The idea of multi-asset investing is not new. One predecessor of the multi-asset portfolio was the balanced portfolio, which held fixed proportions of bonds and equities. With increased accessibility of different asset classes worldwide, multi-asset investing became mainstream for 2nd generation asset allocation methods (multi-factor/multi-period models), from approximately 2000-2010 (Azmi, Schuller, 2013). Constructing optimally diversified multi-asset portfolios remains even more relevant for investors following the premises of 3rd generation asset allocation methods, like adaptive asset allocation (Sharpe, 2010) or adaptive risk management techniques (Lo, 2004, 2010), based on applied behavioral finance insights.

Surprisingly after all those years, the core question remains unanswered: how to know whether a multi-asset portfolio is well managed?

Many institutions built their internal policy portfolio to judge and measure their strategic multi-asset allocation choices. However, these policy indices are built according to the investment management's preferences and expectations on risks and returns associated to each asset class. This process excludes any further consideration since it starts with discretionl assumptions. Other institutional investors run peer group comparison between multi-asset managers or measure their portfolio against total return indices. All of those cases above are workarounds only.

Investors miss a policy portfolio benchmark at the very beginning of their multi-asset investment process, which can be used as first benchmark for any further asset allocation decision. The purpose of our research was to build a multi-asset, market-weighted policy portfolio index, based on the measures of the global capital stock, therefore genuinely untouched by any kind of active thinking. This index should represent the most comprehensive market portfolio against which to measure any active decision.

CURRENTLY AVAILABLE RESEARCH
Initially, our research focused on measuring the current -economic stock of different assets worldwide. The challenge was big, as only limited primary or secondary research is available on measuring the Global Capital Stock. McKinsey (2011) and Deutsche Bank (2014) targeted to map the global financial assets. Both of their research efforts were explicitly limited to financial assets and therefore incomplete in covering the global capital stock. Another attempt by Dowswijk, Lam, and Swinkels (“Global Multi-Asset Market Portfolio 1959-2012”, 2014) only considers what we call a level 3 “Investable Policy Portfolio” as starting point of their research. Understandable reduction of complexity, but insufficiently comprehensive for our research target.
The Global Capital Stock 2005-2014
A Natural Benchmark for Multi-Asset Portfolios

Our conducted research especially on illiquid global stock components such as real estate, land and private equity could have only been done thanks to the contribution of several international institutions such as the OECD, BIS, Global Data Gaps Initiative, SME Europe, the European Commission and (hedge) fund managers like Strategos Capital Mgmt. Due to their support, we gained access to data or won insights on their interpretation and manipulation. At this point we would like to sincerely thank all the institutions and fund managers who supported our project.

Conclusively, our research on accurately measuring all three levels represents the most comprehensive research conducted in that field so far, but still represents only the beginning of an ongoing optimization process. This optimization process perspective shaped our research when covering the Global Capital Stock of 11 assets and their major changes since 2005. When considering an extension of the time series pre 2005, the trade off with regards to the quality and availability of data would have been too unfavorable.

Only in recent years, academia benefitted from the increasing reach and quality of databases like OECD Stats. Exemplarily, we want to highlight research on specific asset classes in certain geographies such as New Estimate of Value of Land of United States (Larson, 2015). We used those kind of works not just for retrieving data but also to interpolate applicable findings to other uncovered areas.

We recognized that even 7 years after the Great Recession, the world is still suffering significant data gaps in its understanding of the Global Capital Stock.

Driven by projects like the G20/IMF/FSB Data Gaps Initiatives, ongoing improvements on measuring the global flow of funds and stock values are achieved. They are systematically addressing those issues. We can therefore expect further improvements ahead.

Panthera Solutions Categorization
The Global Capital Stock 2005-2014
A Natural Benchmark for Multi-Asset Portfolios

FINDINGS
The two figures to the right visualize our research findings when measuring the Global Financial Stock per asset class, firstly expressed as percentage and lastly in Trillions of USD.

We aimed for high levels of granularity when measuring each single asset class. With regards to public equity we built a basket of 94 countries (level 2) where we can observe daily market capitalizations with their relative weights and compute the performances. The public debt is monitored quarterly and it is represented by several Bloomberg indices for government securities and several ETFs for corporate bonds (level 2). Cash and money market instruments are represented by the main money market ETFs and cash deposit actually earning no interest (level 2). Regarding the amount outstanding of the whole publicly traded debt we based our computation mainly on BIS data and Bloomberg indices capitalization (level 1).

Securitised and nonsecuritised loans are represented by some specific Barclays indices for Euro area and for the US, while with regard to other markets we used the best available option (level 2). Again we based our computations for the amount outstanding on the BIS data (level 1). Lastly with regards the alternatives we used global indices for real estate and private equity released quarterly by Cambridge Associates (level 2), while for the land we divided the aggregate value between forestry/timberland (roughly 85% of the total value of land) and agricultural land (15% of the total land value). We used the NCREIF Timberland Index and NCREIF Farmland Index to replicate the performance (level 2).

Source: Panthera Solutions computations on McKinsey, Deutsche Bank, BIS, OECD, La Salle, data.
The Global Capital Stock 2005-2014
A Natural Benchmark for Multi-Asset Portfolios

With regards to the volume, the alternatives clearly represented one the most challenging task. We addressed it by consolidating different studies and sources, or by making estimates. The public equity see a consistent and unchallenged domination by the United States. China, although highly volatile, tripled its weight over the 10 year period (Level 2).

The graph bottom right plots the evolution of nonsecuritized loans in terms of geographic exposure. We would like to highlight the growing weight of China and the relative decline of Japan’s segment as a result of the rebalance in the global economies. Lastly we tested the performance of the Policy Portfolio (level 2) against a global 60-40 portfolio and the gestaltu portfolio, which represents an alternative liquid market portfolio.

Source: Panthera Solutions computations on Bloomberg data.

Source: Panthera Solutions computations on BIS data.

Source: Panthera Solutions computations on McKinsey, Deutsche Bank, BIS, OECD, La Salle, Bloomberg data.
The back-testing started at the end of 2010 due to lack of data for previous years. However we look for updating our computations as more data become available.

VALIDATION AND CONCLUSIONS
By comprehensively measuring the Global Capital Stock and its two byproducts: the Policy Portfolio (level 2) and the investable policy portfolio (level 3), we understand our research as a first achievement towards reliably defining a natural benchmark for multi-asset portfolios. When comparing a multi-asset portfolio with the policy portfolio (level 2), one can derive first conclusions on the asset managers active decisions in terms of his strategic asset allocation configuration.

The limitations of our research revolve around the margin of error in measuring the Global Capital Stock. However we feel strongly optimistic about future development about data gap initiatives which will further reduce the margin of error.

We will continue our efforts on searching
- for better measures of the Global Capital Stock,
- for finding better indices to covering the Global Capital Stock (level 1) for the Policy Portfolio
- and for converting the Policy Portfolio (level 2) into an Investable Policy Portfolio (level 3).

The results of our ongoing optimization process will be accessible through the quarterly publication of the PS Policy Portfolio Index (level 2).

BIBLIOGRAPHY EXCERPT
ABOUT PANTHERA SOLUTIONS

ABOUT US

Panthera Solutions – based in the Principality of Monaco – provides Strategic Asset Allocation Intelligence for professional investors - primarily in Europe.

OUR SERVICES

We offer investment process optimization for the management of multi-asset-portfolios. Our solutions are based on the third generation of asset allocation principles.

We are a team of internationally renowned specialists in different fields. Our assignments and publications have proven us to be innovation leader in Germany, Austria and Switzerland.
**ASSET ALLOCATION GENERATIONS**

1950-2000

1GEN

Single-Factor / Single-Period Models
Traditional Equity/Fixed Income Beta

2000-2010

2GEN

Multi-Factor / Multi-Period Models
Globalized Multi-Asset-Diversification

2010 -

3GEN

Applied Behavioral Finance Techniques
Dynamization of Multi-Asset-Diversification, Risk Factor Allocation and proactive reduction of behavior gaps

OUR CORE COMPETENCE

EDUCATE

IMPLEMENT

PRACTICE

EMPOWERMENT

THE PANTHERA EXPERIENCE
CONTACT US

49, Avenue Hector Otto
MC 98000 Monaco

+33 674 274 986

info@panthera.mc

www.panthera.mc

@panthera_s

Company ID
09P07550

DISCLAIMER

This material is for your information only and is not intended to be used by anyone other than you. It is directed at professional clients and eligible counterparties only and is not intended for retail clients. The information contained herein should not be regarded as an offer to sell or as a solicitation of an offer to buy any financial products, including an interest in a fund, or an official confirmation of any transaction. Any such offer or solicitation will be made to qualified investors only by means of an offering memorandum. The material is intended only to facilitate your discussions with Panthera Solutions as to the opportunities available to our clients. The given material is subject to change and, although based upon information which we consider reliable, it is not guaranteed as to accuracy or completeness and it should not be relied upon as such. The material is not intended to be used as a general guide to investing, or as a source of any specific investment recommendations. Past performance is not a guide to future performance. Future returns are not guaranteed and a loss of principal money may occur.

© 2015 Panthera Solutions. All rights reserved.