

FTK outlier detection

Using active learning to improve data quality

Michiel Nijhuis

FTK line-by-line data

- DNB receives an overview of all the assets of pension funds each quarter
 - FTK 208 & 209 data
 - Comparable to S-II S.06.02.01 data

The image shows a blurred financial data table with the following columns: 'Chg', '%Chg', and numerical values. The data is as follows:

Chg	%Chg	Value
0.00	0.00%	
-0.75	-1.09%	
+0.50	+0.96%	2,511,000
-0.20	-1.90%	4,576,000
+1.25	+4.24%	2,000,000
+0.30	+1.42%	1,595,000
+0.10	+0.64%	430,000
0.00	0.00%	884,900
		18,861,000

FTK line-by-line data

Aantal	Aankoopwaarde	Marktwaarde	Naam van het stuk	Sector	Emittentgroep	Land	Valuta	CIC
2978712	€ 133.034.850	€ 145.497.910	Republic of Ireland	Not applicable / All or Total	Permanent TSB Group Holdings P	IRELAND	EUR	IE31
9915341	€ 5.269.146	€ 27.315.622	Cache Logistics Trust	L68.2.0 - Renting and operating of own or leased real estate	Cache Logistics Trust	SINGAPORE	SGD	SG32
1868508	€ 8.468.436	€ 25.896.935	Dairy Farm International Holdi	G - Wholesale and retail trade; repair of motor vehicles and motorcycles	Dairy Farm International Holdi	UNITED STATES	USD	SG31
12009890	€ 5.669.056	€ 9.160.732	Diamond Offshore Drilling Inc	B9.1.0 - Support activities for petroleum and natural gas extraction	Loews Corp		USD	US31
11794896	€ 945.457	€ 12.297.600	Lundin Petroleum AB	L68.2.0 - Renting and operating of own or leased real estate	Lundin Petroleum AB		SEK	SE31
1162914	€ 4.528.625	€ 23.357.583	MEDIA GEN INC CVR	L68.2.0 - Renting and operating of own or leased real estate	Media General Inc		USD	US33
2374677	€ 2.300.946	€ 8.289.004	RHBCAP	K64.1.9 - Other monetary intermediation	RHB Capital Bhd		MYR	US33
6252713	€ 4.385.811	€ 14.482.586	Archmore International Infrastructure Fund	K64.1.9 - Other monetary intermediation	UBS	SWITZERLAND	USD	CH46
4796686	€ 10.875.056	€ 14.732.847	De Munt Nederlands Hypotheken Fonds	O84.1.1 - General public administration activities	DMFCO		EUR	XL49
			Macquarie European Infrastructure Fund 2	K64.9.9 - Other financial service activities, except insurance and pension				

FTK line-by-line data

- DNB receives an overview of all the assets of pension funds each quarter
- With these data analysis can be done on a number
 - Comparing ESG performance and risks of pension funds
 - Improving data quality for insurers and banks
 - Interconnectedness between financial institutions
- Checking these data on errors is time intensive for reporting institutions and DNB

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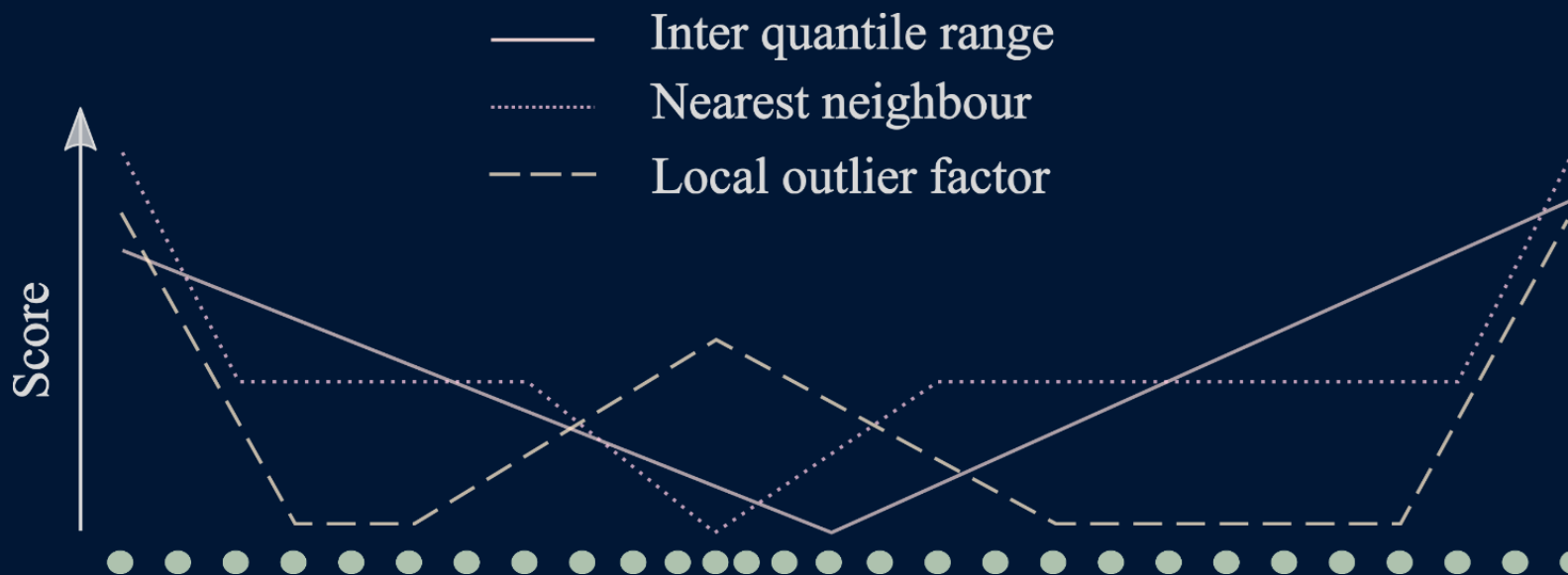
Outlier detection



Outlier
detection

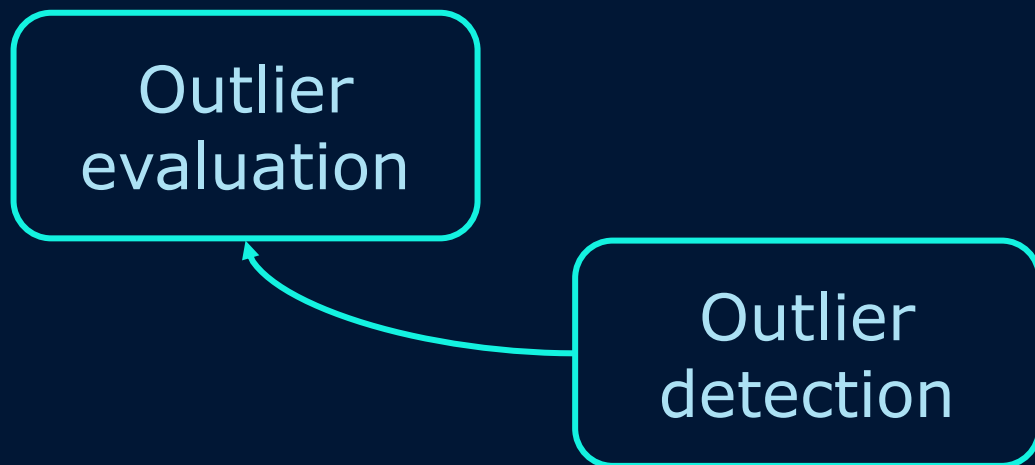


Outlier detection



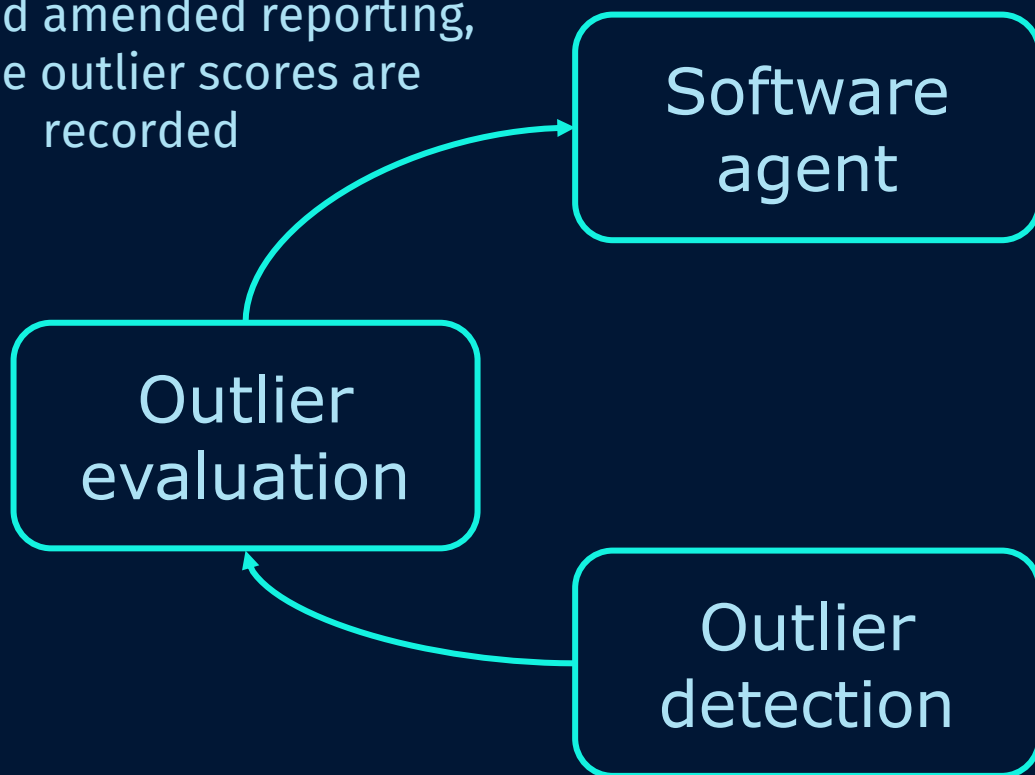
Outlier detection

The results are shared with the institutions, who file ammended reporting data

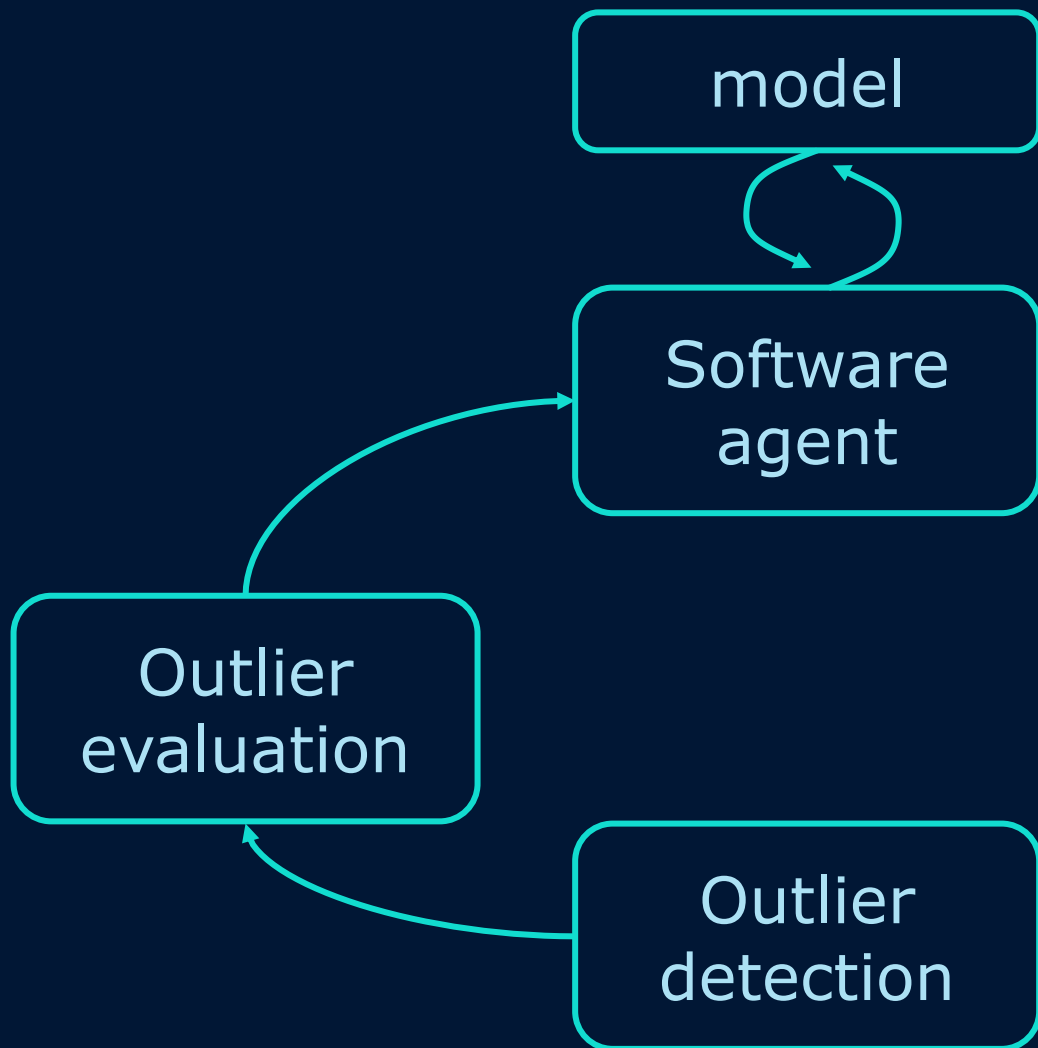


Outlier detection

The differences between the initial and amended reporting, and the outlier scores are recorded

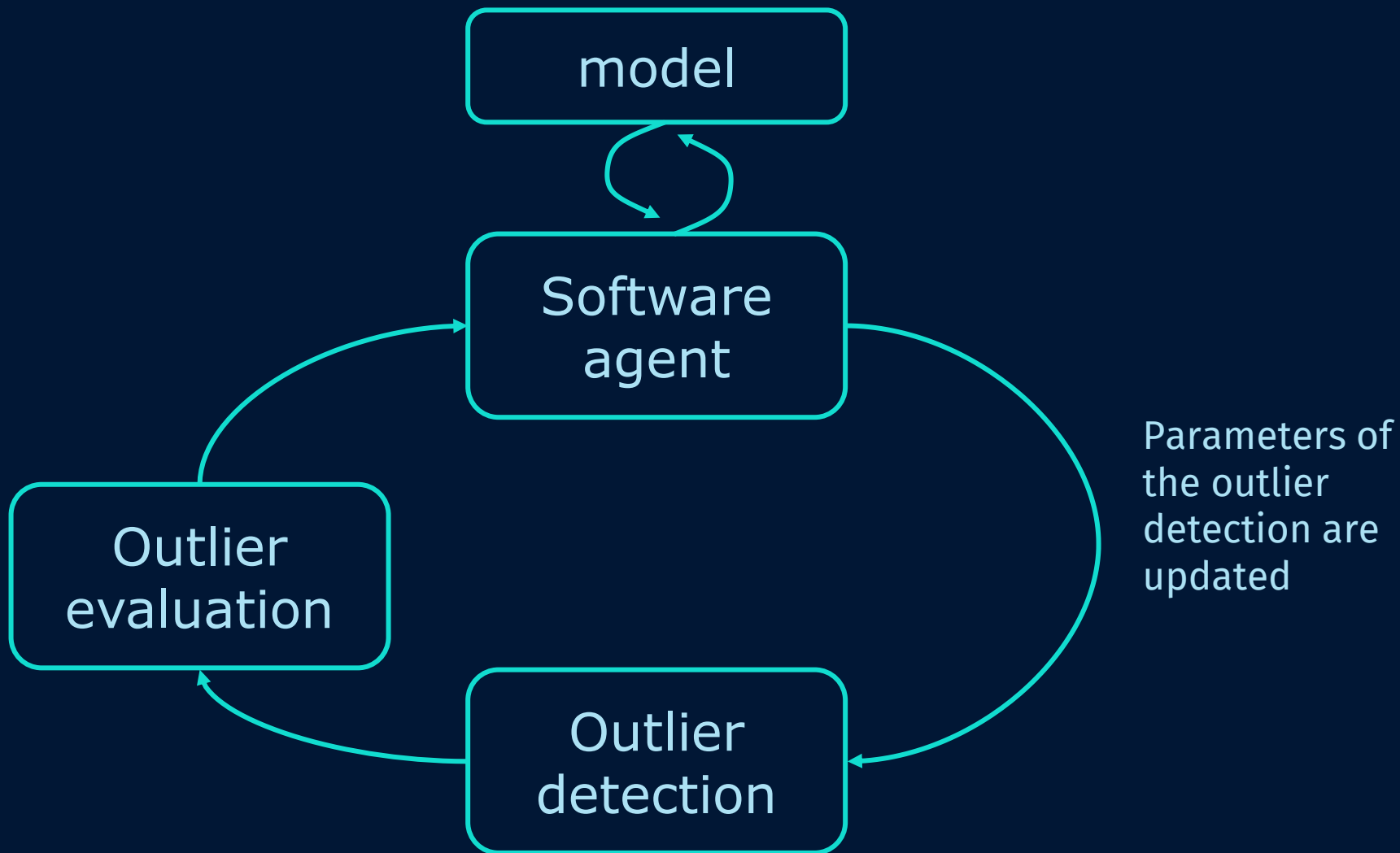


Outlier detection



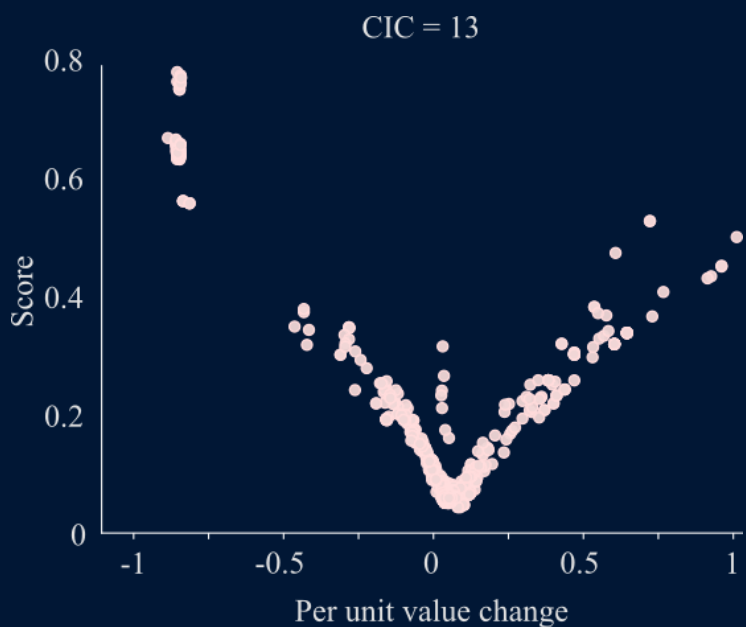
Software agent optimises the parameters of the outlier detection

Outlier detection

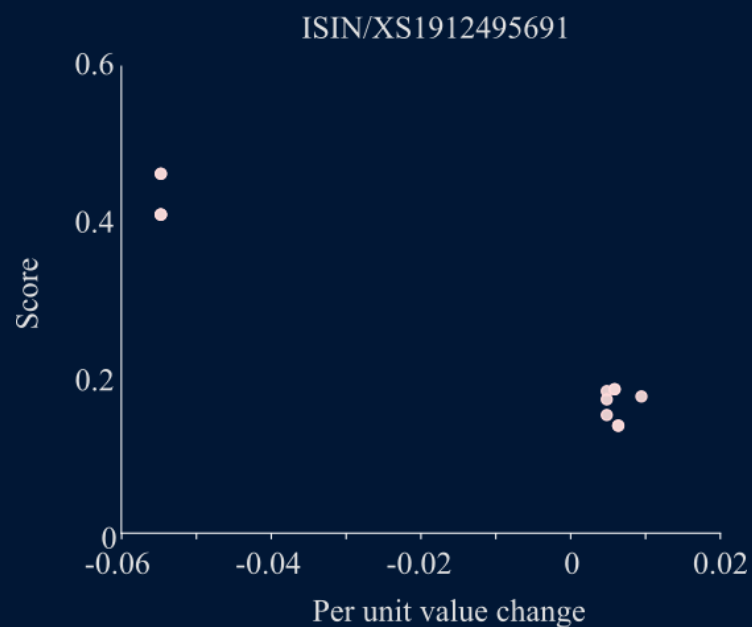


Results

Regional government bonds

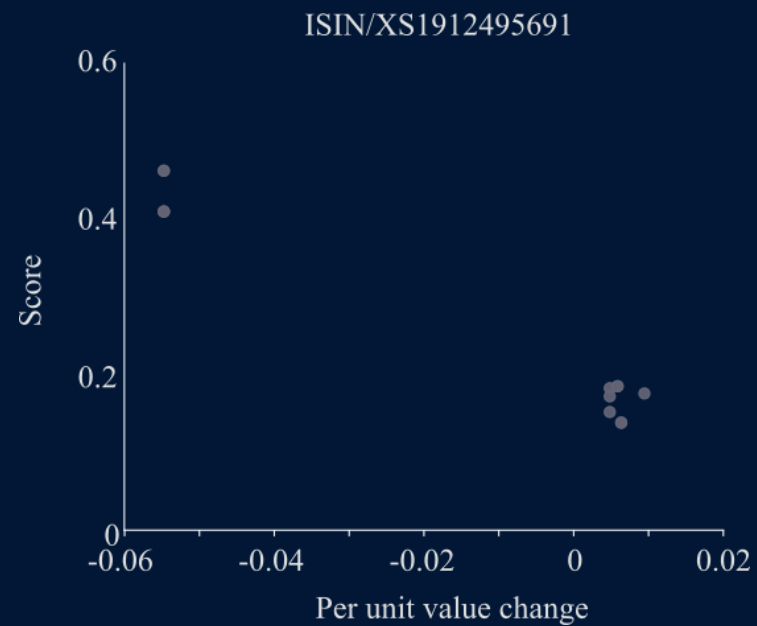
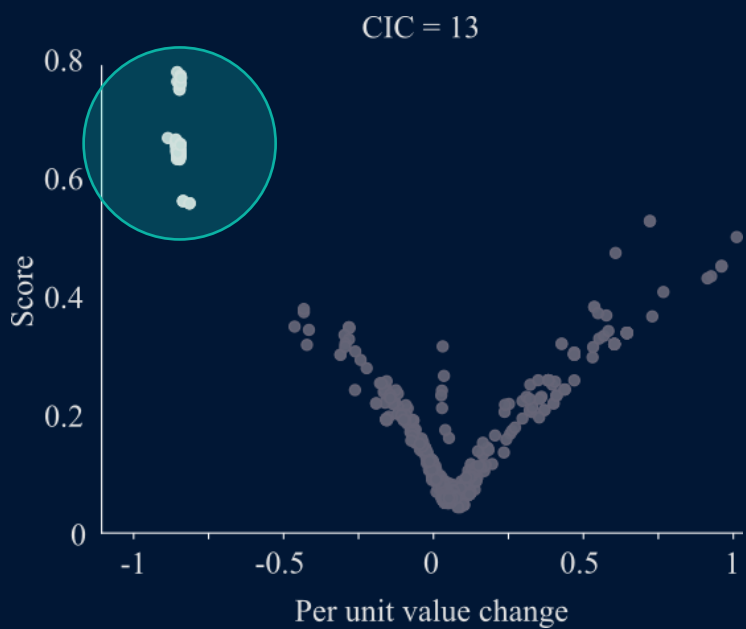


International Bank for Reconstruction and Development



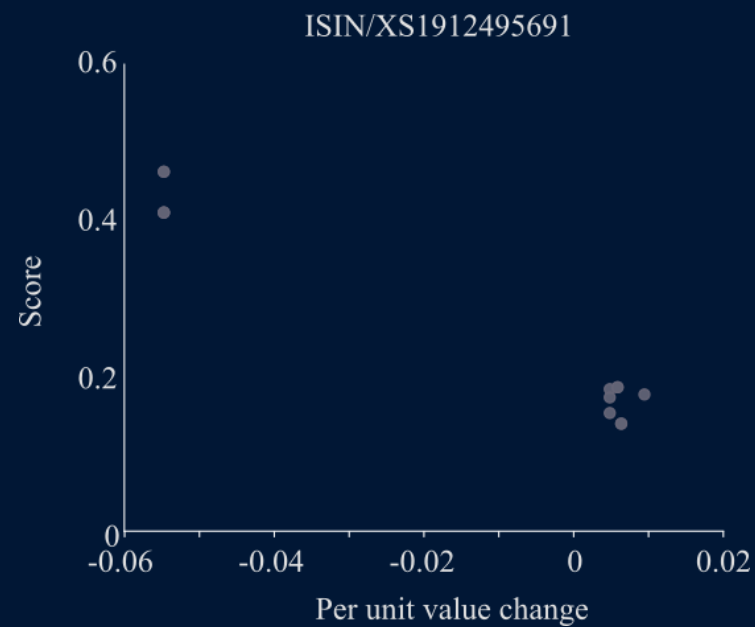
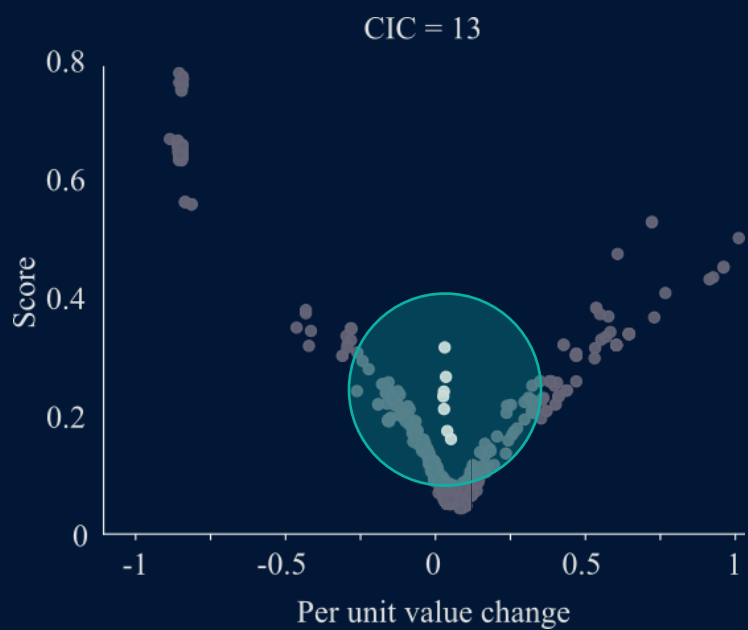
Results

Extremely large drop in value



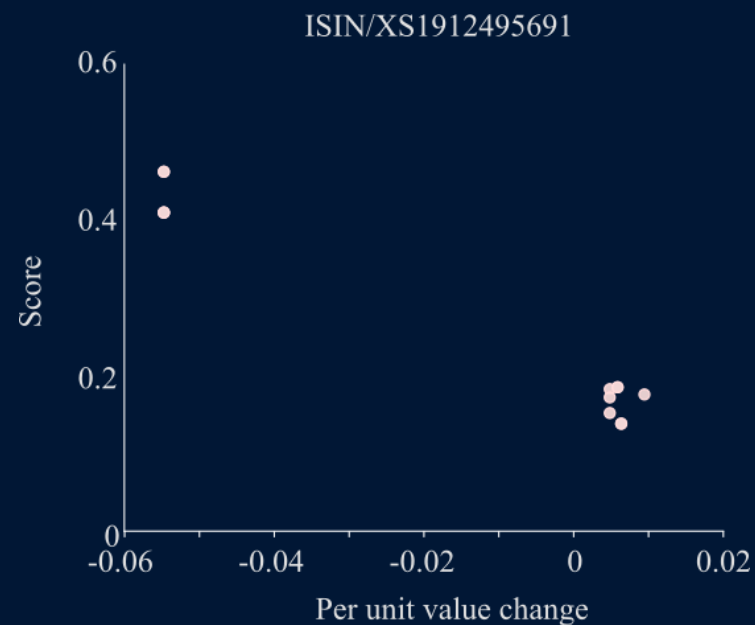
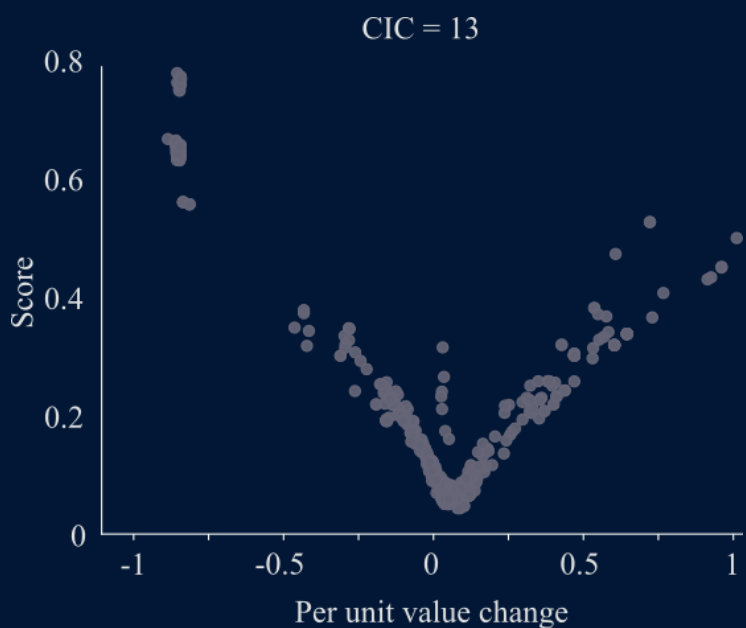
Results

Very similar values

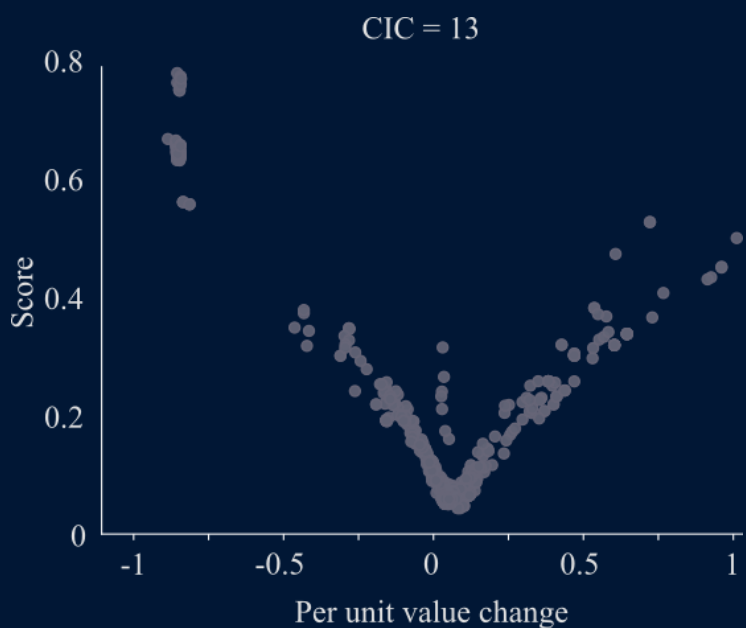


Results

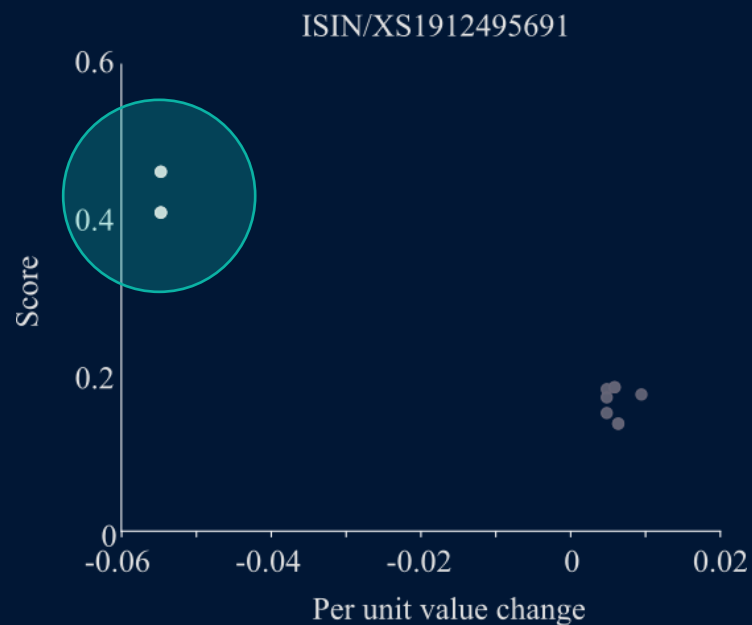
International Bank for Reconstruction and Development



Results



Small absolute difference high outlier score



Reinforcement learning

	Initial	Adjusted
Max	6.93	5.60
99.5 th percentile	3.20	2.56
median	1.06	1.06
0.5 th percentile	-0.59	-0.59

The per unit change in the value between two quarters of a single asset for the initial outlier detection and after a single iteration of the reinforcement learner

Outlier detection can help improve data quality

Using the reinforcement learning can improve the performance of the outlier detection, thus reducing the burden on the reporting institutions

By using a **simple outlier detection** model in combination with **reinforcement learning**, results remain explainable while still leveraging some ML advantages

Next steps

