How can outsiders benefit from the StarMine® insider filings model?

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Introduction

It is widely agreed that insiders – i.e., executives – reveal private information when they trade equity in their own firms. In this research note, we discuss how outside investors can use StarMine® Insider Filings and StarMine Price Momentum models by LSEG to interpret the "informativeness" of the insider trades and design profitable trading strategies.

Insider trading is highly regulated in the US. Since the enactment of the Sarbanes-Oxley Act (SOX) in 2002, insiders are required to report trades to the Securities and Exchange Commission (SEC) – electronically, via forms 3, 4, 5 and 144 – within two days and firms are required to post those filings on their website.

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In theory, an outsider can analyse the SEC filings (or website postings) to unravel the private information they reveal about these trades. But it is not an easy task: insider transaction data is highly complex. Transactions are categorised by insiders themselves according to a scheme incorporating 20 categories – and a significant fraction of insider trades are in non-common equity (preferred shares) and derivatives (options to purchase common stock).

The StarMine Insider Filings model (Insider) is a stock-ranking model for US equities that intelligently combines complex insider holdings and insider trading data to determine an insider's overall sentiment towards their company. Underlying the proprietary algorithm is the basic hypothesis that insider purchasing reflects bullish sentiment while insider selling reflects bearish sentiment. Details on the model can be found in Ref. [1].

The StarMine Price Momentum model (PriceMo) is a stock-ranking model that improves upon the standard momentum anomaly implementation by combining information from multiple dimensions of price momentum, from the negative autocorrelation in short-term returns to the positive autocorrelation in intermediate to long-term returns. It also incorporates information on industry-level price momentum and the degree of consistency, or volatility, in prior returns. Model details can be found in Ref. [2].

Insider informativeness

We consider insiders as value investors, wanting to buy their company's stock when they think it is cheap and sell it when they think it is overpriced. However, not all insider trades are informative. Executives may trade for other reasons as well – purchasing shares to meet their holding requirements and selling them to meet their liquidity needs and diversify their exposure to firm-specific risk.

Our research shows that combining insider sentiment with PriceMo signals can help us gauge the informativeness of the insider trades. Our hypothesis is that when insiders start buying a stock that has gone up in price it suggests a strong bullish insider sentiment. Conversely, when insiders begin selling a stock that has already dropped in price, it is reflective of a strong bearish insider sentiment. As stated in the original whitepaper, to keep each model unique and reduce correlation we do not include any price information in the insider model.

To test this hypothesis we performed bivariate (or double) sorting analysis, which is used to build and analyse portfolios based on two characteristics. StarMine provides model scores as ranks between 1 and 100 with 1 representing a bearish and 100 representing a bullish score. Table 1 shows the average annual excess return of 25 equal-sized portfolios (5x5 bivariate sorting using the Insider and PriceMo signals) created on the largest 3,000 US securities by market capitalisation over the period from January 2013 to December 2022. The excess return is calculated by subtracting the equal-weighted average annual universe return.

		StarMine Price Momentum				
		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
StarMine Insider Filings	Quintile 1	-3.00%	0.11%	2.38%	1.83%	5.20%
	Quintile 2	-1.45%	0.31%	3.71%	2.46%	2.46%
	Quintile 3	-0.07%	1.26%	1.75%	3.25%	0.57%
	Quintile 4	-4.31%	1.29%	4.20%	2.81%	2.79%
	Quintile 5	-2.21%	0.48%	3.17%	4.64%	7.82%

Table 1: Average annual excess-return of StarMine Insider Filings and Price Momentum signal based bivariate portfolios built on largest 3,000 US stocks over the period from January 2013 to December 2022. The portfolios are rebalanced monthly and each bin (portfolio) contains roughly 4% of the universe. Quintile 1 is most bearish, and Quintile 5 is most bullish.

It can be observed that the PriceMo signal provides a clear differentiation across the most bearish (Quintile 1) and the most bullish (Quintile 5) Insider quintiles. The differentiation is particularly strong and monotonic across Insider Quintile 5. A long portfolio constructed using the stocks in the bivariate bin Insider Quintile 5 and PriceMo Quintile 5 (which characterises strong insider buying of positive past winners) would have earned an impressive 7.8% average annual excess return over the 2013-2022 period. A univariate Quintile 5 portfolio (on the US top 3,000 universe) from Insider and PriceMo signals over the same period would have yielded 1.7% and 3.9% average annual excess return respectively. Also, it can be noted that shorting the stocks in the bivariate bin Insider Quintile 1 and PriceMo Quintile 1 (which characterises strong insider selling of negative past losers) would have generated an average annual excess return of 3.0%.

We now discuss two easy to implement approaches that can be used to construct informative insider portfolios.

1. Insider with PriceMo Blending: in this approach, first a blended score is calculated as:
    $$blended\_score = a \times Insider\_score + (1-a) \times PriceMo\_score,$$
    where a is a coefficient in the range [0,1] that controls the relative contribution from the two signals. Then top (bot) N securities are selected based on the blended_score to build the portfolio. The blending scheme requires a non-NULL value for the Insider score. When PriceMo score is not available for a security, it can be either excluded from the investible universe or assigned a score of "0" before blending.

2. Insider with PriceMo Screening: in this approach, the portfolio is built in three steps:
    a. Insider-based selection: select top (bot) N1 stocks based on the Insider score
    b. PriceMo-based screening: drop securities where PriceMo score is smaller (greater) than 50 or is not available
    c. Final selection: order the list obtained in the previous step by Insider and PriceMo scores simultaneously (multi-variable ordering with Insider being the first variable) and select top (bot) N stocks to build the portfolio
    N1 can be varied to build the desired size (N) portfolio.

Table 2 explains the mechanics of the two approaches to build a 5-security (N=5) portfolio.

Stock ID	Insider Score	PriceMo Score	Insider w PriceMo Blending		Insider w PriceMo Screening		
			blended_score (a=0.8)	Final Selection	Insider Selection (Step a)	PriceMo Screening (Step b)	Final Selection (Step c)
A	100	80	96	1	1	Include	1
B	100	48	89.6	3	2	Drop (PriceMo < 50)	x
C	100	Not-Available	Not-Available	x	3	Drop (Not-Available)	x
D	95	99	95.8	2	4	Include	2
E	90	55	83		5	Include	4
F	90	60	84	4	6	Include	3
G	85	80	84	5	7	Include	5
H	85	40	76		8	Drop	x
I	81	40	72.8		9	Drop	x
J	80	23	68.6		10	Drop	x

Table 2: Mechanics of the PriceMo Blending and the PriceMo Screening approaches to build informative insider portfolios.

PriceMo blending is the classic (linear) multi-factor approach that is used to design quantitative trading strategies (a=1 will result in a purely Insider-signal based portfolio). In PriceMo screening, we are screening out the securities from the top (bot) Insider portfolio whose insider sentiment is misaligned with the PriceMo signal. It is interesting to note that in PriceMo screening, a security with an Insider score of 100 and PriceMo score of 80 will always get a higher relative rank than a security with an Insider score of 95 and PriceMo score of 99 in the final selection. However, in PriceMo blending, depending on the magnitude of the coefficient a, the latter security might get a higher relative rank than the former in the final selection.

We also want to highlight that no tie-breaking rules are used in either approach. In case of a tie between two securities, either both the securities are selected or any one is selected at random in the final selection. Barring such minor differences, we expect the two approaches to produce highly correlated portfolios (holdings). They are considered to test the sensitivity of the portfolio performance to minor perturbations in the holding.

Informative insider portfolios

Figures 1 and 2 show the cumulative return of 50 stock (N=50) PriceMo blended and PriceMo screened insider informative portfolios constructed over a representative large-cap and small-cap US equity universe, respectively. The large-cap universe is constructed using the largest 1,000 securities by market capitalisation and the small-cap universe is constructed by selecting the smallest 2,000 securities from the largest 3,000 securities. The portfolios are rebalanced monthly and their performance is compared against an equal-weighted market portfolio over the January 2013 to December 2022 period. We chose a = 0.8 (20% PriceMo blending) to build PriceMo blended portfolios. When the PriceMo score is not available, the security is dropped from the final selection in both approaches. Performance statistics are reported in Table 3.
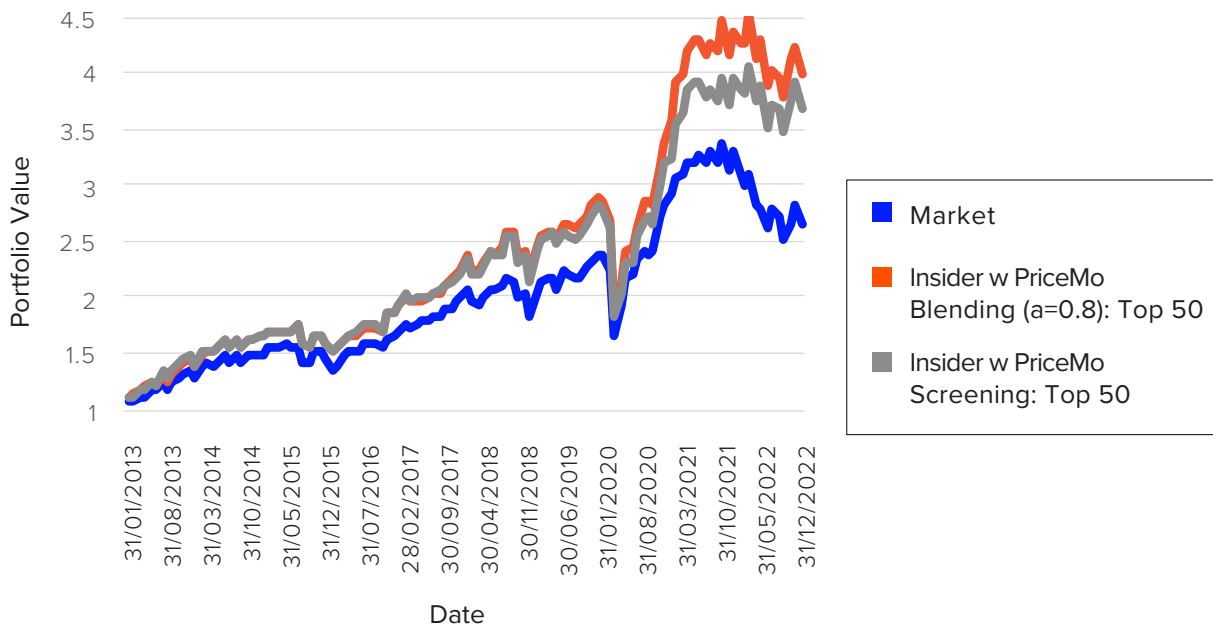
Cumulative return: US top 1,000

Figure 1: Cumulative return of 50 stock PriceMo blended and PriceMo screened informative insider portfolios over a representative large-cap US equity universe.

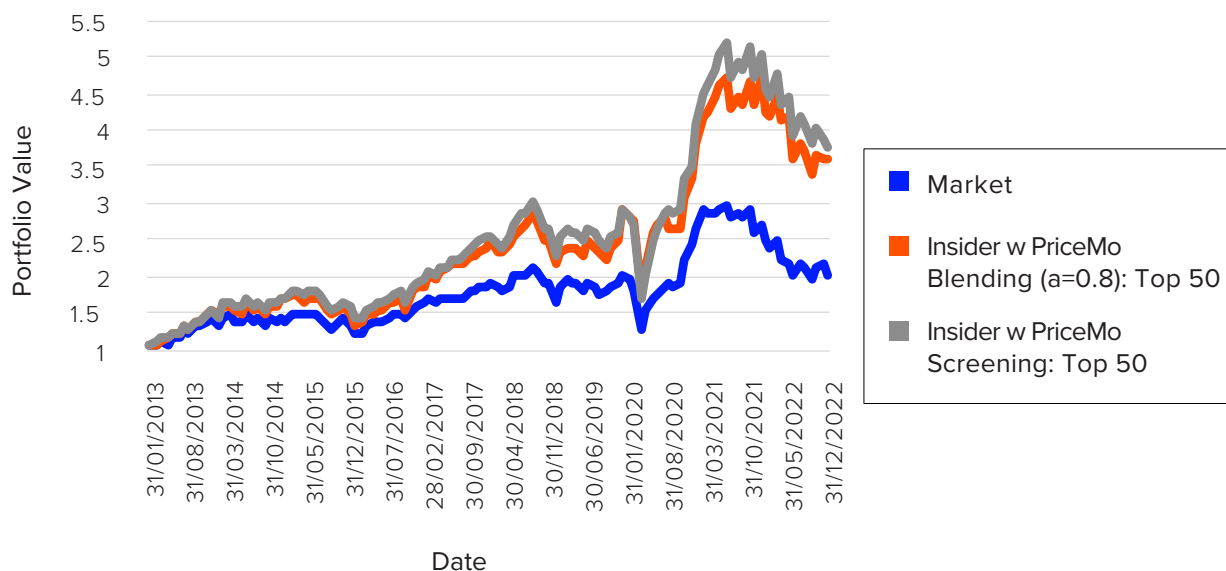Cumulative return: US smallest 2,000 (from largest 3,000)

Figure 2: Cumulative return 50 stock PriceMo blended and PriceMo screened informative insider portfolios over a representative small-cap US equity universe.

Jan-2013 to Dec-2022	Portfolio	Average Annual Return (%)	Sharpe	Turnover (%)
US: Largest 1000	Market	11.58%	0.67	-
	Insider w PriceMo Blending (a=0.8): Top 50	15.93%	0.94	384%
	Insider w PriceMo Screening: Top 50	14.93%	0.90	396%
US: Smallest 2000 (from largest 3000)	Market	9.04%	0.46	-
	Insider w PriceMo Blending (a=0.8): Top 50	16.20%	0.66	504%
	Insider w PriceMo Screening: Top 50	16.69%	0.68	468%

Table 3: Performance statistics of monthly rebalanced PriceMo blended and PriceMo screened informative insider portfolios.

It can be observed that in both the large-cap and small-cap universes, informative insider portfolios consistently outperformed the equal-weighted market portfolios from 2013-2022. We also tested the sensitivity of the performance to the size (N) of the portfolio by constructing top 25, 50 and 100 informative insider stock portfolios. In each case, the performance of the PriceMo blended and the PriceMo screened portfolio were statistically indistinguishable from each other and both portfolios were found to outperform the respective equal-weighted market portfolios. The biggest impact of portfolio size was observed on the portfolio turnover, where increasing the portfolio size resulted in a relatively small overall turnover.

Conclusion

We have discussed how the StarMine Insider Filings and Price Momentum models can be used to unravel insiders' private information and build profitable trading strategies. We discussed two easy-to-implement approaches that can be used to build informative insider portfolios. The informative insider portfolios were found to outperform the equal-weighted market portfolios created on a representative large-cap and small-cap US equity universe over the 2013-2022 period.

Both StarMine Insider and Price Momentum models are available as a daily data feed and as a referential tool in LSEG Workspace. Historical daily and monthly frequency testing files are also available for those who wish to design and test the trading strategies

References

1   Genin, H., Roser, R., Stauth, J., Bonne, G., Jacobek, L. and Malinak, S., 2013, How Insider behavior can predict future stock performance even post-SOX. StarMine Insider Filings Model US, StarMine white paper.

2   Bonne, G., Erickson, I. and Jacobek, L., 2009c, StarMine Price Momentum Model (PriceMo): Overview and Global Performance, StarMine white paper

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Tarun Sanghi is a Senior Quant Researcher at StarMine. His work involves application of his computational and statistical expertise to develop data-driven quantitative models for stock-selection, risk estimation, and portfolio optimization.

Prior to joining StarMine, Tarun was a Research Analyst (2019-2020) at an Asian and Emerging Market focused hedge fund, and a Quantitative Strategist (2015-2019) at a U.S-equity focused hedge fund. There he performed factor research and developed computational tools to build interpretable non-linear stock-selection and risk estimation factor models. He also developed an investment propensity model to capture the behavioural biases of retail investors.

Tarun received his B.S. in Physics from BITS Pilani, India, in 2005, an M.S. in Mechanical Science and Engineering from University of Illinois at Urbana-champaign (UIUC), USA, in 2009, and a Ph.D. degree in Mechanical Science and Engineering from UIUC, USA, in 2015. Tarun was awarded the Chartered Financial Analyst (CFA) designation in 2022.

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