1.1. Methanol price analysis

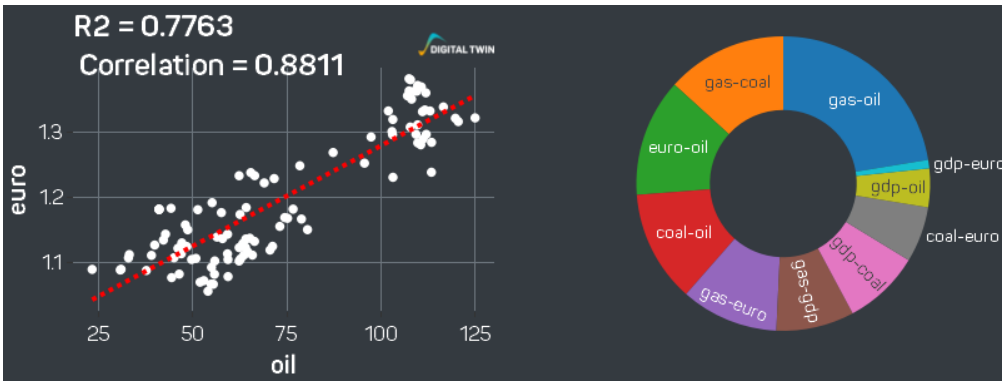
To assess methanol price dependence, we have run correlation analysis between methanol prices and main factors: oil prices, coal prices and euro exchange rate

From a wide range of factors that are used in the company forecasting system, it is possible to select three that have the highest correlation with the price of methanol.

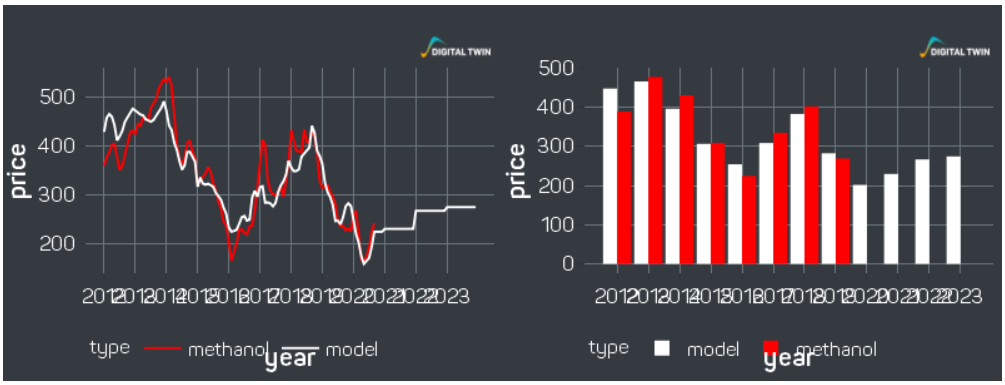
- The first is the price of gas, with a correlation of 0.906. The factor demonstrates a strong relationship with the price of methanol and is present in all models, regardless of the estimation interval.
- The second factor is the price of oil, with a correlation of 0.805. The factor also demonstrates a strong relationship with the price of methanol and is present in all models, regardless of the estimation interval.
- The third factor is the price of Australian coal, which correlates with 0.516. The factor begins to significantly influence after the 2008-2009 crisis.

In addition, the analysis of the impact of the growth rate of world GDP on the price of methanol was carried out. The chart below shows that significant downward pressure on prices occurs during periods of low and negative GDP growth. The main example of such a period is Q2 and Q3 2020 amid restrictions due to the coronavirus pandemic. It is not possible to find a stable connection for periods of more calm growth in the analysed interval.

An analysis of the directions of the relationship between the variables shows that the most correct models are obtained when using data from 2012.



Using these correlations, we created combined methanol price model depending on oil prices, coal prices and the euro / dollar exchange rate:



- For almost 9 years since 2012, there have been two periods of price increases and two periods of price decreases. All these movements can be explained using a three-factor model. At the same time, model estimates are smoother, and real data are more volatile.
- In the process of modeling, the possibility of delayed influence of factors was taken into account. The analysis showed that the best quality model is obtained using gas prices with a lag of one month.
- The final equation of the methanol price model: Methanol price ($) = 61.2 + 0.624 * Brent price ($) + 27.32 * Gas price ($) + 0.628 * Coal price ($)
- The R-square index of the model is 0.830.
- The model does not use the autoregressive component, since the analysis showed that when using it, forecasts for 1-3 months are improved, but the accuracy of forecasts for periods of more than 3 months decreases due to the underestimated influence of other factors.

Methanol forecast

Using the model described above we ran predictive simulation of methanol prices in 3 distinct oil scenarios.

year	oil	euro	coal	gdp	gas	methanol	gdp_less_1	model
2012	109.6765	1.3110953849636	92.88	1.13330889604595	10.5625	431.716616666667	0	476.6155863915
2013	110.674	1.36951377232217	84.3375	2.51986222635993	11.2866666666667	537.705316666667	0	491.649189447334
2014	62.33	1.23279999081493	62.44	3.09612278152956	8.3625	375.1706875	0	367.82873253
2015	37.72	1.08697826086957	52.1275	3.00522023514886	5.25	236.62155	0	260.96036382
2016	54.07	1.05502608695652	86.32	2.99636346938427	5.3625	316.81850625	0	295.73664447
2017	64.21	1.18380909090909	102.155	3.36208676787324	7.46333333333333	367.56368125	0	369.410512976667
2018	56.46	1.13835909090909	101.37	2.6737969	8.01666666666667	326.58625	0	379.195615593333
2019	65.85	1.11061428571429	66.18	2.4566793	4.86	224.708083333333	0	276.69853255
2020	41.09	1.18105652173913	54.6	-2	3.74333333333333		-2	223.460252056667
2021	45	1.2	63.69	2	3.66448886194379		0	229.462141119045

year	oil	euro	coal	gdp	gas	methanol	gdp_less_1	model
2022	45	1.22	69.6080065625	2	4.88572420088728		0	266.543925775684
2023	45	1.24	74.27375	2	5.05664274751648		0	274.146581578167
2024	45	1.24	75.6	2	5.29190037015231		0	281.40706346754
2025	45.99	1.24	75.6	2	4.22940806641501		0	253.000576098195
2026	47.00178	1.24	75.6	2	4.32245504387614		0	256.173825740355
2027	48.03581916	1.24	75.6	2	4.41754905484142		0	259.416886874643
2028	49.09260718152	1.24	75.6	2	4.51473513404793		0	262.731295353885
2029	50.1726445395134	1.24	75.6	2	4.61405930699698		0	266.11862081967
2030	51.2764427193827	1.24	75.6	2	4.71556861175092		0	269.580467445703
2031	52.4045244592092	1.24	75.6	2	4.81931112120944		0	273.118474697509
2032	53.5574239973118	1.24	75.6	2	4.92533596587605		0	276.734318108854
2033	54.7356873252526	1.24	75.6	2	5.03369335712532		0	280.429710075249
2034	55.9398724464082	1.24	75.6	2	5.14443461098208		0	284.206400664904
2035	57.1705496402292	1.24	75.6	2	5.25761217242368		0	288.066178447532