

Short-term trading strategy using filtered share buyback signal

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1. Introduction

Share buyback, which refers to a company's repurchase of its own stocks that have previously been sold to the market, is known to be one of the indicators that could be used by the inside managers to signal to the public that the company's share is undervalued and therefore induce confidence that encourages people to buy. Compared to other indicators, share buyback signal seems to be a more straightforward guide for trading decisions. As such, some traders rely on the signal as a prompt to make their decision to buy. It is largely agreeable that should the stock be held for long-term trading, the price would eventually appreciate. Nevertheless, the optimal selling time is not as clear cut should a short-term strategy be adopted. Therefore, in response to this niche, this report shall explore share buyback as a signal in short-term trading within 14 days and how its holding period could be optimised to maximise profit.

2. Methodology

2.1 Approach

The strategy shall be tested with regards to the Standard and Poor's (S&P) 500 Companies due to their relatively accessible and comprehensive data, as well as the availability of benchmark, to account for market trends, which is the index itself. This is especially crucial to avoid the false premise that changes in the price of the stock may be a result of the whole market movement as opposed to the share buyback effect, which is why the profit obtained is subtracted with the S&P 500 Index during the same period using this formula:

$$\% \text{ Benchmarked Profit} = \% \text{ Profit of Stock} - \% \text{ Benchmark of S\&P 500 Index}$$

whereby % Profit refers to the change in price if sold in Day X over the initial price paid and % Benchmark denotes the change in S&P 500 index in the same period divided by its starting price. For instance, the day when buyback is issued, Stock Y has a closing price of \$5.00, then after 1 day the price increases to \$5.15. During the same period, the S&P 500 Index rises from \$4.00 to \$4.01. As such the % Benchmarked Profit can be calculated as follows:

$$(5.15 - 5.00)/5.00 - (4.01 - 4.00)/4.00 * 100 = 2.75\%$$

Additionally, backtesting of the strategy is assisted by the stock analysis software, Stoxy, which is provided by Dr. David Rossiter. In particular, using the Events feature whereby certain happenings around the company such as share buyback may be included in the graph of its historical data. This program is complemented with the existing data crunching and visualisation packages such as Pandas, Matplotlib, and Seaborn to perform analysis.

2.2 Data Collection & Cleaning

Relevant data that need to be collected include dates of share buyback issuance and the amount as a percentage to the outstanding shares, for each of the company, and these were gathered from the Bloomberg terminal to ensure its reliability. After conducting minor cleaning of the data including date and number formats, not all companies that have issued buybacks will be tested upon. To allow more focused and credible analysis to be carried out, there are two criteria that need to be considered:

- The number of shares buyback that has been issued, as this indicates the potential frequency of buybacks in the near future. Thus, a company must have issued at least 10 buybacks.
- The amount of shares that has been bought back is relevant because the company must issue enough share buyback to induce the confidence in traders. Hence, a company must have bought back at least 50% of its outstanding shares.

Proceeding with these constraints, the resulting dataset contains 30 companies (Appendix A) and for each, two .csv files are required to be fed into Stoxy:

- historical data containing daily prices obtained from Yahoo finance under Stocks directory
- the dates of buyback generated by a Python script under Events directory

To aid analysis, each available stock is classified according to the sector that the company is in, as the nature of business may usually affect the behaviour of the stock price of the company. Of the 30 companies, there are 5 sectors including: Information Technology, Health Care, Consumer Discretionary, Financials, and Industrials — obtained from S&P classification.

2.3 Implementation

The backtesting function within Stoxy is illustrated by the following flowchart:

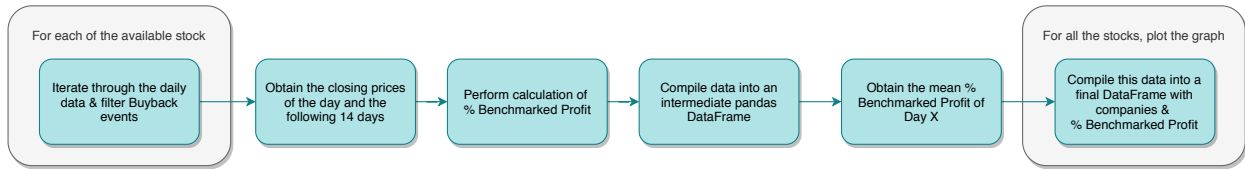


FIG 1. BACKTESTING FUNCTION FLOWCHART

2.4 Data Interpretation

All obtained data is presented in violin plots. The coloured part of the plot represents the overall distribution of the data. A minor disclaimer that colour only serves as a visual aid, and therefore does not contain any significant statistical meaning. The box-and-whiskers plot within show the 50% of the most commonly occurring data, with the whit dot being the median, the box as the Interquartile Range, and the whiskers as the 1.5x Interquartile Range. The statistical validity of the sector plots that come in the next section is to be taken with a pinch of salt as heavy filtering was used to sieve out the companies that frequently bought stocks and do so in large amount. The table below summaries how many companies there are for each of the sector. Also, the first holding day result may not be a good estimate as data regarding the timing of the buyback announcement could not be obtained.

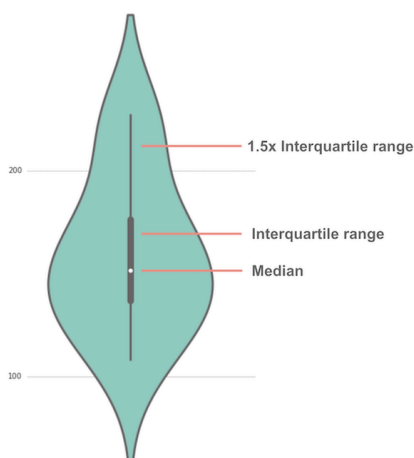


FIG 2. THE ANATOMY OF A VIOLIN PLOT, MODE.COM

Sectors	Number of Companies
Information Technology	9
Health Care	5
Consumer Discretionary	7
Financials	2
Industrials	6

3. Results

The results, attached in Appendix B, of the model is summarised by the following violin plots.

A. Master Plot

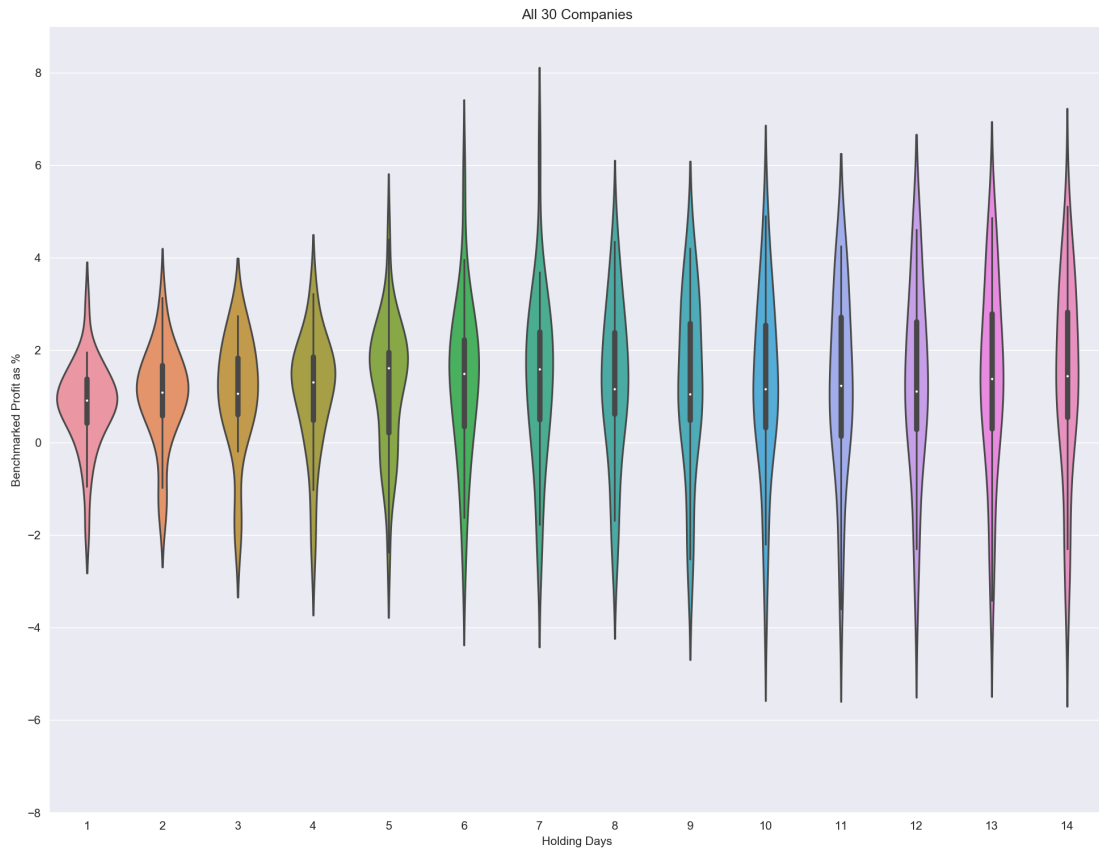


FIG 3. % BENCHMARKED PROFIT FOR ALL 30 COMPANIES

The overall results for all 30 companies show that the most ideal holding period is 5 or 7 days with a median benchmarked profit of 1.6%. Throughout the 14 days, the benchmarked profit remain positive, and therefore an indication of continual purchase of stock by other traders, regardless of market trend which is subtracted by the S&P 500 Index. The distribution becomes flatter in about 1 week after the issuance of the share buyback.

B. Sector Plots

- Information Technology

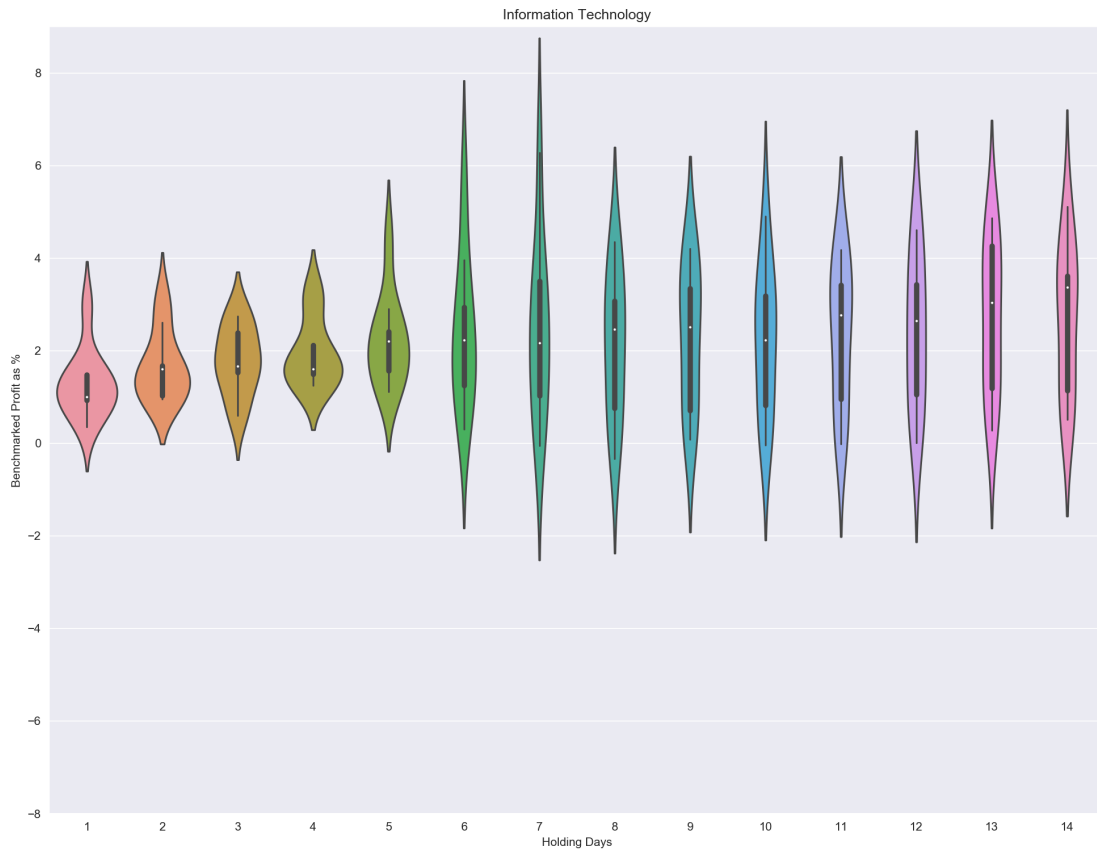


FIG 4. % BENCHMARKED PROFIT FOR COMPANIES IN INFORMATION TECHNOLOGY

For companies in the Information Technology sector, the most ideal holding period is 14 days with a median benchmarked profit of 3.0%. In the 14 days, the benchmarked profit remain positive throughout, and there is a slight indication of increasing trend, which could be tested further with a duration of 30 or 60 days. In terms of distribution, the effect of share buyback is most obvious if stock is resold within Day 1 to Day 5 of holding period, as the distribution from Day 6 tapers off to become more spread out.

- Health Care

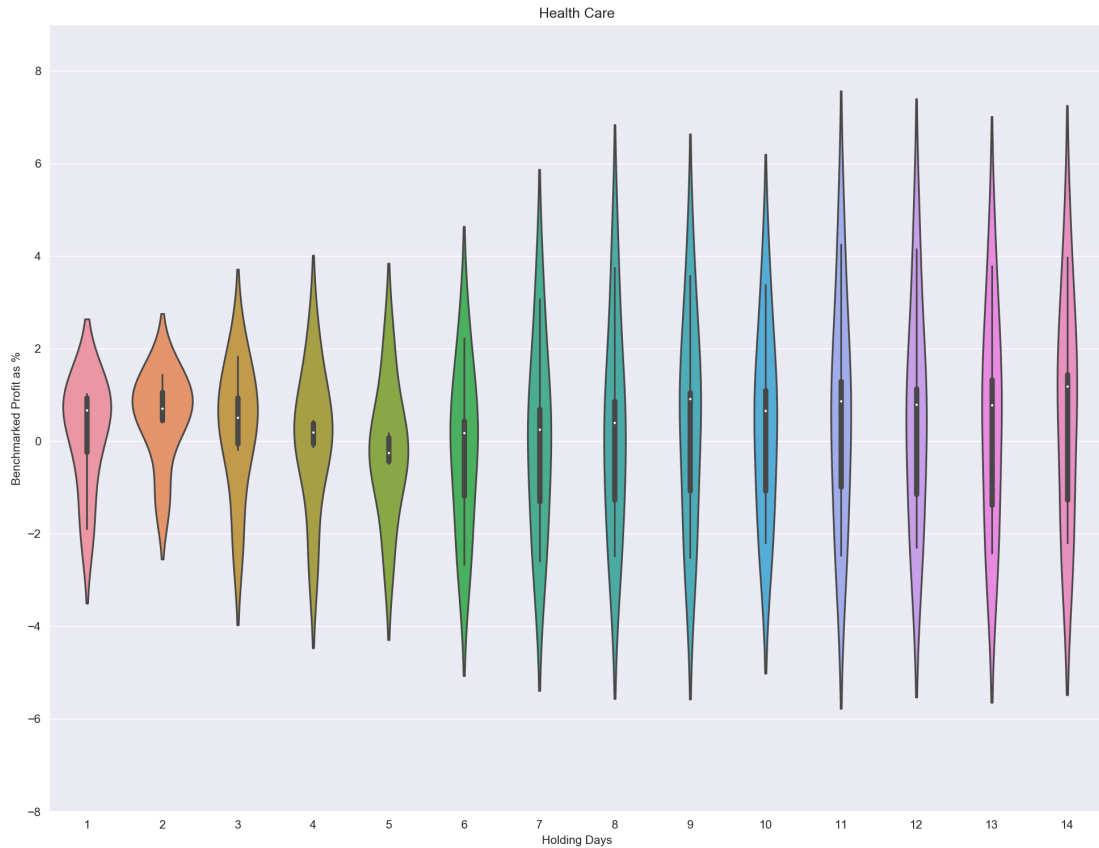


FIG 5. % BENCHMARKED PROFIT FOR COMPANIES IN HEALTH CARE

The results for companies operating within the Health Care Industry show that the most ideal holding period is 14 days with a median benchmarked profit of 1.2%. In the 14 days, the median benchmarked profit mostly remains positive, except for Day 5, whereby it shows a loss of 0.3%. Should the dataset be larger, i.e. more companies in the Health Care sector, this could be further examined.

- Consumer Discretionary

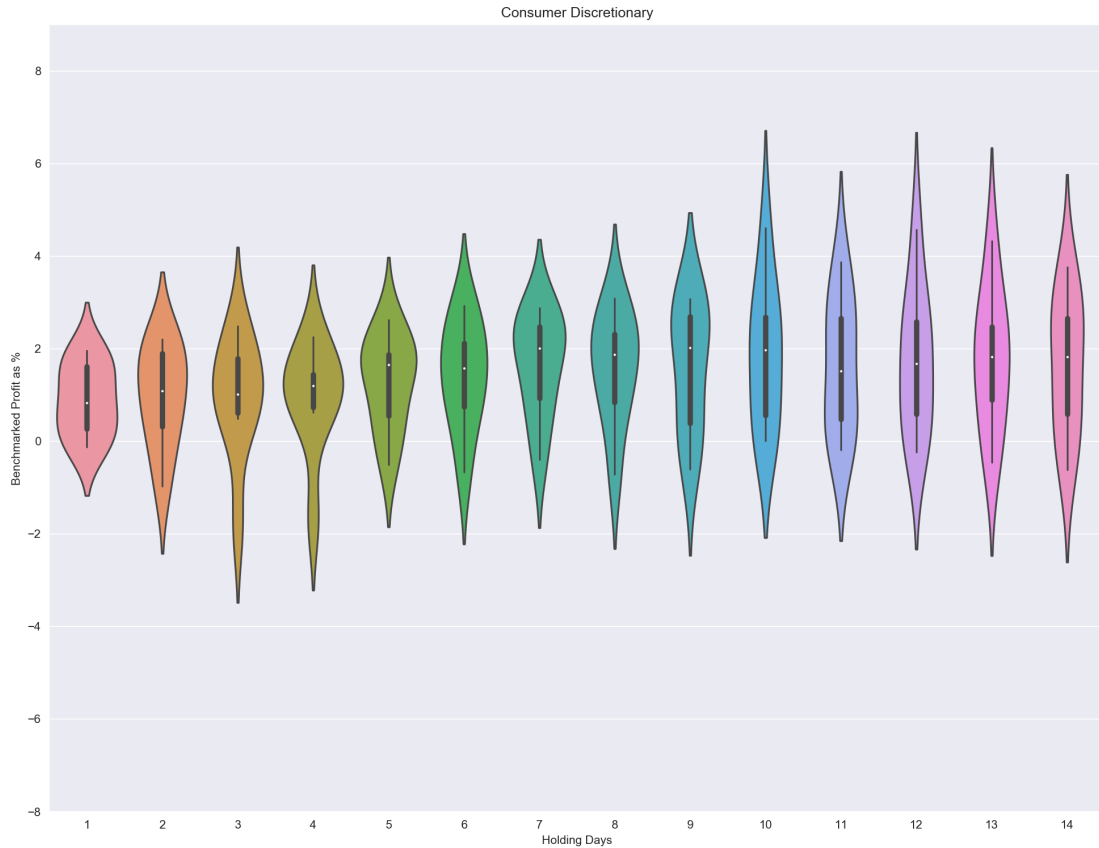


FIG 6. % BENCHMARKED PROFIT FOR COMPANIES IN CONSUMER DISCRETIONARY

The Consumer Discretionary companies show that the most ideal holding period is 7, 9 or 10 days with a median benchmarked profit of 2.0%. In the 14 days, the median benchmarked profit remains positive, with a slight dip in Day 11 showing a median benchmark of 1.5%. The distribution is less tapered off compared with other sectors which may be due to the nature of the industry.

- Financials

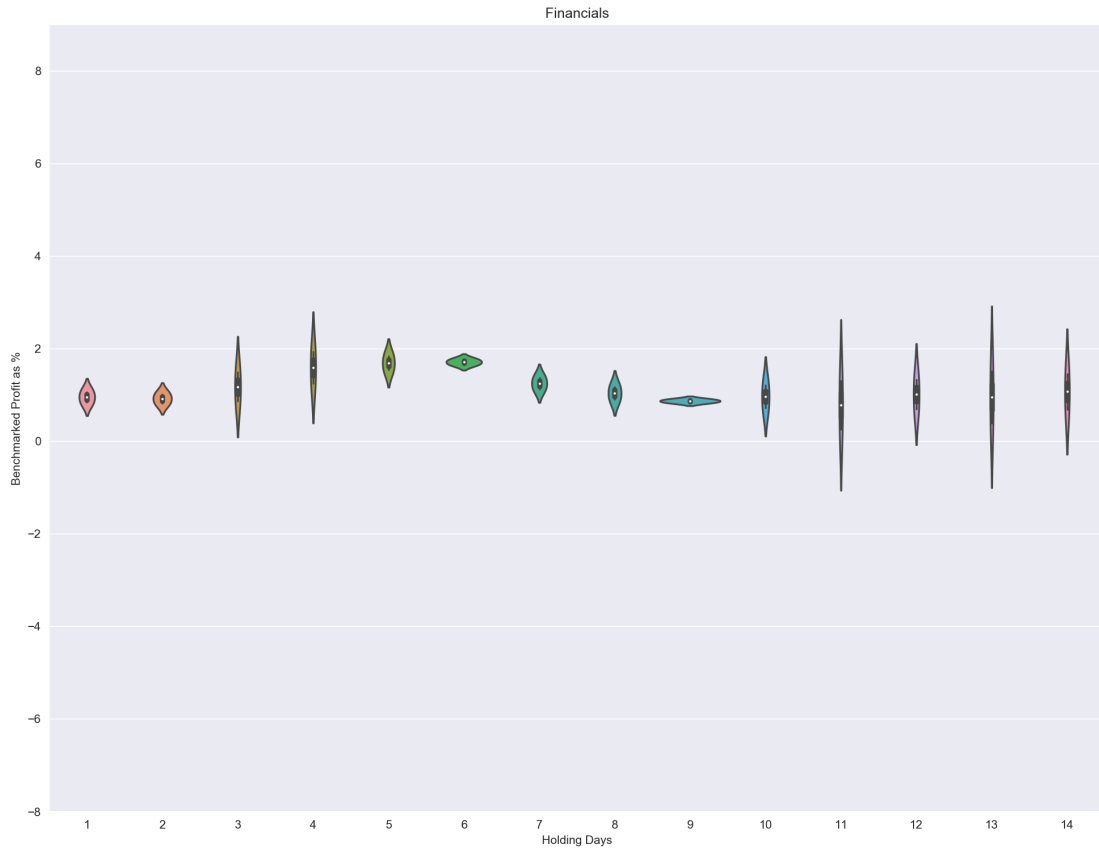


FIG 7. % BENCHMARKED PROFIT FOR COMPANIES IN FINANCIALS

For companies in the Financials sector, the most ideal holding period is 6 days with a median benchmarked profit of 1.8%. In the 14 days, the benchmarked profit remain positive throughout, In terms of distribution, data is slightly different from the rest as they come only from 2 companies, as such this finding is perhaps the most statistically insignificant.

- Industrials

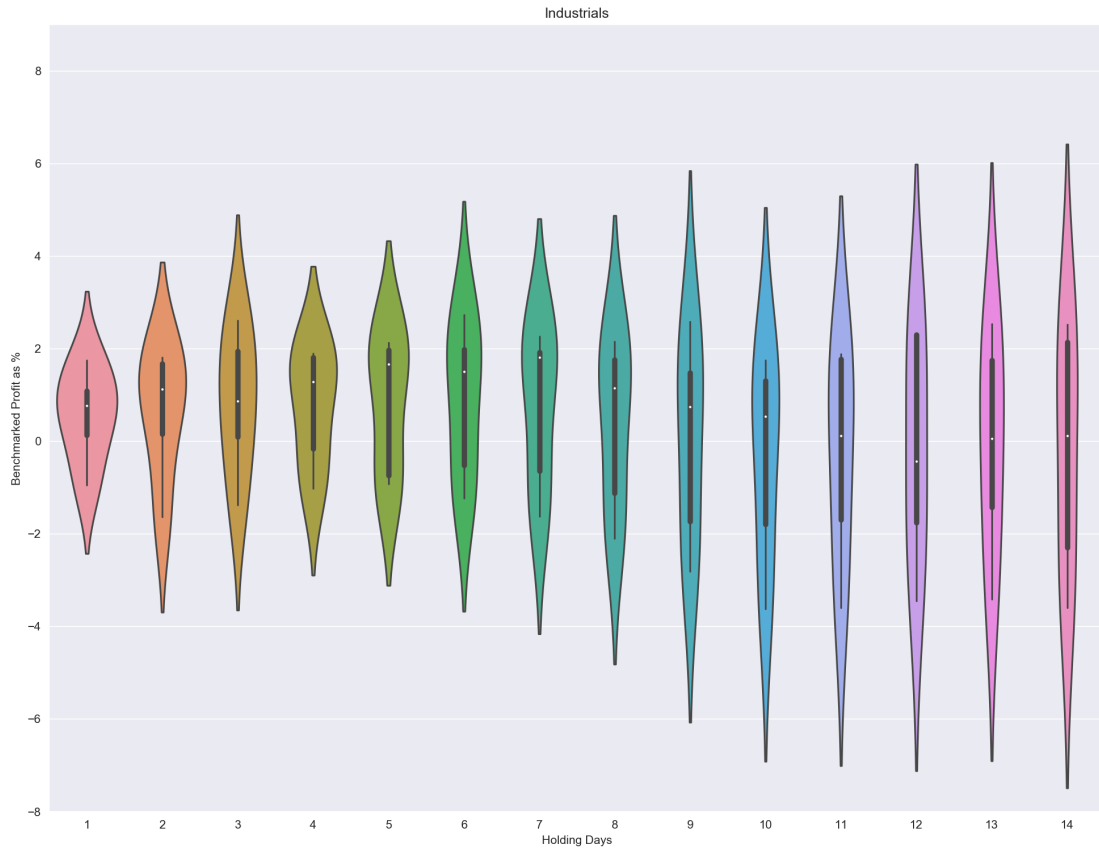


FIG 8. % BENCHMARKED PROFIT FOR COMPANIES IN INDUSTRIALS

The results of companies in the Industrials sector show that the most ideal holding period is 7 days with a median benchmarked profit of 1.7%. In the 14 days, the benchmarked profit remain positive mostly, despite showing a loss of 0.5% in Day 12. In terms of distribution, the spread slowly tapers off but has no significant holding period in which it drastically changes.

4. Analysis

The overall trend of the violin plots show that as holding days increase, the distribution of the benchmarked profit becomes more normalised and spread out. This denotes the lessening effect of the share buyback announcement towards the stock price of companies in general. The mean optimal holding days to maximise the % Benchmarked Profit is shown by the following table:

	Holding Period (in Days)	Benchmarked Profit (in %)
All 30 Companies	5 or 7	1.6
Information Technology	14	3.0
Health Care	14	1.2
Consumer Discretionary	7, 9 or 10	2.0
Financials	6	1.8
Industrials	7	1.7

To be used as a stock trading strategy, traders may resort to either pick the stocks which are discussed in this study, or extend the model further by backtesting stocks that fit into the constraints of the filter.

5. Conclusion, Limitation, and Extension

The shares buyback initiative by the company could be correlated positively with the increase in its stock price. This effect is more pronounced in some sectors than others including Consumer Discretionary and Financials within 7 days, and Information Technology within 14 Days. Perhaps, the most major limitation and possible extension of this study is the unavailability of intraday trading data and the time of the share buyback issuance, which could provide a more comprehensive insight should they be examined. In addition, to ensure that this signalling could be used as a trading strategy that is timely, it must be complemented with the ability to include real time data in the analysis and alerting trader of the news of shares buyback as soon as it is announced. The benchmarking could be made better in a further study whereby, the relevant sector indexes could be subtracted instead of the S&P 500 index. For instance NASDAQ can be subtracted for companies in the Information Technology Sector. Nevertheless, this may need more caution as for industries with minimal players, the market trends may reflect too closely to the companies index.

6. Appendix

A. Stock List

Ticker	Company	Sector
V	Visa Inc.	Information Technology
WU	Western Union Company	Information Technology
VRSN	VeriSign Inc.	Information Technology
IBM	International Business Machines	Information Technology
FFIV	F5 Networks Inc.	Information Technology
QCOM	QUALCOMM Incorporated	Information Technology
ADS	Alliance Data Systems Corp.	Information Technology
MA	Mastercard Inc.	Information Technology
LRCX	Lam Research Corporation	Information Technology
NOC	Northrop Grumman Corp.	Industrials
MMM	3M Company	Industrials
ROK	Rockwell Automation Inc.	Industrials
CSX	CSX Corporation	Industrials
LMT	Lockheed Martin Corp.	Industrials
LH	Laboratory Corporation of America	Health Care
CELG	Celgene Corporation	Health Care
ABC	Amerisourcebergen Corp.	Health Care
MCK	McKesson Corp.	Health Care
ANTM	Anthem Inc.	Health Care
WAT	Waters Corp.	Health Care
AIZ	Assurant Inc.	Financials
ALL	Allstate Corp.	Financials
LOW	Lowe's Companies	Consumer Discretionary
RL	Ralph Lauren Corp.	Consumer Discretionary
CMG	Chipotle Mexican Grill	Consumer Discretionary
HD	Home Depot	Consumer Discretionary
AZO	Autozone	Consumer Discretionary
ORLY	O'Reilly Automotive Inc.	Consumer Discretionary
YUM	Yum! Brands	Consumer Discretionary
JWN	Nordstrom	Consumer Discretionary

B. Master Data of Tickers % Benchmarked Profit

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14
ABC	0.62	0.92	0.64	0.215	-0.3	0.23	0.45	0.88	0.8	1.055	1.34	1.05	1.175	1.43
ADS	0.347	0.959	0.6	1.347	1.571	1.1	0.653	0.571	0.712	0.547	0.959	1.053	1.106	0.741
AIZ	1.07	1.02	1.49	1.94	1.84	1.66	1.37	1.18	0.84	0.72	0.25	0.7	0.39	0.68
ALL	0.838	0.823	0.862	1.246	1.538	1.762	1.131	0.9	0.9	1.215	1.315	1.331	1.523	1.462
ANTM	1.011	1.439	1.839	2.006	1.922	2.233	3.072	3.756	3.578	3.383	4.256	4.161	3.789	3.972
AZO	0.354	0.429	0.646	0.764	0.339	0.504	0.686	0.779	0.293	0.021	-0.193	-0.239	-0.457	-0.611
CELG	1.027	1.118	1.045	0.445	-0.482	-1.618	-1.764	-1.682	-1.691	-1.509	-1.509	-1.7	-1.964	-2
CMG	0.894	1.061	0.944	1.217	1.867	1.35	1.85	1.989	3.078	2.917	2.956	2.561	2.333	2.461
CSX	-0.942	-1.633	-1.375	-1.017	-0.917	-1.225	-1.617	-2.1	-2.808	-3.617	-3.6	-3.45	-3.417	-3.592
FFIV	2.975	3.142	2.742	3.117	4.4	5.7	6.283	4.35	4.2	3.067	3.425	4.608	3.2	3.375
HD	0.761	1.106	1.089	1.339	1.883	1.95	2.161	2.206	2.578	2.6	2.561	2.639	2.878	2.578
IBM	0.93	1.261	0.874	1.243	1.109	1.243	1.022	0.757	0.687	0.817	0.53	0.626	1.191	1.139
JWN	1.638	2.2	1.777	1.762	2.623	2.931	2.546	2.623	3.069	4.615	3.869	4.577	4.323	3.762
LH	0.721	0.5	0.386	0.164	0.179	0.514	0.779	0.836	1.036	1.114	0.579	0.55	0.386	0.95
LMT	0.133	0.16	0.1	-0.167	-0.733	-0.52	-0.64	-1.113	-1.733	-1.793	-1.693	-1.76	-1.427	-2.3
LOW	-0.131	-0.969	-1.785	-1.669	-0.5	-0.669	-0.392	-0.715	-0.608	0.015	0.046	0.2	0.208	0.108
LRCX	1	1.658	1.65	1.875	2.342	2.483	2.167	2.458	3.342	3.475	3.058	2.767	4.292	4.05
MA	1.475	2.608	2.392	2.117	2.2	2.942	3.692	2.658	3.208	2.233	2.767	2.65	3.033	3.392
MCK	-1.888	-1.231	-2.094	-2.456	-2.369	-2.662	-2.588	-2.481	-2.512	-2.2	-2.463	-2.294	-2.419	-2.2
MMM	1.09	1.68	1.95	1.9	1.67	1.5	1.81	2.16	2.58	1.75	1.89	2.3	2.53	2.52
NOC	1.754	1.808	2.615	1.815	2.131	1.985	1.923	1.762	1.477	1.308	1.777	2.315	1.754	2.146
ORLY	1.958	1.842	2.492	2.258	1.825	2.608	2.883	3.083	2.383	2.408	2.183	2.283	2.292	2.908
QCOM	0.877	0.992	1.892	1.554	1.685	0.3	-0.054	-0.331	0.077	-0.038	-0.015	0.008	0.277	0.508
RL	1.608	2.05	1.825	1.175	1.483	1.808	2.45	1.767	1.658	1.542	0.85	0.708	1.367	0.742
ROK	0.769	1.123	0.862	1.285	1.969	2.731	2.262	1.146	0.746	0.538	0.115	-0.431	0.054	0.123
V	1.476	1.676	1.665	1.488	1.359	1.494	1.935	1.629	1.888	1.982	2.041	1.635	1.835	2.059
VRSN	0.933	1.608	1.533	1.6	2.417	3.958	3.508	3.95	4.15	4.9	4.183	4.558	4.867	5.117
WAT	-0.52	0.43	-0.19	-0.12	-0.19	0.14	0.07	-0.02	1.06	0.26	1.16	1.16	1.39	1.45
WU	1.513	1.025	2.675	3.225	2.9	2.225	2.8	3.075	2.512	3.188	4.15	3.437	4.262	3.613
YUM	-0.009	-0.032	0.491	0.618	0.618	0.832	1.014	0.859	0.414	0.745	0.614	1.068	1.114	1.191

C. Sector Data of Tickers % Benchmarked Profit

Information Technology

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14
ADS	0.347	0.959	0.6	1.347	1.571	1.1	0.653	0.571	0.712	0.547	0.959	1.053	1.106	0.741
FFIV	2.975	3.142	2.742	3.117	4.4	5.7	6.283	4.35	4.2	3.067	3.425	4.608	3.2	3.375
IBM	0.93	1.261	0.874	1.243	1.109	1.243	1.022	0.757	0.687	0.817	0.53	0.626	1.191	1.139
LRCX	1	1.658	1.65	1.875	2.342	2.483	2.167	2.458	3.342	3.475	3.058	2.767	4.292	4.05
MA	1.475	2.608	2.392	2.117	2.2	2.942	3.692	2.658	3.208	2.233	2.767	2.65	3.033	3.392
QCOM	0.877	0.992	1.892	1.554	1.685	0.3	-0.054	-0.331	0.077	-0.038	-0.015	0.008	0.277	0.508
V	1.476	1.676	1.665	1.488	1.359	1.494	1.935	1.629	1.888	1.982	2.041	1.635	1.835	2.059
VRSN	0.933	1.608	1.533	1.6	2.417	3.958	3.508	3.95	4.15	4.9	4.183	4.558	4.867	5.117
WU	1.513	1.025	2.675	3.225	2.9	2.225	2.8	3.075	2.512	3.188	4.15	3.437	4.262	3.613

Health Care

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14
ABC	0.62	0.92	0.64	0.215	-0.3	0.23	0.45	0.88	0.8	1.055	1.34	1.05	1.175	1.43
ANTM	1.011	1.439	1.839	2.006	1.922	2.233	3.072	3.756	3.578	3.383	4.256	4.161	3.789	3.972
CELG	1.027	1.118	1.045	0.445	-0.482	-1.618	-1.764	-1.682	-1.691	-1.509	-1.509	-1.7	-1.964	-2
LH	0.721	0.5	0.386	0.164	0.179	0.514	0.779	0.836	1.036	1.114	0.579	0.55	0.386	0.95
MCK	-1.888	-1.231	-2.094	-2.456	-2.369	-2.662	-2.588	-2.481	-2.512	-2.2	-2.463	-2.294	-2.419	-2.2
WAT	-0.52	0.43	-0.19	-0.12	-0.19	0.14	0.07	-0.02	1.06	0.26	1.16	1.16	1.39	1.45

Consumer Discretionary

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14
LOW	-0.131	-0.969	-1.785	-1.669	-0.5	-0.669	-0.392	-0.715	-0.608	0.015	0.046	0.2	0.208	0.108
RL	1.608	2.05	1.825	1.175	1.483	1.808	2.45	1.767	1.658	1.542	0.85	0.708	1.367	0.742
CMG	0.894	1.061	0.944	1.217	1.867	1.35	1.85	1.989	3.078	2.917	2.956	2.561	2.333	2.461
HD	0.761	1.106	1.089	1.339	1.883	1.95	2.161	2.206	2.578	2.6	2.561	2.639	2.878	2.578
AZO	0.354	0.429	0.646	0.764	0.339	0.504	0.686	0.779	0.293	0.021	-0.193	-0.239	-0.457	-0.611
ORLY	1.958	1.842	2.492	2.258	1.825	2.608	2.883	3.083	2.383	2.408	2.183	2.283	2.292	2.908
YUM	-0.009	-0.032	0.491	0.618	0.618	0.832	1.014	0.859	0.414	0.745	0.614	1.068	1.114	1.191
JWN	1.638	2.2	1.777	1.762	2.623	2.931	2.546	2.623	3.069	4.615	3.869	4.577	4.323	3.762

Financials

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14
AIZ	1.07	1.02	1.49	1.94	1.84	1.66	1.37	1.18	0.84	0.72	0.25	0.7	0.39	0.68
ALL	0.838	0.823	0.862	1.246	1.538	1.762	1.131	0.9	0.9	1.215	1.315	1.331	1.523	1.462

Industrials

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14
NOC	1.754	1.808	2.615	1.815	2.131	1.985	1.923	1.762	1.477	1.308	1.777	2.315	1.754	2.146
MMM	1.09	1.68	1.95	1.9	1.67	1.5	1.81	2.16	2.58	1.75	1.89	2.3	2.53	2.52
ROK	0.769	1.123	0.862	1.285	1.969	2.731	2.262	1.146	0.746	0.538	0.115	-0.431	0.054	0.123
CSX	-0.942	-1.633	-1.375	-1.017	-0.917	-1.225	-1.617	-2.1	-2.808	-3.617	-3.6	-3.45	-3.417	-3.592
LMT	0.133	0.16	0.1	-0.167	-0.733	-0.52	-0.64	-1.113	-1.733	-1.793	-1.693	-1.76	-1.427	-2.3

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