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Economic Research

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Commodity currencies: Norwegian Krone

The Dukascopy Bank research department presents the final part of its research on commodity currencies. In the current issue we consider commodity sectors' influence on Norwegian krone exchange rates. Norway is the second largest non-OPEC oil exporter, and energy products make up more than 50% of its exports. It gives us an opportunity to establish whether the exports' share can be named as one of the relationship-defining factors.

Considering this new idea and the conclusions we have drawn from our previous research, we will examine the following questions:

1. How strong is the link between the Norwegian krone and commodities?
2. Which commodity sectors have the most influence on the exchange rates?
3. What is the relationship now?

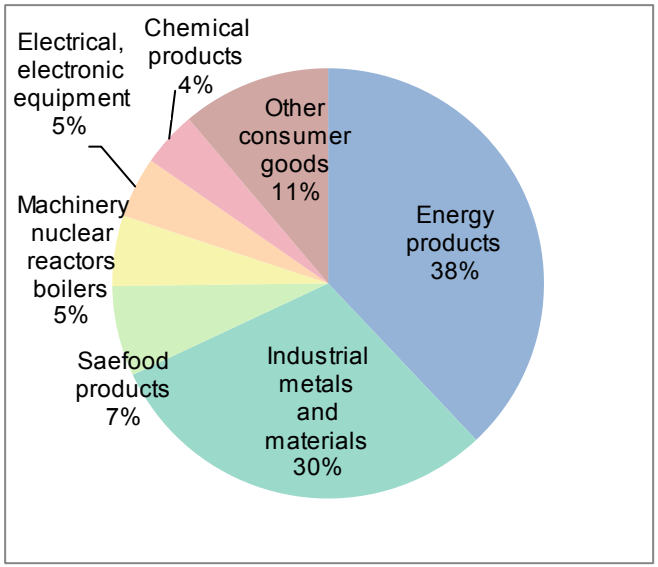
Methodology

We use rolling correlation as an index of relationship and apply the method to asset returns.

Correlation is a measure of how similar the performances of two datasets are. It is expressed by a correlation coefficient that can vary from -1 to 1, with -1 being a perfectly opposite movement and 1 – a perfectly unidirectional one. Commonly absolute values of 0.3 and below are considered insignificant and do not indicate a relationship.

To compare results of the current research with those previously, we use the same indices to represent commodity sectors. Namely, S&P GSEN (Energy), S&P GSIN (Industrial Metals), S&P GSAG (Agriculture), and S&P GSPM (Precious Metals). The time frame also is the same – from 2000 to 2011. The currency pairs chosen for analysis are NOK/USD, NOK/EUR, NOK/JPY, NOK/CAD, NOK/CHF, and NOK/AUD. More detailed information can be found in the appendix.

Figure 1. Norway's 2010 export by product



Findings

<u>First finding:</u> commodities' relationship with NOK is weaker than with the Australian dollar, but stronger than with the Canadian.

In the last periods, the averaged NOK returns' correlations with commodities were above or near to significance level. The values are notably greater than the ones of CAD, which were often close to zero and had more dramatic drops. The AUD correlations prevail over the NOK in both values and stability. It is especially clear in the results for the Industrial Metals and the Agriculture sectors. NOK correlations with Energy, however, are on the same level as AUD-Energy, and even higher in the period pre-2008.

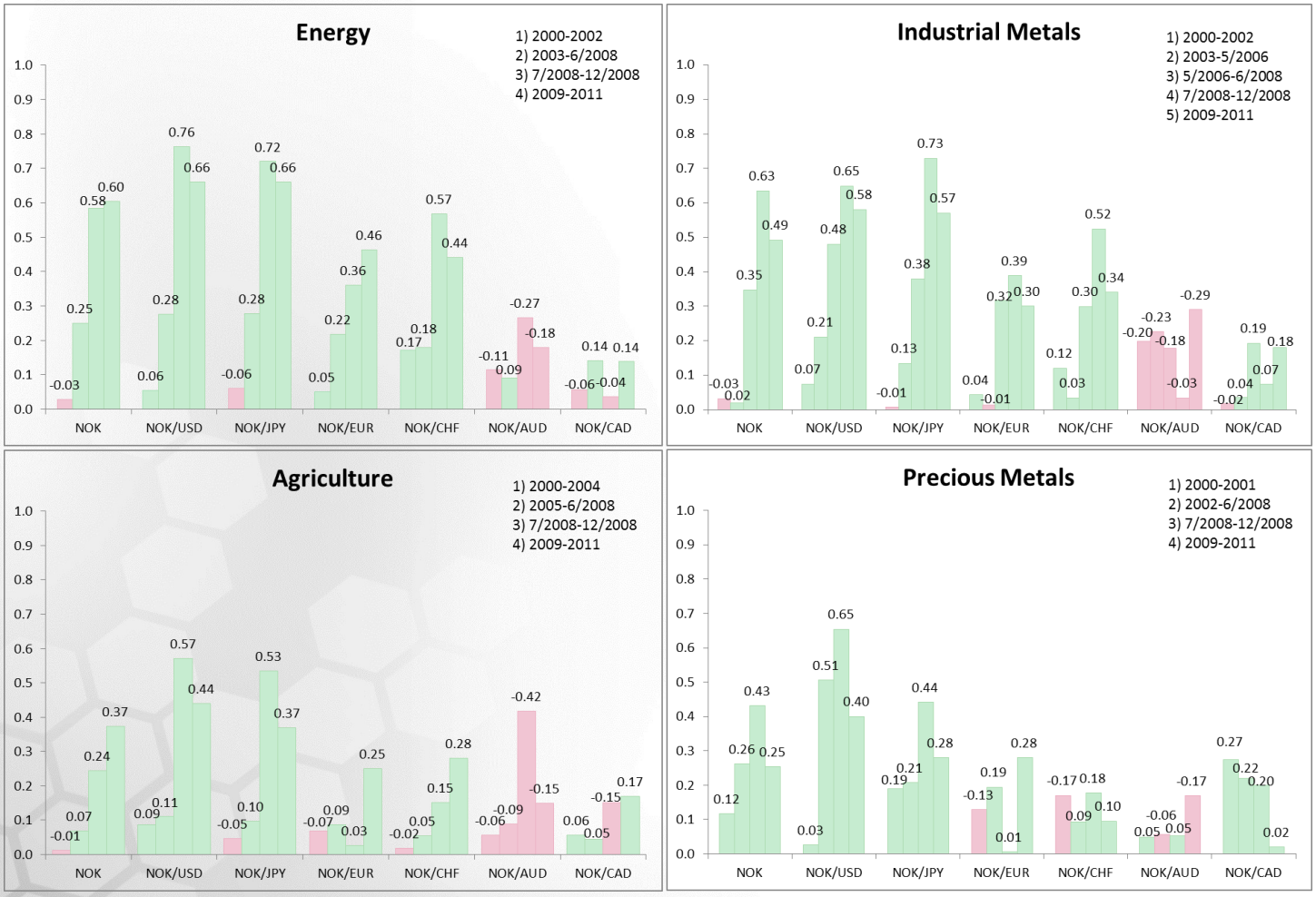


Figure 2.Correlations for 2000-2011

Separate NOK currency pairs, similar to CAD and AUD ones, have different levels of correlation with commodities. As in previous cases, we divide them into three groups based on the strength of the relationship in the latest periods.

NOK/USD and NOK/JPY form the first group with 50% of Energy and Industrial Metals correlations above 0.6. Most of the pairs' correlations with Agriculture and Precious Metals for that time are at the significance level. As pairs with the same counter currencies made up the first group in CAD and AUD researches as well, these results can also be compared. Agriculture correlations are at the same level for all three currencies. Norwegian results with Industrial and Precious Metals are better than those of CAD, as they were for averaged returns. The same values compared with the Australian have higher peaks, but lose on stability. It is notable that the Norwegian group's correlations with Energy are higher than both Canadian and Australian correlations.

The second group is formed by NOK/EUR and NOK/CHF. These pairs have significant average correlations with the Energy and the Industrial Metals' sectors and values below 0.3 with Agriculture and Precious Metals. Compared with the same group of the Australian dollar, results for the first two commodity sectors are slightly less, but generally at the same level. The Canadian dollar against both European currencies gave mainly insignificant correlation values.

Correlations with absolute values below 0.3 are the main characteristic of the third group. It contains NOK/AUD and NOK/CAD – pairs with the Norwegian krone put against two other commodity currencies. NOK/CAD correlations with commodities are mostly insignificantly positive, indicating that the link with the Norwegian krone might be either slightly stronger, or generally at the same level as with the Canadian dollar. Correlations of NOK/AUD, on the other hand, are negative, which suggests that the Australian dollar's relationship with commodities might be stronger. In the case of Industrial Metals, many values are below -0.2 and close to significance level, but 50% of values for the last period are below -0.31.

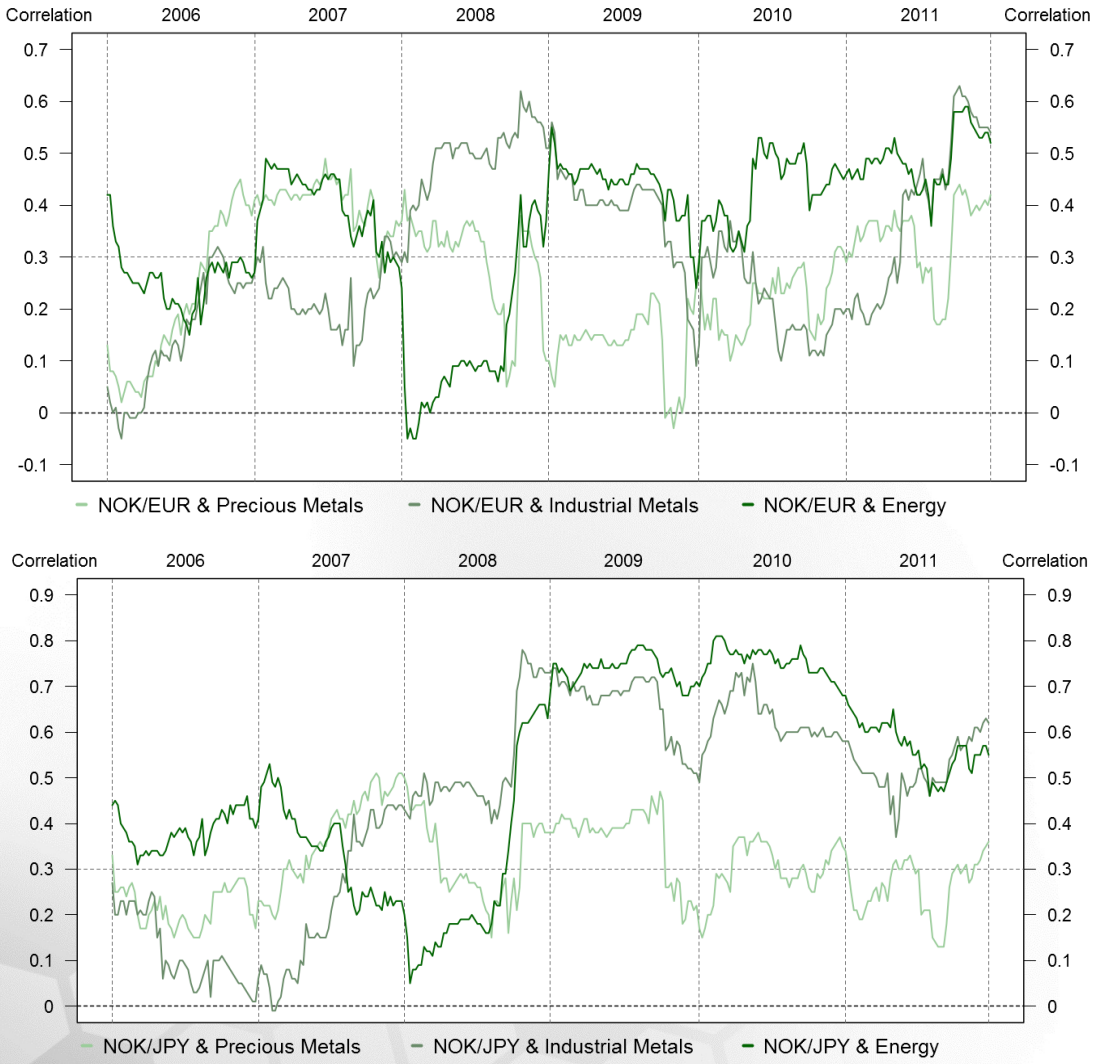


Figure 3. Rolling correlations for 2006-2011

<u>Second finding:</u> the Energy and the Industrial Metals' sectors give the best correlations with NOK exchange rates.

In the time period from 2006 to mid-2008, the correlation ranking was changing. Precious Metals had a strong link with the pairs of both groups in mid-2000s. However, the relationship weakened later in the decade, and Energy and Industrial Metals' results became leaders for all assets. The Energy sector's correlations dominated until late 2007, when the values dropped to zero in three months. Correlations with Industrial Metals were on an uptrend at the time and passed the significance level when Energy correlations crossed below it. By November 2008 Industrial Metals correlations surpassed all the others and reached the all-time highest values of 0.8 for the first group and 0.6 for the second.

The peaks for Energy correlations followed a month later, with 0.75 for NOK/USD and NOK/JPY, and 0.6 for NOK/EUR and NOK/CHF. As Industrial Metals correlations were already going down from their maxima, ones with the Energy sector took the lead. For the next two and a half yeas Energy correlations remained above 0.6 for the first group and moved in a 0.3-0.55 tunnel for the second. Differences between the groups occurred in the final months of 2011. After catching up with the leader in mid-2011, Industrial Metals correlations with NOK/USD and NOK/JPY got ahead of the Energy sectors', leaving it 0.1 point behind at the 0.5-0.6 level.

As for the second group, NOK/EUR finished the year with both correlations at about 0.55, but NOK/CHF-Industry Metals dropped severely. It resulted in the pair's Industrial Metals correlations resting below 0.4, when NOK/CHF-Energy passed 0.5, remaining the highest.

Before 2006 correlations were mostly insignificant, with only occasional short-term outbursts. With that, the ranking in earlier periods is irrelevant.

The averaged NOK returns' correlations show the same pattern of rearrangements. NOK-Industrial Metals dominated in 2008, reaching its highest value of 0.73 in December.

NOK-Energy replaced it in early 2009 and remained in the leading position up until the end of the period. It grew to its 0.73 maximum, the same value as Industrial Metals, in September 2009 and stayed above 0.5 ever since.

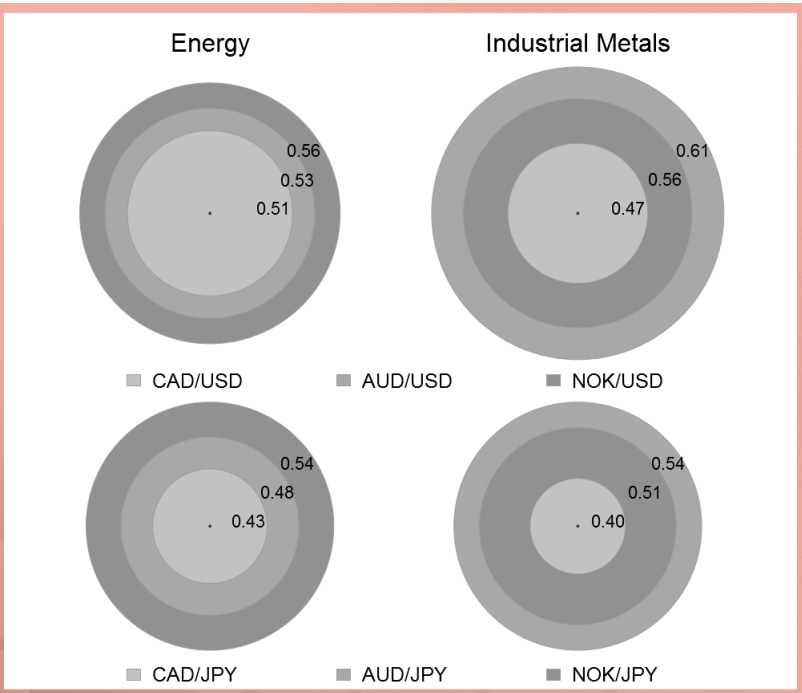


Figure 4. Comparison of averaged correlations

NOK exchange rates' correlations with the Energy sector are higher compared to other commodity currencies.

In our first finding we have established that NOK correlations are generally ranked between AUD and CAD ones. However, its results with Energy tend to surpass the ones of both other currencies. Figure 4 shows that, while Industrial Metals have higher correlations with AUD/USD and AUD/JPY, the same quote currencies give better Energy results when put against the Norwegian krone. Correlations of averaged returns are ordered likewise, indicating that it might be a general characteristic of the currencies.

This also might be the answer for whether exports' share can influence correlation with commodities. We did not see any convincing differences between NOKs correlations with Energy and Industrial Metals. But the sectors themselves are tightly linked, so the values cannot vary greatly. Therefore it is possible that the effect occurs only in relative values, contributing to the ranking among commodity currencies.

Third finding: In the beginning of 2012 the best correlations for Norwegian krone are stably over 0.5.

Such high positive values indicate that the currency pairs are currently in a period of rather strong direct relation to the commodity sectors. It is notable that in 2012 the values are above 2009-2011 averages.

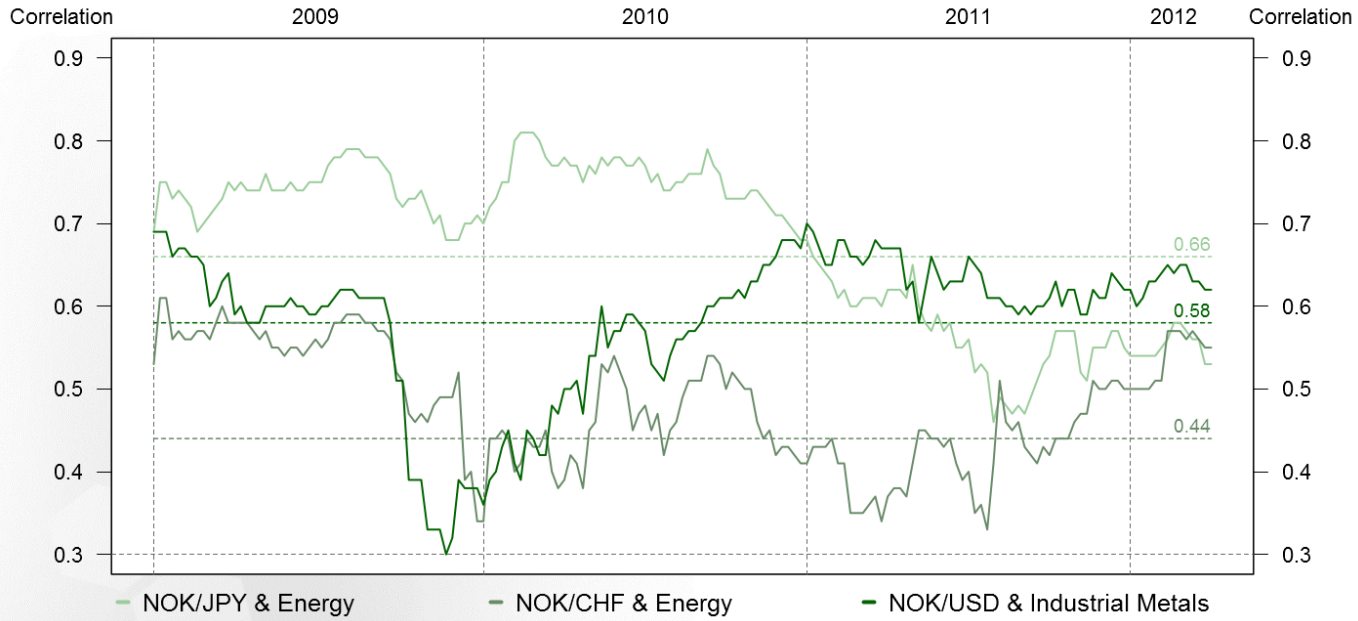


Figure 5. Rolling correlations with 2009-2011 average levels

The NOK/EUR correlation with Industrial Metals may be pointed out as the most remarkable in this respect. In the last month it remained at 0.52, which is 0.22 points above its previous average. NOK/EUR and NOK/CHF Energy correlations are second-best in terms of improvement. Their values of 0.53-0.56 are about 0.15 points greater than the average. The latest results for the pairs of the first group and Industrial Metals do not exceed the averages that much, but are on a generally high level at 0.6. There are, however, two combinations that do not follow the trend of a strengthening currency-commodity link. Correlations of NOK/USD-Energy and NOK/JPY-Energy are around 0.56 – high, but 0.1 point below the last period's average.

Conclusion

At the moment there are five currency pairs – commodity combinations that have a stably strong relationship since 2011:

Rank	Currency Pair	Commodity Sector	Correlation	Performance
1	NOK/USD	Industrial Metals	0.62	commodity ↗, pair ↗, NOK strengthening commodity ↘, pair ↘, NOK weakening
2	NOK/JPY	Industrial Metals	0.6	commodity ↗, pair ↗, NOK strengthening commodity ↘, pair ↘, NOK weakening
3	NOK/CHF	Energy	0.55	commodity ↗, pair ↗, NOK strengthening commodity ↘, pair ↘, NOK weakening
4	NOK/USD	Energy	0.54	commodity ↗, pair ↗, NOK strengthening commodity ↘, pair ↘, NOK weakening
5	NOK/JPY	Energy	0.53	commodity ↗, pair ↗, NOK strengthening commodity ↘, pair ↘, NOK weakening

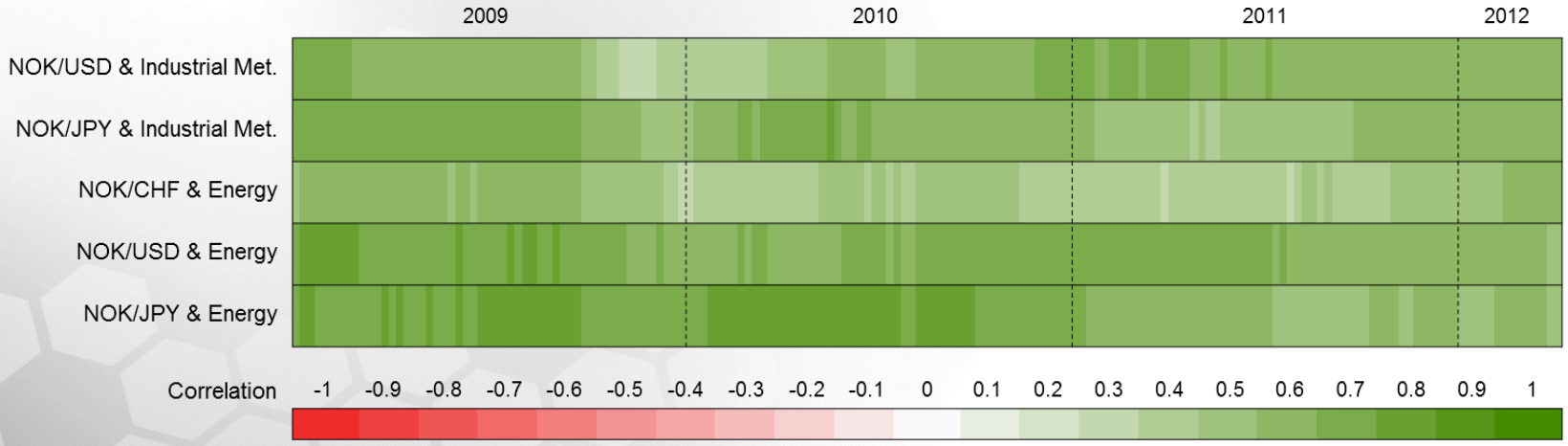
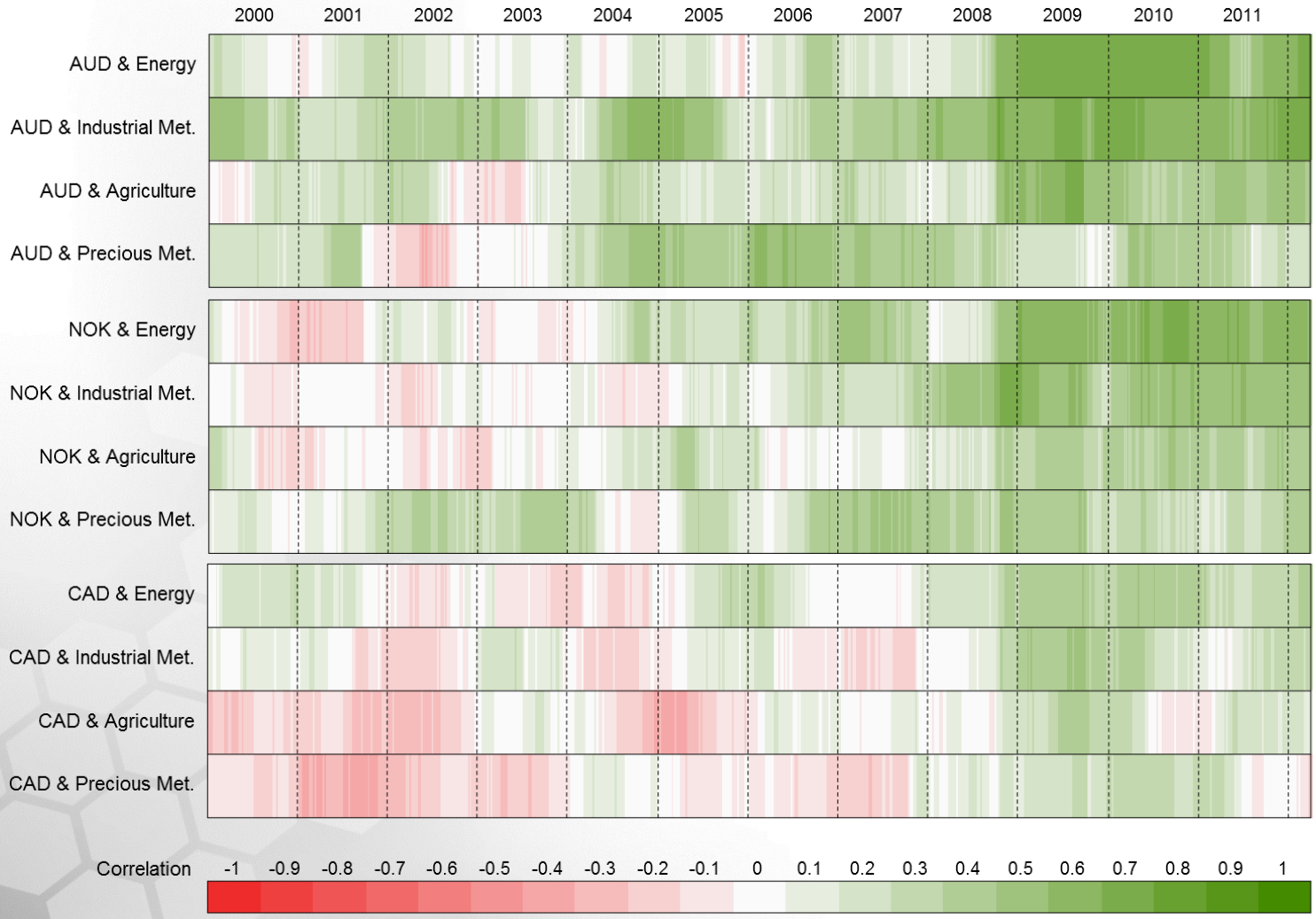


Figure 6. Top pair - commodity correlations by March

Changes in price on Industrial Metals are significant for NOK/USD and NOK/JPY. The energy sector might be considered in trading NOK/USD, NOK/JPY, and NOK/CHF. However, the relationship is changeable, and traders should follow global market tendencies to estimate the link.

The aim of this research was to establish whether there is a link between commodities and so-called commodity currencies. We have examined three currencies and concluded that each of them is to some degree related to certain commodity sectors. The strength of the link changes in time, and currently all currencies are in a period of close relationship with commodities. The most impacted currency is the Australian dollar. The Norwegian krone is second-best. The weakest but still mostly significant relationship is between commodities and the Canadian dollar.

Figure 7. **2000-2012 commodities correlations with the averaged AUD, NOK, and CAD returns:**

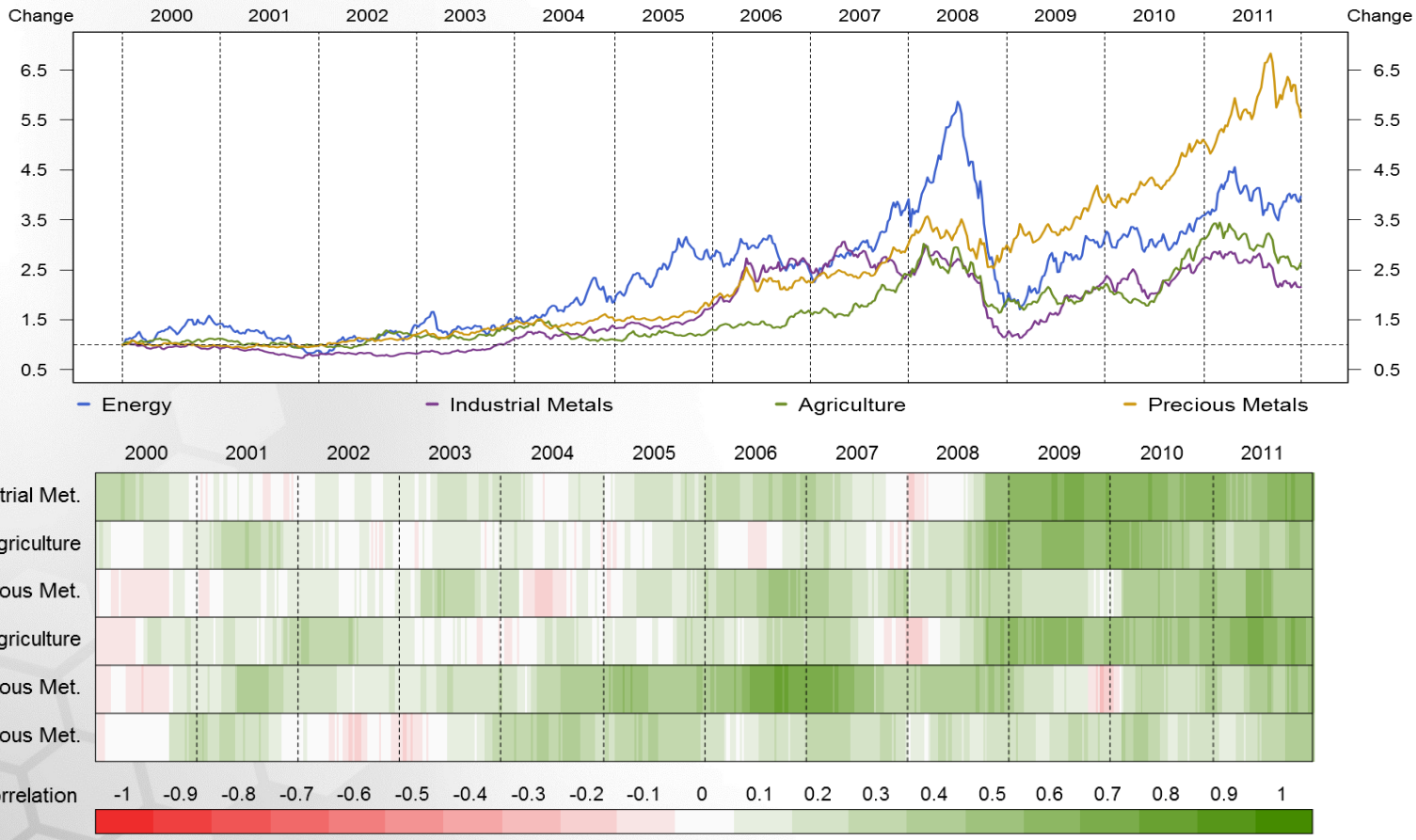


Appendix

Spot sub-indices of Standard & Poor's Global Industry Classification Standard:

- S&P GSEN (Energy) – Crude Oil, Brent Crude, Unleaded Gasoline, Heating Oil, Gas Oil, Natural Gas
- S&P GSIN (Industrial Metals) – Aluminum, Copper, Lead, Nickel, Zinc
- S&P GSAG (Agriculture) – Wheat, Kansas Wheat, Corn, Soybeans, Cotton, Sugar, Coffee, Cocoa, Biofuel
- S&P GSPM (Precious Metals) - Gold, Silver

2000-2011 performance and correlation between commodity sectors:



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