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THE EFFECT OF NET POSITIONS BY TYPE OF TRADER ON VOLATILITY IN FOREIGN CURRENCY FUTURES MARKETS

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We investigate the effect of net positions by type of trader on return volatility in six foreign currency futures markets using the weekly Commitments of Traders (COT) data. When net positions are decomposed into expected and unexpected components, we find that expected net positions by type of trader generally do not co-vary with volatility. However, volatility is positively associated with shocks (in either direction) in net positions of speculators and small traders, and negatively related to shocks (in either direction) in net positions of hedgers. This evidence suggests that changes in speculative positions destabilize the market. Consistent with dispersion of beliefs models and noise trading theories, hedgers appear to possess private information, whereas speculators and small traders are less informed in these markets. © 2002 Wiley Periodicals, Inc. Jrl Fut Mark 22:427–450, 2002

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INTRODUCTION

There is extensive evidence on the relation between financial market volatility and trading activity. For example, Karpoff (1987) cited a number of studies that document a positive relation between trading volume and volatility. In eight futures markets, Bessembinder and Seguin (1993) found that futures return volatility is positively associated with trading volume, but negatively related to open interest. They also found that trading activity shocks have larger effects on prices than expected trading activity.

In this paper, we extend extant studies by using data uniquely available from the Commodity Futures Trading Commission (CFTC). We examine the relation between futures return volatility and net positions by type of trader in six major foreign currency futures contracts traded on the International Monetary Market (IMM). A net position is defined as the long open interest less the short open interest based on the CFTC's COT (Commitments of Traders) reports. The primary focus of this study is on the difference in the volatility-net position relation for speculators, hedgers, and small traders.[1] By examining the relation between volatility and net positions by type of trader, this study allows us to investigate whether changes in net positions by type of trader destabilize the market. Such an answer is thought to be of great interest to financial regulators concerned about promoting market stability. In addition, this study allows us to conduct a test of dispersion of beliefs models and noise trading theories in the futures context, which postulate that the relation between trading activity and volatility depends on the information that traders possess (De Long, Shleifer, Summers, & Waldmann, 1990; Shalen, 1993).

After controlling for the effect of overall trading activity (trading volume and open interest), we find that expected net positions by type of trader generally do not co-vary with volatility in these currency futures markets. However, shocks in net positions are significantly correlated with volatility. Moreover, the volatility-net position shock relations differ substantially across trader types. Both a positive and a negative shock in net positions of speculators and small traders are, on average, related to an increase in volatility, while both a positive and a negative shock in net positions of hedgers are generally associated with a decrease in volatility.

Consistent with Shalen's (1993) dispersion of beliefs model with asymmetrically informed traders, the evidence suggests that speculators and small traders in these futures markets are likely to be uninformed. These traders are unable to interpret precisely information signals from

[1]Speculators, hedgers, and small traders correspond to noncommercials, commercials, and nonreportable traders in the COT reports, respectively. For details, see the Data subsection.

volume and price changes, resulting in a wider dispersion of beliefs, and therefore larger volatility. However, hedgers possess certain private information as discussed below. These traders usually buy and sell within a relatively small range of prices around the intrinsic value, and thus dampen volatility. The relations between volatility and trades by asymmetrically informed traders are also in line with noise trading theories (De Long et al., 1990). These authors contend that uninformed traders often trade irrationally on noise and overreact to information, and therefore trades by these traders result in larger price variability. In contrast, rational informed traders buck against noise-driven price movements, and often decrease volatility.

Foreign currency futures hedgers are typically large commercial banks, multinational corporations, and commercial dealers. It is understandable that these traders possess certain amount of private information because they are also major players in spot/forward Forex transactions, possess information on customer activities, have their own seats in futures exchanges, and can benefit from economies of scale in information gathering. In contrast, speculators are less informed, but they actively extract information signals from changes in prices and volume. There is ample evidence of widespread use of chartism in formulating speculative trading strategies in foreign exchange markets. For example, Bilson (1990) studied the profitability of simple technical rules that have led to the creation of a managed futures industry, and that a number of advisory firms in the industry have introduced programs specializing in foreign currency futures. Frankel and Froot (1987), Taylor and Allen (1992), and Kho (1996) documented that professional speculators in foreign exchange markets consider chartism at least relevant in formulating their trading strategies.

Studies related to this paper include Chang, Pinegar, and Schachter (1997), Chang, Chou, and Nelling (2000), and Daigler and Wiley (1999). Chang et al. (1997) found a positive relation between speculative trading volume and price volatility in the S&P 500 index, Treasury bonds, gold, corn, and soybean futures markets. Chang et al. (2000) reported a positive relation between price volatility and (long/short) hedging positions, but a negative relation between volatility and (long/short) speculative positions in the S&P 500 index futures market. Small traders do not significantly respond to volatility. We differ from the Chang et al. (2000) study by focusing on the relation between changes (in either direction) in net positions and volatility, and are able to test dispersion of beliefs models and noise trading theories in the futures context. Daigler and Wiley (1999) examined the relation between return volatility and trading volume categorized by market makers, clearing members, floor traders, and the general public for five financial futures contracts at the Chicago Board of Trade. These authors showed that trades by the general public tend to drive up volatility, and trades by floor traders are often associated with decreased volatility. In contrast, we examine the contemporaneous relation between volatility and net positions by conventionally categorized traders—speculators, hedgers, and small traders.

Our paper is also related to the work of Ito, Lyons, and Melvin (1998), who examined the intraday volatility patterns before and after the introduction of lunch-hour trading in the Tokyo foreign exchange market, and found that traders who possess private information affect market volatility. These researchers investigated the effect of "temporary private information," such as traders' risk aversion, trading constraints, changes in other traders' beliefs, etc. In contrast, this paper primarily focuses on the effect of "permanent private information" on volatility. Unlike temporary private information, permanent private information likely predicts future market movements.

TRADES BY TYPE OF TRADER AND ASSET PRICE BEHAVIOR

Traders in financial markets are generally classified into informed traders and uninformed traders. Various models have been proposed to explain the relations between volatility and trading volume by traders with divergent beliefs and asymmetric information. Shalen (1993) and Harris and Raviv (1993) showed that a greater dispersion of beliefs creates excess price volatility and excess volume of trade, resulting in a positive relation between volatility and trading volume. In particular, Shalen examined a noisy rational expectations model of a futures market with uninformed speculators and liquidity traders. Uninformed traders attempt to filter private information from current prices, however, they are uncertain whether price changes are due to private information or liquidity demand shocks. Consequently, uninformed speculators react to all changes in volume and prices, generating larger volatility. In contrast, informed traders have access to private information and have relatively homogeneous beliefs compared to uninformed traders. These traders buy and sell within a relatively narrow range of prices around the true value of the asset, and therefore their trades are related to smaller price variability or decreased volatility.

Noise trading theories contend that uninformed traders, with little access to private information, tend to act irrationally on noise (Black, 1986; De Long et al., 1990), which results in a similar volume–volatility relationship to those predicted by dispersion of beliefs models. For example, De Long et al. argued that uninformed traders are trend-followers and often overreact to information by buying assets when prices rise and selling assets when prices fall, resulting in larger price variability. Rational traders buck noise-driven price movements and dampen price volatility, although they do not eliminate mispricing due to the presence of noise trader risk.

DATA AND METHODOLOGY

Data

This paper analyzes weekly (Tuesday's) trader position data on the Australian dollar, Canadian dollar, British pound, Deutschmark, Japanese yen, and Swiss franc futures contracts traded on the International Monetary Market (IMM) of the Chicago Mercantile Exchange over the interval from January 1993 to March 2000. These data come from the COT reports, and were obtained from Pinnacle Data Corp., Webster, New York. The COT reports include the closing positions aggregated for all outstanding contracts by categorized traders. The CFTC annually classifies reportable positions as either commercial or noncommercial based on whether a trader holds a reportable position. Traders taking commercial positions to hedge specific risks are commonly regarded as *hedgers*. Noncommercial traders who trade futures for reasons other than hedging are seen as *speculators.* Traders with nonreportable positions are termed *small traders*.[2] This trader position information has been published weekly since October 1992, relating to the closing positions on the preceding Tuesday. We also obtained daily opening, high, low, and settlement prices, trading volume, and open interest for these futures contracts over the sample period. These data were collected from Datastream International.

Methodology

To examine the relation between net positions by type of trader and volatility, we follow a similar procedure to that of Bessembinder and Seguin (1993) and regress the volatility estimate on lagged volatilities,

[2]It should be noted that this interpretation might be inaccurate. Ederington and Lee (2001) found that while "noncommercials" in the heating oil futures market represent speculators, the "commercials" group includes some traders with no known positions in the cash/forward markets. Nevertheless, this interpretation has been widely used in the literature (Bessembinder, 1992; Chang et al., 2000; Chang et al., 1997; De Roon, Nijman, & Veld, 2000).

expected and unexpected overall trading activity variables, and expected and unexpected net positions by type of trader. The empirical model is of the following form

$$\hat{\sigma}_t = \mu + \sum_{i=1}^{m} \phi_i \hat{\sigma}_{t-i} + \sum_{j=1}^{2} \alpha_j EA_{j,t} + \sum_{j=1}^{2} \beta_j UA_{j,t} + \gamma_k ENP_{k,t} + \lambda_k UNP_{k,t} + \phi_k D \times UNP_{k,t} + \varepsilon_t \qquad (1)$$

where $\hat{\sigma}_t$ is the volatility estimate at week t. $EA_{j,t}$ and $UA_{j,t}$ are expected and unexpected overall trading activity respectively, and j represents open interest and trading volume.[3] $ENP_{k,t}$ and $UNP_{k,t}$ are expected and unexpected net positions for trader type k respectively; k represents speculators, hedgers, and small traders. D is a dummy variable that is equal to 1 for a positive shock in net positions (the net position is above the expected level), and 0 otherwise.

The lagged volatilities are included in equation (1) to account for the effect of volatility persistence (Bessembinder & Seguin, 1993; French, Schwert, & Stambaugh, 1987). The Akaike information criterion and the Schwarz criterion are used to determine the lag structure. Trading activity variables are included since there is extensive evidence on the relation between overall trading activity and volatility (Bessembinder & Segiun, 1993; Karpoff, 1987). Therefore, the coefficient estimate for net positions can be interpreted as the effect of net positions on volatility after controlling for the effect of overall trading activity. Since the futures market-clearing condition requires that the sum of net positions of all trader types be zero, and there exist high correlations between (expected and unexpected) net positions of these trader types (see Panel C of Table I), equation (1) is estimated separately for each trader type.

To be consistent with prior studies (Bessembinder & Seguin, 1993), overall trading activity and net position series are decomposed into expected and unexpected components using an ARIMA(p, k, q) model.[4] The expected component is the fitted value from the ARIMA model, while the unexpected series is the actual overall trading activity or net position series less the expected component. The number of lags is chosen based on the Akaike information criterion and the Schwarz criterion.

It is evident that financial market volatility responds differently to volume shocks (Bessembinder & Seguin, 1993; Gervais, Kaniel, &

[3]To match the COT data, trading volume is measured using the average daily trading volume (Wednesday to Tuesday). Open interest represents Tuesday's closing open interest.

[4]For a robustness check, we also decompose these variables using the technique suggested by Hodrick and Prescott (1980). The results are available upon request and are generally consistent with those derived from the ARIMA model.

Minglegrin, 1999). For example, Bessembinder and Seguin (1993) found that positive volume shocks have a larger effect on volatility than negative shocks, whereas the effect of positive open interest shocks on volatility is of the same magnitude but of the opposite sign as that of negative open interest shocks. We therefore examine possible asymmetric responses of volatility to shocks in net positions by type of trader by including an interaction variable in equation (1), that is, the product of the dummy variable and unexpected net positions. The coefficient estimate for unexpected net positions captures the impact of a negative shock in net positions on volatility. The sum of coefficient estimates for the interaction variable and for unexpected net positions represents the marginal effect of a positive shock in net positions on volatility.

An advantage of this specification is that it allows us to test the informativeness of trades by type of trader in the futures context. Based on Shalen (1993), if both positive and negative shocks in net positions of a trader type are positively related to volatility, this trader type likely represents uninformed traders, having a greater dispersion of expectations. On the other hand, if both positive and negative shocks in net positions of a trader type are negatively associated with volatility, this trader type tends to possess private information. This trader type has relatively homogeneous beliefs, and buys/sells within a narrow range of asset prices around their fundamental value. Noise trading theories also allow us to draw the similar inference about the informativeness of trades by type of trader to that implied in the dispersion of beliefs model.

Volatility Estimations

We measure volatility using the same procedure as that of Bessembinder and Seguin (1993), Schwert (1990), and Davidian and Carroll (1987) (hereafter referred to as the Schwert volatility estimator). This procedure allows for an unbiased estimation of daily standard deviations conditional on observable variables. This method involves iterating between the following two equations

$$R_t = \alpha_0 + \sum_{j=1}^{n} \alpha_{1j} R_{t-j} + \sum_{k=1}^{4} \alpha_{2k} D_{kt} + \sum_{j=1}^{n} \alpha_{3j} \hat{\sigma}_{t-j} + U_t \tag{2}$$

$$\hat{\sigma}_t = \beta_0 + \sum_{j=1}^{n} \beta_{1j} U_{t-j} + \sum_{k=1}^{4} \beta_{2k} D_{kt} + \sum_{j=1}^{n} \beta_{3j} \hat{\sigma}_{t-j} + \varepsilon_t \tag{3}$$

where R_t denotes the return at time t, D_{kt} represents the four dummy variables for the day of the week, U_t is the unexpected return from equation (2), and $\hat{\sigma}_t$ is the estimated conditional volatility of returns at time t, which is given by $\hat{\sigma}_t = |\hat{U}_t|\sqrt{\frac{\pi}{2}}$. The lagged return is included in equation (2) to allow for short-term shifts in expected returns. The inclusion of lagged unexpected return captures the possible asymmetry in the relation between return and volatility. It is well known that volatility is negatively related to unexpected return in stock markets (French et al., 1987). Lagged volatilities are included in equation (3) to account for the effect of volatility persistence. Since net positions represent the outcome of weekly adjustments of trading strategies by traders, the daily volatility estimate is averaged over the Wednesday–Tuesday interval to match the COT data.

The weakness of the Schwert volatility estimator is that it ignores intra-day price variations. We therefore also employ the extreme-value volatility estimator developed by Garman and Klass (1980), which takes intra-day price changes into account (hereafter referred to as the Garman–Klass volatility estimator). The reduced form of the Garman–Klass volatility estimator can be written as[5]

$$\hat{\sigma}_t = \{0.5 \times (\ln(P_{t,H}/P_{t,L}))^2 - (2\ln(2) - 1)(\ln(P_{t,O}/P_{t,C}))^2\}^{1/2} \quad (4)$$

where $P_{t,H}$, $P_{t,L}$, $P_{t,O}$, and $P_{t,C}$ are the high, low, opening, and closing futures prices at date t, respectively. Wiggins (1992) and Daigler and Wiley (1999) showed that the Garman–Klass volatility estimator is more efficient than using close-to-close prices. To match the weekly COT data, the daily volatility estimate is averaged over the Wednesday–Tuesday interval, and used as the dependent variable in equation (1).

RESULTS

Summary Statistics

Table I presents summary statistics for returns, volatility, overall trading activity, net positions by type of trader, and the number of large traders. Panel A of Table I presents the mean daily return, weekly average of daily volatility, and average trading volume and open interest for the six currency futures markets over the sample period. Futures return is the percentage change in the settlement prices of the contract closest to expiration, except within the delivery month, when the change in the second nearest contract is used. The results show that the mean daily return is positive for all except the Canadian dollar futures, but none of the

[5]We eliminate all cross terms in open/high/low/close prices. This will not significantly affect the coefficient estimates. As Daigler and Wiley (1999) pointed out, the correlation between these two volatility measures is above 0.95, and the coefficients of regressions are very close to each other.

TABLE I

Summary Statistics for Return, Volatility, Overall Trading Activity, and Net Positions (1993.1–2000.3)

Panel A. Summary Statistics for Return, Volatility, and the Overall Trading Activity Series

	Return		*Volatility*	*Trading Volume*			*Open Interest*		
	Mean (%)	*t Value*	*Mean (%)*	*Mean*	*St. Dev.*	*ADF Test*	*Mean*	*St. Dev.*	*ADF Test*
Australian dollar	0.0153	0.92	0.5555	0.986	0.843	−5.73**	1.513	0.843	−2.24
Canadian dollar	−0.0052	−0.49	0.2829	0.805	0.562	−8.56**	5.239	1.628	−3.56**
British pound	0.0112	0.56	0.4264	1.092	0.721	−7.16**	4.437	1.278	−4.59**
Deutschmark	0.0074	0.36	0.5497	1.376	0.820	−2.19	0.830	0.397	−2.18
Japanese yen	0.0114	0.49	0.7343	11.816	4.719	−7.46**	8.561	2.236	−5.06**
Swiss franc	0.0139	0.57	0.6427	1.685	0.836	−6.48**	4.953	1.446	−3.71*

Note. Returns are calculated as the logarithmic change in daily settlement prices, in percent. Volatility is the weekly (Tuesday's) average of daily standard deviations based on the Schwert volatility measure. Trading volume and open interest are in units of 10,000 contracts. ADF test statistics are for the hypothesis that a series contains a unit root. **Indicates significance at the 0.01 level, and *denotes significance at the 0.05 level.

Panel B. Summary Statistics for Net Positions by Type of Trader and the Number of Large Traders

	Net Position									*No. of Large Traders*			
	Speculator			*Hedger*			*Small Trader*			*Speculator*		*Hedger*	
	Mean	*St. Dev.*	*ADF Test*	*Mean*	*St. Dev.*	*ADF Test*	*Mean*	*St. Dev.*	*ADF Test*	*Long*	*Short*	*Long*	*Short*
Australian dollar	−0.014	0.485	−4.27**	−0.019	0.774	−4.59**	0.034	0.307	−5.15**	3.41	3.22	8.88	9.41
Canadian dollar	−0.013	1.296	−4.62**	−0.738	1.794	−4.65**	0.750	0.729	−3.36*	13.47	11.26	18.67	21.50
British pound	0.053	1.363	−5.71**	−0.796	2.013	−5.82**	0.026	0.720	−6.14**	10.46	9.83	19.81	20.55
Deutschmark	−0.059	0.221	−5.74**	0.119	0.323	−5.53**	−0.060	0.112	−5.01**	16.25	24.23	27.94	27.49
Japanese yen	−1.406	2.226	−4.24**	2.256	3.147	−4.25**	−0.850	1.045	−4.73**	12.22	24.25	30.95	27.76
Swiss franc	−0.556	1.564	−5.18**	1.102	2.266	−5.68**	−0.456	0.792	−6.36**	8.37	14.67	18.91	19.11

Note. A net position is defined as the long open interest less the short open interest. ADF test statistics are for the hypothesis that a series contains a unit root. Net positions are in units of 10,000 contracts. **Indicates significance at the 0.01 level, and *denotes significance at the 0.05 level.

(Continued)

TABLE I
(Continued)

Panel C: Correlation Matrix

	ETV	*UTV*	*EOI*	*UOI*	ENP^S	UNP^S	ENP^H	UNP^H	ENP^L	UNP^L
Australian dollar										
ENP^S	0.03	−0.01	−0.02	−0.01	1.00					
UNP^S	0.01	−0.07	−0.03	0.04	0.00	1.00				
ENP^H	−0.19	0.00	−0.11	0.00	−0.91	0.03	1.00			
UNP^H	−0.03	0.04	−0.05	−0.07	0.01	−0.88	0.00	1.00		
ENP^L	0.33	0.04	0.38	0.01	0.44	−0.04	−0.75	0.01	1.00	
UNP^L	0.02	−0.03	0.05	0.03	−0.01	0.56	0.01	−0.81	0.00	1.00
Canadian dollar										
ENP^S	0.04	−0.02	−0.02	−0.01	1.00					
UNP^S	0.02	−0.06	−0.03	0.02	0.00	1.00				
ENP^H	−0.24	0.00	−0.21	0.00	−0.92	0.01	1.00			
UNP^H	−0.06	0.04	−0.02	−0.04	−0.01	−0.87	0.00	1.00		
ENP^L	0.29	0.03	0.35	0.01	0.53	−0.04	−0.79	0.01	1.00	
UNP^L	0.09	−0.01	0.06	0.06	−0.02	0.66	0.01	−0.81	0.00	1.00
British pound										
ENP^S	−0.03	−0.06	−0.01	−0.02	1.00	0.00				
UNP^S	0.00	−0.05	−0.03	0.05	0.00	1.00				
ENP^H	0.07	0.06	0.03	0.02	−0.92	−0.02	1.00			
UNP^H	0.00	0.05	0.04	−0.04	0.01	−0.93	0.00	1.00		
ENP^L	−0.14	−0.05	−0.06	−0.01	0.85	0.05	−0.91	−0.01	1.00	
UNP^L	0.00	−0.04	−0.04	0.00	0.03	0.74	−0.01	−0.87	−0.01	1.00

Deutschmark										
ENP^S	0.03	−0.05	0.17	−0.06	1.00					
UNP^S	−0.04	0.03	−0.07	−0.15	0.01	1.00				
ENP^H	−0.04	0.06	−0.19	0.08	−0.91	−0.04	1.00			
UNP^H	0.03	−0.02	0.07	0.17	0.02	−0.89	0.01	1.00		
ENP^L	0.06	−0.07	0.22	−0.10	0.88	0.10	−0.85	−0.06	1.00	
UNP^L	−0.01	0.02	−0.06	−0.17	−0.02	0.78	0.01	−0.84	0.01	1.00
Japanese yen										
ENP^S	0.03	−0.03	−0.24	−0.13	1.00					
UNP^S	0.00	0.12	0.12	−0.18	−0.01	1.00				
ENP^H	−0.04	0.04	0.22	0.12	−0.95	−0.01	1.00			
UNP^H	0.00	−0.15	−0.13	0.19	0.02	−0.93	−0.01	1.00		
ENP^L	0.03	−0.07	−0.16	−0.10	0.82	0.05	−0.92	−0.01	1.00	
UNP^L	0.02	0.18	0.14	−0.18	0.02	0.65	−0.01	−0.84	−0.01	1.00
Swiss franc										
ENP^S	0.21	0.10	−0.29	−0.10	1.00					
UNP^S	0.10	0.04	−0.04	−0.08	0.00	1.00				
ENP^H	−0.23	−0.10	0.26	0.10	−0.88	−0.03	1.00			
UNP^H	−0.13	−0.07	0.02	0.10	0.01	−0.91	0.00	1.00		
ENP^L	0.25	0.09	−0.17	−0.08	0.82	0.07	−0.81	−0.02	1.00	
UNP^L	0.16	0.10	0.02	−0.11	0.03	0.68	−0.02	−0.82	0.00	1.00

Note. ETV, EOI, and ENP are expected trading volume, expected open interest, and expected net positions, respectively. UTV, UOI, and UNP are unexpected volume, unexpected open interest, and unexpected net positions, respectively. S, H, and L denote speculators, hedgers, and small traders, respectively.

unconditional returns is significantly different from zero. It appears that the most volatile market is the Japanese yen futures, with a weekly average of daily return standard deviation of 0.73%. In contrast, the average standard deviation for the Canadian dollar futures is 0.28%, the lowest among these markets. In terms of trading volume and open interest, the Japanese yen futures is the largest among all currency futures markets, with weekly average trading volume and open interest of 47,190 contracts and 85,600 contracts, respectively. The Canadian dollar futures shows the smallest average trading volume (8,500 contracts), while the smallest average open interest occurs in the Deutschmark futures market (8,300 contracts).

Panel B of Table I reports summary statistics for the net position series and the number of large traders for each market. On average, speculators take net short positions in these markets with the exception of the British pound futures, while hedgers take net long positions in the Deutschmark, Japanese yen, and Swiss franc futures, and net short positions in the other markets. The net short position in the foreign currency futures market means that traders are on average hedging U.S. dollars rather than the foreign exchange. In absolute terms, both speculators and hedgers take the largest net position in Japanese yen futures with weekly average net positions of 14,060 contracts and 22,560 contracts, respectively. Small traders' net positions are generally smaller compared to those of speculators and hedgers. For example, the largest net position for small traders occurs in the Japanese yen futures, with a weekly average position of 8,500 contracts. Compared to the volume and open interest, the net positions are smaller in magnitude especially for speculators. The last column of Panel B reports the average number of (long and short) speculators and hedgers. It appears that positions in the Deutschmark futures are less concentrated given the smaller magnitude of net positions and the larger number of long and short speculators and hedgers. Consistent with the market size, there are more large traders in the Japanese yen futures except for long speculators.

The results in Panels A and B of Table I also show that the Augmented Dickey–Fuller (5 lags) (ADF) test statistics for the presence of a unit root in overall trading activity or net position series reject the existence of a unit root for all contracts except the Deutschmark futures (trading volume and open interest series) and the Australian dollar futures (open interest series). The existence of a unit root has implications for decomposing a variable into expected and unexpected components. A variable in absence of a unit root is decomposed using an ARIMA(2, 0, 2) model, while a nonstationary series is partitioned using an ARIMA(2, 1, 2) model.

Panel C of Table I presents the contemporaneous relations between partitioned overall trading activity and partitioned net positions by type of trader. There exist strong correlations between expected and unexpected net positions of speculators and hedgers for all markets. For example, the correlations between expected and unexpected net positions of speculators and hedgers are as high as −0.95 and −0.93 in the Japanese yen futures respectively. Net positions of small traders tend to be positively correlated with those of speculators, but negatively to those of hedgers, suggesting that small traders share similar characteristics to speculators, although an accurate identification of small traders is unfeasible given available information. The high correlations between expected (unexpected) net positions across trader types suggest that it is appropriate to estimate equation (1) separately for each trader type. It does not appear that partitioned net positions are highly correlated with partitioned overall trading activity. This justifies the specification of equation (1) that includes both overall trading activity and net position variables.

Volatility and Overall Trading Activity

Bessembinder and Seguin (1993) showed that volatility is positively related to trading volume, and the impact of unexpected volume on volatility is several times greater than that of expected volume. However, they found that the relation between volatility and expected open interest is negative. We test for the relations between overall trading activity and return volatility using weekly data in these currency futures markets. This also allows us to see whether the relation between net positions and volatility is significant after controlling for the effect of overall trading activity in the latter analysis. The results of regressing weekly volatility estimates on expected and unexpected overall trading activity variables are reported in Table II.

Consistent with the previous studies (Bessembinder & Seguin, 1993), the estimated coefficient on unexpected volume is positive and significant. The estimated coefficient on expected trading volume is positive for all except the British pound futures. The estimated coefficients on expected open interest show mixed signs. The coefficient estimate for unexpected open interest is negative and significant for all except the Swiss franc futures ($t = -0.26$). Compared to the findings in Bessembinder and Seguin, open interest tends to have less significant effects on volatility. For the two currency futures markets also covered in Bessembinder and Seguin's study (Deutschmark and Japanese yen), the coefficient estimates for expected open interest are negative and

TABLE II
Overall Trading Activity and Volatility

	Australian dollar	*Canadian dollar*	*British pound*	*Deutsch-mark*	*Japanese yen*	*Swiss franc*
Intercept	0.142	0.083	0.268	0.391	0.474	0.407
	(5.91)***	(3.66)***	(3.20)***	(10.86)***	(6.14)***	(6.06)***
Expected TV	0.008	0.042	−0.008	0.001	0.008	0.016
	(2.20)**	(1.85)*	(−0.83)	(0.32)	(0.49)	(2.09)**
Unexpected TV	0.024	0.017	0.042	0.041	0.014	0.029
	(1.97)**	(2.93)***	(1.83)*	(3.31)***	(5.13)***	(4.19)***
Expected OI	−0.003	−0.004	−0.004	0.048	0.004	−0.004
	(−0.47)	(−0.16)	(−0.77)	(1.33)	(0.93)	(−0.78)
Unexpected OI	−0.019	−0.008	−0.038	−0.053	−0.014	−0.003
	(−1.96)**	(−1.93)*	(−2.51)**	(−1.97)**	(−1.72)*	(−0.26)
Sum of lagged volatilities	0.715	0.703	0.465	0.289	0.211	0.258
	(183.01)***	(122.16)***	(189.66)***	(84.30)***	(8.14)***	(6.24)**
Durbin–Watson	2.00	2.06	2.00	2.00	2.10	2.00
Adjusted R^2	0.501	0.220	0.219	0.109	0.269	0.183
No. of obs.	375	375	378	376	378	377

Note. TV and OI represent trading volume and open interest, respectively, in units of 10,000 contracts. TV and OI are decomposed into expected and unexpected components based on an ARIMA(p, k, q) model. Volatility is estimated using the Schwert volatility estimator. Test statistics for individual coefficients are *t* statistics for the hypothesis that the coefficient is zero, computed using White (1980) heteroskedasticity consistent standard errors. Test statistics for lagged volatilities are *F* statistics for the hypothesis that the sum of the coefficients of lagged volatilities is zero. ***Indicates significance at the 0.01 level, **denotes significance at the 0.05 level, and *indicates significance at the 0.10 level.

significant ($t = -2.65$ and $t = -4.20$ for the two markets, respectively), so are the coefficients for unexpected open interest ($t = -1.98$ and $t = -2.32$ respectively). Our results show that the coefficient estimates for expected open interest are positive (insignificant) for the Deutschmark and Japanese yen futures, while those for unexpected open interest are negative and significant ($t = -1.97$ and $t = -1.72$ respectively).[6]

Volatility and Net Positions by Type of Trader

Panels A, B, and C of Table III present the regression results of estimating equation (1) for each trader type. Consistent with the results in Table II, the coefficient estimates for expected and unexpected open

[6]We initially suspected that this result is likely due to the fact that Tuesday's open interest is matched to weekly average of daily volatility. We therefore check the relation between average volatility and average daily open interest over the weekly interval, and the results (not reported) are generally consistent with those reported here. One possible explanation for the difference in the results is that the sample size using daily data in Bessembinder and Seguin (1993) is substantially larger than ours. Therefore, the significance level in the Bessembinder and Seguin's study might need to be adjusted downward (Connolly, 1989).

TABLE III
Net Positions by Type of Trader and Volatility (1993.1–2000.3)

	Australian dollar	*Canadian dollar*	*British pound*	*Deutsch-mark*	*Japanese yen*	*Swiss franc*
Panel A: Speculator						
Intercept	0.152	0.065	0.256	0.352	0.486	0.428
	(5.49)***	(2.80)***	(7.09)***	(8.58)***	(7.07)***	(6.76)***
Expected TV	0.019	0.038	0.011	0.001	0.007	0.013
	(1.69)*	(1.47)	(0.77)	(0.03)	(1.57)	(1.63)
Unexpected TV	0.005	0.012	0.014	0.034	0.013	0.025
	(1.92)*	(2.23)**	(1.91)*	(2.63)***	(4.46)***	(3.42)***
Expected OI	−0.002	−0.001	−0.004	−0.001	0.003	−0.006
	(−0.29)	(−0.21)	(−0.52)	(−0.01)	(0.56)	(−1.88)*
Unexpected OI	−0.012	−0.002	−0.015	−0.022	−0.017	−0.001
	(−1.83)*	(−1.91)*	(−2.96)***	(−1.98)**	(−2.35)**	(−1.77)*
Expected NP	−0.012	−0.002	−0.002	−0.022	0.014	−0.001
	(−1.63)	(−0.85)	(−1.18)	(−1.39)	(1.33)	(−0.24)
Unexpected NP	0.047	0.022	0.002	0.243	0.022	0.039
	(1.97)**	(2.45)**	(1.30)	(3.74)***	(3.10)***	(2.79)***
$D \times$ Unexpected NP	0.027	0.058	0.041	0.081	0.063	0.051
	(1.22)	(3.68)***	(2.51)**	(0.62)	(2.03)**	(2.34)***
Sum of lagged volatilities	0.693	0.633	0.479	0.352	0.202	0.245
	(166.17)***	(126.62)***	(181.31)***	(76.78)***	(8.79)***	(5.71)**
Durbin–Watson	2.03	2.05	2.01	2.04	2.01	2.00
Adjusted R^2	0.542	0.306	0.261	0.219	0.292	0.269
No. of obs.	375	375	378	376	378	377
Panel B: Hedger						
Intercept	0.153	0.057	0.248	0.325	0.480	0.428
	(5.56)***	(2.45)***	(6.87)***	(8.82)***	(6.86)***	(6.77)***
Expected TV	0.017	0.043	−0.005	0.002	0.007	0.013
	(1.58)	(1.72)*	(−1.06)	(0.14)	(1.41)	(1.51)
Unexpected TV	0.004	0.011	0.026	0.031	0.013	0.022
	(1.87)*	(2.09)**	(1.77)*	(2.40)**	(6.31)***	(3.51)***
Expected OI	−0.002	0.001	−0.004	0.112	0.003	−0.006
	(−0.25)	(0.13)	(−0.78)	(1.44)	(0.60)	(−1.71)*
Unexpected OI	−0.011	−0.002	−0.016	−0.015	−0.016	−0.001
	(−1.85)*	(−1.88)*	(−3.09)***	(−1.84)*	(−2.15)**	(−1.97)**
Expected NP	0.002	0.002	0.002	0.019	−0.010	0.002
	(1.86)*	(1.36)	(0.61)	(1.25)	(−3.17)***	(0.66)
Unexpected NP	−0.017	−0.025	−0.026	−0.285	−0.064	−0.068
	(−1.98)**	(−2.96)***	(−3.73)***	(−5.57)***	(−5.19)***	(−7.94)***
$D \times$ Unexpected NP	0.007	0.012	0.017	0.117	0.047	0.038
	(1.76)*	(4.56)***	(3.19)***	(1.44)	(2.12)**	(2.57)**
Sum of lagged volatilities	0.702	0.622	0.272	0.316	0.198	0.258
	(169.58)***	(122.11)***	(188.10)***	(83.26)***	(7.12)***	(5.88)**
Durbin–Watson	2.03	2.06	2.08	2.00	2.01	1.98
Adjusted R^2	0.539	0.313	0.272	0.243	0.299	0.306
No. of obs.	375	375	378	376	378	377

(Continued)

TABLE III
(Continued)

	Australian dollar	*Canadian dollar*	*British pound*	*Deutsch-mark*	*Japanese yen*	*Swiss franc*
Panel C: Small Trader						
Intercept	0.153	0.052	0.247	0.351	0.487	0.453
	(5.66)***	(2.20)**	(6.73)***	(9.45)***	(6.65)***	(6.81)***
Expected TV	0.017	0.054	−0.007	0.007	0.007	0.012
	(1.74)*	(2.05)**	(−0.80)	(0.53)	(1.34)	(1.46)
Unexpected TV	0.004	0.012	0.005	0.029	0.013	0.021
	(1.75)*	(1.99)**	(1.73)*	(2.39)***	(6.43)***	(3.19)***
Expected OI	−0.002	0.003	−0.003	0.099	0.013	−0.007
	(−0.17)	(1.21)	(−0.55)	(1.25)	(0.68)	(−1.69)*
Unexpected OI	−0.011	−0.001	−0.014	−0.052	−0.017	−0.003
	(−1.72)*	(−1.88)*	(−2.82)***	(−1.94)*	(−2.31)**	(−0.42)
Expected NP	−0.003	−0.012	0.001	−0.026	0.028	−0.005
	(−1.99)**	(−2.45)**	(0.31)	(−0.76)	(1.61)	(−0.63)
Unexpected NP	0.085	−0.072	0.005	0.414	0.035	0.080
	(2.21)**	(−3.97)***	(2.27)**	(2.86)***	(1.96)**	(3.23)***
$D \times$ Unexpected NP	0.115	0.119	0.109	0.553	0.124	0.066
	(2.09)**	(4.24)***	(4.09)***	(2.28)**	(2.09)**	(1.98)**
Sum of lagged volatilities	0.688	0.591	0.470	0.292	0.189	0.233
	(178.79)***	(113.97)***	(129.16)***	(70.36)***	(7.56)***	(5.46)**
Durbin–Watson	2.03	2.10	2.09	2.02	1.99	1.98
Adjusted R^2	0.540	0.324	0.285	0.269	0.278	0.276
No. of obs.	375	375	378	376	378	377

Note. TV, OI, and NP represent trading volume, open interest, and net positions, respectively, in units of 10,000 contracts. All trading activity variables are decomposed into expected and unexpected components based on an ARIMA(p, k, q) model. Volatility is estimated using the Schwert volatility estimator. *D* is an indicator variable that is equal to one for a positive demand shock, and zero otherwise. Test statistics for individual coefficients are *t* statistics for the hypothesis that the coefficient is zero, computed using White (1980) heteroskedasticity consistent standard errors. Test statistics for lagged volatilities are *F* statistics for the hypothesis that the sum of the coefficients of lagged volatilities is zero. ***Indicates significance at the 0.01 level, **denotes significance at the 0.05 level, and *indicates significance at the 0.10 level.

interest are generally negative for all regressions, with a few exceptions. The coefficient estimates for expected and unexpected trading volume are generally positive, although insignificant for unexpected trading volume for most regressions. It is noted that the adjusted R^2 values after net position variables are included are substantially larger compared to those in Table II. The largest increase in adjusted R^2 occurs in the Deutschmark futures, showing an increase of over 10% after net positions of a trader type is included in the regression.[7] The smallest increase in R^2 occurs in the Australian dollar futures, showing an increase of about 4%. This

[7]The adjusted R^2 value, which was 0.109 for the Deutschmark futures market in Table III, increases to 0.219, 0.243, and 0.269 for speculators, hedgers, and small traders, respectively, after net positions variables are included to the regression model. See also Table V.

suggests that net positions indeed have power to explain volatility in these markets, in addition to overall trading activity that have been studied in the literature. However, it does not appear that the explanatory power of net positions for volatility is significantly different across trader types, given that the adjusted R^2s of regressions for the three trader types are about the same magnitude.

Our results show little evidence that expected net positions are related to volatility. The coefficient estimate for expected net positions is significant in only a few cases (hedgers for the Australian dollar and Japanese yen futures, small traders for the Australian dollar and Canadian dollar futures). However, the coefficient estimates for unexpected net positions and for the interaction variable are significant in most cases. More importantly, there exist significant asymmetries for net position shocks of all trader types, and the pattern of asymmetries differs greatly across trader types. The coefficient estimate for unexpected net positions is positive for speculators and small traders for all markets, with one exception. The estimated coefficient on unexpected net positions for small traders is negative and significant for the Canadian dollar futures ($t = -3.97$). Since the coefficient estimate for the interaction variable is positive, therefore, the sum of the coefficient estimates for unexpected net positions and for the interaction variable, which represents the effect of a positive shock in net positions on volatility, is also positive and larger than the coefficient for unexpected net positions. This suggests that both a positive and a negative shock in net positions of speculators and small traders are positively associated with volatility, and the effect of a positive shock on volatility is larger than that of a negative shock.

Panel B of Table III shows that the coefficient estimate for unexpected net positions is negative and significant for hedgers, and the coefficient estimate for the interaction variable is positive and significant except for the Deutschmark futures ($t = -1.44$). Since the coefficient estimate for the interaction variable is smaller in magnitude than that for unexpected net positions, the sum of the coefficient estimates for the interaction variable and for unexpected shocks is therefore negative. This suggests that both a positive and a negative shock in net positions of hedgers are associated with a decrease in volatility, however, the effect of a positive shock on volatility is smaller than that of a negative shock. Our results differ from those of Chang et al. (2000), who found that the level of long and short positions of hedgers increase with stock market volatility, and the opposite is true for speculators and small traders. The difference may be because their study uses long and short positions as contrasted with the net positions in this paper. Their study also does not control for overall trading activity variables. Moreover, the difference can also present simply because the information traders possess differs across markets.

Based on dispersion of beliefs models and noise trading theories (Black, 1986; De Long et al., 1990; Shalen, 1993), the different relations between volatility and signed net position shocks across trader types suggest that the informativeness of trades differs. Speculators and small traders are likely to be uninformed. These traders react to all changes in prices and volume as if these changes reflect information, and therefore both a positive and a negative shock in net positions of these traders is associated with increased volatility. In contrast, hedgers appear to be associated with private information. They buy and sell within a relatively small range of prices around the true value of the exchange rate at contract maturity, and therefore, both a positive and a negative shock in net positions of hedgers are negatively related to volatility.

Our results indicate that the effect of shocks in net positions of speculators and small traders on volatility is larger when these traders unexpectedly increase long positions than when they unexpectedly increase short positions, and vice versa. A possible explanation for this result is that these traders more likely overreact to good news than to bad news.[8] In contrast, the effect of shocks in net positions of hedgers on volatility is larger for an unexpected increase in short positions than for an unexpected increase in long positions. This suggests that hedgers are more confident in taking advantage of their private information when futures prices are seen excessively high.

Robustness Check

As a robustness check and to see if intraday volatility affects our results, we also report the results of re-estimating equation (1) using the Garman–Klass volatility estimator. These results are presented in Table IV. To conserve space, only the coefficient estimate associated with net positions by type of trader is reported.

The results show that the expected net position coefficient estimates are very similar to the corresponding estimates in Table III except for speculators in the Deutschmark and Swiss franc futures. The

[8]Previous studies show that equity investors more likely react to bad news than to good news (McQueen, Pinegar, & Thorley, 1996). However, our results indicate that traders more likely overreact to good news than to bad news. Since a currency futures contract expresses the currency futures price in U.S. dollars of one unit of the foreign currency, the "good news" in currency futures markets has a different effect on prices compared to that in equity markets, and thus, our results do not necessarily contradict the previous findings. For example, an expected increase in interest rate in the United States causes stock prices to fall. However, an expected increase in interest rate in the United States, leaving the interest rate in the foreign country unchanged, would drive up currency futures prices.

TABLE IV
Net Positions by Type of Trader and Volatility: The Garman–Klass Volatility Measure (1993.1–2000.3)

	Australian dollar	*Canadian dollar*	*British pound*	*Deutsch-mark*	*Japanese yen*	*Swiss franc*
Expected NP						
Speculator	−0.023	−0.003	−0.001	0.048	0.017	0.008
	(−1.58)	(−0.88)	(−0.22)	(0.30)	(2.13)**	(0.69)
Hedger	0.015	0.005	0.001	−0.029	−0.010	−0.002
	(1.55)	(1.60)	(0.33)	(−0.73)	(−1.97)**	(−0.67)
Small trader	−0.029	−0.028	0.001	0.066	0.011	−0.002
	(1.12)	(−2.21)**	(0.17)	(1.41)	(2.16)**	(−0.08)
Unexpected NP						
Speculator	0.014	0.003	0.036	0.132	0.085	0.018
	(1.88)*	(1.93)*	(2.13)**	(2.51)**	(2.40)**	(1.88)*
Hedger	−0.087	−0.014	−0.042	−0.198	−0.025	−0.068
	(−2.16)**	(−2.41)**	(−3.61)***	(−2.91)***	(−2.78)***	(−2.81)***
Small trader	0.055	0.014	0.014	0.308	0.089	0.031
	(2.39)**	(2.09)**	(3.32)***	(2.27)**	(2.31)**	(1.86)*
$D \times$ Unexpected NP						
Speculator	0.493	0.013	0.127	0.019	−0.005	0.079
	(2.83)***	(2.08)**	(4.10)***	(0.39)	(−0.50)	(2.83)**
Hedger	0.009	0.004	0.014	0.092	0.002	0.014
	(1.41)	(1.09)	(3.41)***	(0.41)	(0.34)	(1.76)*
Small trader	0.740	0.050	0.257	0.018	0.038	0.023
	(2.97)***	(2.49)**	(5.53)***	(0.59)	(0.83)	(2.08)**
Adjusted R^2						
Speculator	0.469	0.251	0.446	0.417	0.486	0.363
Hedger	0.474	0.258	0.453	0.429	0.489	0.374
Small trader	0.450	0.276	0.456	0.426	0.483	0.370

Note. NP represents net positions in units of 10,000 contracts. Trading activity and net position variables are decomposed into expected and unexpected components based on ARIMA model. Return volatility is estimated using the Garman–Klass volatility estimator. D is an indicator variable that is equal to one for a positive demand shock, zero otherwise. The numbers in the parentheses are t statistics for the hypothesis that the coefficient is zero, computed using White (1980) heteroskedasticity consistent standard errors. ***Indicates significance at the 0.01 level, **denotes significance at the 0.05 level, and *indicates significance at the 0.10 level.

coefficient estimates for expected net positions for the Deutschmark and Swiss franc futures were negative for speculators in Table III, and they are positive in Table IV, although none of them is significant. The coefficient estimates in Table IV for net position shocks are also similar to the corresponding estimates in Table III, with one exception. Whereas the estimated coefficient on unexpected net positions for the Canadian dollar futures was negative and significant for small traders in Table III ($t = -3.97$), it is positive and significant in Table IV ($t = 2.09$). There also exist some differences in the coefficient estimates for the interaction variable. For example, the coefficient estimate for the interaction variable for the Japanese yen futures was positive and significant for speculators in Table III ($t = 2.03$), and it is negative (but insignificant) in Table IV. Note also that the adjusted R^2 are higher for most regressions compared to those in Table III (discussed below). Despite these discrepancies, our conclusion on the asymmetric effect of net position shocks on volatility for all trader types remains largely unaltered.

Table V provides a comparison of explanatory power of various regression models. Model 3 denotes the benchmark model—equation (1). Model 1 regresses the volatility estimate on lagged volatilities only. Model 2 omits the net position variables from equation (1). Similar to the direction dummy model used by Daigler and Wiley (1999), Model 4

TABLE V

R^2 Values of Regressions for Different Models and Volatility Measures

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*
Australian dollar						
Speculator			0.542	0.761	0.469	0.511
Hedger	0.423	0.501	0.539	0.749	0.474	0.530
Small trader			0.540	0.760	0.450	0.501
Canadian dollar						
Speculator			0.306	0.593	0.251	0.393
Hedger	0.186	0.220	0.313	0.599	0.258	0.418
Small trader			0.324	0.605	0.276	0.429
British pound						
Speculator			0.261	0.635	0.446	0.617
Hedger	0.189	0.219	0.272	0.639	0.453	0.625
Small trader			0.285	0.629	0.456	0.629
Deutschmark						
Speculator			0.219	0.510	0.417	0.650
Hedger	0.099	0.109	0.243	0.528	0.429	0.655
Small trader			0.269	0.541	0.426	0.646
Japanese yen						
Speculator			0.292	0.515	0.486	0.515
Hedger	0.217	0.269	0.299	0.523	0.489	0.523
Small trader			0.278	0.494	0.483	0.509
Swiss franc						
Speculator			0.269	0.567	0.363	0.554
Hedger	0.149	0.183	0.306	0.575	0.374	0.565
Small trader			0.276	0.556	0.370	0.558

Note. Model 1 regresses the volatility estimate on lagged volatilities only. Model 2 regresses the volatility estimate on lagged volatilities and expected and unexpected trading volume and open interest. Model 3 denotes equation (1). Volatility is estimated using the Schwert volatility estimator for Models 1–3. Model 5 denotes the estimation of equation (1) using the Garman–Klass volatility estimator. Models 4 and 6 add a dummy variable to Models 3 and 5, respectively. The dummy variable indicates increasing or decreasing volatility.

adds a dummy variable to equation (1), which is set to 1 when volatility increases from the previous week and 0 otherwise. The relation between volatility and net positions is likely to be stronger when markets become more volatile due to a possible nonlinear change in dispersion of beliefs to the "noisiness" of the market. The above models use the Schwert volatility estimator. Model 5 provides adjusted R^2s of re-estimating equation (1) using the Garman–Klass volatility estimator, and Model 6 is the direction dummy model using the Garman–Klass volatility measure.

It is apparent that Model 3 shows an improvement in explanatory power over Model 2. The adjusted R^2 values of Model 3 increase up to 16% over Model 2 for the Deutschmark futures after expected and unexpected net positions of hedgers are included in the regression model. For most regressions, Model 3 shows an increase in R^2 above 5% over the Model 2. The least improvement occurs in the Japanese yen futures, showing an increase in R^2 of only 1% for hedgers. Model 2 also shows an improvement in R^2 over Model 1 from 1% for the Deutschmark futures to 8% for the Australian dollar futures. Therefore, net positions by type of trader have explanatory power for volatility in these markets. The last column of Table V shows that the adjusted R^2 values using the Garman–Klass volatility estimator are smaller for the Australian dollar and Canadian dollar futures, and larger for the other futures markets compared to those for Model 3. This result is similar to the findings reported by Daigler and Wiley (1999).

Consistent with Daigler and Wiley's findings, the direction dummy models show a dramatic increase in R^2 values. When the dummy variable is added to Model 3, R^2 values increase by 22% or more when the Schwert volatility estimator is used. The largest improvement occurs in the British pound futures. The R^2 value increases from 0.261, 0.272, and 0.285 in Model 3 to 0.635, 0.639, and 0.629 in Model 4 for speculators, hedgers, and small traders, respectively. The R^2 values for the Garman–Klass measure increase from about 3% for the Japanese yen futures to around 23% for the Deutschmark futures. However, the magnitude of the increase in R^2 values is generally smaller for the Garman–Klass volatility measure than that for the Schwert volatility measure.

CONCLUSIONS

We investigated the effect of net positions by type of trader on return volatility in the six major foreign currency futures markets—the Australian dollar, Canadian dollar, British pound, Deutschmark, Japanese yen, and Swiss franc, over the period of January 1993 through March

2000. The principal findings of this study are that an unexpected change (in either direction) in net positions of speculators and small traders is, on average, positively associated with volatility. There is a negative connection between an unexpected change (in either direction) in net positions of hedgers and volatility.

Consistent with dispersion of beliefs models and noise trading theories, speculators and small traders appear to be uninformed in these currency futures markets. In contrast, hedgers likely possess certain private information. Hedgers in currency futures markets are typically large commercial banks, commercial dealers, and large global corporations. It is not surprising that these traders possess certain amount of private information regarding, for example, a country's trade balance figures, interest rate adjustments, possible central bank interventions, because they also have substantial cash/forward transactions and potentially benefit from economies of scale in information gathering.

These findings suggest that—consistent with the contention in Hart and Kreps (1986), Stein (1987), Harris (1989), and the U.S. General Accounting Office (1994)—changes in speculative positions destabilize the market. This has implications for financial regulators concerned about promoting market stability. The evidence that hedgers, speculators, and small traders in foreign currency futures markets are asymmetrically informed may also be useful for investors. Acknowledging the difference in the informativeness of trades by type of trader, investors can improve timing strategies based on the CFTC's COT information. A related question to this study is whether hedgers consistently outperform the market, while speculators and small traders consistently lose money. This investigation requires the COT data at shorter intervals. Given the nonavailability of finer COT data at this time, we leave such an exercise for future research.

BIBLIOGRAPHY

Bessembinder, H. (1992). Systematic risk, hedging pressure, and risk premiums in futures markets. Review of Financial Studies, 5, 637–667.

Bessembinder, H., & Seguin, P. J. (1993). Price volatility, trading volume, and market depth: Evidence from futures markets. Journal of Financial and Quantitative Analysis, 28, 21–39.

Bilson, J. F. (1990). Technical currency trading. [Mimeo]. Chicago: The Chicago Corporation.

Black, F. (1986). Noise. Journal of Finance, 41, 529–543.

Chang, E., Chou, N., & Nelling, E. (2000). Market volatility and the demand for hedging in stock index futures. Journal of Futures Markets, 20, 105–125.

Chang, E. R., Pinegar, M., & Schachter, B. (1997). Interday variations in volume, variance and participation of large speculators. Journal of Banking and Finance, 21, 797–810.

Connolly, R. A. (1989). An examination of the robustness of the weekend effect. Journal of Financial and Quantitative Analysis, 24, 133–169.

Daigler, R. T., & Wiley, M. K. (1999). The impact of trader type on the futures volatility–volume relation. Journal of Finance, 54, 2297–2316.

Davidian, M., & Carroll, R. J. (1987). Variance function estimation. Journal of the American Statistical Association, 82, 1079–1168.

De Long, J., Shleifer, A., Summers, L., & Waldmann, R. (1990). Noise trader risk in financial markets. Journal of Political Economy, 98, 703–738.

De Roon, F., Nijman, T., & Veld, C. (2000). Hedging pressure effects in futures markets. Journal of Finance, 55, 1437–1456.

Ederington, L., & Lee, J. H. (2001). Who trades futures and how: Evidence from the heating oil futures market. Journal of Business, forthcoming.

Frankel, J. A., & Froot, K. A. (1987). Using survey data to test standard propositions regarding exchange rate expectations. American Economic Review, 77, 133–153.

French, K. R., Schwert, G. W., & Stambaugh, R. F. (1987). Expected stock returns and volatility. Journal of Financial Economics, 19, 3–30.

Garman, M., & Klass, M. (1980). On the estimation of security price volatilities from historical data. Journal of Business, 53, 319–331.

Gervais, S., Kaniel, R., & Mingelgrin, D. (1999). The high volume return premium (Working paper 001-99). Philadelphia: The Wharton School, University of Pennsylvania.

Harris, L. (1989). S&P 500 cash stock price volatilities. Journal of Finance, 44, 1155–1175.

Harris, M., & Raviv, A. (1993). Differences of opinion make a horse race. Review of Financial Studies, 6, 473–506.

Hart, O., & Kreps, D. (1986). Price stabilizing speculation. Journal of Political Economy, 94, 927–952.

Hodrick, R. J., & Prescott, E. C. (1980). Postwar US business cycle: An empirical investigation (Discussion paper 451). Pittsburgh: Carnegie–Mellon University.

Ito, T., Lyons, R. K., & Melvin, M. T. (1998). Is there private information in the FX market? The Tokyo experiment. Journal of Finance, 53, 1111–1130.

Karpoff, J. M. (1987). The relation between price changes and trading volume: A survey. Journal of Financial and Quantitative Analysis, 22, 109–126.

Kho, B.-C. (1996). Time varying premia, volatility, and technical trading rule profits: Evidence from foreign currency futures markets. Journal of Financial Economics, 41, 249–290.

McQueen, G., Pinegar, M., & Thorley, S. (1996). Delayed reaction to good news and the cross-autocorrelation of portfolio returns. Journal of Finance, 51, 889–919.

Schwert, G. W. (1990). Stock volatility and the Crash of 87. Review of Financial Studies, 3, 77–102.

Shalen, T. V. (1993). Volume, volatility, and the dispersion of beliefs. Review of Financial Studies, 6, 405–434.

Stein, J. C. (1987). Informational externalities and welfare-reducing speculation. Journal of Political Economy, 95, 1123–1145.

Taylor, M. P., & Allen, H. (1992). The use of technical analysis in the foreign exchange market. Journal of International Money and Finance, 11, 304–314.

U.S. General Accounting Office. (1994). Financial derivatives: Actions needed to protect the financial system (GAO/GGD-94-133). Washington, DC: Author.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica, 48, 817–838.

Wiggins, J. B. (1992). Estimating the volatility of S&P 500 futures prices using the extreme-value method. Journal of Futures Markets, 12, 265–273.