The Impact of Commodity Prices on the Terms of Trade

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Terms-of-trade and Commodity Price Sensitivity

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This paper explores the link between the changes in commodity prices and the terms-of-trade factor within Heckman Global Advisor's (HGA) country allocation framework. For each country, HGA calculates a proprietary terms-of-trade factor which measures its aggregate export price index relative to its aggregate import price index. The factor is calculated on the basis of each country's import and export structure in the following categories

- Global fuels
- Minerals
- Agricultural commodities
- Manufacturing

and the movements of prices of goods in these categories. Data for computing a country's terms-of-trade comes from the International Monetary Fund (IMF), World Trade Organization, and the U.S. Bureau of Economic Analysis.

Table 1 shows the performance of the HGA terms-of-trade trend factor within our country allocation framework. It uses the HGA proprietary model to overweight markets with attractive terms-of-trade and underweight markets with unattractive terms-of-trade. The factor provides an annualized alpha of 2.8% within an ACWI universe of countries. The alpha is even higher, at 3.5% when allocating internationally within an ACWI ex-US universe. The corresponding information ratios (IR) are 0.6 and 0.7 respectively. The alpha is smaller in the developed markets universe, but with a lower tracking error. It is higher at 3.1% in the emerging markets universe, but the tracking error is high as well. As a result, the information ratio (IR) is only 0.3 for the case of developed markets and emerging markets individually.

Table 1: Country Allocation Performance with a 100% Weight on the Terms-of-Trade Trend Factor **Jan-1989 through Dec-2017**	**MSCI ACWI Universe**	**MSCI ACWI x-US Universe**	**MSCI Developed Universe**	**MSCI Emerging Universe**
Annualized Alpha (Gross)	2.8%	3.5%	0.7%	3.1%
Annualized Tracking Error (Gross)	4.5%	4.7%	2.6%	7.4%
IR	0.6	0.7	0.3	0.3
T-Stat	3.4	4.0	1.5	1.9
Average Correlation*	2.3%	2.4%	2.8%	2.5%
Frequency of Positive Correlation	56.4%	55.9%	54.4%	54.2%
t-Stat (of Correlations)	2.0	2.0	2.0	1.8
* Cross-sectional correlation between scores and subsequent month returns				

Of the four categories of imports and exports, global fuel prices are the most volatile, with a monthly standard deviation of 8.2% over the January 1980-December 2017 period. These are followed by the prices of minerals with a standard deviation of 4.6%. The prices of agricultural goods are less volatile than fuels and minerals, with a standard deviation of 2.4%, and manufactured good prices are the least volatile with a standard deviation of 0.6%. We, therefore, expect commodity price changes to have a major impact on the terms-of-trade trend calculations.

In general, a large proportion of exports of developed markets tends to be manufactured goods, while exports of emerging markets are more variable, and tend to be dominated by commodities. There are exceptions to this rule, as there are commodity-exporting developed markets such as Canada, Australia and Norway, where commodities make up a large part of exports. On the other, manufactured goods make up a large proportion of exports from emerging markets such as China, South Korea, and Taiwan.

Since commodity prices are more volatile than the prices of manufactured goods, we expect terms-of-trade to be influenced by changes in commodity prices. In particularly, commodity exporters are expected to benefit as commodity prices increase, while commodity importers are expected to benefit when commodity prices drop. We illustrate this by showing how the terms-of-trade trend factor varies with changes in commodity prices for several pairs of markets.

Figures 1 and 2 show the variation in the HGA terms-of-trade factor scores with changes in commodity prices as reflected by the 18-month percent change in the CRB index for the US and Canada. Both series are smoothed by taking a 3-month moving average to reduce noise and make the charts easier to read. Terms-of-trade trend and commodity prices changes are inversely correlated in the US, while they are positively correlated in Canada. The US was a major importer of fuels before the recent shale revolution, and so the market's terms-of-trade trend was negatively influenced by increases in oil prices and commodity prices in general. As a major exporter, Canada benefits from the increase in commodity prices, and its terms-of-trade trend factor moves closely with commodity price changes.

Figures 3 and 4 show that a similar inverse relationship exists between Japan and Australia, where Japan, as a major importer of commodities suffers a decline in its terms-of-trade when commodity prices go up. On the other hand, Australia, as an exporter of commodities, benefits when commodity prices increase.

Within Europe, Figures 5 and 6 show that the relationship between commodity prices and terms-of-trade is negative for Germany, while it is positive for Norway. Within emerging markets, a similar negative relationship is present for South Korea, a commodity importer, while a positive relationship between the terms-of-trade and commodity prices exists for Russia, a major exporter of oil and minerals. These are shown in Figures 7 and 8.

Figure 1: USA Terms of Trade vs. CRB 18m % change

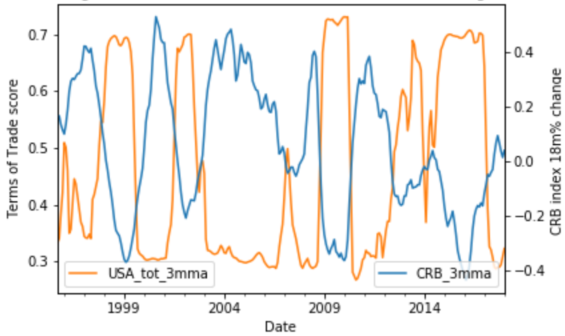

Figure 2: Canada Terms of Trade vs. CRB 18m % change

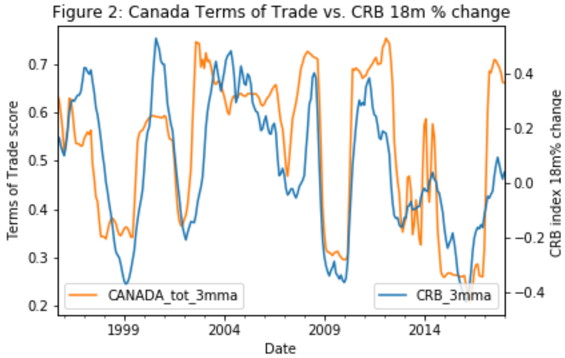

Figure 3: Japan Terms of Trade vs. CRB 18m % change

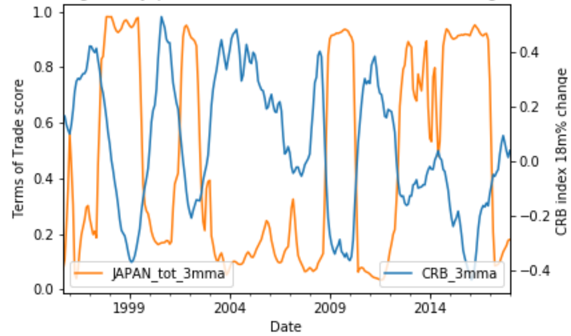

Figure 4: Australia Terms of Trade vs. CRB 18m % change

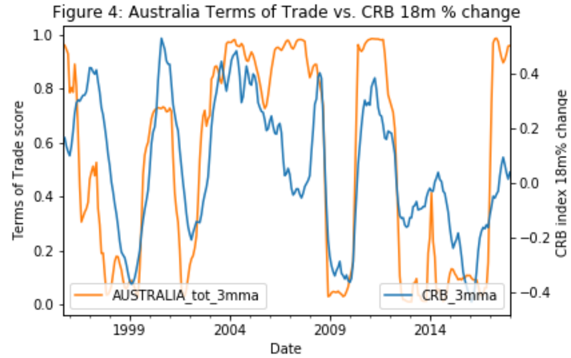

Figure 5: Germany Terms of Trade vs. CRB 18m % change

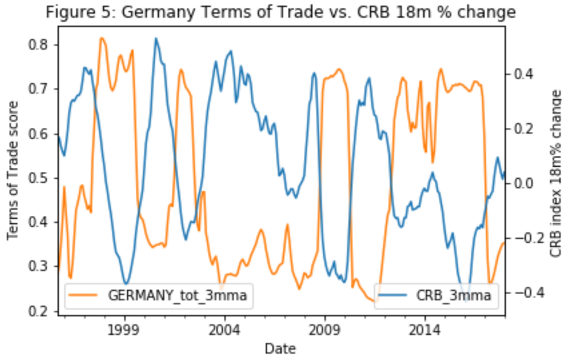

Figure 6: Norway Terms of Trade vs. CRB 18m % change

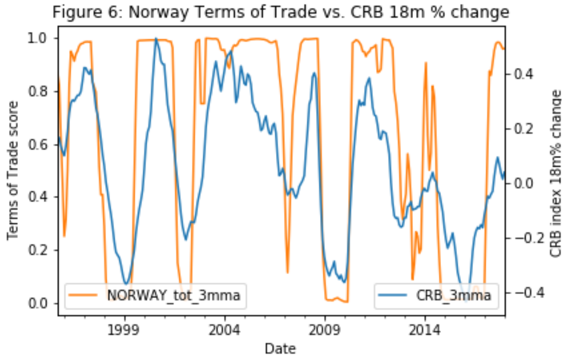

Figure 7: S. Korea Terms of Trade vs. CRB 18m % change

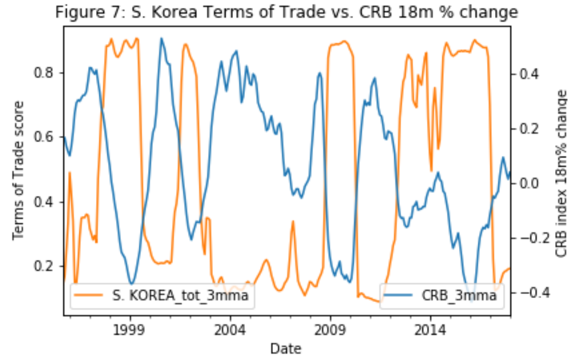

Figure 8: Russia Terms of Trade vs. CRB 18m % change

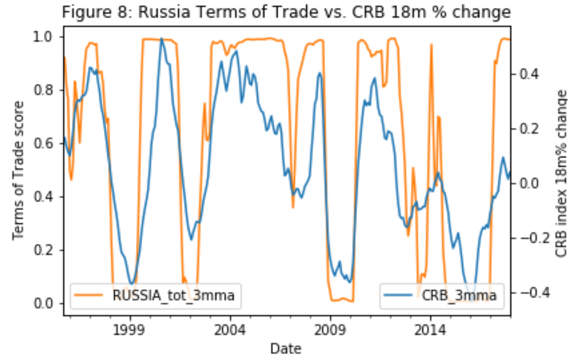

Table 2 shows the correlation between each country's terms-of-trade trend scores and changes in commodity prices, and confirms our observation from the graphs. The terms-of-trade trend scores are based on an 18-month change, so for consistency, we compute the correlations with an 18-month percent change in the CRB index. We also show the correlation of terms-of-trade with oil and copper. Note that these correlations have overlapping observations as we are using 18-month rolling price changes. Nevertheless, the large magnitudes of these values confirm that the correlations of the terms-of-trade with the CRB index are very strong.

For a majority of the countries, the correlations are negative, consistent with the fact that the vast majority of countries are importers of commodities. Their terms-of-trade deteriorate when commodity prices increase. These are shown in blue in the table. Countries where the terms-of-trade are positively correlated with commodity price changes are shown in green. These include Canada, Australia, Colombia, Peru, Russia, Qatar and the UAE.

Table 2: Correlation of Country Terms-of-Trade Trend with 18-month percent change in the price of oil, copper, and the CRB index (7/1995 – 12/2017)

Country Tems of Trade	Oil	Copper	CRB
USA_tot	-0.80	-0.65	-0.80
CANADA_tot	0.71	0.57	0.70
JAPAN_tot	-0.74	-0.67	-0.77
AUSTRALIA_tot	0.64	0.77	0.67
HONG KONG_tot	-0.59	-0.71	-0.63
NEW ZEALAND_tot	0.03	0.22	0.15
SINGAPORE_tot	-0.62	-0.71	-0.64
AUSTRIA_tot	-0.69	-0.73	-0.71
BELGIUM_tot	-0.70	-0.73	-0.72
DENMARK_tot	-0.01	-0.17	0.03
FINLAND_tot	-0.71	-0.75	-0.74
FRANCE_tot	-0.75	-0.73	-0.75
GERMANY_tot	-0.71	-0.71	-0.73
IRELAND_tot	-0.68	-0.64	-0.70
ITALY_tot	-0.69	-0.72	-0.72
NETHERLANDS_tot	-0.56	-0.73	-0.50
NORWAY_tot	0.78	0.53	0.79
SPAIN_tot	-0.76	-0.71	-0.75
SWEDEN_tot	-0.72	-0.73	-0.74
SWITZERLAND_tot	-0.65	-0.69	-0.70
UK_tot	-0.16	-0.48	-0.19
ARGENTINA_tot	0.49	0.47	0.57
BRAZIL_tot	-0.34	0.13	-0.30
CHILE_tot	0.23	0.76	0.31
COLOMBIA_tot	0.78	0.51	0.76
MEXICO_tot	0.55	-0.01	0.53

PERU_tot	0.38	0.81	0.43
CHINA_tot	-0.57	-0.73	-0.60
INDIA_tot	-0.81	-0.60	-0.82
INDONESIA_tot	0.58	0.25	0.59
MALAYSIA_tot	0.30	-0.25	0.27
PHILIPPINES_tot	-0.74	-0.64	-0.80
S. KOREA_tot	-0.74	-0.70	-0.77
TAIWAN_tot	-0.71	-0.73	-0.73
THAILAND_tot	-0.71	-0.66	-0.70
CZECH REP_tot	-0.68	-0.73	-0.74
GREECE_tot	-0.12	0.30	-0.02
HUNGARY_tot	-0.69	-0.54	-0.72
ISRAEL_tot	-0.73	-0.66	-0.75
RUSSIA_tot	0.78	0.59	0.79
POLAND_tot	-0.61	-0.42	-0.70
PORTUGAL_tot	-0.71	-0.71	-0.74
SOUTH AFRICA_tot	0.17	0.52	0.24
TURKEY_tot	-0.77	-0.67	-0.79
EGYPT_tot	0.68	0.42	0.72
QATAR_tot	0.76	0.52	0.77
U.A.E._tot	0.78	0.52	0.79

Conclusion

HGA's proprietary terms-of-trade factor captures the effect of changes in each country's price structure of import and export. We have shown that commodity price changes are an important component of the terms-of-trade factor, and help to distinguish between the returns outlook for commodity exporters vs. commodity importers.

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