Strategic Asset Allocation over the Long-Term (SAALT)

Calculating the Global Market Portfolio

A research note

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General considerations

This report documents the exercise of estimating the investable global market portfolio, termed empirical global market portfolio (GMP) hereafter. Given the geographic dispersion and imperfect tracking mechanisms for trading volumes on some of the asset classes, important choices have to be made regarding comprehensiveness and tractability. Among them, the granularity of the portfolio features prominently, i.e. how many different asset classes should be considered. The general goal is to obtain asset classes that are different in an economic and statistical sense. However, there is a clear trade-off between granularity and tractability. Too little granularity means aggregating very different securities in one asset class. Too high granularity produces many different asset classes that are rather similar. Furthermore, in a context of applying Black-Litterman asset allocation modelling in the steps ahead, diverging prior expectations on too fine-grained individual returns might generate false precision. It also becomes increasingly difficult to obtain reliable and consistent time series for all individual asset classes.

When setting the level of granularity, the size of the asset class as well as geographical distribution and level of development are important guiding principles. Dividing along these axis is interesting because one can clearly see the relative importance of regions in one point in time as well as shifts across time. The growing economic and financial importance of emerging Asia, for example, becomes evident across all asset classes from equity over debt to real estate markets.

The composition of the GMP has also been guided by the aim to use it as starting point for SAALT's own portfolio, having the same asset classes but different weights. Within a framework and spirit of Black-Litterman, the calculated weights of the empirical GMP, together with the historic variances and covariances of the individual securities, allow backing out the market expected return for the portfolio components. The divergence in expectations of return by SAALT's Investment Committee (IC) members are then fed the same Black-Litterman framework so as to readjust the GMP's weights accordingly.

Benchmarking against similar exercises

Two relatively recent studies that also calculate the global market portfolio are Doeswijk et. al. (2014) and Hewitt EnnisKnupp (2014). They will serve here as benchmarks, particularly for comparison among the broad sizes of individual asset classes. As shown in Table 1, Doeswijk et. al. (2014) have opted for a less fine-grained approach. In the paper they do not apply any regional differentiation, besides the division between developed and emerging debt. Furthermore, they do not include commodities or other real goods, which are often looked at in the context of asset allocation. The research report of Hewitt EnnisKnupp (2014) has a much higher degree of differentiation between asset classes; but it rather segments by levels of economic development and less so in terms of geographical distribution. It also includes some asset classes that are excluded in our own exercise because of their rather small size, or due to the difficulty of access for a standard retail investor, or both.

Table1: Asset classes considered

SAALT		Hewitt EnnisKnupp (2014)	Asset classes in Doeswijk et. al. (2014)
Adv. Markets Equity	- N America - Europe - Asia Pacific	U.S. Equity ex REITs	Equities (globally, including emerging and advanced)
		Non-U.S. equity (Developed) ex REITs	
EM Equity	- Americas - Europe, Middle East and Africa - Asia Pacific	Emerging Markets equity ex REITs	
Frontier Markets	- All available	Frontier Markets equity ex REITs	
Private Equity	- Global	Private Equity	Private equity
		Private (unlisted) Infrastructure	
Debt Markets	- US aggregate index - Canada broad bond index	U.S. Bonds (Investment Grade)	Government bonds (developed)
	- Pan-European aggregate index - LATAM index - Asia-Pacific aggregate index	Non-U.S. bonds (developed) Emerging Market bonds (sovereign; USD) EM bonds (corporate; USD)	Emerging market debt Investment-grade credit
	- Global high yield Index	High yield bonds	High yield bonds
		Bank loans	
	- World inflation-linked index	Inflation-linked bonds	Inflation-linked bonds
		Insurance-linked securities	
Real Estate	- North America - Europe - Asia Pacific	Private real estate debt	Real estate
		Private real estate Equity	
		Public real estate equity	
Other Real Goods	- Timber & forestry	Timberland	
Commodities	- Oil & gas, metals, agribusiness	Commodities	
		Money Market/cash equivalents	

Timespan and index families

The choice of historic coverage and index products was guided by data availability and consistency of results. The timespan analysed starts in 2006 and ends in September 2016. While many of the used indices and security prices would also be available for a longer time period, some regional equity indices actually have a later starting date and therefore need to be extrapolated back. Hence, in order to avoid additional index transformations and lack of comparability between asset class sizes, the cut-off date was set about ten years in the past. The reason for resorting to index based asset classification and coverage was the need to guarantee comparability of data across asset classes, regions, and time. Having that in mind, we have tried to restrict the usage of index families to the same provider, which allowed to segregate and compare, and therefore it provided a simple way to exclude overlaps in data aggregation. For equity market disaggregation we have resorted to the indices provided by MSCI, which allow a sufficiently granular and consistent breakdown between levels of development and regions[1]. The most comprehensive and detailed breakdown of the global bond market is provided by Barclays Capital[2]. Nonetheless, in order to guarantee the inclusion of Latin America, we have also used an index from the JP Morgan Bond EM index family.

While using index families' results in the listed advantages of internal consistency, it comes at a price. That price is the dependence on the inclusion criteria for individual securities, the accuracy and diligence in covering the breadth of the named asset class by an independent provider. One example to illustrate this point is to look at the aggregate Asia-Pacific bond market. We have used the *Asian-Pacific Aggregate Index*[3] from Barclays, which excludes securities such as:

- Contingent capital securities, including traditional CoCos and contingent write-down securities, with explicit capital ratio or solvency/balance sheet-based triggers
- Privately placed and retail Japanese government bonds (JGB), including "Shin-madohan" issuance (as of April 1, 2014)
- Bonds with equity type features (eg, warrants, convertibles, preferreds)
- Inflation-linked bonds, floating-rate issues
- Structured notes, pass-through certificates
- Illiquid securities with no available internal or third-party pricing source

The exclusion of many of the listed securities is reasonable in the context of our exercise, e.g. inflation linked bonds are aggregated in a separate category. Nonetheless, when comparing the overall total nominal size of the estimated market, it becomes evident that large differences exist depending on the source of data. While the Barclays index calculates total bond market capitalization to stand at around 8.3 trillion US Dollars, the estimates from the Asian Development Bank (ADB) rather indicate the total nominal size to be roughly twice as large[4]. Three main reasons have convinced us to still continue using Barclays as the source of aggregated bond market data: 1) the unavailability of a detailed structure and documentation of securities considered by sources such as the ADB; 2) our need to have a consistent methodology to compare across

[1] For details see https://www.msci.com/market-cap-weighted-indexes
[2] For details see https://index.barcap.com/Home/Guides_and_Factsheets
[3] For details see https://index.barcap.com/indices/action/indexDownload?id=7d64910ed89557365f426cbf5aa7b1e6
[4] For details see https://asianbondsonline.adb.org/regional/data/bondmarket.php?code=LCY_in_USD_Local_Total

regions; 3) necessity to exclude some securities such as inflation linked bonds; and 4) the ballpark similarity of the Barclays estimates to those generated by the two other studies analysed here.

A detailed analysis of the asset classes

Equity

The asset class was split into developed, emerging and frontier markets, and then clustered further regionally into North America, Europe and Asia/Pacific. Frontier markets were kept on a global level, since they are still relatively small. The reasons for choosing a regional breakdown are manifold, two of the main ones being i) the broad similarity in macroeconomic and financial development patterns within these regions, and ii) the fact that financial analysts tend to report their expectations in those groups. Consequently, it is easier to apply the Black-Litterman framework since both historic as well as forecasting analysis are available.

A potential further division could have been between small and large/mid cap stocks. This used to be regarded as an important distinction, since some empirical exercises were able to show a small cap premium. The underlying theoretical argument stated that smaller companies were more volatile and less transparent, and therefore there should be a return premium to be paid to investors for this non-diversifiable risk. However, recent research shows that this premium cannot be verified throughout various stretches of time over the last 100 years.[5] Hence, within the strategic asset allocation debate, the small versus large cap argument has played a continuously smaller role. For the purposes of our GMP exercise we have therefore used the overall market by region, where small and large caps are bundled.

For the equity coverage of the portfolio, the MSCI indices were chosen for the reasons discussed, broad regional coverage and stage of development segmentation. The index data is obtained from Bloomberg. The MSCI indices usually exist in several types per region: a standard (without any specific ending) that contains large and mid cap companies, a small cap version, and an 'IMI' (investable market) version, which are the sum of the first two.

For Emerging Europe, Middle East and Africa (EMEA) the IMI was constructed by adding the standard and the small cap index.[6] Since the time series for the EMEA index starts in 2010, the European index was used for the time before. The difference is likely to be small, since the developed EMEA is the same as Europe plus Israel. [7] One can see from the numbers that the market capitalization of Europe and EMEA are almost the same. For both North America and developed Asia/Pacific, the IMI index exists only from 2010

[5] A good overview can be obtained here: http://ibd.morningstar.com/article/article.asp?id=631329&CN=brf295,http://ibd.morningstar.com/archive/archive.asp?inputs=days=14;frmtId=12,%20brf295 .

[6] For the EMEA IMI index, a market value from Bloomberg could not be obtained (while the index price could be retrieved).

[7] The data is correct from 2010 onwards. The error before 2010 cannot be quantified. In 2010 however, the first time both were available, the difference between the European Index and the EMEA were 100bn USD, compared to a total market capitalisation of 9.0 and 9.1 tr. USD, respectively, i.e. 1.1.%.

onwards. Hence, the IMI was again constructed as described above, using equivalent/similar indices. For frontier markets, the standard and not the IMI index was used, since the later might not be investable[8].

Private Equity

Obtaining a clean and easily available estimate of the market value of all private equity investments is hardly possible. For instance, the value of all listed private equity is only roughly a third of the estimated market value. Therefore, we resort to the estimated market value numbers of the research agency 'Preqin', published in their 'Preqin Global Private Equity & Venture Capital Report'. The latest report of 2016 contains their estimate for 'Private equity and venture capital assets under management' for the years 2000-2015.[9] It should be noted that in each report the last available figure is from June of the latest year, while all historic figures are from December[10].

Debt

In debt markets, the asset class granularity can be determined at least along three dimensions: geography, issuer and risk.[11] First, one can group issuers regionally, which tend to have broadly similar business cycles, like Europe or North America. Second, one can classify bonds according to the type of issuer, i.e. sovereigns and corporates (the two most important ones), but also supranational organisations, municipals, mortgage debt etc. Lastly, the default risk can differ, even for the same issuer. For corporates, this is a well-known feature, since they will be sliced in senior and junior debt, and possibly several tranches in between. For government bonds an important distinction is between regular and inflation-linked bonds.

To obtain a reasonable trade-off between tractability and granularity, the following classes are chosen: Asian-Pacific Aggregate Index, Pan-European Aggregate Index, US Aggregate Index, Canada Broad Bond Index, LATAM Broad Index, World Inflation-Linked Securities Index and Global High Yield. The segmentation into the different regions of the Americas was due to the unavailability of a single index. In total, the market capitalisation of the indices add up to almost the value of the Barclays Global Aggregate.

On a first level, following the same segmentation reasoning as for equities, debt markets were split into geographic regions. On the second level though, segmentation did not take place in levels of development, but rather into the more important distinction between classes of risk. Hence, bonds were separated into investment Grade (AAA to BBB in S&P ratings) and high yield (everything below BBB). Since the high yield segment is rather small, it makes sense to group it globally. Lastly, inflation linked bonds constitutes

8 The difference between the IMI and the standard version is relatively small at about $100bn.
9 https://www.preqin.com/docs/samples/2016-Preqin-Global-Private-Equity-and-Venture-Capital-Report-Sample_Pages.pdf
10 Form the 2015 report, the numbers from Figure 3.1. have been used, combining 'Unrealized Portfolio Value' and the 'Dry Powder'. For 2016 estimate, return of "S&P Global Listed Private Equity Index USD" (Ticker: GLPEX) from 30.6.2015 to 22.09.2016 is used to extrapolate.
11 Sometimes also the dimension time is used, i.e. bond with maturities in a certain range. Although the time to maturity is important for yield and risk, this dimension is rarely considered.

a very different asset in terms of risk. Since regional markets are relatively small this asset is aggregated globally.[12]

The most widely used debt indices are the ones provided by Barclays Capital. The market capitalization of the selected debt indices are obtained from DataStream.

Commodities

Commodities are a very difficult case. The major problem is that a measure like market capitalization does not exist for this asset class. Furthermore, it is unclear how much of the total exposure to commodity risk in the world is already contained in the equity prices: The majority of all commodities are produced by listed companies. The price of their equity is the sum of all discounted future dividends, which depend on the profits, which depend on commodity prices. Hence long-term commodity prices are the major driver for the price of commodity producers' equity. On the other hand, industries that buy commodities to manufacture products have the opposite risk. Higher prices for their inputs increase their costs and, due to higher selling prices, probably decreasing their sales. Hence a major part of the commodity price risk is already incorporated in listed equity. Theoretically, there could be remaining risks for two reasons. First, there are commodity producers that do not have listed equity. Second, companies could sell parts of their risk to other parties using derivatives or long-term contracts. If these parties are not listed companies, wealth management companies, (non-corporate) financial investors, among many others, this fraction of risk is not reflected in the listed equity prices.

It can be assumed that this fraction of risk is rather low. Several sources say that the amount of managed investment assets linked to commodities is around US$400 billion at the moment.[13] Just to provide a comparative figure, the global amount of produced oil is estimated by several sources to be around 2 trillion USD or more per year.[14] The estimated fraction of the broader commodity production relative to total GDP is about 10% (global GDP was 77 tr. USD in 2014[15]). The amount of global commodities exports reached 6.1 tr. USD in 2011.[16] These figures illustrate that the invested money is only a small fraction of the total global commodity production. Furthermore, the AUM related to commodities are more of an upper threshold, since in the reported AUM figures there are long and short positions held by financial investors, which cancel each other out. Hence, the actual net amount of risk sold by the industry could be lower.[17] For practical purposes of analysing the market size, a commonly used source are the numbers sporadically

[12] A regional division was considered, since the majority of these bonds come either from North America or Europe. But on global aggregate data was available in DatasStream, so this idea had to be dropped also for practical reasons.
[13] See for example http://www.reuters.com/article/us-commodities-aum-barclays-idUSKCN0QB1ID20150806 or http://www.commodityfact.org/faqs/.
[14] See e.g. https://www.iea.org/aboutus/faqs/oil/. The estimated production amount is 35 billion barrels per year. With the recent drop in oil prices this would amount to about 1 trillion USD. However, average prices of the past years, the number is much higher.
[15] See also World Bank: http://data.worldbank.org/data-catalog/GDP-ranking-table
[16] http://unctad.org/en/pages/InformationNoteDetails.aspx?OriginalVersionID=38.
[17] This theoretical argument is given support by some of the results of Bhardwaj, Gorton and Rouwenhorst (2015), who claim that only a fraction of 25-40% of all open interest in futures (which is less than the AUM in commodities) is held by speculators, and that the major fraction is held by hedgers. However, they already point out that their identification is noisy.

provided by Barclays Capital, [18] but a continuous time series is not publicly available.[19] The freely available and often used alternative is compiled by BarclayHedge. They provide a time series of 'CTA Industry - Assets Under Management' on their website.[20] This time series is roughly similar to the data points obtainable from Barclays Capital.[21]

While the actual investment positions in commodities is not very transparent and relatively small, there are some good arguments to still include it as a separate asset class. An important contribution related to returns of commodity prices is presented by Gorton and Rouwenhorst (2006) and the update in Bhardwaj, Gorton and Rouwenhorst (2015).[22] They argue that commodities could offer similar returns as equities, but have low or even negative correlations with either stocks or bonds. However, their study has at least two weaknesses. First, they use an equally weighted index of several traded commodities. Some of the very good returns stem from rather small commodities like coca beans. Furthermore, they only use data after 1959. Dwyer, Gardner and Williams (2011) show that real commodity prices have been declining from 1900 to 1970 for oil and from 1900 to the early 2000s for agriculture and metals.

Real estate

Obtaining a clean and easily available estimate of the market value of all real estate is hardly possible. The value of all listed real estate is only a fraction (about a third) of some estimates of the institutionally owned real estate (and even less of the total real estate). Furthermore, the analysis is complicated by the fact that some of the sources combine both equity and debt related to real estate[23], while we will focus on the equity part only, so as to avoid potential asset class overlaps.

The paper of Doeswijk et. al. (2014) uses an estimate of 4.0 tr. for 2006 from the real estate specialist of RREEF Real Estate Research, and then it extrapolates missing points by the returns on a global real state index, the 'GPR General PSI Global Index'. As a cross check, the paper references a similar estimate reached in Idzorek, Barad and Meier (2007), who calculate that this measure of the global real-estate market revolves at around USD 4.6 trillion.

For the current exercise, we will use the $4.0 tr. measure of tradeable real estate (equity) market in 2006 from Doeswijk et. al (2014) as given. At the next step, we will compare it to a readily available and transparent international index, the MSCI World Real Estate index[24]. Interestingly the market capitalization of that index for the same year only indicates $834 bn, or a factor 4.8 times smaller. A large part of that difference will be explained by the fact that the index only captures large to mid-cap equity and further

[18] These are the figures that are used e.g. here: http://www.reuters.com/article/us-commodities-aum-barclays-idUSKCN0QB1ID20150806 and in several presentations

[19] Some of the figures are available on the web, but not all of them. I collected the ones I could find in an Excel sheet. Several presentations include exactly this time series, but only as graph and not the exact numbers.

[20] http://www.barclayhedge.com/research/indices/cta/mum/CTA_Fund_Industry.html

[21] I produced an Excel sheet which compares the two time series and include it into the final file package.

[22] There is of course more academic research on commodities. However, much recent research focuses on whether the recent attention to commodities ('financialization') had significant and lasting impact on prices and their volatility.

[23] A more detailed review can be found here http://www.pensionfundsonline.co.uk/content/specialist-outlook/specialist-outlook/the-real-estate-investable-universe-2014/1521

[24] For more details see https://www.msci.com/resources/factsheets/index_fact_sheet/msci-world-real-estate-index.pdf

exclusions should be explained by illiquidity and availability restrictions. We will assume that to properly capture the global market value of real estate equity, the referenced MSCI index as well as its regional subcategories, North America, Europe, and Asia/Pacific, should be multiplied by a factor of 4.8.

Alternatives to the MSCI World Real Estate Index certainly exist, one of them being the GPR General PSI Global Index, used by Doeswijk et. al. (2014), which shows broadly similar market capitalization. But simplicity of data collection and public availability through standard database providers speak for the MSCI index family.

Other Real Goods/Timber & Forestry

The increased popularity of timber and forestry as an asset class is evident across groups of investors, including large university endowment funds[25]. Average returns have been high over the last few decades, even better than equity, and at the same time correlations with equities are low or even negative.[26] For example, the average annual return over the past 5, 10 and 20 years has been about 21%, 18% and 10%, respectively.[27] Furthermore, the reasoning for its promising value development is as simple as powerful: The demand will rise in countries that are getting richer, like China, Brazil and other developing countries. At the same time the supply of forest land can be barely increased and might even decrease due to climate change, and there are limits to productivity increases on the supply side.

But the question of investability and tradability is not trivial. Large parts of the forest lands are owned by the state, private companies or rich families, and are traded rarely.[28] The investable part is through traded equity and REITS of companies that invest in land and forests. The S&P Global Timber & Forestry Index is the major index for this asset class. Hence, its market capitalisation is used as proxy. However, with around 100 bn. USD market capitalization it is small in comparison to the other asset class groups.

Relative importance of asset classes

When looking at the final compilation of market capitalization some interesting results and insights can be obtained, particularly when comparing 2006, our first year of data, with 2016. Overall the market capitalization, in current US dollars, increased 75%, going from $66trn. at the end of 2006 to about $116trn. at September 2016. In terms of relative weights a few items are noteworthy. The US has clearly maintained a fairly stable prominence in the size and share of the global equity market, at around 22-23%. Europe and advanced Asia, on the other hand, have clearly lost importance, while emerging Asia has increased its share. Furthermore, the asset classes of Private Equity and Frontier Market equity have also increased their weight in the scale. The most salient shift can be noticed when looking at the broad asset classes, debt versus equity: while in 2005 all equities carried a weight of 56% versus a lower 37% for the sum of debt related products, in 2016 we have seen a broad equalization of the two. The overall equity

[25] See http://www.bloomberg.com/bw/articles/2012-09-20/can-timber-rebuild-harvards-endowment
[26] See http://commodityhq.com/investing-ideas/guide-to-timber-investment-funds-how-to-invest-in-timber/
[27] http://www.economist.com/news/britain/21652355-wealthy-investors-are-branching-out-evergreen-new-asset-class-where-money-grows-trees
[28] For some investors like large endowment funds this is not so much a problem, they have the opportunity to invest directly.

market weight fell to 45%, while debt markets increased in relative importance by reaching a level of 44% in 2016. This certainly is not only driven by investors sentiment and reorientation among asset classes, but also reflects the aggressive bond buying programs of various central banks, which rapidly increased valuation and squeezed yields of sovereigns towards unchartered low or even negative territory. It is noteworthy that the US debt market has seen an increase in capitalization of around $9 trillion, similar to the number on the equity market. Given its lower starting point and an overall smaller market, this means that the US debt market has increased its market share from 13% to 17%. For the Asia-Pacific region, an increase in market share by about 1 percentage point is noticeable, while Europe has actually shrunk its debt market share by the equivalent number. The global inflation linked bond market has more than doubled its size, from about $1 trillion in 2006 to $2.6 trillion in 2016.

Table 2: Asset class market value (in millions) and market share

		2006		2016	
Adv. Markets Equity	N America	15,466,785	23.3%	25,634,916	22.0%
	Europe	11,187,635	16.8%	11,353,719	9.8%
	Asia Pacific	5,686,550	8.6%	7,490,742	6.4%
EM Equity	Asia Pacific	2,582,268	3.9%	5,662,352	4.9%
	Americas	806,980	1.2%	1,045,077	0.9%
	Europe, Middle East and Africa	1,376,811	2.1%	1,281,136	1.1%
Private Equity	Global	1,694,000	2.5%	3,939,540	3.4%
Frontier Markets	All available	0	0.0%	274,162	0.2%
Debt Markets	Asian-Pacific Aggregate Index	4,451,000	6.7%	10,471,505	9.0%
	Pan-European Aggregate Index	9,155,977	13.8%	15,052,672	12.9%
	US Aggregate Index	8,862,657	13.3%	19,483,992	16.7%
	Canada Broad Bond index	261,957	0.4%	565,392	0.5%
	LATAM	145,180	0.2%	438,672	0.4%
	World Inflation-Linked Bond Index	995,460	1.5%	2,639,845	2.3%
	Global High Yield Index	1,019,682	1.5%	2,385,749	2.1%
Real Estate	N. America	1,796,168	2.7%	4,178,302	3.6%
	Europe	711,232	1.1%	634,443	0.5%
	Asia Pacific	0	0.0%	3,338,943	2.9%
Other Real Goods	Timber & Forestry	108,249	0.2%	137,973	0.1%
Commodities	Oil & Gas, Metals, Agribusiness	170,000	0.3%	333,700	0.3%
Sum		**66,478,591**	**100%**	**116,342,830**	**100%**

Source: Bloomberg, Datastream and Author's own calculations. 2016 data as of 09/2016.

Notes: The dataseries for Frontier Markets equities and Asia-Pacific Real real estate start after 2006 and are entered as zero in this exercise.

Market capitalization comparison – a sanity check

After having clearly delineated how we have put together our global market portfolio, it is important to compare results to similar exercises and thereby conclude basic "sanity checks". Starting with Doeswijk et. al. (2014), Table 2 below compares values for 2012. It is interesting to note that most asset classes roughly match, except for equities. Here the market capitalization calculated by us is about 30% larger, although we use the same index family compiled by MSCI. It appears as if the authors have used only the nominal value of the "free float" securities, instead of the total market capitalization. Nonetheless, the overall market

Table 3: Comparing market capitalization by asset class, in billions of US$

	Values Doeswijk et. al. (2014), values 2012	Matched classes SAALT, values 2012
Equities	32,920	43,616
Private equity	3,270	3,272
Real estate	4,612	4,916
High yield bonds	1,523	1,797
Emerging market debt	2,681	--
Investment-grade credits	16,761	--
Government bonds	26,739	--
sum: Global Bond	46,181	43,225
Inflation-linked bonds	2,062	2,062
Others	---	461
Global invested multi-asset market portfolio	**90,568**	**99,349**

Table 4: Comparing market capitalization by asset class, in billions of US$

	Hewitt EnnisKnupp (2014), values 2014	Matched classes SAALT, values 2014
U.S. Equity	18,190	25,608
Non-U.S. Equity (Developed)	13,850	18,502
Emerging Markets Equity	3,990	7,577
Frontier Markets Equity	150	321
Private Equity	2,520	3,788
Private (Unlisted) Infrastructure	240	--
Timberland	50	--
Private Real Estate Debt	5,800	--
Private Real Estate Equity	4,200	--
Public Real Estate Equity	1,260	--
sum real estate equity	5,460	7,201
Commodities	330	318
High Yield Bonds	1,850	2,128
Bank Loans	880	--
Emerging Market Bonds (Sovereign; USD)	550	--
Emerging Market Bonds (Sovereign; Local Currency)	1,480	--
Emerging Market Bonds (Corporate; USD)	680	--
Insurance-Linked Securities	20	--
U.S. Bonds (Investment Grade)	15,340	17,609
Non-U.S. Bonds (Developed)	22,650	--
sum non-US bonds	25,360	24,055
Inflation-Linked Bonds	2,570	2,388
Money Market/Cash Equivalents	4,490	--
Total Global Invested Capital Market including Hedge Funds	**101,100**	**106,528**

portfolio capitalization is broadly similar. Comparing our exercise to the one by Hewitt EnnisKnupp (2014), presented in Table 3 below, delivers a broadly similar pattern. While among most asset classes the differences are limited, our calculations demonstrate a higher market value for equities. Again, while no further details are spelled out, our calculations indicate that the difference could be in using free float versus total capitalization.

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