Trading Behaviour in closely related markets for S&P500 Index Futures

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This article examines the determinants of trading decisions, and the performance of trader types, in the context of the E-Mini S&P 500 futures and S&P 500 futures markets. Although the markets are very similar, essentially trading the same underlying asset but with different contract sizes, some significant differences in trading behaviour in each market emerge. Speculators and small traders tend to follow positive feedback strategies while hedgers adopt contrarian strategies. Small traders apparently act as liquidity providers in order to meet hedging demand. Generally, traders are better at predicting market rallies, and while speculators are most adept at adjusting their position ahead of large changes in futures prices, small traders make correct return predictions most frequently. There is evidence of behaviour changing in the aftermath of the 2008-2009 financial crisis; subsequently hedgers have helped to stabilize prices in the futures market.

Introduction

The behaviour of investors, the determinants of their trading decisions, and their investment performance has fascinated academics and market practitioners for decades. Following its introduction in 1982, the S&P 500 index futures contract became the most actively traded equity index contract in the world, and the focus of attention from the media, traders, and academics. However, 1997 witnessed the introduction of the E-Mini S&P 500 futures contract market, a contract trading the same underlying index as the original *big* S&P 500 futures contract, but with a smaller contract size and electronic-only trading platform. The establishment of this E-Mini contract allows for the study of investor behaviour across two closely related equity index futures markets.

Whilst there is clear evidence (e.g. Karagozoglu and Martell, 1999; Karagozoglu et al., 2003) that smaller contract sizes have positive impacts on the market in terms of increasing volume, smoother trading, and encouraging more small traders to trade, the literature on the quality of open outcry versus electronic trading is not so clear as to the preferred method. Tse and Zabotina (2001) suggest that while electronic markets have lower bid-ask spreads, the market quality and trade informativeness is greater in the open outcry market. Pirrong (1996) argues that miscommunication between traders reduces the efficiency of open outcry markets, while several studies find that execution time is reduced in electronic markets. Whatever the result from empirical evidence, it is clear from the migration to electronic exchanges, which side of the argument is winning in the minds of the exchanges themselves.

An extant literature has developed around sentiment indicators and investment performance. Clarke and Statman (1998) find that the Bullish Sentiment Index, a measure of the bullishness of newsletter writers, does not have significant forecasting power. Fisher and Statman (2000) consider the sentiment of newsletter writers, small investors, and Wall Street strategists , while Simon and Wiggins III (2001) use market-based sentiment measures, and both types of sentiment measures are found to be reliable contrarian indicators. More recently, Baker and Wurgler (2007) demonstrate that it is possible to measure investor sentiment, and that waves of sentiment have clearly discernible, and regular effects on both individual firms and the stock market as a whole. Examining the issue from the opposite angle, Brown and Cliff (1999) examine whether technical indicators are correlated with survey measures of sentiment, and find that the

sentiment measure is driven mainly by market returns but also by some technical indicators including the net trading position of investors.

The Commodity Futures Trading Commission (CFTC) has published data on positions taken by three types of traders – speculators, hedgers, and small traders – in U.S. futures markets periodically since the 1980s. The unique trader-position information contained in such Commitment of Traders (COT) reports has been promoted by financial analysts as valuable for timing the market, and recent academic research has utilised the reports in order to estimate position based sentiment. Wang (2001) utilises CFTC data and demonstrates that speculator sentiment is price continuation whereas hedger sentiment is a contrary indicator for returns on agricultural futures. Wang (2003) controls for market risk factors and finds that speculators (hedgers) are positively (negatively) correlated with subsequent abnormal returns, although it is unlikely that speculators possess superior forecasting power. Consistent with sentiment theories of initial under-reaction and delayed over-reaction, Moskowitz et al. (2012) document significant time series momentum across a range of futures markets and report that speculators profit from momentum at the expense of hedgers. Most recently, Fishe and Smith (2012) use data from the CFTC's Large Trader Reporting System (LTRS) to identify informed traders across12 commodity markets, and find that while money traders/hedge funds tend to be well informed, commercial hedgers do not. This article focuses on this latter, position based sentiment indicator derived from CFTC COT reports.

Along with investigating the relationship between investor sentiment, this article seeks to understand the determinants of this sentiment and subsequent trading behaviour. Whilst Bryant et al. (2006) reject it, the theory of normal backwardation proposed by Keynes (1923) has been the prevalent explanation as to why futures prices deviate from expected future cash prices. This *hedging pressure* theory suggests that hedgers use futures markets to transfer risk to speculators, and speculators receive a premium to compensate them for accepting this additional risk. Bessembinder (1992) is supportive of hedging pressure and market segmentation as a determinant of futures premiums finding that, after controlling for systematic risk, futures market returns vary with the net holding of hedgers.

The final section of this article considers the investment performance of different trader types in predicting movements in the futures market, as such this is closely related to the existing literature on market timing ; this provides mixed evidence on investor ability to time the market.

Sharpe (1975) suggests that the likely gains from market timing are modest. Graham and Harvey (1996) find no evidence of timing ability in the asset allocation suggestions of investment newsletters. And Jiang (2003) fails to find evidence of superior timing ability among actively managed equity funds. On the contrary, Lee and Rahman (1990), Larsen and Wozniak (1995), and Bollen and Buse (2001) provide evidence of timing ability in mutual fund managers.

This article adds to the literature in several ways. Firstly, the determinants of trading behaviour in closely related markets may be better understood, together with the influence that microstructure effects (contract size and trading platform) and economic conditions, particularly the global financial crisis, has on that behaviour. Secondly, this article adds to the literature on the drivers of investment performance, and considering potential bias in the forecasts highlights potential trading strategies to benefit from such bias. An additional benefit of considering both the behaviour and performance of a trader type is that it allows for the inference of whether a trader type has a destabilizing effect on futures prices; an important consideration for market regulators.

The principal findings suggest that although the E-Mini S&P 500 futures and S&P 500 futures markets are very similar there are some significant differences in trading behaviour, and this behaviour changes as a result of the financial crisis of 2008-2009. Speculators and small traders tend to follow positive feedback strategies while hedgers adopt contrarian strategies; this is not inconsistent with conventional thought on the behaviour of futures traders. Liquidity is provided to the market by small traders. There is evidence that trader behaviour is not static in the sense that investment style is reflective of changes in the economic environment. Generally, traders are better are predicting market rallies, than market falls, and while small traders make correct predictions most frequently, speculators are most adept at adjusting their net position ahead of large changes in futures prices. There is some evidence to suggest that hedgers have helped to stabilize prices in the futures market in the period following the onset of the financial crisis of 2008-2009. These findings have implications for academics seeking to understand investment behaviour, for market regulators concerned with systemic stability during financial crisis, and for market practitioners seeking to develop trading systems.

The remainder of this article is organized as follows. The next section discusses the nature of the S&P 500 Index Futures market, and the reporting of market positions by trader type together with the data utilised in this article. The section Behaviour by Trader Type investigates

the determinants of trading decisions and the influence of the GFC on those decisions. The section Market Timing by Trader Type examines the predictive ability and profitability of market timing by traders. The last section concludes.

S&P Futures and Trader Position Reporting

Data for S&P500 Index Futures Contracts

The S&P500 Futures[1] contract was introduced in April 1982, and remained the pre-eminent equity index futures contract for more than two decades. However, as the value of the contract became too large for many small traders the Chicago Mercantile Exchange (CME) introduced the E-Mini S&P500 contract in September 1997; at the time one S&P Futures contract was valued at nearly $500,000[2]. Whilst the big S&P500 contract trades using the open outcry method in the Chicago pit[3] the E-Mini contract is traded solely through the all-electronic Globex system. The possibility that the two contracts will attract a different clientele provides motivation for studying the positioning of traders in each market separately.

The benefits of trading electronically, in terms of speed and accuracy of execution, has appeal to high-frequency traders and hedge funds and, together with the smaller contract size, has resulted in liquidity moving towards the E-Mini contract during the sample period. As at March 2013[4], the average daily volume of the E-Mini contract was over 2 million contracts with open interest of 3.3 million, while the S&P 500 contact was trading just 34,982 per day with open interest of 199,904. The CME also reports noticeable year-on-year changes with rising volume in the E-Mini contract somewhat offsetting the rapidly falling volume in S&P 500 contracts.

A series of futures returns is created for both the E-Mini and S&P500 futures contract, using data collected from Thomson Reuters Tick History[5]. The return is measured as the percentage change in settlement prices of the contract with the nearest delivery date using a

[1] S&P500 Futures Ticker: SP, E-Mini S&P500 Futures Ticker: ES

[2] $500 x 927.6 - the index value as of 1st September 1997. The E-Mini contract was introduced with a notional value of $50 per index point – 1/10th the value of the S&P500 contract at the time, although this has since been reduced to $250 per index point.

[3] The S&P500 futures contract (SP) trades using open outcry from 8:30 – 3:15 and on Globex at other times.

[4] Source: CME Average Daily Volume Report, April 2013.

[5] Provided by SIRCA – Securities Industry Research Institute of Asia-Pacific

standard roll-over strategy; such that the contract is switched to the second-nearest contract in the delivery month. To match the data on trader positions, a weekly return series is constructed.

Data on Trader Positions

This paper analyses weekly data on the positions of futures traders in the two futures markets related to the S&P500 Index, over the January 2003 – December 2012 interval. The information on trader positions is obtained from the weekly Commitment of Traders (COT) report issued by the U.S. Commodity Futures Trading Commission (CFTC.). The COT report provides a decomposition of positions held by categorized traders on the basis of whether the trader holds a reportable commercial or non-commercial position, as defined by the CFTC. Traders taking commercial positions to hedge a specific risk are regarded as hedgers, and those who take non-commercial positions for reasons other than hedging are seen as speculators. The non-reportable positions provide the balance of the market and are categorized more generally as small traders since it is not clear whether such traders hold positions for hedging or speculative purposes. While Wang (2003) notes that this interpretation may be inaccurate, and Ederington and Lee (2002) find that the commercial group likely includes some traders with no positions in the cash market, this interpretation has been widely utilised in the extant literature (e.g. Bessembinder, 1992; Wang, 2001, 2004; Moskowitz et al., 2012). Figure 1 depicts the positioning, expressed as a percentage of open interest, and its evolution over the sample period. Note that while the positions are relatively volatile, both speculators and hedgers have generally been short (net negative position) while small traders have been long (net long position)

<Insert Figure 1>

Data on Investor Sentiment and Risk Factors

Investor sentiment is proxied by the Chicago Board Options Exchange (CBOE) Market Volatility Index (*VIX*). Introduced by Whaley (1993), the VIX is calculated using the implied volatility of S&P 500 Index options, and is a measure of the market's expectation of stock market volatility over the next 30-day period. This measure is commonly used as a measure of investor sentiment by academics, market participants, and media. Bollen and Whaley (2004) indicate that increases in VIX are largely due to increases in the level of put option purchases; the result is the oft-mentioned reference to VIX as the investor 'fear-gauge'. Whaley (2000), Simon and Wiggins III (2001), Giot (2005), and Smales (2013) all find evidence of a negative relationship between

changes in VIX and stock market returns. Data for VIX is obtained from CBOE and matched with the trader position and futures return series.

Bessembinder and Chan (1992) demonstrate that the T-bill yield, corporate bond credit spread, and equity dividend yield are priced risk factors in U.S. futures markets. One aspect of interest in this paper is to examine how such risk factors influence the market positioning of traders and how traders perform after controlling for such risk. Therefore, data is collected on the 3-month T-bill yield (*TYLD*), Moody's BAA-rated long-term corporate bond yield, AAA-rated corporate bond yield (the credit spread – *CSPR* - is then simply the difference between the two corporate bond yields), and the S&P 500 index dividend yield (*DYLD*) for the sample period January 2003 to December 2012. Data for the risk factors are obtained from Datastream.

Table I presents summary statistics for the data used in this study. Panel A reports statistics for net positions (long positions less short positions) for each trader type. For both futures markets, speculators and hedgers have net short positions on average, and tend to be short 2/3rd of the time. Small traders, with non-reportable positions, take the opposite position and tend to be long. Conventional wisdom in the literature is that hedgers, who are long the underlying asset, will have net short positions in the futures market, while speculators will take the opposite position. The results indicated here are not entirely inconsistent with this wisdom in the sense that hedgers do tend to hold short positions, however, there is a key difference in that speculators also tend to be short and it is instead the small-traders who take the off-setting position.

Panel B reports the correlation between changes in the positions of the different trader types for each market; all Pearson coefficients are significant at the 1% level. Note the negative relationship between trading positions, particularly between hedgers and small traders; as hedgers go long (short), the small traders take the opposite position and go (short) long. Panel C provides statistics for futures market returns, investor sentiment, and risk factors. The average weekly futures market return is indistinguishable from zero over the period considered. The average level of investor sentiment (VIX) is 20.877 over the sample period, while the average 3-month T-Bill yield is 1.65%, the corporate bond credit spread is 1.17%, and the dividend yield is 2.01%. The mean for all risk factor variables is significantly different from zero.

<Insert Table I>

Behaviour by trader type

Determinants of Trading Decisions

The determinants of trading positions are investigated by considering how traders change their positions in light of available information. Odean (1998), Grinblatt and Keloharju (2000), Gorton et al. (2008), and Moskowitz et al. (2012) show that investors most likely condition their trades on past returns, in the process exhibiting negative / positive feedback investment behaviour. Bessembinder (1992), Bessembinder and Chan (1992), and Frank and Garcia (2009) investigate the risk premium in futures markets; finding that certain variables, including the T-Bill yield, corporate bond credit spread, and equity dividend yield have forecasting power in futures markets. It is therefore likely that such risk factors have an effect on the positioning of traders, and their investment decisions.

Following Wang (2003), the determinants of trading decisions by type of trader are estimated using the following equation for both of the S&P500 futures markets:

$$\Delta NP_{t+1}^{i} = \alpha_0^i + \alpha_1^i R_t + \alpha_2^i \Delta VIX_t + \sum \beta_j^i \phi_{jt} + \varepsilon_{t+1}^i \qquad (1)$$

Where ΔNP_{t+1}^{i}represents the change in net positions of trader type *i* in month t+1, and *i* denotes speculators, hedgers, and small traders. A net position is defined as the long position less the short position of a trader type, and is expressed as a percentage of open interest[6]. R_t is the futures market return in period *t*. ΔVIX_t denotes the change in the investor sentiment index in period *t*. ϕ_t is a set of common risk factors available to all market participants at time *t*, including: (i) the yield on 3-month T-bills, representing the short-term discount rate; (ii) a credit spread calculated as the yield on Moody's BAA-rated long-term corporate bonds minus the yield on AAA-rated corporate bonds; and (iii) the dividend yield on the S&P 500 Index, which is often regarded as a signal for risk premium owing to the tendency for the dividend yield to be higher during periods of recession.

Empirical Results

The estimated coefficients for Equation (1) are reported in Table II; where each regression has 514 observations. For each futures contract, Model 1 is the base model, which simply

[6] The analysis is repeated with nominal net positions – not accounting for open interest – and the results are qualitatively similar.

demonstrates the empirical relationship between returns in one period, and changes in the positions of traders in the following period. Model 2 augments this model by controlling for investor sentiment and the common risk factors. Considering the speculators first; there are no significant variables in either specification for the E-Mini future, although the coefficients for lagged returns are positive they are not well-defined. However, for the larger S&P500 future the coefficient for the lag returns is positive and highly significant. This suggests that speculators follow a continuation, or positive feedback, strategy and increase net long positions following increases in futures prices. If futures prices appreciate by 1 percentage point, the speculators will increase their long position by 0.15 x total open interest. This result holds after controlling for common risk factors. It appears that the risk factor variables do not significantly influence the trading decisions of speculators since none of the coefficients are significant.

Considering the estimated coefficients for hedgers, the coefficients for return lags are negative and significant for both E-Mini and S&P 500 futures; suggesting that hedgers decrease (increase) net positions if prices rose (fell) in the previous month. Such evidence suggests that hedgers follow a contrarian trading strategy. The coefficients are of a smaller magnitude than those for speculators, suggesting that the hedgers have a lower level of adjustment in their portfolios following changes in market prices. The only risk factor variable that has a significant coefficient is that for the credit spread; the negative coefficient is consistent with Bessembinder and Chan (1992) and indicates that as the credit risk premium increases the hedger will reduce their net position (i.e. sell S&P 500 futures).

<Insert Table II>

The last section of Table II presents the regression results for small traders; such traders have smaller, non-reportable positions and so it may be likely that such traders are more likely to trade in the E-Mini futures market. The results for the E-Mini futures market suggests that small-traders are positive feedback traders; that is they increase their net position (buy futures) when the market rallies, and decrease their net position (sell futures) when the market falls. The coefficients are reverse in sign, and similar in magnitude, to those for hedgers in the E-Mini futures market. This result is suggestive of small traders and hedgers entering into off-setting transactions following changes in market prices. The credit spread is significant and negative when considering the E-Mini futures market, but positive in the S&P 500 futures market while the reverse is true of the dividend yield coefficient. Such results are suggestive of small traders

decreasing (increasing) their positions in the E-Mini futures market, and been more willing to increase (decrease) their positions in the more established S&P 500 futures market at times of economic recession (growth).

Influence of the Global Financial Crisis

The suggestion that the economic setting may have an influence on the investment behaviour of futures traders, together with the sample period considered, leads to the investigation of the impact that the global financial crisis (GFC) of 2008-2009 has had on trading behaviour in equity index futures. The sample data is disaggregated into three distinct periods; the first period runs from 2003 until the start of the GFC in 2008, the second period covers the GFC period of 2008-2009, while the final period runs from the end of 2009 until December 2012. The regression results for equation (1) with the disaggregated sample periods are shown in Table III.

<Insert Table III>

Considering the Pre-GFC period first, it is apparent that there is some dichotomy in the trading behaviour between investors in the two markets. The coefficients for lagged returns suggest that speculators and small traders appear to follow a positive feedback strategy in the E-Mini futures market, but a contrarian (and less aggressive) strategy in the S&P 500 futures market. On the other-hand, hedgers follow contrarian strategies in the E-Mini futures market and (less aggressive) positive feedback strategies in the S&P 500 futures market. The reaction to investor sentiment is also apparently different between the two markets; speculators and small traders increase their position in E-Mini futures as investor uncertainty increases[7], and decrease their position in the S&P 500 futures market, and hedgers do the opposite.

The reported coefficients for hedgers and small traders are well-defined and of opposite sign, but equivalent magnitude, in the pre-GFC period for both markets. This suggests that the two types of traders are providing liquidity for each other in the respective markets, and is consistent with the 'hedging demand' argument of Merton (1973) such that investment opportunities change as the information variables vary. The coefficients of the variables suggest that, in the pre-GFC period, hedgers increase (decrease) their net position in the E-Mini futures

[7] An increase in VIX is representative of investor uncertainty, and tends to occur during periods of economic turmoil.

market during low (high) economic growth periods and decrease (increase) their net position in the S&P 500 futures market; small traders apparently take the opposite side of this transaction.

Upon the onset of the GFC in 2008 there is seemingly a change in the investment behaviour of the speculators and hedgers with regards lag returns; speculators switch from contrarian to positive feedback investors, while the behaviour of hedgers is modified as they become contrarian traders. This behaviour does not return to the pre-GFC style following the end of the GFC period, suggesting that the GFC has induced a permanent switch in the way that traders react to changes in market prices, perhaps as a result of a change in investor risk appetite owing to the excessive volatility in asset prices during the GFC. The GFC period also witnesses a adjustment in the response of speculators to changes in investor sentiment – prior to the GFC they sell (buy) S&P futures as investor uncertainty rises (falls), however during the GFC the reverse is true as they respond positively to increases in market uncertainty, perhaps as they become more risk-seeking as potential returns increase. An additional factor to consider is that subsequent to the onset of the GFC, volume has switched from the open outcry S&P 500 futures market to the electronically traded E-Mini futures market; suggestive of traders preferring the immediacy of execution offered by electronic markets at times of fast moving and volatile markets.

The reported coefficients for the risk factors are consistent with investor behaviour changing during times of acute economic distress. Prior to the GFC, during times of economic uncertainty[8] hedgers tended to decrease their net positions in the S&P 500 futures and increase their net positions in the E-Mini futures, while speculators and small traders will react to this change in hedging pressure by undertaking the opposite position. This situation reversed somewhat during the GFC (although the coefficients were not significant) although, in contrast to the trading behaviour concerning lag returns, the coefficients reverse once more in the period following the GFC.

In summary, when examining the determinants of changes in the net position of traders, and controlling for risk factors, speculators and small traders tend to follow positive feedback strategies while hedgers follow contrarian strategies. While this result is not inconsistent with conventional thought on the behaviour of futures traders, it is contrary to Wang (2003) who finds

[8] Increasing inflation expectations (signified by higher T-Bill yields), higher credit spreads, increasing investor uncertainty, and falling dividend yields

that speculators in financial futures are contrarian whilst hedgers exhibit positive feedback to lagged returns. However, the difference may be explained by the consideration of trading behaviour around the period of the GFC which demonstrates that investor actions are not static. There is evidence of switching between markets, and between trading behaviour, as a result of changes in the economic environment. It is also likely that small traders are adding liquidity to the market in order to meet hedging demand.

Market Timing by Trader Type

Net Positioning by Trader Type and Subsequent Returns

One possible explanation for the change in investor behaviour in response to evolving economic conditions may be that certain trader types are adept at developing market insights and thus are able to time the direction of the market. In a similar vein to Fisher and Statman (2000), and Wang (2001), in order to investigate whether the level, or change, of net positioning forecasts future market movements, the following model is used:

$$R_{t+K}^{j} = \alpha_i^j + \beta_i^j NP_{it}^j + \varepsilon_{it}^j \qquad (2)$$

Where R_{t+K}^{j} represents returns in market j in the subsequent K weeks, where K = 1,2,4,8, and 12. *NP* represents the net position, and i is the trader type. Following Wang (2001), this analysis focuses on the value of forecasts in shorter horizons since the life of a futures contract is typically no more than 3 months (12 weeks). A positive β coefficient of eq.(2) suggests that the net positioning of a trader type is a good indicator of buying or selling opportunities, while a negative coefficient implies that the net positioning of a trader type is a contrary indicator. The regression results for eq.(2) are with the level of net positioning as the independent variable are reported in Table IV[9].

<Insert Table IV>

Panel A reports results for the E-Mini futures market. The overall pooled sample does not have any significant β coefficient which suggests no relationship between the level of net positions and subsequent market returns. However, it may be possible that a better indication of future returns may be provided by considering extreme net positions. In particular, one may

[9] In the interest of brevity only the β coefficients are reported.

expect that extremely long net positions are good indicators of positive future returns, while extremely short net positions indicate negative future returns. To facilitate this analysis, the sample of net positions by trader type is sorted into quintiles; the highest quintile is classified as an long positioning and the lowest quintile as short positioning. The coefficients reveal that there is a strong direct relationship between small traders and future returns for all holding periods considered (from 1-day to 12-weeks). That is, when small traders hold extremely long net positions (Table I suggests they are long on average) the market returns are positive in future periods on average. There is a similar relationship for hedgers but only for longer periods of 8-12 weeks. When the lowest (short) quintile is considered, the strongest association is between the net position of hedgers and future returns; when hedgers (who have net short positions on average) have their lowest net position, then subsequent returns are negative over 1-day and from 4-12 weeks. The net position of speculators (who are also short on average) also has a negative association with returns, but this is of a lesser magnitude than that exhibited by hedgers, and only for longer periods of 8-12 weeks.

Turning to the S&P500 Futures results reported in Panel B. Considering the level of net positions for the whole sample, speculators (who have net short positions on average) tend to be contrarian indicators; this suggests that an increase in the net position of speculators is associated, on average with a subsequent drop in futures prices. The results are significant for periods of 2-12 weeks. On the other hand, returns tend to be significantly positively related, for periods of 4-12 weeks, with the net positions of small traders (who have net long positions on average), and thus small traders offer a direct indicator of future returns. No significant relationship appears for hedgers, apart from a contrarian indicator in the 12 week interval, and thus hedgers may not be useful for predicting the returns of S&P500 Futures.

Similarly, to the E-Mini futures market it is possible that stronger indicators of future returns may be found by considering net positions that are extremely long, or extremely short. Positions are sorted into quintiles once more. In contrast to the results for E-Mini futures there are no significant coefficients for the extremely long (highest) quintile. However, when considering the extremely short positioning (lowest quintile) there is significant evidence of a negative association between net positioning of speculators and subsequent returns. That is, when the level of net positioning by speculators in the S&P 500 futures market is extremely low (short) then the subsequent market returns are negative.

<Insert Table V>

Since it is possible that there are structural reasons for trader types to be net long or net short, the change in net positioning may prove more informative in forecasting changes in market prices. Table V reports the results for eq.(2) with changes in net positions as the dependent variable. No significant results are found for the E-Mini futures market, however the extreme positions in the S&P 500 futures market appear to be informative. Large (high quintile) increases in the net position of speculators are indicative of positive future returns over a 8-12 week timeframe. Similarly, large decreases (low quintile) in the net position of speculators are indicative of negative future returns over a 4-12 week timeframe. There is therefore some evidence that speculators appear adept at adjusting their net position ahead of changes in market prices.

Measuring predictive ability

The evidence presented in Table IV and Table V appears to be suggestive of superior forecasting ability by certain trader types. However, one question that posits itself is how frequently different trader types predict market returns correctly; Table VI presents evidence on measuring this predictive ability. Panel A presents results for the pooled sample for each futures contract, and for each trader type. For each trader type, the first column provides the predictive ability on the basis of the level of net position. For example, if the trader type has a net long (short) position and the market rallies (falls) in the subsequent week then this is a correct prediction. However, using only the net position level may not be wholly informative as if a trader type is structurally long (or short) then the result is purely a function of market movements and may not have anything to do with the predictive power of the trader. Therefore, the second column shows the predictive ability based on changes in the net position, i.e. if the trader type increases (decreases) the net position and returns in the subsequent period are positive (negative) then the prediction is correct. The evidence in Panel A suggests that all trader types are better at predicting positive returns than negative for both futures contracts, and overall the small traders are correct most frequently – indeed apart from the position change by hedgers in the S&P 500 futures market, the small traders are the only trader type to forecast correctly more than 50% of the time.

<Insert Table VI>

On the basis that more extreme net positions are indicative of more strongly held convictions on market direction, the positions (and changes in positions) are sorted into quintiles and the frequency of correct predictions is reported in Panel B. Again, it appears that all participants correctly forecast market rallies on the majority of occasions, and the large decreases in net positions by small traders and hedgers appear to correctly predict falls in the E-Mini futures and S&P 500 futures respectively. Indeed, whilst the small traders remain the most accurate forecasters in the E-Mini futures market, the extreme levels (and changes in levels) of the net position of hedgers is most frequently correct in the S&P 500 futures market.

The evidence reported in Table VI appears contradictory to that provided in Table IV and Table V. In particular, speculators do not appear to be good at predicting market returns, especially negative returns. However, this may be explained by the fact that when the speculators make correct predictions the returns generated offset the losses from the incorrect predictions. This is consistent with anecdotal evidence provided in texts such as Schawager (1992) Market Wizards or Covel (2009) Turtle Trader where futures traders accept frequent small loses in exchange for occasional large gains.

Controlling for risk factors

A final stage in the analysis of market timing by trader types is to account for the risk factors identified earlier. Controlling for such factors provides evidence as to whether changes in net position are consistent with the premise that traders receive a risk premium for bearing non marketable risks, and whether traders have ability that is superior to public information. To test for market-timing ability, and control for risk factors, a methodology similar to Graham and Harvey (1996), and Wang (2003) is employed, and the following model is estimated:

$$R_{t+1} = \alpha_0^i + \alpha_1^i \Delta NP_{t+1}^i + \sum \beta_j^i \phi_{jt} + \varepsilon_{t+1}^i \qquad (3)$$

Where R_{t+1} is the futures market return in period $t+1$, ΔNP_t is the change in net position during period t, ϕ_t is a set of common risk factors available to all market participants; the inclusion of such control variables is designed to separate market-timing ability based on public information from the market-timing ability that is superior to public information, and thus acts as a measure of abnormal performance. The results are reported in Table VII; coefficients are reported for the overall pooled sample, along with those for a disaggregated sample period to

allow for inspection of the changing nature of the relationship during the GFC. None of the coefficients for the risk factors are significant. Considering the E-Mini future, it may be surprising given the prior analysis of returns that speculator coefficient for ΔNP_t is negative; however this is consistent with the idea that returns are a function of risk premiums, and is also consistent with extant literature. In contrast, hedgers appear to generate abnormal returns as a result of market-timing that is superior to that inferred by public information; this may be a result of information generated from the commercial holding position that they are seeking to hedge.

<Insert Table VII>

Contrary to the finding in Wang (2003) that hedgers destabilize the futures market, the positive coefficient here together with evidence of contrarian trading suggests that hedgers have a tendency to push prices towards fundamental value, and thus have a stabilizing influence on futures prices. It is noteworthy that prior to the GFC the coefficients were consistent with Wang (2003) and had the opposite sign; i.e. speculators generated abnormal returns whilst hedgers generated abnormal losses after controlling for risk-factors. This is further evidence of the GFC forming a regime change in the way that traders behave. The only other significant coefficient in the E-Mini futures market is a the coefficient for position changes by small traders, consistent with the earlier results this indicates that they generate abnormal returns at least in the pre-GFC period. The results reported for the S&P 500 futures market are generally not significant, although there is some evidence of abnormal returns by hedgers, and abnormal losses to small traders, as a result of market timing in the pre-GFC period.

In summary, there is some evidence to suggest that speculators are adept at adjusting their net position ahead of changes in futures prices. In general, traders are better at predicting positive returns than negative returns, and overall small traders make correct predictions most frequently. While hedgers do not appear to be as reliable market indicators for future returns as speculators or small traders, they generate abnormal profits even after controlling for risk factors, and also help to stabilize the futures market. In order to explore this issue further, it would be prudent to examine the profitability of a simple trading strategy based on the reported findings. One such strategy, based on the level of futures positions, may be to buy E-Mini or S&P 500 futures when small traders are extremely long, and sell E-Mini futures when hedgers are extremely short or sell S&P 500 futures when speculators are extremely short. A second strategy, based on changes in net

positions would be to buy (go long) S&P 500 futures when speculators increase their net position by a large amount and sell (go short) when they decrease their net position by a large amount[10].

Conclusion

This article examines the determinants of trading decisions, and the performance of trader types, in the context of the E-Mini S&P 500 futures and S&P 500 futures markets. Although the markets are very similar, essentially trading the same underlying asset but with different contract sizes and trading platforms, some significant differences in trading behaviour in each market appear. Potentially, this is a result of different participants concentrating trading activity in the respective markets. There is also evidence of behaviour changing as a result of the financial crisis of 2008-2009, with migration of volume away from the open outcry trading of the S&P 500 futures contract to the electronically traded E-Mini futures contract.

Evidence suggests that, after controlling for risk factors, speculators and small traders tend to follow positive feedback strategies while hedgers adopt contrarian strategies; this is not inconsistent with conventional thought on the behaviour of futures traders. Evidence also points to small traders acting as liquidity providers in order to meet hedging demand. Trading behaviour around the GFC suggests that there is switching between markets, and between investment styles, as a result of changes in the economic environment; that is investor behaviour is not static.

Analysis of the market timing ability of trader types reveals that small traders make correct predictions most frequently, while speculators are most adept at adjusting their net position ahead of changes in futures prices. In general, all trader types are better at predicting market rallies than market falls. While hedgers do not appear to be reliable market indicators for future gross returns, they are the only trader type to generate abnormal profits after controlling for risk factors, and since the GFC have helped to stabilize prices in the futures market. These findings have implications for academics seeking to understand investment behaviour, for market regulators concerned with systemic stability during financial crisis, and for market practitioners seeking trading opportunities. This work could be extended to other futures market, and through the implementation of simple trading strategies based on the reported results.

[10] I intend to include evidence on the profitability of this trading strategy in the next draft of this article.

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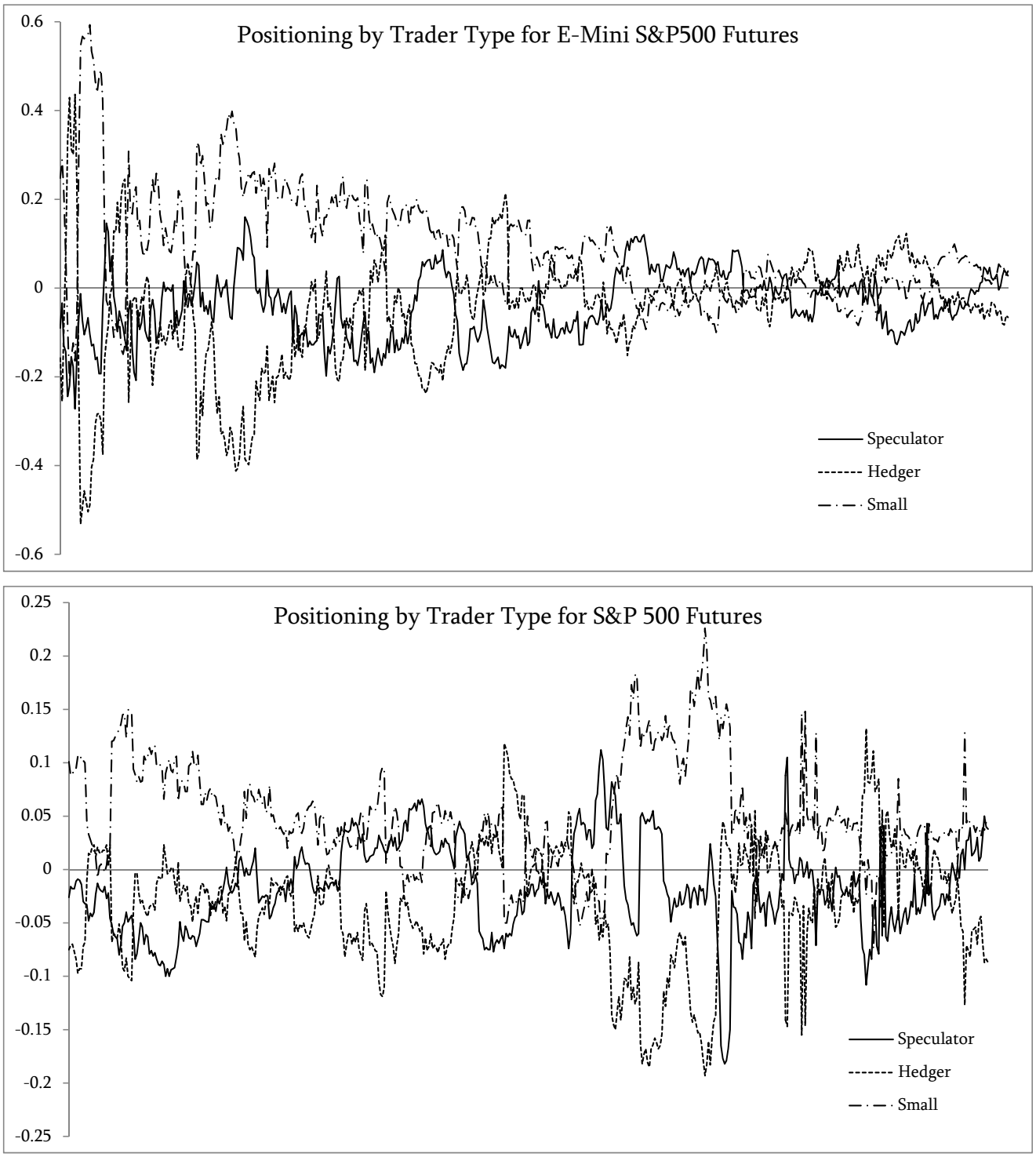

Figure 1

Positioning, expressed as a percentage of open interest, for each trader type in each futures contract.

Table I

Summary Statistics

Panel A: Summary Statistics for Net Positions

	Speculator		Hedger		Small Traders	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
E-Mini S&P 500 Futures (ES)						
Nominal Position	- 54,002	140,701	- 48,963	156,707	102,965	146,144
Nominal Position as % of Open Interest	-3.8%	7.5%	-5.2%	13.0%	9.0%	12.6%
% Occasions Net Long	32.1%		34.0%		74.3%	
% Occasions Net Short	67.9%		66.0%		25.7%	
S&P 500 Futures (SP)						
Nominal Position	- 10,247	25,931	- 17,770	32,331	28,017	26,198
Nominal Position as % of Open Interest	-1.7%	4.7%	-3.7%	6.6%	5.3%	5.9%
% Occasions Net Long	32.1%		26.3%		87.2%	
% Occasions Net Short	67.9%		73.7%		12.8%	

Panel B: Correlations of Net Positions

E-Mini S&P 500 Futures (ES)		Speculator	Hedger
	Hedger	-0.585	
	Small	-0.248	-0.796

S&P500		Speculator	Hedger
	Hedger	-0.482	
	Small	-0.305	-0.809

Panel C: Summary Statistics for Other Variables

	Mean	SD	*t*-stat	
Returns on ES & SP Futures (*R*)	0.084	2.385	0.886	
Investor Sentiment (*VIX*)	20.877	9.447	50.444	***
90-Day T-Bill Yield (*TYLD*)	1.650	1.760	21.422	***
Credit Spread (*CSPR*)	1.170	0.533	50.142	***
Dividend Yield (*DYLD*)	2.006	0.303	151.343	***

This table provides summary statistics for variables used within the analysis. *Panel A* represents information on the positioning of each trader type for each futures contract. The nominal net positions are defined as long positions less the short positions of a trader type on the basis of the CFTC's COT reports. Positions are also expressed in terms of a proportion of total open interest for the given period. *Panel B* shows the correlation in the net positioning of each trader type, for each futures contract. *Panel C* provides summary statistics for the remaining variables of interest. The S&P futures return is measured as the percentage change in settlement prices of a futures contract over the 1-week interval between CFTC reports. *VIX* is the level of implied volatility in S&P 500 options, and represents equity investor sentiment. *TYLD* is the yield on 90-day Treasury Bills. *CSPR* is the credit spread, calculated by subtracting the yield on Moody's AAA-rated bonds from the yield on BAA-rated bonds. *DYLD* is the dividend yield on the S&P 500 index. The numbers in parentheses are *t*-statistics for the hypothesis that the related parameter is zero. *** indicates significance at the 1% level.

TABLE II

Determinants of Positioning: Changes in Net Positions and Lag Changes in Returns, Investor Sentiment, and Information Variables

Dep. Variable: Change in Net Position (t+1)	E-Mini S&P500 Futures				S&P500 Futures			
	Model 1		Model 2		Model 1		Model 2	
Speculator								
Constant	0.001		0.023		0.000		-0.015	
	(0.32)		(0.68)		(-0.01)		(-0.81)	
R_t	0.044		0.010		0.141	***	0.151	***
	(0.79)		(0.11)		(4.23)		(2.86)	
ΔVIX_t			-0.015				0.007	
			(-0.75)				(0.01)	
$TYLD_t$			-0.054				0.019	
			(-0.33)				(0.21)	
$CSPR_t$			0.015				-0.003	
			(1.25)				(-0.40)	
$DYLD_t$			-0.019				0.009	
			(-0.87)				(0.72)	
Durbin-Watson	2.166		2.167		2.280		2.286	
Adj. R^2	0.001		0.007		0.027		0.028	
Hedger								
Constant	0.002		0.102		0.000		0.001	
	(0.39)		(1.56)		(0.08)		(0.04)	
R_t	-0.380	***	-0.326	**	-0.097	**	-0.116	**
	(-3.56)		(-1.99)		(-2.42)		(-1.98)	
ΔVIX_t			0.039				-0.003	
			(1.02)				(0.01)	
$TYLD_t$			0.018				-0.009	
			(0.01)				(-0.08)	
$CSPR_t$			0.033				-0.015	**
			(1.46)				(-2.00)	
$DYLD_t$			-0.069				0.008	
			(-1.63)				(0.62)	
Durbin-Watson	2.147		2.149		2.133		2.134	
Adj. R^2	0.024		0.032		0.009		0.023	
Small Trader								
Constant	-0.003		-0.125	**	0.000		0.014	
	(-0.64)		(-2.19)		(-0.01)		(0.75)	
R_t	0.336	***	0.336	**	-0.043		-0.035	
	(3.56)		(2.26)		(-1.27)		(-0.65)	
ΔVIX_t			-0.024				0.003	
			(-0.72)				(0.23)	
$TYLD_t$			0.000				0.000	
			(0.13)				(-0.11)	
$CSPR_t$			-0.048	**			0.018	***
			(-2.42)				(2.78)	
$DYLD_t$			0.088	**			-0.017	
			(2.38)				(-1.44)	
Durbin-Watson	2.139		2.140		2.137		2.140	
Adj. R^2	0.025		0.038		0.003		0.021	

Note: The dependent variable is the change in net position for each trader type, where net position is defined at the long position less the short position of a trader type on the basis of the weekly CFTC COT report, and expressed as a percentage of total open interest. VIX_t is the percentage change in investor sentiment. $TYLD_t$ is the change in yield on 90-day Treasury Bills. $CSPR_t$ is the change in the credit spread, calculated by subtracting the yield on Moody's AAA-rated bonds from the yield on BAA-rated bonds. $DYLD_t$ is the change in the dividend yield on the S&P 500 index. t-statistics are shown in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels respectively.

TABLE III

Impact of the Global Financial Crisis (GFC) on Changes in Net Positions and Lag Changes in Returns, Investor Sentiment, and Information Variables

Dep. Variable: Change in Net Position (t+1)	E-Mini S&P 500 Futures			S&P500 Futures		
	Pre-GFC	GFC	Post-GFC	Pre-GFC	GFC	Post-GFC
Speculator						
Constant	-0.008	-0.004	0.046	-0.077 **	0.092	-0.038
	(-0.06)	(-0.07)	(0.91)	(-2.32)	(1.55)	(-0.78)
R_t	0.831 ***	-0.122	-0.080	-0.135 **	0.204 **	0.467 ***
	(2.97)	(-1.34)	(-0.83)	(-1.99)	(2.12)	(3.84)
ΔVIX_t	0.028	0.002	0.023	-0.039 ***	0.090 ***	0.006
	(0.60)	(0.10)	(1.16)	(-3.41)	(3.51)	(0.26)
$TYLD_t$	-0.024	-0.019	-0.029	-0.020 *	0.087	0.028
	(-0.56)	(-0.37)	(-0.42)	(-1.87)	(1.61)	(0.43)
$CSPR_t$	-0.031	0.005	0.064 ***	-0.015	0.039 **	-0.004
	(-0.82)	(0.35)	(2.84)	(-1.54)	(2.35)	(-0.18)
$DYLD_t$	0.020	-0.001	-0.055 *	0.054 **	-0.071 *	0.018
	(0.24)	(-0.00)	(-1.79)	(2.56)	(-1.93)	(0.63)
Durbin-Watson	0.715	0.773	0.671	0.594	0.533	1.788
Adj. R^2	0.080	0.097	0.007	0.107	0.193	0.107
Hedger						
Constant	1.166 ***	-0.070	-0.079	-0.183 ***	-0.052	0.040
	(4.50)	(-1.03)	(-1.59)	(-3.12)	(-0.92)	(0.71)
R_t	-3.660 ***	0.058	0.064	0.434 ***	-0.035	-0.597 ***
	(-6.80)	(0.52)	(0.68)	(3.57)	(-0.38)	(-4.23)
ΔVIX_t	-0.224 **	-0.020	-0.009	0.045 **	-0.042 *	-0.023
	(-2.49)	(-0.67)	(-0.49)	(2.20)	(-1.71)	(-0.81)
$TYLD_t$	0.031 ***	-0.038	0.091	-0.040 **	0.018	-0.015
	(3.78)	(-0.01)	(1.37)	(-2.12)	(0.36)	(-0.20)
$CSPR_t$	0.259 ***	-0.021	-0.050 **	-0.039 **	-0.025	-0.020 **
	(3.54)	(-1.08)	(-2.30)	(-2.35)	(-1.55)	(-0.84)
$DYLD_t$	-0.809 ***	0.046	0.059	0.126 ***	0.037	-0.006
	(-4.98)	(1.11)	(1.52)	(3.43)	(1.07)	(-0.18)
Durbin-Watson	0.605	0.784	0.988	0.632	0.717	1.868
Adj. R^2	0.232	0.034	0.042	0.067	0.072	0.115
Small Trader						
Constant	-1.158 ***	0.075	0.031	0.260 ***	-0.042	-0.001
	(-5.01)	(1.18)	(0.62)	(4.75)	(-0.82)	(-0.03)
R_t	2.833 ***	0.062	0.017	-0.302 ***	-0.167 **	0.128
	(5.89)	(0.60)	(0.17)	(-2.65)	(-2.02)	(1.11)
ΔVIX_t	0.197 **	0.017	-0.014	-0.006	-0.048 **	0.016
	(2.45)	(0.61)	(-0.70)	(-0.29)	(-2.19)	(0.70)
$TYLD_t$	-0.029 ***	0.022	-0.061	0.060 ***	-0.011 **	-0.013
	(-3.91)	(0.38)	(-0.91)	(3.42)	(-2.27)	(-0.22)
$CSPR_t$	-0.228 ***	0.015	-0.014	0.054 ***	-0.015	0.024
	(-3.49)	(0.86)	(-0.65)	(3.45)	(-1.05)	(1.24)
$DYLD_t$	0.789 ***	-0.046	-0.004	-0.180 ***	0.034	-0.013
	(5.44)	(-1.18)	(-0.12)	(-5.23)	(1.10)	(-0.47)
Durbin-Watson	2.148	2.162	2.169	2.166	2.156	2.000
Adj. R^2	0.186	0.066	0.024	0.128	0.170	0.013

Note: This table disaggregates data into three samples surrounding the global financial crisis (GFC) of 2008-2009; the crisis period is taken to be January 2008 to December 2009 inclusive. The dependent variable is the change in net position for each trader type, where net position is defined as the long position less the short position of a trader type on the basis of the weekly CFTC COT report, and expressed as a percentage of total open interest. VIXt is the percentage change in investor sentiment. TYLDt is the change in yield on 90-day Treasury Bills. CSPRt is the change in the credit spread, calculated by subtracting the yield on Moody's AAA-rated bonds from the yield on BAA-rated bonds. DYLDt is the change in the dividend yield on the S&P 500 index. t-statistics are shown in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels respectively.

Table IV

The Relationship Between Level of Net Positioning and Futures Returns in Subsequent Periods

	1day		1week		2week		4week		8week		12week	
Panel A: E-Mini S&P 500 Futures												
Overall												
Speculators	0.142		0.010		-0.021		-0.011		0.009		0.027	
	(0.58)		(0.09)		(-0.23)		(-0.16)		(0.19)		(0.67)	
Hedgers	-0.302		-0.072		-0.043		-0.034		0.018		-0.001	
	(-0.71)		(-0.35)		(-0.26)		(-0.28)		(0.21)		(-0.01)	
Small Traders	0.163		0.061		0.064		0.045		-0.027		-0.026	
	(0.39)		(0.30)		(0.40)		(0.38)		(-0.33)		(-0.39)	
Long Positioning (High Quintile)												
Speculators	0.012		-0.065		-0.085		-0.124	**	-0.053		-0.016	
	(0.06)		(0.47)		(-1.31)		(-2.36)		(-1.34)		(-0.44)	
Hedgers	-0.534		-0.196		0.119		0.110		0.397	***	0.358	***
	(-0.90)		(-0.70)		(0.53)		(0.61)		(2.80)		(3.21)	
Small Traders	5.128	***	1.641	***	1.561	***	1.510	***	1.180	***	1.188	***
	(3.81)		(2.83)		(3.78)		(5.18)		(5.31)		(5.90)	
Short Positioning (Low Quintile)												
Speculators	0.433		0.071		-0.202	*	-0.066		-0.163	**	-0.190	***
	(1.60)		(0.50)		(-1.80)		(-0.80)		(-2.48)		(-3.89)	
Hedgers	-3.316	**	-0.211		-0.681	*	-1.109	***	-0.872	***	-0.925	***
	(-2.46)		(-0.37)		(-1.65)		(-3.91)		(-4.34)		(-4.90)	
Small Traders	-0.217		-0.064		-0.053		-0.050		-0.077		-0.062	
	(-0.98)		(-0.63)		(-0.69)		(-0.81)		(-1.39)		(-1.36)	
Panel B: S&P 500 Futures												
Overall												
Speculators	-0.039		-0.112		-0.126	**	-0.119	***	-0.112	***	-0.084	***
	(-0.28)		(-1.56)		(-2.28)		(-2.87)		(-3.85)		(-3.50)	
Hedgers	0.205		0.088		0.045		0.010		-0.049		-0.094	***
	(1.03)		(0.87)		(0.57)		(0.17)		(-1.17)		(-2.74)	
Small Traders	-0.167		0.022		0.081		0.110	**	0.161	***	0.179	***
	(-0.93)		(0.24)		(1.14)		(2.04)		(4.27)		(5.80)	
Long Positioning (High Quintile)												
Speculators	-0.042		-0.005		-0.009		-0.022		-0.017		-0.007	
	(-0.37)		(-0.08)		(-0.18)		(-0.56)		(-0.75)		(-0.36)	
Hedgers	0.222		0.106		-0.017		-0.048		-0.041		-0.017	
	(0.99)		(0.97)		(-0.19)		(-0.74)		(-0.80)		(-0.37)	
Small Traders	0.367	*	0.045		0.012		-0.031		-0.066		-0.080	*
	(1.67)		(0.44)		(0.15)		(-0.48)		(-1.29)		(-1.76)	
Short Positioning (Low Quintile)												
Speculators	-0.362	**	-0.223	***	-0.156	**	-0.159	***	-0.107	**	-0.010	
	(-1.98)		(-2.62)		(-2.42)		(-2.99)		(-2.49)		(-0.27)	
Hedgers	0.127		0.036		-0.014		0.010		0.041		0.043	
	(0.56)		(0.33)		(-0.17)		(0.15)		(0.86)		(1.03)	
Small Traders	-0.113		-0.008		0.030		0.030		0.016		0.018	
	(-0.87)		(-0.11)		(0.51)		(0.76)		(0.62)		(0.89)	

Note: The regression results are from equation (2) with weekly observations. The independent variable is the the level of net positioning, defined as the long position less short position for each trader type and expressed as a percentage of open interest. This is disaggregated into very long positioning (defined as the net position been in the highest quintile), and short positioning (defined as the net position been in the lowest quintile). Only slope coefficients, which indicate the relationship between trader positioning and subsquent returns, are reported. *t*-statistics are shown in parentheses. ***,**, and * denote significance at the 1%, 5% and 10% levels respectively.

Table V

The Relationship Between Change in Level of Net Positioning and Futures Returns in Subsequent Periods

	1day	1week	2week	4week	8week	12week
Panel A: E-Mini S&P 500 Futures						
Overall						
Speculators	0.211 *	0.076	0.031	-0.004	-0.006	-0.012
	(1.91)	(1.43)	(0.74)	(-0.13)	(-0.27)	(-0.67)
Hedgers	-0.200	-0.053	-0.020	-0.025	0.007	-0.004
	(-1.09)	(-0.61)	(-0.29)	(-0.49)	(0.20)	(-0.13)
Small Traders	-0.005	-0.023	-0.011	0.029	-0.001	0.016
	(-0.04)	(-0.32)	(-0.19)	(0.71)	(-0.05)	(0.66)
Large Increase in Net Postion (High Quintile)						
Speculators	0.102	0.012	0.029	0.071	0.035	0.056 *
	(0.65)	(0.15)	(0.38)	(1.25)	(0.93)	(1.72)
Hedgers	-0.302	-0.253 *	0.003	-0.070	-0.007	0.063
	(-1.03)	(-1.70)	(0.02)	(-0.82)	(-0.11)	(1.17)
Small Traders	0.148	0.026	0.000	0.043	-0.003	0.069
	(0.29)	(0.11)	(0.00)	(0.33)	(-0.04)	(0.86)
Large Decrease in Net Position (Low Quintile)						
Speculators	0.346 *	0.178 *	0.014	0.049	0.033	0.027
	(1.76)	(1.77)	(0.23)	(1.00)	(0.93)	0.8
Hedgers	0.152	-0.081	-0.022	-0.136	-0.085	-0.165 *
	(0.25)	(-0.32)	(-0.10)	(-0.83)	(-0.78)	-1.69
Small Traders	0.073	0.022	-0.032	0.022	-0.053	-0.102 *
	(0.35)	(0.18)	(-0.28)	(0.22)	(-0.73)	-1.81
Panel B: S&P 500 Futures						
Overall						
Speculators	-0.048 *	-0.015	-0.017	-0.015	-0.015	-0.010
	(-0.45)	(-0.27)	(-0.39)	(-0.46)	(-0.68)	(-0.55)
Hedgers	0.068	0.067	0.016	0.039	0.026	0.021
	(0.39)	(0.76)	(0.24)	(0.76)	(0.70)	(0.69)
Small Traders	-0.018	-0.053	-0.001	-0.025	-0.010	-0.011
	(-0.10)	(-0.60)	(-0.01)	(-0.47)	(-0.28)	(-0.35)
Large Increase in Net Postion (High Quintile)						
Speculators	-0.265	-0.046	0.049	0.079	0.100 **	0.115 **
	(-1.19)	(-0.33)	(0.62)	(1.22)	(2.11)	(2.50)
Hedgers	-0.307	-0.152	-0.137	-0.068	-0.056	-0.097
	(-1.21)	(-1.05)	(-1.04)	(-0.66)	(-0.66)	(-1.39)
Small Traders	0.326	-0.052	-0.051	-0.124	-0.113	-0.058
	(0.99)	(-0.10)	(-0.41)	(-1.08)	(-1.22)	(-0.77)
Large Decrease in Net Position (Low Quintile)						
Speculators	-0.021	-0.050	-0.039	-0.123 **	-0.130 ***	-0.108 ***
	(-0.14)	(-0.61)	(-0.48)	(-1.98)	(-2.83)	(-2.97)
Hedgers	-0.098	-0.147	-0.138	-0.044	-0.053	-0.030
	(-0.30)	(-0.86)	(-1.24)	(-0.44)	(-0.72)	(-0.43)
Small Traders	-0.258	-0.101	0.093	0.096	0.180 **	0.161 **
	(-0.69)	(-0.44)	(0.61)	(0.81)	(1.98)	(2.05)

Note: The regression results are from equation (2) with weekly observations. The independent variable is the change in the level of net positioning. This is disaggregated into large (high quintile) increases in the net position, and large (low quintile) decreases in the net position. Only slope coefficients, which indicate the relationship between trader positioning and subsquent returns, are reported. *t*-statistics are shown in parentheses. ***,**, and * denote significance at the 1%, 5% and 10% levels respectively.

Table VI

Measuring the predictive ability of traders

Panel A: Overall

	E-Mini S&P500 Futures						S&P500 Futures					
	Speculator		Hedger		Small Trader		Speculator		Hedger		Small Trader	
	Position Level	Position Change	Position Level	Position Change	Position Level	Position Change	Position Level	Position Change	Position Level	Position Change	Position Level	Position Change
Correct - All	44.0%	49.2%	49.2%	46.1%	**51.9%**	**51.8%**	46.5%	48.2%	47.1%	**52.9%**	**55.3%**	45.7%
Incorrect - All	56.0%	50.8%	50.8%	53.9%	48.1%	48.2%	53.5%	51.8%	52.9%	47.1%	44.7%	54.3%
Correct - Market Up	**53.7%**	**58.8%**	**61.8%**	**54.2%**	**56.4%**	**61.4%**	**57.7%**	**58.4%**	**60.6%**	**60.8%**	**57.5%**	**54.8%**
Incorrect - Market Up	46.3%	41.2%	38.2%	45.8%	43.6%	38.6%	42.3%	41.6%	39.4%	39.2%	42.5%	45.2%
Correct - Market Down	39.5%	41.1%	43.7%	38.5%	39.4%	45.8%	41.5%	41.2%	42.7%	45.4%	40.9%	38.5%
Incorrect - Market Up	60.5%	58.9%	56.3%	61.5%	60.6%	54.2%	58.5%	58.8%	57.3%	54.6%	59.1%	61.5%

Panel B: Sorted Postions and Position Changes (quintiles)

	E-Mini S&P500 Futures						S&P500 Futures					
	Speculator		Hedger		Small Trader		Speculator		Hedger		Small Trader	
	Position Level	Position Change	Position Level	Position Change	Position Level	Position Change	Position Level	Position Change	Position Level	Position Change	Position Level	Position Change
Correct - All	48.3%	26.3%	49.5%	39.6%	**52.2%**	**56.2%**	**52.0%**	44.9%	**52.3%**	**59.3%**	42.6%	44.1%
Incorrect - All	51.7%	73.7%	50.5%	60.4%	47.8%	43.8%	48.0%	55.1%	47.7%	40.7%	57.4%	55.9%
Correct - Market Up	**57.0%**	34.4%	**62.7%**	47.5%	**65.0%**	**61.5%**	**57.0%**	**57.4%**	**63.5%**	**67.7%**	**59.0%**	**54.6%**
Incorrect - Market Up	43.0%	65.6%	37.3%	52.5%	35.0%	38.5%	43.0%	42.6%	36.5%	32.3%	41.0%	45.4%
Correct - Market Down	39.8%	18.6%	36.5%	31.7%	39.6%	**54.2%**	47.1%	33.7%	41.4%	**51.4%**	26.5%	34.3%
Incorrect - Market Up	60.2%	81.4%	63.5%	68.3%	60.6%	45.8%	52.9%	66.3%	58.6%	48.6%	73.5%	65.7%

Note: This table depicts the predictive ability of various types of traders. Panel A shows the proportion of times the respective trader types are positioned correctly for subsequent changes in the futures market (in the following month). Net positioning is defined as the long position less short position for each trader type, taken from the CFTC COT report, and expressed as a percentage of open interest. The overall prediction accuracy is shown, as is the proportion of times the trader types predict market increases and market decreases. The prediction accuracy of position levels (positive or negative) and changes in positioning are shown for both E-Mini S&P500 Futures and S&P500 Futures. Panel B reports the predictive accuracy after sorting position levels (and changes) into quintiles; very long (high-quintile) levels and increases in positions are assumed to predict increases in the futures market, while very short (low-quintile) levels and decreases in positions are assumed to predict declines in the futures market. Instances in which the predictive ability is greater than 50% are highlighted in bold.

Table VII

Timing Ability of Traders: The Relationship between Changes in Net Positions and Subsequent Returns

Dep. Variable:	E-Mini S&P500 Futures				S&P500 Futures			
R_{t+1}	Overall	Pre-GFC	GFC	Post-GFC	Overall	Pre-GFC	GFC	Post-GFC
Speculator								
Constant	0.015	-0.036	0.064	-0.028	0.012	-0.036	0.066	-0.021
	(1.23)	(-1.34)	(1.57)	(-0.86)	(1.24)	(-1.32)	(1.53)	(-1.20)
ΔNP_t	-0.714 ***	0.512 **	-2.197 ***	-1.035 ***	-0.158	0.347	0.136	-0.238
	(-3.62)	(2.14)	(-3.48)	(-3.64)	(-0.35)	(0.21)	(0.04)	(-0.63)
$TYLD_t$	-0.047	-0.083	-0.085 *	0.020	-0.033	-0.086	-0.083 *	0.017
	(-0.73)	(-0.94)	(-1.87)	(0.47)	(-0.61)	(-0.96)	(-1.71)	(0.68)
$CSPR_t$	0.011	0.056	0.012	0.008	0.026	0.006	0.011	-0.003
	(0.24)	(0.69)	(0.93)	(0.56)	(0.07)	(0.70)	(0.80)	(0.00)
$DYLD_t$	-0.007	0.020	-0.035	0.009	-0.006	0.020	-0.035	0.010
	(-0.89)	(1.19)	(-1.32)	(0.46)	(-0.88)	(1.17)	(-1.26)	(0.95)
Durbin-Watson	2.107	2.208	2.213	2.123	2.060	2.185	2.202	1.982
Adj. R^2	0.029	0.029	0.150	0.093	0.004	0.011	0.046	0.008
Hedger								
Constant	0.014	-0.028	0.086 **	-0.031	0.012	-0.032	0.063	-0.021
	(1.12)	(-1.03)	(2.12)	(-0.94)	(1.25)	(-1.16)	(1.45)	(-1.18)
ΔNP_t	0.306 **	-0.462 ***	1.908 ***	0.945 ***	0.334	1.947 **	0.256	-0.026
	(1.98)	(-3.14)	(3.68)	(3.22)	(0.86)	(2.12)	(0.83)	(-0.07)
$TYLD_t$	-0.048	-0.059	-0.077	0.020	-0.033	-0.077	-0.083 *	0.016
	(-0.73)	(-0.67)	(-1.70)	(0.45)	(-0.61)	(-0.87)	(-1.74)	(0.67)
$CSPR_t$	0.008	0.007	0.017	0.005	0.032	0.007	0.010	0.004
	(0.02)	(0.93)	(1.27)	(0.34)	(0.09)	(0.81)	(0.73)	(0.00)
$DYLD_t$	-0.006	0.014	-0.048	0.012	-0.006	0.017	-0.033	0.010
	(-0.74)	(0.83)	(-1.83)	(0.63)	(-0.89)	(0.99)	(-1.18)	(0.93)
Durbin-Watson	2.102	2.293	2.198	2.119	2.062	2.204	2.218	2.003
Adj. R^2	0.012	0.048	0.161	0.076	0.005	0.028	0.053	0.007
Small Trader								
Constant	0.013	-0.029	0.072	-0.040	0.012	-0.027	0.061	-0.021
	(1.1)	(-1.05)	(1.65)	(-1.20)	(1.26)	(-0.99)	(1.40)	(-1.19)
ΔNP_t	0.184	0.435 **	-0.505	0.193	-0.321	-2.289 **	-2.484	0.354
	(0.97)	(2.28)	(-0.83)	(0.54)	(-0.67)	(-2.36)	(-0.84)	(0.81)
$TYLD_t$	-0.044	-0.065	-0.081 *	0.031	-0.033	-0.064	-0.084 *	0.016
	(-0.67)	(-0.73)	(-1.67)	(0.68)	(-0.61)	(-0.72)	(-1.75)	(0.67)
$CSPR_t$	0.035	0.007	0.013	0.006	0.004	0.007	0.010	-0.002
	(0.08)	(0.90)	(0.88)	(0.04)	(0.10)	(0.91)	(0.72)	(-0.02)
$DYLD_t$	-0.006	0.014	-0.039	0.018	-0.006	0.013	-0.032	0.010
	(-0.75)	(0.86)	(-1.37)	(0.92)	(-0.91)	(0.80)	(-1.14)	(0.95)
Durbin-Watson	2.141	2.262	2.196	2.182	2.069	2.205	2.217	1.994
Adj. R^2	0.006	0.031	0.053	0.015	0.005	0.032	0.053	0.009

Note: The regression results are from equation (3) with weekly observations; returns in the following period are regressed on changes in the level of trader positioning and a number of information variables. Net positioning is defined as the long position less short position for each trader type, taken from the CFTC COT report, and expressed as a percentage of open interest. $TYLD_t$ is the change in yield on 90-day Treasury Bills. $CSPR_t$ is the change in the credit spread, calculated by subtracting the yield on Moody's AAA-rated bonds from the yield on BAA-rated bonds. $DYLD_t$ is the change in the dividend yield on the S&P 500 index. The overall sample period is also disaggregated into three samples surrounding the global financial crisis (*GFC*) of 2008-2009; the crisis period is taken to be January 2008 to December 2009 inclusive. *t*-statistics are shown in parentheses. ***,**, and * denote significance at the 1%, 5% and 10% levels respectively.