

## **Market Timing, Portfolio Rebalancing and Portfolio Performance: Evidence from Bangladesh**

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### **Abstract:**

*The study is unique in a sense that this kind of study has not done before in our country for any period. From this study investors will have a knowledge about market timing on when to enter and exit a market and which industry to rely on while investing or constructing portfolio. To conduct the study, we have collected data of monthly return of all the industries from 2001 to 2019. The first finding of the study is that bank, telecommunication and travel and leisure industries are the most reliable since probability of above average return is high around or more than 60%. Among them telecommunication is the best one as its probability of below average return is 0.00% which means that its return doesn't fall from the median industry return for any period. Cement, service & real estate and ceramic industry has 40% chance of being above and 40% chance of being below average return. So, they are volatile industries in nature. The second findings from the study is that there is a paradoxical relationship between portfolio rebalancing frequency and the portfolio return. For top portfolio when the frequency reduces from monthly to semiannual to annual the return also decreases for short term, and long-term period. This relation is negative for median portfolio as when the frequency reduces the return increases for every investment horizon. Worst portfolio has also negative relation as when the frequency increases the return become less negative for every investment horizon. Lastly, top portfolio with monthly, semiannual or annual rebalancing can make investor multi billionaire for the period of 2001 to 2019. Median portfolio will generate 434% with monthly rebalancing, 794% with semiannual rebalancing and 2247.96% for annual rebalancing if the investment horizon is from 2001 to 2019. Worst portfolio will make investor lose its all money within 3 or 4 years of its investment for annual, semi-annual or monthly rebalancing.*

**Key Word:**  *Holding period return, weighted average return, portfolio rebalancing.*

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### **I. Introduction**

Investors are always in a combined state of being optimistic and highly doubtful of future trends in stock markets. When the market exerts a higher return on the stock, it seems attractive for investors and traders. Investments take place in a different asset class with an expectation of favorable future gains which is usually an inter-temporal choice. It indicates that the purchase of goods is not consumed today rather used to create wealth in the future (Kanojia and Arora, 2018). Various trends affect the stock market arising ups and downs in the stock prices. Market timing is imperative for investors to understand while making an investment decision and creating their portfolio with an intended optimized return. In financial terms, stock market ups and downs are defined as bull and bear market timing. In different market timing, investor's sentiment directs them to buy/sell the stocks according to their rebalancing strategy. Thus, the investor's portfolio performance is impacted by the timing of investment and rebalancing strategy in their asset allocation.

This study reveals the market timing impacting the portfolio performance as well as industry performance in Bangladesh. Identifying the best performing industry in a specified time, investors will be able to have optimized returns while rebalancing benefits after considering the timing factor will be opened up for them. It broadens the strong interest of investors in the stock market enhancing financial wellbeing. Having a good market timing method, at the same time forecasting trends of both the short-term and long-term, investors can feel confident that the odds of the current bottom low or top high is likely to hold so that they can place the stop just beyond it. Furthermore, a reliable industry for investment will be acknowledged which gets stable in different market timing. The economic impact of the result entails efficiency and the determination of the bull and bear trend of the market. A signaling effect in the stock can be portrayed using the study as material for further research.

## **II. Literature Review**

Sunaina and Neha (2018) explored market timing and portfolio performance across India in the paper "Investments, Market timing and Portfolio Performance across Indian Bull and Bear Market" where it is found that return on stocks gets exponentially higher if it is supported by appropriate timing. The timing is considered as the two business cycles, bull and bear situation. Motivated from Sunaina and Neha (2018) study, this work has been done keeping market timing as short, medium and long term categories. Many other studies have been done to identify market timing. G Metcalfe (2018) researched on "The Mathematics on Market Timing" and based on a feasible set of market timing portfolios using index mutual fund data of US stocks and bonds over the time period of 1993–2017. He found that the market timing returns gave asymmetric probability distribution function which means the highest point of probability outcome for market timing shows below median return. Maheu and McCurdy (2009) tried to find out the partition of the bull and bear regimes. They used intra-regime dynamics to capture bear market rallies and bull market corrections. Also they took 123 years of data in their Bayesian estimation approach study which provides probability statements about future regimes and returns along with superior identification of trends in stock prices. Dwight Grant (1977) included expected value and the variance of return for portfolios to examine market how market timing affects the one-parameter performance measures of Sharpe, Treynor and Jensen. Bry and Boschan (1971) detected the turning points of business cycle in the paper "Cyclical analysis of time series: selected procedures". Being inspired by the timing factor Pagan and Sossounoy (2003) evaluated stock return trend of an extensive period using similar algorithms of Bry and Boschan. Another study was conducted just after that on US equity market by Gonzalez, Powell, Shi and Wilson (2005) which was associated with interest of investors, financial stability and stock prices.

Gary P. Brinson, L. Randolph Hood, and Gilbert L. Beebower (1995) had developed a framework to decompose total portfolio return and market timing effects on total portfolio return by using the sample of large corporate pension plans large corporate pension plans of SEI's clients over the 10-year period. They considered both benchmark return and market timing factor. Benchmark return was determined by long term investment policy adopted by plan sponsors and Timing was assumed to achieve incremental returns relative to the policy return. The study showed that the average plan lost 66 basis points per year because of market timing effects and lost another 36 basis points per year from security selection.

Kole and Dijk (2016) conducted rule based and regime switching techniques that reflected market directions. Average return and volatility for identifying timing of equity market. According to them, market timing is one of the essential determinants of economic condition, thus financial decision making is related to this. They emphasized on the interrelationship among timing, return and investor's interest on stock market. Although these studies conducted different techniques to determine the timing, our study uniquely focuses on the timing exerted from investor's perspective; short, medium and long term investment strategy through which bull and bear regimes can be identified after several procedures.

Merton (1981) developed a model related to market timing forecast which allows the forecaster predict when stocks will outperform bonds and when bonds will outperform stocks but was unable to predict the magnitude at which one instrument would outperform the other. Later this basic model was used to derive a parametric and nonparametric statistical procedure to test for superior forecasting skills. Significant evidence of superior forecasting skills would violate the Efficient Markets Hypothesis, which will have a far-reaching implication in the world of finance, with respect to optimal portfolio holdings of investors, the equilibrium valuation of securities, and many decisions in corporate finance. Modern capital market theory has always tried to provide applications to measure investment performance, within which the practice of forecasting skill has been partitioned into micro forecasting and macro forecasting skill. The former is called "security analysis" and the latter is referred to as "market timing." Moreover, this partitioning of forecasting was expanded upon the work of Treynor and Black (1973). According to him, an investment manager can effectively separate the actions related to security analysis from those related to market timing.

Recent empirical studies of investment performance focus on micro forecasting and are based on a mean-variance capital asset pricing model framework. Using this specification, Jensen (2003) developed theoretical structures for the evaluation of micro- and macro forecasting performance of investment managers where the ex post performance of the manager's fund with the returns on the market has been used as basis in which market timer is assumed to forecast the actual return on the market portfolio, and the forecasted return and the actual return on the market are assumed to have a joint normal distribution. Our study investigates on the investment as well as portfolio performance based on the market timing factor after adjusting the return with stock dividend, right issue and cash dividend as well. This is done uniquely in Bangladesh taking the timing factor in short, long and medium term by rebalancing yearly, monthly and semi-annually to identify the optimized return portion for best, worst and medium performing industry.

### III. Material And Methods

#### Data & Sampling

The present study uses monthly return and market capital of the listed companies in the stock market. The study covers the period started from February 2001 to December 2019. The companies that were delisted in the time period from 2001 to 2019 are excluded because the share price and market capital of the delisted companies are not found from the available sources. And also the newer companies are not taken in consideration while doing the study of market timing and portfolio performance.

Since the concept like 'market-timing' is more relevant in case of equity based portfolios the present study has considered all the companies mainly of equity in nature. The study is done to show the performance of portfolios solely constructed of shares and that's why Mutual Fund and Corporate Bonds are excluded from the study. The maximum number of companies incorporated in the study is 370 where there are total 592 listed companies in the secondary market. The monthly return and market capital of the companies are collected from their annual reports which are available in the DSE library.

#### Methodology

This part will present the methodology of the conducted study. Before starting, here is the description of some of the basic terminology used in the study.

#### Basic Terminology

Here, **Top Portfolio** = A portfolio consisting of the best performing industry with the highest return for a given period.

**Median Portfolio** = A portfolio consisting of the average performing industry with the median return for a given period.

**Worst Portfolio** = A portfolio consisting of the worst performing industry with the lowest return for a given period.

**Weighted Average return portfolio** = A portfolio where the returns for each industry is calculated using the Weighted average return formula.

**Short term Investment Horizon portfolio** = A portfolio where investors hold the portfolio for 5 years and reinvest for next 5 years. The holding period is allocated as February 2001 to December 2005, January 2006 to December 2010, January 2011 to December 2015 and January 2016 to December 2019.

**Long term Investment Horizon Portfolio** = A portfolio where investors hold the portfolio for 19 years (from 2001 to 2019).

**Monthly Rebalancing** = Investors rebalance its portfolio by choosing an industry each month.

**Annual rebalancing** = Investors rebalance its portfolio by choosing an industry only once a year.

**Semi-annual Rebalancing** = Investors rebalance its portfolio by choosing an industry every six months.

Now, to facilitate the study, the monthly return of all companies is calculated for the period February 2001 to December 2019. The return is adjusted for stock split, dividend, bonus share, right issue and secondary offerings.

#### Calculation of holding period return

At first, the average monthly return of each industry is calculated using the weighted average method. First of all, to calculate the weighted average return, monthly return and monthly market cap of each of the company is taken. The formula to calculate the weighted average return of a company for a particular month is:

$$\bar{R}_{ij} = (K_{ij}/\Sigma K_j) * R_{ij}$$

Here  $\bar{R}_{ij}$  is the weighted average market return of the company;  $K_{ij}$  is the market cap of the company  $i$  for the month of  $j$ .  $\Sigma K_j$  is the total market cap of the industry for the month of  $j$ .  $\bar{R}_{ij}$  is calculated by multiplying its weight in the industry with its monthly return. The weight is calculated by dividing the market cap of the company by the total market cap of the industry in a particular month.

Then the summation of the weighted average return of all of the companies of the particular industry for a particular month is taken as the weighted average return of the industry. The formula is:

$$I_j = \Sigma \bar{R}_{ij}$$

Here  $I_j$  is the weighted average return of an industry for the  $j^{\text{th}}$  month. It is calculated by the summation of the weighted average return of the companies of the respective industry for a particular month.

Next, the portfolio return is calculated for each selected portfolio following monthly, semi-annual, and annual rebalancing.

**Monthly Rebalancing method:**

**Top Portfolio:** To construct top return portfolio the highest return industry is selected to invest for the first month of investment horizon. The rebalancing is done every month then invested in the top return industry of that particular month. This rebalancing and reinvestment is done for 227 months for the long term investment horizon for February 2001 to December 2019. Finally the holding period return is calculated by dividing the terminal rebalanced value by net of initial investment.

**Median Portfolio:** The weighted average monthly return of each industry is taken to construct median portfolio where the median return offering industry of a particular month is selected to invest. Again rebalancing is done in every month to invest the end value of a month in the industry which offers the median return among all of the industries. Following this the holding period return is calculated for different time horizons which are long term and short term investment in portfolio.

**Worst Portfolio:** Finally the worst return portfolio is made based on the strategy of investing in the industry which offers the lowest return in each month. Then rebalancing is performed to reinvest the balance in the next month in the industry which offers the worst return in that month. Following same procedure as of top portfolio, holding period return is calculated for the two investment horizons.

**Half Yearly Rebalancing Method:**

In this rebalancing method, the initial investment is rebalanced in every six months to reinvest in the next month for six more months. Following the other procedures in monthly rebalancing method top portfolio, median portfolio and worst portfolio is constructed for the different time horizons. Here the average industry return of every six months is taken into consideration to identify the top return, median return and worst return industry. The holding period return is calculated for long term, medium term and short term investment horizon.

**Yearly Rebalancing Method:**

In yearly rebalancing method, investment is rebalanced in the end of each year. So the December return of each year is taken into consideration to identify the top return portfolio, medium return portfolio and worst return portfolio. And the holding period return is calculated for long term, and short term investment horizon.

**IV. Result**

**Descriptive Analysis**

In this part, the analysis of the research is shown with precise and succinct interpretation. The first test done on the variables is descriptive statistics where the average scenario of the industries is shown.

**Table 1:** Annual Mean, median, Standard deviation and variance of returns of all industries for 2001 to 2019.

Industry	Mean	Median	Standard Deviation	Variance
BANK	34.28%	20.93%	170.47%	9.35%
Engineering	31.16%	17.96%	190.01%	10.83%
Foods & Allied Products	37.74%	21.09%	176.50%	9.80%
Fuel & Power	29.23%	9.11%	166.21%	9.03%
Jute	65.97%	0.00%	1134.86%	88.60%
Textile	31.80%	10.79%	225.13%	13.57%
Pharmaceuticals & Chemicals	28.35%	10.93%	160.09%	8.57%
PAPER & PRINTING	31.80%	0.00%	561.80%	41.07%
SERVICES & REAL ESTATE	22.78%	0.00%	324.97%	21.58%
Cement	14.54%	-11.29%	248.51%	15.42%
IT - Sector	29.91%	10.03%	429.61%	30.16%
Tannery	40.29%	9.27%	318.33%	21.04%
Ceramic	26.42%	-1.50%	302.39%	19.75%
Insurance	43.58%	16.56%	231.15%	14.04%
TELECOMMUNICATION	17.77%	12.54%	212.82%	12.60%
Travel and Leisure	10.05%	-11.02%	312.79%	20.59%
Miscellaneous	58.70%	0.08%	1270.83%	99.94%
Average	32.61%	6.79%	378.62%	26.23%

Table 1 shows the annual mean return of the industries. It is clear from the table that the jute industry has the highest mean value (65.97%) which indicates that on an average jute industry has given the highest annual return from 2001 to 2019. The travel and leisure industry has the lowest mean value (10.05%) that means it has given the lowest annual return. The average mean of the industries is 32.61%. So, from the above table we can see that only 6 out of 17 industries performed above the average.

Annual median value shows that the food & allied industry has performed best as it has provided 21.09% return during the period of 2001 to 2019. On the other hand, the cement industry is the lowest (-11.29%) return provider. The average median value is 6.79%. So, from the above table we can see that 8 out of 17 industries performed above the average according to median value.

The table also shows that miscellaneous is the riskiest industry as it has the highest standard deviation value which is 1270.83%. Pharmaceuticals & chemicals industry is the least risky as it has the lowest deviation value which is 160.09%. The average standard deviation value is 370.62%. So, from the above table we can see that 4 out of 17 industries are riskier than the average.

In summary, it can be said that the jute industry has the highest mean return and its standard deviation is also high which is justifiable. Travel and leisure has the lowest mean return but its standard deviation is average which is needed to be the lowest. Median shows that the food & allied industry has the highest return but its standard deviation is below the average and the cement industry has the lowest return but its standard deviation is closer to the average which is unjustifiable. The standard deviation indicates the miscellaneous industry is the riskiest which is consistent to the theory that it also provides the maximum return. Though the least risky industry is the pharmaceuticals and chemicals, the travel and leisure industry provides the minimum return.

**Performance Analysis of Portfolio of Top Industry Return**

The top portfolio is created by incorporating those industries that have the highest return for each single month. The study attempts to show the impact of portfolio rebalancing on the performance of holding period return for the top portfolio.

**Top Portfolio Long Investment Horizon**

If an investor can predict or apprehend the exact time to enter a market and with the predictability to identify the best performing industry and thereby rebalances its portfolio for every single month, semi-annually or annually, he or she can construct a portfolio with those best performing industry by making an equal weighted investment. This kind of perfect market timing sense can make an investor very wealthy within a very short period of time.

So, to understand how this theory will benefit the investors in the context of Dhaka Stock Exchange we have conducted a study for the period of 2001-2019 with monthly industry return using weighted average method.

**Table 2:** Long term investment horizon for Top Portfolio using monthly, semi-annual and annual rebalancing

Rebalancing frequency	Top Portfolio Long term Investment Horizon Return
Monthly	843676372984309000000%
Semi annual	30158935910.35%
Annual	148276261.98%

Table 2 reveals that with a long term investment horizon, making a top portfolio, an investor can generate billions times of return using both weighted average method. This high amount of HPR could only be possible if an investor could predict the industry performance beforehand and hold the portfolio for a long investment horizon. The study can conclude another observation that if the rebalancing frequency gets lower and lower (from monthly to semi-annually to annually) the portfolio will generate lower return. So a positive relationship between rebalancing frequency and portfolio return is found when top portfolio is selected.

**Top Portfolio Short Term Investment Horizon**

To check for weather short term investment horizon provides greater than long term investment horizon, we conducted a study taking 5 years as a short term horizon with monthly rebalancing, semiannual rebalancing and annual rebalancing.

**Table 3:** Short term investment horizon for Top Portfolio using monthly, semi-annual and annual rebalancing

Rebalancing frequency	Top Portfolio Short term Investment Horizon Return
Monthly	1507656756%
Semi annual	25670%
Annual	8193%

Table 3 shows that if a short term investment horizon is selected, a top portfolio has lower return compared to the return generated from investing in long term horizon no matter what the rebalancing frequency is used for implementing portfolio strategy. The study can conclude another observation that if the rebalancing frequency gets lower and lower (from monthly to semi-annually to annually) the portfolio will generate lower return. So a positive relationship between rebalancing frequency and portfolio return is found when top portfolio is selected.

**Performance Analysis of Portfolio of Median Industry Return**

The median portfolio consists of those industries that have the median weighted average return. Here the study shows the effect of annual rebalancing, monthly rebalancing and semiannual rebalancing in the performance of this median portfolio.

**Median Portfolio with Long term Investment Horizon**

As we are trying to focus on the market timing and portfolio performance it is quite impossible that an investor will predict the best performing industry for the upcoming months beforehand. But identifying industry with the median return is not that difficult. So this portfolio makes much sense compared to top portfolio as the assumptions of identifying the top performing industry beforehand and entering the market with perfect timing is quite vague.

**Table 4:** Long term investment horizon for Median Portfolio using monthly, semi-annual and annual rebalancing

Rebalancing Frequency	Median Portfolio Long term Investment Horizon Return
Monthly	631%
Semi Annually	1318.63%
Annually	2247.96%

Table 4 shows that with a long term investment horizon, making a median portfolio, an investor can generate 631% of return using weighted average method with monthly rebalancing. We can see that as the frequency of rebalancing decreases, the HPR gets higher and higher for median portfolio unlike the opposite scenario of top portfolio performance. An investor can get the highest HPR using annual rebalancing which is 2248% when calculated as using weighted average.

**Median portfolio with Short-term Investment Horizon**

To check for weather short term investment horizon provides greater than long term investment horizon, we conducted a study taking 5 years as a short term horizon with monthly rebalancing, semiannual rebalancing and annual rebalancing.

**Table 5:** Short term investment horizon for Median Portfolio using monthly, semi-annual and annual rebalancing

Rebalancing frequency	Median Portfolio Short term Investment Horizon Return
Monthly	105%
Semi annual	192%
Annual	195%

Table 5 shows that when a short term investment horizon is used, a median portfolio generates more than 100% holding period return (HPR) irrespective of the rebalancing frequency. But the return is lower than the return found when investment is in top portfolio. We can see that as the frequency of rebalancing decreases, the HPR gets higher and higher for median portfolio unlike the opposite scenario of top portfolio performance. An investor can get the highest HPR using annual rebalancing which is 195% using the median portfolio at max. So there prevails a negative relationship between rebalancing frequency and holding period return.

**Performance Analysis of Portfolio of Worst Industry Return**

The worst portfolio is created by taking the industry in the portfolio that possesses the lowest return in any period. The study shows what the relationship between worst portfolio holding return and its rebalancing strategy.

**Worst Portfolio Long Investment Horizon**

If an investor fail to predict or apprehend the exact time to enter a market and misguided to identify the best performing industry rather stuck with the worst performing industry and thereby rebalances its portfolio for every single month, semi-annually or annually, he or she could be stuck with a portfolio consisting of worst performing industry by making an equal weighted investment. This kind of imperfect market timing sense can make an investor lose his/her entire money within a very short period of time.

**Table 6:** Long term investment horizon for worst Portfolio using monthly, semi-annual and annual rebalancing

Rebalancing Frequency	Worst Portfolio Long investment Horizon HPR
Monthly	-100.00%
Semi-Annually	-99.96%
Annually	-99.57%

Table 6 reveals that with a long term investment horizon, making a worst portfolio, an investor can lose all his money within first 3 years of its investments for monthly rebalancing, first 12 years of investment for semi-annual rebalancing, after 17 years of investment for annual rebalancing. The portfolio will get negative return using both weighted average method and simple average method. Still we can conclude an observation that if the rebalancing frequency gets lower and lower (from monthly to semi-annually to annually) the portfolio will generate lower negative return.

**Worst portfolio with Short-term Investment Horizon**

To check for weather short term investment horizon provides greater than long term investment horizon, we conducted a study taking 5 years as a short term horizon with monthly rebalancing, semiannual rebalancing and annual rebalancing as well.

**Table 7:** Short term investment horizon for worst Portfolio using monthly, semi-annual and annual rebalancing

Rebalancing frequency	Worst Portfolio Short term Investment Horizon Return
Monthly	-100%

Semi annual	-80%
Annual	-70%

Table 7 reveals findings that are similar to the result found for worst portfolio using short term investment horizon. We can conclude an observation that if the rebalancing frequency gets lower and lower (from monthly to semi-annually to annually) the portfolio will generate lower negative return. So there prevails a negative relationship between rebalancing frequency and holding period return in terms of worst portfolio.

**Probability Analysis of Industry Return**

To check the probability of return of the industries we have counted how many times an industry has provided maximum return and minimum return. After finding the total number of maximum and minimum return providing number, we divided the number by the sample size.

**Probability of topping in a month by an Industry**

Probability is calculated by dividing the number of months an industry topped or bottomed in terms of return by the total number of months considered in our study for each industry.

**Table 8: Probability of topping in a month by an Industry**

Industry with Maximum Return in a Month			
Industry	No of Months	Sample Size	Probability
Jute	26	227	11.45%
Paper & Printing	26	227	11.45%
Bank	19	227	8.37%
Foods & Allied Products	18	227	7.93%
Telecommunication	18	121	14.88%
IT - Sector	15	211	7.11%
Miscellaneous	15	227	6.61%
Insurance	14	227	6.17%
Services & Real Estate	12	227	5.29%
Ceramic	11	227	4.85%
Fuel & Power	11	227	4.85%
Travel and Leisure	11	120	9.17%
Textile	10	227	4.41%
Cement	9	227	3.96%
Tannery	9	227	3.96%
Engineering	5	227	2.20%
Pharmaceuticals & Chemicals	5	227	2.20%

Table 8 shows that telecommunication and travel and leisure industries have lowest sample size as these industries have started after 2009. From the table we can see that telecommunication industry has the highest probability (14.30%) of providing maximum return and engineering and pharmaceuticals & chemicals industries have the lowest probability of 2.20%. Besides telecommunication, jute and paper & printing industries have also good probability, of above 10%, to provide maximum return.



**Probability of bottoming in a month by an Industry**

**Table 9:** Probability of bottoming in a month by an Industry

Industry with Minimum Return in a Month			
Industry	No of Months	Sample Size	Probability
Paper & Printing	38	227	16.74%
Jute	32	227	14.10%
Cement	27	227	11.89%
Services & Real Estate	17	227	7.49%
Telecommunication	17	121	14.05%
Travel and Leisure	17	120	14.17%
Miscellaneous	17	227	7.49%
IT - Sector	16	211	7.58%
Ceramic	14	227	6.17%
Foods & Allied Products	12	227	5.29%
Bank	9	227	3.96%
Insurance	7	227	3.08%
Tannery	6	227	2.64%
Fuel & Power	4	227	1.76%
Textile	2	227	0.88%
Pharmaceuticals & Chemicals	2	227	0.88%
Engineering	0	227	0.00%

Table 9 shows the probability of an industry to get lowest return in a month. Here, engineering industry has the lowest probability (0.00%) of providing worst result and paper & printing industries has the highest probability (16.74%) to provide minimum return. Besides engineering, textile and pharmaceuticals & chemicals industries also have low probability, of 0.88%, to provide minimum result.

**Probability of above and below average return in a month by an Industry**

Though the telecommunication industry has the highest probability of providing maximum return it also has the high probability of providing minimum return. It indicates that this industry is volatile. Despite being volatile, the industry has the highest probability (72%) of providing above average return and a below average probability of 0.00%. So, it indicates that this industry has the probability of providing handsome return in the future. Besides telecommunication, travel and leisure and bank industry also have more than 50% probability of providing more above average return and also a low probability of providing below average return. So, these industries have a good probability of providing handsome return. Pharmaceuticals & chemicals and engineering industries have the lower probability for both maximum and minimum return which indicates that these are fewer volatile industries. But they also have more than 40% probability of providing below average return. Besides these, ceramic and miscellaneous industries have less than 50% probability of providing above average return and more than 40% probability of providing below average return which indicates that these industries probability are poor enough to provide a good return in future.

**Table 10:** Probability of above and below average return in a month by an Industry

Industry	Sample Size	No of Months	Probability of above average	Probability of below average
TELECOMMUNICATION	120	86	72%	0.0%
Travel and Leisure	121	71	59%	18.0%
BANK	227	129	57%	30.8%
Foods & Allied Products	227	121	53%	33.5%
Pharmaceuticals & Chemicals	227	121	53%	43.6%

Tannery	227	121	53%	40.1%
Insurance	227	116	51%	39.6%
Engineering	227	113	50%	48.0%
IT - Sector	211	104	49%	36.0%
Textile	227	110	48%	46.3%
Fuel & Power	227	108	48%	45.8%
Ceramic	227	102	45%	44.1%
Miscellaneous	227	100	44%	41.9%
PAPER & PRINTING	227	99	44%	28.2%
SERVICES & REAL ESTATE	227	99	44%	43.6%
Jute	227	97	43%	31.7%
Cement	227	92	41%	43.6%

In summary, we can say that telecommunication, travel and leisure and bank industries are the most reliable industries. So, our recommendation is an investor can rely to invest in these industries.

### V. Discussion

Investors are always excited to manage portfolio in a way to be the gainer. They invest when the market is growing in promising and stable industries. They always try to invest in different asset classes to diversify the risk and ensure future gains. Among so many variables that affect portfolio return, market timing and rebalancing frequency in asset allocation came out as one of the most significant factors. This study suggests portfolio construction should consider industry type as well as the ups and downs of the market. Simple statistics showed that jute industry has been studied as the highest monthly return giving industry and pharmaceuticals & chemicals industry has been identified as the least risky industry with lowest standard deviation. So, investors can invest in these two industries. In addition to that, monthly, semiannual or annual rebalancing also has different sets of impacts in case of top, median and worst portfolio performance. For top portfolio, frequency has positive relationship with return for all the time horizons. But for median and worst portfolio performance analysis, this relation is negative for all the timeframe. When the rebalancing frequency decreases, portfolio return increases or negative return decreases. So investor should always be aware of what type of portfolio he is managing before conducting rebalancing of weights for asset allocation in his portfolio. And he should invest in stable and promising industries as well which are bank, telecommunication and travel and leisure industries in case of Bangladesh as there are higher probabilities of giving above average return in all the scenarios.

### VI. Conclusion

Portfolio rebalancing and market timing have an influential role on the performance of portfolio. If an investor can predict the top industry in a period and rebalance it monthly, that portfolio will generate the most significant return in the settings of Bangladesh. If an investor invests in the median return portfolio, he/she will maximize return when annual rebalancing is used. In terms of probability analysis, telecommunication, travel and leisure and banking sector provides more than 50% probability that they will be the top gainer in a month.

### References

- [1]. Brinson, G., Hood, L. and Beebower, G., 1995. Determinants of Portfolio Performance. *Financial Analysts Journal*, 51(1), pp.133-138.
- [2]. Bry, G. and Boschan, C., 1971. *Cyclical Analysis of Time Series: Selected Procedures*. New York: National Bureau of Economic Research,
- [3]. Gonzalez, L., Powell, J., Shi, J. and Wilson, A., 2005. Two centuries of bull and bear market cycles. *International Review of Economics & Finance*, 14(4), pp.469-486.
- [4]. Grant, D., 1978. "Market Timing and Portfolio Management." *The Journal of Finance*, 33(4), p.1119.
- [5]. Henriksson, R. and Merton, R., 1981. On Market Timing and Investment Performance. II. Statistical Procedures for Evaluating Forecasting Skills. *The Journal of Business*, 54(4), p.513.
- [6]. Jensen, M., 2003. Optimal Utilization of Market Forecasts and the Evaluation of Investment Performance. *SSRN Electronic Journal*,
- [7]. Kanojia, S. and Arora, N., 2018. Investments, Market Timing and Portfolio Performance across Indian Bull and Bear Markets. *Asia-Pacific Journal of Management Research and Innovation*, [online] 13(3-4), pp.98-109. Available at: <<http://journals.sagepub.com/home/abr>> [Accessed 1 October 2020].
- [8]. Kole, E. and van Dijk, D., 2016. How to Identify and Forecast Bull and Bear Markets?. *Journal of Applied Econometrics*, 32(1), pp.120-139.

- [9]. Maheu, J. and McCurdy, T., 2009. Identifying Bull and Bear Markets in Stock Returns. *Journal of Business & Economic Statistics*, 18(1), p.100.
- [10]. Metcalfe, G., 2018. The mathematics of market timing. *PLOS ONE*, 13(7), p.e0200561.
- [11]. Pagan, A. and Sossounov, K., 2003. A simple framework for analyzing bull and bear markets. *Journal of Applied Econometrics*, 18(1), pp.23-46.
- [12]. Treynor, J. and Black, F., 1973. How to Use Security Analysis to Improve Portfolio Selection. *The Journal of Business*, 46(1), p.66.

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