Online Appendix for "Trend Factor in China: The Role of Large Individual Trading"

By

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This Online Appendix consists of five parts that detail the analysis and support the results in the main text. Section B.1 provides the summary statistics for other factor models and the additional results on comparing model explanatory power discussed in Section 3.2 of the paper. Section B.2 examines the implication of the theoretical model in Section 4 of the paper and presents the empirical analysis on the relationship between the trend predictability and noise trader risk. Section B.3 conducts further robustness tests on the trend factor and provides supplementary results discussed in Section 5 of the paper. Section B.4 lists the anomalies examined in the paper, and provides the detailed definition and the WIND items to construct the anomaly variables. Section B.5 reports the factor summary statistics in the international stock markets.

Online Appendix

B.1 Further empirical results

B.1.1 Figures of coefficients

Figure B.1 plots the smoothed coefficients of the short- and long-term moving averages (MAs) for the price and volume signals in Equation (7). We also report the smoothed coefficients of the univariate cross-section regression of regressing the individual monthly return on the lagged market capitalization or the earnings-to-price ratio.

B.1.2 Summary statistics for q-4 and FF-5

Table B.1 reports the summary statistics for Hou et al. (2015) q-4 and Fama and French (2015) FF-5 factor model in China.

B.1.3 Factor alphas

Table B.2 reports the detailed results for factor alphas.

B.1.4 Additional results on explaining the size premium

Table B.3 compares LSY-4 and our-4 factor in explaining the size premium, where we use the market capitalization of floating A-shares as the weight to calculate the value-weighted (VW) factor returns.

Table B.4 reports the factor summary statistics and the results of regressing the size premium on various factors over the shell factor sample from January 2011 through December 2022.

Table B.5 conducts the same analysis as in Table B.4, but we use the market capitalization of floating A-shares as the weight to calculate the value-weighted (VW) factor returns.

Table B.6 compares the summary statistics for the three trend factors and the turnover factor.

B.2 Further empirical analysis on trend factor predictability and noise trader risk

In this section, we present more empirical evidence showing the impact of noise trader risk on the predictability of price and volume trend factors.

Specifically, we use the residual trading volume volatility to measure σ_θ. We first regress the daily trading volume in day t on that in day t-1 over the previous 24 months. Note that stocks with big market capitalization tend to have greater trading volume, leading to higher volatility of trading volume. To eliminate this magnitude effect, we normalize the trading volume residual by dividing its average in the past 24 months, and then define volatility of trading volume, Vol_{Volume}, as the volatility of the scaled residual, which approximates σ_θ, the noise trader risk. We use a sequential double-sorting procedure to examine how the volatility of noise trader demand Vol_{Volume} impacts on the trend factor. Specifically, at the end of each month, stocks are first sorted by Vol_{Volume} into three groups: Vol_{Low}, Vol_{Mid}, and Vol_{High}. In each group, we define the trend factor as the return spread between the extreme quintile portfolios sorted by ER_{Trend}.

The empirical results in Table B.7 show that the greater the volume volatility, the better the trend factor performance. For example, the composite trend factor earns a significantly higher return in the Vol_{High} group (1.95%) than in the Vol_{Low} group (1.12%). The return difference ($\Delta Trend$) is significant at 0.82% (t-stat: 2.95). The results are similar for the price and volume trend, as the resulting $\Delta Trend$ is significant at 1.13% and 0.82%, respectively. This is consistent with the model implication that the trend effect increases with the noise trader risk.

Table B.8 investigates which trend is more related to noise trader risk. To this end, we examine the performance of the price (volume) trend with various volume volatility after controlling for the volume (price) trend. Specifically, we regress the price trend measure (ER_{TrendP}) on the volume trend measure (ER_{TrendV}) in the cross-section each month using a market capitalization-weighted least squared regression. The resulting residuals, denoted as ER_{TrendP}^{ω}, thus resemble a "pure" price trend measure. We then examine the trend factor formed on ER_{TrendP}^{ω} with various volume

volatility. For comparison, we also examine the performance of the "pure" volume trend ER^{ω}_{TrendV} with different volume volatility after controlling for the price trend in the same manner.

The results in Table B.8 show that, controlling for the price trend measure, the monthly return of the "pure" volume trend spread portfolio in Panel B grows from 0.44% in Vol_{Low} group to 1.29% in Vol_{High} group. The performance difference $\Delta Trend$ is highly significant at 0.85% (t-stat: 2.83). On the other hand, controlling for volume trend measure, the resulting "pure" price trend spread portfolio no longer increases with volume volatility. In short, Table B.8 indicates that the volume trend is more related to noise trader risk.

As robustness checks, we also use retail investor participation, the share-holding ratio of retail investors, to approximate the noise trader risk of the stock.[1] Consistent with the model implication, we find that the trend effect increases with the retail investor participation and the volume trend is more related to retail investor participation, which echos the volume volatility results. The detailed results on retail ownership are provided in Table B.9 and Table B.10 in the Online Appendix.

B.3   Further robustness tests

B.3.1   Alternative MA specification

Table B.11 reports the factor summary statistics, where we use all nine MA signals ranging from 3-days to 400-days to construct the trend factor. In Panel A to Panel C, we use two averaged MA signals, each of which is the average of individual MA signals over the short- and long-term horizons, for price (volume) signals in regression (5). In Panel D, we use all nine individual MA signals ranging from 3-days to 400-days for price (volume) signals in regression (5).

B.3.2   Alternative stock sample

Table B.12 reports the factor summary statistics after applying the LSY filters. Following Liu et al. (2019), we first exclude stocks with the smallest 30% market capitalization of total A-shares. Second, we apply the suspension filter to exclude stocks having less than 120 trading records in the

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[1]Stambaugh (2014) uses the same measure to proxy for the equity fraction owned by noise traders. Even though the retail investor participation so defined corresponds to both uninformed investors and noise traders in our model, according to Jones et al. (2023), the majority of the retail investor trading volume comes from the noise traders. Hence, due to data availability issues, we use this measure proxy for the noise trader risk in our empirical test.

past year or less than 15 trading records in the past month. Third, we exclude stocks listed less than six months.

Table B.13 reports the factor summary statistics after excluding stocks breaking the price limit rule in the previous month, namely the stocks with price movements within a day exceeding 10% in absolute value.

B.3.3   Sub-period performance

Table B.14 reports the factor performances over the earlier vs recent periods, and crisis vs non-crisis periods.

B.3.4   Transaction cost

Table B.15 reports the turnover rate and the break-even transaction costs (BETCs) for the trend factor and the turnover factor.

B.3.5   Controlling for other effects

Table B.16 reports the performance of the trend factor after controlling for other variables that are known to affect the cross-section of stock expected returns.

B.4   Anomalies in China

B.4.1   Anomaly definition

Table B.17 lists the 60 anomalies examined in the paper. We use the LSY suspension filter to exclude stocks to construct anomaly portfolios. We now provide the detailed definition and the WIND item used to construct the anomalies. Note that we always use the most recent available data at the end of month-t to construct the anomaly portfolio in month-(t+1), and hold the portfolio for 1-month, except for short-term reversal (SREV).[2]

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[2]As discussed below, since SREV is a short-term anomaly, we follow LSY to sort the stocks each day based on the most recently available 20-day cumulative return and hold it for five trading days. In this way, we have five reversal strategies on each trading day, and we average their daily returns to compute the monthly return for SREV.

1. Trading frictions

1.1 Size (*Size*): Market capitalization of total A-shares (including non-tradable shares), defined as the daily close price (WIND item: S_DQ_CLOSE) multiplied by total A-share outstanding (WIND item: S_SHARE_TOTALA), is used to calculate the size anomaly.[3] Market capitalization of total A+B+H share, defined as the daily close price (WIND item: S_DQ_CLOSE) multiplied by total shares outstanding (WIND item: TOT_SHR), is used to calculate the financial ratio defined below, such as book-to-market ratio.

1.2 Abnormal turnover (*AbTurn*): AbTurn is the ratio of the average daily turnover over the past 20 days to the average daily turnover over the past 250 days. The daily turnover is the ratio between the daily trading volume (WIND item: S_DQ_VOLUME) and the floating A-share outstanding (WIND item: S_SHARE_FREESHARES). When calculating the average turnover over the past windows for individual stocks, we exclude the observations with zero trading volume.

1.3 Illiquidity (*ILLIQ*): ILLIQ is the Amihud (2002) illiquidity, which is the average of daily illiquidity measure in the previous 1 month. The daily illiquidity measure is the ratio of the absolute daily return to the daily RMB trading volume (WIND item: S_DQ_AMOUNT).

1.4 Standard deviation of the RMB trading volume (*STD_RVOL*): STD_RVOL is the volatility of the trading volume in the previous 3 months.

1.5 Return asymmetry (*IE*): IE is defined as,

$$IE = \int_{1}^{+\infty} f(x)dx - \int_{-\infty}^{-1} f(x)dx, \tag{B.1}$$

where $f(x)$ is the probability density function of the standardized return residual after adjusting for the market risk with unit variance. We estimate the probability using the empirical distribution function based on the daily returns in the previous 250 days. We require a minimum of 80% of non-zero-volume trading days in the previous 250 days.

1.6 Turnover (*Turn*): Turn is the monthly turnover over the previous month.

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[3] We use the market capitalization of total A-shares to calculate value-weighted return.

1.7 RMB trading volume ($RVOL$): RVOL is defined as the RMB trading volume (WIND item: S_DQ_AMOUNT) in the previous 6 months.

1.8 Short-term reversal ($SREV$): SREV is cumulative return in the past 20 days. Note that since it is a short-term anomaly, we follow LSY to sort the stocks each day based on the most recently available 20-day cumulative return and hold it for five trading days. Using this sort, we have five reversal strategies on each trading day, and we average their daily returns to compute the monthly return for SREV.

1.9 Maximum daily return (MDR): MDR is the average of the highest daily return over the last month. We require a minimum of 50% of non-zero-volume trading days in month t.

1.10 Beta ($Beta$): Beta is the estimated market beta from daily returns and market returns in the previous 3 months.

1.11 Idiosyncratic volatility ($IVOL$): IVOL is the standard deviation of residuals of individual stock daily returns with respect to CAPM in month t. We require a minimum of 50% of non-zero-volume trading days in month t.

1.12 Skewness ($SKEW$): SKEW is the skewness of a stock's daily return in the past 250 days. We require a minimum of 80% of non-zero-volume trading days in the previous 250 days.

1.13 Idiosyncratic skewness ($ISKEW$): ISKEW the skewness of the residuals from regressing a stock's daily return on the CAPM in the past 250 days. We require a minimum of 80% of non-zero-volume trading days in the previous 250 days.

1.14 Co-skewness ($COSKEW$): COSKEW for stock j is defined as γ_j in the regression

$$R_{j,d} = \alpha_j + \beta_j R_{m,d} + \gamma_j R_{m,d}^2 + \epsilon_{j,d}, \tag{B.2}$$

where $R_{j,d}$ and $R_{m,d}$ is the stock j's return and the market return on day d, respectively. We use the daily return over the previous 250 days to estimate the regression, and require a minimum of 80% of non-zero-volume trading days.

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1.15 Price (PR): PR is the close price (WIND item: S_DQ_CLOSE) in the end of the last month.[4]

1.16 Downside beta ($DBeta$): DBeta is calculated based on the daily return in the previous 12 months, and we only use the observation on the days during which the market return is lower than the average market return over the previous 6 months.

2. Value

2.1 Earnings-to-price (EP): Earnings equals the net profit excluding nonrecurrent gains/losses (WIND item: NET_PROFIT_AFTER_DED_NR_LP) in the most recent available quarter report. EP is the ratio of earnings to the total market capitalization of A+B+H share in the last month.

2.2 Book-to-market (BM): BM is the ratio of the total shareholder equity (WIND item: TOT_SHRHLDR_EQY_INCL_MIN_INT) to the total market capitalization of A+B+H share in the last month.

2.3 Assets-to-market (AM): AM is the ratio of total assets (WIND item: TOT_ASSETS) in the most recent available quarter report to the total market capitalization of A+B+H share in the last month.

2.4 Debt-to-market (DM): DM is the ratio of total liabilities (WIND item: TOT_LIAB) in the most recent available quarter report to the total market capitalization of A+B+H share in the last month.

2.5 Operating cash flow-to-price (CP): Operating cash flow is the net cash flow from operating activities (WIND item: NET_CASH_FLOWS_OPER_ACT). OCFP is the ratio of operating cash flows in the most recent available quarter report to the total market capitalization of A+B+H share in the last month.

2.6 Dividend yield (DP): DP is the ratio of the total dividends paid out (WIND item: DVD_PAYABLE) in the most recent available quarter report to the total market capitalization of A+B+H share in the last month.

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[4]The prices adjusted for splits and dividends (WIND item: S_DQ_ADJCLOSE) are used to calculate the pricing moving average signals.

2.7 Debt-to-equity (DE): DE is the ratio of the total liabilities (WIND item: TOT_LIAB) to the total shareholder equity (WIND item: TOT_SHRHLDR_EQY_INCL_MIN_INT) in the most recent available quarter report.

2.8 Long-term reversal ($LREV_{1,60}$): $LREV_{1,60}$ is cumulative return from month t-60 to t-1.

2.9 Long-term reversal ($LREV_{12,60}$): $LREV_{12,60}$ is cumulative return from month t-60 to t-13.

2.10 Long-term reversal ($LREV_{24,60}$): $LREV_{24,60}$ is cumulative return from month t-60 to t-25.

2.11 Long-term reversal ($LREV_{36,60}$): $LREV_{36,60}$ is cumulative return from month t-60 to t-37.

3.Profitability

3.1 Return on equity (ROE): ROE is the ratio of the net profit excluding nonrecurrent gains/losses (WIND item: NET_PROFIT_AFTER_DED_NR_LP) to the total shareholder equity (WIND item: TOT_SHRHLDR_EQY_INCL_MIN_INT) in the most recent available quarter report.

3.2 Return on assets (ROA): ROA is the ratio of the net profit excluding nonrecurrent gains/losses (WIND item: NET_PROFIT_AFTER_DED_NR_LP) to the total assets (WIND item: TOT_ASSETS) in the most recent available quarter report.

3.3 Operating profits-to-equity (OPE): OPE is the ratio of operating profits to the total shareholder equity (WIND item: OT_SHRHLDR_EQY_INCL_MIN_INT) in the most recent available quarter report, where operating profits equals operating revenue (WIND item: OPER_REV) minus cost of goods sold (WIND item: LESS_OPER_COST), interest expense (WIND item: LESS_INT_EXP), and selling (WIND item: LESS_SELLING_DIST_EXP), general, and administrative expense (WIND item: LESS_GERL_ADMIN_EXP).

3.4 Operating profits-to-assets (OPA): OPA is the ratio of operating profits to the total assets (WIND item: TOT_ASSETS) in the most recent available quarter report, where

operating profits equals operating revenue (WIND item: OPER_REV) minus cost of goods sold (WIND item: LESS_OPER_COST), interest expense (WIND item: LESS_INT_EXP), and selling (WIND item: LESS_SELLING_DIST_EXP), general, and administrative expenses (WIND item: LESS_GERL_ADMIN_EXP).

3.5 Book leverage (BL): BL is the ratio of total assets (WIND item: TOT_ASSETS) to the total shareholder equity (WIND item: TOT_SHRHLDR_EQY_INCL_MIN_INT) in the most recent available quarter report.

3.6 Capital turnover (CT): CT is the ratio of the operating revenue (WIND item: OPER_REV) to the total assets (WIND item: TOT_ASSETS) in the most recent available quarter report.

3.7 Profit margin (PM): PM is the ratio of the operating profits to the operating revenue (WIND item: OPER_REV) in the most recent available quarter report, with operating profits defined above.

3.8 Number of consecutive quarters with earnings increases (NEI): NEI is the number of consecutive quarters (up to eight quarters) with an increase in earnings (WIND item: MRQ_NET_PROFIT_AFTER_DED_NR_LP) over the same quarter in the prior year.

3.9 Gross profits-to-assets (GPA): GPA is the gross profit (WIND item: MRQ_TOT_PROFIT) divided by the total asset (WIND item: MRQ_TOT_ASSETS).

4. Momentum

4.1 Standard unexpected earnings (SUE): Difference of the earnings per share (WIND item: NET_PROFIT_AFTER_DED_NR_LP divided by TOT_SHR) in quarter t-4 and quarter t divided by the volatility of this difference in the past 8 quarters.

4.2 Revenue surprise (RS): Difference of the revenue per share (WIND item: TOT_OPER_REV divided by TOT_SHR) in quarter t-4 and quarter t divided by the volatility of this difference in the past 8 quarters.

4.3 Price momentum (PM_3): PM_3 is defined as the cumulative return from month t-3 to month t-2.

4.4 Price momentum (PM_6): PM_6 is defined as the cumulative return from month t-7 to month t-2.

4.5 Price momentum (PM_9): PM_9 is defined as the cumulative return from month t-9 to month t-2.

4.6 Price momentum (PM_{12}): PM_{12} is defined as the cumulative return from month t-12 to month t-2.

4.7 Price momentum (PM_{18}): PM_{18} is defined as the cumulative return from month t-18 to month t-2.

4.8 Price momentum (PM_{24}): PM_{24} is defined as the cumulative return from month t-24 to month t-13.

4.9 Residual momentum (RM_6): RM_6 is the ratio of average monthly residual return to standard deviation of monthly residual return from month t-7 to month t-2. Monthly residual return is estimated with monthly LSY3 from month t-36 to t-1.

4.10 Residual momentum (RM_{12}): RM_{12} is the ratio of average monthly residual return to standard deviation of monthly residual return from month t-12 to month t-2. Monthly residual return is estimated with monthly LSY3 from month t-36 to t-1.

4.11 Residual momentum (RM_{24}): RM_{24} is the ratio of average monthly residual return to standard deviation of monthly residual return from month t-24 to month t-13. Monthly residual return is estimated with monthly LSY3 from month t-36 to t-1.

4.12 Industry momentum (IM): Based on the industry classification proposed by China Securities Regulatory Commission (CSRC), we have 19 industries. We calculate the value-weighted return for these industries, and sort industries based on the cumulative return in the prior 6-month. Then, the industry momentum is defined as the simple average return of the top 3 winner industries minus the simple average return of the top 3 loser industries.

4.13 52-Week high (52-W): 52-W is defined as the ratio of the split-adjusted price per share at the end of month t to its highest (daily) split-adjusted price per share during the prior 12 months.

4.14 Momentum Change ($MCHG$): MCHG is the cumulative return from month t-6 to month t-1 minus the cumulative return from month t-12 to month t-7.

5.Investment

5.1 Asset growth (AG): AG is the percent change in total assets (WIND item: TOT_ASSETS) from quarter t-4 to quarter t.

5.2 Net operating assets (NOA): NOA equals operating asset minus operating liabilities, and then divided by the total asset (WIND item: TOT_ASSETS) in the previous quarter. And operating asset is defined as the total asset (WIND item: TOT_ASSETS) minus cash (WIND item: MONETARY_CAP) and minus the short-term investment (WIND item: TRADABLE_FIN_ASSETS). Operating liabilities is defined as the total asset (WIND item: TOT_ASSETS) minus short-term borrowings (WIND item: ST_BORROW) minus long-term borrowing (WIND item: LT_BORROW) minus minority interest (WIND item: MINORITY_INT) minus total shareholders' equity excluding minority interest (WIND item: TOT_SHRHLDR_EQY_EXCL_MIN_INT).

5.3 Inventory change ($IVCHG$): IVCHG is the change in inventory (WIND item: INVENTORIES) from quarter t-4 to quarter t, scaled by total assets (WIND item: TOT_ASSETS).

5.4 Inventory growth (IVG): IVG is the percent change in inventory (WIND item: INVENTORIES) from quarter t-4 to quarter t.

5.5 Accrual (ACC): ACC is calculated as

$$ACCRUAL_t = ((\Delta CA_t - \Delta Cash_t) - (\Delta CL_t - \Delta STD_t - \Delta TP_t) - Dep_t)/Assets_t \quad \text{(B.3)}$$

in which ΔCA_t is the change of current assets (WIND item: TOT_CUR_ASSETS) from quarter t-4 to quarter t, $\Delta Cash_t$ is the change of cash and cash equivalents (WIND item: CASH_CASH_EQU_END_PERIOD), ΔCL_t is the change of current liabilities (WIND item: TOT_CUR_LIAB), ΔSTD_t is the change of debt included in current liabilities (sum of WIND item: NON_CUR_LIAB_DUE_WITHIN_1Y and NOTES_PAYABLE), ΔTP_t is the change of taxes payable (WIND item: TAXES_SURCHARGES_PAYABLE), Dep is depreciation and amortization expense (sum of WIND item: DEPR_FA_COGA_DPBA and AMORT_INTANG

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_ASSETS) and $Assets_t$ is total assets (WIND item: TOT_ASSETS) in the most recent available quarter report.

5.6 Book value growth (BVG): BVG is the percent change in total shareholder equity (WIND item: TOT_SHRHLDR_EQY_INCL_MIN_INT) from quarter t-4 to quarter t.

6.Intangible

6.1 R&D to market equity (RDM): RDM is the ratio of management fee (WIND item: LESS_GERL_ADMIN_EXP) in the most recent available quarter report to market capitalization in the last month.

6.2 R&D to sales (RDS): RDS is the ratio of management fee (WIND item: LESS_GERL_ADMIN_EXP) to the operating revenue (WIND item: OPER_REV) in the most recent available quarter report.

6.3 Operating leverage (OL): OL is the ratio of operating cost (WIND item: TOT_OPER_COST) to the total assets (WIND item: TOT_ASSETS) in the most recent available quarter report.

6.4 Age (Age): Age is the number of month since IPO.

B.4.2 Insignificant anomalies

Table B.18 reports the average monthly returns and CAPM alphas for the insignificant anomalies.

B.5 International results

Table B.19 reports the factor summary statistics in the international markets.

(A) Price MA-10

(B) Price MA-400

(C) Volume MA-10

(D) Volume MA-400

(E) Log(Size)

(F) EP
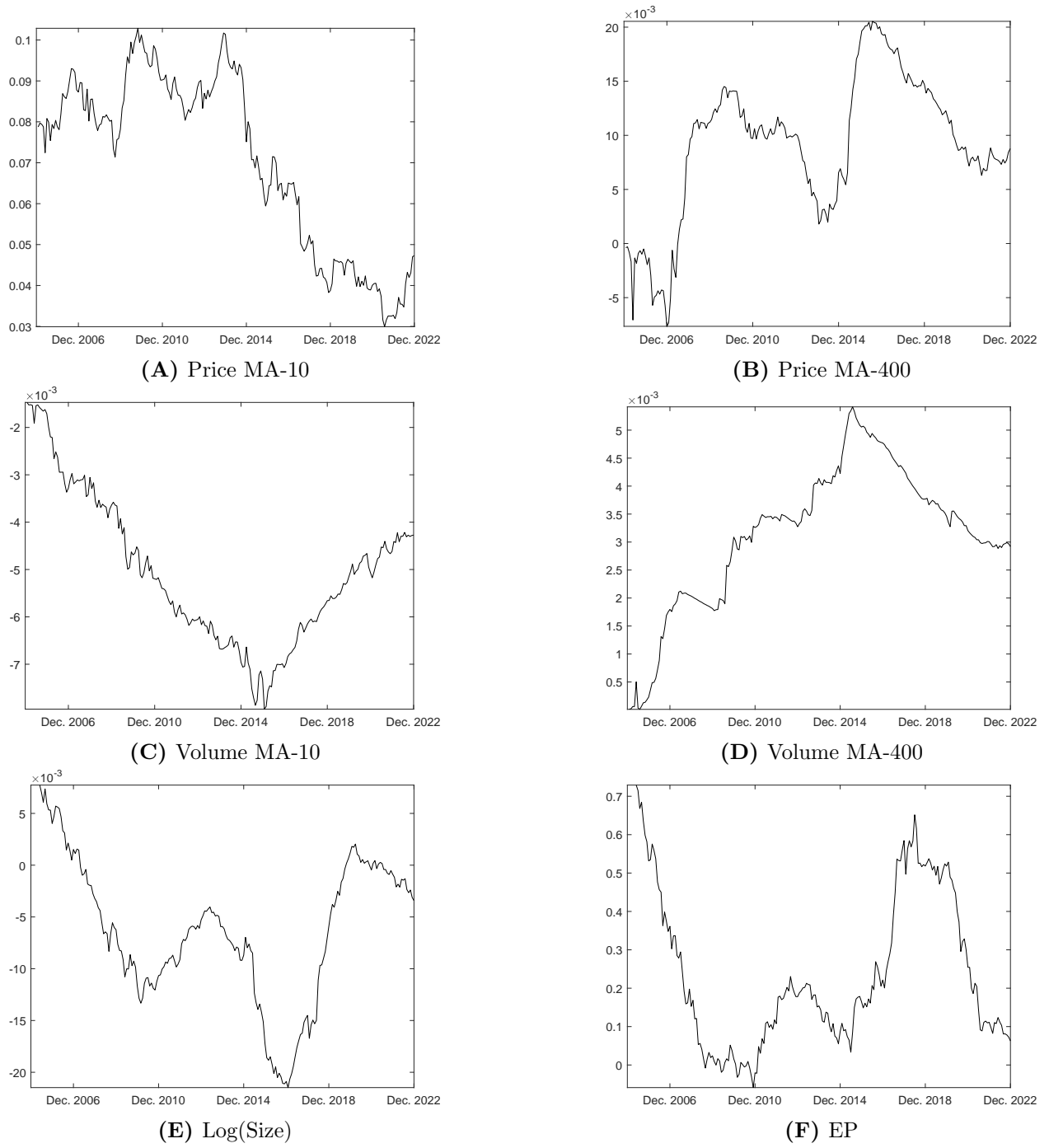
Figure B.1

Smoothed coefficients of MA signals, size, and EP

This figure plots the smoothed coefficients for the price and volume moving averages (MAs) signals in Equation (7). We also plot the smoothed coefficients of the univariate cross-section regression of regressing the individual monthly return on the lagged market capitalization (log(size)) or the earnings-to-price ratio (EP). The sample period is from January 2005 through December 2022.

Table B.1
Summary statistics for q-4 and FF-5

Panel A: FF-5	MKT	SMB	HML	RMW	CMA
Mean (%)	0.78	1.17***	0.69**	0.29*	-0.19
	(1.28)	(3.26)	(2.29)	(1.72)	(-1.21)
Std. dev. (%)	7.74	5.02	4.67	2.70	2.30
Sharpe ratio	0.10	0.23	0.14	0.10	-0.08
Skewness	-0.23	-0.14	0.41	-0.23	-0.09
Panel B: q-4	MKT	SMB	ROE	I/A	
Mean (%)	0.78	1.19***	0.31*	-0.07	
	(1.28)	(3.83)	(1.73)	(-0.72)	
Std. dev. (%)	7.74	4.42	2.86	1.65	
Sharpe ratio	0.10	0.27	0.10	-0.04	
Skewness	-0.23	-0.16	-0.04	-0.15	

This table reports the summary statistics for Hou et al. (2015) q-4 factor model, including the market factor (MKT), the size factor (SMB), the profitability factor (*ROE*), and the investment factor (*I/A*), and the Fama and French (2015) FF-5 factor model, including the the market factor (MKT), the size factor (SMB), the value factor (*HML*), the profitability factor (*RMW*), and the investment factor (*CMA*) in China. Panel A reports the results for FF-5 and Panel B reports the results for q-4. For each factor, we report the sample mean, Newey-West (1987) adjusted t-statistics, sample standard deviation, Sharpe ratio, and skewness for each of the factors. The sample period is from January 2005 through December 2022.

Table B.2
Alphas of factors

	LSY-3	LSY-4	q-4	FF-5
Panel A: Alphas (%) of others factors w.r.t. our-4				
SMB	-0.11	-0.09	0.03	-0.00
	(-1.12)	(-0.91)	(0.27)	(-0.01)
VMG	-0.13	-0.13		
	(-1.78)	(-1.78)		
PMO		0.32		
		(1.05)		
ROE			-0.13	
			(-1.18)	
I/A			-0.14	
			(-1.08)	
HML				-0.38
				(-0.97)
RMW				0.00
				(0.01)
CMA				-0.20
				(-0.97)
Panel B: Alphas (%) of Trend factor w.r.t. other models				
Trend	0.91***	0.86***	1.10***	0.69***
	(2.73)	(2.79)	(3.87)	(2.87)

This table reports the alphas of factors from various models, including CAPM, Liu et al. (2019) 3-factor (LSY-3) and 4-factor (LSY-4), Hou et al. (2015) q-factor (q-4), Fama and French (2015) 5-factor (FF-5), and our 4-factor model. Panel A reports the alphas of factors in LSY-3, LSY-4, q-4, and FF-5 with respect to our 4-factor model. Panel B reports the alphas of our trend factor with respect to other models. The sample period is from January 2005 through December 2022.

Table B.3

Comparison of LSY-4 and our-4 factor model in explaining the size premium: value-weighted return based on the market capitalization of floating A-shares

	Unadjusted	LSY-4	Our-4	PMO	Trend
Panel A: Factors under original sorting					
α (%)	2.13***	0.79***	0.46**	1.77**	1.09
	(3.55)	(4.77)	(2.36)	(2.32)	(1.46)
β_{MKT}		0.07***	0.12***		
		(3.99)	(4.71)		
β_{SMB}		1.51***	1.61***		
		(33.18)	(27.80)		
β_{VMG}		-0.42***	-0.76***		
		(-5.91)	(-8.58)		
β_{PMO}		0.03		0.44	
		(0.51)		(1.07)	
β_{Trend}			0.21**		0.68***
			(2.53)		(3.54)
Panel B: Factors under 3×3×3 sorting					
α (%)	2.13***	0.74***	0.05	1.73**	1.17
	(3.55)	(3.96)	(0.23)	(2.20)	(1.59)
β_{MKT}		0.07***	0.15***		
		(2.82)	(4.44)		
β_{SMB}		1.30***	1.30***		
		(29.32)	(24.05)		
β_{VMG}		-0.81***	-0.80***		
		(-9.58)	(-7.79)		
β_{PMO}		0.06		0.42	
		(0.58)		(0.98)	
β_{Trend}			0.20**		0.60***
			(2.29)		(3.24)

This table reports the alphas and betas of regressing the decile spread portfolio sorted by stock size on the LSY-4 and our-4 factor model. When constructing the factor, we use the market capitalization of floating A-shares as the weight to calculate the value-weighted (VW) factor returns. In Panel A, factors are constructed under the original sorting. In Panel B, factors are constructed using 3×3×3 sorting on size, EP, and ER_{Trend} (AbTurn) for our-4 (LSY-4) factor model. The sample period is from January 2005 through December 2022.

Table B.4
Factor Performance in the shell factor sample period: 2011-2022

Panel A: Summary statistics

	MKT	SMB	VMG	PMO	ESP	Trend
Mean (%)	0.31	1.10***	1.08***	0.79***	1.26*	1.25***
	(0.59)	(2.73)	(4.54)	(2.86)	(1.94)	(3.97)
Std. dev.(%)	6.16	4.59	2.94	3.41	7.80	3.50
Sharpe ratio	0.05	0.23	0.36	0.23	0.16	0.35
Skewness	-0.07	0.45	0.31	1.21	-0.59	0.54

Panel B: Correlation matrix

MKT	1.00	0.25	-0.33	-0.07	0.30	0.00
SMB	0.25	1.00	-0.52	0.42	0.94	0.26
VMG	-0.33	-0.52	1.00	-0.14	-0.67	0.00
PMO	-0.07	0.42	-0.14	1.00	0.41	0.48
ESP	0.30	0.94	-0.67	0.41	1.00	0.24
Trend	0.00	0.26	0.00	0.48	0.24	1.00

Panel C: Explaining the size premium

	Unadjusted	LSY-4	LSY-4+ESP	Our-4
α (%)	1.82***	0.62***	0.36***	0.40
	(2.70)	(3.91)	(3.64)	(1.52)
β_{MKT}		0.00	-0.02	0.11*
		(0.01)	(-1.47)	(1.91)
β_{SMB}		1.48***	0.61***	1.31***
		(27.93)	(9.02)	(20.86)
β_{VMG}		-0.48***	-0.05	-0.96***
		(-5.69)	(-1.39)	(-5.72)
β_{PMO}		0.10	0.03	
		(1.40)	(1.22)	
β_{Trend}				0.18
				(1.61)
β_{ESP}			0.66***	
			(14.40)	

This table reports the factor performance in Lee et al. (2023)'s shell factor (ESP) sample. Panel A reports the summary statistics for the market (MKT), size (SMB), value (VMG) and turnover (PMO) factor in LSY-4 model, the ESP factor, and our trend (Trend) factor based on the $3 \times 3 \times 3$ sorting method. Panel B reports the factor correlation matrix. Panel C reports the alphas and betas of regressing the size decile spread portfolio on various factors. The sample period is from January 2011 through December 2022.

Table B.5

Factor Performance in the shell factor sample period: 2011-2022, value-weighted return based on the market capitalization of floating A-shares

Panel A: Summary statistics						
	MKT	SMB	VMG	PMO	ESP	Trend
Mean (%)	0.34	0.97**	0.94***	0.78***	1.26*	1.26***
	(0.66)	(2.35)	(3.97)	(3.21)	(1.94)	(4.15)
Std. dev. (%)	6.00	4.73	3.00	3.10	7.80	3.52
Sharpe ratio	0.05	0.20	0.31	0.25	0.16	0.35
Skewness	-0.08	0.36	0.44	0.36	-0.59	0.57

Panel B: Correlation matrix						
MKT	1.00	0.19	-0.28	-0.12	0.25	0.02
SMB	0.19	1.00	-0.61	0.36	0.95	0.21
VMG	-0.28	-0.61	1.00	-0.16	-0.72	-0.06
PMO	-0.12	0.36	-0.16	1.00	0.37	0.46
ESP	0.25	0.95	-0.72	0.37	1.00	0.24
Trend	0.02	0.21	-0.06	0.46	0.24	1.00

Panel C: Explaining the size premium				
	Unadjusted	LSY-4	LSY-4+ESP	Our-4
α (%)	1.82***	0.62***	0.34***	0.00
	(2.70)	(3.84)	(3.58)	(0.00)
β_{MKT}		0.01	-0.01	0.12**
		(0.31)	(-1.31)	(2.09)
β_{SMB}		1.48***	0.64***	1.26***
		(28.40)	(10.81)	(18.33)
β_{VMG}		-0.34***	0.03	-0.81***
		(-4.31)	(0.91)	(-5.36)
β_{PMO}		0.10	0.01	
		(1.52)	(0.66)	
β_{Trend}				0.18*
				(1.77)
β_{ESP}			0.65***	
			(15.46)	

This table reports the factor performance in Lee et al. (2023)'s shell factor (ESP) sample. We use the market capitalization of floating A-shares as the weight to calculate the value-weighted (VW) factor returns for LSY-4 and the trend factor. Panel A reports the summary statistics for the market (MKT), size (SMB), value (VMG) and turnover (PMO) factor in LSY-4 model, the ESP factor, and our trend (Trend) factor based on the $3 \times 3 \times 3$ sorting method. Panel B reports the factor correlation matrix. Panel C reports the alphas and betas of regressing the size decile spread portfolio on various factors. The sample period is from January 2011 through December 2022.

Table B.6
Comparison of the three trend factors and turnover factor

	TrendPV	TrendP	TrendV	PMO
Panel A: Summary statistics				
Mean (%)	1.50***	1.15***	0.76***	0.71***
	(5.47)	(3.93)	(3.10)	(2.83)
Std. dev. (%)	3.71	4.22	3.33	3.50
Sharpe ratio	0.40	0.27	0.22	0.20
Skewness	0.57	0.50	0.44	0.38
Panel B: Correlation matrix				
TrendPV	1.00	0.89	0.43	0.32
TrendP	0.89	1.00	0.16	0.05
TrendV	0.43	0.16	1.00	0.68
PMO	0.32	0.05	0.68	1.00

This table compares the three trend factors and the turnover factor. Panel A reports the sample mean, Newey-West (1987) adjusted t-statistics, sample standard deviation, Sharpe ratio, and skewness for each of the factors. Panel B reports the correlation matrix of the factors. The sample period is from January 2005 through December 2022.

Table B.7
Trend factor and noise trader risk

	Low	2	3	4	High	Trend	$\Delta(Trend)$
Panel A: Sorted by $ER_{TrendPV}$							
Vol_{Low}	0.99	1.47**	1.80***	1.86***	2.11***	1.12***	0.82***
	(1.47)	(2.25)	(2.64)	(2.69)	(2.92)	(2.74)	(2.95)
Vol_{Mid}	0.45	1.48**	1.77**	1.94***	2.39***	1.93***	
	(0.67)	(2.05)	(2.47)	(2.64)	(3.06)	(5.60)	
Vol_{High}	0.16	1.02	1.53**	1.98***	2.12***	1.95***	
	(0.23)	(1.48)	(2.24)	(2.77)	(2.91)	(5.76)	
Panel B: Sorted by ER_{TrendP}							
Vol_{Low}	1.20*	1.55**	1.84***	1.82**	1.78**	0.58	1.13***
	(1.79)	(2.35)	(2.73)	(2.54)	(2.48)	(1.41)	(4.06)
Vol_{Mid}	0.70	1.59**	1.91***	1.83**	2.10***	1.40***	
	(1.02)	(2.27)	(2.65)	(2.42)	(2.74)	(3.90)	
Vol_{High}	0.10	1.18*	1.73**	1.91***	1.82**	1.72***	
	(0.14)	(1.75)	(2.49)	(2.62)	(2.50)	(4.87)	
Panel C: Sorted by ER_{TrendV}							
Vol_{Low}	1.48**	1.56**	1.65**	1.64**	1.73***	0.24	0.82**
	(2.04)	(2.23)	(2.57)	(2.50)	(2.62)	(0.66)	(2.57)
Vol_{Mid}	1.12	1.42*	1.60**	1.76***	2.06***	0.93***	
	(1.48)	(1.96)	(2.29)	(2.60)	(2.83)	(2.84)	
Vol_{High}	0.52	1.27*	1.58**	1.95***	1.60**	1.07***	
	(0.75)	(1.70)	(2.30)	(2.77)	(2.36)	(3.86)	

This table reports the average monthly return of the trend quintile portfolios in stock groups with different noise trader risk measured by Vol_{Volume}, defined as the volatility of the normalized residual trading volume. Vol_{High} and Vol_{Low} indicate high and low Vol_{Volume}, respectively. Within each volatility group, we construct the trend spread portfolio conditional on size based on a 2×5 sorting on size and the trend measure. $\Delta(Trend)$ is the difference between the trend spread in Vol_{High} and Vol_{Low} groups. Panel A, B and C report the results for the composite trend factor, price trend factor, and volume trend factor, respectively. Newey-West (1987) adjusted t-statistics are reported in parentheses. The sample period is from January 2005 through December 2022.

Table B.8

Trend factor and noise trader risk: TrendP and TrendV, controlling for each other

	Low	2	3	4	High	Trend	$\Delta(Trend)$
Panel A: Sorted by ER^{ω}_{TrendP}							
Vol_{Low}	1.83***	1.51**	1.68**	1.69**	1.68***	-0.15	-0.69
	(2.65)	(2.33)	(2.39)	(2.40)	(2.74)	(-0.29)	(-1.08)
Vol_{Mid}	1.59**	1.63**	1.69**	1.50**	2.10**	0.51	
	(2.11)	(2.12)	(2.31)	(2.01)	(2.00)	(0.66)	
Vol_{High}	1.57**	1.22	1.49**	1.56**	0.73	-0.84	
	(2.12)	(1.59)	(2.09)	(2.05)	(0.93)	(-1.25)	
Panel B: Sorted by ER^{ω}_{TrendV}							
Vol_{Low}	1.35*	1.80**	1.68**	1.74***	1.79***	0.44	0.85***
	(1.95)	(2.43)	(2.42)	(2.64)	(2.76)	(1.40)	(2.83)
Vol_{Mid}	0.98	1.70**	1.74**	1.90***	2.11***	1.12***	
	(1.34)	(2.24)	(2.46)	(2.66)	(2.87)	(3.39)	
Vol_{High}	0.48	1.28*	1.72**	1.86***	1.78***	1.29***	
	(0.68)	(1.75)	(2.45)	(2.66)	(2.62)	(4.52)	

This table reports the average monthly return of the trend quintile portfolios in stock groups with different noise trader risk measured by Vol_{Volume}, defined as the volatility of the normalized residual trading volume. Vol_{High} and Vol_{Low} indicate high and low Vol_{Volume}, respectively. In Panel A, we regress the price trend measure (ER_{TrendP}) on the volume trend measure (ER_{TrendV}) in the cross-section each month, using a market-capitalization-weighted least-squared regression, to get the residuals ER^{ω}_{TrendP}. Then, within each volatility group, we construct the trend spread portfolio conditional on size based on a 2×5 sorting on size and ER^{ω}_{TrendP}. In Panel B, we perform the analysis for ER^{ω}_{TrendV} in a similar procedure. $\Delta(Trend)$ is the difference between the trend spread in Vol_{High} and Vol_{Low} groups. Newey-West (1987) adjusted t-statistics are reported in parentheses. The sample period is from January 2005 through December 2022.

Table B.9
Trend factor and retail investor participation

	Low	2	3	4	High	Trend	$\Delta Trend$
Panel A: Sorted by $ER_{TrendPV}$							
$Retail_{Low}$	0.88	1.49**	1.99***	2.07***	2.16***	1.28***	0.90***
	(1.34)	(2.32)	(2.98)	(3.16)	(3.10)	(3.40)	(3.18)
$Retail_{Mid}$	0.31	1.24*	1.79**	1.86**	2.02***	1.71***	
	(0.44)	(1.73)	(2.55)	(2.53)	(2.65)	(4.69)	
$Retail_{High}$	0.22	1.29*	1.56**	2.15***	2.41***	2.18***	
	(0.31)	(1.75)	(2.03)	(2.75)	(2.87)	(6.30)	
Panel B: Sorted by ER_{TrendP}							
$Retail_{Low}$	1.05	1.66**	1.92***	1.96***	1.97***	0.91**	0.62**
	(1.62)	(2.59)	(2.95)	(3.00)	(2.82)	(2.29)	(2.18)
$Retail_{Mid}$	0.35	1.49**	1.67**	1.84**	1.78**	1.42***	
	(0.51)	(2.08)	(2.38)	(2.51)	(2.32)	(3.84)	
$Retail_{High}$	0.48	1.35*	1.83**	1.98**	2.02**	1.53***	
	(0.67)	(1.85)	(2.31)	(2.50)	(2.47)	(4.02)	
Panel C: Sorted by ER_{TrendV}							
$Retail_{Low}$	1.40**	1.72**	1.61**	1.89***	1.90***	0.50*	0.66***
	(2.10)	(2.59)	(2.56)	(2.97)	(2.93)	(1.70)	(2.73)
$Retail_{Mid}$	0.83	1.25*	1.47**	1.71**	1.86**	1.03***	
	(1.10)	(1.70)	(2.14)	(2.46)	(2.58)	(3.15)	
$Retail_{High}$	0.84	1.45*	1.63**	1.84**	2.01**	1.16***	
	(1.09)	(1.89)	(2.18)	(2.49)	(2.55)	(3.76)	

This table reports the average monthly return of the trend quintile portfolios in stock groups with different retail investor participation measured by the share-holding ratio of retail investors. $Retail_{High}$ and $Retail_{Low}$ indicate high and low retail investor participation, respectively. Within each retail participation group, we construct the trend spread portfolio conditional on size based on a 2×5 sorting on size and the trend measure. $\Delta(Trend)$ is the difference between the trend spread in $Retail_{High}$ and $Retail_{Low}$ groups. Panel A, B, and C report the results for the composite trend factor, price trend factor, and volume trend factor, respectively. Newey-West (1987) adjusted t-statistics are reported in parentheses. The sample period is from January 2005 through December 2022.

Table B.10

Trend factor and retail investor participation: TrendP and TrendV, controlling for each other

	Low	2	3	4	High	Trend	$\Delta(Trend)$
Panel A: Sorted by ER^{ω}_{TrendP}							
$Retail_{Low}$	1.69***	1.67**	1.87***	1.73***	1.47**	-0.21	-0.27
	(2.71)	(2.50)	(2.73)	(2.89)	(2.10)	(-0.36)	(-0.38)
$Retail_{Mid}$	1.35*	1.29*	1.57**	1.33*	1.91*	0.56	
	(1.96)	(1.67)	(2.20)	(1.66)	(1.77)	(0.74)	
$Retail_{High}$	1.60*	1.47*	1.73**	1.87**	1.11	-0.49	
	(1.92)	(1.93)	(2.28)	(2.18)	(1.40)	(-0.92)	
Panel B: Sorted by ER^{ω}_{TrendV}							
$Retail_{Low}$	1.15*	1.80***	2.00***	1.97***	1.94***	0.79***	0.61**
	(1.80)	(2.67)	(2.87)	(3.03)	(3.04)	(2.95)	(2.23)
$Retail_{Mid}$	0.70	1.25*	1.59**	1.73**	1.90***	1.19***	
	(0.97)	(1.73)	(2.24)	(2.46)	(2.63)	(3.97)	
$Retail_{High}$	0.68	1.60**	1.64**	1.87**	2.10***	1.41***	
	(0.89)	(2.06)	(2.16)	(2.54)	(2.66)	(4.08)	

This table reports the average monthly return of the trend quintile portfolios in stock groups with different retail investor participation measured by the share-holding ratio of retail investors. $Retail_{High}$ and $Retail_{Low}$ indicate high and low retail investor participation, respectively. In Panel A, we regress the price trend measure (ER_{TrendP}) on the volume trend measure (ER_{TrendV}) in the cross-section each month, using a market-capitalization-weighted least-squared regression, to get the residuals ER^{ω}_{TrendP}. Then, within each retail group, we construct the trend spread portfolio conditional on size based on a 2×5 sorting on size and ER^{ω}_{TrendP}. In Panel B, we perform the analysis for ER^{ω}_{TrendV} in a similar procedure. $\Delta(Trend)$ is the difference between the trend spread in $Retail_{High}$ and $Retail_{Low}$ groups. Newey-West (1987) adjusted t-statistics are reported in parentheses. The sample period is from January 2005 through December 2022.

Table B.11
Summary statistics: alternative MA specification

	MKT	SMB*	VMG*	Trend
Panel A: Window-1 with two averaged MA signals				
Mean (%)	0.78	1.24***	1.12***	1.48***
	(1.28)	(4.01)	(5.83)	(5.03)
Std. dev. (%)	7.74	4.11	2.96	3.69
Sharpe ratio	0.10	0.30	0.38	0.40
Skewness	-0.23	-0.12	0.01	0.42
Panel B: Window-2 with two averaged MA signals				
Mean (%)	0.78	1.28***	1.09***	1.45***
	(1.28)	(4.09)	(5.69)	(4.94)
Std. dev. (%)	7.74	4.11	2.94	3.79
Sharpe ratio	0.10	0.31	0.37	0.38
Skewness	-0.23	-0.02	-0.04	0.62
Panel C: Window-3 with two averaged MA signals				
Mean (%)	0.78	1.28***	1.08***	1.43***
	(1.28)	(4.11)	(5.62)	(5.15)
Std. dev. (%)	7.74	4.12	2.94	3.75
Sharpe ratio	0.10	0.31	0.36	0.38
Skewness	-0.23	-0.00	0.02	0.48
Panel D: Window-4 with nine individual MA signals				
Mean (%)	0.78	1.33***	1.09***	1.34***
	(1.28)	(4.20)	(5.48)	(5.94)
Std. dev. (%)	7.74	4.20	2.97	3.12
Sharpe ratio	0.10	0.31	0.36	0.43
Skewness	-0.23	-0.02	0.14	0.17

This table reports the summary statistics for the factors in our 4-factor model with alternative specifications of moving average (MA) lag windows to construct the trend factor. In Panel A to Panel C, we use two averaged MA signals, each of which is the average of individual MA signals over short- and long-term horizons, for the price (volume) signals in regression (5). In Panel A, the short-term MA is the average of the 3-, 5-, 10-, and 20-days MA, and the long-term MA is the average of the 50-, 100-, 200-, 300-, and 400-days MA. In Panel B, the short-term MA is the average of the 3-, 5-, 10-, 20, and 50-days MA, and the long-term MA is the average of the 100-, 200-, 300-, and 400-days MA. In Panel C, the short-term MA is the average of the 3-, 5-, 10-, 20-, 50-, and 100-days MA, and the long-term MA is the average of the 200-, 300-, and 400-days MA. In Panel D, we use all nine individual MA signals ranging from 3-days to 400-days for price (volume) signals in regression (5). The sample period is from January 2005 through December 2022.

Table B.12
Summary statistics: excluding smallest 30% stocks

	MKT	SMB	VMG	PMO	SMB*	VMG*	Trend
Panel A: Summary statistics							
Mean (%)	0.77	0.68*	1.06***	0.69***	0.68**	1.17***	1.08***
	(1.28)	(1.96)	(4.71)	(3.49)	(2.27)	(5.75)	(3.88)
Std. dev. (%)	7.73	5.01	3.83	3.19	4.08	3.37	3.82
Sharpe ratio	0.10	0.13	0.27	0.21	0.16	0.34	0.28
Skewness	-0.29	-0.15	0.19	-0.58	-0.21	0.00	0.17
Panel B: Correlation matrix							
MKT	1.00	0.14	-0.30	-0.23	0.08	-0.24	-0.02
SMB	0.14	1.00	-0.60	0.13	0.97	-0.59	0.19
VMG	-0.30	-0.60	1.00	0.01	-0.51	0.97	0.00
PMO	-0.23	0.13	0.01	1.00	0.13	0.01	0.31
SMB*	0.08	0.97	-0.51	0.13	1.00	-0.52	0.14
VMG*	-0.24	-0.59	0.97	0.01	-0.52	1.00	0.02
Trend	-0.02	0.19	0.00	0.31	0.14	0.02	1.00

This table reports the summary statistics for the market (MKT), size (SMB), value (VMG) and turnover (PMO) factor in LSY-4 model, and our size (SMB*), value (VMG*) and trend (Trend) factor. We follow Liu et al. (2019) to apply the same filters to exclude stocks. We first exclude stocks with the smallest 30% market capitalization of total A-shares. Second, we apply the suspension filter to exclude stocks having less than 120 trading records in the past year or less than 15 trading records in the past month. Third, we exclude stocks listed less than six months. Panel A reports the sample mean,Newey-West (1987) adjusted t-statistics, sample standard deviation, Sharpe ratio and skewness for each of the factors. Panel B reports the correlation matrix of the factors. The sample period is from January 2005 through December 2022.

Table B.13
Summary statistics: excluding stocks breaking the price limit

	MKT	SMB	VMG	PMO	SMB*	VMG*	Trend
Panel A: Exclude stocks breaking price limit on the last day in the previous month							
Mean (%)	0.76	1.27***	1.01***	0.68***	1.27***	1.08***	1.48***
	(1.25)	(3.38)	(4.71)	(2.84)	(4.08)	(5.85)	(5.43)
Std. dev. (%)	7.72	5.30	3.40	3.35	4.17	2.89	3.69
Sharpe ratio	0.09	0.24	0.29	0.20	0.30	0.37	0.40
Skewness	-0.24	-0.09	0.18	-0.30	-0.07	-0.01	0.52
Panel B: Exclude stocks breaking price limit in the last week in the previous month							
Mean (%)	0.79	1.29***	0.95***	0.55**	1.32***	1.02***	1.33***
	(1.31)	(3.45)	(4.35)	(2.21)	(4.26)	(5.34)	(4.92)
Std. dev. (%)	7.71	5.25	3.37	3.31	4.14	2.91	3.62
Sharpe ratio	0.10	0.24	0.28	0.16	0.32	0.35	0.36
Skewness	-0.25	-0.17	0.12	-0.70	-0.07	-0.13	0.46
Panel C: Exclude stocks breaking price limit in the previous month							
Mean (%)	0.83	1.38***	0.88***	0.44*	1.42***	0.96***	1.23***
	(1.40)	(3.59)	(3.96)	(1.76)	(4.49)	(4.88)	(4.33)
Std. dev. (%)	7.57	5.30	3.44	3.28	4.12	2.95	3.65
Sharpe ratio	0.11	0.26	0.25	0.13	0.34	0.32	0.33
Skewness	-0.31	-0.19	0.24	-0.39	-0.10	-0.01	0.60

This table reports the summary statistics for the market (MKT), size (SMB), value (VMG) and turnover (PMO) factor in LSY-4 model, and our size (SMB*), value (VMG*) and trend (Trend) factor. We exclude stocks breaking the price limit rule in the previous month, namely the stocks with price movements within a day exceeding 10% in absolute value. Panel A reports the results for excluding stocks breaking the price limit on the last trading day of the previous month. Panel B reports the results for excluding stocks breaking the price limit in the last week of the previous month. Panel C reports the results for excluding stocks breaking the price limit in the previous month. The sample period is from January 2005 through December 2022.

Table B.14
Sub-period performance

	MKT	SMB	VMG	Trend	PMO
Panel A: Earlier and recent sample					
Earlier	0.92	1.43***	1.09***	1.82***	0.62*
	(0.90)	(3.26)	(4.08)	(4.98)	(1.74)
Recent	0.63	1.13**	1.09***	1.18***	0.80**
	(0.97)	(2.51)	(4.09)	(2.93)	(2.25)
Panel B: Financial crisis vs non-crisis period					
Crisis	-1.77	2.67**	1.03***	4.08***	1.54**
	(-0.51)	(2.62)	(3.23)	(3.98)	(2.77)
Non-crisis	1.02*	1.15***	1.09***	1.25***	0.63**
	(1.81)	(3.53)	(5.42)	(4.86)	(2.36)

This table reports sub-period performance for the factors in our-4 factor model and the PMO in LSY-4 model. Panel A reports the factor return in the earlier (2005:01-2013:12) and the recent (2014:01-2022:12) periods. Panel B reports the factor return in the crisis and non-crisis periods. The crisis period is from 2007:12 to 2009:06.

Table B.15
Transaction costs

	Turnover(%)	Break-even costs(%)	
	Mean	Zero return	5% Insignificant
Trend	125.76	1.19	0.77
PMO	99.05	0.73	0.22

This table reports the turnover rate and the break-even transaction costs (BETCs) of the trend factor (Trend) and of the turnover factor (PMO). *Zero return:* BETCs that would completely offset the returns; *5% Insignificant*: BETCs that make the returns insignificant at the 5% level. The sample period is from January 2005 through December 2022.

Table B.16
Performance after controlling for firm characteristics

	Low	2	3	4	High	High-Low
Panel A: Control for size						
Small	1.39*	2.79***	3.07***	3.64***	4.08***	2.69***
	(1.96)	(3.49)	(3.98)	(4.35)	(4.55)	(6.47)
2	0.41	1.76**	2.30***	2.51***	2.85***	2.44***
	(0.54)	(2.30)	(2.97)	(3.20)	(3.58)	(7.71)
3	0.44	1.36*	1.74**	2.07***	2.25***	1.80***
	(0.61)	(1.84)	(2.30)	(2.68)	(2.94)	(6.23)
4	0.54	1.20	1.35*	1.62**	1.83**	1.28***
	(0.73)	(1.64)	(1.86)	(2.20)	(2.47)	(3.65)
Big	0.43	0.81	1.23*	1.24**	1.21*	0.78
	(0.60)	(1.23)	(1.93)	(2.03)	(1.75)	(1.60)
Average over size	0.64	1.58**	1.94***	2.22***	2.44***	1.80***
	(0.94)	(2.24)	(2.75)	(3.05)	(3.24)	(5.78)
Panel B: Control for other variables						
Average over EP	0.37	0.90	1.23*	1.50**	1.70**	1.32***
	(0.55)	(1.34)	(1.86)	(2.19)	(2.37)	(3.43)
Average over BM	0.66	0.99	1.25*	1.52**	1.76**	1.10***
	(0.98)	(1.53)	(1.89)	(2.18)	(2.51)	(3.01)
Average over ROE	0.27	0.99	1.34**	1.53**	1.67**	1.40***
	(0.40)	(1.48)	(2.03)	(2.17)	(2.37)	(3.68)
Average over SUE	0.43	0.99	1.34**	1.51**	1.74**	1.30***
	(0.64)	(1.47)	(2.02)	(2.24)	(2.44)	(3.15)
Average over GPA	0.46	0.90	1.38**	1.55**	1.70**	1.23***
	(0.69)	(1.40)	(2.04)	(2.25)	(2.41)	(3.10)
Average over MOM	0.60	1.05	1.44**	1.55**	1.86***	1.25***
	(0.88)	(1.59)	(2.16)	(2.25)	(2.61)	(3.40)
Average over ILLIQ	0.82	1.57**	1.85***	1.99***	2.00***	1.17***
	(1.23)	(2.29)	(2.76)	(2.88)	(2.76)	(3.82)

This table reports the average monthly return of double sorting portfolios after controlling for various firm characteristics. Stocks are first sorted by one of the control variables into five quintile groups, and then in each quintile stocks are further sorted into five trend quintile portfolios. We then average the resulting 5×5 portfolios across the five quintiles of the control variable to form five new trend quintile portfolios. In Panel A, we report the results of the 5×5 portfolios and five new trend quintile portfolios after controlling for the market capitalization. In Panel B, we report the results of the new trend quintile portfolios after controlling for one of the firm characteristics. Newey-West (1987) adjusted t-statistics are reported in parentheses. The sample period is from January 2005 through December 2022.

Table B.17
Anomaly list

Panel A: Trading friction			
Size	Market equity, Banz (1981)	MDR	Maximum daily return, Bali, Cakici and Whitelaw (2011)
STD_RVOL	Standard deviation of RMB trading volume Chordia, Subrahmanyam, and Anshuman (2001)	Beta	Market beta, Fama and French (1992)
IE	Return asymmetry, Jiang, Wu, Zhou, and Zhu (2020)	IVOL	Idionsyncratic volatility, Ang, Hodrick, Xing, and Zhang (2006)
ILLIQ	Amihud illiquidity, Amihud (2002)	SKEW	Skewnss, Amaya, Christoffersen, Jacobs, and Vasquez (2015)
AbTurn	Abnormal Turnover, Liu, Stambaugh, and Yuan (2019)	ISKEW	Idiosyncratic skewness, Boyer, Mitton and Vorkink (2009)
Turn	Turnover, Datar, Naik and Radcliffe (1998)	COSKEW	Co-skewness, Harvey and Siddique (2000)
RVOL	RMB trading volume, Brennan, Chordia and Subrahmanyam (1998)	PR	Price, Miller and Scholes (1982)
SREV	Short-term reversal, Jagadeesh (1990)	DBeta	Downside beta, Ang, Chen and Xing (2006)
Panel B: Value			
EP	Earnings-to-price, Basu (1983)	DE	Debt-to-equity, Bhandari (1988)
BM	Book-to-market, Basu (1983)	$LREV_{1,60}$	Long-term reversal, DeBondt and Thaler (1985)
AM	Assets-to-market, Bhandari (1988)	$LREV_{12,60}$	Long-term reversal, DeBondt and Thaler (1985)
DM	Debt-to-market, Bhandari (1988)	$LREV_{24,60}$	Long-term reversal, DeBondt and Thaler (1985)
CP	Cash-flow-to-price, Lakonishok, Shleifer, and Vishny (1994)	$LREV_{36,60}$	Long-term reversal, DeBondt and Thaler (1985)
DP	Dividend yield, Litzenberger and Ramaswamy (1979)		

Panel C: Profitability

ROE	Return on equity,	CT	Capital turnover
	Haugen and Baker(1996)		Haugen and Baker(1996)
ROA	Return on assets,	PM	Profit margin
	Balakrishnan, Bartov, and Faurel (2010)		Soliman (2008)
OPE	Operating profits-to-equity,	NEI	Number of consecutive quaters with earnings increases
	Fama and French (2015)		Barth, Elliott, and Finn (1999)
OPA	Operating profits-to-assets,	GPA	Gross profits-to-assets
	Ball, Gerakos, Linnainmaa, and Nikolaev (2015)		Novy-Marx (2013)
BL	Book leverage,		
	Fama and French (1992)		

Panel D: Momentum

SUE	Standard unexpected earnings,	PM_{24}	Price momentum,
	Foster, Olsen, and Shevlin (1984)		Jagadeesh and Titman (1993)
RS	Revenue surprise,	RM_6	Residual momentum,
	Jegadeesh and Livnat (2006)		Blitz, Huij, and Martens (2011)
PM_3	Price momentum,	RM_{12}	Residual momentum,
	Jagadeesh and Titman (1993)		Blitz, Huij, and Martens (2011)
PM_6	Price momentum,	RM_{24}	Residual momentum,
	Jagadeesh and Titman (1993)		Blitz, Huij, and Martens (2011)
PM_9	Price momentum,	IM	Industry momentum,
	Jagadeesh and Titman (1993)		Moskowitz and Grinblatt (1999)
PM_{12}	Price momentum,	52-W	52-Week high
	Jagadeesh and Titman (1993)		George and Hwang (2004)
PM_{18}	Price momentum,	MCHG	Momentum Change
	Jagadeesh and Titman (1993)		Gettleman and Marks (2006)

Panel E: Investment			
AG	Asset growth,	IVG	Inventory growth,
	Cooper, Gulen, and Schill (2008)		Thomas and Zhang (2002)
NOA	Net operating assets	ACC	Accrual,
	Hirshleifer, Hou, Teoh, and Zhang (2004)		Sloan (1996)
IVCHG	Inventory change,	BVG	Book value growth,
	Thomas and Zhang (2002)		Richardson, Sloan, Soliman, and Tunna (2005)

Panel F: Intangible			
RDM	R&D to market equity,	OL	Operating leverage,
	Chan, Lakonishok, and Sougiannis (2001)		Novy-Marx (2011)
RDS	R&D to sales,	Age	Age,
	Chan, Lakonishok, and Sougiannis (2001)		Jiang, Lee, and Zhang (2015)

This table lists the 60 anomalies examined in the paper.

Table B.18
Insignificant anomalies: mean returns and CAPM alphas

Anomaly	Mean	Alpha	Anomaly	Mean	Alpha
BM	0.51	0.57	52-W	-0.20	0.00
	(1.03)	(1.18)		(-0.36)	(0.00)
AM	-0.13	-0.01	RM_{12}	-0.03	0.05
	(-0.27)	(-0.03)		(-0.08)	(0.12)
DM	-0.13	-0.01	RM_{24}	-0.06	-0.04
	(-0.27)	(-0.03)		(-0.18)	(-0.13)
DE	-0.25	-0.15	RS	0.29	0.37
	(-0.56)	(-0.35)		(1.11)	(1.44)
EP	0.31	0.49	ROA	0.51	0.65
	(0.73)	(1.24)		(1.20)	(1.63)
CF	-0.07	-0.01	GPA	0.52	0.65
	(-0.37)	(-0.07)		(1.24)	(1.57)
DP	0.23	0.20	OPE	0.38	0.53
	(0.94)	(0.90)		(0.93)	(1.32)
$LREV_{36,60}$	0.37	0.31	OPA	0.31	0.50
	(0.90)	(0.78)		(0.74)	(1.27)
AG	0.31	0.28	BL	-0.25	-0.14
	(0.94)	(0.85)		(-0.55)	(-0.34)
IVG	-0.32	-0.26	CT	0.26	0.13
	(-1.25)	(-1.08)		(0.85)	(0.49)
IVCHG	-0.33	-0.31	PM	0.15	0.35
	(-1.31)	(-1.29)		(0.33)	(0.85)
BVG	0.07	0.09	RDS	-0.40	-0.26
	(0.22)	(0.29)		(-1.11)	(-0.82)
ACC	-0.24	-0.24	OL	0.30	0.17
	(-1.11)	(-1.16)		(1.02)	(0.66)
NOA	0.27	0.33	Age	0.32	0.28
	(0.71)	(0.95)		(1.03)	(0.99)
PM_3	-0.00	-0.01	PR	0.35	0.18
	(-0.00)	(-0.03)		(0.91)	(0.54)
PM_6	-0.54	-0.45	DBeta	-0.12	-0.40
	(-1.16)	(-1.00)		(-0.25)	(-0.89)
PM_9	-0.26	-0.19	ISKEW	0.40	0.35
	(-0.54)	(-0.42)		(1.18)	(1.08)
PM_{12}	0.32	0.38	SKEW	0.53	0.52
	(0.67)	(0.82)		(1.57)	(1.61)
PM_{18}	0.29	0.35	COSKEW	0.03	0.03
	(0.60)	(0.77)		(0.09)	(0.08)
PM_{24}	-0.34	-0.37	IM	-0.04	-0.06
	(-0.79)	(-0.88)		(-0.12)	(-0.15)

This table reports the average monthly returns and alphas (%) under CAPM for the insignificant anomalies.
The sample period is from January 2005 through December 2022.

Table B.19
Factor performances in the global markets

	TrendPV	TrendP	TrendV	PMO
Panel A: Emerging markets				
China	1.50***	1.15***	0.76***	0.71***
	(5.47)	(3.93)	(3.10)	(2.83)
India	0.58**	0.60**	0.36*	-0.84***
	(2.19)	(2.10)	(1.65)	(-3.93)
South Korea	0.88***	0.90***	0.24	0.10
	(3.77)	(3.84)	(1.42)	(0.65)
Malaysia	1.46***	1.48***	0.41**	-0.85***
	(5.93)	(5.92)	(2.31)	(-5.20)
Thailand	0.58***	0.14	0.29*	-0.43***
	(2.65)	(0.47)	(1.91)	(-2.75)
Brazil	0.62*	0.38	0.65**	-0.57*
	(1.84)	(1.32)	(2.32)	(-1.72)
Philippine	1.54***	1.49***	0.21	-0.74***
	(4.51)	(4.61)	(0.74)	(-2.98)
Poland	1.79***	1.80***	0.52**	-0.62***
	(4.98)	(4.71)	(2.01)	(-2.70)
South Africa	1.71***	1.86***	0.96***	-0.82***
	(8.23)	(8.97)	(4.60)	(-3.75)
Indonesia	0.93***	0.92***	0.87***	-1.42***
	(3.66)	(2.99)	(3.80)	(-5.10)
Panel B: Developed markets				
US	0.69***	0.69***	-0.01	-0.25*
	(2.96)	(3.07)	(-0.08)	(-1.72)
Canada	0.76***	0.73***	-0.04	-0.36**
	(3.15)	(3.09)	(-0.25)	(-2.16)
France	0.66***	0.66***	0.29*	-0.12
	(4.00)	(4.22)	(1.81)	(-0.78)
Germany	0.89***	0.89***	-0.02	0.06
	(5.49)	(5.57)	(-0.20)	(0.52)
Italy	0.53**	0.85***	0.20	0.02
	(1.98)	(3.26)	(1.20)	(0.14)
Japan	0.48**	0.39*	0.08	-0.23*
	(2.43)	(1.68)	(0.49)	(-1.84)
UK	0.91***	0.69***	0.26	0.12
	(3.72)	(2.82)	(1.51)	(0.87)
Panel C: Average over markets				
Emerging: Return	1.16	1.07	0.53	-0.55
Emerging: t-stat	4.32	3.89	2.39	-2.47
Developed: Return	0.70	0.70	0.11	-0.11
Developed: t-stat	3.39	3.39	0.64	-0.71

This table reports the average monthly return for the three trend factors (TrendPV, TrendP, and TrendV) and the turnover factor (PMO) in each market. The sample period is from January 2005 through December 2022.

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