Can We Make the Permanent Portfolio Even Better by Rebalancing More Frequently or by Changing the Rebalancing Day?

Tommy Man-Hung Wong
The Open University of Hong Kong

Kevin Chi- Keung Li
The Open University of Hong Kong

In this paper, we would investigate whether the performance of the permanent portfolio can be further improved by varying the frequency of rebalancing or by doing rebalancing on a non-month end day. The performance of the portfolio rebalanced on an annual basis was compared with rebalancing on a quarterly basis. The result was negative and the more frequent rebalancing would adversely affect the performance. Another factor we investigate was whether there would be advantage for rebalancing on the in the middle of the month, comparing with rebalancing at the end of the month. The result was again negative.

INTRODUCTION

In our previous paper: A Portfolio for All Seasons: Does it make sense?(Wong & Li, 2015) We investigated whether the so-called permanent portfolio (Rowland & Lawson, 2012) ; with its components consist of cash, long-term bonds, gold, and equity in equal proportions; can live up to its name, and provide superior risk-adjusted return under all market situations. The result was clearly affirmative with the permanent portfolio producing a superior risk-adjusted return.

In this paper, we would try to investigate whether the performance of the permanent portfolio can be improved by a number of measures. These measures are: (i) varying the frequency of the rebalancing - instead of doing that annually, we would investigate whether rebalancing on a more frequent basis (quarterly and monthly) could improve the performance, and (ii) varying the day of rebalancing - our original portfolio was based on rebalancing at the end of each calendar year, we would like to see whether rebalancing on the 15th of the month would affect the performance to a significant degree. The effects of these two measures are studied separately.

We would also lengthen the period of study from 15 years in our previous paper to 30 years to make the result more representative over a longer period of time.

The reasons for doing rebalancing are the different rebalancing strategies outperform the buy and hold investment strategies according to the US benchmark data (Dichtl, Drobetz, & Wambach, 2014). The permanent portfolio using rebalancing strategy will provide a superior risk-adjusted return was confirmed by our paper and some other authors(Anderson, Marshall, & Miao, 2014).

In the following discussion, we would demonstrate the effects of changing the frequency of re-balancing and changing the day of the rebalancing. The results will have important implication for individual investor, the fund industry and managers of retirement schemes (Benartzi & Thaler, 2001).

METHODOLOGY

Data

For the stocks component, we would track the adjusted closing index of Hang Seng Index, taking into account the impact of dividends, on the last trading day (or the 15th of the month when we are investigating the impact of the second measure) of each month, quarter and year. For gold, being an international commodity, we track the price in the US market. For the bonds component, which as stated in our previous study, the bond component has to be long-term bonds with 20 or more years of maturity. As the bond market in Hong Kong is not that developed, we do not have an alternative and therefore can only use the US Government 30-year Treasury Bonds Total Return Index in our study. For the cash component, as rebalancing is done on regular basis, the cash can still be used profitably while waiting for the next rebalancing. Accordingly, we use the yields of US 12-month Treasury Bills at the beginning of each year as the interest income for the cash component for the annual rebalancing study and the short-term deposits of corresponding period for the study on quarterly and monthly rebalancing. All data were collected from Thomson Reuter DataStream.

Rebalancing Approaches

Firstly, in this revised study, the performance of the different components and the Permanent portfolio ("PP") were tracked and rebalanced on a monthly, quarterly and yearly basis and all the rebalancing were done on the last day of the respective month, quarter, or year.

As explained in our last paper as the closing values could only be ascertained after the end of the trading day and it may affect the accuracy of the closing values that were supposed to be used. We envisage these inaccuracies will have minimal effects over long periods of time. We also take into account transaction costs that would be incurred during the rebalancing process; we based the transaction costs on the most cost-efficient platform available.

Secondly; we set to investigate whether rebalancing on the 15th day of the year-end month or quarter-end month (that is December 15 instead of December 31; June 15 instead of June 30, etc) would have any significant effects on the portfolio performance.

Consideration for Rebalancing Differently

In the original permanent portfolio, rebalancing was done on an annual basis. It was anticipated that, with more frequent rebalancing, there are two possible outcomes: the portfolio may be better-positioned to utilize the market fluctuations and bring about better performance; or the more frequent rebalancing might increase the transaction costs and adversely affect the performance of the portfolio. We set out to investigate the performance of the portfolio by rebalancing it on a monthly, quarterly basis and yearly basis over a 30 years period.

On rebalancing in the middle of the month rather than at the end of the month, we consider that the fund industry have a tendency to "window-dress" the performance of the funds at the end of the calendar for a number of reasons, and we would like to see how it would affect the performance of our portfolio.

RESULTS – PERFORMANCE AND ANALYSIS

The results were tabulated in the following tables.

TABLE 1
RETURN OF INDIVIDUAL COMPONENT AND THE PP
(REBALANCING ANNUALLY ON 31 DECEMBER EACH YEAR)

For the year ended	Hang Seng Index	30-year bond	Gold	1-year T bill	Portfolio annual return
31/12/86					
31/12/87	-10.34%	-7.90%	24.46%	5.95%	3.03%
31/12/88	16.70%	8.12%	-15.69%	7.10%	4.04%
31/12/89	5.55%	20.19%	-2.23%	9.02%	8.11%
31/12/90	6.61%	4.90%	-2.49%	7.76%	4.18%
31/12/91	42.11%	17.28%	-9.62%	6.82%	14.14%
31/12/92	28.28%	6.84%	-5.80%	4.12%	8.35%
31/12/93	115.67%	18.32%	17.35%	3.61%	38.72%
31/12/94	-31.10%	-11.90%	-2.09%	3.63%	-10.41%
31/12/95	22.98%	33.73%	1.10%	7.20%	16.19%
31/12/96	33.53%	-4.84%	-4.43%	5.18%	7.33%
31/12/97	-20.29%	15.41%	-21.74%	5.51%	-5.31%
31/12/98	-6.29%	16.70%	-0.61%	5.51%	3.80%
31/12/99	68.80%	-14.98%	1.18%	4.53%	14.85%
31/12/00	-11.00%	20.55%	-6.26%	5.98%	2.26%
31/12/01	-24.50%	3.45%	1.41%	5.41%	-3.59%
31/12/02	-18.21%	16.74%	23.96%	2.17%	6.15%
31/12/03	34.92%	1.01%	21.74%	1.32%	14.73%
31/12/04	13.15%	9.19%	4.97%	1.26%	7.12%
31/12/05	4.54%	8.72%	17.12%	2.75%	8.27%
31/12/06	34.20%	-1.46%	23.92%	4.38%	15.25%
31/12/07	39.31%	10.33%	31.59%	5.00%	21.54%
31/12/08	-48.27%	41.19%	3.41%	3.34%	-0.12%
31/12/09	52.02%	-25.55%	27.63%	0.35%	13.53%
31/12/10	5.32%	5.26%	27.74%	0.44%	9.63%
31/12/11	-19.97%	29.86%	11.65%	0.27%	5.42%
31/12/12	22.91%	2.26%	5.68%	0.11%	7.71%
31/12/13	2.87%	-14.89%	-27.79%	0.14%	-9.94%
31/12/14	1.28%	29.68%	-0.19%	0.12%	7.71%
31/12/15	-7.16%	-3.25%	-11.42%	0.22%	-5.43%
30/12/16	0.39%	0.88%	8.43%	0.61%	2.57%
Total Returns 1987 to 2016	757%	618%	195%	191%	579%
Compound annual growth rate	7.43%	6.79%	3.67%	3.63%	6.59%
Sharpe Ratio	**0.12**	**0.21**	**0.003**	**-**	**0.31**

TABLE 2
RETURN OF INDIVIDUAL COMPONENT AND THE PP
(REBALANCING ANNUALLY ON 15 December EACH YEAR)

For the year ended (15 days ealrier)	Hang Seng Index	30-year bond	Gold	1-year T bill	Portfolio annual return
31/12/86					
15/12/87	-18.99%	-10.36%	26.30%	5.95%	0.72%
15/12/88	26.27%	9.86%	-14.64%	7.22%	7.15%
15/12/89	10.25%	22.87%	-2.62%	9.18%	9.90%
15/12/90	7.89%	4.07%	-9.07%	7.65%	2.62%
15/12/91	32.98%	11.61%	-3.82%	7.09%	11.95%
15/12/92	27.92%	10.82%	-6.74%	4.43%	9.10%
15/12/93	87.09%	20.02%	15.30%	3.78%	31.54%
15/12/94	-16.95%	-12.38%	-1.50%	3.61%	-6.83%
15/12/95	19.36%	31.24%	1.51%	7.09%	14.77%
15/12/96	29.67%	-2.45%	-4.35%	5.32%	7.02%
15/12/97	-18.37%	13.84%	-23.26%	5.46%	-5.61%
15/12/98	-4.62%	18.38%	3.28%	5.47%	5.60%
15/12/99	59.00%	-14.12%	-4.32%	4.49%	11.23%
15/12/00	-5.37%	18.85%	-3.41%	5.85%	3.93%
15/12/01	-23.43%	1.51%	1.68%	5.68%	-3.67%
15/12/02	-15.15%	15.93%	21.34%	2.22%	6.07%
15/12/03	28.70%	2.90%	21.29%	1.47%	13.57%
15/12/04	12.45%	11.38%	8.23%	1.30%	8.32%
15/12/05	6.96%	5.02%	14.76%	2.64%	7.34%
15/12/06	26.91%	1.93%	24.60%	4.33%	14.43%
15/12/07	44.23%	5.07%	27.20%	4.96%	20.36%
15/12/08	-45.41%	38.09%	3.92%	3.28%	-0.06%
15/12/09	44.97%	-19.94%	34.74%	0.50%	14.99%
15/12/10	5.32%	0.86%	24.51%	0.36%	7.71%
15/12/11	-21.54%	32.44%	14.53%	0.31%	6.40%
15/12/12	25.40%	4.39%	6.70%	0.11%	9.11%
15/12/13	2.83%	-15.10%	-27.93%	0.13%	-10.03%
15/12/14	-0.94%	28.20%	-0.98%	0.14%	6.59%
15/12/15	-7.61%	-2.82%	-11.70%	0.20%	-5.50%
15/12/16	3.69%	-1.12%	5.54%	0.68%	2.19%
Total Returns 1987 to 2016	759%	606%	189%	194%	540%
Compound annual growth rate	7.43%	6.73%	3.60%	3.66%	6.38%
Sharpe Ratio	**0.14**	**0.21**	**(0.004)**	**-**	**0.32**

TABLE 3
RETURN OF INDIVIDUAL COMPONENT AND THE PP
(REBALANCING QUARTERLY AT THE LAST DAY OF EACH QUARTER)

For the quarter ended	Hang Seng Index	30-year bond	Gold	1-year T bill	Portfolio annual return
Total Returns 1987 to 2016	757%	618%	195%	197%	405.7%
Compound annual growth rate	7.42%	6.79%	3.67%	3.70%	5.55%
Sharpe Ratio	**0.07**	**0.10**	**(0.00)**	**-**	**0.12**

TABLE 4
RETURN OF INDIVIDUAL COMPONENT AND THE PP
(REBALANCING QUARTERLY ON THE 15th OF THE QUARTER-END MONTH)

For the quarter ended (15 days earlier)	Hang Seng Index	30-year bond	Gold	1-year T bill	Portfolio annual return
Total Returns 1987 to 2016	759%	606%	189%	196%	391.4%
Compound annual growth rate	7.43%	6.73%	3.60%	3.69%	5.45%
Sharpe Ratio	**0.07**	**0.12**	**-0.00**	**-**	**0.12**

TABLE 5
RETURN OF INDIVIDUAL COMPONENT AND THE PP
(REBALANCING MONTHLY ON THE LAST DAY OF EACH MONTH)

For the month ended	Hang Seng Index	30-year bond	Gold	1-year T bill	Portfolio annual return
Total Returns 1987 to 2016	757%	618%	195%	195%	391.1%
Compound annual growth rate	7.42%	6.79%	3.67%	3.68%	5.45%
Sharpe Ratio	**0.12**	**0.22**	**-0.00**	**-**	**0.18**

TABLE 6
RETURN OF THE INDIVUAL COMPONENT AND THE PP
(REBALANCING MONTHLY ON THE 15th OF EACH MONTH)

For the month ended (15 days earlier)	Hang Seng Index	30-year bond	Gold	1 Year T bill	Portfolio annual return
Total Returns 1987 to 2016	759%	606%	189%	195%	390.6%
Compound annual growth rate	7.43%	6.73%	3.60%	3.68%	5.44%
Sharpe Ratio	**0.13**	**0.21**	**-0.00**	**-**	**0.18**

Referring to tables 1, 3, and 5, the performance of the PP was at its best when rebalancing was done annually, and yielded a cumulative return of 579% over the 30-year study period. When balanced on a quarterly basis, the cumulative return was reduced to 405%, and was further reduced to 391% when the rebalancing was done on a monthly basis.

For rebalancing done on the 15th of the relevant month (the mid-month PP) rather than at the end of the month, we have to refer to tables 2, 4 and 6 to compare the performance with that of the corresponding rebalancing frequency. Interestingly, a discernible trend was obtained. When rebalanced on an annual basis, the mid-month PP yielded a cumulative return of 540% over the 30-year period, which compared unfavorably with the cumulative return of 579% of the normal PP. On a quarterly basis, the same situation was found; with the mid-month PP's cumulative return at 391% vs the normal PP's return of 405%. On a monthly basis, the mid-month PP's cumulative return was at 390.6% vs the normal PP's return of 391.1%, but this time the difference in performance is minimal

CONCLUSION

The results indicated that, over the 30-year observation period, rebalancing more frequently would in fact produce adverse impact on the performance of the PP. The impact was more significant when rebalancing was changed from annually to quarterly as the returns are reduced significantly from 579% to 405%. The impact was not so significant when rebalancing was changed from quarterly to monthly with the cumulative returns reduced from 405% to 391%. It is evident that when frequency of rebalancing is increased, the impact of the transaction costs would outweigh the benefit of rebalancing.

Another factor that would help the performance of the annual PP can be attributed to the "window-dressing" practice of the fund industry, when the fund managers are more eager to show a good "annual report" to the investors and therefore stock price levels are generally higher at the end of the calendar year. When rebalancing on a year-end basis that would result in more equity/stocks are being disposed off at higher prices, therefore enhancing the return of the portfolio.

On the second measure of balancing on mid-month rather than month-end basis, the results indicated that the month-end PP always perform better than the mid-month PP over the same rebalancing frequency. When balanced annually, the impact was particularly significant, with the month-end PP generating a cumulative return of 579% vs the return of the mid-month PP of 540%. When balanced on a quarterly basis, the direction of the impact is the same, but the magnitude of the impact is not so significant, with the month-end PP's performance of 405% vs 391% of the mid-month PP. This again seems to support the argument that the "window-dressing effect" as mentioned above was more obvious at the end of the calendar year and is not a significant factor in other months of the year.

The conclusion for this study was that increasing the frequency of rebalancing or doing the rebalancing in the middle of the month would not enhance the returns of the permanent portfolio. The

industry's focus to make the "annual report" looks good would help the permanent portfolio's performance.

REFERENCES

Anderson, H., Marshall, B., & Miao, J. (2014). The permanent portfolio. *Applied Financial Economics, 24*(16), 1083-1089.

Benartzi, S., & Thaler, R. H. (2001). Naive diversification strategies in defined contribution saving plans. *American economic review*, 79-98.

Dichtl, H., Drobetz, W., & Wambach, M. (2014). Where is the value added of rebalancing? A systematic comparison of alternative rebalancing strategies. *Financial Markets and Portfolio Management, 28*(3), 209-231.

Rowland, C., & Lawson, J. M. (2012). *The Permanent Portfolio: Harry Browne's Long-Term Investment Strategy*: Wiley.

Wong, T. M.-H., & Li, K. C.-K. (2015). A Portfolio for All Seasons: Does it Make Sense? *International Conference on Accounting and Finance (AT). Proceedings*, 15.