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# A new strategy using term-structure dynamics of commodity futures

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## A R T I C L E   I N F O

## A B S T R A C T

The term structure of commodity futures is important information for traders and investors. Traditional term-structure strategies are static; they tend to use the slope of term structure at a given moment. Instead, our trading strategy uses the change of term structure and generates statistically significant return. It also produces significant abnormal return in excess of the traditional two factors, i.e. the returns from static-slope strategy and daily momentum. Thus, its return includes orthogonal information or excess return that standard static-slope and momentum strategies cannot explain. This suggests a novel risk factor in the asset class of commodity futures or robust trading opportunities.

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## 1. Introduction

This paper proposes a trading strategy for commodity futures. Two types of trading strategies are popular for commodity futures (Bodie and Rosansky, 1980; Erb and Harvey, 2006; Gorton and Rouwenhorst, 2006). The first uses the static slope of term structure: long on backwardation and short on contango. The second uses the dynamics of returns (e.g. momentum): long on winners and short on losers. These two are used together in practice. For example, traders take long position on the commodity futures showing both large momentum and backwardation (and short position on the opposites).

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In contrast, our novel strategy combines the intuition of both the first and second. We suggest a long position on the commodity futures exhibiting dynamic backwardation and a short position on the dynamic contango. Dynamic backwardation means the tendency of stiffening backwardation. The opposite is dynamic contango in which the extent of contango elevates. We call this strategy a dynamic-slope strategy. We find our dynamic-slope strategy generates significant excess returns even after considering the two popular strategies for commodity futures as well as transaction costs.

## 2. Data

We collect the data about commodity futures from Thomson Reuters Quantitative Analytic Direct (QAD). Gold and silver futures are not included because these are often considered as financial contracts. We collect daily closing prices of 20 futures contracts that are listed in CME group or ICE. The data span from January 1990 to June 2012. The list of the commodity contracts are provided in Table 1. We clean the data by eliminating where daily prices vary over 20% per day.

Commodity futures market usually stops trading futures several days before the maturity dates; market participants call it "last trading date". In order to exclude roll-yield effect, we exclude the returns from last trading dates of old contracts to the first trading dates of new contracts. In addition to this, we do not impose any trading activity when a contract is two days or less away from the last trading date because term structure might be unstable near last trading dates. For this reason, most commodity indices roll-over the contracts several days before the last trading dates. Since the return data are all from the nearest futures contracts without roll-yields, they should resemble spot return.

## 3. Analysis of dynamic-slope strategy

As a benchmark, Table 2 provides daily returns from the traditional term structure strategy (static-slope strategy): long near futures on backwardation and short them on contango. First, we computed a hypothetical 100-day-to-be-matured contract price via linear interpolation. The interpolation uses two closest futures contracts with maturities right before and after 100 days ahead. We undertake this computation and interpolation each day. Then we measure the slope between (1) the hypothetical futures contract price expiring in 100 days and (2) the nearest contract, the value of which should be similar to spot price. The slopes are also measured at the close prices each day.

The traditional 'static-slope strategy' longs the nearest futures when the term structure slope is negative (backwardation), and shorts the nearest futures when the slope is positive (contango). Long or short positions are entered at the close price. The positions are cleared at the close prices on the next trading day for each commodity future. Opposite positions for each future are taken with cash. Transaction costs are considered. Panel A shows the statistics for the whole sample period while the other panels provide statistics for the sub periods. The results clearly show that this long-short strategy works very well for all and sub periods. For the whole period, its trading profit is 0.036% per day or around 10% per annum.

We propose 'dynamic-slope strategy' extending this traditional static-slope strategy of using term structure of commodity futures. The daily implementation of dynamic-slope strategy is similar to the traditional static-slope strategy described in Table 2. More specifically, first we compute daily the hypothetical 100-day-to-be-matured contract price. Second, we calculate the slope between the nearest contract and 100-day-to-be-matured contract price. Third, we compute the *change of the slope* daily.

**Table 1**
List of commodity futures.

Corn, Cocoa, Crude oil, Cotton, Milk, Live cattle, Gasoline, Copper, Heating oil, Coffee, Orange juice, Lumber, Lean hog, Natural gas, Oats, Palladium, Platinum, Soy beans, Sugar, Wheat