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Contango and Backwardation as Predictors of Commodity Price Direction

by

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Contango and Backwardation as Predictors of Commodity Price Direction

Abstract: *This study examines whether term structure can be used as a predictor of commodity price direction. It uses daily prices for the S&P GSCI and each of the 24 underlying commodities from January 2007 through December 2013. During each day of the monthly roll period, one-month returns for each commodity are calculated and compared with the corresponding term structure. In nearly all cases, the relationship between returns and term structure is no different from that of a random process. Mean returns for each commodity under backwardation-only and contango-only are examined and in most cases are not significantly different from zero. A detailed examination of unleaded gasoline finds that returns on a long position are little affected by term structure, but heavily affected by the price trend in the underlying market.*

Key Words: backwardation, contango, roll return, term structure

Introduction

The theory of storage (Working 1949) describes how a downward-sloping forward price structure for storable commodities – also known as "inverted" or "in backwardation" – is often indicative of a shortage. When prices are higher for nearby contract months than for deferred contract months, inventory holders are encouraged to accelerate sales because the market is paying a negative return to storage, and users are encouraged to postpone purchases because prices will be lower at a later date. The theory likewise describes how an upward-sloping forward price structure – also known as "normal" or "in contango" – is often indicative of a sufficient or surplus supply-demand balance. When prices are lower for nearby contract months relative to deferred contract months, inventory holders are encouraged to postpone sales because the market is paying a positive return to storage, and users are encouraged to accelerate purchases because prices will be higher at a later date.

With the advent of commodity indexes and other commodity-related investments, the term structure of futures prices has become associated with commodity investment returns, and particularly the returns from "rolling" a position from one contract month to another. Backwardation is commonly associated with positive roll returns, and contango is commonly associated with negative roll returns.

The literature provides little support for the existence or importance of roll returns. Among those questioning the notion of roll returns are Gorton and Rouwenhorst (2006) ["The rolling itself is not a source of return." (p. 67)], Erb and Harvey (2006) ["Clearly, spot returns have been more important than roll returns in explaining the excess return volatility of individual commodity futures." (p. 80)], Main et al. (2013) ["The much discussed 'return to roll' or 'roll yield' is irrelevant in determining the return to a long futures position. The slope of the futures term structure does not determine futures returns." (pp. 5-6)], Peterson (2013) ["If the normalizing constant for the S&P GSCI operated in the same manner as the divisor for the S&P 500, there

would be no roll return…" (p. 7)], and Bessembinder et al. (2014) ["…wide-spread myth among both academics and the financial press that a roll trade generates an immediate gain or loss attributable to the divergence of the near-to-delivery futures price from that of the more distant delivery price." (p. 32)].

This lack of supporting research has not discouraged the commodity index community from developing and promoting various so-called "contango killer" and "roll select" products. Examples include iShares Commodity Optimized Trust (BlackRock 2015), PowerShares DB Commodity Index Tracking Fund (Inveso 2015), and United States Commodity Index Fund (United States Commodity Index Fund 2015). All are designed to minimize contango and maximize backwardation by varying the contract months used in the contract roll.

Motivation

The question we seek to address is a simple one: *Can term structure be used as a predictor of commodity price direction?* This question has been ignored thus far in the roll return debate, but it may be useful in resolving this issue. If backwardation can reliably predict upward price movements, and if contango can reliably predict downward price movements, then perhaps term structure contains useful information for explaining commodity investor behavior.

Stock market investors understand that returns result from dividends and capital gains on the underlying investments, and it is a relatively simple matter to determine the contribution by each source. In contrast, commodity index investors may find it difficult to allocate total returns between roll returns (analogous to dividends) and price-related returns (analogous to capital gains). Consequently, commodity investors and others may confuse the actual source of profits on a long-only position, and mistakenly attribute the gain received from a market in backwardation to positive roll return when it is actually due to an upward move in commodity prices.

Measurement of Term Structure

To answer this question, we use daily prices for the S&P GSCI and each of the 24 underlying commodities from January 2007 through December 2013. This was one of the most volatile periods in history, with rapidly rising and rapidly falling prices and an extended time with relatively stable prices, providing a wide range of market conditions (Figure 1).

The S&P GSCI rolls positions in a soon-to-expire contract month to a later-to-expire contract month on the fifth through ninth business days of the month, with 20% of the position rolled each day. For a particular commodity (e.g., corn), suppose that futures prices are in backwardation (e.g., March > May) on a specific day of the roll period (e.g., the fifth business day of February) just prior to the expiration of the nearby contract (e.g., March). If this price relationship indicates a shortage, then we would expect the price of the deferred futures contract (e.g., May) to be higher one calendar month later (e.g., the fifth business day of March), and we

would realize a positive return on a long position in the May contract held from the fifth business day of February to the fifth business day of March.

Alternatively, suppose that futures prices are in contango (e.g., March < May) on a specific day of the roll period (e.g., the fifth business day of February) just prior to the expiration of the nearby contract (e.g., March). If this price relationship indicates a normal situation or a surplus, then we would expect the price of the deferred futures contract (e.g., May) to be unchanged or lower one calendar month later (e.g., the fifth business day of March), and we would realize a zero or negative return on a long position in the May contract held from the fifth business day of February to the fifth business day of March.

Directional Test

If term structure – which we define here as the nearby price minus the deferred price – is a useful predictor of price direction, then a scatter plot of returns against term structure would be expected to show most observations in either Quadrant II (positive returns and backwardation) or Quadrant IV (negative returns and contango). Few observations would be expected in either Quadrant I (positive returns and contango) or Quadrant III (negative returns and backwardation).

Figure 2 shows the results for lean hogs, and is representative of all the individual return-structure relationships. Neither the S&P GSCI nor any of the 24 underlying commodities exhibit a clear tendency for observations to be concentrated in Quadrant II, Quadrant IV, or both. Returns for all commodities were consistently centered around zero, but term structure for a particular commodity can be centered around zero, predominantly positive (i.e., backwardation), or predominantly negative (i.e., contango). Consequently, we need to modify our hypothesis so that if returns are positively related to term structure, then most observations would be expected in Quadrant II *and* Quadrant IV, and few observations would be expected in Quadrant I *and* Quadrant III. Conversely, if returns are independent of term structure and this is a random process, then observations would be equally likely in Quadrants II and IV, or in Quadrants I and III. This is a purely directional test because it ignores the magnitudes of the term structure values and corresponding returns.

If there is a directional relationship – in other words, returns are positively related to term structure, with backwardation (positive term structure) associated with positive returns and contango (negative term structure) associated with negative returns – then the number of expected returns should exceed the 50% the level that would result from a purely random process. Table 1 shows the number of observations by quadrant, and the number of expected and unexpected observations as defined above, for the S&P GSCI and each of the 24 underlying commodities. For all 25 commodities[1] the percentage of expected observations are near 50%: for 12 commodities the percentage is greater than 50%, for 1 commodity percentage is exactly equal to 50%, and for 12 commodities the percentage is less than 50%. The individual percentages range from a high 60.6% (KC wheat) to a low of 37.9% (cotton).

[1] From this point forward we will refer to the S&P GSCI as a "commodity," and there will be 25 commodities: the 24 underlying commodities of the S&P GSCI plus the index itself.

For the 12 commodities with greater than 50%, only six were statistically significant: two (coffee and silver) at the .05 level and four (wheat, KC wheat, natural gas, and nickel) at the .01 level. Consequently, for the remaining 19 commodities the percentages are not significantly greater than 50%, and we conclude that overall there is only a very weak directional relationship between term structure and returns.

Quantitative Test

It is possible that by disregarding the magnitudes of the term structures and/or returns, or by combining backwardation and contango results, we may have overlooked some important economic relationships. Therefore, we will examine the returns from backwardation only, and the returns from contango only, for each of the 25 commodities.

Table 2 presents summary statistics for returns on each of the 25 commodities during backwardation. If returns are positively related to term structure, then we would expect mean returns under backwardation to be significantly greater than zero. Notice that for four commodities (wheat, coffee, gold, silver) there are no instances of backwardation during roll periods for the seven years covered by this study, so we will focus on the 21 remaining commodities.

Of these 21 commodities in backwardation, there are nine with positive mean returns and 12 with negative mean returns. For the nine commodities with positive mean returns, only five are statistically significant: one (WTI crude) at the .05 level and four (heating oil, gasoil, Brent crude, and aluminum) at the .01 level. The mean returns for the remaining 16 of the 21 commodities are not significantly greater than zero, indicating no statistical relationship between backwardation term structure and mean returns from a quantitative standpoint.

Table 3 presents summary statistics for returns on each of the 25 commodities during contango. If returns are positively related to term structure, then we would expect mean returns under contango to be significantly less than zero. Notice that contango is far more common than backwardation, and is observed in all 25 commodities.

Of the 25 commodities in contango, there are 15 with negative mean returns and 10 with positive mean returns. For the 15 commodities with negative mean returns, only six are statistically significant: two (WTI crude and nickel) at the .05 level and four (corn, live cattle, natural gas, and aluminum) at the .01 level. The mean returns for the remaining 19 of the 25 commodities are not significantly less than zero, indicating no statistical relationship between contango term structure and mean returns from a quantitative standpoint.

With only a small fraction of the mean returns – five under backwardation and six under contango – being statistically significant, we also conclude there is only a weak quantitative relationship between term structure and returns. These quantitative results are similar to the directional results, in the sense that all of them show only a very weak relationship between term structure and returns. However, there is little consistency in the results for the individual

commodities across all tests, highlighting the limited utility of term structure as a predictor of commodity price direction.

Table 4 summarizes the statistically significant directional and quantitative results by commodity. There are 13 commodities with statistically significant results: nine commodities have one significant result and four commodities have two significant results. No commodities have statistically significant results from all three tests, and 12 have no statistically significant results from any test.

Individual Returns for Unleaded Gasoline

With such a weak – some might say no – reliable connection between term structure and commodity returns, during one of the most volatile periods in history, why is the belief that backwardation leads to positive returns on a long position and contango leads to negative returns so persistent?

To explore this question, we examine all returns to a long position held from one roll day of a particular month to the same roll day in the following month (e.g., from the fifth business day of February to the fifth business day of March, from the sixth business day of February to the sixth business day of March, and so on). This examination focuses on unleaded (RBOB) gasoline, which had the most roll days in backwardation (245 out of 420) of the 25 commodities examined.[2]

Figure 3 shows the returns from backwardation, roll day by roll day, with a separate panel for each of the seven years 2007-2013. If the market is in backwardation on a particular roll day, a long position is established and held for one calendar month and then liquidated. If the market is in contango, no position is established and no results are shown in Figure 3. Trading results are summarized in Table 5. Notice that taking a long position based only on the existence of backwardation was highly profitable in most individual years, and for the full period 2007-2013. With the exception of 2013, roughly half or more of the individual trades were profitable in any given year, and for the seven-year period as a whole. Cumulative profits from this trading strategy – going long when the market is in backwardation and taking no position when the market is in contango – would have been $3.04 per gallon.

Figure 4 shows the corresponding returns from contango for each of the seven years 2007-2013; as before, if the market is in backwardation no position is established and no results are shown. It is widely believed by market participants that holding a long position when a market is in contango leads to losses. However, the results in Figure 4 show that most of the trading results were profitable, which is contrary to popular belief.

Trading results are summarized in Table 6. Notice that taking a long position based only on the existence of contango was highly profitable in most individual years, and for the full period 2007. However, holding a long position during contango was even more profitable. With the

[2] The other 24 commodities also were examined in this manner, with similar results. Complete details are available from the author.

exception of 2013, roughly half or more of the individual trades were profitable in any given year, and for the seven-year period as a whole. Cumulative profits from this contrarian trading strategy – going long when the market is in contango and taking no position when the market is in backwardation – would have been $6.70 per gallon, or more than twice the cumulative profit for the traditional long-during-backwardation strategy.

From this example, we can see that a long position during backwardation can be profitable, but these profits have little to do with the term structure of the market and instead are heavily dependent upon the general trend in prices. In the case of unleaded gasoline, Figure 5 shows that prices were in a general uptrend for most of 2007-2013 with the notable exception of 2008, when the long-during-contango strategy experienced its greatest losses.

Summary and Conclusions

The notion that backwardation should lead to positive returns on a long position, and contango should lead to negative returns, is difficult to refute without a complete examination of the facts. The unleaded gasoline example is a perfect illustration: backwardation does in fact lead to positive returns, and typically that would be the end of the story until further exploration reveals that contango leads to even greater positive returns. The failure to completely examine all facets of this question goes a long way toward explaining how these ideas are able to endure.

This study has revealed a number of important points. First, there is no consistent, statistically significant relationship between term structure and returns. This is true for the S&P GSCI and its underlying commodities, and it likely applies to other commodity indexes and individual futures contracts. Second, these results are consistent with the efficient market hypothesis. If profitable trading required nothing more than determining the term structure, these profits should be quickly arbitraged away. In fact, this appears to have already happened, based on the small number of statistically significant results.

Finally, the underlying price trend is shown to be the dominant factor in commodity returns. The unleaded gasoline example illustrates how capital gains (i.e., the upward trend in prices) is what matters, not dividends (i.e., roll returns). These findings will be useful to investors in understanding the behavior of their commodity investments.

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Table 1.
Term Structure and Returns
Number of Observations by Quadrant

	Total Observations	Quadrant II Backwardation and Positive Returns	Quadrant IV Contango and Negative Returns	Total "Expected" Observations	Quadrant I Contango and Positive Returns	Quadrant III Backwardation and Negative Returns	Total "Unexpected" Observations
Wheat	175	0	103	**103 (58.9%)†**	72	0	72 (41.1%)
KC Wheat	175	1	105	**106 (60.6%)†**	68	1	69 (39.4%)
Corn	175	18	78	96 (54.9%)	63	16	79 (45.1%)
Soybeans	175	35	49	84 (46.7%)	65	26	96 (53.3%)
Coffee	175	0	100	**100 (57.1%)***	75	0	75 (42.9%)
Sugar	140	23	36	59 (42.1%)	51	30	81 (57.9%)
Cocoa	175	14	56	70 (40.0%)	96	9	105 (60.0%)
Cotton	140	13	40	53 (37.9%)	57	30	87 (62.14%)
Hogs	245	44	83	127 (51.8%)	70	48	118 (48.2%)
Live Cattle	210	13	98	111 (52.9%)	64	35	99 (47.1%)
Feeder Cattle	280	10	143	153 (54.6%)	114	13	127 (45.4%)
Heating Oil	420	58	147	205 (48.8%)	176	39	215 (51.2%)
Gasoil	420	80	118	198 (47.1%)	157	65	222 (52.9%)
Unleaded	420	134	60	194 (46.2%)	115	111	226 (53.8%)
WTI Crude	420	51	163	214 (51.0%)	186	20	206 (49.0%)
Brent Crude	420	125	85	210 (50.0%)	123	87	210 (50.0%)
Natural Gas	420	8	229	**237 (56.4%)†**	150	33	183 (43.6%)
Aluminum	415‡	17	223	240 (57.8%)	164	11	175 (42.2%)
Copper	415‡	57	117	174 (41.9%)	175	66	241 (58.1%)
Lead	415‡	64	139	203 (48.9%)	168	44	212 (51.1%)
Nickel	415‡	30	212	**242 (58.3%)†**	154	19	173 (41.7%)
Zinc	415‡	8	170	178 (42.9%)	197	40	237 (57.1%)
Gold	175	0	81	81 (46.3%)	94	0	94 (53.7%)
Silver	175	0	100	**100 (57.1%)***	75	0	75 (42.9%)
S&P GSCI	420	37	146	183 (43.6%)	203	34	237 (56.4%)

* indicates statistically significant at .05 level; † indicates statistically significant at .01 level ; ‡ indicates returns were not calculated for December 2013

Table 2.
Returns by Commodity, Backwardation Only

	Units	Observations	Mean	Standard Deviation	Maximum	Minimum
Wheat	cents/bu	0	**n/a**	n/a	n/a	n/a
KC Wheat	cents/bu	2	-3.75	10.25	3.50	-11.00
Corn	cents/bu	34	13.38	81.83	225.50	-93.00
Soybeans	cents/bu	61	15.80	94.70	232.75	-171.75
Coffee	cents/lb	0	**n/a**	n/a	n/a	n/a
Sugar	cents/lb	53	-0.07	3.37	6.50	-7.63
Cocoa	$/MT	23	-10.13	207.19	195.00	-561.00
Cotton	cents/lb	43	-6.63	18.75	43.32	-49.01
Hogs	cents/lb	92	-0.18	5.14	8.80	-14.83
Live Cattle	cents/lb	48	-2.20	3.70	3.65	-10.20
Feeder Cattle	cents/lb	23	-2.23	6.57	8.03	-12.60
Heating Oil	$/gal	97	**0.07†**	0.20	0.54	-0.28
Gasoil	$/MT	145	**14.46†**	68.70	203.75	-192.25
Unleaded	$/gal	245	0.01	0.21	0.44	-0.78
WTI Crude	$/bbl	71	**2.11***	9.03	17.06	-27.67
Brent Crude	$/bbl	212	**1.28†**	6.67	17.38	-14.97
Natural Gas	$/mmBTU	41	-0.30	0.35	0.34	-0.97
Aluminum	$/MT	28	**49.86†**	106.36	196.50	-158.50
Copper	$/MT	123	-130.98	708.30	1512.00	-2156.50
Lead	$/MT	108	-12.51	336.38	854.00	-1031.00
Nickel	$/MT	49	-89.52	5907.94	10150.00	-11100.00
Zinc	$/MT	48	-237.79	267.15	244.00	-799.00
Gold	$/oz	0	**n/a**	n/a	n/a	n/a
Silver	$/oz	0	**n/a**	n/a	n/a	n/a
GSCI	index pts	71	5.05	30.56	72.10	-59.85

* indicates statistically significant at .05 level; † indicates statistically significant at .01 level ; n/a indicates no instances of backwardation

Table 3.
Returns by Commodity, Contango Only

	Units	Observations	Mean	Standard Deviation	Maximum	Minimum
Wheat	cents/bu	175	-5.51	81.33	257.50	-180.00
KC Wheat	cents/bu	173	-5.52	83.08	250.25	-192.25
Corn	cents/bu	141	**-8.33†**	40.66	73.25	-128.75
Soybeans	cents/bu	114	20.70	78.80	210.50	-142.50
Coffee	cents/lb	175	-3.11	27.21	42.20	-142.87
Sugar	cents/lb	87	0.13	1.41	2.89	-3.02
Cocoa	$/MT	152	43.45	203.77	455.00	-608.00
Cotton	cents/lb	97	1.37	5.73	14.20	-9.43
Hogs	cents/lb	153	-0.44	4.37	8.43	-12.25
Live Cattle	cents/lb	162	**-1.20†**	3.49	4.93	-12.10
Feeder Cattle	cents/lb	257	0.01	4.72	9.75	-13.53
Heating Oil	$/gal	323	-0.01	0.23	0.52	-1.03
Gasoil	$/MT	275	-2.24	73.12	152.50	-321.75
Unleaded	$/gal	175	0.04	0.24	0.43	-0.74
WTI Crude	$/bbl	349	**-0.72***	8.18	17.06	-32.65
Brent Crude	$/bbl	208	-0.39	9.65	16.09	-33.98
Natural Gas	$/mmBTU	379	**-0.15†**	0.72	1.80	-4.03
Aluminum	$/MT	387	**-28.21†**	171.20	532.75	-568.25
Copper	$/MT	292	80.58	558.42	1731.00	-1753.25
Lead	$/MT	307	9.36	239.61	736.00	-776.50
Nickel	$/MT	366	**-228.88***	2254.19	5840.00	-7880.00
Zinc	$/MT	367	-0.76	195.20	755.50	-588.50
Gold	$/oz	175	4.39	56.87	196.80	-156.40
Silver	$/oz	175	0.01	2.43	6.81	-5.47
GSCI	index pts	349	-2.05	44.53	94.50	-185.00

* indicates statistically significant at .05 level; † indicates statistically significant at .01 level

Table 4.
Comparison of Statistical Results, Directional and Quantitative Tests

	Directional	Mean Returns, Backwardation Only	Mean Returns, Contango Only
Wheat	†	n/a	
KC Wheat	†		
Corn			†
Soybeans			
Coffee	*	n/a	
Sugar			
Cocoa			
Cotton			
Hogs			
Live Cattle			†
Feeder Cattle			
Heating Oil		†	
Gasoil		†	
Unleaded			
WTI Crude		*	*
Brent Crude		†	
Natural Gas	†		†
Aluminum		†	†
Copper			
Lead			
Nickel	†		*
Zinc			
Gold		n/a	
Silver	*	n/a	
GSCI			

*indicates statistically significant at .05 level; † indicates statistically significant at .01 level; n/a indicates no instances of backwardation; blank cell indicates not statistically significant at .05 level

Table 5.
Returns on a Long Position in Unleaded Gasoline, Backwardation Only

	Total Trades	Profitable Trades	Total Profits (per gallon)
2007	38	27 (71.1%)	$1.57
2008	25	13 (52.0%)	−$0.05
2009	22	10 (45.5%)	$1.13
2010	33	27 (81.8%)	$2.20
2011	39	18 (46.2%)	−$0.98
2012	45	24 (53.3%)	$0.35
2013	43	15 (34.9%)	−$1.18
2007-2013	245	134 (54.7%)	$3.04

Table 6.
Returns on a Long Position in Unleaded Gasoline, Contango Only

	Total Trades	Profitable Trades	Total Profits (per gallon)
2007	22	19 (86.4%)	$3.69
2008	35	16 (45.7%)	−$6.83
2009	38	28 (73.7%)	$3.36
2010	27	12 (44.4%)	−$0.72
2011	21	20 (95.2%)	$3.78
2012	15	15 (100.0%)	$2.87
2013	17	5 (29.4%)	$0.54
2007-2013	175	115 (65.7%)	$6.70

Figure 1.
S&P GSCI Index, 2007-2013

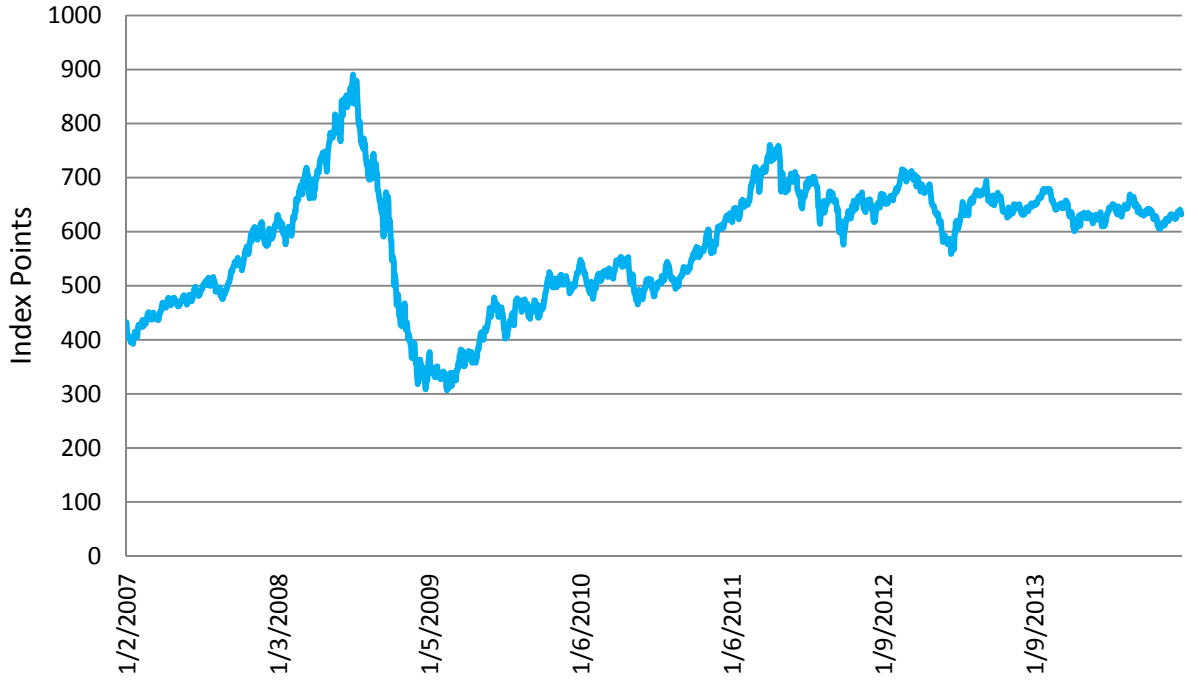


Figure 2.
Lean Hogs Returns vs. Term Structure

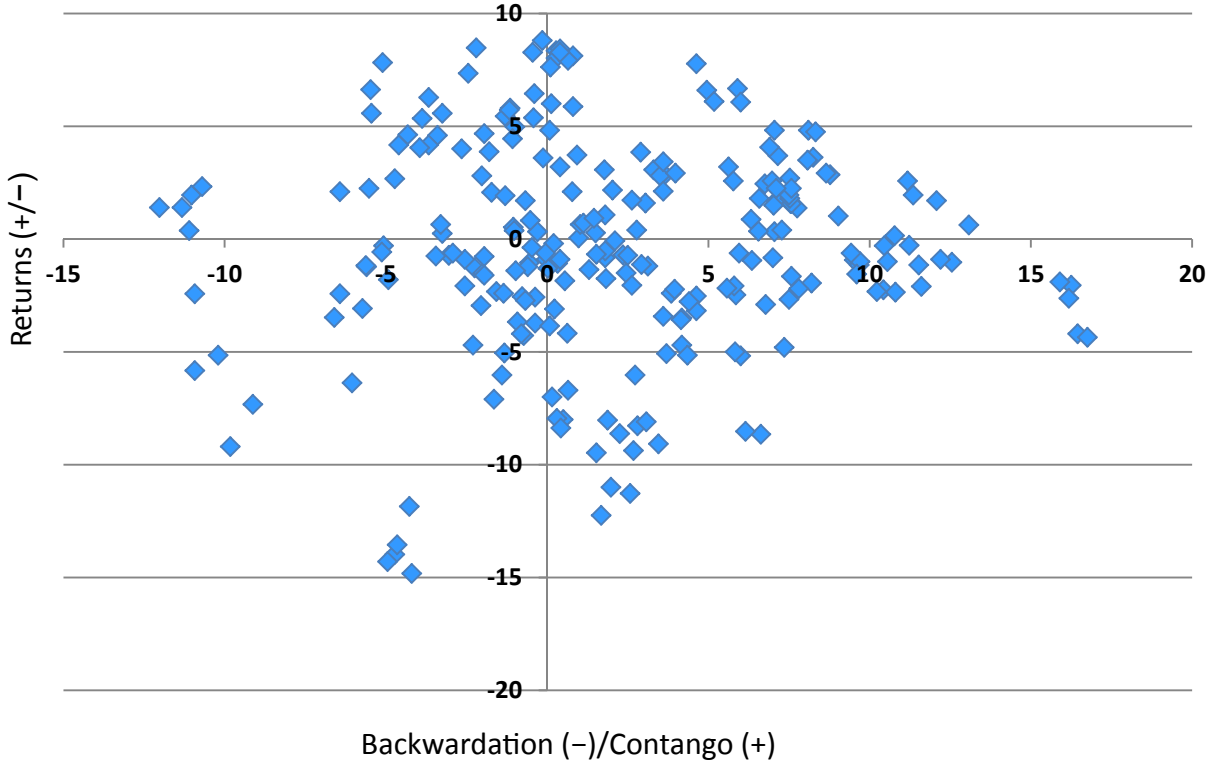
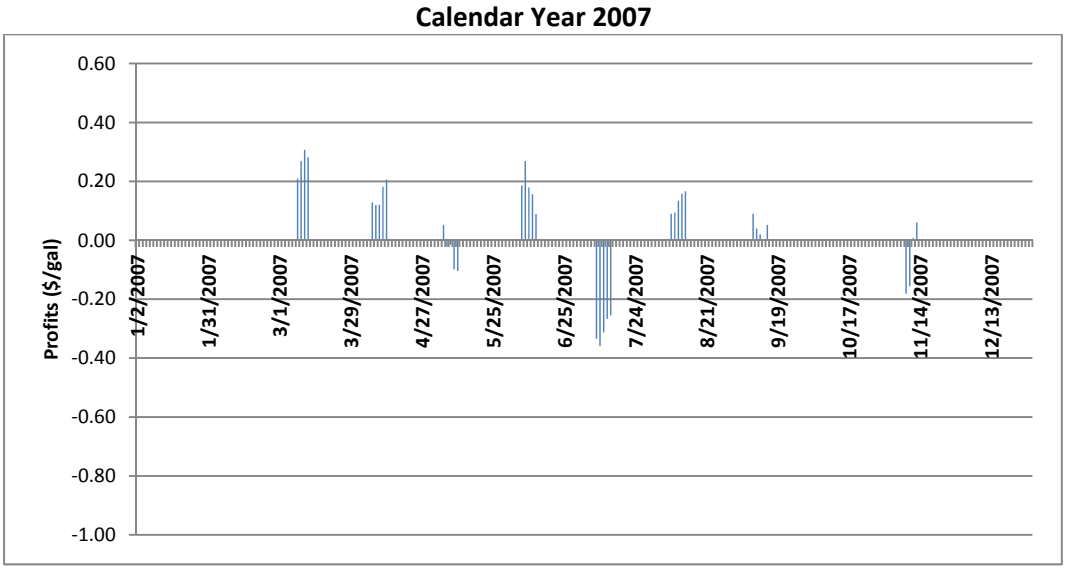
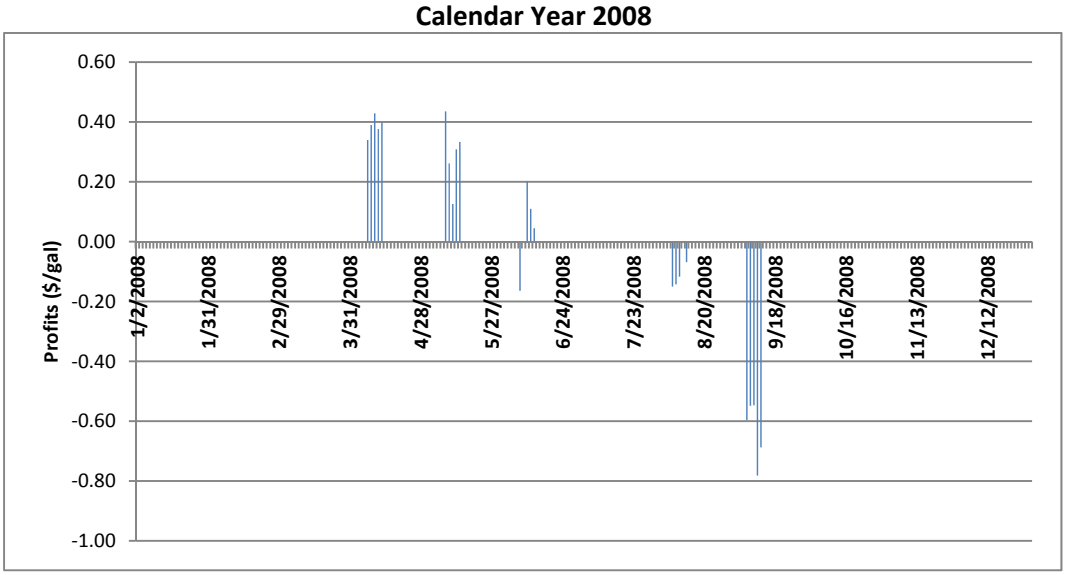
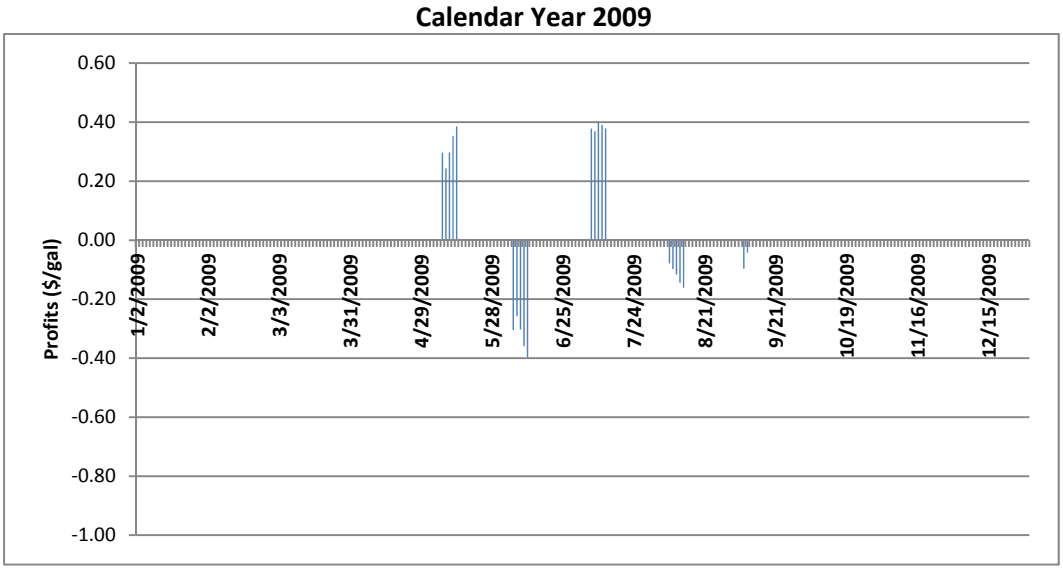
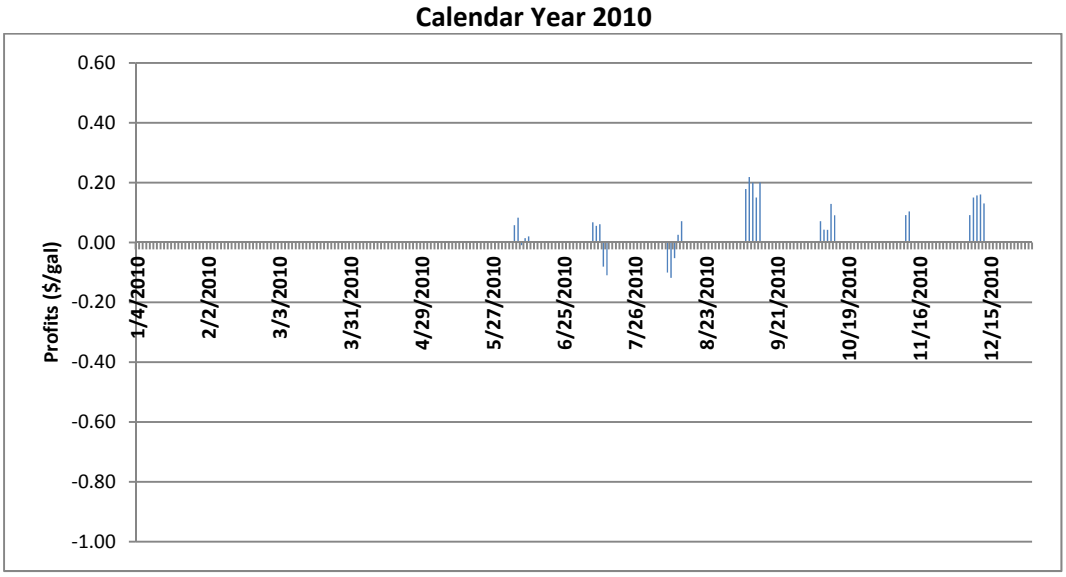


Figure 3.
Returns on a Long Position in Unleaded Gasoline, Backwardation Only






Calendar Year 2009
Profits ($/gal)
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
1/2/2009
2/2/2009
3/3/2009
3/31/2009
4/29/2009
5/28/2009
6/25/2009
7/24/2009
8/21/2009
9/21/2009
10/19/2009
11/16/2009
12/15/2009


Calendar Year 2010
Profits ($/gal)
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
1/4/2010
2/2/2010
3/3/2010
3/31/2010
4/29/2010
5/27/2010
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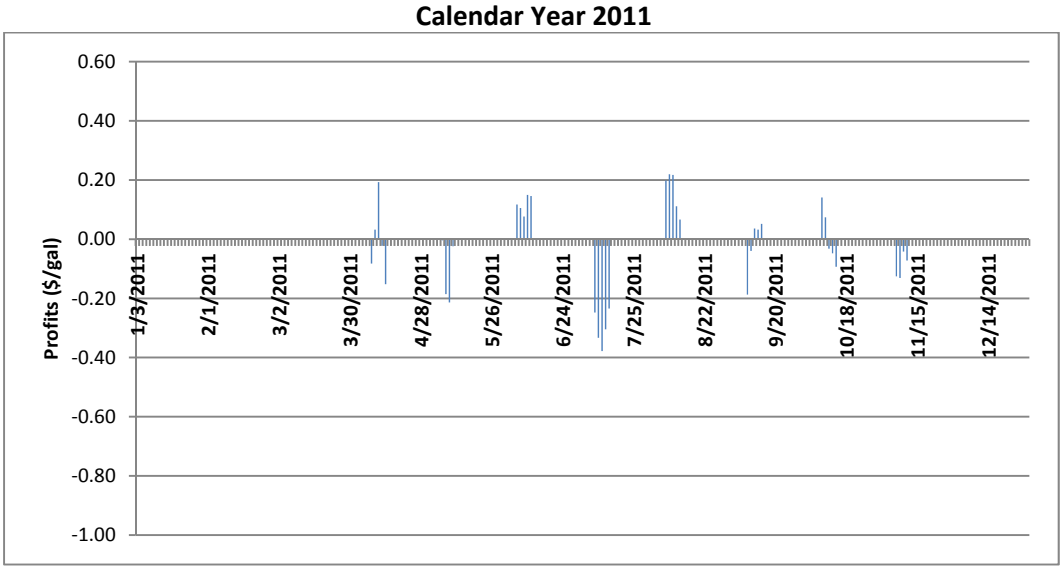
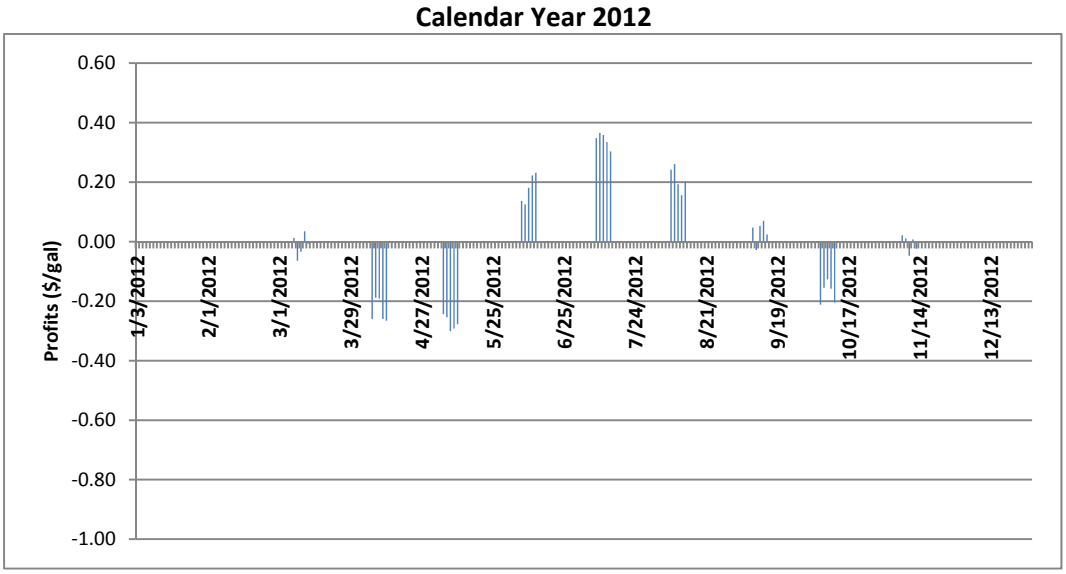
11/16/2010
12/15/2010


Calendar Year 2011
Profits ($/gal)
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
1/3/2011
2/1/2011
3/2/2011
3/30/2011
4/28/2011
5/26/2011
6/24/2011
7/25/2011
8/22/2011
9/20/2011
10/18/2011
11/15/2011
12/14/2011


Calendar Year 2012
Profits ($/gal)
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
1/3/2012
2/1/2012
3/1/2012
3/29/2012
4/27/2012
5/25/2012
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10/17/2012
11/14/2012
12/13/2012

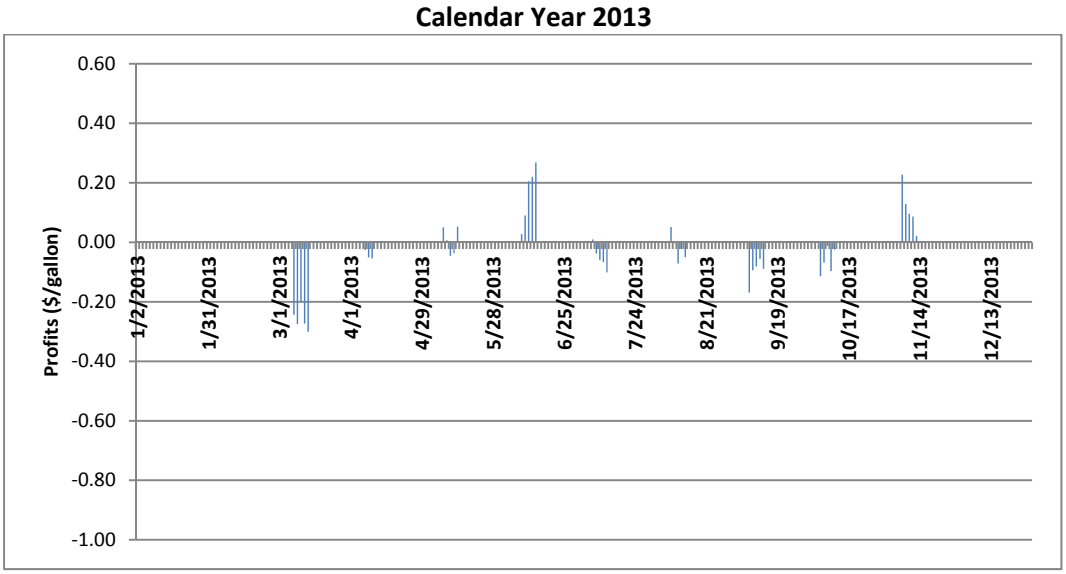
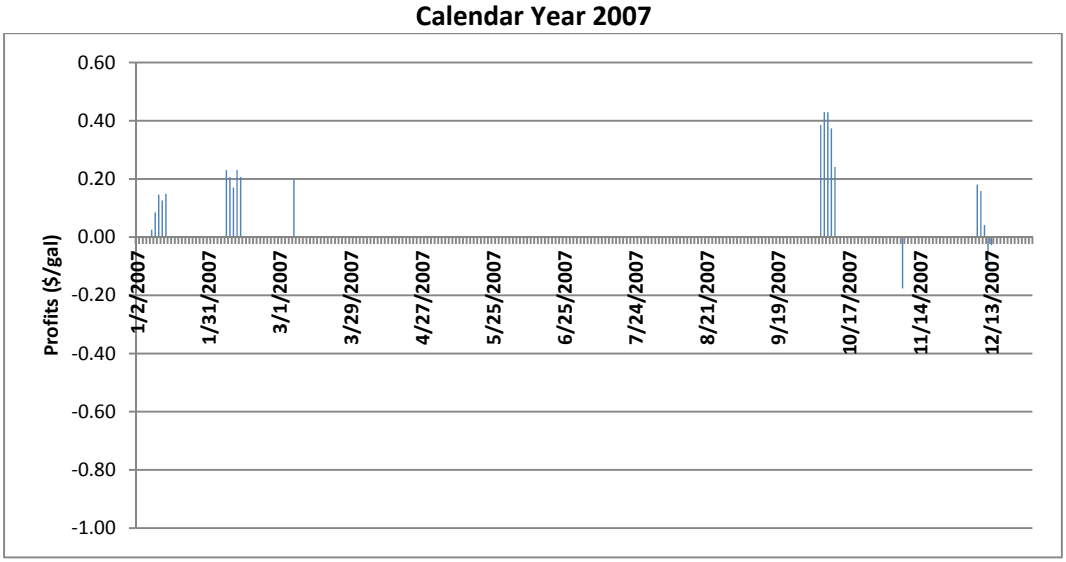
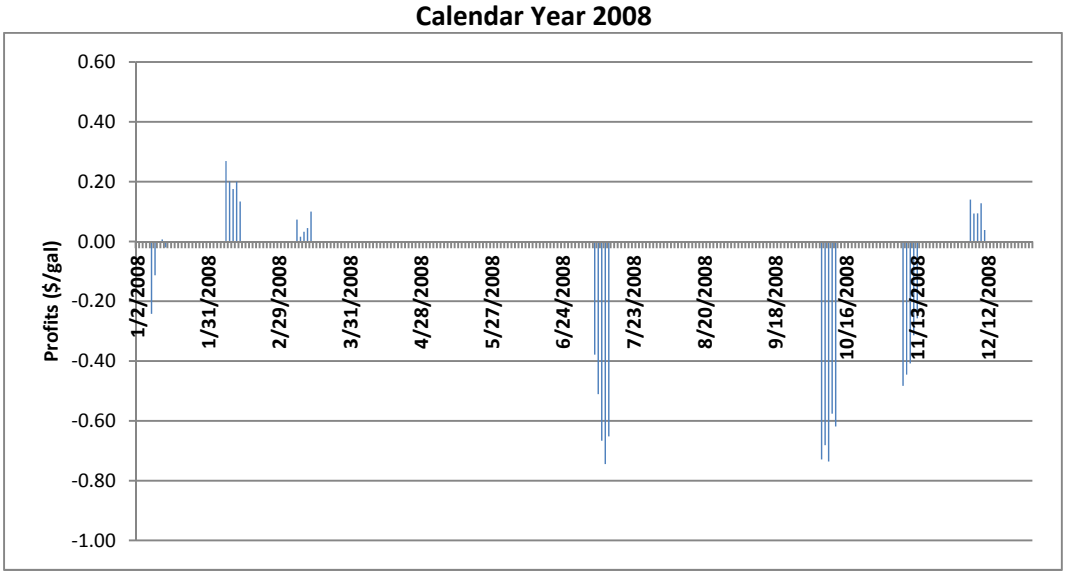
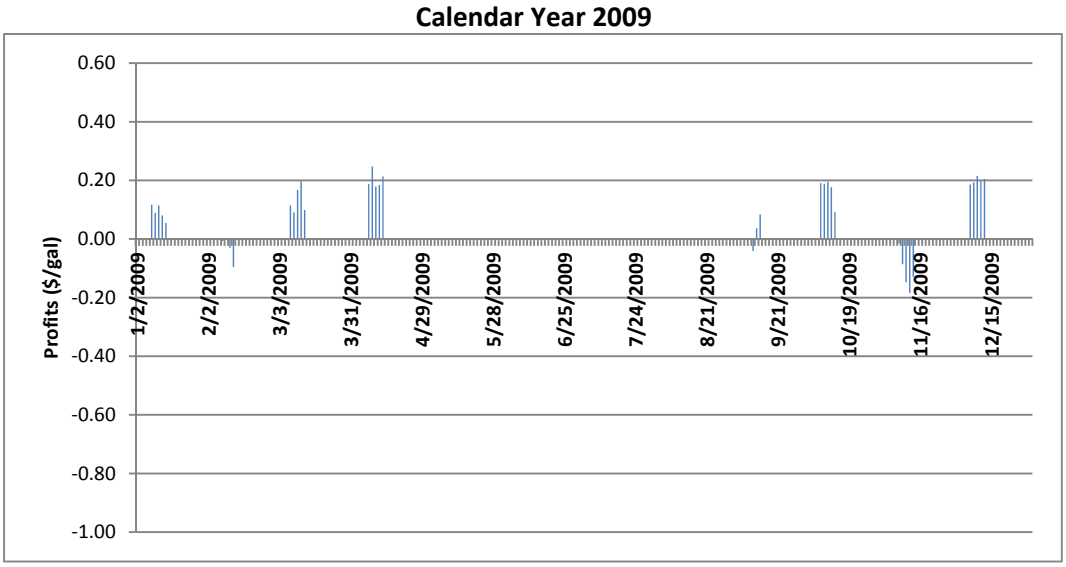

Calendar Year 2013
Profits ($/gallon)
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
1/2/2013
1/31/2013
3/1/2013
4/1/2013
4/29/2013
5/28/2013
6/25/2013
7/24/2013
8/21/2013
9/19/2013
10/17/2013
11/14/2013
12/13/2013

Figure 4.
Returns on a Long Position in Unleaded Gasoline,
Contango Only






Calendar Year 2009
Profits ($/gal)
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
1/2/2009
2/2/2009
3/3/2009
3/31/2009
4/29/2009
5/28/2009
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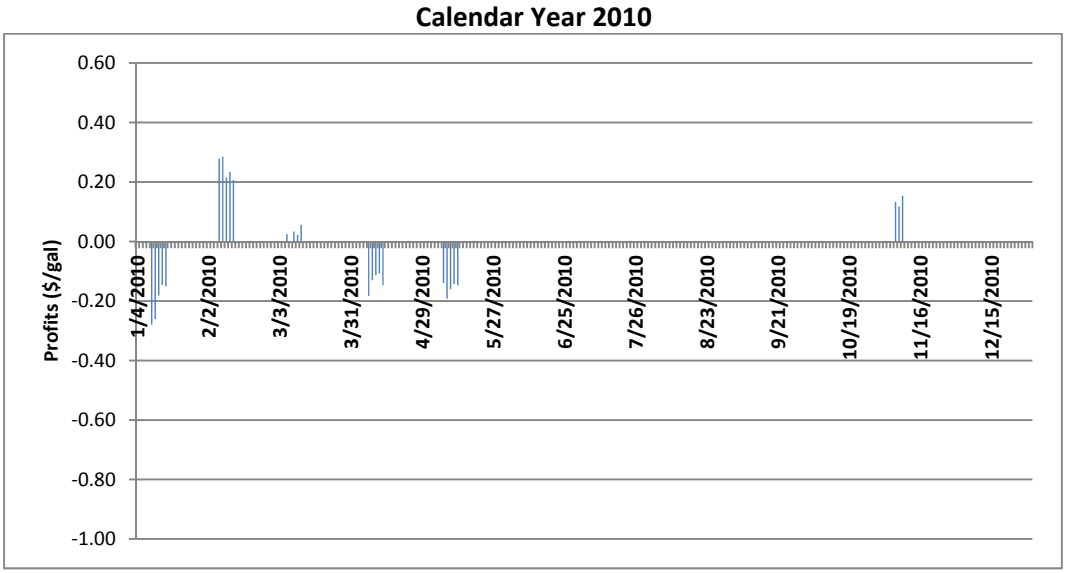
11/16/2009
12/15/2009


Calendar Year 2010
Profits ($/gal)
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
1/4/2010
2/2/2010
3/3/2010
3/31/2010
4/29/2010
5/27/2010
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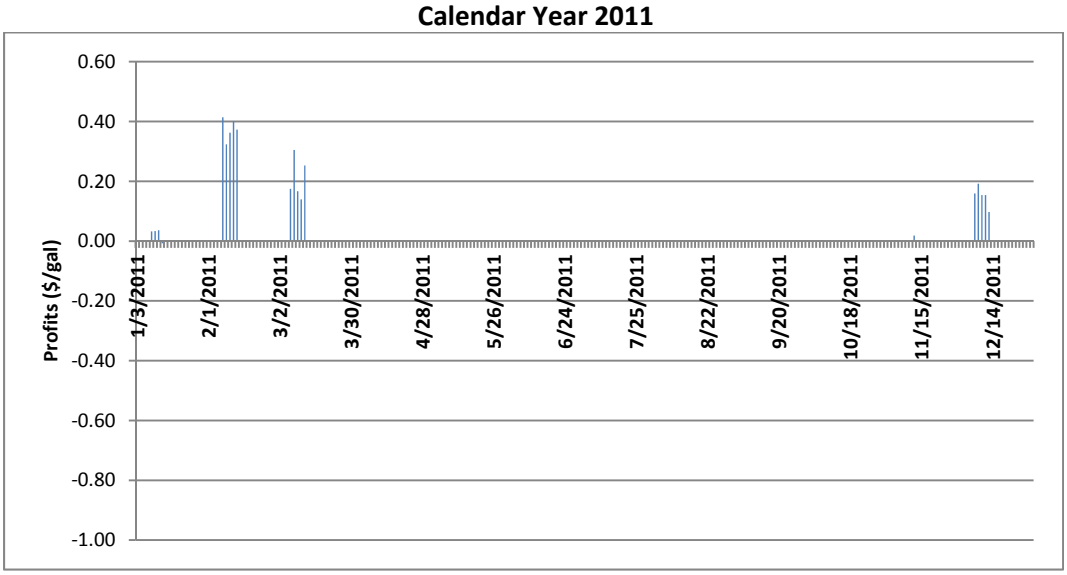
9/21/2010
10/19/2010
11/16/2010
12/15/2010


Calendar Year 2011
Profits ($/gal)
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
1/3/2011
2/1/2011
3/2/2011
3/30/2011
4/28/2011
5/26/2011
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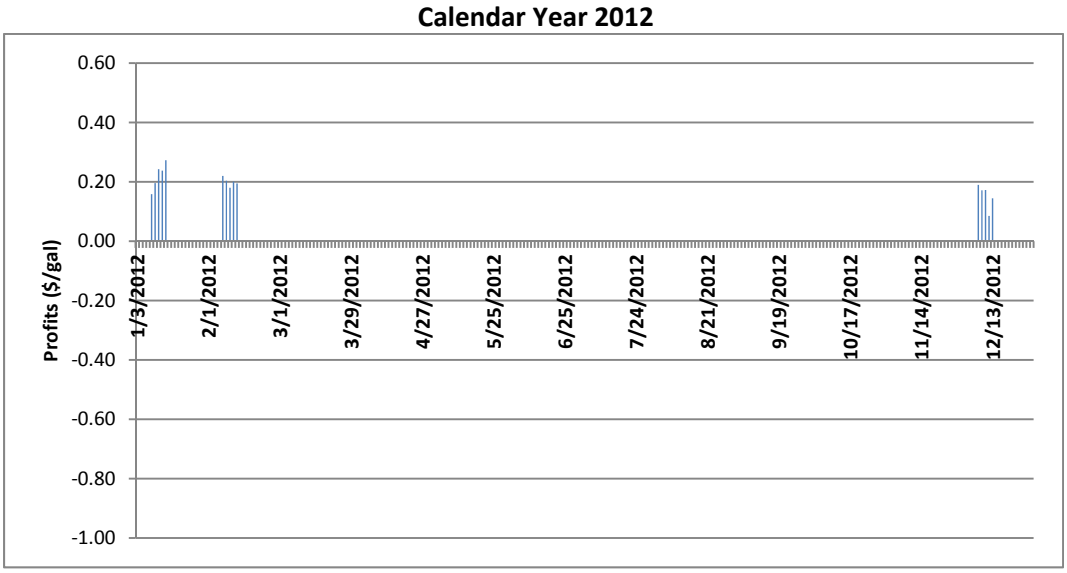
9/20/2011
10/18/2011
11/15/2011
12/14/2011


Calendar Year 2012
Profits ($/gal)
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
1/3/2012
2/1/2012
3/1/2012
3/29/2012
4/27/2012
5/25/2012
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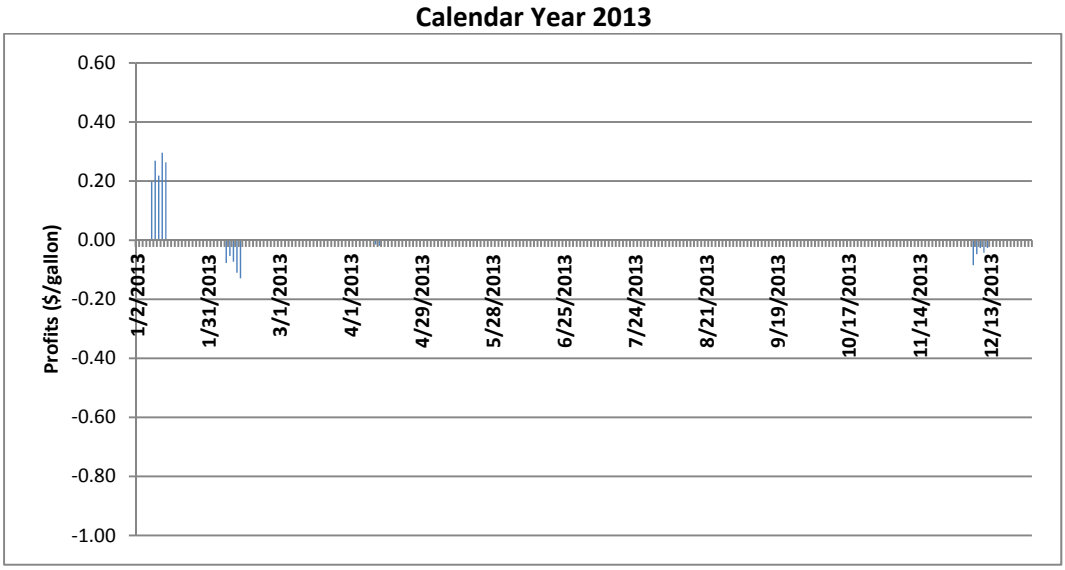
12/13/2012


Calendar Year 2013
Profits ($/gallon)
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
1/2/2013
1/31/2013
3/1/2013
4/1/2013
4/29/2013
5/28/2013
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12/13/2013
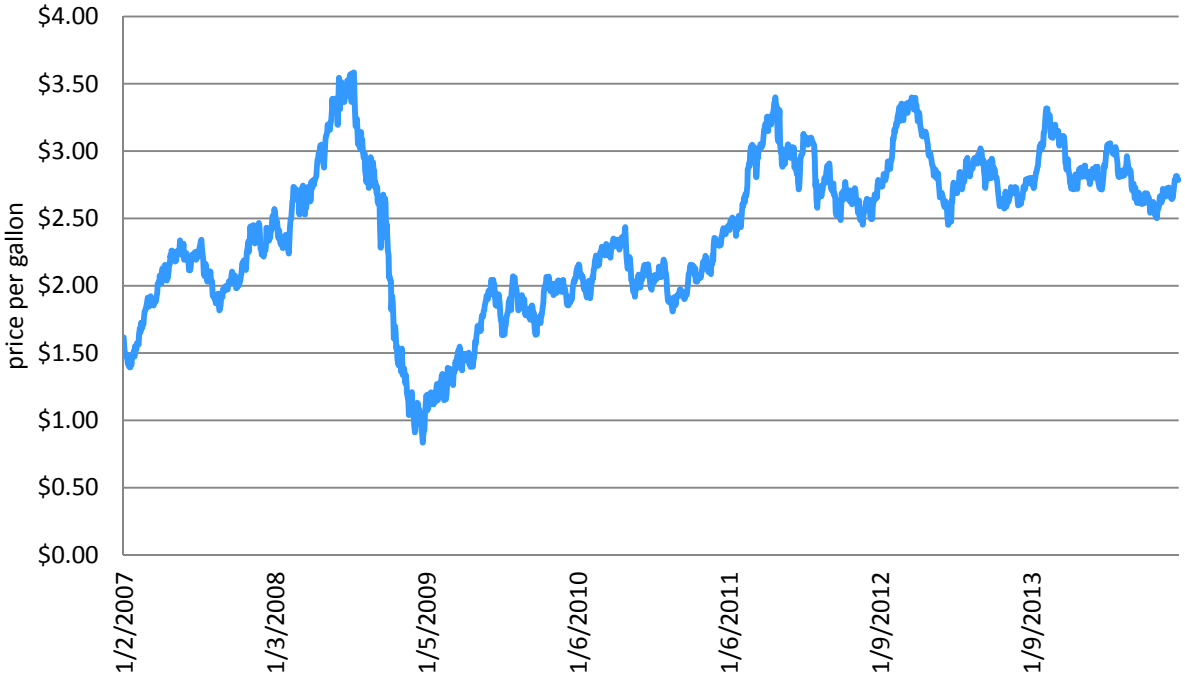
Figure 5.
Unleaded Gasoline Futures, Nearby Month