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TRADING STRATEGIES IN FUTURES MARKETS

Ivan Francisco Julio[*], M. Kabir Hassan[*] and Geoffrey M. Ngene[**]

ABSTRACT

In this article, we investigate the profitability of momentum and contrarian portfolio strategies in a cross-section of broad futures markets. We identify 16 profitable momentum strategies that earn 33.64% average return a year and 16 profitable contrarian strategies that earn 10.69% average return a year. Overall, this indicates that relative-strength and contrarian strategies perform better on a risk-adjusted basis than passive long-only strategies in equity and futures markets, making futures markets contracts better candidates to be included in well-diversified portfolios. Further, since arbitrage strategies are more readily available in futures markets than in equity markets due to the low cost and high liquidity of futures trading, these results have significant implications for academics in terms of market efficiency and for practitioners in terms practical trading strategies and asset allocation.

Keywords *Futures Market, Momentum, Contrarian Strategies, Diversification*

JEL classification codes *G11, G13*

INTRODUCTION

Until recently, futures markets were a relatively unknown asset class by both the individual and institutional investor, despite being available for trade in the United States for more than 100 years and even longer in other parts of the world[1]. The reason for this may be that futures market contracts are remarkably different from stocks, in the sense that they are short-maturity derivative claims on real assets, not claims on long-lived corporations; and possibly because of the lack of easily futures markets return data (Gorton and Rouwenhorst, 2006).

However, in recent times, individual and institutional investors are turning to futures markets to trade. Moreover, recent academic research has claimed "equity-like" returns to portfolios of commodity futures while also touting the diversification benefits relative to traditional asset classes[2] (Gorton and Rouwenhorst, 2006; Erb and Harvey, 2006). Markets participants also find in futures a first-rate instrument to hedge against inflation. Futures also offer leverage and are not subject to short-selling restrictions prevalent in the equity markets. Moreover, the nearby contracts are usually very liquid and transaction costs are low compared to the stocks markets

[*] Department of Economics and Finance, University of New Orleans, 2000 Lakeshore Drive, New Orleans, LA 70148, USA, *E-mail: ijulio@uno.edu, mhassan@uno.edu*

[***] Stetson School of Business and Economics, Mercer University, 1400 Coleman Avenue, Macon, GA 31207, USA, *E-mail: ngene_gm@mercer.edu*

trade. These make futures good candidates for tactical and strategic asset allocation (Wang and Yu, 2004; Erb and Harvey, 2006) with new implications for futures market efficiency and for futures market participants' trading strategies.

This study investigates whether the profitable momentum portfolio strategy (of buying past winners and selling past losers) and the long-term contrarian portfolio strategy (of buying past losers and selling past winners) identified in equity markets by Jegadeesh and Titman (1993, 2001) and De Bondt and Thaler (1985) are present in a cross-section of broad futures markets. Our article builds on the research of Wang and Yu, (2004) and Erb and Harvey (2006). The authors find strong evidence of futures return reversals over the 1-week horizon. Specifically, they find that a contrarian strategy of buying past losers and selling past winners gives rise to an average return of 0.31% per week (16.12% per annum). Erb and Harvey's article find evidence that a momentum strategy of buying past winners and selling past losers with a 12-month ranking period and a 1-month holding period is profitable in futures markets achieving an attractive excess return of 10.8% per year.

In particular, this paper looks at the performance of 16 momentum strategies in futures markets for four ranking periods (4, 6, 9 and 12 months) and four holding periods (1, 2, 3, and 4 months). We find that the winner portfolios typically outperform the loser portfolios over holding periods that range from 1 to 4 months and this pattern holds for each of our formation periods. Across the 16 strategies that are profitable, one could make a profit of an average return of 33.63% a year by consistently buying the best performing futures and selling the worst performing ones. We also find evidence of a contrarian strategy in which past winners turn into losers over ranking and holding periods that range from 1 to 5 years. The average returns of the past winner portfolios range from -3.92% to -0.94% a year while the average returns of the past loser portfolios range from 6.78% to 16.07%.

The remainder of this paper is organized as follows. Section 2 describes the data set and shows summary descriptive statistics. Section 3 summarizes the methodology used to construct momentum and contrarian portfolios. Section 4 discusses the results from the momentum strategies. Section 5 highlights the results of the contrarian strategies. Finally, section 6 highlights the most important finding in our article and delineates further guidelines for future research.

2. DATA DESCRIPTION

In this article, we analyze monthly settlement prices for 43 US futures market contracts over the period January 1970-June 2008. These data were obtained from Price-Data Corporation. To avoid survivorship bias, we include contracts that started trading after January 1970 or were delisted before June 2008. In consequence, the total sample size ranges from a low of 12 contracts over the period April 1970-November 1973 to a peak of 43 contracts over the period January 1999-September 2003.

The composition of our sample is as follows: we consider eight currencies futures (Australian Dollar, British Pound, Brazilian Real, Canadian Dollar, Dollar Index, Euro Currency, Japanese Yen, Swiss Franc), three energies futures (Crude Oil, Heating Oil, and Natural Gas), eight financials futures (Eurodollars, EuroYen, Fed. Funds, Five Year Notes, Muni Bonds, Treasury

Bills, Ten Year Notes, Thirty Year Bonds), five foods futures (Cocoa, Orange Juice, Coffee, Rough Rice, Sugar), eight grains futures (Soybean Oil, Corn, Kansas City Wheat, Minnesota Wheat, Oats, Soybeans, Soybean Meal, Wheat), seven metal/fiber futures (Cotton #2, Gold, High Grade Copper, Lumber, Palladium, Platinum, Silver), and lastly, four meat futures (Feeder Cattle, Live Cattle, Lean Hogs, Pork Bellies). One word of caution about our sample is worth mentioning. We do not include contracts that are traded in international markets such as London futures, Sydney futures, Tokyo futures and Winnipeg futures markets. It is noted that excluding these contracts might introduces a sample selection bias.

Following the tradition in the futures markets' literature, we compute monthly futures returns as the change in the logarithms of the settlement prices. Continuous series of futures returns are created for each futures contract, for both the first and the second nearest-to-maturity contracts. Because individual futures contracts have a finite life defined by the contractual delivery date, an investor must sell a maturing contract and buy a yet-to-mature contract. This process is referred to as "rolling" a futures position. Therefore, these return series are created by using a rollover strategy. The procedure is as follows. First, we collect the futures prices on all nearest and second nearest contracts. We hold the first nearby contract up to one month before maturity. At the end of that month, we roll our position over to the second nearest contract and hold that contract up to one month prior to maturity. The procedure is then rolled forward to the next set of nearest and second nearest contracts when a new sequence of futures returns is computed[3].

The article also tests the sensitivity of the results to the day of the month employed to compute futures returns. Therefore, we not only calculated monthly returns by picking the settlement price of the first trading day for each month as in Fama and French (1987) but we also calculate returns based on the price of the last trading day of the month as in Erb and Campbell (2006). Moreover, to ensure that the results are not driven by weekend effect we calculate returns based on the second Wednesday prices of each month (See Table 1). This exercise indicates that the day of the month chosen to calculate the returns do not alter our results. To see why this is the case, notice that the summary statistics presented in Table 1 are all similar to the one presented in Table 2.

Table 2 presents summary statistics for monthly futures returns over the sample period for the nearest-to-maturity series for all contracts. Table 2 shows a positive unconditional mean return for all except the British Pound, Brazilian Real and Dollar Index futures markets. The return is insignificant. This suggests that a simple buy-and-hold strategy is not likely to be profitable in most futures markets.Without exception, the t-values reported in column 3 of Table 2, show that for most futures contracts, the average futures return is not significantly different from zero. Bessembinder (1992), and Bessembinder and Seguin (1993) use a sample period that only partially overlaps with our sample period and report similar statistics for these categories of futures contracts. However, they find that mean returns on agricultural and mineral futures are comparable in (absolute) size with the mean returns on financial and currency futures. We find similar results in our sample. For instance, mean returns on foods, grains, metals/fiber, meat and energies futures are larger than the mean returns on financial and currency futures. As expected, standard deviations for foods, grains, metals/fiber, meat and energies futures returns are also somewhat larger than for financial futures.

Table 1
Sensitivity Analysis for Futures Returns Construction

Returns are calculated from monthly data for the period January 1970 to June 2008. Mean returns and standard deviations are annualized and are in percentages. Monthly returns are calculated by picking the settlement price of the second Wednesday of the month, the first trading day and last trading day of each month.

	Average			*Std. Dev.*		
	2nd Wed	*First Trading Day*	*Last Trading Day*	*2nd Wed*	*First Trading Day*	*Last Trading Day*
Foods						
Cocoa	3.42	3.17	3.37	30.00	30.58	30.26
Orange Juice	2.34	2.36	2.01	31.32	31.04	31.22
Coffee	2.15	1.98	2.14	35.78	37.83	37.61
Rough Rice	7.17	7.25	7.02	31.50	30.19	30.49
Sugar	3.22	3.24	2.94	43.11	41.84	40.73
Grains				0.00	0.00	0.00
Soybean Oil	5.09	5.14	4.97	31.99	32.09	32.66
Corn	4.24	4.33	4.27	24.81	25.87	24.77
Kansas City Wheat	2.49	2.48	2.59	23.35	21.49	21.79
Minnesota Wheat	2.18	2.17	2.19	24.15	22.38	22.87
Oats	5.05	4.72	4.91	28.76	31.86	31.63
Soybeans	4.50	4.55	4.47	26.45	29.43	28.19
Soybean Meal	4.04	3.89	3.95	28.18	29.63	33.87
Wheat	4.42	4.47	4.44	27.34	26.18	26.53
Metals/Fiber				0.00	0.00	0.00
Cotton	2.72	2.46	2.57	30.17	28.52	28.74
Gold	4.82	4.80	4.80	20.65	19.16	19.13
High Grade Copper	4.47	4.28	4.39	25.62	26.46	26.12
Lumber	1.60	1.82	1.88	29.05	29.50	29.57
Palladium	7.00	7.06	6.59	34.91	36.03	35.90
Platinum	6.72	6.68	6.65	26.70	28.48	27.17
Silver	5.73	5.80	5.66	33.86	32.08	31.90
Meats				0.00	0.00	0.00
Feeder Cattle	1.99	1.93	2.21	18.44	18.12	18.09
Live Cattle	2.99	3.25	3.16	21.29	20.26	20.22
Lean Hogs	2.76	2.64	2.76	31.52	32.83	32.02
Pork Bellies	1.45	1.37	1.32	44.26	41.02	42.10
Energies						
Crude Oil	5.70	5.98	6.00	32.12	32.12	32.53
Heating Oil	6.36	6.36	5.80	30.90	33.06	33.04
Natural Gas	10.54	11.53	11.19	54.62	56.16	57.96
Financials				0.00	0.00	0.00
Eurodollars	0.57	0.54	0.48	1.95	1.98	1.94
EuroYen	0.32	0.31	0.32	0.69	0.68	119.83
Fed. Funds	0.34	0.35	0.33	1.00	0.93	0.96
Five Year Notes	0.67	0.66	0.64	4.75	4.92	4.82
Muni Bonds	0.99	1.00	1.04	10.76	10.05	10.04
Treasury Bills	0.15	0.16	0.15	2.88	2.44	2.45
Ten Year Notes	1.77	1.74	1.56	7.49	7.41	7.24
Thirty Year Bonds	1.03	1.02	0.97	14.78	14.28	14.07
Currencies						
Australian Dollar	1.68	1.85	1.79	9.64	10.10	9.95
British Pound	-0.57	-0.49	-0.45	10.51	10.40	10.48
Brazilian Real	-4.25	-4.11	-4.00	45.51	46.53	48.95
Canadian Dollar	0.07	0.07	0.11	5.32	5.77	5.75
Dollar Index	-2.37	-2.49	-2.37	8.73	8.87	8.60
Euro Currency	3.02	2.90	3.38	9.62	9.54	8.96
Japanese Yen	3.29	3.30	3.22	11.75	12.22	11.87
Swiss Franc	2.44	2.60	2.47	12.09	12.53	12.40

Table 2
Summary Statistics for Futures Returns

Returns are calculated from monthly data for the period January 1970 to June 2008. Mean returns and standard deviations are annualized and are in percentages

Contract Name	*Mean*	*Std. Dev.*	*t-value*
Currencies			
Australian Dollar	1.68	39.03	0.69
British Pound	-0.57	43.16	-0.26
Brazilian Real	-4.25	339.87	-0.15
Canadian Dollar	0.07	20.07	0.07
Dollar Index	-2.37	34.79	-1.12
Euro Currency	3.02	38.9	0.82
Japanese Yen	3.29	49.24	1.30
Swiss Franc	2.44	50.96	0.96
Financials			
Eurodollars	0.57	6.95	1.45
EuroYen	0.32	2.42	1.89
Fed. Funds	0.34	3.5	1.48
Five Year Notes	0.67	17.74	0.58
Muni Bonds	0.99	44.35	0.35
Treasury Bills	0.15	10.46	0.27
Ten Year Notes	1.77	29.28	1.02
Thirty Year Bonds	1.03	65.12	0.30
Energies			
Crude Oil	5.7	189.83	0.52
Heating Oil	6.36	178.82	0.67
Natural Gas	10.54	479.49	0.32
Foods			
Cocoa	3.42	170.89	0.41
Orange Juice	2.34	182.55	0.28
Coffee	2.15	225.31	0.19
Rough Rice	7.17	184.13	0.63
Sugar	3.22	308.52	0.22
Grains			
Soybean Oil	5.09	188.63	0.58
Corn	4.24	129.34	0.70
Kansas City Wheat	2.49	118.72	0.41
Minnesota Wheat	2.18	124.49	0.32
Oats	5.05	160.42	0.68
Soybeans	4.50	141.82	0.68
Soybean Meal	4.04	155.62	0.56
Wheat	4.42	148.8	0.64
Metals/Fiber			
Cotton	2.72	172.42	0.34
Gold	4.82	100.36	0.96
High Grade Copper	4.47	135.45	0.71
Lumber	1.6	162.86	0.20
Palladium	7.00	216.53	0.63
Platinum	6.72	143.77	1.00
Silver	5.73	206.18	0.6
Meats			
Feeder Cattle	1.99	86.32	0.47
Live Cattle	2.99	104.57	0.61
Lean Hogs	2.76	184.31	0.32
Pork Bellies	1.45	323.28	0.10

3. METHODOLOGY

This paper evaluates 32 trading strategies. In particular, we focus on 16 short-term momentum strategies with four ranking periods (4, 6, 9, and 12 months) and four holding periods (1, 2, 3, and 4 months) and in 16 long-term contrarian strategies with four ranking periods (12, 24, 36 and 60 months) and four holding periods[4] (12, 24, 36 and 60 months).

Futures contracts are sorted at the end of each month into deciles based on their average return over the previous *J* months (ranking period). The decision to form deciles was based to enhance the dispersion of returns between the best and worst performing futures and thus the profitability of the strategies. By adopting this approach, our cross section return gets smaller as the risk diversification decreases. Wang and Yu (2004) find evidence suggesting that trading activity enhances short-term contrarian profits in futures markets. Therefore, the futures contracts in each of the deciles are value weighted by adopting a weighting scheme that assigns higher weights to the contracts with higher open interests.

The performance of both the top and bottom deciles is monitored over the subsequent *K* months holding period over which no rebalancing is made. We call the resulting strategy the *J-K* momentum or contrarian strategy. Following the traditional momentum literature (Moskowitz and Grinblatt, 1999 and Jegadeesh and Titman, 2001), we form overlapping winner and loser portfolios. Taking, as an example, the 6-3 momentum strategy, the winner portfolio in, say, November is formed by equally weighting the top 3 deciles portfolios that were formed at the end of August, September and October. The same mechanics applies to the loser portfolio. Its return is equal to the average return in November of the 3 bottom deciles that were formed at the end of August, September and October. The return of the momentum (contrarian) strategy is then simply defined as the difference in the November returns of the winner (loser) and loser (winner) portfolios. The procedure is rolled over to the next month, where another set of winners, losers, momentum and contrarian portfolios is formed. Since the October winner and loser contribute towards only a third of the November momentum profits, it is realistic to assume that the momentum profits are not driven by bid-ask bounce. Therefore, following Moskowitz and Grinblatt (1999), we chose not to skip a month between the ranking and holding periods.

4. MOMENTUM STRATEGIES

In this section we examine whether future returns are predictable based on past returns over short horizons in futures markets by showing the results of our momentum strategies. We test 16 short-term momentum trading strategies with four ranking periods (4, 6, 9 and 12 months) and four holding periods (1, 2, 3, and 4 months). Table 3 presents summary statistics of returns for these short-term momentum strategies where the rows represent the ranking periods in which the portfolios cumulative returns were calculated and the columns the holding periods. For example, the first row and column present the average return for a portfolio of a relative strength strategy based on 12 month lagged returns and one month holding period.

It is clear from Table 3 that the winner portfolios typically outperform the loser portfolios over holding periods that range from 1 to 4 months. Note that this pattern holds for each of our formation periods. Note that for 12 out of 16 strategies the difference in returns between the winner and the loser portfolios is positive and significant at the 1% level. The other four strategies

give us a positive average return and are still significant at the 5% level. Across the 16 strategies that are profitable, one could earn an average return of 33.63% a year by consistently buying the best performing futures contracts and selling the worst performing ones. The results in Table 3 are consistent with Erb and Harvey (2006) who observe that a 12-1 momentum strategy is profitable in futures markets. Our results are also in line with the well-known results of Jegadeesh and Titman (1993, 2001) who show that stocks that perform the best (worst) over a 3 to 12 months period tend to continue to perform well (poorly) over the subsequent 3 to 12 months.

We observe that in 10 out of the 16 strategies that are profitable, the loser portfolios always earn negative and significant average return that range from a low of -0.03% (for the 12-4 strategy) to a high of -28.71% (for the 4-1 strategy). The data from the 16 winner portfolios is significant both in economic and statistical terms. The winner portfolios offer average returns that can range from a low of 10.10% (for the 6-4 strategy) to a high of 41.11% (for the 4-1 strategy). According to our results and within the frame of our 16 trading strategies we can conclude that price continuation in futures markets is mainly driven by the winners.

We also report in Table 3 the annualized standard deviations and the Sharpe's reward-to-risk ratios of the strategies given the possibility that the momentum strategies might pay off as a compensation for risk. As we would expect, the most profitable strategies rank among the most risky. To see why this is the case, notice that the 4-1 momentum strategy with an average returns of 96.08% offers the highest average returns and, with a standard deviation of 68.82%, it is also the most volatile. On the other hand, any trading strategy that combines any of the proposed rankings periods (12, 9, 6, or 4) with 4-month holdings period momentum strategy falls among the lowest level of risk strategies (between 37.30% and 44.43%), subsequently, it gives the lowest average return (between 11.81% and 20.52%).

However, two unexpected result are worth mentioning. The 6-1 and 4-1 profitable momentum strategies in Table 3 had reward-to-risk ratios greater than one, which indicates that the return is greater than or proportional to the risk the investor incurred to earn that return. A negative Sharpe ratio would indicate that a risk-less asset would perform better than the security being analyzed. Over the same period, a long-only portfolio that equally weights the 43 futures contracts we considered in this study earned 5.09% a year with a Sharpe ratio of 0.001. We also note that over the same period, the S&P500 composite index had earned a 1.18% a year with a Sharpe ratio of 0.1325. Overall, this indicates that momentum strategies perform better on a risk-adjusted basis than passive long-only strategies in equity and futures markets.

5. CONTRARIAN STRATEGIES

This section presents the summary statistics of returns of long-term contrarian strategies in futures markets. In particular, it analyzes 16 long-term contrarian strategies with four ranking periods (12, 24, 36 and 60 months) and four holding periods (12, 24, 36 and 60 months). Table 4 reports summary statistics of returns of long-term contrarian strategies. A contrarian strategy states that the losers (winners) in the ranking period will turn into winners (losers) in the holding period. Similarly, the winners in the ranking period will turn into losers in the holding period. Consequently and consistent with DeBondt and Thaler (1985), a contrarian

Table 3
Summary Statistics of Returns of Relative Strength Portfolios

The mean and standard deviation are annualized. The reward-to-risk ratio is measured as the ratio of the annualized mean to the annualized standard deviation. The p-values for the significance of the mean are in parentheses. Our definition of returns assumes that we hold contracts up to one month before maturity, at which date the position is rolled over to the second nearest contract and held up to one month prior to maturity. Futures prices are collected at a monthly frequency, in particular for the second Wednesday of each month to avoid the weekend effect.

	1-Month Holding Period			*2-Month Holding Period*			*3-Month Holding Period*			*4-Month Holding Period*		
Portfolios based on	*Sell Losers*	*Buy Winners*	*Buy-Sell*	*Sell Losers*	*Buy Winners*	*Buy-Sell*	*Sell Losers*	*Buy Winners*	*Buy-Sell*	*Sell Losers*	*Buy Winners*	*Buy-Sell*
12 months lagged returns												
Mean	-13.10	29.88	49.03	-7.32	20.63	29.70	-4.00	16.95	21.55	-0.03	12.88	12.77
p-value	(0.00)	(0.00)	(0.00)	(0.11)	(0.01)	(0.00)	(0.38)	(0.01)	(0.01)	(0.99)	(0.04)	(0.09)
Std	30.42	52.79	60.63	29.77	42.36	50.90	29.06	38.36	47.26	28.33	36.09	44.43
Sharpe Ratio	-0.431	0.566	0.809	-0.246	0.487	0.583	-0.138	0.442	0.456	-0.001	0.357	0.287
9 months lagged returns												
Mean	-13.76	28.44	47.67	-4.36	17.55	22.44	-1.46	15.41	16.12	0.13	13.27	12.12
p-value	(0.00)	(0.00)	(0.00)	(0.32)	(0.01)	(0.01)	(0.74)	(0.01)	(0.03)	(0.98)	(0.02)	(0.08)
Std	28.76	44.72	52.09	27.75	40.71	47.27	27.61	36.38	43.06	27.30	34.13	41.23
Sharpe Ratio	-0.4784	0.6359	0.9151	-0.1570	0.4312	0.4748	-0.0529	0.4236	0.3743	0.0047	0.3890	0.2941
6 months lagged returns												
Mean	-21.72	30.37	65.34	-11.88	18.73	34.33	-6.18	13.33	20.06	-2.50	10.10	11.81
p-value	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.14)	(0.04)	(0.01)	(0.54)	(0.08)	(0.07)
Std	29.81	57.14	62.58	28.23	43.39	48.46	26.95	38.19	43.58	26.04	34.54	39.22
Sharpe Ratio	-0.7287	0.5316	1.0440	-0.4210	0.4316	0.7084	-0.2292	0.3490	0.4604	-0.0959	0.2924	0.3011
4 months lagged returns												
Mean	-28.71	41.11	96.08	-16.77	25.72	49.92	-10.27	16.72	28.72	-5.66	14.91	20.52
p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)	(0.03)	(0.00)	(0.15)	(0.01)	(0.00)
Std	30.53	64.69	68.82	27.27	52.79	56.51	26.49	44.62	47.61	25.60	33.96	37.30
Sharpe Ratio	-0.9403	0.6354	1.3960	-0.6149	0.4872	0.8834	-0.3877	0.3746	0.6032	-0.2211	0.4392	0.5499

Table 4
Summary Statistics for Returns of Contrarian Portfolios

The mean and standard deviation are annualized. The reward-to-risk ratio is measured as the ratio of the annualized mean to the annualized standard deviation. The p-values for the significance of the mean are in parentheses. Our definition of returns assumes that we hold contracts up to one month before maturity, at which date the position is rolled over to the second nearest contract and held up to one month prior to maturity. Futures prices are collected at a monthly frequency, in particular for the second Wednesday of each month to avoid the weekend effect.

	1-Year Holding Period			*2-Year Holding Period*			*3-Year Holding Period*			*5-Year Holding Period*		
Portfolios based on	*Sell Winners*	*Buy Losers*	*Buy-Sell*	*Sell Winners*	*Buy Losers*	*Buy-Sell*	*Sell Winners*	*Buy Losers*	*Buy-Sell*	*Sell Winners*	*Buy Losers*	*Buy-Sell*
5 years lagged returns												
Mean	-3.17	16.07	20.80	-0.98	12.50	14.66	-1.01	9.45	11.88	1.76	6.78	6.00
p-value	(0.45)	(0.00)	(0.00)	(0.80)	(0.01)	(0.01)	(0.78)	(0.04)	(0.02)	(0.61)	(0.12)	(0.20)
Std	24.93	28.35	33.69	22.92	27.67	31.13	21.43	26.46	28.80	20.63	25.29	26.78
Sharpe Ratio	-0.127	0.567	0.618	-0.043	0.452	0.471	-0.047	0.357	0.412	0.085	0.268	0.224
3 years lagged returns												
Mean	-0.94	13.57	15.67	0.77	13.13	13.40	1.87	10.44	9.69	3.70	7.11	4.16
p-value	(0.82)	(0.00)	(0.00)	(0.84)	(0.00)	(0.00)	(0.60)	(0.02)	(0.03)	(0.29)	(0.07)	(0.23)
Std	24.65	27.33	30.84	22.89	25.73	26.71	21.77	26.03	25.67	20.99	23.40	20.86
Sharpe Ratio	-0.0381	0.4966	0.5082	0.0336	0.5103	0.5015	0.0857	0.4011	0.3775	0.1762	0.3041	0.1995
2 years lagged returns												
Mean	-3.92	12.57	17.80	-1.09	14.44	16.31	0.68	12.53	12.48	2.58	9.90	7.52
p-value	(0.37)	(0.01)	(0.00)	(0.77)	(0.00)	(0.00)	(0.85)	(0.00)	(0.00)	(0.46)	(0.01)	(0.04)
Std	27.54	27.81	34.32	23.47	25.11	27.04	22.24	24.03	23.72	21.74	23.27	21.67
Sharpe Ratio	-0.1423	0.4520	0.5186	-0.0465	0.5752	0.6034	0.0304	0.5213	0.5263	0.1184	0.4254	0.3469
1 years lagged returns												
Mean	5.83	6.13	1.46	3.07	8.91	7.56	4.72	9.18	5.62	4.63	8.36	4.79
p-value	(0.20)	(0.15)	(0.78)	(0.43)	(0.02)	(0.06)	(0.19)	(0.01)	(0.09)	(0.16)	(0.02)	(0.09)
Std	27.86	26.21	31.93	23.90	23.71	23.75	22.05	21.94	20.12	20.20	21.81	17.09
Sharpe Ratio	0.2092	0.2338	0.0458	0.1283	0.3760	0.3183	0.2142	0.4183	0.2795	0.2292	0.3831	0.2805

strategy that deliberately buys the long-term underpriced losers and sells the long-term overpriced winners turn out to be lucrative.

The results in Table 4 indicate that the systematic rebalancing of futures contracts portfolios using a contrarian approach is a source of abnormal returns in futures markets. There is evidence that past winners turn into losers over ranking and holding periods that range from 1 to 5 years. The average returns of the past winner portfolios range from -3.92% to -0.94% a year while the average returns of the past loser portfolios range from 6.78% to 16.07%. As a result, all of the contrarian strategies are lucrative.

The findings have other notable aspects. First, the contrarian pattern identified in stock markets over long-term horizons by De Bondt and Thaler (1985) is present in futures markets and they are consistent with the overreaction hypothesis. Second, the overreaction effect is asymmetric; it is much larger for losers than for winners. Finally, the overreaction phenomenon mostly occurs during the second year of the test period, if we exclude the (J, 1) contrarian strategies.

It would be interesting to investigate in future research whether the profits remain significant after corrections for plausible transaction costs in futures trading, and whether imperfections in market microstructure like bid-ask spread and nonsynchronous trading have a non-trivial effects in our futures markets' sample. Granted that transaction costs in futures markets range from 0.0004% to 0.033% (Locke and Venkatesh, 1997), which is much less than the conservative 0.5% estimate of Jegadeesh and Titman (1993) for the equity market, we do not expect that including transaction costs would affect our results in a significant way.

6. CONCLUSIONS

In this article, we examine whether futures markets returns are predictable based on past returns over short and long horizons. In particular, we look at the performance of 16 momentum strategies in a cross-section of broad futures markets for four ranking periods (4, 6, 9 and 12 months) and four holding periods (1, 2, 3, and 4 months). Our results show that the winner portfolios typically outperform the loser portfolios over holding periods that range from 1 to 4 months. We document that this pattern holds for each of our formation periods. Across the 16 strategies that are profitable, one could earn an average return of 33.63% a year by consistently buying the best performing futures and selling the worst performing ones.

We also find evidence that past winners turn into losers over ranking and holding periods that range from 1 to 5 years. The average returns of the past winner portfolios range from -3.92% to -0.94% a year while the average returns of the past loser portfolios range from 6.78% to 16.07%. As a result, all of the contrarian strategies are profitable.

Overall, our article indicates that relative-strength and contrarian strategies perform better on a risk-adjusted basis than passive long-only strategies in equity and futures markets, making futures markets contracts attractive candidates to be included in well-diversified portfolios. Further, since arbitrage strategies are more readily available than in equity markets due to the low cost and high liquidity of futures trading, these results have significant implications for academics in terms of market efficiency and for practitioners in terms practical trading strategies and asset allocation.

A question left for further research is related to the role of institutional investors in futures markets. An interesting exercise could be to test whether the momentum profits have decreased recently due to a rising interest of institutional investors in futures markets.

Finally, it would be interesting to study also whether the profits remain significant after corrections for plausible transaction costs in futures trading, and second whether imperfections in market microstructure like bid-ask spread and non-synchronous trading have a non-trivial effects in our futures markets' sample.

Notes

1. For example, Japanese rice futures, which originated the modern futures markets, were traded in Osaka starting in the early 18th century (see Anderson, Hamori, and Hamori 2001).
2. However, recent research by Daskalaki and Skiadopoulos (2010) shows that this widely-touted diversification role of commodities does not necessarily hold up out-of-sample.
3. Ma, Mercer, and Walker (1992) show that the choice of the rollover date can have unpredictable effects on the results of empirical studies. They compare different methods to rollover futures and demonstrate that important biases are generated from its selection. However, recent research by Carchano and Pardo (2009) indicate that the choice of the criterion to link thematurities does not matter for the constructionof continuous series of returns.
4. The choice of the formation and holding periods is arbitrary. Wang and Yu (2004) study focused on the 1-weekhorizon for the contrarian strategy. Badrinath *et al.* (1995) and Chordia and Swaminathan (2000) suggest that it may takelonger for some asset prices to revert after under/outperforming; therefore, we consider the formation period up to 12 months and the holding period up to 4 months. This seems appropriate given that futures trading usuallyconcentrates oncontracts that typically mature within two or three months.

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