Who Influences the Fundamental Value of Commodity Futures in Japan?

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Motivation

- Which investors possess more **fundamental information** on securities prices?
- Who's trades influence the future **"efficient price"** of a security?
- Are some types of investors more **profitable** than others over the long run?

Motivation

- Informed investors possess private information and can influence the "efficient price" of a financial security.
- Informed investors' trades have persistent impact on a security's price as they incorporate new private information into the price, and accordingly their investing activities are expected to be profitable in the long run.
- Uninformed investors' trades have a transitory impact on the security price. Their trades convey no fundamental information.
    - However, liquidity providers may profit from their trades if the liquidity premium they earn is sufficient.

Literature

- Several studies examine how various types of investors influence securities prices and their profitability. However, these studies do not examine the influence of investors' trades on the **efficient price**. Some representative contributions in the area are:

- Kamesaka et al. (2003) provide evidence supporting **positive investment performance** for securities firms, banks and foreign investors, and negative performance for individual investors on the Tokyo Stock Exchange.

- In the debate about **foreign investors destabilising** stock prices, Karolyi (2002) finds no evidence that the trades of foreign investors persistently influenced Japanese stock prices during the Asian financial crisis of 1997, with the effect of trades on price decaying over the following month.

Literature

- Similarly, Choe et al. (1999) find that **foreign investors** did not have a persistent impact on Korean stock prices in 1997.

- Lakonishok et al. (1992) argue that, as a group, **institutional investors** trades can be classified neither as stabilising nor destabilising, as these investors pursue a wide variety of investment strategies.

Tokyo Commodity Exchange (TOCOM)

- Futures on precious metals, oil and petroleum products, natural rubber, agricultural products, plus commodity indices.
- An important exchange for a number of commodities, but relatively little research on its market microstructure.
- An important feature of trade on TOCOM is the far contract is generally the most actively traded, versus the near contract on most other exchanges.
- Trading hours overlap those of other major exchanges:
  - Day session: 08:45 to 15:15 JST.
  - Night session: 16:30 to 05:30, except rubber 16:30 to 19:00.

Six Investor Groups

- **Commercial:** entities hedging physical positions.
- **Dealer:** market-making brokers and dealers, and prop traders with direct trade access to TOCOM.
- **Fund:** all types of funds managed by financial institutions, both active and passive.
- **General:** domestic individual (retail) investors.
- **Agency:** financial intermediaries without direct trade access to TOCOM.
- **Foreign:** foreign domiciled investors, mainly funds, prop traders and dealers.

- The investor groups are denoted by the subscript $g = 1, \ldots, 6$.
- Brokers report the investor type when placing orders on the J-GATE trading system.

Four Commodities

- **Gold:** Decentralised trade across the globe in similar underlying. Tokyo relatively small.
- **Platinum:** Relatively concentrated. Tokyo is a globally important market in physical and futures trade.
- **Gasoline:** Domestic grade underlying. Closely linked to domestic supply and demand factors influencing the crack spread and crude.
- **Rubber:** Major natural rubber supply and demand in Asia, regional market. Several grades traded on various exchanges. Tokyo an important centre.

- Differentiated international connectedness vis a vis contracts for similar underlying commodities on other futures exchanges.
    - Different cross-market information flow, fundamental and empirical linkages.

Price and Transactions Data

- Daily data from TOCOM for 20 September 2016 to 28 February 2018.
  - Corresponds with introduction of the J-GATE trading system.
- **Close of day-session futures prices** for the farthest (most actively traded) contract in each commodity.
- **Number of contracts purchased and sold** by each investor group during each trading day over all open contracts for each commodity.
  - Six futures contract maturities open for each commodity.
  - Contract months are all even months of the year for gold and platinum, and six consecutive months for gasoline and rubber.
- Trading day defined as night session open (16:30) to next day session close (15:15).

Daily Returns

- Returns calculated from the beginning of the night session to the end of the day session, which aligns with the transaction data.

$$r_t = \frac{P_t - P_{t-1}}{P_{t-1}} \times 100 \tag{1}$$

  - where P_t represents the close price at the end of the day session at time t.

Daily Trade Ratio

- Trade ratio, $x_{g,t}$, for each investor group g at time t defined as:

$$x_{g,t} = \frac{B^{\star}_{g,t} - S^{\star}_{g,t}}{B^{\star}_{g,t} + S^{\star}_{g,t}} \tag{2}$$

  where $B^{\star}_{g,t}$ and $S^{\star}_{g,t}$ represent the number of futures contracts bought and sold by investor group g at time t, respectively.

- A positive (negative) trade ratio shows the investor group has bought (sold) more contracts than it has sold (bought) during the day.

- The trade ratio is stationary and in the range $[-1, 1]$.

- Trades are typically serially correlated.

Gold Futures Market

Table 1: Summary Statistics for Trades and Return

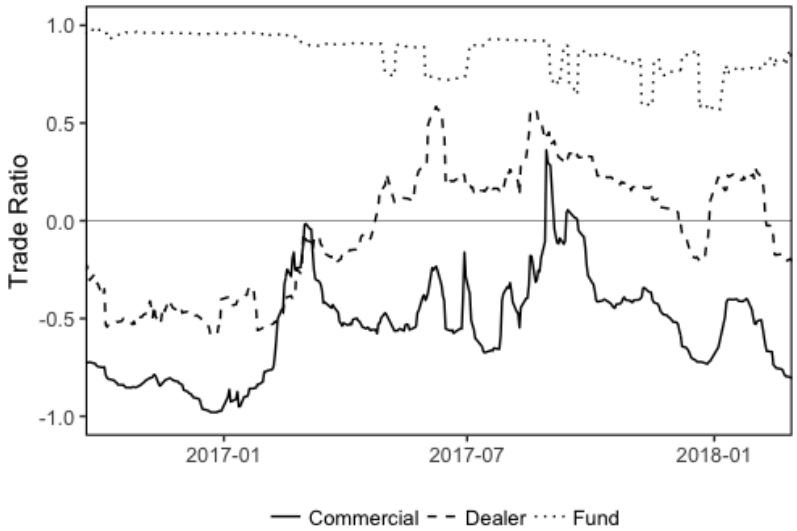
	Commercial		Dealer		Fund		General		Agency		Foreign		Return
	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	
Mean	6248	23876	13382	14774	601	35	50212	40898	6745	6023	12017	3682	0.017
Med.	6292	21724	12602	13938	459	25	47802	41257	6209	6007	13008	2539	0.022
Max.	11991	49951	28053	25434	1201	99	82821	63654	11509	9009	27273	15317	1.480
Min.	326	4193	5569	4107	336	12	24505	20954	3422	3311	1337	188	-2.465
S.D.	2986	10375	5807	5646	251	20	13562	9778	1997	1322	5969	3248	0.474
Skew.	0.03	0.36	0.94	0.13	0.84	1.58	0.38	0.08	0.73	0.15	-0.07	1.44	-0.490
Kurt.	2.35	2.34	3.00	1.88	2.01	4.81	2.16	2.38	2.53	2.47	2.11	4.78	2.776
Obs.	354	354	354	354	354	354	354	354	354	354	354	354	353

Table 2: Correlations Between Trade Ratios

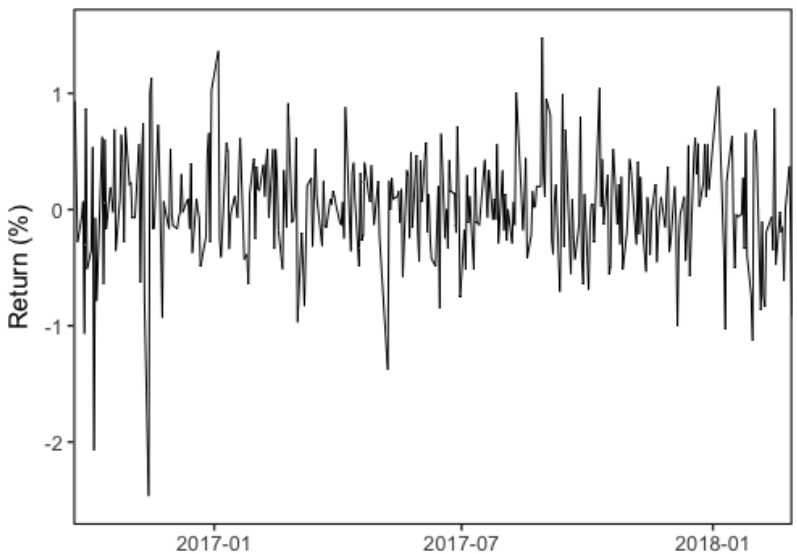
	Commercial	Dealer	Fund	General	Agency	Foreign	Return
Commercial	1.00						
Dealer	0.74	1.00					
Fund	-0.36	-0.57	1.00				
General	-0.88	-0.80	0.31	1.00			
Agency	-0.88	-0.79	0.42	0.96	1.00		
Foreign	0.54	0.42	-0.16	-0.79	-0.79	1.00	
Return	0.01	0.00	0.02	-0.08	-0.10	0.23	1.00

Gold Futures Market

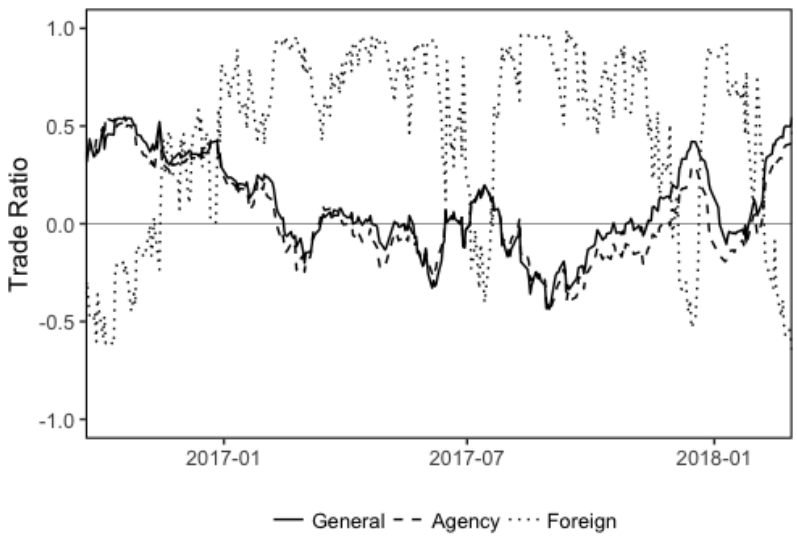
(a) Price



(b) Trade Ratio



(c) Return



(d) Trade Ratio

Platinum Futures Market

Table 3: Summary Statistics for Trades and Return

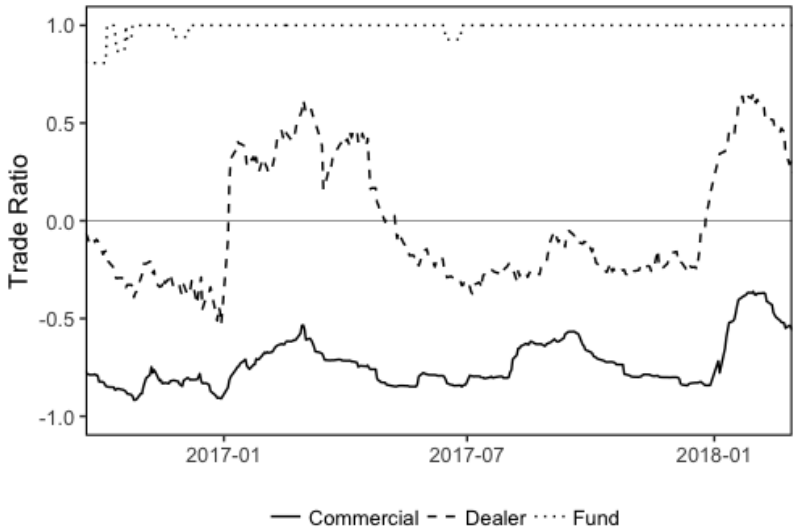
	Commercial		Dealer		Fund		General		Agency		Foreign		Return
	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	
Mean	4055	26599	3627	4136	282	2	37895	16615	5056	1678	5027	6991	0.006
Med.	3710	25953	3640	3266	266	0	38520	16938	5266	1697	3768	7157	0.000
Max.	8140	35920	7781	10167	476	42	53752	23572	6383	2544	15705	19301	4.014
Min.	1083	14910	700	1003	224	0	20792	6435	2625	816	1093	162	-3.204
S.D.	1744	6206	1447	2666	51	8	7965	3810	972	335	3486	4071	0.862
Skew.	0.67	-0.28	0.02	0.71	1.66	4.02	-0.09	-0.45	-0.91	-0.37	0.87	0.79	0.185
Kurt.	2.61	1.76	3.03	2.30	4.59	18.56	2.40	2.51	2.77	2.68	2.72	3.87	1.322
Obs.	354	354	354	354	354	354	354	354	354	354	354	354	353

Table 4: Correlations Between Trade Ratios

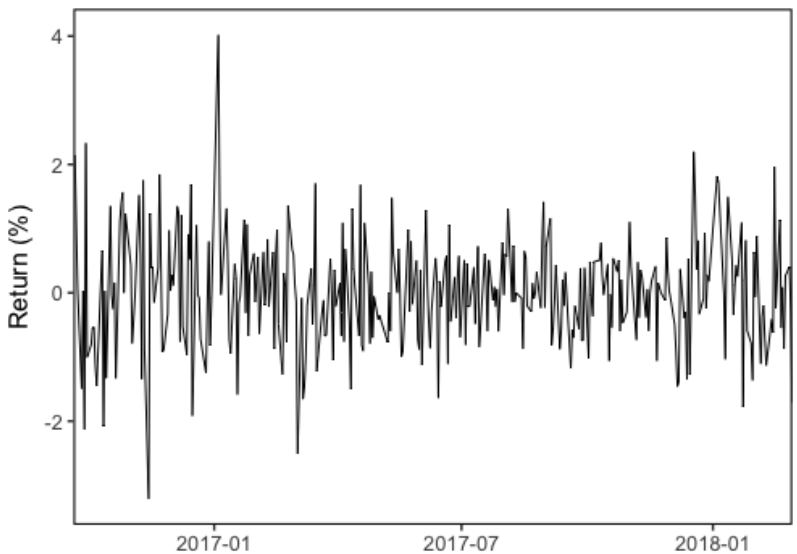
	Commercial	Dealer	Fund	General	Agency	Foreign	Return
Commercial	1.00						
Dealer	0.72	1.00					
Fund	0.22	0.17	1.00				
General	-0.71	-0.71	-0.08	1.00			
Agency	-0.73	-0.75	-0.09	0.94	1.00		
Foreign	0.40	0.21	0.27	-0.61	-0.48	1.00	
Return	-0.06	-0.03	0.03	-0.01	-0.04	0.12	1.00

Platinum Futures Market

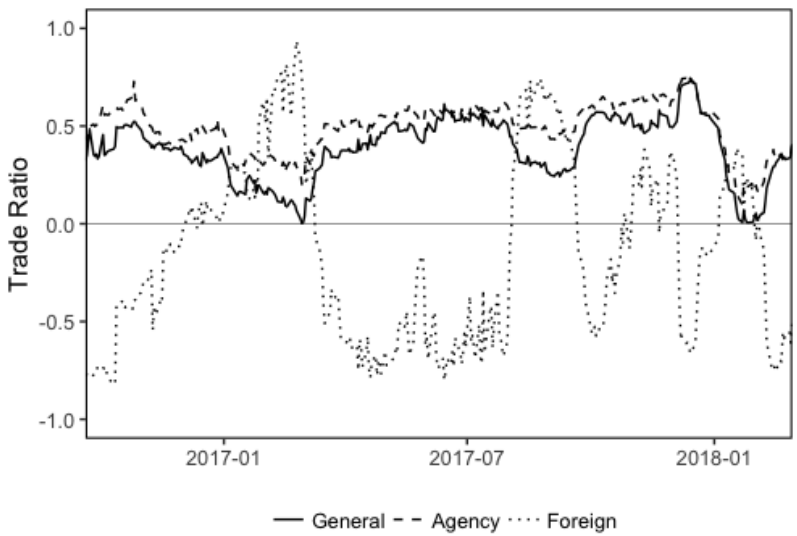
(a) Price



(b) Trade Ratio



(c) Return



(d) Trade Ratio

Gasoline Futures Market

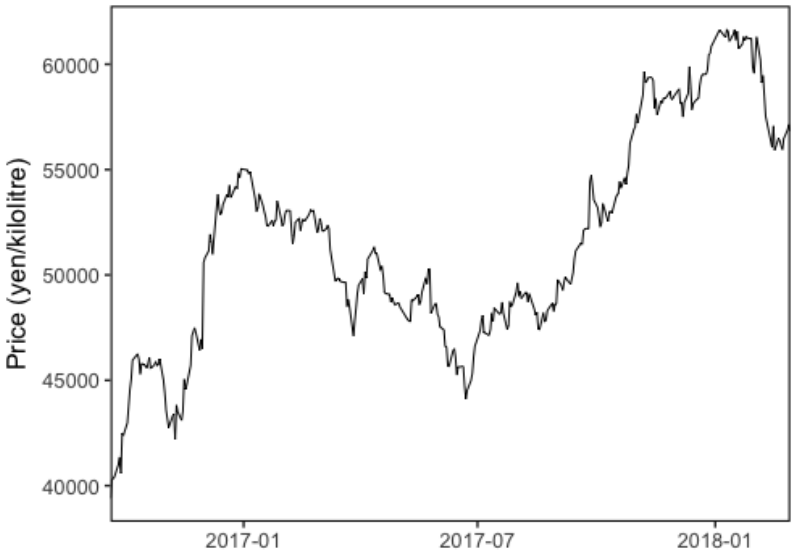
Table 5: Summary Statistics for Trades and Return

	Commercial		Dealer		Fund		General		Agency		Foreign		Return
	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	
Mean	4344	3574	1577	1756	7	42	2649	2436	301	257	497	1296	0.111
Med.	4301	3593	1479	1577	0	28	2619	2393	283	247	203	1502	0.170
Max.	6334	5777	2859	3114	65	171	3749	3454	560	503	2435	2356	8.774
Min.	1791	1567	676	410	0	23	1436	1269	94	131	20	48	-4.157
S.D.	1192	1082	492	720	13	30	557	365	118	62	588	671	1.245
Skew.	-0.15	0.10	0.66	0.13	1.69	2.52	0.14	0.46	0.43	1.11	1.47	-0.49	1.070
Kurt.	1.85	2.20	2.80	1.75	4.69	9.32	2.02	3.07	2.35	4.72	4.20	1.84	6.886
Obs.	354	354	354	354	354	354	354	354	354	354	354	354	353

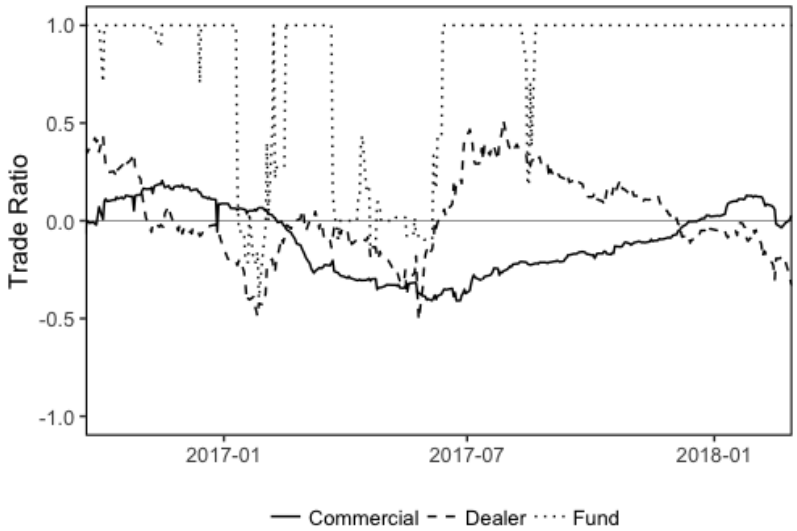
Table 6: Correlations Between Trade Ratios

	Commercial	Dealer	Fund	General	Agency	Foreign	Return
Commercial	1.00						
Dealer	-0.16	1.00					
Fund	0.34	0.58	1.00				
General	-0.25	-0.43	-0.52	1.00			
Agency	-0.57	-0.09	-0.43	0.84	1.00		
Foreign	-0.73	-0.03	-0.19	-0.21	-0.02	1.00	
Return	0.08	0.15	0.08	-0.11	-0.06	-0.09	1.00

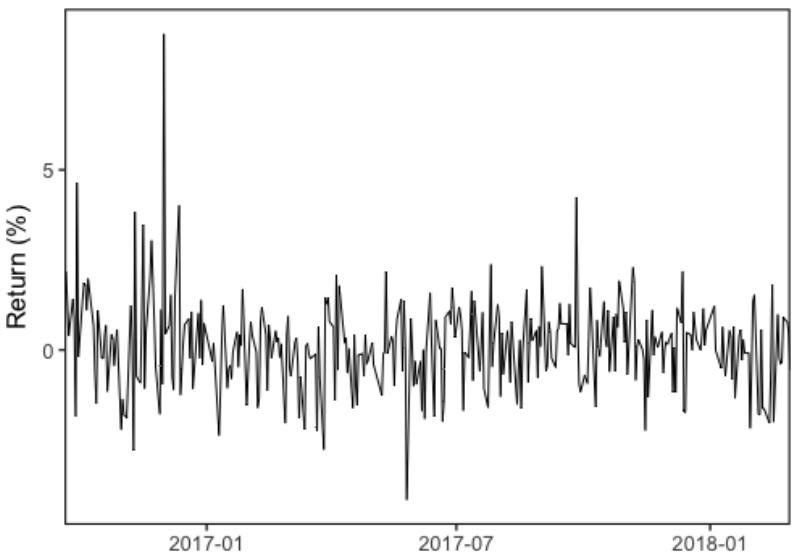
Gasoline Futures Market



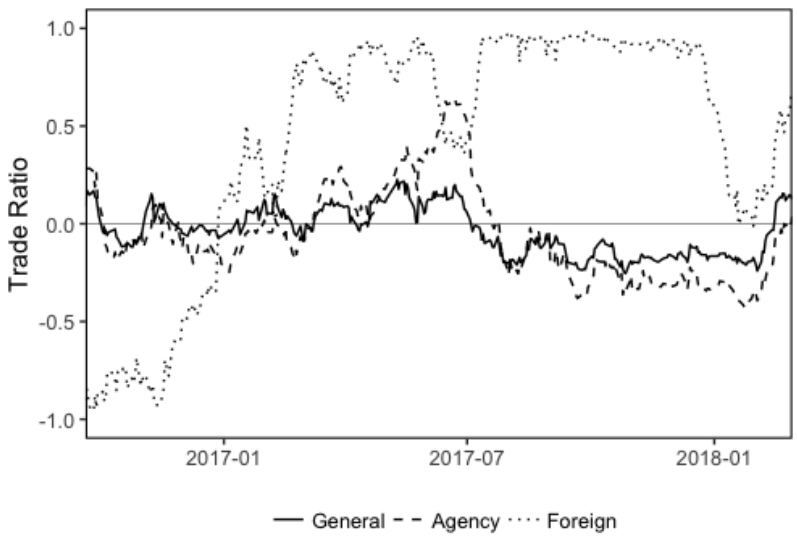
(a) Price



(b) Trade Ratio



(c) Return



(d) Trade Ratio

Rubber Futures Market

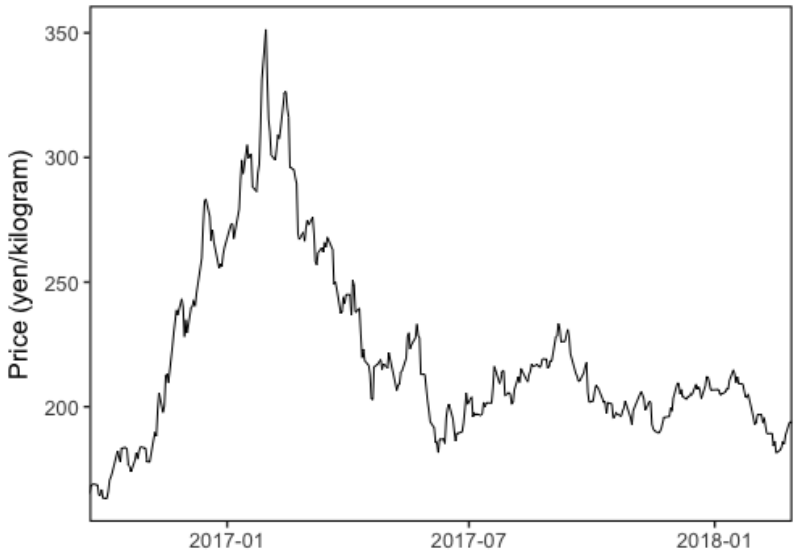
Table 7: Summary Statistics for Trades and Return

	Commercial		Dealer		Fund		General		Agency		Foreign		Return
	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	
Mean	2254	4195	1676	1675	24	5	8538	5798	792	1229	8575	8993	0.072
Med.	2332	4029	1526	1515	14	0	8434	4782	793	1063	8002	8076	0.061
Max.	4587	9615	4435	4472	122	35	13780	12327	1130	2684	19430	21464	6.969
Min.	336	1337	620	326	9	0	2529	2672	300	517	1835	2016	-6.943
S.D.	1174	1585	660	690	22	6	3055	2626	175	456	3598	3873	2.297
Skew.	0.17	0.88	1.26	1.10	2.56	1.65	0.01	0.94	-0.40	1.13	0.79	0.98	-0.012
Kurt.	1.91	4.04	5.04	4.40	9.56	6.13	1.92	2.44	2.77	3.61	3.64	3.87	0.747
Obs.	354	354	354	354	354	354	354	354	354	354	354	354	353

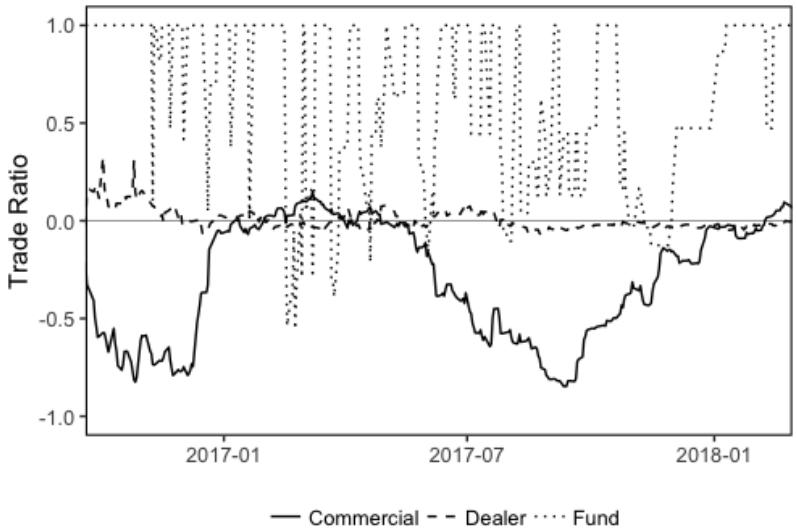
Table 8: Correlations Between Trade Ratios

	Commercial	Dealer	Fund	General	Agency	Foreign	Return
Commercial	1.00						
Dealer	-0.27	1.00					
Fund	-0.04	0.35	1.00				
General	-0.04	-0.21	-0.18	1.00			
Agency	0.25	-0.05	-0.18	0.76	1.00		
Foreign	-0.18	0.25	0.23	-0.89	-0.77	1.00	
Return	-0.11	0.10	0.29	-0.09	-0.16	0.11	1.00

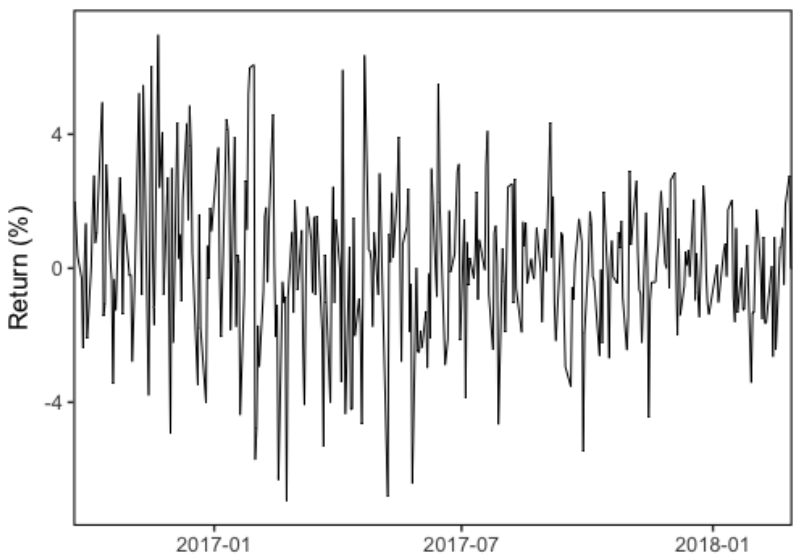
Rubber Futures Market



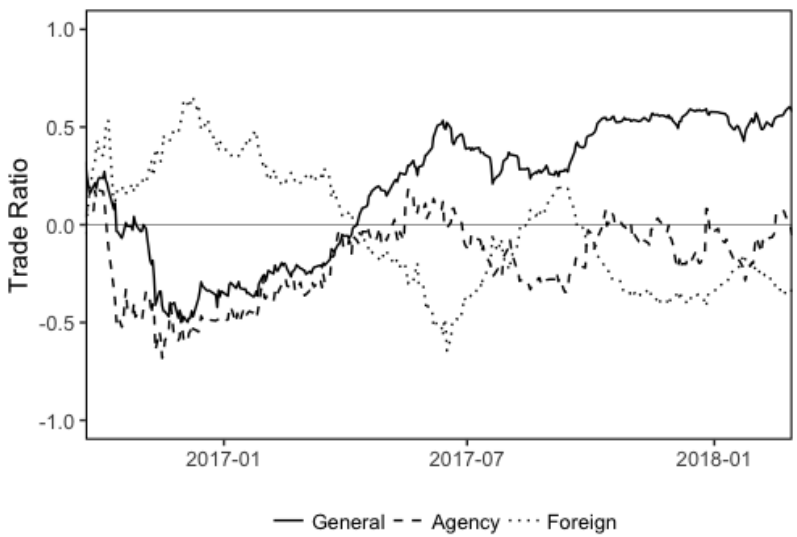
(a) Price



(b) Trade Ratio



(c) Return



(d) Trade Ratio

Modelling the Information Content of Trades

- Hasbrouck (1991a, 1991b) models the interactions between trades and price revisions as a bivariate structural VAR and provides a method to isolate the variance of innovations to the **permanent component of price** (the efficient price), and the proportions attributable to **trade and non-trade related information**.

- Trade related information may be interpreted as **private information** contained in the unexpected trades of investors, and non-trade related information as **public information**.

- We adapt this approach to estimate asymmetry in investors' long run influence on price and their influence on the efficient price.
    - Contemporaneous and lagged relationships between trades and returns, multiple trade indicators.

VAR Model

- The VAR model can be expressed as:

$$BY_t = \Phi_0 + \Phi_1 Y_{t-1} + \Phi_2 Y_{t-2} + \cdots + \epsilon_t \tag{3}$$

where:

$$Y_t = \begin{bmatrix} X_t \\ r_t \end{bmatrix}, \quad X_t = \begin{bmatrix} x_{1,t} \\ x_{2,t} \\ x_{3,t} \\ x_{4,t} \\ x_{5,t} \\ x_{6,t} \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & -b_1 \\ 0 & 1 & 0 & 0 & 0 & 0 & -b_2 \\ 0 & 0 & 1 & 0 & 0 & 0 & -b_3 \\ 0 & 0 & 0 & 1 & 0 & 0 & -b_4 \\ 0 & 0 & 0 & 0 & 1 & 0 & -b_5 \\ 0 & 0 & 0 & 0 & 0 & 1 & -b_6 \\ -c_1 & -c_2 & -c_3 & -c_4 & -c_5 & -c_6 & 1 \end{bmatrix}$$

- X_t is the set of trade ratios $x_{g,t}$ for investor group $g = 1, \ldots, 6$.
- The b_g are coefficients on the returns explaining the trade ratios.
- The c_g are coefficients on the trade ratios explaining the returns.
- The Φ_i are 7×7 coefficient matrices.

Efficient Price and Mispricing

- The price of a security, p_t, may be decomposed into the **efficient price** m_t and **mispricing** s_t:

$$p_t = m_t + s_t \tag{4}$$

where m_t follows a random walk process and s_t is a mean-zero covariance stationary process, and $\lim_{h\to\infty} E(s_{t+h}) = 0$.

- The efficient price, or permanent component, is modelled as:

$$m_t = m_{t-1} + \omega_t \tag{5}$$

where $\omega_t \sim N(0, \sigma_\omega^2)$ and $E(\omega_t, \omega_h) = 0$ for $t \neq h$.

- Mispricing (s_t) is **transitory**, while the efficient price shock (w_t) is **permanent**.
- Both shocks may be related to the trades of the investor groups or non-trade related.

VMA Representation

- The VAR can be inverted to VMA:

$$Y_t = \left(I + \theta_1 L + \theta_2 L^2 + \theta_3 L^3 + \dots\right) \epsilon_t = \theta\left(L\right) \epsilon_t \qquad (6)$$

where L is the lag operator, the θ_i are 7×7 matrices of coefficients, and ϵ_t is a white noise error process with $E\left(\epsilon_t\right) = 0$ and $Var\left(\epsilon_t\right) = \Omega$.

Variance of the Permanent Components

- Variance of the **permanent component** is estimated as:

$$\sigma_{\omega}^{2} = [\theta(1)]_{7} \, \Omega \, [\theta(1)]_{7}' \tag{7}$$

where $[\theta(1)]_{7}$ denotes the seventh row of $[\theta(1)]$ that corresponds to returns, and $[\theta(1)] = (I + \theta_1 + \theta_2 + \dots)$.

- Variance of the **trade-related component**:

$$\sigma_{\omega,x_g}^{2} = [\theta^{\star}(1)]_{7} \, \Omega \, [\theta^{\star}(1)]_{7}' \tag{8}$$

where $\theta^{\star}$ represents θ from the VMA with the coefficients related to all other investor groups and returns set to zero.

- Similarly the variance of the **non-trade related component**:

$$\sigma_{\omega,r}^{2} = [\theta^{\star\star}(1)]_{7} \, \Omega \, [\theta^{\star\star}(1)]_{7}' \tag{9}$$

where $\theta^{\star}$ represents θ from the VMA with the coefficients related to all investor groups set to zero.

Extracting the Variances

- Trade innovations for different investor groups are likely to be correlated, thus Ω is **non-diagonal**. Accordingly, use Cholesky factorisation to extract σ_ω^2.
- Set $\Omega = F'F$, where where F is the upper triangular Cholesky factor, and let $d = [\theta(1)]_7 F'$. Then:

$$\sigma_w^2 = \sum d_i^2 \tag{10}$$

- From the factorisation, we obtain the variance due to trade and non-trade components, which we express relative to σ_ω^2.
- The relative trade-related variance component for an investor group provides a measure of the relative influence of that group's trades on the efficient price.

Estimation

- The number of lags in the VAR model for each commodity was determined using AIC.
- Three lags are included for platinum, two for gold and gasoline, and one for rubber.
- Each VAR model was estimated using maximum likelihood.

Long Run Price Impact of Trade (Cumulative IRF)

Table 9: Price Impact of Trade (30 Days)

	Gold	Platinum	Gasoline	Rubber
Commercial	-0.04	-0.29	-0.43	-0.79
Dealer	-0.02	-0.15	-0.94	1.09
Fund	0.06	0.20	0.14	1.13
General	0.37	-0.31	0.75	-1.01
Agency	0.04	-0.13	0.26	-0.84
Foreign	0.17	-0.26	0.25	0.55
Return	-0.04	0.29	0.16	2.57

- The **price impact of trade** for each investor group uses the sum of the coefficients in $[\theta(1)]_7$ related to that group, with the coefficients for all other investor groups set to zero (multiplied by the shock).
- This measure includes **permanent and transitory components**.
- A low (absolute) number suggests unexpected trades have little total long-run influence on price.
- A **positive (negative)** sign indicates the group is **informed (a liquidity provider)**.
- Relative magnitudes across markets can be interpreted as indicating relative **liquidity**.

Recall the VMA

- The VMA model can be written as:

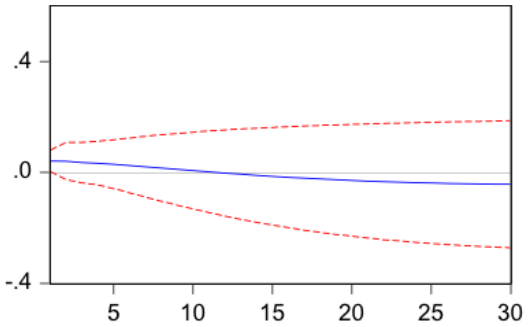
$$\begin{bmatrix} x_{1,t} \\ x_{2,t} \\ x_{3,t} \\ x_{4,t} \\ x_{5,t} \\ x_{6,t} \\ r_t \end{bmatrix} = \begin{bmatrix} a_1(L) & b_1(L) & c_1(L)\,d_1(L) & e_1(L) & f_1(L) & g_1(L) \\ a_2(L) & b_2(L) & c_2(L)\,d_2(L) & e_2(L) & f_2(L) & g_2(L) \\ \vdots & & & & & \vdots \\ a_7(L) & b_7(L) & c_7(L)\,d_7(L) & e_7(L) & f_7(L) & g_7(L) \end{bmatrix} \begin{bmatrix} \epsilon_{1,t} \\ \epsilon_{2,t} \\ \epsilon_{3,t} \\ \epsilon_{4,t} \\ \epsilon_{5,t} \\ \epsilon_{6,t} \\ \epsilon_{7,t} \end{bmatrix} \tag{11}$$

- For example, the ultimate effect of the unexpected component of a trade by the Commercial investor group ($g = 1$) on price is:

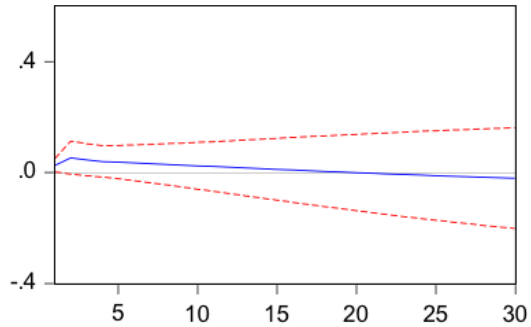
$$\Psi_{30} = \sum_{k=0}^{30} a_{7,k}(\epsilon_{1,0}) \tag{12}$$

which is equivalent to the cumulative impulse response of return to the Commercial trade ratio.

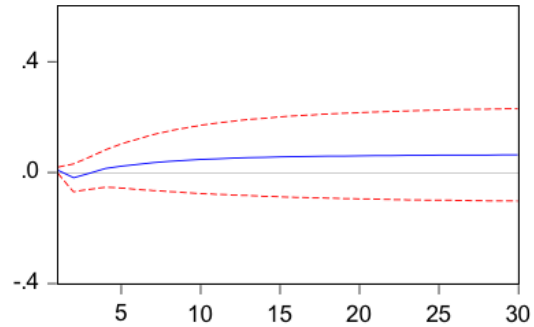
Cumulative Impulse Responses for Gold



(e) Commercial



(f) Dealer



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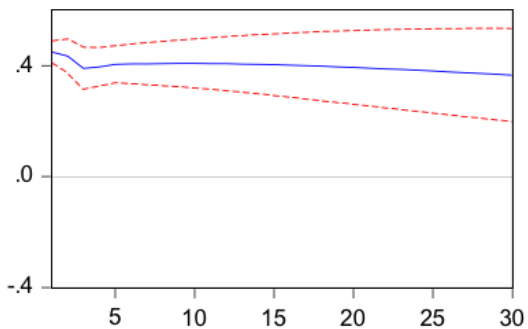

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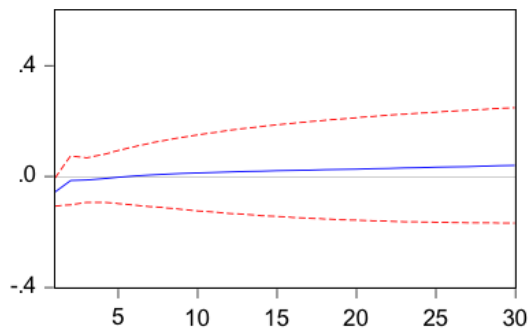

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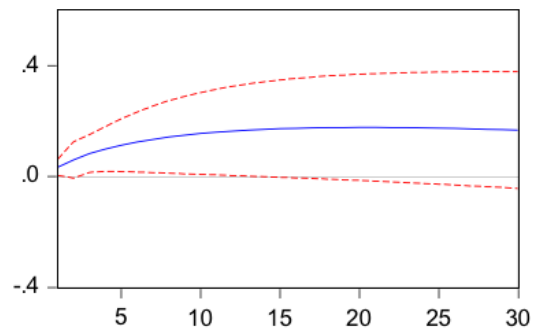

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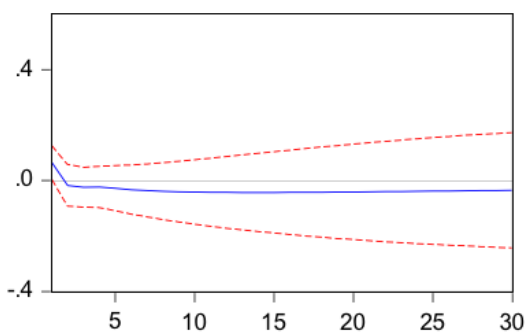
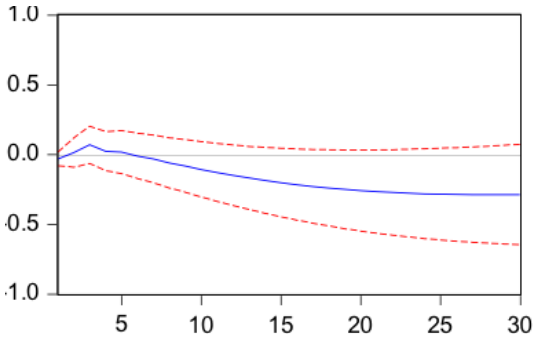


(k) Return

Cumulative Impulse Responses for Platinum



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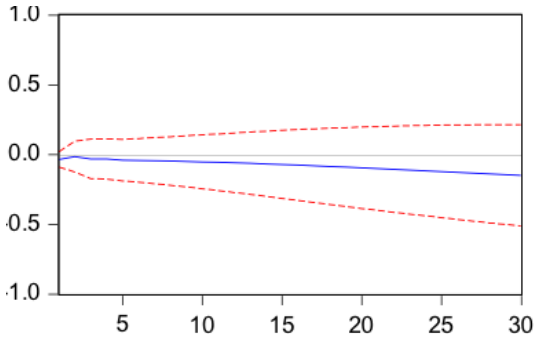

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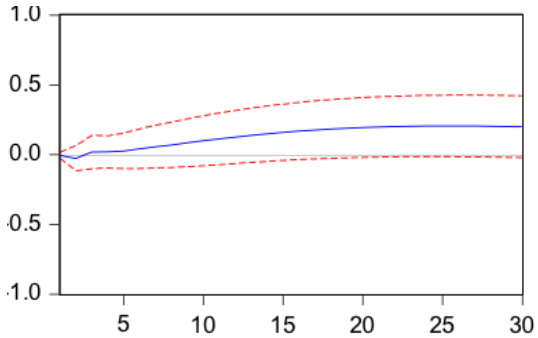

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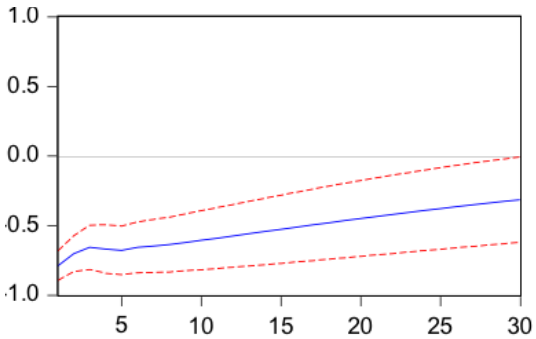

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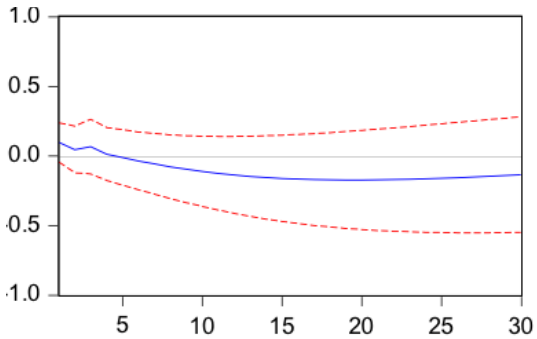
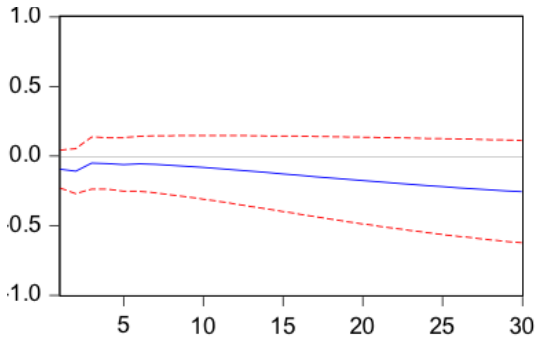
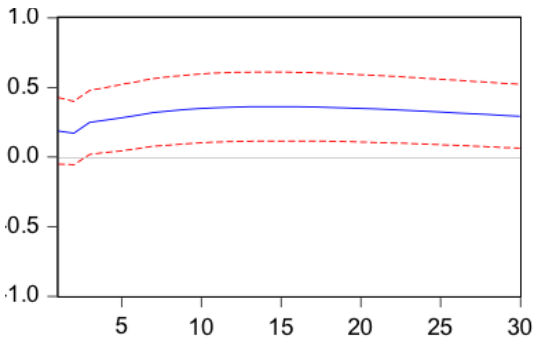


(e) Agency

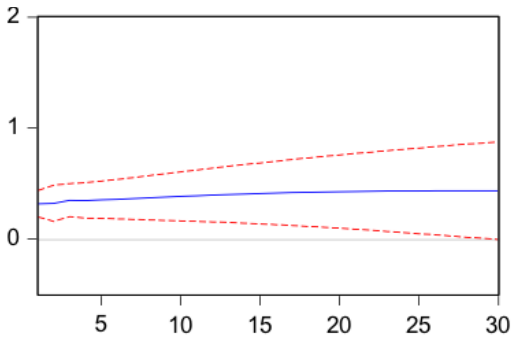


(f) Foreign

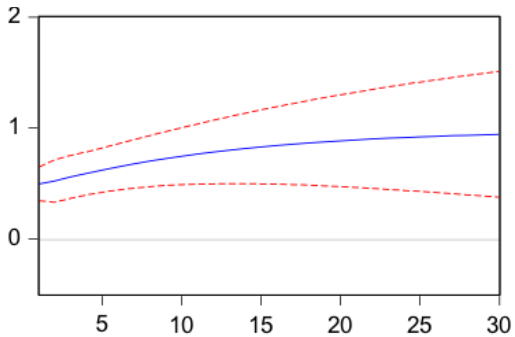


(g) Return

Cumulative Impulse Responses for Gasoline



(a) Commercial



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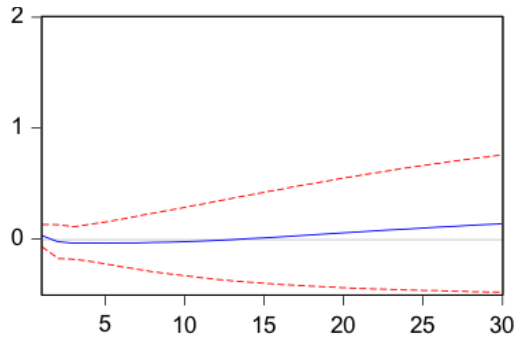

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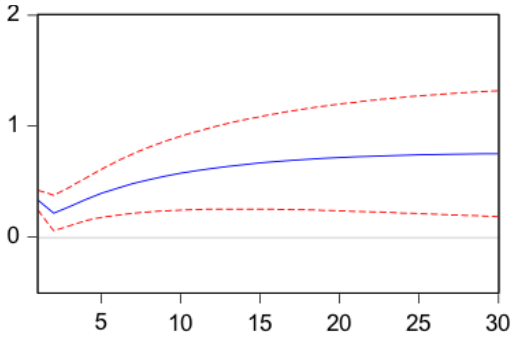

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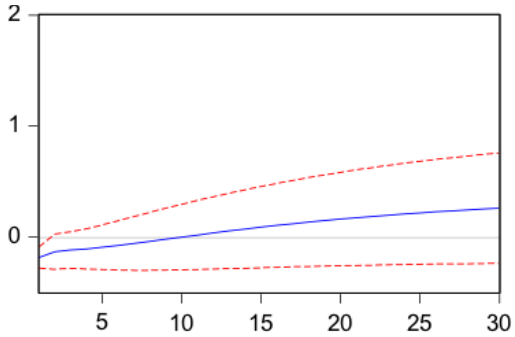

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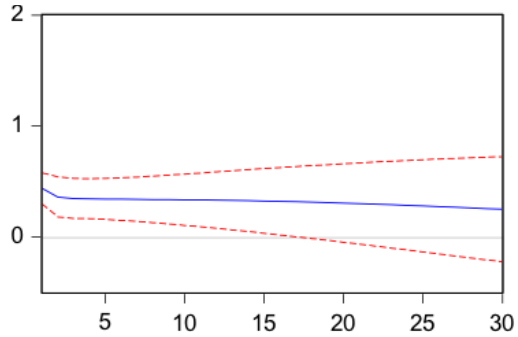

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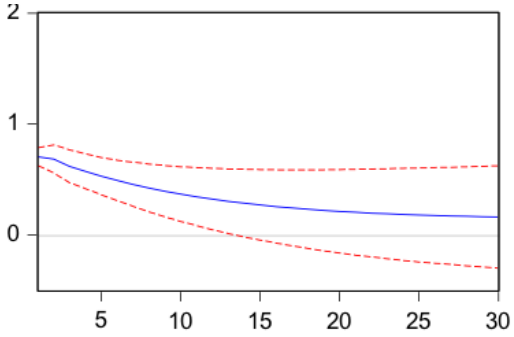
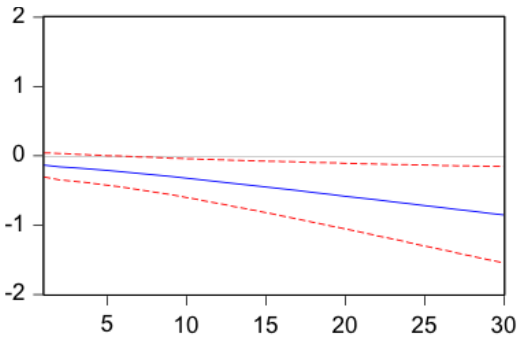
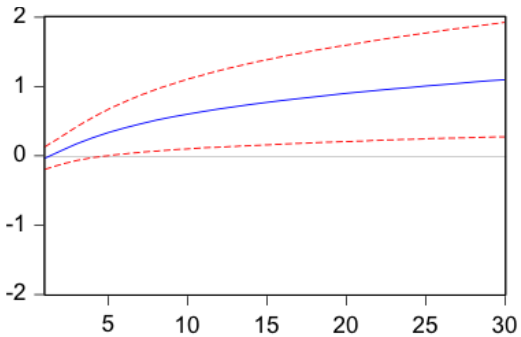


(g) Return

Cumulative Impulse Responses for Rubber



(a) Commercial



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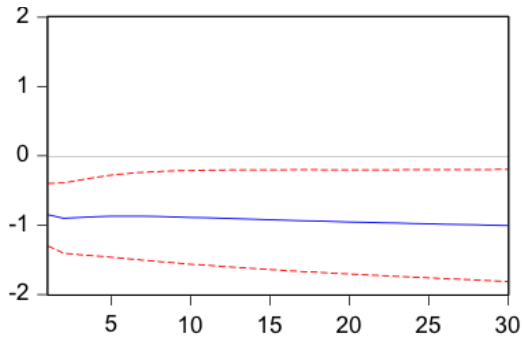
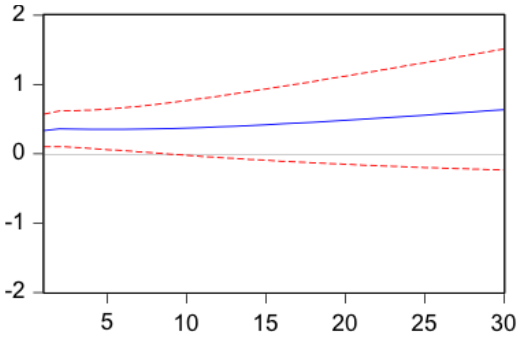
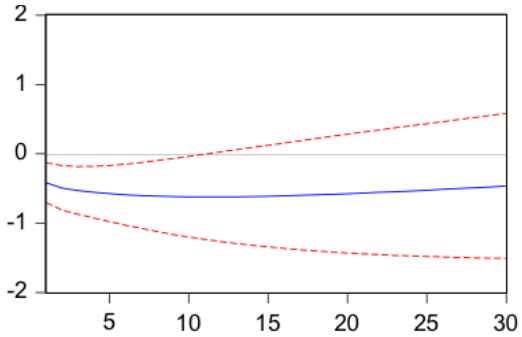


(c) Fund



(d) General



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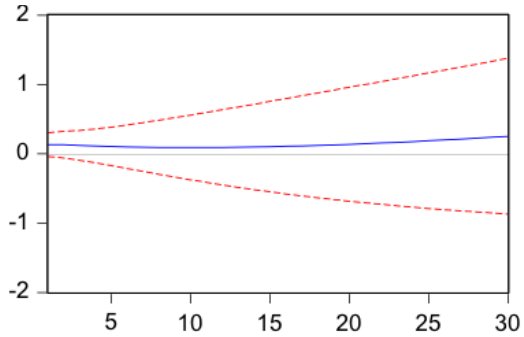
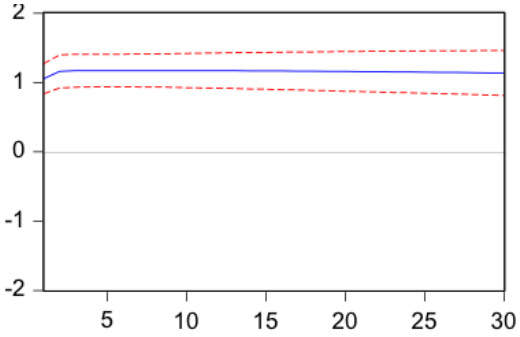


(f) Foreign



(g) Return

Forecast Error Variance Decomposition

Table 10: Forecast Error Variance Decomposition (%, 30 days)

	Gold	Platinum	Gasoline	Rubber
Commercial	0.88	1.91	8.08	1.59
Dealer	0.71	0.32	20.14	2.80
Fund	0.70	0.65	0.43	32.02
General	89.23	86.67	11.42	5.16
Agency	2.21	2.58	3.41	8.07
Foreign	1.42	1.95	15.73	0.83
Return	4.85	5.92	40.79	49.53

- The standard forecast error variance decomposition for a SVAR places a higher weight on short-run influences of an innovation.
  - Transitory mis-pricing will reverse over time.
- Trade-related information has the most influence over price in the gold and platinum markets, while both trade- and non-trade-related are equally influential over the prices of gasoline and rubber.
- General have most influence over the price in gold and platinum.

Variance Decomposition of the Efficient Price

- We want to know how important **trade-related information** is for each investor group, relative to the efficient price, which we interpret as the private information in the trades of each group.

- Calculate the ratio of the variance of the trade-related component, σ^2_{ω,x_g} to the variance of the permanent component, σ^2_{ω}.

- We also want to know the relative importance of **non-trade related information**, which we interpret as public information.

- Calculate the ratio of the variance of the trade-related component, $\sigma^2_{\omega,r}$ to the variance of the permanent component, σ^2_{ω}.

Variance Decomposition of the Efficient Price

Table 11: Variance Decomposition of the Efficient Price

	Gold	Platinum	Gasoline	Rubber
Commercial	39.48	27.55	4.86	0.29
Dealer	8.06	0.43	17.79	1.25
Fund	5.80	29.16	4.08	27.70
General	0.41	6.36	57.94	17.50
Agency	0.36	3.13	3.97	5.65
Foreign	45.64	14.90	7.98	0.28
Return	0.24	18.47	3.38	47.34
Share by trades	99.76	81.53	96.62	52.66

- The efficient price in the gold, platinum and gasoline markets is mainly influenced by trade-related innovations.
- Foreign & Commercial have the greatest influence over the efficient price in gold, Fund & Commercial in platinum and General in gasoline. These investor groups are expected to be the most profitable in the long-run.
- Both trade and non-trade related innovations have an equal influence on the efficient price of rubber, with trades by Fund having the largest information content.

Thank you

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Contemporaneous Coefficient Estimates for Gold

Table 12: Model for the Gold Futures Market

	Dependent variable	Explanatory variable	Coeff.		Standard Error	P-value
Eq.1	Commercial	Return	0.035	***	0.006	0.000
Eq.2	Dealer	Return	0.036	***	0.004	0.000
Eq.3	Fund	Return	-0.008	*	0.004	0.090
Eq.4	General	Return	-0.290	**	0.115	0.012
Eq.5	Agency	Return	-0.066	***	0.004	0.000
Eq.6	Foreign	Return	0.199	***	0.016	0.000
Eq.7	Return	Commercial	14.682	***	1.330	0.000
		Dealer	11.605	***	1.595	0.000
		Fund	3.326	***	1.432	0.020
		General	64.024	***	2.567	0.000
		Agency	-35.243	***	2.324	0.000
		Foreign	4.390	***	0.469	0.000

Contemporaneous Coefficient Estimates for Platinum

Table 13: Model for the Platinum Futures Market

	Dependent variable	Explanatory variable	Coeff.		Standard Error	P-value
Eq.1	Commercial	Return	0.007	***	0.001	0.000
Eq.2	Dealer	Return	0.024	***	0.003	0.000
Eq.3	Fund	Return	0.002	*	0.001	0.076
Eq.4	General	Return	0.049		0.051	0.334
Eq.5	Agency	Return	-0.018	***	0.003	0.000
Eq.6	Foreign	Return	0.077	***	0.012	0.000
Eq.7	Return	Commercial	-10.750	***	3.763	0.004
		Dealer	-4.216	***	1.321	0.001
		Fund	-1.668		3.639	0.647
		General	-67.258	***	3.997	0.000
		Agency	23.450	***	2.958	0.000
		Foreign	-5.247	***	0.675	0.000

Contemporaneous Coefficient Estimates for Gasoline

Table 14: Model for the Gasoline Futures Market

	Dependent variable	Explanatory variable	Coeff.		Standard Error	P-value
Eq.1	Commercial	Return	-0.002		0.001	0.244
Eq.2	Dealer	Return	-0.007	*	0.004	0.082
Eq.3	Fund	Return	0.001		0.008	0.880
Eq.4	General	Return	-0.019	***	0.002	0.000
Eq.5	Agency	Return	-0.013	***	0.002	0.000
Eq.6	Foreign	Return	-0.001		0.005	0.859
Eq.7	Return	Commercial	23.989	***	4.088	0.000
		Dealer	16.751	***	2.156	0.000
		Fund	0.334		0.543	0.539
		General	18.396	***	2.410	0.000
		Agency	-7.791	***	1.907	0.000
		Foreign	10.713	***	1.435	0.000

Contemporaneous Coefficient Estimates for Rubber

Table 15: Model for the Rubber Futures Market

	Dependent variable	Explanatory variable	Coeff.		Standard Error	P-value
Eq.1	Commercial	Return	0.000		0.002	0.835
Eq.2	Dealer	Return	0.000		0.001	0.909
Eq.3	Fund	Return	0.004		0.040	0.912
Eq.4	General	Return	-0.002		0.002	0.292
Eq.5	Agency	Return	-0.003		0.004	0.422
Eq.6	Foreign	Return	0.003		0.002	0.107
Eq.7	Return	Commercial	-3.732		2.305	0.106
		Dealer	-1.383		3.225	0.668
		Fund	3.260	***	0.731	0.000
		General	-11.326	***	3.100	0.000
		Agency	-8.696	***	2.167	0.000
		Foreign	-3.075		1.940	0.113