

Seasonal Effects, Trends and Pre-Announcement Drifts:

From Anomalies to Trades

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June 2, 2018

Seasonal Effects, Trends and Pre-Announcement Drifts: From Anomalies to Trades

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We revisit a series of popular anomalies: seasonal, announcement and momentum. We comment on statistical significance and persistence of these effects and propose useful investment strategies to incorporate this information. We investigate the creation of a seasonal anomaly and trend model composed of the Sell in May (*SIM*), Turn of the Month (*TOM*), Federal Open Market Committee pre-announcement drift (*FOMC*) and State Dependent Momentum (*SDM*). Using the total return S&P 500 dataset starting in 1975, we estimate the parameters of each model on a yearly basis based on an expanding window, and then proceed to form, in a walk forward manner, an optimized combination of the four models using a return to risk optimization procedure.

Anomalies

- ▶ Seasonal Effects
 - ▶ Turn of The Month (TOM)
 - ▶ Sell-in-May (SIM)
 - ▶ January Effect
 - ▶ Weekend Effect
- ▶ Announcement Drifts
 - ▶ Federal Open Market Committee (FOMC)
 - ▶ U.S. Macroeconomic Announcements
- ▶ Trend Models

Univariate Trading Strategies

- ▶ Annual Refits
- ▶ Walk-Forward Simulation
- ▶ Signal Bounds: 0% - 150% (unless noted otherwise)
- ▶ Objective Function: SR

Turn of The Month (TOM) Strategy

- ▶ Model Parameters:
 - ▶ Start Date, End Date
 - ▶ Binary Signal (0%/150%)

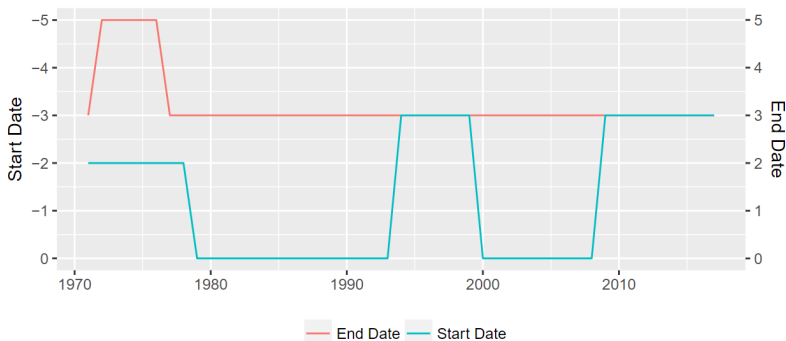


Figure 1: Evolution of the optimal start and end dates for the Turn of the Month Strategy. Start date shows how many days before the last trading day of the month we enter the market, and end date shows how many days after the beginning of the month we stay long.

Sell-in-May (SIM) Strategy

- ▶ Model Parameters:
 - ▶ Start Date, End Date
 - ▶ Binary Signal (0%/150%)

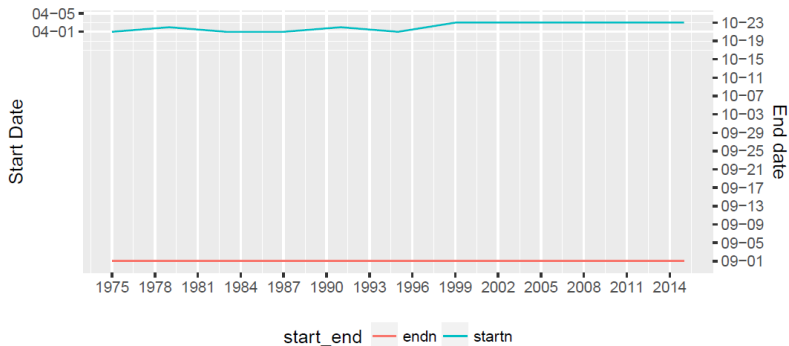


Figure 2: Evolution of the optimal start and end dates for the Sell-in-May Strategy. Start date shows the date when we sell our positions and exit the market, and end date shows the date we return.

- ▶ Model Parameters:
 - ▶ Binary Signal (0%/150%)

	SR_{FOMC}	$SR_{non-FOMC}$	$\bar{r}_{FOMC} - \bar{r}_{other} [\%]$
2pm S&P 500 Index	5.60	0.34	0.36
3pm S&P 500 Index	6.54	0.34	0.37
4pm S&P 500 Index	4.13	0.38	0.27
S&P 500 Index	4.11	0.34	0.27
1 day ahead S&P 500 Index	1.68	0.41	0.12
2-day S&P 500 Index	2.76	0.29	0.20

Table 1: FOMC pre-announcement drift effect 1994-2017. The first two columns compare Sharpe ratios of days with FOMC announcements (or the day before in case of "1-day ahead S&P 500 Index"), with other days. The third column shows the average daily return difference of these two sets. The first three rows assume entering a long position at at a specific time (all times are displayed in Eastern Time Zone), and selling 24 hours later. The fourth row shows trading results of a strategy that trades in the closing auction of the SPY ETF, and therefore we expect the results to be very similar to 4pm ET trading.

The one day ahead strategy (fifth row) tests entering a long position two days before the announcement and selling day before the announcement. 2-day S&P 500 Index strategy (sixth row) combines rows four and five.

State Dependent Momentum (SDM) Strategy

- ▶ Model Parameters:

- ▶ Continuous Signal: (-50%/150%)

- ▶ 2-State Predictive regression [Huang et al., 2017]:

$$r_{t+1} = \alpha + \beta_{good} \cdot I_{good,t} \cdot Z_t + \beta_{bad} \cdot (1 - I_{good,t}) \cdot Z_t + \epsilon_{t+1}$$

where I_{good} is the 200-day MA, z_t is a predictor of the market return.

Univariate Strategy Performance

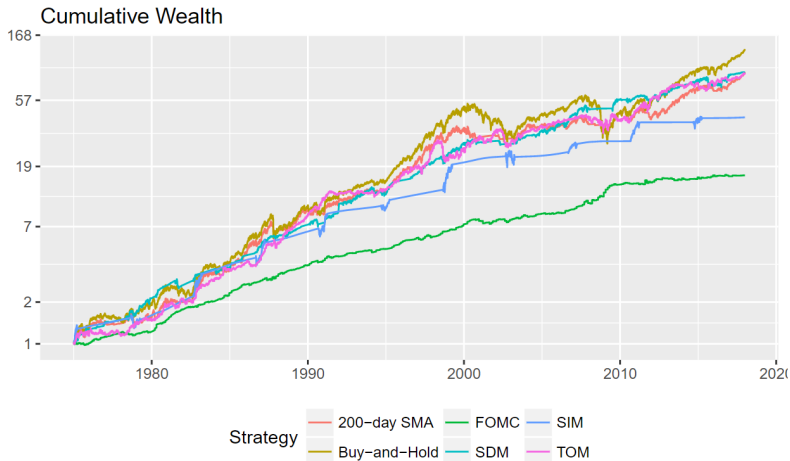


Figure 3: Wealth Accumulation of the Turn of the Month, Sell-in-May, FOMC, State Dependent Momentum and simple 200-day moving average strategies.

Univariate Strategy Performance

	TOM	SIM	SDM	FOMC	Buy-and-Hold
CAGR[%]	10.97	9.13	11.05	6.71	11.99
TotalReturn[%]	8724.03	4193.99	8984.29	1539.13	12 996.79
Volatility[% Ann.]	12.32	9.61	8.83	4.67	17.13
Sharpe	0.50	0.45	0.70	0.44	0.42
Return/Risk	0.89	0.95	1.25	1.44	0.70
maxDrawdown[%]	30.59	21.22	15.45	7.63	55.20
TimeUnderWater[days]	799	970	689	561	1805
CAPM[alpha][% Ann.]	3.84	2.99	3.76	1.74	
CAPM[beta]	0.34	0.21	0.32	0.05	

Table 2: Performance statistics of all univariate strategies, 1975 - 2017

Combining Anomalies

- ▶ Equal Weight
- ▶ Mean Variance Optimization [Markowitz, 1952]:

$$\begin{aligned} & \text{minimize } \frac{1}{2} w^T \Sigma w \\ & \text{subject to } m^T w \geq \mu_b, \text{ and } e^T w = 1 \end{aligned}$$

- ▶ Optimizing the Signal Combination

Optimal Weights: Mean Variance Optimization

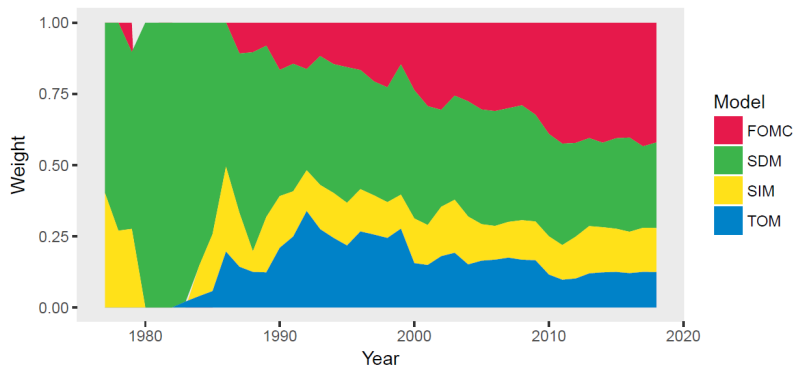


Figure 4: Evolution of the optimal weights when all four strategies are included with weights between 0% and 100%, with the sum of all weights set equal to 100%.

Optimal Weights: Signal Combination

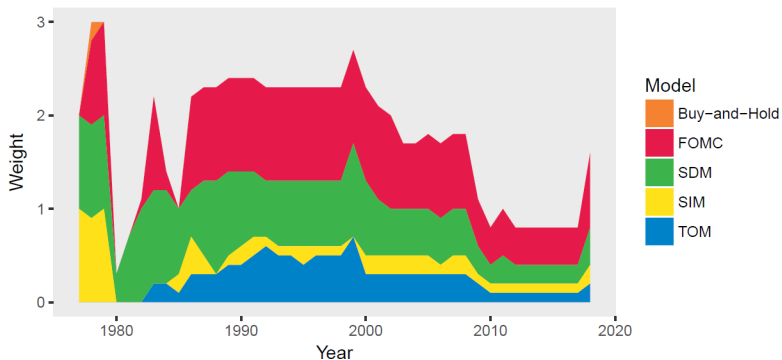


Figure 5: Evolution of the optimal weights of a grid search optimization procedure.

Combining Anomalies: Performance

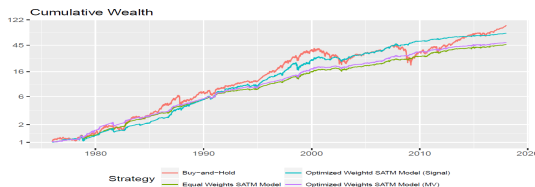


Figure 6: Simulated Performance of the four different anomaly combination strategies vs. Buy-and-Hold (1996-2017). Optimized Weights SATM Model (MV) stands for mean-variance optimized, and Optimized Weights SATM Model (Signal) denotes portfolio of walk forward optimized signals.

	Equal Weight	Optimized (MV)	Optimized (Signal)	Buy-and-Hold
CAGR[%]	9.76	9.75	10.71	11.49
TotalReturn[%]	5410.31	4898.67	7090.52	9590.86
Volatility[% Ann.]	5.82	6.20	8.83	17.17
Sharpe	0.85	0.81	0.67	0.39
Return/Risk	1.68	1.57	1.21	0.67
maxDrawdown[%]	12.63	14.38	25.75	55.20
TimeUnderWater[days]	360	362	760	1805
CAPM[alpha][% Ann.]	3.11	3.15	3.56	
CAPM[beta]	0.23	0.24	0.32	

Table 3: Performance statistics of all combined strategies, 1975-2017. Optimized (MV) stands for mean-variance optimized, and Optimized (Signal) denotes portfolio of walk forward optimized signals.

Combining Anomalies: Drawdowns

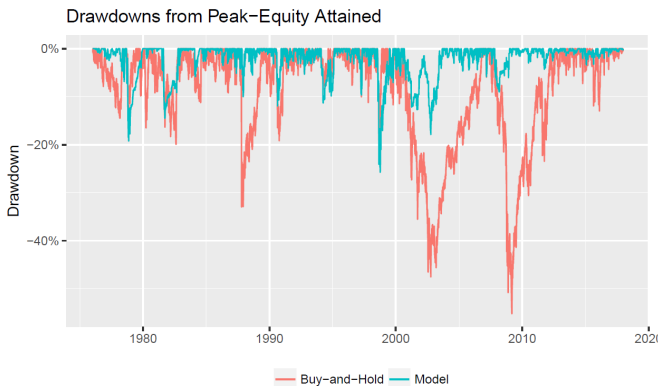


Figure 7: Drawdowns of the optimized portfolio of the four strategies vs. Buy-and-Hold, 1996-2017

Magnitude	Date
-25.75%	1998-07-21/1999-07-02
-19.25%	1978-09-13/1979-12-27
-17.89%	2000-09-05/2003-09-08
-14.50%	1981-08-12/1982-10-11
-11.96%	1990-07-05/1990-12-12

Table 4: Top 5 Drawdowns of the SATM strategy

Combining SATM Signals with ERP forecasts

- ▶ Why combine?
 - ▶ State-dependent performance
 - ▶ Alpha Decay
 - ▶ Difficult to identify a single best forecast
 - ▶ Successful examples
 - ▶ Economic forecasting: GDP, inflation, interest rates
 - ▶ Forex: currency market volatility and exchange rates
 - ▶ Other: Marketing (Netflix), Meteorological data, city populations, outcomes of football games, political risks...
- ▶ When to combine?
 - ▶ Individual forecasts are misspecified.
 - ▶ Unstable forecasting environment (unreliable past track record)
 - ▶ Short track record
- ▶ What to combine?
 - ▶ Forecasts using different information sets, including different horizons, for example 1 day, 1 week, 6 month etc.
 - ▶ Forecasts based on different modeling approaches (linear/nonlinear, directional/regression based).

Combining Anomalies: Performance



Figure 8: Wealth Accumulation of the Combined Strategy.

	SATM	6M	1M	(1M+6M)/2	(SATM + 1M + 6M)/2	Buy-and-Hold
CAGR[%]	6.60	11.80	17.81	15.14	18.03	10.30
TotalReturn[%]	156.66	417.20	1020.34	698.82	1051.38	324.27
Volatility[% Ann.]	4.92	11.15	16.21	11.69	13.26	18.16
Sharpe	1.09	0.94	1.02	1.18	1.26	0.50
Return/Risk	1.34	1.06	1.10	1.29	1.36	0.57
maxDrawdown[%]	5.17	20.15	20.04	14.33	14.71	55.20
TimeUnderWater[days]	312	368	428	329	327	1411
CAPM[alpha][% Ann.]	3.72	8.75	10.43	9.63	11.49	
CAPM[beta]	0.16	0.18	0.60	0.39	0.47	

Table 5: Performance statistics (2003-2016) for all strategies.

Market-Timing Ensemble: Drawdowns

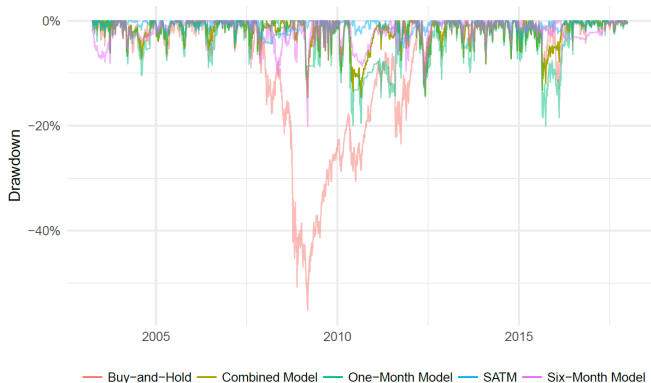


Figure 9: Drawdowns of all proposed strategies and their combination. 2003-2016.

Magnitude	Date
-14.71%	2009-02-10/2009-05-04
-14.66%	2010-04-26/2011-08-08
-14.22%	2012-04-03/2012-09-06
-13.22%	2015-05-22/2016-04-13
-9.82%	2010-01-15/2010-03-17

Table 6: Top 5 Drawdowns of the combined strategy.

Daily Report



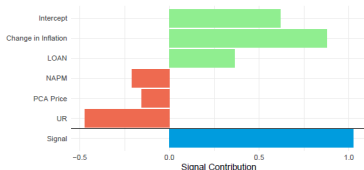
Daily Report Monthly Model

- ▶ Updated at 4:15pm ET
- ▶ Includes all published models
- ▶ [Latest report](#)

Model Description

The monthly model employs stepwise weighted least squares to find the most significant predictors from a group of 16 diverse variables. The current estimate uses 5 of the 15 variables. The regression finds the historical sensitivity (the regression coefficient) of the next month's excess return on the stock market to each variable. Each variable's forecast contribution is the product of its coefficient and value. The forecast is the sum of the forecast contributions. The forecast is adjusted by dividing by the root mean squared error of the regression (RMSE). A larger RMSE is accompanied by a smaller bet size, as a result. The RMSE adjusted forecast is multiplied by five to scale the bets to a range between 0% and 150%. If a scaled bet falls below 0%, the actual bet is set to 0%. Likewise, if a scaled bet exceeds 150%, the actual bet is set to 150%.

Monthly Model Indicators



	Coefficient	Value	ERP forecast contribution	Signal contribution
Intercept	0.49	1.00	0.49%	61.70%
Change in Inflation	0.52	1.35	0.70%	87.77%
LOAN	-0.39	-0.75	0.29%	36.31%
NAPM	0.53	-0.31	-0.17%	-20.74%
PCA Price	-0.70	0.18	-0.12%	-15.48%
UR	-0.47	0.80	-0.38%	-47.29%
Signal			0.82%	102.28%

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Final Thought

“Just as it was considered irresponsible to time the market in the last 30 years, it will be considered irresponsible NOT to time the market in the next 30 years.”

Blair Hull
CNBC Interview ¹

⁵<http://www.cnbc.com/2016/01/20/blair-hull-timing-the-market-turning-a-profit.html>

Acknowledgments

Many thanks to Alexander, Rick and Blair for their data, inputs, plots and thoughts.

References



Huang, D., Jiang, F., Tu, J., and Zhou, G. (2017).

Forecasting Stock Returns in Good and Bad Times: The Role of Market States.

[SSRN Scholarly Paper ID 2188989](#), Social Science Research Network, Rochester, NY.



Markowitz, H. (1952).

Portfolio selection.

The Journal of Finance, 7(1):77-91.

Thank You

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