Commodities 3

The Commodities Trading 3 Case will introduce students to the risks and opportunities associated with the concept of "transportation arbitrage". Students will be allowed to buy crude oil and transport it across different locations.

Description

The Commodities Trading 3 case consists of a simulation of 10 minutes that represents 1 month of calendar time (20 trading days).

Parameter	Value
Simulation time	600 seconds (10 minutes)
Calendar time per simulation	1 month (20 trading days)
Max order size	30 contracts

Market Dynamics

There are 3 tradable securities and 5 assets. The tradable securities are:

Securities	Description	Contract Size	Shortable
CL	Crude oil spot (in Cushing)	1,000 Barrels	No
CL-AK	Crude oil in Alaska	1,000 Barrels	No
CL-NYC	Crude oil in New York City	1,000 Barrels	No

Students must lease storage before buying crude oil in the spot market. A storage tank holds up to 10,000 barrels of crude oil and costs $500 per day (charged every 30 seconds). Each storage tank must be leased in its entirety (i.e. students cannot lease half a tank). There are three storage tanks available for lease, one for crude oil in each location: CL-STORAGE for tanks in Cushing, AK-STORAGE for tanks in Alaska, NYC-STORAGE for tanks in New York City. Students are allowed to lease up to 10 storage tanks at the same time in each location.

The following table summarizes the storage tanks available as well as their capacity and costs.

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Storage Assets	Description	Capacity	Cost
CL-STORAGE	Storage for Crude Oil Spot in Cushing	10K Barrels	$500/day
AK-STORAGE	Storage for Crude Oil in Alaska	10K Barrels	$500/day
NYC-STORAGE	Storage for Crude Oil in New York City	10K Barrels	$500/day

Students can also transport crude oil across different locations. For example, students can buy 1,000 barrels of crude oil in Alaska (AK) and transport the oil to Cushing (CS). In order to transport crude oil, students must "lease and use" pipelines. Unlike storage, pipelines must be used immediately after lease. The transport process will take 30 seconds to complete. Again, unlike the storage tanks, the pipeline will automatically be released at the end of the lease period.

There are two pipelines available: AK-CS-PIPE and CS-NYC-PIPE. Please note that Crude Oil only flows one way in these pipes, from the location of supply to the location of demand. Students may lease up to 10 pipelines for each route.

If students do not have sufficient storage at the receiving location (in Cushing when using AK-CS-PIPE or in New York when using CS-NYC-PIPE), storage tanks will automatically be leased at a penalty of $2500 per tank in addition to regular lease prices.

Transportation Assets	Description	Capacity	Transport or Conversion Period
AK-CS-PIPE	Pipeline for Crude Oil flowing from Alaska to Cushing	10K Barrels	1 Day (30 seconds)
CS-NYC-PIPE	Pipeline for Crude Oil flowing from Cushing to New York City	10K Barrels	1 Day (30 seconds)

A pipeline can transport up to 10,000 barrels of crude oil at a time and costs, at the beginning of the case, $40,000 per use for the AK-CS-PIPE and $20,000 per use for the CS-NYC-PIPE. This cost is subject to change at random times during the case. Students will be notified of changes to pipeline costs through news releases.

The CL daily market returns are normally distributed with the mean equal to zero and an annualized volatility of 40%. This case represents 1 month of calendar time (20 trading days) therefore it assumes that there are 240 (=12 x 20) trading days in 1 year.

Trading Limits, Transaction Costs and Position close-out

Participants will be subject to gross and net trading limits of 500 contracts and 100 contracts respectively. The gross trading limit reflects the sum of the absolute values of the long and short positions across all securities and cannot exceed 500 contracts. The net trading limit reflects the sum of long and short positions such that short positions negate any long positions and has an upper bound of 100 contracts of crude equivalent products. Trading limits will be strictly enforced and students will not be able to exceed them.

The maximum trade size will be 30 contracts, restricting the volume of contracts transacted per trade to 30. Transaction fees will be set at $1 per contract traded.

Any outstanding position in Crude Oil (CL, CL-AK, CL-NYC) will be closed at their last traded price at the end of the period (month).

Key Objective

Participants will have to balance costs associated with storage and transport of crude oil from one location to the other with expected returns to earn "arbitrage" profits. They will have to develop a "transport model" to evaluate risks and opportunities associated with the strategies and allocate their resources to the most profitable strategy.

Note that practitioners call this strategy a "transportation arbitrage". However, it is worth noting that transporting crude oil from one location to the other takes 1 day (30 seconds in this simulation) and the strategy is not risk free. Indeed, while transporting the crude oil from one location to the other, the crude oil price might change.