Do Large Hedgers and Speculators React to Events? An Analysis of Stability and Events

Ikhlaas Gurrib*

Using Commodity Futures Trading Commission (CFTC) and Commitment of Traders (COT) data, this paper analyzes whether large hedgers and large speculators were influenced by the major economic events of the 1990s. Eight major economic events are analyzed for a period of 10 years, and findings support that these informed players were hardly affected by the major events. The trading determinant model, mean equation model, and risk and return relationship model, suggests that the behavior and performance of these key market players were stable, and any significant structural break were short lived. The use of standard deviation as a measure of risk captured more breaks in the risk and returns relationship model, due to its higher sensitiveness to futures prices in the 29 US futures markets.

Introduction

Although the US exchange markets had witnessed huge success in the 1990s due to factors like good macroeconomic policy, luck, and stability in oil shocks, many major events did occur during that decade. As propelled by Frommel and Menkhoff (2003), structural breaks in futures markets may indicate that in addition to the permanent micro-structural impacts, macroeconomically caused shifts, are possibly also important for any increase in volatility. While it is hard to examine all the events that took place in the US, in the 1990s, an attempt is made to consider the effect of the major macroeconomic events on the 29 futures markets. Graph 1 shows the relative performance of the US stock market and the major macroeconomic events during the 1990s. In line with the Bank of International Settlements (BIS 1990-2001) reports, Table 1 depicts more specific details about the event analysis.[1]

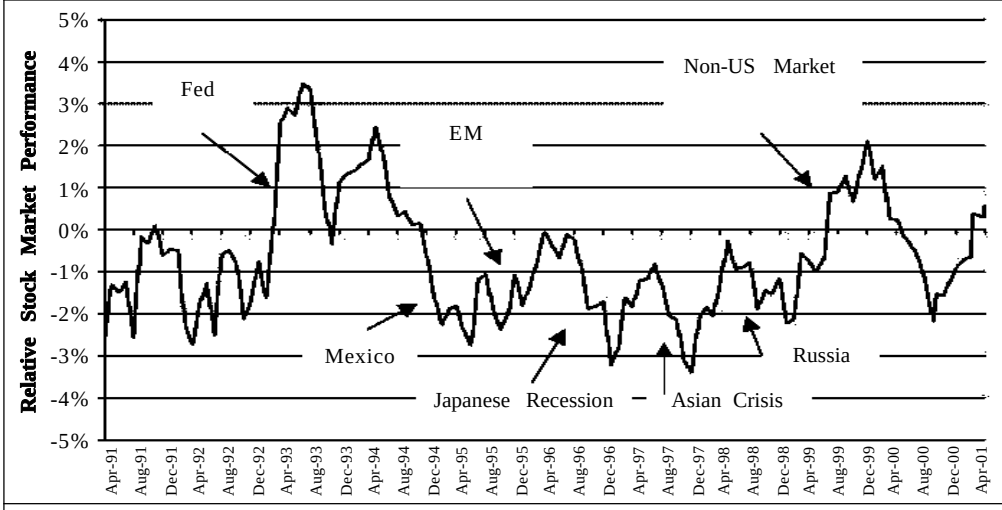
To know whether any of these eight events have affected the US futures markets, a stability test is performed over behavior/performance models. Although previous empirical evidences made use of tests such as, Ramsey (1969) and Perron structural break test, recursive coefficient estimation is utilized here, as it enables the mapping of estimates for any coefficient, when more and more data are employed in the model. Significant coefficient variation indicates instability. Any dramatic jumps in coefficient plots, suggest that the postulated equation tried

* Ph D Scholar, School of Economics and Finance, Curtin University, Bentley WA, Western Australia. E-mail: Muhammad.gurrib@cbs.curtin.edu.au

[1] The 'sample before event' column provides the data sample up to including the nearest Commitment of Traders (COT) reporting date, just before the event, and the 'sample after event' column provides the data sample up to including the nearest COT reporting date, just after the event.

to digest a structural break. Any structural break is matched with any of the eight events and regressed accordingly, using the pre-event and post-event samples. If there is no structural break for some commodity markets, this suggest that the events, did not significantly affect the specific futures markets during the last decade.

Graph 1: Major Macroeconomic Events and Relative Stock Market Performance During the Period April 1991-April 2001



Source: MSCI, Bloomberg Financial Markets, and Citibank Analysis.

Table 1: Major Macroeconomic Events of the 1990s, in the US

Date Range		Events	Duration (Months)	Sample	
From	To			Before Event	After Event
04-Feb-94	06-Jul-95	US Fed tightening of interest rates	20	49	69
23-Mar-94	20-Dec-94	Mexico Crisis	11	51	62
13-Jan-95	12-Jan-96	Emerging Markets (EM) slump and rebound	14	62	76
28-May-94	01-Apr-96	Temporary revival of Japanese Recession	25	53	78
02-Jul-97	01-Mar-98	Asian Crisis	9	94	103
01-Aug-98	23-Sep-98	Long Term Capital Management (LTCM) near financial collapse	3	108	111
17-Aug-98	31-Dec-99	Russian crisis and recovery	19	108	127
01-Jan-99	Ongoing	Introduction of the Euro Currency	26*	113	139

Note: * 26 months has been entered as the duration since, the introduction of the Euro Currency, as our data sample ends in December 5, 2000.

Source: Datastream, Bloomberg Financial Markets.

The Commitment of Traders (COT) reports, from the Commodity Futures Trading Commission (CFTC) are used to obtain the hedgers' and speculators' net positions. Consistent with Chatrath et al. (1999), a continuous futures returns series is formed for the

29 US futures markets, using a roll-over strategy, calculated as the percentage change in settlement prices of the contract with closest delivery date. To ensure consistency with COT data, a monthly return series (Tuesday-Tuesday) is implemented.

Behavior–Trading Determinant Model

Due to some events (like events 1 and 2, (Chronologically)) having small sample sizes, and in order to keep consistency in our models, only variables deemed important are regressed in the models. The trading determinant model in Wang (2003), modified by removal of some unimportant variables like the information variables and the sentiment data[2] and is as follows:

$$\Delta NP_{t+1} = M_0 + M_1 R_t + \varepsilon_t \quad \ldots(1)$$

Only significant recursive coefficients of the futures returns (with significant t ratios, after adjusting for structural breaks) in equation 1, have been displayed in Graph 1 in the Appendix. The highest coefficient estimates of R_t can be found in Canadian dollars, Eurodollars, British Pound, Treasury bonds, Japanese Yen and Gold.[3] The occurrence of relatively higher coefficient estimates suggests that the large players tend to rely more on actual returns, R_t , to change their net positions next month, than the large players in the agricultural futures markets. Moreover, the coefficient estimates of R_t, between the hedgers and speculators tend to bear a negative relationship.[4] This is supportive of the fact, that the futures market is a zero sum game. The S&P500 R_t coefficient for the hedgers appears to be negative on average. The fact that the hedgers were net short during the 2000 burst, compared to the large speculators who were net long, suggest that the following hedgers during that period would have led to less losses (and possibly profits), than herding with speculators.

In checking the stability of our behavior model, most of the markets appear to be stable with rare occasions of structural breaks. It is important to neglect the instability of the coefficient estimates in early stages of the graph, since ΔNP_{t+1} would be highly sensitive to R_t.[5] Those markets with significant jumps in their returns coefficient estimates, were crude oil, cotton, Eurodollars, soybean, wheat (Chicago) and cocoa (for speculators); and corn, Japanese yen, soybean and cocoa (for hedgers).[6] This is in line with Cheung (2001), who argued that the major macroeconomic events have a bigger effect on the Eurodollars and Japanese Yen, than the gold market. Furthermore, Patterson and Fung (2001), reinforce our result, that the Eurodollar despite being influenced greatly by the domestic US announcements, is an international financial instrument traded worldwide, hence, reflects

[2] Information variables are removed due to their insignificance as shown in Gurrib (2006). Sentiment data is removed since they were exhibiting a bullish behavior, which was quite predictable.

[3] All had negative coefficients for hedgers' return coefficient estimates.

[4] Except for Crude oil, Japanese Yen and Heating oil where both the hedgers and speculators tend to add to their next month's net position, when the actual returns are positive.

[5] To ensure consistency throughout this event analysis, any instability before sample 49 is rejected from the analysis. This allows us to analyze any structural break starting with US Fed tightening of interest rates, which occurred in sample 50.

[6] While there are many structural breaks in the 29 markets, only those structural breaks that match any of the eight events of Table 1 are analyzed.

movements in risk premiums among different global Euro denominated currency rates, accordingly. Table 2 shows that while all breaks for hedgers' returns coefficients estimates were upward movements, speculators' returns breaks were in both directions. The hedgers' returns coefficient estimates went up for corn, Japanese yen, soybean and cocoa, after the major economic event regained stability from the previous economic conditions. For example, soybeans and corn returns had more effect on net positions of hedgers, after the end of the long period of, the US tightening of interest rates.

Table 2: Structural Breaks and Macroeconomic Events (on Behavior Trading Determinant Model)

This table shows the structural breaks for those markets that matched any of the eight major macroeconomic events of the 1990s. The arrow signs show whether there was an upward jump or downward jump in the recursive coefficient estimates of hedgers' and speculators' returns.

Structural Breaks				
	Hedgers	**Speculators**	**Date**	**Event**
Crude oil	–	p	04/02/1996	End of temporary revival from Japanese recession
	–	p	12/08/1998	Start of the introduction of Euro currency
Corn	n	–	25/07/1995	End tightening of US interest rates
Cotton	–	p	10/01/1995	Start of EM slump
Eurodollars	–	n	11/01/1994	Start of US tightening interest rates
	–	p	21/07/1998	Start of LTCM near financial collapse/Russian crisis
	–	n	13/10/1998	End of LTCM near collapse
Japanese yen	n	–	11/01/1994	Start of temporary revival from Japanese recession
Soyabeen	n	–	25/07/1995	End tightening of US interest rates
	–	n	03/05/1994	Start of temporary revival from Japanese recession
S&P500	–	n	01/04/2000	End of Russian crisis
Wheat (Chicago)	–	p	04/02/1996	End of temporary revival from Japanese recession
Cocoa	n	n	03/05/1994	Start of temporary revival from Japanese recession

Source: Output from Eviews 5.0 recursive estimation.

The effect of speculators' returns on next month's net positions, is backed by the positive feedback behavior (Gurrib, 2006), where the speculators took more long (short) positions, when major economic events eased (tightened) the economic conditions. For instance, speculators took less long positions in Eurodollars, after the Long Term Capital Management's (LTCM) near financial collapse, but then, took more long positions, after the buyouts occurred to save the LTCM from affecting the financial markets. Similarly, jumps in returns coefficients occurred due to more favorable economic conditions like end of the US tightening of interest rates, introduction of the Euro currency, and downward breaks due

to less favorable economic conditions like LTCM's near collapse, Russian crisis, EM (Emerging Markets) slump, US tightening of interest rates, and Japanese recession. The only exceptions would be the Eurodollars returns coefficient estimates which jumped at the start of the US tightening of interest rates. Speculators going more net long in Eurodollars, as an alternative to less attractive US dollars, can explain that this. t statistics only show that soybeans, cotton, wheat (Chicago) and cocoa have significant return coefficient estimates (all from speculators). This supports BIS (1995-2001) reports on these major economic events, that the eight events do not significantly affect the futures markets in the US, except in four markets (as mentioned above), at a specific point in time.

Mean Equation Model

Using the same understanding about small size sampling, a modified mean equation model of Grinblatt et al. (2000), is regressed to obtain the estimated recursive coefficients of net positions.[7]

$$R_t \quad M_0 \quad M_1 NP_t \quad \varepsilon_t \qquad ...(2)$$

As seen in Table 3, all recursive coefficients of returns tend to be stable. The small amount of structural breaks is due to the low coefficient estimates of the net positions. This supports that positive feedback trading persists in the long run, where the recursive coefficient estimates are greater than zero. Only crude oil return estimate tended to rise in a more upward fashion than the rest, but nonetheless maintaining its overall stability. This is in line with Frankel and Froot (1988), who found that market participants expect recent price changes (short run) to trigger others in the same direction, while also expecting the prices to return to their fundamental values, in the long run. This is backed by De Bondt and Thaler (1987), whose empirical evidence established that extreme changes in prices, ultimately go back to their fundamental values, provided that part of these changes are attributed by positive feedback trading. Only corn, cocoa, cotton, coffee and lumber have had structural breaks in the net positions of speculators, and only coffee and live hogs have had structural breaks. Further, results from Table 3, seem to indicate that only the temporary revival from Japanese recession event and the US tightening of interest rates event, have had some effect on these six markets. More importantly, only coffee[8] and live hogs have significant negative coefficient estimates when the effect of the event is taken into account. The jump in the change of net positions occur, due to the start of the temporary revival from Japanese recession, can be attributed to more confidence of the hedgers about selling their futures contracts later at a better price. The jump in live hogs net positions coefficient estimates, due to the start of US Fed tightening of interest rates, can be attributed to hedgers shorting fewer contracts in the expectation of interest rates easing in the future. The overall findings suggest that all the eight major events had hardly any significant effect on futures markets, where the impact of monthly net positions on returns is assessed.

[7] Net positions are adjusted for stationarity before regressing equation (2).
[8] For coffee, the estimated coefficient is that of a change in net positions.

Table 3: Structural Breaks and Macroeconomic Events (on Mean Equation Model)

This table shows the structural breaks for those markets that matched any of the eight major macroeconomic events of the 1990s. The arrow signs show whether there was an upward jump or downward jump in the recursive coefficient estimates of hedgers' and speculators' net positions. Net positions are adjusted for stationarity using ADF unit root test.

Structural Breaks				
	Hedgers	**Speculators**	**Date**	**Event**
Cocoa	–	p	03/05/1994	Start of temporary revival from Japanese recession
Corn	–	p	11/01/1994	Start of US tightening interest rates
Cotton	–	n	11/01/1994	Start of US tightening interest rates
Coffee	n	n	03/05/1994	Start of temporary revival from Japanese recession
Lumber	–	p	04/02/1996	End of temporary revival from Japanese recession
Live hogs	n	–	11/01/1994	Start of US tightening interest rates

Source: Output from Eviews 5.0 recursive estimation.

Risk and Return Relationship

Assuming risk can be proxied as standard deviation and variance, the actual return, R_t , is regressed against standard deviation and against variance as follows:

$$R_t = \alpha_0 + \alpha_1 V_t + \varepsilon_t \quad ...(3)$$

$$V_t^G = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \left| \varepsilon_{t-i} \right| + \beta_1 \varepsilon_{t-i}^G + \sum_{j=1}^{q} \alpha_j V_{t-j}^G + \varepsilon_t$$

where, $V > 0$, $G > 0$, $\left| \beta_1 \right| < 1$ for i = 1, ..., r, and $\beta_1 = 0$ for all $i > r$, $r < p$.

$$R_t = \alpha_0 + \alpha_1 V_t^2 + \varepsilon_t \quad ...(4)$$

$$V_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 V_{t-1}^2 + \varepsilon_t$$

where, V_t is the standard deviation from a PARCH (Power Auto Regressive Conditional Heteroscedasticity) model, and V_t^2 is the variance from a GARCH (Generalized Auto Regressive Conditional Heteroscedasticity) model. The recursive coefficients V_t and V_t^2 show that whether there is any relationship between the risk and return, and help in finding whether there is any significant break, due to any of the major macroeconomic events. Any structural break, matched with any of the 8 events is reported in Table 4.

Results from Panel A shows a positive significant relationship between hedgers' risk (standard deviation) and return for soybean, oil, copper, and coffee, and a significant negative relationship for live cattle; and a positive significant relationship between speculators' risk (standard deviation) and return for copper, coffee, and live hogs, and a significant negative relationship for live cattle. From Panel B, there is a different findings due to the different sensitivity of the proxy of risk over return. Panel B shows a positive

significant relationship between hedgers' risk (variance) and return for copper and treasury bonds a negative significant relationship for Wheat (Chicago, Kansas); a significant positive relationship between speculators' risk (variance) and return for feeder cattle, coffee, platinum and sugar; and a significant negative relationship for gold, copper and Treasury bonds. While the findings of a positive relationship between risk and return supports the portfolio theory, that a higher risk is compensated with a higher return, the negative relationship between risk and return can be explained by Glosten et al. (1993), who argued that investors may not demand high risk premium if they are better able to bear risk at times of particular volatility. Further, if the future seems risky the investors may want to save more in the present thus, lowering the need for larger premium. In addition to Glosten et al. (1993) who argued that both positive and negative relationships between current returns and current variances (risk) are possible, our study contributes further by finding more negative relationships between current returns and current standard deviation (risk). The higher number of negative significant relationship is due to derivatives prices being more proportional to standard deviation than variance, hence the higher sensitivity (Poon and Granger, 2003).

Table 4: Structural Breaks in the Risk and Return Relationship for Large Hedgers and Large Speculators

This table shows the structural breaks for those markets that matched any of the eight major macroeconomic events of the 1990s. The arrow signs show whether there was an upward jump or downward jump in the recursive coefficient estimates of hedgers' and speculators' attitude towards risk. Both standard deviation and variance are used as proxies of risk when modeling the relationship between risk and return. Panel A reports the matched structural breaks with standard deviation used as a proxy to risk, and Panel B with variance as a proxy to risk.

Structural Breaks in Return and Risk Relationship				
Panel A (h_t as a measure of risk)				
	Hedgers	**Speculators**	**Date**	**Event**
Crude oil	p	–	04/02/1996	End of temporary revival from Japanese recession
Cotton	n	–	25/07/1995	End tightening of US interest rates
	–	p	11/01/1994	Start of US tightening interest rates
	–	n	10/01/1995	Start of EM slump
Feeder cattle	–	p	03/05/1994	Start of temporary revival from Japanese recession
Copper	n	–	04/02/1996	End of temporary revival from Japanese recession
Japanese yen	–	p	25/07/1995	End tightening of US interest rates
Coffee	–	n	03/05/1994	Start of temporary revival from Japanese recession
Live hogs	–	n	08/12/1998	Introduction of Euro currency
Soybean	n	–	25/07/1995	End tightening of US interest rates
Treasury bonds	–	p	03/05/1994	Start of temporary revival from Japanese recession
Panel B (h_t^2 as a measure of risk)				
Copper	–	n	03/05/1994	Start of temporary revival from Japanese recession
	–	p	04/02/1996	End of temporary revival from Japanese recession
Japanese yen	–	p	25/07/1995	End tightening of US interest rates
Wheat (Kansas)	n	n	25/07/1995	End tightening of US interest rates
Treasury bonds	–	p	08/03/1994	Start of Mexico crisis
Wheat (Chicago)	–	p	04/02/1996	End of temporary revival from Japanese recession

Source: Output from Eviews 5.0 recursive estimation.

Using equation 3, Panel A shows that speculators' returns have been affected with 7 structural breaks in risk in cotton, feeder cattle, Japanese yen, coffee, live hogs, soybean and treasury bonds, for speculators; and soybean, crude oil, cotton and copper, for hedgers. Since speculators' attitude towards risk have been more affected than hedgers', this suggests that speculators' return are more affected during major macroeconomic events. However, only soybean and treasury bonds have significant risk coefficient estimates before and after the event. This is consistent with Flood and Rose (1999), who demonstrated that exchange rate volatility cannot be linked to changes in underlying fundamentals. The structural break of hedgers' risk on return for the soybean futures market has been occurring after the end of the long period of the US tightening of interest rates. This can be explained by hedgers in the soybean futures market taking more risk towards obtaining their return, due to the instability of the US interest rates that eased after a long period of tightening. The structural break of speculators' risk on return for treasury bonds has been occurring at the start of the temporary revival from the Japanese recession, where the speculators put less risk to obtain a desired return, due to the stability regained by the global economy, after the temporary recovery of the Japanese recession. Overall, Panel A supports that the major global economic events named in Table 4, did not have much significant effect on the risk and return relationship.

Panel B shows that there are fewer structural breaks occurring during major economic events. Speculators' attitude towards risk changed in copper, Japanese yen, wheat (Kansas, Chicago) and treasury bonds, while hedgers' attitude towards risk changed only in wheat (Kansas). The lower number of breaks in Panel B can be explained since many of the recursive coefficient estimates of standard deviation from Panel A, were larger in magnitude than their recursive coefficient estimates of variance. This is supported by Poon and Granger (2003), who found that the derivative prices are roughly proportional to standard deviation. None of the structural breaks in Panel B significantly affected the risk and return relationship in the futures markets. Both measurements of risk tend to return to their stable long run estimate shortly, suggesting that any effect of events were short lived. This is inconsistent with Christie and Chaudhry (1999), who showed that volatility persistence following macroeconomic events, particularly for liquid financial markets. Our study makes contribution to BIS (1999) reports, that events like Russian crisis and LTCM near financial collapse did not have significant effect upon the attitude towards risk of large speculators, and even have lesser significance for large hedgers.

Conclusion

The trading determinant model, mean equation model, and the risk/return relationship model were all stable over the 10 years period. Major economic events had little or no significant effects on hedgers' and speculators' trading decisions, and risk attitude. All models tended to capture more structural breaks, where risk was proxied as standard deviation, due to the higher sensitiveness of standard deviation to futures prices than variance. Y

Reference # 42J-2007-06-03-01

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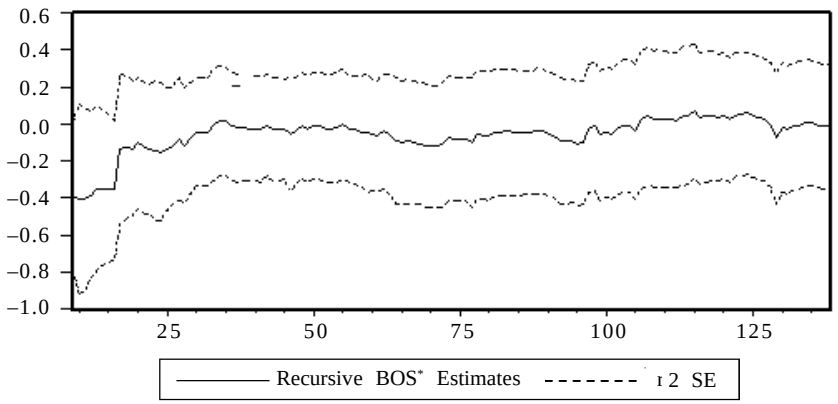
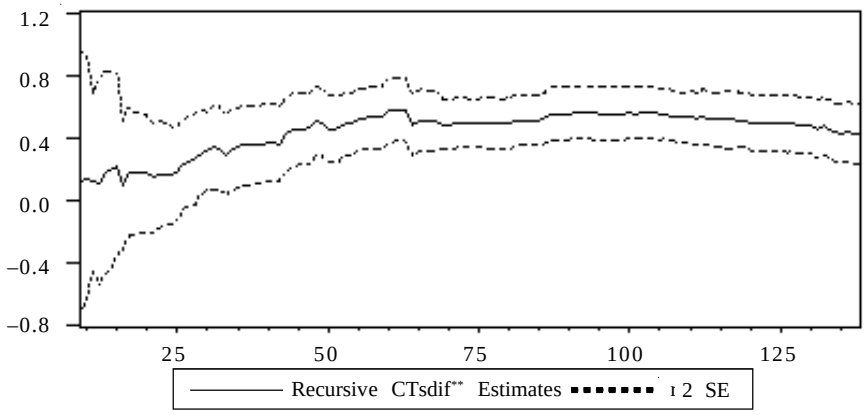
Appendix

This set of graph shows the recursive coefficient estimates of futures returns from equation (1). The ability to trade the evolution of the returns over the whole sample helps in finding whether the behavior equation (1) is stable. If coefficient plots show dramatic jumps, this suggests the postulated equation is trying to digest a structural break.

Graph 1: Recursive Coefficient Estimates of Futures Returns in Behavior Model





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Appendix

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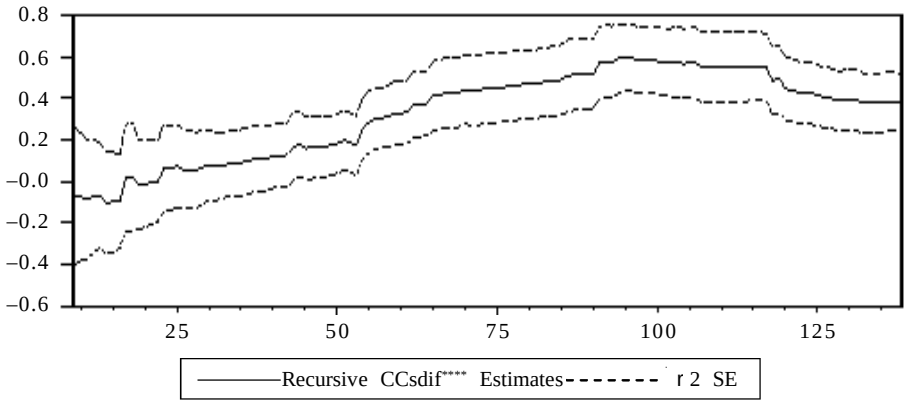
Graph 1: Recursive Coefficient Estimates of Futures Returns in Behavior Model



Note: * BOS Estimates: Net Positions for speculators in the soybean oil futures market.
** CTsdif Estimates: Net Positions for speculators in the wheat (Chicago) futures market.
*** Wsdif Estimates: Net Positions for speculators in the wheat (Chicago) futures market.
**** CCsdif Estimates: Net Positions for speculators in the cocoa futures market.