Futures beacon: 
Can commodity futures and interest rate expectations help predict the value of the Canadian dollar?*

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This version: 270508

Presented at the 2008 CEA Meetings, University of British Columbia, Vancouver, June 7.

The views expressed in this paper are those of the authors.
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ABSTRACT
While Canada has a free floating exchange rate regime and official intervention was abandoned in 1998, monetary policy decisions take into account current and anticipated movements in the exchange rate to the extent that they are deemed to affect aggregate demand and ultimately inflation. One instrument in interpreting exchange rates movements is a reduced-form equation that links the Canada-US exchange rate to lagged movements in commodity price and interest rate differentials. The exchange rate, however, as an asset price also reflects expectations about future economic developments at home and abroad. Our paper investigates the potential empirical contribution of relevant futures prices and market-based interest rate expectations to explain and predict the short-run evolution of the bilateral exchange rate in order to improve our interpretative framework of exchange rate movements.

*We have benefited from comments by our colleagues for which we are grateful.
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1. INTRODUCTION

This paper examines the value of using market expectations of fundamentals to explain the evolution of the exchange rate, more specifically, the Canadian dollar. Our motivation is pragmatic. The Bank of Canada is dedicated to maintaining an environment of low, stable, and predictable inflation. To this end, it has adopted an inflation-targeting (IT) framework, and commensurably, a flexible exchange rate regime (Macklem 2006). Given Canada’s openness to international trade and financial transactions, movements in foreign prices and exchange rates can play an important part in shaping domestic inflation. Thus a better understanding of what drives the exchange rate and how it is likely to evolve in the short to medium run is crucial for the conduct of monetary policy.

Our paper follows a long tradition, going back over twenty years, in trying to encapsulate the forces impinging on the Canadian dollar in a few key variables, notably commodity prices and the perceived stance of Canadian monetary policy relative to that of Canada’s major trading partner, the United States (Amano and van Norden 1993; Helliwell et al. 2005; Bailliu et al. 2007; Issa, Lafrance, and Murray 2008). The survival of this approach, in the face of the conventional wisdom post-Meese and Rogoff (1983) that all empirical exchange rate models are no longer valid from the time they are published, is a testament to its viability.

The Bank’s approach has also survived doubts raised about Canada’s membership in the commodity currency club. For instance, Laidler and Aba (2001) note that the importance of commodity prices for the exchange rate declined between the 1970s and the 1990s. Reinhart and Rogoff (2002) find limited correspondence between commodity price and exchange rate movements for Canada. Chen and Rogoff (2003) argue that the long-run relationship between commodity prices and the Canadian dollar may be due to deterministic rather than stochastic trends and that there is relatively weak comovement in the short run. Cashin, Cepésdes, and Sahay (2003) in testing for cointegration between commodity export prices and the real exchange rate for 58 countries fail to find it for Canada (as well as New Zealand and Norway among the industrialized countries). In contrast, our findings and those of our other Bank of Canada researchers support the view that the evolution of the Canadian dollar in real terms has been greatly influence by the cycles in real commodity prices.

Recent research has suggested that exchange rates may be reflecting expectations about developments in commodity prices. Chen, Rogoff, and Rossi (2008) argue, on the basis of Granger-causality tests that allow for parameter instability, that the relationship between the exchange and commodity prices should be

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1. At least in theory, in practice, it has been difficult to identify large exchange rate pass-through effects.
2. The seeds of this approach, inspired by the exchange rate literature that followed the oil price shocks of the 1970s, were sown in Lafrance and Longworth (1987).
inverted: the former explaining or predicting the latter, in contrast to the Bank of Canada’s traditional view. This is motivated by theory that sees the exchange rate, as the relative price of two monies or assets, as a forward-looking variable. Engel and West (2005) interpret this basic postulate, and the oft-observed statistical property of exchange rates as random walks (or very close approximations to random walks), as a strong basis for arguing that an exchange rate represents long-term views of market participants on the prospects of economic fundamentals that drive exchange rates. While accepting that exchange rates reflect market perceptions about future fundamentals, we take the view that these perceptions are held for relatively short horizons as new information and trades are constantly being evaluated by market participants. Our maintained hypothesis is quite modest. We assume that changes in the Canada-U.S. real exchange rate can be explained by its tendency to gravitate towards a long-run relationship with real commodity prices, which are determined in world markets and are thus strictly exogenous, contemporaneous changes in commodity futures, and expected changes in Canada-US short-term interest rates. In this paper, we are looking at the merits of integrating available market information on commodity futures and interest rate expectations to improve the current version of the Bank’s exchange rate equation as described in Issa, Lafrance, and Murray (2008) or ILM. Our research question is: can commodity futures and interest rate expectations help predict the value of the Canadian dollar?

Our findings show promise. Adding market expectations of commodity prices and interest rate changes reduce the unexplained variance of the Canadian dollar in real terms beyond the ability of the Bank’s traditional equation to do so. Meese-Rogoff tests indicate that the exchange rate equation is superior to a random walk alternative in out-of-sample ex post forecasts. And dynamic simulations track the data more closely in recent years by including commodity price futures as well as expectations of relative change in short-term interest rates. Less positive are the findings that the exchange rate equation, with or without additional expectation terms, is not particularly robust to historical sample variations. Section 2 outlines our hypothesis, which is tested in section 3 and checked for robustness. The results and their implications are summarized in the conclusion.

2. HYPOTHESIS

Ceteris paribus, for a commodity exporter, an increase in commodity prices determined on world markets leads to an improvement in the current account, higher domestic income as wage rates are bid up to induce labour to shift into the resource sector, and excess demand and inflation pressures as demand increases.

4 Certain studies have purported to find a reverse link as US dollar movements can affect specific commodities and their future prices, notably in the case of coffee and cocoa (Jumah and Kunst 1999), and oil and related products (Sadorsky 2000). Chen, Rogoff, and Rossi (2008) show that exchange rates predict world commodity prices, both in- and out-of-sample, after taking account of parameter instability. An important consideration is that most commodities are quoted in US dollar terms. Thus, a depreciation of the US dollar, ceteris paribus, reduces commodities in other local currencies, boosting demand (and thus their prices in US dollars).

5 Nason and Rogers (2007) also show why exchange rates mimic a random walk by using the present value model of exchange rate as an interpretative framework.

6 As commodity futures are determined in world markets (Chicago, New York and London), the presumption that they can be considered as exogenous in our setting seems reasonable.
There is a presumption that this leads to an increase in the price of non-tradables, or a real exchange rate appreciation, to restore internal balance. Depending on the perceived persistence of the shock, anticipated wealth effects will further stimulate domestic demand and imports, offsetting part of the initial appreciation. This mainstream view follows from numerous papers that explored these phenomena in the wake of the oil shocks of the 1970s. A representative sample includes Bruno (1982), Buiter and Purvis (1982), Corden (1984), and Neary (1988).

Amano and van Norden (1995), or AvN, base their pioneering empirical study of the Canadian dollar on Neary’s analysis. Neary considers the case of a small open economy that produces a variety of traded and non-traded goods under competitive conditions and examines the required adjustment in the real exchange rate to re-equilibrate the current account following a terms-of-trade shock. His insight is that the effect is a priori undetermined as it depends on its net effect on the excess demand for non-traded goods, and thus on the nexus of demand and supply elasticities. Amano and van Norden find that the Canada’s terms-of-trade need to be decomposed to get a stable relationship with the real exchange rate. Their analysis points to the need to treat energy related resources differently from other commodities, such as forestry products, minerals, and agricultural goods. Subsequent work has followed in this vein.

More recently, Issa, Lafrance, and Murray (2008), or ILM, fine-tune the AvN analysis by showing that a structural break occurred in the effect of energy prices on the Canadian dollar in the early nineties. They argue that market distortions created by supply management policies, notably the National Energy Policy in 1980 might explain why higher energy prices were not translated into a Canadian dollar appreciation prior to early 1990s. With the end of the National Energy Policy in 1985, the implementation of the Canada-US Free Trade Agreement in 1989 (with Mexico joining in 1993), the loosening of Canadian ownership restrictions in the oil and gas sector in 1992, and other measures designed to support the development of the Alberta oil sands in 1993, the way was paved for Canada to become a “petro-currency”. This has been reflected in an estimated positive relationship between the Canadian dollar and energy as well as non-energy prices since 1993Q3.

In parallel fashion, researchers in Australia were linking their exchange rate to commodity prices (Blundell-Wignall and Gregory 1989; Gruen and Wilkinson 1994; Freebairn 2002). Gruen and Kortian (1996) show that the Australian dollar is predictable over the medium term (4 to 8 quarters ahead) and that a lack of depth in the exchange market for the Australian dollar leads to excess returns that are not exploited. Kears (2007) argues that commodity futures have predictive power in Australia’s case but uncertainty about monetary policy actions limits the predictive content of exchange rate futures, even though the Australian dollar is a commodity currency.
Table 1 – The AvN/ILM real exchange rate equation

\[
\begin{align*}
(1) & \quad q_t &= p_t - p_t^* - e_t \\
(2) & \quad q_t &= \beta x_t \\
(3) & \quad \Delta q_t = \alpha (q_{t-1} - \beta x_{t-1}) + \chi z_t + v_t,
\end{align*}
\]

Where:
- \( q_t \): real exchange rate; \( e_t \): nominal exchange rate
- \( p_t \): Canadian aggregate prices (CPI); \( p_t^* \): US aggregate prices (CPI)
- \( x_t \): a vector of long-run fundamentals and a constant term
- \( z_t \): a vector of short-run determinants
- \( v_t \): stochastic error term

The real exchange rate is defined in bilateral terms (equation 1), which is deemed to be sufficient given the dominance of the US economy in Canada’s international trade and financial transactions.\(^8\) The real exchange rate is posited to have a long-run relationship (equation 2) with commodity prices (distinguishing between energy and non-energy commodities). This has been repeatedly established in previous work. As shown in Amano and van Norden and Issa, Murray, and Lafrance, the time series of the real exchange rate and real commodity prices split into energy and non-energy components are integrated of order one and cointegrated.\(^9\) Commodity prices are also assumed to be exogenous to the real exchange rate as they represent a broad range of commodities whose prices are mainly determined in world markets.

The estimated equation is given by (3). The short-run dynamics are kept to a minimum. In the ILM equation, only the interest rate differential is considered.\(^10\) While the ILM equation gives a fair account of the dollar’s evolution (see Chart 4b), its specification does not embody the expectations of economic agents regarding the evolution of key macroeconomic variables as presumed in economic theory. The nature of these variables depends on the approach that one favours to explain exchange rates, such as cross-country differences in money demand and supply, portfolio balance choices and wealth allocation considerations, terms-of-trade effects, differences in consumer preferences, cross-country productivity differentials, consumption smoothing and long-run external indebtedness sustainability constraints, or combinations of the above.

Engel and West (2005) are strong proponents of the forward-looking view. They show that, under certain assumptions, exchange rates may reflect expectations of future economic fundamentals while exhibiting random walk behavior. In their model, future fundamentals matter much more than current fundamentals when the discount factor is close to one. For large values of the discount factor, the log of the exchange rate

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\(^8\) The specification ignores the structural break introduced by ILM as the market expectations data that we use are only available as time series from 1996 onward.

\(^9\) As this paper, while using higher frequency data (weekly or monthly averages), covers a short period (post 1996) and cointegration relationships are best established over a long time span, we will take these results as given. The evidence in favour of cointegration is less clear in Issa, Lafrance, and Murray, however.

\(^10\) To avoid apprehended simultaneity problems, the differential is lagged one period in the estimation. Note that changes in spot commodity prices (not reported here) were found to be not significant when estimated.
is approximately a random walk, irrespective of the underlying model. Engel, Mark, and West (2007) build on this foundation to argue that exchange rate models have empirical validity. They show that exchange rates incorporate news about future fundamentals as the models imply and that the out-of-sample forecasting power of models can be enhanced by using panel estimation and long-run horizon forecasts.

Our perspective is different. Market participants in exchange markets are likely to have limited confidence in their long-run expectations and are more prone to re-assess their positions on the basis of near-term developments. Thus, our focus is on exploiting market data on expectations of commodity price and relative interest rate developments to improve our understanding of the evolution of the Canadian dollar. We prefer to use market-based data rather than survey data because markets synthesize a broad set of opinions, and market data are more timely and easier to track. For the purposes of this analysis, we have constructed future price proxies for energy and non-energy commodity prices as traded on the NYMEX in New York or the London Metal Exchange. These futures cover only a sub-sample of the commodities tracked by the Bank of Canada’s two commodity price indices. We assume that they are representative.\footnote{The correlations of changes between our constructed one month futures indices and the Bank of Canada’s commodity price indices are 0.81 (for non-energy commodities) to 0.83 (for energy commodities).}

We constructed futures indices for energy and non-energy commodities by weighting the available futures on the same basis as in the Bank’s indices, and renormalized to one. Data definitions and sources are reported in the Appendix.

3. EMPIRICS

Our preliminary findings fall under four sub-headings. First, commodity price futures play a role in predicting exchange rate movements, but it is a small one. At the monthly (and weekly) frequencies that we examine, most of the variation in the real exchange rate remains unexplained, and the marginal effect of commodities futures has an elasticity of less than 0.1. Second, the exchange rate equation is not particularly robust to sample changes. Expanding rolling regressions (as well as fixed-window rolling regressions which are not reported here) indicate that parameter stability and significance is somewhat fragile to the sample used for the estimation. While this instability may reflect the difficulty in pinning down an error correction formulation with short sample periods, it might also warn us that our specification is too parsimonious to capture the dynamics of the exchange market since the mid-1990s. Third, on a more positive note, the exchange rate equation passes the simple Meese-Rogoff out-of-sample predictability test, showing that the fundamentals add, in principle, some forecasting value. Fourth, the fairly wide confidence intervals of the adjustment parameter of the error correction process suggests that the underlying assumed cointegration between real commodity prices and the real exchange rate requires additional validation. The estimates at various frequencies also confirm that the adjustment process is a relatively slow one, though time aggregation bias may be playing a role at lower frequencies.
Are commodity price futures useful in predicting the real exchange rate in sample?

The results reported in Table 2 suggest that futures prices of energy and non-energy commodities and interest rate expectations can provide some additional predictive power for the real exchange rate, at least within sample (equation 2). Expected relative interest rate changes play a role (equation 3), and combined with commodity price futures, they contribute to raising the adjusted $R^2$ from 2 to 20 per cent (equation 4).  

Table 2 - Estimated coefficients (standard errors) *

<table>
<thead>
<tr>
<th>Variables</th>
<th>1. Original exchange rate equation</th>
<th>2. With commodity futures</th>
<th>3. With interest rate expectations</th>
<th>4. With both</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Long run</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjustment</td>
<td>-0.041 (0.033)</td>
<td>-0.056 (0.031)</td>
<td>-0.136 (0.047)</td>
<td>-0.168 (0.046)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.329 (0.082)</td>
<td>-0.350 (0.058)</td>
<td>-0.470 (0.076)</td>
<td>-0.526 (0.068)</td>
</tr>
<tr>
<td>Non-energy prices</td>
<td>0.869 (0.502)</td>
<td>0.752 (0.343)</td>
<td>0.384 (0.168)</td>
<td>0.371 (0.147)</td>
</tr>
<tr>
<td>Energy prices</td>
<td>0.231 (0.119)</td>
<td>0.207 (0.070)</td>
<td>0.222 (0.087)</td>
<td>0.261 (0.081)</td>
</tr>
<tr>
<td><strong>Short run</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest rate differential (t-1)</td>
<td>0.004 (0.002)</td>
<td>0.004 (0.002)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆ Non-energy futures</td>
<td>0.071 (0.031)</td>
<td></td>
<td>0.125 (0.059)</td>
<td></td>
</tr>
<tr>
<td>∆ Energy futures</td>
<td>0.060 (0.017)</td>
<td></td>
<td>0.101 (0.025)</td>
<td></td>
</tr>
<tr>
<td>Expected change in the interest rate differential</td>
<td></td>
<td></td>
<td>0.035 (0.012)</td>
<td>0.044 (0.0135)</td>
</tr>
<tr>
<td>Statistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.036**</td>
<td>0.116</td>
<td>0.063</td>
<td>0.202</td>
</tr>
<tr>
<td>D.W.</td>
<td>1.52</td>
<td>1.44</td>
<td>1.44</td>
<td>1.33</td>
</tr>
<tr>
<td>Sample</td>
<td>96:07-08:01</td>
<td>96:07-08:01</td>
<td>02:05-08:01</td>
<td>02:05 – 08:01</td>
</tr>
</tbody>
</table>

* Based on monthly data and one-month futures or forwards. Bold denotes coefficients not significant at the 5% level.
** Adjusted $R^2$ over the 2002:05-2008:01 sample is 0.016.

Is the exchange rate equation robust?

The estimates are not robust to variations in the sample.  

Is this comparable to the adjusted $R^2$ of the ILM equation (0.204) which was estimated with quarterly data over the 1973-2005 period in Issa, Lafrance, and Murray (2008).

These results are consistent with those of Issa, Lafrance, and Murray (2008) and Maier and DePratto (2008).
participants focused more and more on the importance of energy prices for the Canadian economy and trade balance in the latter part of the sample. It remains that our results can only be characterized as tentative and further work will have to see if the exchange rate equation stands the test of time.

Is the long-run relationship robust?
We also examined whether the long-run relationship between both commodity price indices and the real exchange rate are sensitive to the sampling frequency. In Table 3 we report comparisons of estimates of equation 2 using weekly, monthly, and quarterly data over a common sample period. While the differences are not statistically meaningful, the results suggest that lower frequency data infer slower estimated adjustment to equilibrium. With samples over a relatively short time span, however, the underlying cointegration relationship is more an act of faith than something that can be established statistically as the standard errors of the adjustment coefficient are quite large.

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment (s.e.)</td>
<td>-0.016 (0.009)</td>
<td>-0.056 (0.031)</td>
<td>-0.116 (0.093)</td>
</tr>
<tr>
<td>Estimated half-life (in weeks)</td>
<td>43</td>
<td>53</td>
<td>77</td>
</tr>
<tr>
<td>Non-energy commodity prices</td>
<td>0.760 (0.303)</td>
<td>0.752 (0.343)</td>
<td>0.905 (0.529)</td>
</tr>
<tr>
<td>Energy prices</td>
<td>0.194 (0.069)</td>
<td>0.207 (0.070)</td>
<td>0.255 (0.131)</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.06</td>
<td>0.16</td>
<td>0.23</td>
</tr>
<tr>
<td>Degrees of freedom</td>
<td>598</td>
<td>131</td>
<td>37</td>
</tr>
</tbody>
</table>

Coefficients which are not significant at the 5% level are denoted in bold.

Can we beat a random walk?
In short, yes. This is not unexpected, since both AvN in its time and ILM more recently could do so. Chart 3 shows the Theil U-statistics for forecasts from one to twelve months ahead, using the Meese-Rogoff methodology. This test allows the model the advantage of “knowing” the future values of the explanatory variables. Sequential expanding rolling regressions are then run and the model’s predictive ability at different forecast horizons is compared to that of a no change, or random walk, benchmark. The researcher’s model does better than a random walk when the calculated Theil statistic is less than one. This is the case for equations 2 and 4 in Table 2 at all horizons up to twelve months. Having said that, the use of futures in this context seems a bit of a stretch. In future work, we will explore our ability to predict exchange rate movements ex ante by using historical commodity price Bank of Canada staff forecasts.

14 Inoue and Kilian (2004) question the wisdom of relying on out-of-sample predictability tests. Based on the higher power of in-sample tests of predictability, they argue that results of in-sample tests are more credible than those of out-of-sample tests.
Can we improve our forecasts?

This remains to be seen for true ex ante forecasts over the horizon that is relevant for monetary policy (up to three years). The key challenge lies in developing good forecasting models for commodity prices. What we can say at this time is that dynamic simulations of the AvN/ILM equation augmented by commodity price futures and market expectations of relative interest rate changes can track the historical data relatively well, particularly in recent years (Chart 4a). Further work will be required, however, to establish this more convincingly over the long run.

4. CONCLUSION.

The findings in this paper suggest that using commodity price futures and market expectations of anticipated interest rate changes can help explain more recent movements of the Canadian dollar. Further work will be required to see if this approach can yield interesting results to improve our ability to forecast these movements ex ante over short horizons. Our other main result, that the reduced-form exchange rate equation that we considered in its limited variants is not robust to the historical samples considered, is not as comforting. This evidence might be pointing to changes over time in the relative importance of fundamentals, notably the growing importance of net energy exports as other researchers have emphasized (Bayoumi and Muhleisen 2006). Alternatively, it might be pointing to a shift in perception by market participants of the growing importance of the Canadian dollar as a petro-currency. In either case, the results are indicative of the challenges that one faces when trying to explain exchange rate movements and the modesty that one is compelled to adopt in presenting new results. Yet, as the commodity based approach to explaining the Canadian dollar at the Bank of Canada enters its third decade, there is a certain sense of comfort in the ability of a simple equation to stand, albeit with qualifications, the test of time.
Appendix

Chart 1: Data

Monthly Data

Real US dollar per Canadian dollar

Nominal US dollar per Canadian dollar

Non-energy commodity price index

Energy commodity price index

Non-energy commodity futures (1-month)

Energy commodity futures (1-month)

Canada-US interest rate differential

Expected change in interest differential (1-month)
Chart 2a: Coefficient Estimates Using an Expanding Rolling Window

Equation 2

Adjustment

Interest rate differential

Non-energy commodity price index

Energy commodity price index

Non-energy commodity futures (1-month)

Energy commodity futures (1-month)
Chart 2b: Coefficient Estimates Using an Expanding Backward Rolling Window

Equation 2
*Equations 1 and 2 are estimated from 1996:7-2004:1. Equation 5 is estimated from 2002:5-2006:1.*
Chart 4b: Dynamic Simulation Versus Actual
Monthly, Estimated from 1995:3-2008:1

US dollar per Canadian dollar

- Actual
- Equation 1

[Graph showing the comparison of actual and simulated exchange rates from 1996 to 2008, with a notable increase in the latter years.]
References


Sources and definitions of variables

All data comes from Bloomberg, unless otherwise indicated. *Denotes data retrieved from Global Insight.

rfx: Real U.S. per Canadian dollar exchange rate.

Average of the daily noon spot rate recorded by the Bank of Canada, multiplied by the ratio of Canada to U.S. consumer price index (CPI). CPI indices are indexed to 2002=100 and are obtained from Statistics Canada (v41690973) and the Bureau of Labor Statistics.

com: Real commodity price index excluding energy.

Average of the daily non-energy commodity price index calculated by the Bank of Canada (Statistics Canada series v36383). Deflated by the U.S. CPI index.

ene: Real energy price index.

Average of the daily energy commodity price index calculated by the Bank of Canada (Statistics Canada series v36384). Deflated by the U.S. CPI index.

int: Canada-U.S. nominal interest rate differential.

Average of the daily Canadian three-month prime corporate paper rate (Statistics Canada series v39074) and U.S. 90-day AA non-financial commercial paper closing rate from the Federal Reserve Board.

int_1m: Expected change in the Canada-U.S. interest rate differential. Measured by the difference in the fixed rate of the 1-month overnight index swap and the current overnight rate for Canada, and the 1-month overnight index swap and the current effective fed funds rate for the United States. Data available beginning from May 2002.

com_1m: Real non-energy commodity price index, constructed using 1-month ahead futures prices. Deflated by the U.S. CPI index.

ene_1m: Real energy commodity price index, constructed using 1-month ahead futures prices. Deflated by the U.S. CPI index.

com_3m: Real non-energy commodity price index, constructed using 3-month ahead futures prices. Deflated by the U.S. CPI index.

ene_3m: Real energy commodity price index, constructed using 3-month ahead futures prices. Deflated by the U.S. CPI index.

Components of commodity price indices constructed using futures prices

Energy
Light, sweet crude oil futures: traded on the New York Mercantile Exchange (NYMEX), trading symbol CL
Henry Hub natural gas futures: traded on the NYMEX, trading symbol NG

Non-Energy
Wheat futures: traded on the Chicago Board of Trade (CBOT), trading symbol W
Live cattle futures: traded on the Chicago Mercantile Exchange (CME), trading symbol LC
Random length lumber futures: traded on the CME, trading symbol LC
Aluminum futures: traded on the London Metals Exchange (LME), trading symbol AL*
Copper futures: traded on the LME*
Gold futures: traded on the NYMEX, trading symbol GC
Nickel: traded on the LME*
Zinc: traded on the LME *