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Trading Behaviour in S&P 500 Index Futures

Abstract: This article examines the determinants of trading decisions and the performance of trader types, in the context of the E-Mini S&P500 futures and S&P500 futures markets. Speculators and small traders tend to follow positive feedback strategies while hedgers dynamically adjust positions in response to market returns. Such strategies apparently reverse during the 2008-09 financial crisis. Investor sentiment and market volatility play an important role in determining the net trading position of traders across the sample period. While all trader types are better at foreseeing market upturns, an out-of-sample test suggests that speculators and small traders have some predictive ability for short-term market returns.

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Introduction

Following its introduction in 1982, the S&P 500 index futures contract quickly became the most actively traded equity index contract in the world, and the focus of much attention from the media, traders, and academics. Following significant increases in the standard contract size, as a result of increases in the index value, the electronically traded E-Mini S&P 500 futures contract[1] was introduced in 1997. The establishment of this E-Mini contract allows for the study of investor behaviour across two closely related equity index futures markets, and goes some way towards exploring whether the introduction of the new contract was a worthwhile exercise for the Chicago Mercantile Exchange (CME).

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. Martinez et al. (2011) suggest that transaction costs are higher in an open-outcry market and volume migrates away as a result.

[1] A contract trading the same underlying index as the original "big" contract but with a value per index point equal to 1/10th of the value of the larger contract - $50 v $500.

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.

A 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, all of which are found to be contrarian indicators. More recently, Baker and Wurgler (2007) demonstrate that waves of investor sentiment have clearly discernible, and regular, effects on both individual firms and the stock market as a whole. Another approach has Brown and Cliff (1999) note that market sentiment is driven mainly by returns, but also by indicators such as 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 (2003a) and Salm and Schuppli (2010) provide strong evidence of positive feedback trading by speculators in equity index futures, whereas Wang (2001) finds that hedger sentiment is a contrary indicator for returns on agricultural futures. Wang (2003b) controls for market risk factors and finds that speculators (hedgers) positions are positively (negatively) correlated with subsequent abnormal returns.

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. The response of volatility to this activity is unclear with Chen et al. (2010) reporting that conditional volatility increases with speculative trading activity, while Miffre and Brooks (2013) suggest that speculators do not impact volatility of commodity futures in their portfolios. Most recently, Fishe and Smith (2012) use data from the CFTC's Large Trader Reporting System (LTRS) to identify informed traders across 12 commodity markets, and find that while money traders/hedge funds tend to be well informed, commercial hedgers do not. Lutzenberger (2014) finds that investor

sentiment is the best in-sample predictor of short-horizon returns in commodity futures. The theory of normal backwardation proposed by Keynes (1923) explains the deviation of futures prices 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) reports that, after controlling for systematic risk, futures market returns vary with the net holding of hedgers.

Essentially, this article seeks to answer two key questions. First, is there a relationship between the net position of different trader types and measures of investor sentiment and market volatility? Second, do the net positions of different trader types hold any explanatory power in forecasting future market returns?

This article adds to the literature in several ways. Firstly, the determinants of trading behaviour in closely related markets may be better understood; in particular the influence of changes in economic conditions on that behaviour. Secondly, this article adds to the discussion of whether specific trader-types are able to forecast market returns with any significance. Finally, 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 important differences in trading behaviour, and this behaviour changes as a result of the financial crisis of 2008-2009. The trading behaviour of speculators and small traders is significantly related to changes in investor sentiment, and measures of market volatility. Speculators and small traders tend to follow positive feedback[2] strategies while hedgers adopt strategies[3] which suggest the presence of dynamic hedging; this is not inconsistent with conventional thought on the behaviour of futures traders, and suggests that hedgers have helped to stabilize prices in the future market. 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 at predicting market upturns than market downturns, and the net positions of both speculators (S&P500 futures) and small-traders (E-Mini and S&P500

[2] That is, they buy following market upturns and sell following market declines – accentuating market movements.

[3] They sell (buy) following market upturns (downturns) – helping to limit market movements.

futures) appear to offer some predictive ability over the short-run, although this capability is greater for positions that are classified as extreme. The results 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. Section 1 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. Section 2 investigates the determinants of trading decisions and the influence of the global financial crisis (GFC) on those decisions. Section 3 examines the predictive ability and profitability of market timing by traders. Section 4 concludes.

1. S&P Futures and Trader Position Reporting Data

Data for S&P500 Index Futures Contracts

The S&P500 Futures[4] 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 this time one S&P Futures contract was valued at nearly $500,000[5]. Whilst the big S&P500 contract trades using the open outcry method in the Chicago pit[6] 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.

Since the introduction of the E-Mini futures, aggregate trading volume (combined values of the "big" and "mini" contracts) has increased markedly, however a significant portion of this volume has migrated away from the "big" contract and towards the E-Mini market. This is illustrated in Figure 1. As at March 2013[7], 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 benefits of trading electronically, in terms of speed and accuracy of execution, has appeal to high-frequency traders and hedge funds and,

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

[5] $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.

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

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

together with the smaller contract size, has likely resulted in liquidity moving towards the E-Mini contract during the sample period.

<Insert Figure 1>

A series of futures returns is created for both the E-Mini and S&P500 futures contract, using data collected from Datastream, for the period September 1997-December 2012. The return is measured as the percentage change in settlement prices of the contract in excess of the risk free rate[8]. Returns are calculated using the nearest delivery date contract and a 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, which reflects positions on a Tuesday of each week, a weekly return series is constructed based on a week that runs from Tuesday-to-Tuesday[9].

Data on Trader Positions

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 (2003b) notes that this interpretation may be inaccurate, and Ederington and Lee (2002) find that the commercial group likely includes some traders with no positions to hedge in the cash market, this interpretation of CFTC data has been widely utilised in the extant literature (e.g. Bessembinder, 1992; Wang, 2001, 2004; Moskowitz et al., 2012). Figure 2 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, hedgers have generally been short (net negative position) which would make intuitive sense if they are seeking to hedge long cash positions. While small traders have generally been long (net long position), speculators have had the smallest net position on average and have alternated between long and short positions.

<Insert Figure 2>

[8] This excludes any return on collateral.

[9] This strategy for calculating returns is analogous to Wang (2003b) although CFTC data is now provided weekly as opposed to monthly.

Data on Investor Sentiment and Economic Variables

Baker and Wurgler (2006) construct an investor sentiment measure based on the first principal component of six orthogonalized proxies (the closed-end fund discount, monthly NYSE turnover, IPO volume, first day IPO returns, equity share in new issues, and the value-weighted dividend premium) and demonstrate how this significantly affects the cross-section of stock returns. This sentiment index is used as a proxy of investor sentiment in this study[10] and denoted *SENT*.

The Chicago Board Options Exchange (CBOE) Market Volatility Index (*VIX*), is used as a proxy for the level of expected market volatility, or investor "fear". Introduced by Whaley (1993, 2000), 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. 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'. Data for VIX is obtained from the 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 economic variables that are priced risk factors in U.S. futures markets. One aspect of interest in this paper is to examine how such economic variables 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 September 1997 to December 2012. Data for the economic variables 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, tend to be long. Conventional

[10] Data is obtained from website of Dr. Jeffrey Wurgler (http://people.stern.nyu.edu/jwurgler/data/investor_sentiment_data_v23_post_xlsx)

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 have 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 economic variables. The average weekly futures market return in excess of the risk free rate is indistinguishable from zero over the period considered. The average level of investor sentiment is 0.17 over the sample period, and the average level of VIX is 22.45, while the average 3-month T-Bill yield is 2.50%, the corporate bond credit spread is 1.06%, and the dividend yield is 1.79%. The mean for all risk factor variables is significantly different from zero.

<Insert Table I>

2. 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. Baker and Wurgler (2006) demonstrate that investor sentiment can explain market returns. Bessembinder (1992), Bessembinder and Chan (1992), and Frank and Garcia (2009) investigate the risk premium in futures markets; finding that certain economic 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 economic variables have an effect on the positioning of traders, and their investment decisions. Following Wang (2003b), the determinants of trading decisions by type of trader are estimated using the following equation for both of the S&P500 futures markets:

$$\Delta NP_{t+1}^{i} = \alpha_0^i + \alpha_1^i R_t + \alpha_2^i \Delta SENT_t + \alpha_3^i \Delta VIX_t + \sum \beta_j^i \Delta \phi_{jt} + \varepsilon_{t+1}^i \qquad (1)$$

Where ΔNP_{t+1}^{i}represents the change in net positions of trader type *i* in week *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[11]. R_t is the futures market return in excess of the risk-free rate for period *t,* expressed in percentage points. $\Delta SENT_t$ denotes the change (first-difference) in the level of investor sentiment index in period *t*, ΔVIX_t denotes the change in the level of expected market volatility during period *t*. ϕ_t is a set of common economic variables 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. The specification utilises the first difference of the designated economic variables, and in order to synchronize with the COT data differences are calculated on the basis of consecutive Tuesday's.

Empirical Results

The estimated coefficients for Equation (1) are reported in Table II; where each regression has 802 observations. For each futures contract, Model 1 is the base model, which simply 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, market volatility and the common economic variables.

Examining the coefficients for speculators first reveals a contradiction between their behaviour in E-mini futures and S&P500 futures markets. Apparently, in the E-mini futures market (where speculator positions are generally smaller), the size of trading positions is reduced as the market rallies. While in the S&P500 futures (with larger speculator positions) the positions are added to following increases in futures prices, suggestive of a continuation or positive feedback strategy. If futures prices appreciate by 1 percentage point, the speculators will increase their long position in S&P500 futures by 0.174 x total open interest. This result holds after controlling for common economic variables. Speculators are shown to increase their position size as investor sentiment rises, but this result is statistically significant only at the 10% level. The

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

results also show that changes in treasury yields, credit spreads, and dividend yields have a negative relationship with the net trading positions of speculators; suggesting that speculators reduce net long (or increase net short) positions as the economic variables increase.

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 is consistent with hedgers adjusting their hedge position in light of changes in the value of the underlying portfolio. In addition, there is weak statistical evidence (at the 10% level) of negative relationship between market volatility (VIX) and hedge positions. The coefficient for changes in sentiment is opposite to that found for speculators, but not statistically significant. While the sign of the coefficient for each of the economic variables is consistent with those found for speculators, it appears that the suggested economic variables are not found to be statistically significant in determining changes in the net position of hedgers. Taken together, the results suggest that the trading behaviour of hedgers is determined solely by market returns (and volatility to a lesser extent) rather than changes in market sentiment or economic variables; one explanation may be that hedgers may follow an automated hedging program.

<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 given the relative contract size it may be likely that such traders are more likely to trade in the E-Mini futures market. Three significant findings present themselves. First, investor sentiment has a positive relationship with net trader positions, implying that positions become longer (shorter) as sentiment improves (declines); this is highly significant in the E-Mini futures market. Second, a positive and significant estimated coefficient for returns suggests that small traders follow a momentum or positive feedback trading strategy; the magnitude of the coefficient is 5x larger for E-Mini futures suggesting greater trading activity in this contract. Third, there is a negative coefficient for market volatility, supportive of the notion that long positions are reduced as market volatility rises. As with hedgers, the coefficients for the economic variables are consistent but not statistically significant.

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[12] has had on trading behaviour in equity index futures; a dummy variable is introduced to signify this crisis and its aftermath. The regression results for equation (1) augmented through the incorporation of interaction terms with the GFC dummy variable are shown in Table III.

<Insert Table III>

The reported results suggest that the GFC does impact trading behaviour. This is most evident when considering the influence of market returns. In general, the sign is consistent with the results reported in Table II, but is reversed for the R_t *x GFC* interaction term. That is, contrary to their behaviour in other periods, speculators and small-traders tend to reduce long positions (or increase short positions) following market rallies during the GFC. Perhaps this is a result of an increased desire from such traders to "lock-in" profits during times of financial crisis; this may also explain the change in behaviour from hedgers who may see market rallies as an opportunity to reduce holdings in the cash-market and then need to adjust their hedge in the futures market. For speculators in the E-Mini futures market, it is apparent that the relationship between position and returns previously reported is driven by the profit-taking (contrarian) behaviour exhibited during the GFC.

The reported effects of sentiment on net trading positions are also consistent with that described earlier, although it is notable that the coefficients are of a much larger magnitude (at least 4.7x) for all trader-types in S&P500 futures during the GFC period, and also for small traders in the E-Mini contract. The relationship with market volatility is also persistent when considering the GFC, indeed for S&P500 futures it is apparent that the identified relationship is only significant in the GFC period, while for E-Mini futures the reverse is true. In the S&P500 contract, the effect of credit spreads on the trading position of speculators is apparently concentrated during the GFC, this may result from such traders facing tighter financial constraints in this period, and so being more responsive to changes in credit costs. Conversely,

[12] 15 September 2008 is taken as the start of crisis period as this reflects the date of the Lehman Brothers failure and coincides with the start of NBER defined recession. 30 June 2009 is assumed to be the end of the crisis as this is the end of the NBER defined recession. The qualitative interpretation of results is robust to changes in this window.

whilst statistically significant overall, the impact of dividend yields has no significant impact for speculators during the GFC.

In summary, when examining the determinants of changes in the net position of traders, and controlling for risk factors, small traders tend to follow positive feedback strategies, and hedgers follow a strategy whereby they adjust futures positions in response to changes in the value of their underlying position. Although in general, speculators also follow a positive feedback strategy, the relationship is more complex with a clear dichotomy between the E-Mini and "big" contracts, and between crisis and non-crisis periods. While such results are not inconsistent with conventional thought on the behaviour of futures traders, it is contrary to Wang (2003b) who finds that speculators in financial futures are contrarian whilst hedgers exhibit positive feedback to lagged returns. There is also evidence to support the view that both investor sentiment and market volatility influence the trading behaviour of speculators and small-traders. Consideration of changes in trader positions around the period of the GFC demonstrates that investor behaviour is not static.

3. 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. Fisher and Statman (2000) and Wang (2001) investigate whether the level of net positioning forecasts future market movements using a simple OLS specification. The following model is used to investigate this relationship:

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

Where R_{t+k}^{j} represents cumulative returns in market j in the subsequent k weeks, where k = 1,2,4,8, and 12. NP represents the level of net trader positions, and i is the trader type. Newey-West standard errors are reported to account for the possibility of autocorrelation in the regression residuals resulting from overlapping observations[13]. This analysis focuses on the value

[13] Appropriate lags are chosen in each case using Akaike Information Criterion (AIC).

of forecasts in shorter horizons since the life of a futures contract is typically no more than 3 months (12 weeks).

If the β coefficient estimated for eq.(2) is significantly different from zero then this is indicative of abnormal performance (or under-performance) by the trader type (Wang, 2001). A well-defined positive coefficient would indicate abnormal performance, and a market participant may then view long (short) positions for that trader type as an indication to buy (sell) futures. Alternatively, if the coefficient is significantly negative (i.e. the trader type abnormally underperforms) then an investor should view this as a contrary indicator and sell (buy) futures if the trader type is long (short). The regression results for eq.(2) are reported in Table IV[14].

<Insert Table IV>

Panel A reports results for the E-Mini futures market. The overall sample has no significant β coefficients which suggest that there is no relationship between the net position of traders and subsequent market returns. This result, together with the generally low R^2 for each regression, is consistent with the empirical results of Wang (2001). However, it may be possible that a better indication of future returns may be provided by considering *extreme* positions; in the sense that traders that are more confident in the future direction of the market will increase position size in advance of expected movements. For instance, intuition dictates that one may expect extremely long net positions to be 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. If the net position for the particular trader type is in the highest (lowest) quintile then the position is classified as an extreme long (short) position. The regression in eq.(2) is then re-run for only the observations corresponding to extreme long (or short). A significant positive (negative) coefficient with long positioning indicates that the trader has abnormal performance (under-performance), while the reverse is true for short positioning.

The reported results suggest that when each of the trader types has *long* positions that are within the highest quintile, then subsequent market returns do tend to be positive on average, but this is not always statistically significant. Indeed for speculators and hedgers this is only the case in one instance each (4-week and 2-week respectively). However, for small traders, the relationship is positive and well-defined for up to 4-weeks from the date of the COT report,

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

suggesting some element of predictive ability. Analysis for extreme *short* positions in E-Mini futures reveals predictive ability from speculators in the 1- and 2-week period, and small traders in the 12-week period. While a hedger net position in the lowest quintile is a contrarian indicator for the 8-week period.

Similar analysis for the S&P500 contract is presented in Panel B. Again there are no significant coefficients to report for the overall sample. Instead, the most salient results relate to speculators, with market returns tending to be positive in the weeks following a high quintile (long) net position, and negative following a low quintile (short) net position. The coefficients for speculator returns are statistically significant for up to 8-weeks following the COT report.

Whilst the level may be an important indicator, given the propensity for certain trader types to be long or short, changes in the level of trading positions prior to market movements may be more informative in forecasting changes in market prices. Conducting a similar analysis with changes in net positions as the dependent variable[15] finds no significant relationships in the E-Mini futures market, although the extreme positions in the S&P 500 futures market appear to be informative. Large increases (those in the highest quintile) in the net position of speculators are indicative of positive future returns over 1-4 week timeframe. Similarly, large decreases (those in the lowest quintile) in the net position of speculators are indicative of negative future returns over a 2-8 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 of traders

The evidence presented in the previous section appears to be suggestive of superior forecasting ability by certain trader types. One question that posits itself is how frequently different trader types predict market returns correctly; Table V presents initial evidence on measuring this predictive ability. 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.

[15] The empirical results are not reported here for the sake of brevity but are available from the author on request.

Using only the net position level may not be wholly informative, since 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 Table V suggests that all trader types are better at predicting positive market returns than at predicting negative returns. The performance of speculators in predicting returns is apparently superior in the S&P500 futures, consistent with the results in the previous section, while small traders are found to have a marginally better performance in the E-Mini futures which is consistent with a majority of their trading activity taking place in this smaller value contract[16].

<Insert Table V>

Welch and Goyal (2008) suggest that a variety of suggested predictors of the equity premium perform poorly in out-of-sample testing, and that historical average returns generate better return forecasts. In order to validate the suggestion that particular trader types may have some predictive ability in forecasting future market movements it is imperative that a more formal analysis is conducted. Campbell and Thompson (2008) suggest one method to evaluate the out-of-sample performance of such forecasts, using an out-of-sample R^2 statistic that which is computed as:

$$R_{OS}^2 = 1 - \frac{\sum_{t=1}^{T}(r_t - \hat{r}_t)^2}{\sum_{t=1}^{T}(r_t - \bar{r}_t)^2} \quad (3)$$

Where $\hat{r}_t$ is the fitted value from a predictive regression estimated through period t-1, and $\bar{r}_t$ is the historical average return estimated through period t-1. If the out-of-sample R^2 is positive, then the predictive regression has lower mean-squared prediction error than the historical average return. More specifically, if the out-of-sample R^2 is positive, the forecast using trader positions, as in equation (2), outperforms that of using the historical average. The significance of the R^2 statistics is determined using the mean square prediction error (MSPE) adjusted technique of Rapach et al. (2010). Consistent with the empirical study in the earlier sections of this paper, the in-sample period ends in December 2012. The out-of-sample period runs from the first COT

[16] It is possible that the results presented in Table V are driven by chance or coincidence. A bootstrap analysis, resampling the time series 5,000 times reveals that for indicative predictive ability greater than 53.0% there is less than 5% of occasions on which the trader type performance is bettered.

report in January 2013, until the end of December 2014, and a recursive estimation window is used. The results, for 1-week and 1-month ahead forecasts, are reported in Table VI.

<Insert Table VI>

The out-of-sample test provides evidence of short-run (1-week ahead) predictive ability of small-traders in both E-Mini and S&P500 futures, and for speculators in S&P500 futures. Such results are consistent with the results reported earlier. Whilst small trader outperformance (in terms of predictive ability) in E-Mini futures may surprising, this could be due to speculators preferring to execute more informative trading positions through the larger value contract (evidenced by significant R^2), while small traders focus their trading in the E-Mini contract. For forecasts of market returns 1-month ahead, the historical average return proves a better predictor of returns and so there is no predictive ability. The predictive ability of extreme speculator positions is also confirmed for S&P500 futures. Whilst the test suggests only modest explanatory power (low R^2), Campbell and Thompson (2008) point out that even small R^2 statistics can generate large benefits for investors.

In summary, there is some evidence to suggest that speculators (S&P500 futures) and small traders (E-Mini contracts) possess some forecasting ability for short-run market returns. In general, traders appear to correctly predict positive returns more regularly than they do negative returns. This suggests that a simple trading strategy of mimicking the net position of speculators (S&P500 futures) and small-traders (E-Mini futures) will yield a positive outcome. While the evidence does not allude to any forecasting ability of hedgers, it must be remembered that such traders are active in futures markets primarily as a means to hedge positions in the underlying cash market.

4. Conclusion

This article examines the determinants of net trading positions, the relationship of those positions with sentiment, and the performance of various trader-types, in the context of the E-Mini S&P 500 futures and S&P 500 futures markets.

Evidence suggests that, after controlling for risk factors, speculators and small traders tend to follow positive feedback strategies while hedgers adopt a strategy which is consistent with dynamic hedging of their underlying portfolio. The determinants of net trading positions are identical in sign, but different in statistical significance, for each trader type in the two contracts.

Speculators are the primary exception to this result as they respond differently to market returns in the two contracts. Net trading positions of speculators and small traders have a well-defined positive relationship with investor sentiment, while increases in market volatility tends to elicit smaller (or larger short positions) within all trader-types. There is also evidence of trading behaviour changing as a result of the financial crisis of 2008-2009, in particular the response of net futures positions to market returns appears to reverse.

The extreme levels of SP500 futures positioning among speculators appears to provide a good indicator of (long and short) trading opportunities, while consideration of the market-timing of trader-types suggests that there is a greater ability in predicting market rallies than market falls. The net positions of both speculators and small-traders appear to offer some predictive ability over the short-run which, while small in magnitude, may offer large benefits for investors.

The 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 also consider the implementation of simple trading strategies based on the reported results; for example mimicking the strategy of speculators and small traders and buying (selling) futures for the 1-week following net increases (decreases) in net positions.

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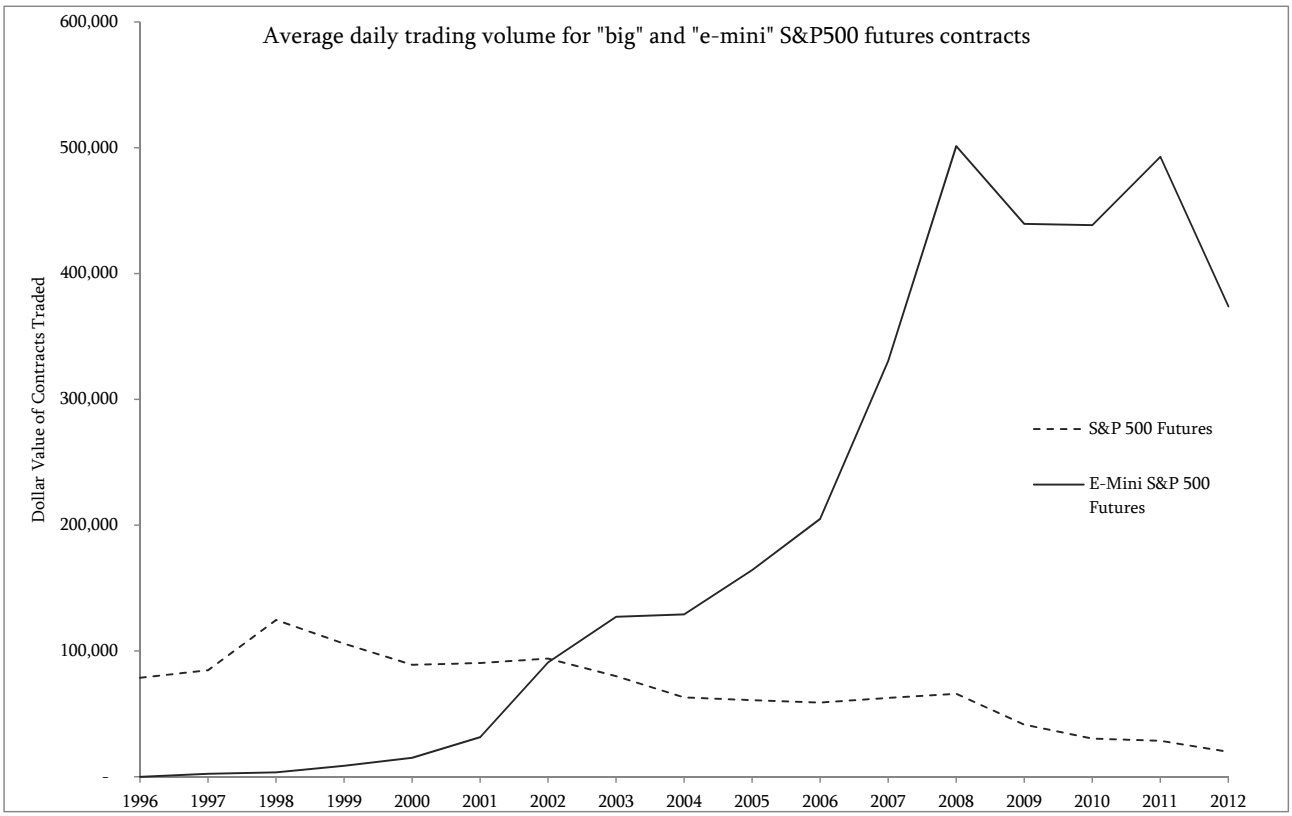

Figure 1

Average daily trading volume for "Big" and "E-Mini" S&P 500 futures contracts, in number of contracts traded. The number of e-mini contracts traded is divided by 5 to reflect the different value of the price multiplier (the multiplier is $250 per index point for the "big" contract and $50 per index point for the E-mini contract). Only the volume of the front/nearest-to-maturity contract is depicted.

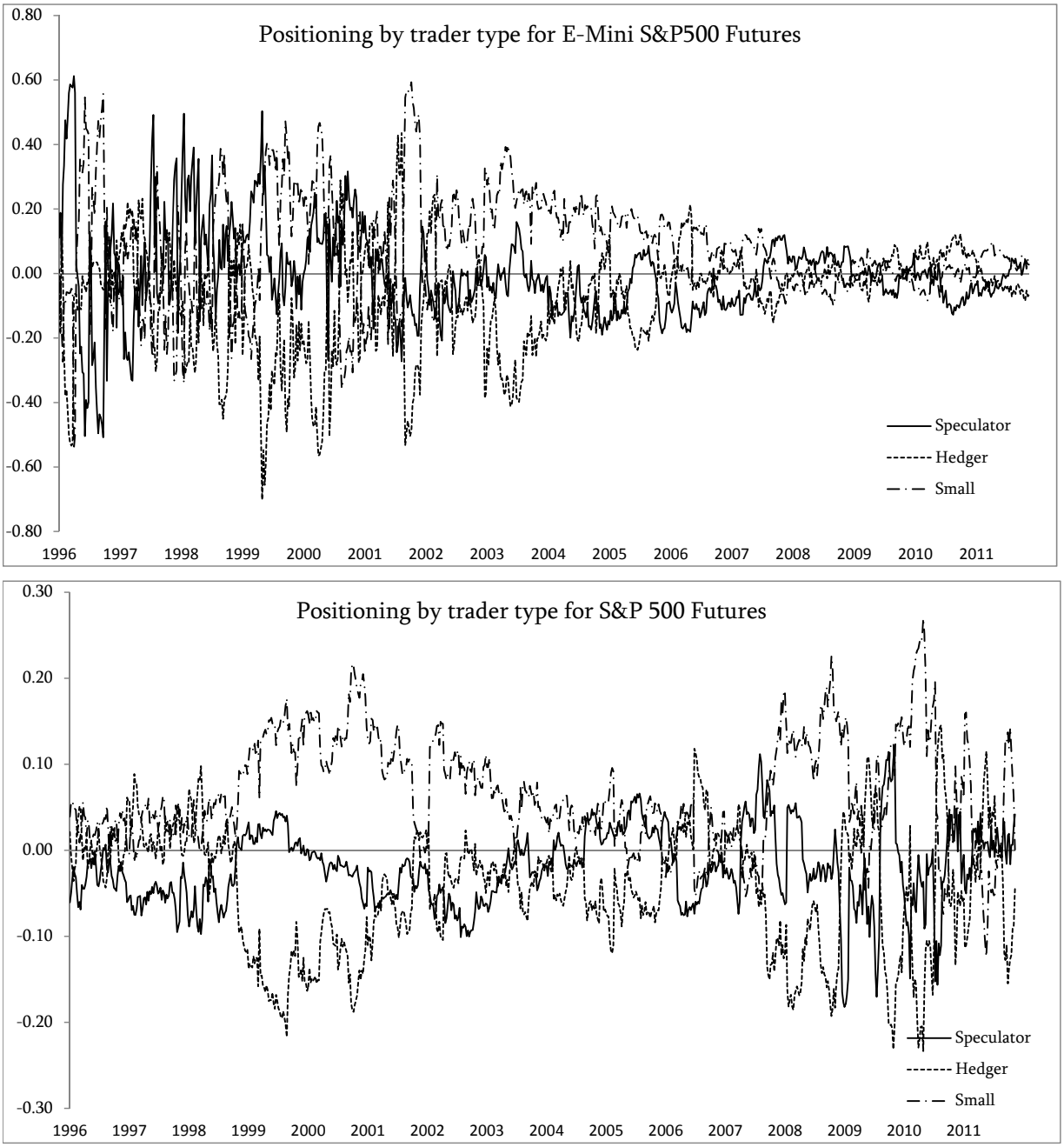

Figure 2

Net position, expressed as a percentage of open interest, for each trader-type.

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	- 26,246	113,569	- 48,255	119,062	74,501	128,036
Nominal Position (% of Open Interest)	0.3%	18.5%	-7.5%	16.6%	7.2%	19.8%
Max Long (% Open Interest)	61.2%		43.6%		59.3%	
Max Short (% Open Interest)	50.8%		70.1%		54.6%	
% Occasions Net Long	45.8%		29.2%		69.1%	
% Occasions Net Short	54.2%		70.8%		30.9%	
S&P 500 Futures (SP)						
Nominal Position	- 9,937	22,716	- 24,456	33,528	34,393	30,026
Nominal Position (% of Open Interest)	-1.8%	4.5%	-4.6%	7.2%	6.4%	6.5%
Max Long (% Open Interest)	11.7%		11.8%		22.6%	
Max Short (% Open Interest)	18.2%		23.1%		5.7%	
% Occasions Net Long	30.1%		27.6%		90.2%	
% Occasions Net Short	69.9%		72.4%		9.8%	

Panel B: Correlations of Net Positions

E-Mini S&P 500 Futures (ES)		Speculator	Hedger
	Hedger	-0.366	
	Small	-0.625	-0.497

S&P500		Speculator	Hedger
	Hedger	-0.460	
	Small	-0.180	-0.790

Panel C: Summary Statistics for Other Variables

	Mean	SD	*t*-stat	
Returns on ES & SP Futures (*R*)	0.06	2.61	0.60	
Investor Sentiment (*SENT*)	0.17	0.62	7.11	***
Market Volatility (*VIX*)	22.45	8.50	74.79	***
90-Day T-Bill Yield (*TYLD*)	2.50	2.05	34.54	***
Credit Spread (*CSPR*)	1.06	0.48	63.10	***
Dividend Yield (*DYLD*)	1.79	0.40	125.50	***

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 (*R*) is measured as the natural log of the futures price change in excess of the risk-free rate over the 1-week interval between CFTC reports. *SENT* is the level of investor sentiment computed using the methodology of Baker & Wurgler (2006). *VIX* is the level of implied volatility in S&P 500 options, and represents the level of market volatility. *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. Sample period: 16 September 1997 - 31 December 2012.

TABLE II

Determinants of Positioning: Changes in Net Positions and Lag Changes in Returns, Investor Sentiment, and Risk Factors

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	0.015		0.048		-0.003		-0.009	
	(0.407)		(0.469)		(0.063)		(0.059)	
R_t	-0.319	**	-0.593	***	0.174	***	0.146	***
	(0.156)		(0.288)		(0.024)		(0.036)	
$\Delta SENT_t$			3.851	*			0.259	*
			(2.126)				(0.137)	
ΔVIX_t			-0.211				-0.023	
			(0.251)				(0.032)	
$\Delta TYLD_t$			-4.685				-0.871	*
			(3.924)				(0.495)	
$\Delta CSPR_t$			-0.746				-2.784	**
			(8.622)				(1.088)	
$\Delta DYLD_t$			-3.915				-3.167	***
			(9.132)				(1.152)	
Durbin-Watson	2.126		2.115		2.014		1.873	
Adj. R^2	0.013		0.011		0.061		0.059	
Hedger								
Constant	-0.004		-0.007		-0.019		-0.017	
	(0.339)		(0.390)		(0.077)		(0.071)	
R_t	-0.280	**	-0.270	**	-0.067	**	-0.107	**
	(0.130)		(0.129)		(0.029)		(0.043)	
$\Delta SENT_t$			-2.721				-1.013	
			(4.601)				(0.839)	
ΔVIX_t			-0.303	*			-0.062	*
			(0.169)				(0.037)	
$\Delta TYLD_t$			-1.626				-0.234	
			(3.267)				(0.596)	
$\Delta CSPR_t$			-4.815				-1.760	
			(7.178)				(1.310)	
$\Delta DYLD_t$			0.951				0.973	
			(7.603)				(1.388)	
Durbin-Watson	2.323		2.314		1.874		1.994	
Adj. R^2	0.023		0.025		0.007		0.015	
Small Trader								
Constant	-0.011		-0.041		0.008		0.018	
	(0.402)		(0.463)		(0.073)		(0.068)	
R_t	0.347	**	0.322	**	0.057	**	0.086	**
	(0.154)		(0.158)		(0.028)		(0.042)	
$\Delta SENT_t$			6.571	***			1.330	*
			(2.459)				(0.728)	
ΔVIX_t			-0.092	*			-0.074	**
			(0.048)				(0.036)	
$\Delta TYLD_t$			-6.313	*			-0.630	
			(3.776)				(0.566)	
$\Delta CSPR_t$			-5.560				-1.689	
			(8.517)				(1.245)	
$\Delta DYLD_t$			-4.867				-0.941	
			(9.020)				(1.319)	
Durbin-Watson	1.977		1.981		1.998		2.078	
Adj. R^2	0.017		0.014		0.006		0.017	

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. R_t is the natural log of the futures price change in excess of the risk-free rate over the 1-week interval between CFTC reports, expressed as a percentage. $\Delta SENT_t$ is the change (first difference) in the measure of investor sentiment derived from Baker-Wurgler (2006), ΔVIX_t is the change in level of expected market volatility. $\Delta TYLD_t$ is the change in yield on 90-day Treasury Bills. $\Delta CSPR_t$ 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. $\Delta DYLD_t$ is the change in the dividend yield on the S&P 500 index. *Newey-West standard errors* are shown in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels respectively. Sample period: 16 September 1997 - 31 December 2012.

TABLE III

Impact of the Global Financial Crisis (GFC) on the relationship between Net Trader Positions and Lag Changes in Returns, Investor Sentiment, and Risk Factors

Dep. Variable: Change in	E-Mini S&P500 Futures			S&P500 Futures		
Net Position (t+1)	Speculator	Hedger	Small Trader	Speculator	Hedger	Small Trader
Constant	-0.097	0.067	0.030	-0.006	-0.009	0.010
	(0.484)	(0.403)	(0.480)	(0.067)	(0.074)	(0.069)
R_t	0.676 **	-0.407 **	0.569 **	0.116 ***	-0.105 **	0.125 **
	(0.343)	(0.186)	(0.241)	(0.043)	(0.046)	(0.049)
$\Delta SENT_t$	9.131 **	-7.322	2.809 ***	0.061	-0.827	0.765
	(4.508)	(4.847)	(1.074)	(0.729)	(0.885)	(0.536)
ΔVIX_t	-0.692 **	-0.020	-0.691 **	-0.035	-0.041	-0.011
	(0.318)	(0.265)	(0.316)	(0.039)	(0.052)	(0.026)
$\Delta TYLD_t$	-4.122	-3.318	-7.441 *	-0.864 *	-0.447	-0.225
	(4.157)	(3.469)	(4.133)	(0.522)	(0.729)	(0.598)
$\Delta CSPR_t$	-7.872	-11.142	-3.272	-0.418	-2.065	-1.557
	(11.688)	(9.754)	(11.619)	(1.466)	(1.893)	(1.679)
$\Delta DYLD_t$	3.683 ***	-6.946	-2.988	-3.215 **	3.242 *	-0.027
	(1.215)	(10.137)	(2.207)	(1.526)	(1.851)	(1.747)
GFC	-0.072	0.426	-0.354	-0.022	0.156	-0.178
	(2.042)	(1.705)	(2.030)	(0.257)	(0.311)	(0.294)
$R_t \times GFC$	-1.398 **	0.917 **	-0.480 **	-0.188 **	0.113	-0.132 *
	(0.688)	(0.444)	(0.224)	(0.086)	(0.104)	(0.079)
$\Delta SENT_t \times GFC$	8.479	6.336	4.143 ***	0.287 **	-4.817	4.524 *
	(20.789)	(17.351)	(1.467)	(2.613)	(3.169)	(2.493)
$\Delta VIX_t \times GFC$	-0.904 *	-0.217	-0.687	-0.130 *	-0.037 *	-0.167 **
	(0.534)	(0.446)	(0.531)	(0.067)	(0.021)	(0.076)
$\Delta TYLD_t \times GFC$	-7.187	-1.442	-8.629	-1.511	-2.517	-1.006
	(13.629)	(11.376)	(13.549)	(1.713)	(2.077)	(1.962)
$\Delta CSPR_t \times GFC$	-9.448	9.273	-0.173	-5.538 **	-0.267	0.521
	(18.025)	(10.043)	(1.792)	(2.263)	(3.070)	(2.593)
$\Delta DYLD_t \times GFC$	-4.073 **	15.044	2.569	-1.175	1.254	0.496
	(1.893)	(15.801)	(1.882)	(2.379)	(2.885)	(2.725)
Durbin-Watson	2.117	2.313	1.986	1.974	1.967	2.066
Adj. R^2	0.027	0.015	0.047	0.080	0.025	0.042

Note: This table reports the results for the regression specified in eq.(1), augmented with a series of interaction terms. 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. *GFC* is a dummy variable indicating the onset of the financial crisis in September 2008, this takes a value of 1 for the period 15 September 2008 - 30 June 2009 and 0 otherwise. *Rt* is the natural log of the futures price change in excess of the risk-free rate over the 1-week interval between CFTC reports, expressed as a percentage. *ΔSENTt* is the change (first difference) in the measure of investor sentiment derived from Baker-Wurgler (2006), *ΔVIXt* is the change in level of expected market volatility. *ΔTYLDt* is the change in yield on 90-day Treasury Bills. *ΔCSPRt* 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. *ΔDYLDt* is the change in the dividend yield on the S&P 500 index. Newey-West standard errors are shown in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels respectively. Sample period: 16 September 1997 - 31 December 2012.

Table IV

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

	1week		Adj. R^2	2week		Adj. R^2	4week		Adj. R^2	8week		Adj. R^2	12week		Adj. R^2
Panel A: E-Mini S&P 500 Futures															
Overall															
Speculators	0.429		0.008	0.260		0.001	0.157		0.009	0.149		0.008	0.058		0.002
	(0.499)			(0.502)			(0.499)			(0.498)			(0.497)		
Hedgers	-0.038		0.001	-0.170		0.008	-0.209		0.004	-0.274		0.009	-0.460		0.002
	(0.556)			(0.556)			(0.555)			(0.554)			(0.554)		
Small Traders	0.237		0.003	-0.018		0.002	-0.106		0.006	-0.220		0.003	-0.666		0.002
	(0.356)			(0.369)			(0.434)			(0.415)			(0.376)		
Long Positioning (High Quintile)															
Speculators	0.330		0.007	0.184		0.002	1.095	***	0.008	1.083		0.002	0.963	*	0.006
	(0.233)			(0.361)			(0.151)			(0.973)			(0.510)		
Hedgers	-2.105	*	0.004	2.948	***	0.007	2.160	*	0.003	0.533		0.002	0.198		0.007
	(1.275)			(0.820)			(1.194)			(2.256)			(2.584)		
Small Traders	2.920	**	0.020	2.515	**	0.009	4.548	***	0.042	-1.520		0.004	-2.048		0.008
	(1.275)			(1.182)			(1.340)			(1.988)			(2.376)		
Short Positioning (Low Quintile)															
Speculators	-1.571	*	0.006	-3.953	**	0.029	0.079		0.001	2.469		0.013	2.569	*	0.013
	(0.878)			(1.808)			(1.876)			(2.928)			(1.442)		
Hedgers	-0.717		0.001	-1.754		0.008	0.109		0.003	0.899	***	0.031	0.932		0.003
	(1.054)			(1.084)			(1.294)			(0.330)			(1.044)		
Small Traders	-0.056		0.002	0.657		0.003	-0.386		0.001	-0.298		0.005	-1.100	***	0.006
	(0.368)			(0.257)			(0.374)			(0.839)			(0.244)		
Panel B: S&P 500 Futures															
Overall															
Speculators	2.374		0.002	1.306		0.006	1.174		0.005	0.637		0.001	-0.334		0.004
	(1.733)			(1.782)			(1.767)			(1.732)			(1.762)		
Hedgers	-1.906	*	0.003	-1.899	*	0.003	-1.913		0.006	-1.289		0.008	-0.405		0.001
	(0.979)			(1.005)			(1.276)			(1.274)			(1.274)		
Small Traders	-1.094		0.001	-1.725		0.002	-1.329		0.002	-0.863		0.006	-0.348		0.003
	(1.416)			(1.415)			(1.415)			(1.412)			(1.411)		
Long Positioning (High Quintile)															
Speculators	15.196	***	0.017	7.752	**	0.004	8.926	**	0.006	11.741	***	0.009	4.805		0.001
	(4.684)			(3.869)			(4.147)			(2.980)			(4.947)		
Hedgers	-0.616		0.006	0.584		0.006	2.434		0.001	-0.990		0.002	8.065	*	0.010
	(4.063)			(6.856)			(6.653)			(3.094)			(4.321)		
Small Traders	-1.214		0.002	-1.192		0.002	0.357		0.001	-7.100		0.005	-6.604		0.004
	(5.038)			(4.700)			(4.929)			(6.704)			(6.877)		
Short Positioning (Low Quintile)															
Speculators	-18.894	***	0.029	-7.797	***	0.006	-7.824	***	0.006	-3.677	**	0.001	12.174	*	0.017
	(4.313)			(2.349)			(1.809)			(1.794)			(6.523)		
Hedgers	-2.612		0.009	-4.297		0.002	-6.198		0.003	-6.936	***	0.006	-10.624		0.004
	(5.570)			(5.053)			(7.238)			(1.798)			(9.555)		
Small Traders	-2.859		0.001	-2.728		0.001	3.815		0.003	-1.193		0.002	-0.139		0.003
	(9.062)			(2.658)			(4.462)			(3.828)			(2.733)		

Note: The regression results are from equation (2) with weekly observations. The dependent variable is the cumulative return in excess of the risk-free rate over the k-week interval following the COT report, expressed as a percentage. 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 extremely long positioning (defined as the net position been in the highest quintile of positions), and extremely short positioning (defined as the net position been in the lowest quintile of positions). Only slope coefficients, which indicate the relationship between trader positioning and subsquent returns, are reported. Newey-West standard errors are shown in parentheses. ***,**, and * denote significance at the 1%, 5% and 10% levels respectively. Sample period: 16 September 1997 - 31 December 2012.

Table V

The predictive ability of traders

	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	47.5%	48.6%	50.6%	48.3%	50.2%	**54.7%**	**56.1%**	**53.6%**	47.9%	49.2%	50.8%	**52.0%**
Correct - Market Up	**53.3%**	**53.8%**	**57.7%**	**53.6%**	**56.7%**	**60.7%**	**58.2%**	**53.0%**	52.3%	**54.6%**	**55.6%**	**57.3%**
Correct - Market Down	42.4%	42.7%	45.8%	42.6%	40.8%	49.3%	**54.0%**	**54.2%**	43.5%	43.9%	46.0%	46.8%

Note: This table depicts the predictive ability of various types of traders. The tables shows the proportion of times the respective trader types are positioned *correctly* for subsequent changes in the futures market (in the following period), that is the trader type is net long (short) in the period prior to market rallies (falls). 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 from the previous period are shown for both E-Mini S&P500 Futures and S&P500 Futures. A bootstrap analysis is undertaken (resampling the time series 5,000 times) in order to determine whether predictive ability is better than chance - instances in which this is true are highlighted in bold.

Table VI

Predicting market returns in out-of-sample test

	1-week ahead		1-month ahead	
	E-Mini S&P 500 Futures	*S&P 500 Futures*	*E-Mini S&P 500 Futures*	*S&P 500 Futures*
Net Position				
Speculators	-4.40%	**0.16%**	-5.56%	-3.28%
Hedgers	-1.09%	-2.73%	-4.20%	-7.08%
Small Traders	**1.63%**	0.14%	-1.28%	-3.19%
Extreme Long Position				
Speculators	-0.24%	**1.60%**	0.20%	**2.29%**
Hedgers	0.04%	-1.06%	0.02%	-2.48%
Small Traders	**1.94%**	-0.18%	**0.55%**	-2.87%
Extreme Short Position				
Speculators	0.03%	**1.89%**	-1.80%	**1.28%**
Hedgers	-0.89%	-2.63%	-2.98%	-3.08%
Small Traders	-0.72%	-1.42%	-1.18%	-2.57%

Note: This table presents forecast statistics, out-of-sample R^2, calculated using equation (3). A positive value suggests that using the net position of a particular trader-type to forecast future market returns (1-week and 1-month ahead) outperforms a forecast using the historical average return. A negative value denotes that the forecast provided by the historical average is better. Figures in bold denote that the out of sample R^2 is significantly greater than zero at the 5% level. Sample period: January 2013 - December 2014