Good Investments are Stable: Analysis of Dynamical Asset Allocation Strategies

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Abstract 

In this article we present a new rating approach. We measure and valuate the stability of 
performance and risk and the stability of the management strategy inherited from funds 
and indices. Our rating scorecard relies on measures derived from a retroactive analysis of 
turning points, of structural breaks, and of non-stationarities. Results are demonstrated by 
comparing dynamically allocated funds with a fixed balanced fund strategy. Our approach 
is in many aspects complementary to fund ratings provided by Morningstar, Lipper, and Feri. 

Introduction 

Several rating services offer a quality monitoring of funds. The big players in this field include, Morningstar, Lipper, and Feri. The Morningstar “Star Rating” offers an approach to analyse costs and risks of similar funds within in the same peer group. The Lipper “Leader Rating System” uses investor-centred criteria to deliver a description of a fund’s success such as preserving capital or building wealth through consistent, strong returns. The Feri “Fonds Rating” is based on an approach to evaluate management quality of investment funds. 

Common to all three rating approaches is that the “true stability” aspect of an investment is only partly reflected in their rating rules. We have recently developed a monitoring process that allows to sort funds with respect to stability concerning the price process. In this sense stability means that the underlying dynamical process of the price is stable and not significantly changing over time. So, for “stable processes” we do not observe structural changes or even structural breaks when economic and financial market conditions change over time. As a consequence we observe a steady increase in wealth with low drawdowns paired with short recovery times. This defines our measure to distinguish more stable from less stable funds. 

In this article we show some examples how our stability rating works. Three indicators are presented and discussed: (i) Turning Point Analytics, (ii) Bayesian Change Point Analytics (BCP), and (ii) Morlet Wavelet Spectral Analytics. All three approaches are described in Setz and Würtz [2014], so we refer for details to this reference. 

In Chapter 1 we describe how stability monitoring works and describe the selected funds, indices and portfolios. We introduce the analytics and briefly describe how to use them. In Chapter 2 the examples are presented and discussed. A short summary puts the results together.
1 Stability Monitoring

Three pillars expressed by charts define our monitoring. First we look on the wealth and calculate
traditional performance, evaluate risk measures, and explore cyclic behavior by analyzing turning points.
The second step performs a Bayesian change point analysis of the dynamics of the price process. And
in a third step we overall visualize the time-frequency behaviour by calculating the wavelet spectrum to
locate non-stationarity in the time series.

Selected Funds, Indices, and Portfolios

To demonstrate how these approaches work, we use as examples for our analysis the following funds and
indices:

- Swiss Balanced Pension Fund Benchmark
- Walser German Select Fund
- Carmignac Patrimoine Fund
- Societe Generale Harmonia Fund
- Barclays Dynamic Balance Index
- Morgan Stanley Dynamic Allocation Index

We have selected these series for the reason, that they follow different allocation strategies. The Swiss
pension fund [2014] follows a strategic allocation with fixed weights over time. No strategic concepts are
considered to protect the wealth and to level the risk over time. The remaining five funds are dynamically
allocated. For each example the allocation strategy is quite different. The Walser [2014] German select
fund strategy is based on exchange option strategies for the equity and bond asset class. The Carmignac
Patrimoine [2014] fund was chosen since it underlies a human inspiration and research based strategy
followed by one manager since inspection of the fund. The Societe Generale Harmonia [2014] fund is a
an allocation strategy between equities and bonds using realized volatility rules. And finally, Morgan
Stanley’s Dynamic Allocation Index [2014] that implements a diversification strategy on four major asset
classes of Exchange Traded Funds.

Chart: Turning Points Analytics

The logarithmic wealth chart displays the performance of the considered fund or index over the last 10
years beginning January 2005, and ending December 2014. On a logarithmic scale we expect for a
good wealth a straight line with a constant (stable) slope over time. The orange (return) ruler on top
of the chart gives a first impression about the variability of the slope. The blue half tone regions mark
downturn periods obtained from a retroactive spline based turning point analytics. The turning points
are marked by red points.

What distinguishes a good from a bad fund? Several scores can be calculated. First the ratio of the sum
of the widths of all blue half tone regions to the length of the overall time period should be as small
as possible. This rule is correlated with the number of turning points. A fund with a small number of
turning points showing small drawdowns should be higher rated.

Do not forget: From the wealth and the derived return values we can also calculate traditional performance
and risk numbers like average returns, standard deviations, volatilities, drawdowns, recovery times, sharpe
ratios, expected shortfalls, and many others.
Chart: BCP Analytics

The BCP analytics performs a Bayesian change point analysis according to Barry and Hartigan [1993] in the framework of a Markov Chain Monte Carlo Simulation according to Emerson and Erdman [2008] as described by Setz and Wuertz [2014]. The results are the posterior mean (performance), the posterior variance (risk), and the posterior probability (stability) that the next point will be a change point in the dynamical process of the underlying price or index series. The graph displays several indicators derived from the posterior measures. The grey bars with a black point on top give the numbers for the change point probabilities: zero means stable, one denotes an almost sure change in the dynamical process. The colored rainbow band gives a measure for the overall strength of the probabilities: low values with a narrow surrounding band indicates stable dynamics. The black curve around the orange line is a twiggling indicator for falling (above the horizontal line) and rising (below the orange line) prices/indices. As an additional information the thin curve on top of the chart measures the drawdowns $D_t$ as $1 - D_t$.

From this chart we can derive several rating criterions for the quality and stability of a fund: (i) the mean and worst 5% change point probability, (ii) the variance of the change point probability, (iii) the average spread of the rainbow band, (iv) the number of crossings in the rainbow band, and (v) regression error for the twiggling indicator.

Chart: Morlet Wavelet Spectrum

As further information we perform a spectral analysis using a Morlet Wavelet [1997] that is an extension to the well known Fourier transformation. Both are time-frequency analysis tools, but wavelets can be used for non-stationary time series analysis. The wavelet power spectrum allows to filter out beside stationary also transient signals. Thus instabilities caused by bubbles, crashes, and any other kind of market turbulences can be extremely well visualized and that makes the value of the wavelet approach.

What kind of scores can be extracted from the Morlet wavelet? First of all, the spectrum should be in its color as unique as possible. As a consequence the dark red 5% islands of high volatility should be as diverse as possible over the whole spectrum. Thus many small islands indicate a much higher overall stability compared to a spectrum with only a few islands. In addition the maximum variability should be as small as possible, its value is given by the right end side of the levelling ruler on top of the spectrum. Furthermore we can calculate overall statistics of the power spectrum, i.e. the mean value and its standard deviation.

2 Examples

In this chapter we present and discuss six examples. These examples demonstrate impressively the importance of stability for fund selection: A steady performance with low drawdowns and short recovery times, a dynamical structure free of structural changes and breaks, and a stationary power spectrum for a homogenous price process.
Example 1: Swiss Balanced Pension Fund Benchmark

The family of LPP 2005 indices from Banque Pictet [2015] is the Swiss pension fund benchmark. The LPP 40 is a balanced fund holding with static weights composed of equities, bonds and money market instruments, with a limited weighting in alternative investments. The fund’s strategic equity weighting is 40%. Source: Banque Pictet.

Figure 1: The LPP40 benchmark index is a statically weighted fund. So it does not astonish that the losses during the sub prime crises and the European debt crises were distinctive. In the spectrum we find two major loss periods that are related to these crisis. The BCP rainbow shows large spreads demonstrating a further weakness of the index. In the Morlet spectrum the sub prime crisis is the dominant source of non-stationarity.
Example 2: Walser German Select Fund

The Walser [2015] German Select Fund is a mixed portfolio that invests exclusively in DAX stocks and German Federal bonds corresponding to the REXP bond market index. Asset allocation is based on a dynamic model. That means the fund invests 50% in stocks and 50% in bonds at the beginning of each year. In the course of the year, successive investments are made in the higher-performing category. By the end of the year up to 100% of investments can be in one category. The basic aim is to allow customers to have their investments in the better category at the end of each year, thus achieving higher returns less the implicit costs of the strategy. Source from: Walser Privatbank.

Figure 2: The Walser German Select Fund is a so called best-of-two funds adapting investments between equities and bond. This mechanism improves the stability during the sub prime crisis, and splits the losses into two periods. The most significant instability in this fund arises from the European debt crisis. The performance insufficiencies of this fund are visible in seven small but distinctive aereas in the power spectrum.
Example 3: Carmignac Patrimoine Fund

Carmignac Patrimoine [2015] is a diversified fund which relies on three performance drivers: international bonds, international equities and currencies. Its minimum investment limit of 50% in fixed income and money market instruments enables a flexible and balanced allocation that aims to minimise the risk of capital fluctuation while seeking the best sources of return. Source from: Carmignac SA.

Figure 3: Carmignac Patrimoine offers a broad diversified fund managed over 18 years by the experience of the same management. The BCP analysis is quite impressive, no serious instabilities due a changing dynamics can be observed. Only the Morlet spectrum shows some minor non-stationary behavior around the sub prime crisis.
Example 4: Société Générale Harmonia Fund

Société Générale Harmonia is a systematic index providing access to a multi-asset allocation based both on a risk budgeting model (ERC equal risk contribution methodology) developed by the Lyxor quantitative team, and on a trend following mechanism. The index aims to provide investors with stable performances during bullish periods and to limit market drawdowns during bearish periods while maintaining volatility near a predefined level. To determine the allocation the quantitative model follows three steps: (i) A strategic allocation thanks to ERC that enables the calculation of the optimal weighting of each asset within the portfolio (ii) a tactical allocation thanks to a trend following in order to benefit from positive trends (iii) a mechanism to maintain volatility near a predefined level of 6%, thanks to a volatility target mechanism. Source from: Société Générale.

Figure 4: What makes the Harmonia fund so interesting is the underlying parity risk budgeting model. Weak structural changes become evident around the sub prime crises. In comparison to the Carmignac Patrimoine fund we observe in the spectrum longer transient signals.
Example 5: Barclays U.S. Dynamic Balance Index

The Barclays U.S. Dynamic Balance Index [2015] reflects the performance of an allocation strategy between the S&P 500 Index and the Barclays U.S. Aggregate Bond Index in accordance with a rules-based model. On a daily basis, the index attempts to allocate weights to the two underlyings based on the historical realized volatilities of both indices. In general, relatively higher realized volatility will mean a relatively smaller weight allocation. For the determination of the weights 20-days and 40-days realized volatility levels are used. Source from: Barclays.

Figure 5: Barclays dynamic balance fund follows like the Walser fund a best-of-two strategy, but the way how the funds are balanced is completely different. Barclays fund make use for rebalancing from historical realized volatilities. A major difference to the other funds is the behaviour during the European sub prime crisis: The duration in time is shorter, and the width in frequency is broader.
Example 6: Morgan Stanley Dynamic Allocation Index

The Morgan Stanley Dynamic Allocation Index consists of four major asset classes of U.S. listed Exchange Traded Funds (ETFs) and an index, representing Equities, Short-Term Treasuries, Bonds and Alternatives. Maximum allocation limits apply so that no single sub-asset class except Short-Term Treasuries and cash can represent 100% of the index exposure. Having a diverse range of asset classes that make up the index may help achieve more stable and less correlated returns than single asset indices. Four times a month, around one-quarter of the index exposure is rebalanced, resulting in an index that potentially could experience fewer high and low swings relative to an index that rebalances less frequently. Source from: Morgan Stanley

Figure 6: We have selected the Morgan Stanley dynamic allocation index because it is fully designed from ETFs. The components were dynamically selected to achieve a high stability of the underlying price process. The spectrum has many commonalities with those of the Carmignac Patrimoine and SGI Harmonai funds.
3 Summary

In this article we have demonstrated a conceptually new rating approach measuring and valuating the stability of the underlying dynamical process and the management strategy of funds and indices. We have compared a static managed balanced fund (LPP40) to those of dynamically allocated funds (Walser, Carmignac, SGI, Barclays, and MSCI). What we have demonstrated is that a combination of a retroactive analysis of (i) turning points, of (ii) structural breaks, and of (iii) non-stationaries results in a powerful scorecard.

Although it seems that dynamically allocated funds paired with elaborated management strategies are superior compared to static balanced funds, one should be careful. Of course, stability is one of the most important drivers for well performing and low risk funds, but it cannot account for any component of possible vulnerabilities. Our approach is in many aspects complementary to fund ratings provided by Morningstar, Lipper, and Feri, giving special emphasis to the stability of the underlying dynamics of the price process.

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