

# 3 Asset allocation

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INVESTMENT PRODUCTS: NOT FDIC INSURED · NOT CDIC INSURED · NOT GOVERNMENT INSURED · NO BANK GUARANTEE · MAY LOSE VALUE



### 3.1 Towards a new asset allocation

STEVEN WIETING, CHIEF INVESTMENT STRATEGIST AND CHIEF ECONOMIST

Achieving diversification by combining equity and fixed income has become much harder. This requires us to consider additional opportunities for building globally diversified portfolios.

#### KEY MESSAGES

- Ever lower yielding government bonds have lost their ability to provide both diversification and returns
- Other investment grade bonds such as high quality corporates are not always an effective substitute
- This implies a major change to asset allocation that must be taken very seriously
- As we contemplate a new asset allocation, gold is likely to play a role, although it doesn't have a coupon either
- We expect much more attention on capital market strategies that can change the risk-return profile of portfolios and provide risk hedging
- For potential long-term return enhancement, we are attracted to private equity and late-stage venture capital in particular, asset classes likely to be more prominent in diversified portfolios going forward

FIGURE 1. GLOBAL DIVERSIFICATION'S RISK-ADJUSTED RETURNS

1950s	1960s	1970s	1980s	1990s	2000s	2010s	Avg 10-year return	Risk-adjusted return
World ex-US Equities 20.8%	US Small Caps 15.5%	EM Govt USD Bond 14.4%	World ex-US Equities 22.8%	US Equities 18.2%	EM Govt USD Bond 12.9%	US Equities 13.6%	US Small Caps 12.0%	Asset Allocation 0.53
US Equities 19.3%	US Equities 7.8%	US Small Caps 11.5%	US Equities 17.5%	US Small Caps 11.6%	G7 Govt Bond 6.4%	US Small Caps 10.5%	US Equities 11.6%	US Equities 0.49
US Small Caps 16.9%	Asset Allocation 5.4%	World ex-US Equities 10.1%	Asset Allocation 17.4%	Asset Allocation 11.0%	US Investment Grade 6.4%	Asset Allocation 7.7%	World ex-US Equities 10.5%	EM Govt USD Bond 0.43
Asset Allocation 12.1%	World ex-US Equities 5.1%	Asset Allocation 8.0%	US Small Caps 15.8%	G7 Govt Bond 8.0%	Asset Allocation 3.4%	EM Govt USD Bond 6.3%	Asset Allocation 9.3%	US Small Caps 0.38
EM Govt USD Bond 5.3%	Cash 4.1%	Cash 6.5%	US Investment Grade 12.8%	US Investment Grade 8.0%	Cash 2.7%	World ex-US Equities 6.0%	EM Govt USD Bond 8.1%	World ex-US Equities 0.37
Cash 2.0%	EM Govt USD Bond 3.5%	US Investment Grade 6.1%	G7 Govt Bond 12.8%	EM Govt USD Bond 7.7%	US Small Caps 2.2%	US Investment Grade 4.3%	US Investment Grade 5.8%	US Investment Grade 0.18
G7 Govt Bond 0.4%	US Investment Grade 2.4%	G7 Govt Bond 6.1%	Cash 9.1%	World ex-US Equities 7.3%	World ex-US Equities 1.6%	G7 Govt Bond 3.7%	G7 Govt Bond 5.7%	G7 Govt Bond 0.17
US Investment Grade 0.4%	G7 Govt Bond 2.4%	US Equities 5.8%	EM Govt USD Bond 6.4%	Cash 5.0%	US Equities -0.9%	Cash 0.6%	Cash 4.3%	

Source: FactSet and Citi Private Bank, Global Asset Allocation team as of 20 Apr 2020. Adaptive Valuation Strategies (AVS) is the Private Bank's proprietary strategic asset allocation methodology. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only. Past performance is no guarantee of future returns. Real results may vary. "Asset allocation" in this diagram represents an AVS Risk Level 3 allocation, which includes allocations to equities, fixed income, commodities, cash and hedge funds. Risk levels are an indication of clients' appetite for risk. Risk Level 3 - Seeks modest capital appreciation and, secondly capital preservation. The returns shown were calculated at an asset class level using indices and do not reflect fees, which would have reduced the performance shown. Risk-adjusted return is defined here as the Sharpe ratio. See Glossary for definition of terms.

Build a globally diversified core portfolio and keep it fully invested for the long term. There is perhaps no more important piece of investment advice that we could offer you as your trusted partners - see [Our Investment Philosophy and Process](#) in [Outlook 2020](#). Over time, this advice has helped to protect and grow wealth more effectively than any other single approach. We believe that it will continue to do so. At the same time, changes in the returns and greater risks associated with certain asset classes make achieving diversification more challenging than ever before. We therefore need to rethink aspects of our asset allocation.

### Less risk takes more effort

In investment, there is no such thing as an entirely free lunch. Diversification is perhaps the next best thing to it. A globally diversified asset allocation has produced superior risk-adjusted returns relative to every individual asset class between 1950 and 2020 - **figure 1**.

Combining equities and fixed income, as well as other asset classes, in the appropriate proportions, dampens portfolio volatility over time. When equities have fallen sharply, high quality fixed income assets have typically risen. The strongest rationale for those gains is the assured income that those bonds provide. However, as yields have fallen and bond income has become scarce, the short-term and long-term diversification properties of bonds fade.

The global yield for all developed and emerging market bonds of all qualities - including sub-investment grade - is now just 1.4%. Looking out several years, we believe the vast majority of fixed income assets will become "non-investments." What we mean is that owning most bonds will be little different than holding cash. And, as we have said repeatedly, holding too much cash is a feature of market timing. It is thus likely that a portfolio

FIGURE 2. ONLY LONG-DURATION US TREASURIES SUBSTANTIALLY OFFSET EQUITY DECLINES

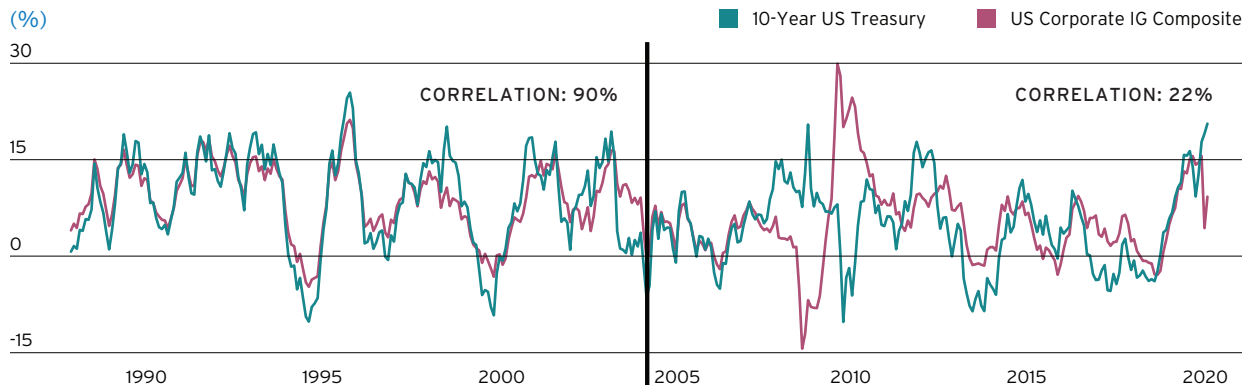
	S&P TOTAL RETURN INDEX (%)	BLOOMBERG BARCLAYS US TREASURY INDEX (%) Index duration: 7.2 years	BLOOMBERG BARCLAYS US CORPORATE INDEX (%) Index duration: 8.3 years
1974	-26.5	7.1	-5.9
1977	-7.2	2.7	3.2
1981	-4.9	9.2	3.0
1990	-3.1	8.5	7.1
2000	-9.1	13.5	9.1
2001	-11.9	6.7	10.3
2002	-22.1	11.8	10.1
2008	-37.0	13.7	-4.9
2018	-4.4	0.9	-2.5
YTD 2020	-12.0	8.8	1.1
CORRELATION TO EQUITIES IN DECLINE YEARS		-0.50	0.44

Source: Haver Analytics, Bloomberg through 1 May 2020. Past performance is not indicative of future returns. Real results may vary. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only. See Glossary for definitions.

with cash and a slew of extremely low yielding bonds will create a huge drag on returns over time - see [The wisdom of lump-sum investing: Why you should get fully invested now](#).

To be sure, high quality fixed income will still have a role to play in core portfolios. On the nine previous occasions when the S&P 500 Index fell over an entire calendar year, US Treasuries delivered a positive return. The correlation between Treasuries and US equities in such years was negative 0.51. In 2020 so far, this pattern has held up, with Treasuries rising as equities have fallen - **figure 2**. However, with 10- to 30-year Treasuries yielding only 0.65% to 1.30%, we now see them solely as a risk hedge rather than also a source of income.

FIGURE 3. TREASURY AND IG CREDIT'S WEAKENING RELATIONSHIP



Source: Haver Analytics, Bloomberg through May 2020. Past performance is not indicative of future returns.

FIGURE 4. SOVEREIGNS AND CORPORATES: IMPERFECT SUBSTITUTES

	Bloomberg Barclays US Corporate Investment Grade (%)	Bloomberg Barclays US High Yield - Corporate (%)	Bloomberg Barclays US Aggregate Government Treasury (20+ Y) (%)
SINCE 2003	0.39	0.73	-0.40
SINCE 2001	0.24	0.72	-0.39
SINCE 1995	0.23		-0.22
SINCE 1990	0.23		-0.13
	RISING CORRELATION		FALLING CORRELATION
	higher correlation		lower correlation
FIRST GULF WAR / RECESSION Aug-Oct 1990	0.62		-0.21
ASIAN FINANCIAL CRISIS Aug-Sep 1998	0.03		-0.66
TECH BUST/RECESSION Sep 2000-Sep 2001	-0.20		-0.22
US ACCOUNTING SCANDAL Apr-Oct 2002	-0.51		-0.56
GLOBAL FINANCIAL CRISIS Sep 2008-Mar 2009	-0.19		-0.33
EURO SOVEREIGN DEBT CRISIS Aug-Sep 2011	-0.57		-0.68
OIL COLLAPSE Dec 2015 - Feb 2016	-0.23		-0.39
COVID 19 Feb-Mar 2020	0.16		-0.40

Source: Haver Analytics, Bloomberg through May 2020. Past performance is not indicative of future returns. See Glossary for definitions. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only.

## Turns out that IG credit is no substitute

What about using investment grade (IG) corporate credit as an income-bearing portfolio substitute for Treasuries and other sovereign debt? Previously, IG corporates and US Treasuries tended to move together strongly. In the fifteen years to 2005, the correlation between their twelve-month returns was an almost perfect 0.90 - **figure 3**. In the last fifteen years, however, the correlation has been a much weaker 0.22. This means that IG credit is a poor risk hedge. Notably, IG credit fell during the 2008 and 2020 bouts of economic turmoil, while US Treasuries rose. Amid such severe uncertainty, investors clearly felt comfortable only with the highest quality debt of all.

In fact, US Investment Grade credit has become increasingly correlated to equities - **figure 4**. Unfortunately, this is especially true during times of stress. In the calendar years when US equities have declined, the correlation between US IG corporate bonds and equities has risen to 0.45, while US Treasuries and equities were negatively correlated. Looking forward, we expect that IG credit will not deliver sufficient diversification at the times when it is needed most. One reason for this is that corporate debt and equities are typically a trade on the same entities. Corporate debt is higher in the capital structure, relatively safer than equity, but with a much more limited potential return.

A second important reason for the rising equity-credit correlation is the growing indebtedness of the US corporate sector. Average credit ratings have declined through the last economic expansions. One symptom of this is the rise in the proportion of US debt rated at BBB - the lowest IG rating - and below - **figure 5**. Developed market corporates outside the US do have relatively stronger balance sheets. However, these generally come with lower yields.

Looking abroad, we see that emerging markets corporates are no substitute for large sovereign borrowers. While still a worthwhile asset class on their own, neither foreign companies nor their home governments have access to a printing press in US dollars or other reserve currencies. They cannot therefore substitute for IG Credit in US dollars.

IG debt, therefore, cannot provide the income and diversification we have previously received through its inclusion.

This is a major change to asset allocation and one that must be taken very seriously.

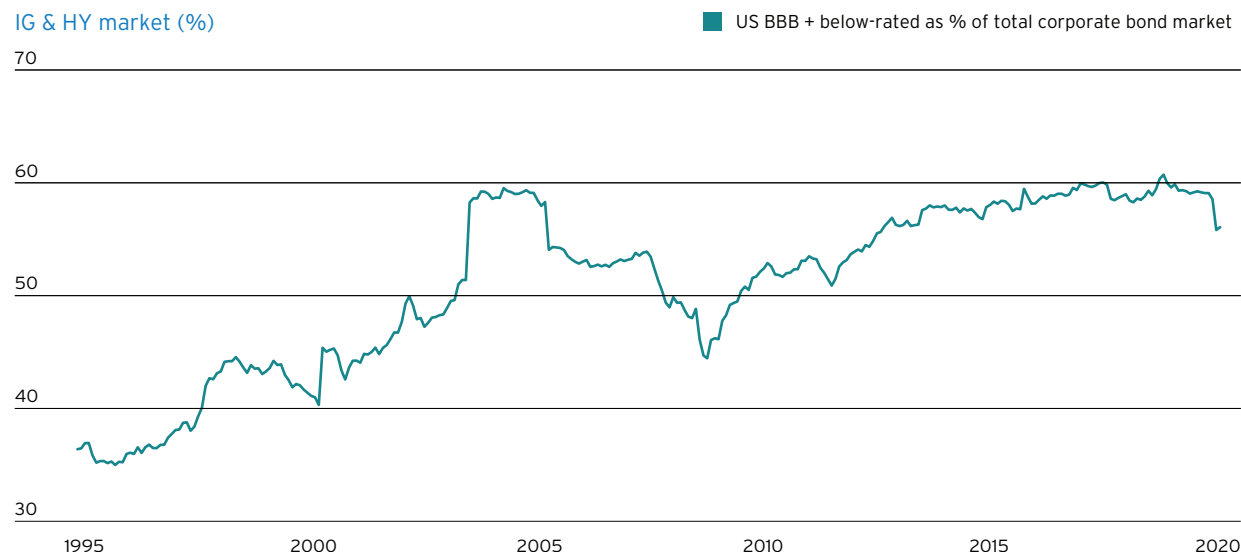
### A new asset allocation

In today's uncertain world of record low interest rates and yield, the quest for core portfolio diversification is both more vital and more challenging than ever. We must look for substitutes for some traditional holdings in the quest to create better long-term risk-adjusted returns.

One consideration is gold. Over the past three decades, the yellow metal's annual returns have shown little correlation with developed market equities. Crucially, it can provide diversification during times of equity stress. Despite broad-based liquidations during the worst of the pandemic-driven sell off of 2020, its spot price dipped just to where it started the year while US equities were down 35%. That said, of course, gold's disadvantage is that it pays no income whatsoever. While gold can help hedge core portfolios, therefore, it plainly cannot substitute for income-bearing diversifiers.

Other considerations include dividend equities. However, these still have correlations with other equities that are too high to provide meaningfully greater diversification. Preferred equities also

FIGURE 5. THE DETERIORATION OF US CREDIT QUALITY



Source: Haver Analytics, Bloomberg through May 2020. Past performance is not indicative of future returns.

provide small portfolio benefits. Alternative investments are, therefore, likely to become increasingly important to diversified long-term portfolios. Private equity will be a beneficiary of low interest rates for years to come. Similarly, late-stage venture capital strategies take on less equity risk by gaining exposure to companies at lower valuations, before they are public. In all of these cases, though, the historical benefits of Treasuries cannot be replicated.

Looking ahead, we would highlight the potential of capital markets strategies. For suitable clients, these may represent an opportunity to create elements of equity and fixed income allocations. Implied volatility has two basic regimes, one high and low. When volatility surges, strategies exist that seek to generate income – see [What smart families are doing in capital markets](#). When volatility is low, hedging costs are low, enabling

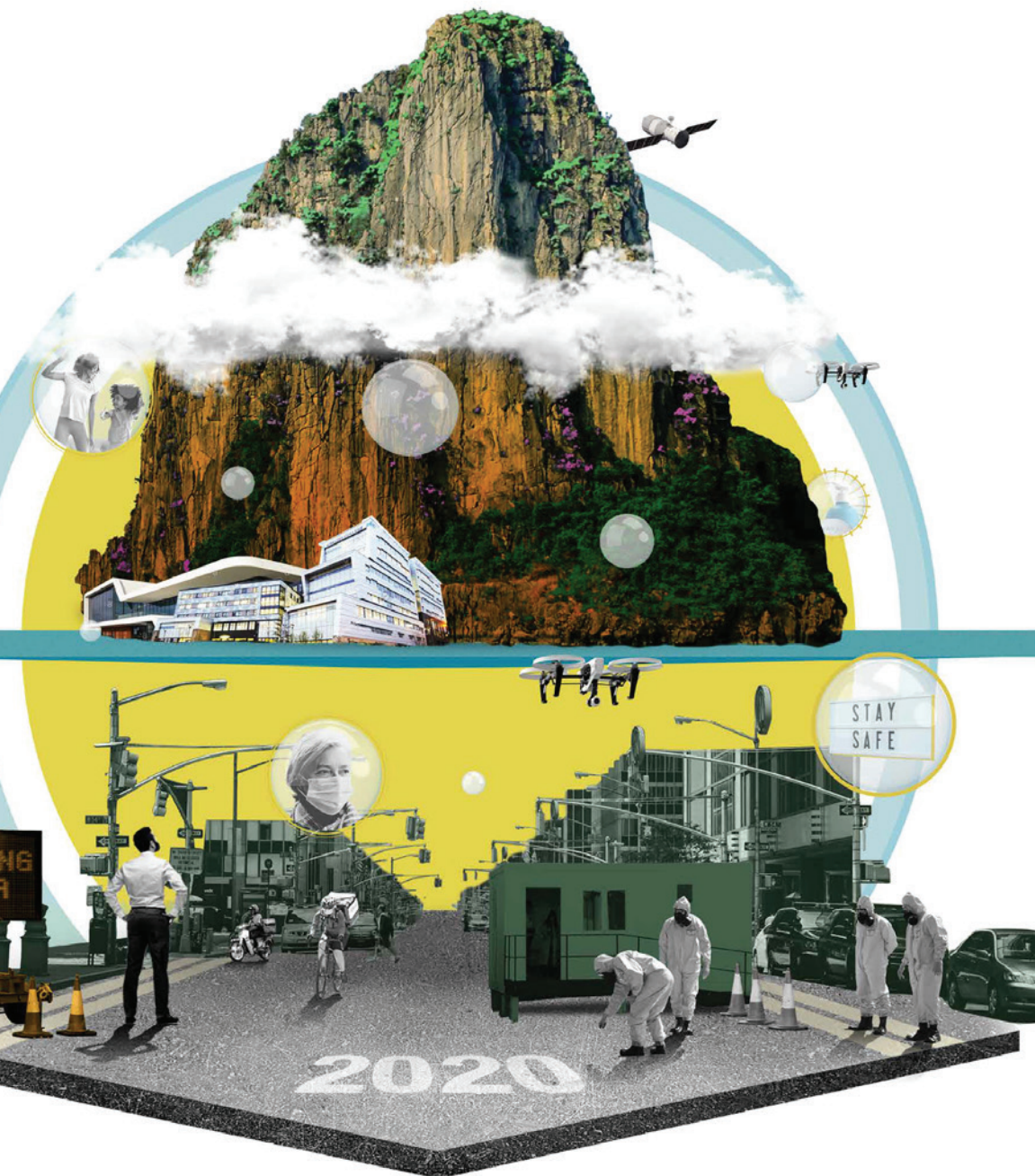
diversification to be added cheaply to core portfolios. In time, we believe hedges and income strategies in place of some bonds will become critical elements in the “new asset allocation.”

To see how well your core portfolio is currently diversified, ask us for your own personalized Outlook Watchlist report. We can then suggest customized opportunities to help enhance your asset allocation.

Joe Fiorica and Joe Kaplan also contributed to this article.

<sup>1</sup> See Glossary for definition.





### 3.2 The wisdom of lump-sum investing: Why you should get fully invested now

PHIL WATSON,  
HEAD OF THE GLOBAL INVESTMENT LAB

Our rigorous analysis shows that investing immediately has produced better results four-fifths of the time. Less cash and less waiting is a potent portfolio booster.

#### KEY MESSAGES

- Some clients routinely hold as much as 35% cash in their core portfolios
- However, the clear lesson of history is that staying out of the market is costly
- We compare three approaches for committing excess cash
- If you are holding excess cash, we advise you to invest it in a globally diversified core portfolio as soon as possible

Despite our advice, there has been a recent increase in many clients' cash levels. Some routinely hold as much as 35% cash in their core portfolios.

If you are currently holding excess cash, you may well be wondering when and how to invest it. With so much uncertainty over the post-pandemic economic outlook, you may feel tempted to await the next market correction before making your move. Likewise, you might be split over whether to invest all your cash in one go or in stages. Fear of experiencing regret later on is likely a powerful influence on your thought process. However, we recommend that you base your decision on certain key lessons drawn from decades of financial market history.

Staying out of the market is costly. We compared the performance of a fully invested globally diversified portfolio and a cash-heavy portfolio between 1955 and 2020.<sup>1</sup> Breaking this era down into rolling five-year periods, we note that globally diversified portfolios outperformed cash-heavy portfolios 97% of the time. Over that 65-year period, there was no five-year window during which the globally diversified portfolio lost money.

The market's best and worst days cluster tightly. Some of the stock market's best days often follow its worst days closely. Between 24 February and 1 April 2020, the S&P 500 registered eight of its worst ten days in the last decade. But it also experienced seven of its ten best days for the same period. Without those best days, the last four months' total return would have been -42%, instead of -9%. This is the typical pattern around periods of market stress. Between 2000 and 2020, 70% of the S&P's top twenty best days occurred within a month of one of its worst days. Being out of the market at times like this can do lasting damage to your wealth.

Having decided to invest, the next question is whether to commit all your cash all at once or in stages. We compared core developed equity

FIGURE 1: LUMP SUM INVESTING WORKS BEST

Annualized Returns (3-year investment periods)  
Historical Performance, Jan 1955 - March 2020

	LUMP SUM INVESTING	DOLLAR COST AVERAGING	BUY DIP
AVERAGE ANNUALIZED RETURN (%)	<b>11.56</b>	10.45	6.39
AVERAGE ANNUALIZED VOLATILITY (%)	8.55	7.69	<b>4.23</b>
SHARPE RATIO	<b>0.81</b>	0.75	0.41
BEST CUMULATIVE RETURN OVER 3 YEARS (%)	<b>179.98</b>	151.50	61.60
WORST CUMULATIVE RETURN OVER 3 YEARS (%)	-39.37	-41.72	<b>-28.60</b>
MAXIMUM DRAWDOWN OVER 12 MONTHS (%)	-47.32	<b>-30.98</b>	-34.60
% POSITIVE (36-MONTH PERIOD)	90.2	90.6	<b>97.6</b>
BEST RETURN (% OUT OF 747 OBSERVATIONS)	<b>60</b>	18	23

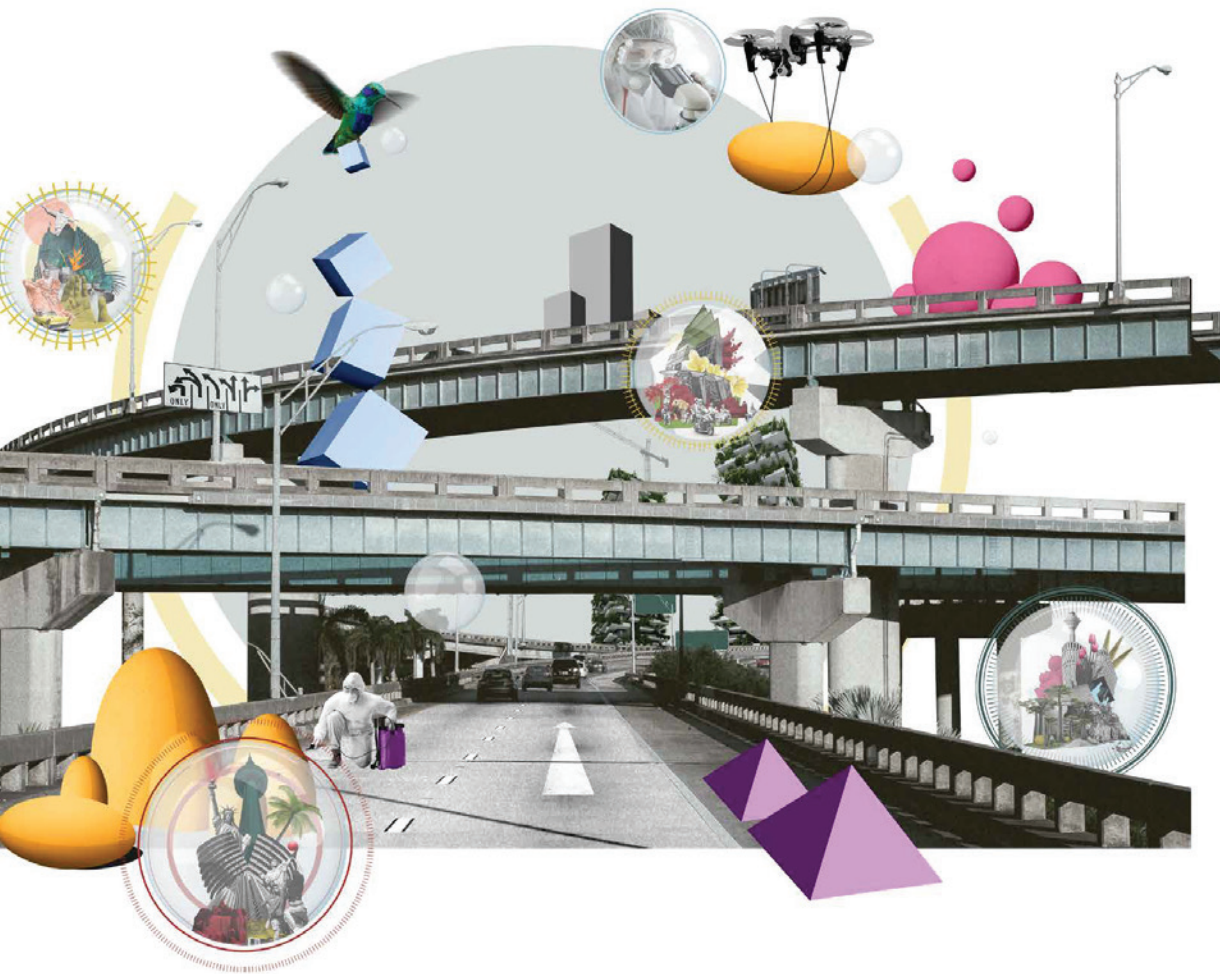
Source: Global Investment Lab, Citi Private Bank, as of 1 May 2020. Asset classes analyzed are Developed Equities and Cash. Dollar cost averaging and "buy the dips" strategies include interest from cash. Lump sum investing: assumes entire amount invested at the outset. Dollar cost averaging: the investments are made over a horizon of twelve months, in five equal investments. Buy the dips starts with 100% cash. Throughout the three-year investment periods, one-third of the available amount is invested whenever the market drops by 7.5%, otherwise stay in cash. Past performance is no guarantee of future returns. This analysis does not include commissions and/or fees that would have reduced the performance shown. See Glossary for definitions.

portfolios following three entry strategies: investing all at once ("lump sum investing"), investing in five equal installments ("dollar cost averaging"), and buying only when the market drops by a certain amount ("dip buying.") Exploring three- and five-year holding periods from 1955, we found lump sum investing achieved higher absolute and risk-adjusted returns than the other two strategies - **figure 1**. Investing immediately produced higher subsequent returns 80% of the time, even during bear markets.

We believe the evidence of history is clear. If you are holding excess cash, you should put it to work in a globally diversified core portfolio as soon as possible. You should then keep it fully invested for the long term. Let us help you do so.

<sup>1</sup> Global allocation: AVS Level III + Hedge Funds. Simulated historical returns are based on asset class returns using indices as a proxy and should not be considered a guarantee of future performance. Global allocation: using AVS time series Global USD Level 3: Global Developed Equities 47%, Global Emerging Equities 7%, Global Developed Investment Grade Fixed Income 27%, Global Developed Corporate High Yield Fixed Income 2%, Emerging Market Fixed Income 2.2%, Cash 2%, Hedge Funds 12%. Allocation is rebalanced annually. Performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index. The aforementioned illustration does not reflect the deduction of any fees or expenses. The illustrations use data from 1 Jan 1950 to 20 Mar 2020.





### 3.3 Major changes to our Strategic Return Estimates

GREG VAN INWEGEN, GLOBAL HEAD OF  
QUANTITATIVE RESEARCH AND ASSET  
ALLOCATION, CITI INVESTMENT MANAGEMENT

Portfolio asset allocations must be revisited when the assumptions that drive them change, as they have in 2020. Our updated Strategic Return Estimates reflect new realities that long-term investors cannot ignore.

#### KEY MESSAGES

- The monetary and fiscal response to the pandemic's fallout have profoundly impacted many asset classes' future return potential
- Rather than waiting till year-end as usual, we are thus updating our annualized asset class return estimates for the next decade - Strategic Return Estimates (SREs) - now
- SREs for Cash and IG fixed income have fallen
- The SREs changes require that portfolios be re-allocated over the coming months

The monetary and fiscal measures to combat the global economic shutdown's devastating effects have helped avert a second Great Depression. But these measures' consequences have profoundly impacted many asset classes' future return potential, especially fixed income and cash. We have therefore decided to update our annualized asset class return estimates for the next decade - Strategic Return Estimates (SREs) - at the mid-year stage, rather than waiting until our normal year-end review.

The changes in our SREs are material. They have risen for developed market equities, especially for small- and medium-sized equities - **figure 1**. High yield fixed income's SRE has also risen along with that of emerging market debt. Changes like these are rare and have been instigated by large declines in expected returns from sovereign bonds and cash.

Based on SREs, our strategic asset allocation methodology - Adaptive Valuation Strategies (AVS) - recommends allocations to multiple asset classes. AVS tends to recommend larger allocations to asset classes with higher SREs. However, some asset classes with more modest SREs can provide valuable downside protection in stress environments and will also receive allocations.

The material recent SREs changes thus require some portfolio adjustment to reflect the changes. As such, our discretionary programs will undergo reallocations over the coming months.

FIGURE 1. OUR UPDATED SREs

	2020 (%)	2020 MID-YEAR* (%)
GLOBAL DEVELOPED MARKET EQUITY	5.1	6.2
GLOBAL LARGE CAP EQUITY	4.4	5.5
GLOBAL SMALL/MID CAP EQUITY	9.2	11.6
GLOBAL EMERGING MARKET EQUITY	10.9	11.7
GLOBAL DEVELOPED IG FIXED INCOME	2.1	1.1
DEVELOPED GOVERNMENT BONDS	1.9	0.7
DEVELOPED CORPORATE BONDS	2.7	2.6
HIGH YIELD	3.5	5.9
GLOBAL EMERGING FIXED INCOME	4.7	6.2
US CASH	1.8	0.6
HEDGE FUND	5.3	4.4

\*Preliminary SRE changes based on returns through 30 Apr 2020.

Source: Citi Private Bank Global Asset Allocation team. 2020 SREs based on data through 31 Oct 2019. Strategic return estimates are no guarantee of actual results. Past performance is not indicative of future results. See Glossary for definitions. Strategic Return Estimates (SRE) based on indices are Citi Private Bank's forecast of returns for specific asset classes (to which the index belongs) over a 10-year time horizon. The forecast for each specific asset class is made using a proprietary methodology that is appropriate for that asset class. Equity asset classes utilize a proprietary forecasting methodology based on the assumption that equity valuations revert to their long-term trend over time. The methodology is built around specific valuation measures that require several stages of calculation. Assumptions on the projected growth of earnings and dividends are additionally applied to calculate the SRE of the equity asset class. Fixed Income asset class forecasts use a proprietary forecasting methodology that is based on current yield levels. Other asset classes utilize other specific forecasting methodologies.





### Why so many changes?

**US Cash's** SRE has dropped significantly this year, as the US Federal Reserve cut interest rates effectively to 0% in March.

In **Global Developed Fixed Income**, central bank asset buying is driving Government Bond SREs materially lower. SREs for Investment Grade (IG) Corporate's SREs, however, are determined not only by changes in rates, but also by credit spreads. Since rates and credit spreads have pulled in opposite directions, the SRE is little changed. Combining Developed Government Bonds with Developed IG Corporate Bonds, the net effect is lower overall Developed IG Fixed Income SREs.

Conversely, **High Yield Fixed Income's** (HY) SRE has increased. HY is heavily driven by its credit exposure, rather than rates sensitivity. Similar to Corporate IG, pandemic risks have widened HY's spread significantly. Energy sector bonds have been especially hard hit.

**Emerging Market Debt** SREs have also increased. Asian debt market volatility has been muted relative to Latin American markets, which have been heavily punished by investors. This effect has pushed up overall EM Debt SREs.

**Developed Market Equity's** SRE has risen.

While cyclically-adjusted earnings have fallen somewhat amid the economic shutdown, current equity market prices are down by more. As result, the cyclically-adjusted price earnings ratio has dropped since year-end 2019, which boosts the SRE. **Developed Small Cap Equity's** SREs has also increased. The turmoil has hit small-cap equities hard, given concerns about their less diversified revenues and greater distress risk.

**Hedge Funds** have characteristics of both equities and fixed income. As of mid-year, the latter component had been the more influential, with early 2020's declining yields and interest rates lowering Hedge Fund SREs.

Paisan Limratamongkol, Andy Zhu, Gene Desello, Xin He, and Wenjing Wu also contributed to this article

To read about more about our methodology, see Adaptive Valuation Strategies – A New Approach to Strategic Asset Allocation: 2020 Annual Update <https://www.privatebank.citibank.com/home/fresh-insight/adaptive-valuation-strategies.html>

## Glossary

### ASSET CLASS DEFINITIONS:

**Cash** is represented by US 3-month Government Bond TR, measuring the US dollar-denominated active 3-Month, fixed-rate, nominal debt issues by the US Treasury.

**Commodities** asset class contains the index composites – GSCI Precious Metals Index, GSCI Energy Index, GSCI Industrial Metals Index, and GSCI Agricultural Index – measuring investment performance in different markets, namely precious metals (e.g., gold, silver), energy commodity (e.g., oil, coal), industrial metals (e.g., copper, iron ore), and agricultural commodity (i.e., soy, coffee) respectively. Reuters/Jeffries CRB Spot Price Index, the TR/CC CRB Excess Return Index, an arithmetic average of commodity futures prices with monthly rebalancing, is used for supplemental historical data.

**Emerging Markets (EM) Hard Currency Fixed Income** is represented by the FTSE Emerging Market Sovereign Bond Index (ESBI), covering hard currency emerging market sovereign debt.

**Global Developed Market Corporate Fixed Income** is composed of Bloomberg Barclays indices capturing investment debt from seven different local currency markets. The composite includes investment grade rated corporate bonds from the developed-market issuers.

**Global Developed Market Equity** is composed of MSCI indices capturing large-, mid- and small-cap

representation across 23 individual developed-market countries, as weighted by the market capitalization of these countries. The composite covers approximately 95% of the free float-adjusted market capitalization in each country.

**Global Developed Investment Grade Fixed Income** is composed of Bloomberg Barclays indices capturing investment-grade debt from twenty different local currency markets. The composite includes fixed-rate treasury, government-related, and investment grade rated corporate and securitized bonds from the developed-market issuers. Local market indices for US, UK and Japan are used for supplemental historical data.

**Global Emerging Market Fixed Income** is composed of Bloomberg Barclays indices measuring performance of fixed-rate local currency emerging markets government debt for 19 different markets across Latin America, EMEA and Asia regions. iBoxx ABF China Govt. Bond, the Markit iBoxx ABF Index comprising local currency debt from China, is used for supplemental historical data.

**Global High Yield Fixed Income** is composed of Bloomberg Barclays indices measuring the non-investment grade, fixed-rate corporate bonds denominated in US dollars, British pounds and euros. Securities are classified as high yield if the middle rating of Moody's, Fitch, and S&P is Ba1/BB+/BB+ or below, excluding emerging market debt. Ibbotson High Yield Index, a broad high yield index including bonds across the maturity spectrum, within the BB-B rated credit quality spectrum, included in the below-investment-grade universe, is used for supplemental historical data.

**Hedge Funds** is composed of investment managers employing different investment styles as characterized by different sub categories – HFRI Equity Long/Short: Positions both long and short in primarily equity and equity derivative securities; HFRI Credit: Positions in corporate fixed

income securities; HFRI Event Driven: Positions in companies currently or prospectively involved in wide variety of corporate transactions; HFRI Relative Value: Positions based on a valuation discrepancy between multiple securities; HFRI Multi Strategy: Positions based on realization of a spread between related yield instruments; HFRI Macro: Positions based on movements in underlying economic variables and their impact on different markets; Barclays Trader CTA Index: The composite performance of established programs (Commodity Trading Advisors) with more than four years of performance history.

**High Yield Bank Loans** are debt financing obligations issued by a bank or other financial institution to a company or individual that holds legal claim to the borrower's assets in the event of a corporate bankruptcy. These loans are usually secured by a company's assets, and often pay a high coupon due to a company's poor (non-investment grade) credit worthiness.

**Private Equity** characteristics are driven by those for Developed Market Small Cap Equities, adjusted for illiquidity, sector concentration, and greater leverage.

### INDEX DEFINITIONS:

**Bloomberg Barclays US Corporate Bond Index** measures the investment grade, fixed-rate, taxable corporate bond market. It includes US dollar denominated securities publicly issued by US and non-US industrial, utility and financial issuers.

**Bloomberg Barclays US Treasury Index** measures US dollar-denominated, fixed-rate, nominal debt issued by the US Treasury.

**FTSE All-World Index** is a stock market index representing global equity performance that covers over 3,100 companies in 47 countries starting in 1986.



**MSCI AC Asia ex-Japan Index** captures large and mid-cap representation across two of three Developed Markets (DM) countries\* (excluding Japan) and 9 Emerging Markets (EM) countries\* in Asia. With 1,187 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

**MSCI China Index** captures large and mid-cap representation across China A shares, H shares, B shares, Red chips, P chips and foreign listings (e.g. ADRs). With 704 constituents, the index covers about 85% of this China equity universe.

**MSCI Emerging Markets Index** captures large- and mid- cap representation across twenty-four Emerging Markets (EM) countries. With 837 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

**MSCI Emerging Markets EMEA Index** captures large and mid cap representation across 11 Emerging Markets (EM) countries\* in Europe, the Middle East and Africa (EMEA). With 173 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

**MSCI Emerging Markets (EM) Latin America Index** captures large and mid-cap representation across five Emerging Markets (EM) countries in Latin America. With 113 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

**MSCI Europe Index** captures large- and mid- cap representation across 15 Developed Markets (DM) countries in Europe\*. With 437 constituents, the index covers approximately 85% of the free float-adjusted market capitalization across the European Developed Markets equity universe.

### The VIX or the Chicago Board Options

**Exchange (CBOE) Volatility Index**, is a real-time index representing the market's expectation of 30-day forward-looking volatility, derived from the price inputs of the S&P 500 index options.

### OTHER TERMINOLOGY:

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**Correlation** is a statistical measure of how two assets or asset classes move in relation to one another. Correlation is measured on a scale of 1 to -1. A correlation of 1 implies perfect positive correlation, meaning that two assets or asset classes move in the same direction all of the time. A correlation of -1 implies perfect negative correlation, such that two assets or asset classes move in the opposite direction to each other all the time. A correlation of 0 implies zero correlation, such that there is no relationship between the movements in the two over time.

**LIBOR** or London interbank offered rate is the rate of interest at which banks offer to lend funds to each other. It is used as a reference rate for large amounts of financial contracts.

**Sharpe ratio** is a measure of risk-adjusted return, expressed as excess return per unit of deviation, typically referred to as risk.



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Bond credit quality ratings	Rating agencies		
	Moody's <sup>1</sup>	Standard and Poor's <sup>2</sup>	Fitch Ratings <sup>2</sup>
<b>Investment grade</b>			
Highest quality	Aaa	AAA	AAA
High quality (very strong)	Aa	AA	AA
Upper medium grade (strong)	A	A	A
Medium grade	Baa	BBB	BBB
<b>Not Investment grade</b>			
Lower medium grade (somewhat speculative)	Ba	BB	BB
Low grade (speculative)	B	B	B
Poor quality (may default)	Caa	CCC	CCC
Most speculative	Ca	C	CC
No interest being paid or bankruptcy petition filed	C	D	C
In default	C	D	D

<sup>1</sup> The ratings from Aa to Ca by Moody's may be modified by the addition of a 1, 2, or 3 to show relative standing within the category.

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