in window

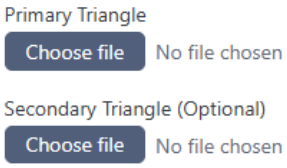
2. Press **"Define New Task"**.

3. Enter a **Task Name**
4. Download a sample triangle before the first use.

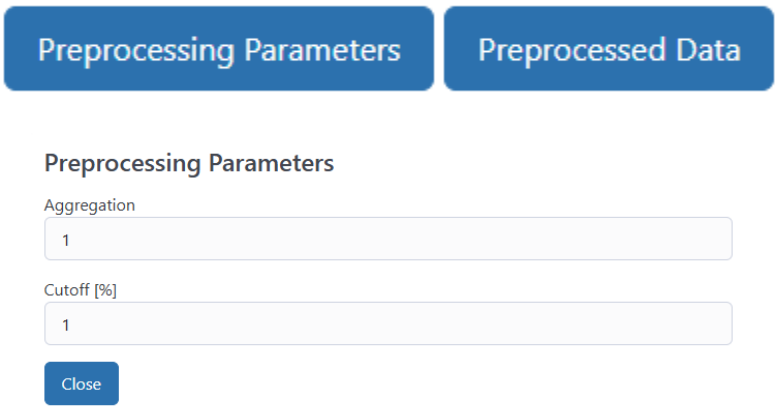


5. Upload a CSV file with the **primary triangle** (e.g., incurred) and, optionally, the **secondary triangle** (e.g., paid).

   If you use the Joint Model run, which assures ultimate predictions for paid and incurred triangles are equal, make sure the ultimate paid and incurred values for the most mature year match. If they don’t, scale the paid triangle by multiplying all its values by a fixed factor, which is your assumption of the gap between ultimates of paid and incurred.



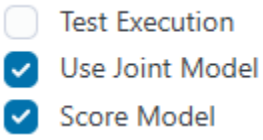
6. Press “Preprocessing Parameters” (Optionally)



Aggregation allows you to convert a monthly or quarterly triangle into a quarterly, half-yearly, annual, or any other chosen structure. The parameter defines how many rows are grouped together.

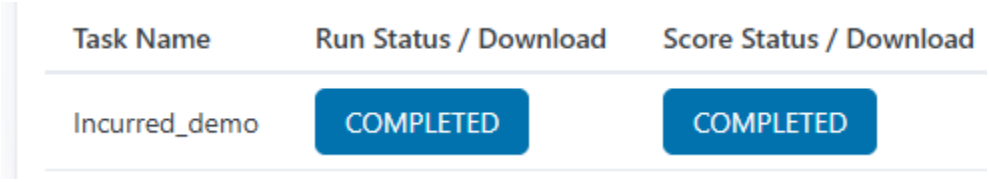
Cutoff % trims the right-hand side of the triangle when there is no meaningful development in the tail. This helps reduce both modeling time and cost. The default parameter is 1%, meaning that columns where all development factors stay within the range of 0.99 to 1.01 will be removed.

7. The “Preprocessed Data” button lets you download the processed triangle before the modeling begins.
8. If you don’t use the Joint Model run, make sure to remove the check mark "✓" used for “Use Joint model”.



9. To execute the process, press **"Start Task"**.

10. Modeling is complete when both “Run Status” and “Score Status” show “Completed”.

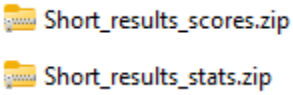


11. Click “Completed” to download the results and scores separately.

Model Output Overview

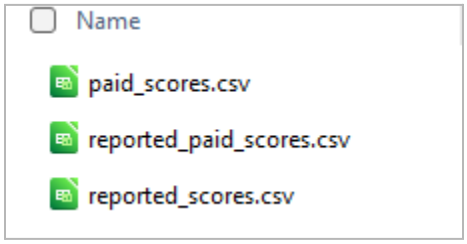
Output Structure

1. After the model run is completed we download two folders:



Folders downloaded from the Interface

2. ***_results_scores.zip** contains three files:



Scoring files list

- **PrimaryTriangleName_SecondaryTriangleName_scores.csv**: Ranks joint models by predictive performance, evaluating both paid and incurred triangles together.

model	reported.csv	paid.csv	fold 0	fold 1	fold 2	fold 3	fold 4	fold 5	fold 6	fold 7	Total
JOINT_E0100001_I0100001_R1000001	True	True	1.124931759304470	0.599449687533908	1.047617806328670	0.879015763606670	0.857826868693034	1.013595475090870	0.572205649481879	1.023645189073350	7.118288819010685
JOINT_E0000001_I0100001_R1000001	True	True	1.137940936618380	0.604459073808458	1.068211025661890	0.895150078667535	0.881963147057427	1.037481519911020	0.590326733059353	1.046574274698890	7.262106789482960
JOINT_E0100001_R1000001	True	True	1.143237643771700	0.605200025770399	1.076041751437720	0.899573644002279	0.884047084384494	1.041405042012530	0.594174808926053	1.050531493292910	7.294211493598090
JOINT_E0000001_R1000001	True	True	1.154546737670900	0.613066090477837	1.094442049662270	0.914211485120985	0.907278696695964	1.064671092563210	0.612002637651232	1.070666631062830	7.430885420905220
JOINT_E0100001_I0100001_R0100001	True	True	2.495690027872720	0.731685956319173	2.350667741563590	0.935738033718533	1.540161238776310	1.014003117879230	0.698776827918159	1.011437310112850	10.77816025416060
JOINT_E0000001_I0100001_R0100001	True	True	2.496883816189240	0.732098738352458	2.355862935384110	0.937915802001953	1.548052151997880	1.017505433824330	0.706326537662082	1.016729036966960	10.81137445237900
JOINT_E0100001_R0100001	True	True	2.500915527343750	0.733290937211778	2.360038757324220	0.939608891805013	1.551287439313390	1.019318368699820	0.707745658026801	1.018525017632380	10.83073059717810
JOINT_E0000001_R0100001	True	True	2.502201504177520	0.733674155341255	2.365416208902990	0.941674020555284	1.559010611640080	1.022837850782610	0.715365992652046	1.023960749308270	10.86414109336010

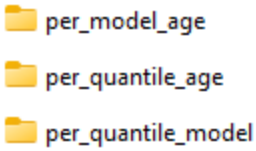
Example of Scoring for a Combined Model

- **PrimaryTriangleName_scores.csv**: Scores both the independent and joint models, evaluating one triangle at a time.

model	reported.csv	paid.csv	fold 0	fold 1	fold 2	fold 3	fold 4	fold 5	fold 6	fold 7	Total
JOINT_E0100001_I0100001_R1000001	True	True	0.317225856165732	0.172436765445176	0.291877890145907	0.245061136061145	0.242934729463311	0.284891641268166	0.165876429568055	0.291894461518975	2.012198909636470
JOINT_E0000001_I0100001_R1000001	True	True	0.320614804503738	0.173828658237252	0.296948791832052	0.249203753727739	0.250116594376103	0.291862588112190	0.170602049878849	0.298302804270098	2.051479985637050
JOINT_E0100001_R1000001	True	True	0.322098065448064	0.173821192915722	0.299445798320155	0.251000496648973	0.250956525084793	0.291977687548566	0.171740367848386	0.29920413929929	2.060244273113950
E0100001_I0100001_R1000001	True	False	0.338676288563718	0.172405386483797	0.303201634396789	0.245036545620170	0.243775460027879	0.298351657060480	0.166079551942887	0.310625999204574	2.078152523245860
JOINT_E0000001_R1000001	True	True	0.325649240965484	0.176019935197728	0.305138495660597	0.254160214495915	0.257285928213468	0.299451910039430	0.176723172587733	0.304587025796213	2.099015922956570
E0000001_I0100001_R1000001	True	False	0.342873665594286	0.173804642051779	0.309516106882403	0.248947266609438	0.251171911916425	0.304875343076644	0.171101354783581	0.316066003614856	2.118356294529410
E0100001_R1000001	True	False	0.344381147815335	0.174269214753182	0.309783463836998	0.251150233771211	0.252062007945071	0.305643943048293	0.172558035901798	0.317265110631143	2.127113157703030
E0000001_R1000001	True	False	0.347518920898438	0.174863733271170	0.315641075052241	0.255401529291625	0.258599783784600	0.311630577169439	0.177199722618185	0.322825893279045	2.163681235364690
JOINT_E0100001_I0100001_R0100001	True	True	0.688607902937038	0.207845072592458	0.646237773279990	0.255160321471512	0.428899334323022	0.283383338682113	0.200173080608409	0.283935854511876	2.994242678406420
JOINT_E0000001_I0100001_R0100001	True	True	0.689025085412470	0.207954222156156	0.647551998015373	0.255778322937668	0.431044916952810	0.284324071740591	0.202155738748530	0.285473033946048	3.003307363038420
JOINT_E0100001_R0100001	True	True	0.690068890971522	0.208286408455141	0.648734226021715	0.256206040741295	0.431860318747900	0.284850253853747	0.202551195698400	0.285924029606645	3.008481364096370
JOINT_E0000001_R0100001	True	True	0.690437809113533	0.208384893273950	0.650144884663244	0.256775415071877	0.433983792540848	0.285800400600638	0.204606415123068	0.287428291895056	3.017561902282060
E0100001_I0100001_R0100001	True	False	0.861419759770875	0.207844231718330	0.737615441763273	0.255205913256573	0.433940108104419	0.299938263431672	0.202023906092490	0.301297444169239	3.299285068306870
E0000001_I0100001_R0100001	True	False	0.864223029023858	0.207939927295972	0.738515710317960	0.255796309440367	0.435803074990549	0.300890604654948	0.204323245633033	0.303360313497564	3.310852214854250
E0100001_R0100001	True	False	0.864519919118574	0.208289402787403	0.740226089313466	0.256206020232170	0.436390866515457	0.301206404162991	0.204453806723318	0.303092320760091	3.314384829613470
E0000001_R0100001	True	False	0.867665772796959	0.208387497932680	0.742914097283476	0.256776276455131	0.439258493402953	0.302196133521295	0.206549306069651	0.305343545893187	3.329091123355330

Example of Scoring for a Single Model

3. ***_results_stats.zip** contains three folders:

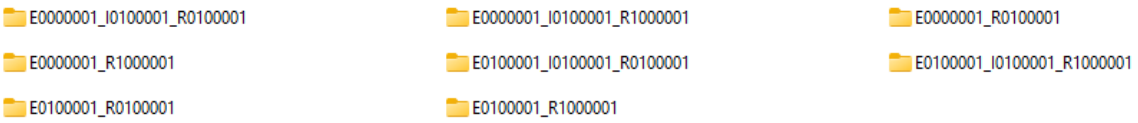


Results folders

3.1. **Per_model_age:**

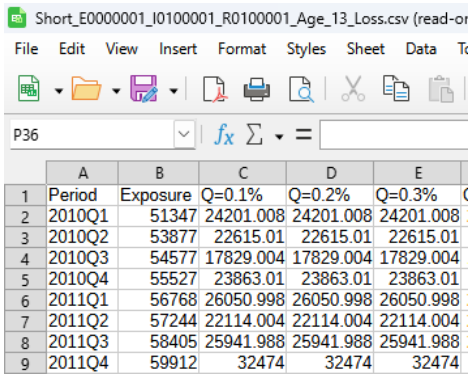
This folder contains a separate subfolder for each model.

- If both paid and incurred triangles are run, there will be 16 subfolders (8 models × 2 triangle types).
- If only one triangle type is used, there will be 8 subfolders, one for each model.



Results per model

Within each **model folder**, there's a separate file for **each development period**, containing a full **distribution of results** for that specific period.

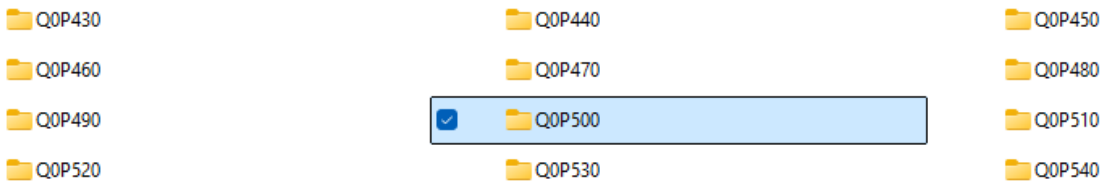


	A	B	C	D	E
1	Period	Exposure	Q=0.1%	Q=0.2%	Q=0.3%
2	2010Q1	51347	24201.008	24201.008	24201.008
3	2010Q2	53877	22615.01	22615.01	22615.01
4	2010Q3	54577	17829.004	17829.004	17829.004
5	2010Q4	55527	23863.01	23863.01	23863.01
6	2011Q1	56768	26050.998	26050.998	26050.998
7	2011Q2	57244	22114.004	22114.004	22114.004
8	2011Q3	58405	25941.988	25941.988	25941.988
9	2011Q4	59912	32474	32474	32474

Full distribution of results for specific age and specific model

3.2. **Per_quantile_age:**

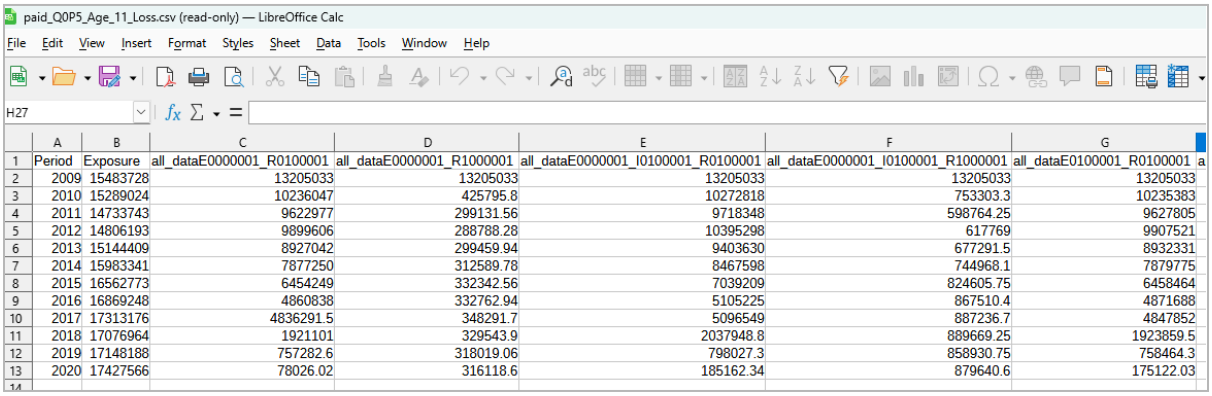
This folder contains a separate subfolder for each percentile (notice, the percentile 50% is Q0P500!)



Separate subfolder for each percentile

Each folder contains results for all models, broken down by development period. Typically, the model with the best predictive performance is selected for generating predictions.
In most cases, the focus is on the oldest development period column, which represents the ultimate value.

Separate file for each development period



	A	B	C	D	E	F	G
1	Period	Exposure	all_dataE0000001_R0100001	all_dataE0000001_R1000001	all_dataE0000001_I0100001_R0100001	all_dataE0000001_I0100001_R1000001	all_dataE0100001_R0100001 a
2	2009	15483728	13205033	13205033	13205033	13205033	13205033
3	2010	15289024	10236047	425795.8	10272818	753303.3	10235383
4	2011	14733743	9622977	299131.56	9718348	598764.25	9627805
5	2012	14806193	9899606	288788.28	10395298	617769	9907521
6	2013	15144409	8927042	299459.94	9403630	677291.5	8932331
7	2014	15983341	7877250	312589.78	8467598	744968.1	7879775
8	2015	16562773	6454249	332342.56	7039209	824605.75	6458464
9	2016	16869248	4860838	332762.94	5105225	867510.4	4871688
10	2017	17313176	4836291.5	348291.7	5096549	887236.7	4847852
11	2018	17076964	1921101	329543.9	2037948.8	889669.25	1923859.5
12	2019	17148188	757282.6	318019.06	798027.3	858930.75	758464.3
13	2020	17427566	78026.02	316118.6	185162.34	879640.6	175122.03

Output Example for the most mature column, all models, percentile 50

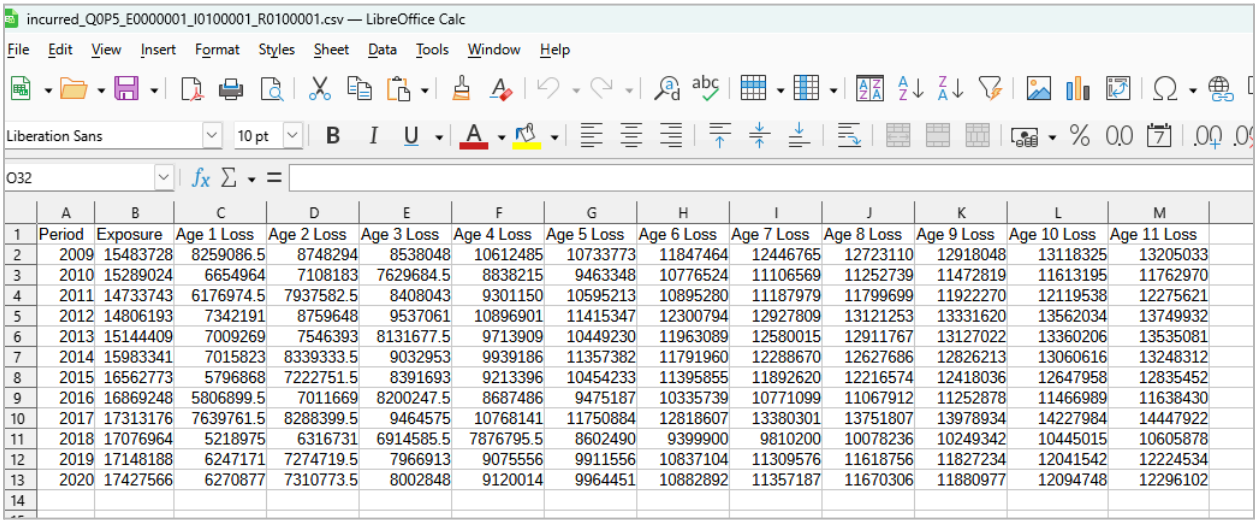
Note: Paid and incurred data are presented separately. For the joint model, results for the final age will be identical by definition across paid and incurred triangles.

3.3. **Per_quantile_model:**

This folder contains a separate subfolder for each percentile.
In each "Per Percentile" folder, results are organised by model and include additional files with explanatory factors:

- **Results by Model**: Files named in the format “incurred / paid_Q0P[percentile]_JOINT / empty_[model_name].csv” store individual model results. For example, incurred_Q0P500_all_data_E0000001_I0100001_R0100001.csv.

These files contain results for each model separately, presented as a completed triangle (rectangle).



incurred_Q0P5_E0000001_I0100001_R0100001.csv — LibreOffice Calc

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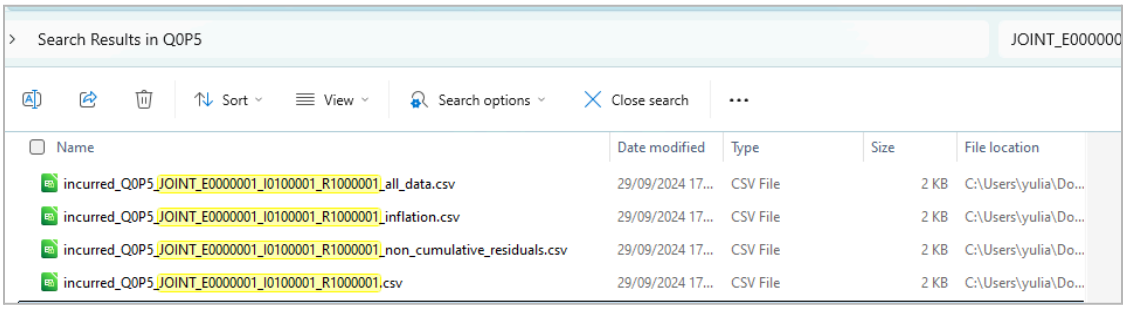
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Period	Exposure	Age 1 Loss	Age 2 Loss	Age 3 Loss	Age 4 Loss	Age 5 Loss	Age 6 Loss	Age 7 Loss	Age 8 Loss	Age 9 Loss	Age 10 Loss	Age 11 Loss
2	2009	15483728	8259086.5	8748294	8538048	10612485	10733773	11847464	12446765	12723110	12918048	13118325	13205033
3	2010	15289024	6654964	7108183	7629684.5	8838215	9463348	10776524	11106569	11252739	11472819	11613195	11762970
4	2011	14733743	6176974.5	7937582.5	8408043	9301150	10595213	10895280	11187979	11799699	11922270	12119538	12275621
5	2012	14806193	7342191	8759648	9537061	10896901	11415347	12300794	12927809	13121253	13331620	13562034	13749932
6	2013	15144409	7009269	7546393	8131677.5	9713909	10449230	11963089	12580015	12911767	13127022	13360206	13535081
7	2014	15983341	7015823	8339333.5	9032953	9939186	11357382	11791960	12288670	12627686	12826213	13060616	13248312
8	2015	16562773	5796868	7222751.5	8391693	9213396	10454233	11395855	11892620	12216574	12418036	12647958	12835452
9	2016	16869248	5806899.5	7011669	8200247.5	8687486	9475187	10335739	10771099	11067912	11252878	11466989	11638430
10	2017	17313176	7639761.5	8288399.5	9464575	10768141	11750884	12818607	13380301	13751807	13978934	14227984	14447922
11	2018	17076964	5218975	6316731	6914585.5	7876795.5	8602490	9399900	9810200	10078236	10249342	10445015	10605878
12	2019	17148188	6247171	7274719.5	7966913	9075556	9911556	10837104	11309576	11618756	11827234	12041542	12224534
13	2020	17427566	6270877	7310773.5	8002848	9120014	9964451	10882892	11357187	11670306	11880977	12094748	12296102
14													

Output Example for model E0100001_I0100001_R0100001, percentile 50

- **Explanatory Factors**: Separate files for each factor used in the model (e.g., cumulative evolution, residuals, inflation, using all data) provide factor values in absolute numbers. These values can be summed to show the total deviation from the base model (E0000001_R0100001).



Search Results in Q0P5 JOINT_E000000

Sort View Search options Close search

Name	Date modified	Type	Size	File location
incurred_Q0P5_JOINT_E0000001_I0100001_R1000001_all_data.csv	29/09/2024 17...	CSV File	2 KB	C:\Users\yulia\Do...
incurred_Q0P5_JOINT_E0000001_I0100001_R1000001_inflation.csv	29/09/2024 17...	CSV File	2 KB	C:\Users\yulia\Do...
incurred_Q0P5_JOINT_E0000001_I0100001_R1000001_non_cumulative_residuals.csv	29/09/2024 17...	CSV File	2 KB	C:\Users\yulia\Do...
incurred_Q0P5_JOINT_E0000001_I0100001_R1000001.csv	29/09/2024 17...	CSV File	2 KB	C:\Users\yulia\Do...

Explanatory files list for model JOINT_E0000001_I0100001_R1000001

4. **Typical workflow**

4.1. Copy model score from ***_results_scores.zip** (files **PrimaryTriangleName_SecondaryTriangleName_scores.csv** and / or **PrimaryTriangleName_scores.csv**)

4.2. Copy ultimate results, all models, percentile 50% from ***_results_stats.zip\per_quantile_age\Q0P500**, choose file with the highest age.

At this stage, you have the results for all models, along with the corresponding scores used to select the best-performing model.

4.3. For the selected model copy full distribution from ***_results_stats.zip\per_model_age**.

4.4. For the selected model and selected percentile copy full development from ***_results_stats.zip\per_quantile_model.**

In the same folder, immediately following the model file (when sorted alphabetically), there is a separate file for each explanatory factor. The number of factor files depends on the model type. To verify that all factors have been correctly copied, select a column (e.g., the last one), sum the values across all factor files, and ensure that the total equals the difference between the selected model and the base model (E0000001_R0100001).

For percentage influence, divide the values by the exposure of the relevant year. Note that each factor's influence is non-linear so the model uses the Shapley values method in order to assign an additive contribution to each factor.

5. Model Selection Guidance:

The top model in **PrimaryTriangleName_SecondaryTriangleName_scores.csv** has the best predictive power amongst the joint models. If only one triangle is uploaded, **PrimaryTriangleName_scores.csv** will be used instead.

Further considerations

- **PrimaryTriangleName_scores.csv** provides an additional ranking by evaluating one triangle at a time. If top-ranked models are not joint, it suggests that using two triangles doesn't improve predictive power compared to one triangle. This may indicate data heterogeneity or systemic changes in one or both triangles that are difficult to model accurately.
- **Total Score**: A similar total score across models suggests comparable performance.
- **Score by Fold**: For more specific insights, review scores for individual folds:
  - **Fold 7**: Uses 70% of diagonals from the left for training, with the remaining 30% used for testing. This approach mirrors standard actuarial validation practices.
  - **Fold 6**: Uses 70% of rows from the top for training.
  - …..
  - **Fold 0**: Uses 70% of rows from the bottom for training, testing forecast accuracy for the most mature periods (first rows).