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# The Low Vol. Phenomenon across the Capital Structure: Stocks vs. Bonds

## Sixth Annual Quantitative Research Conference

May 1, 2019

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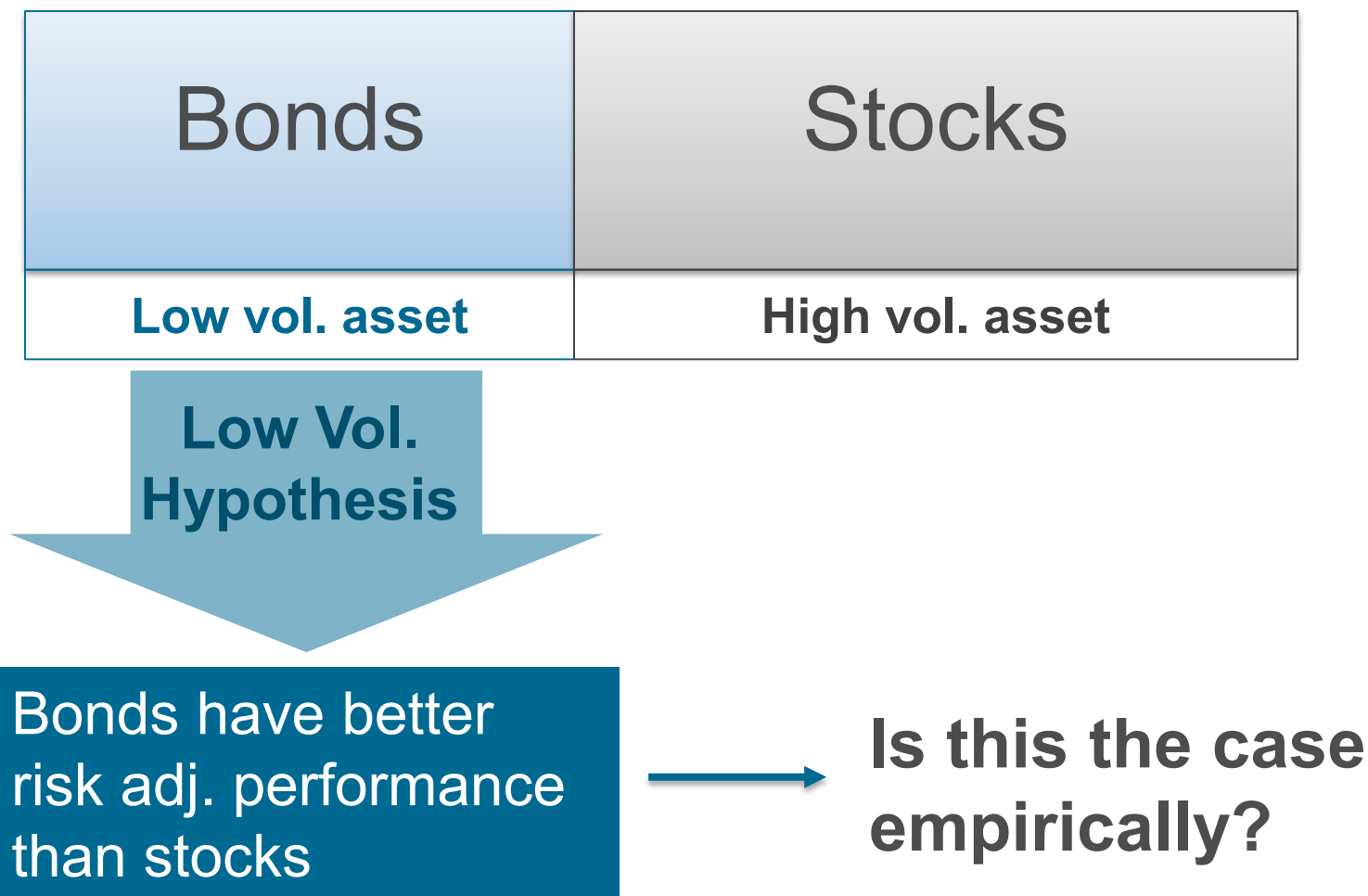
## The Low-Vol. Phenomenon

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- The ‘Low Vol.’ phenomenon – the tendency of **lower-risk stocks to outperform high-risk stocks** on a risk-adjusted basis – is widely documented (Ang, Hodrick, Xing, and Zhang 2006; Frazzini and Pedersen 2014)
- A similar pattern was also detected within credit: **short-maturity bonds had better risk-adjusted performance than long-maturity bonds** (Ambastha, Ben Dor, Dynkin, and Hyman 2008)
- Underlying theory: Investors with leverage constraints chase risky assets as a form of taking on leverage and, thus, bid up the prices and drive down the expected returns of risky assets (Frazzini and Pedersen 2014)

## Does the Low-Vol. Phenomenon Hold *across* Asset Classes?

- Bonds and stocks represent the two extremes of a company's capital structure



# Answering the question, “Are bonds delivering better risk-adjusted performance than stocks?”

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- **Approach 1** (easier but incorrect):  
comparing aggregate bond vs. equity index returns

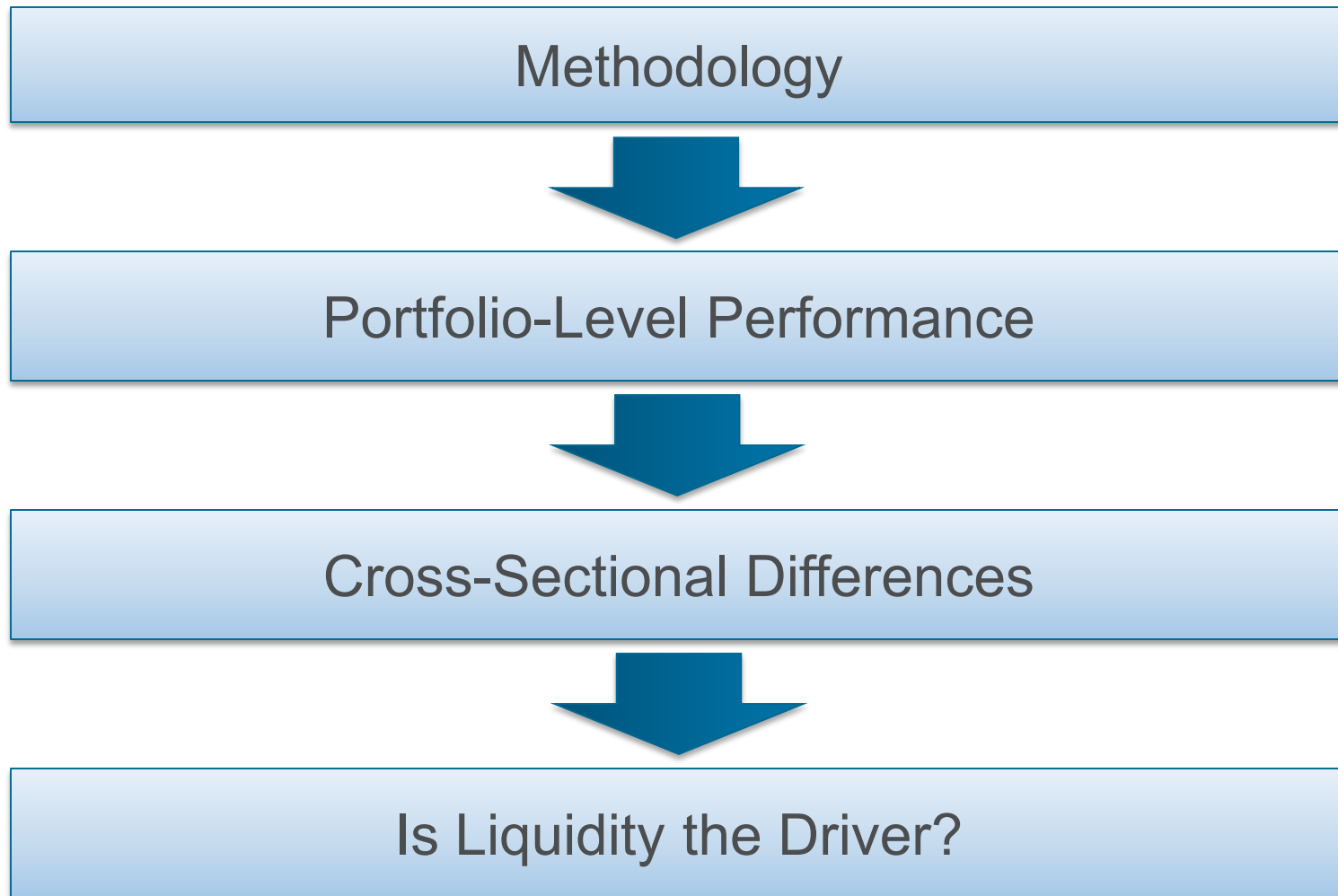
**Inappropriate** due to the following 3 issues

- I. Constituent difference*
- II. Weights mismatch (issuer and sector)*
- III. Risk mismatch*

- **Approach 2**  
Using a carefully matched sample of bonds-to-stocks at company level

# Outline

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# Methodology

# Bond – Equity Sample Construction

- All issuers in the US credit (Jan 1990 – Dec 2017) and Pan Euro credit indices (May 2002 – Dec 2017) were linked to accounting and equity data from COMPUSTAT
- **Key challenges: Lack of common firm identifiers and corporate events**
- Mapping is based on methodology used in BEAM (Bonds in Equity Asset Momentum)\*

## Results

- Mapping success (IG and HY) increased consistently over time
- In recent years, mapped sample covered 90% in market cap, almost 100% for US IG
- Most unmapped HY issuers had no identifiers (private firms)

| Matching of Corporate and High Yield Index Constituents to COMPUSTAT |             |       |       |       |       |       |                     |       |       |       |       |
|--|-------------|-------|-------|-------|-------|-------|---------------------|-------|-------|-------|-------|
| Year End Market Value  | US (\$ Bln) |       |       |       |       |       | Pan Euro (Euro Bln) |       |       |       |       |
|  | 1994        | 1999  | 2004  | 2009  | 2013  | 2017  | 2003                | 2007  | 2011  | 2014  | 2017  |
| Corporate Index  | 560         | 914   | 1,697 | 2,555 | 3,727 | 5,192 | 1,003               | 1,205 | 1,607 | 1,930 | 2,330 |
| Mapped   | 85%         | 87%   | 94%   | 98%   | 97%   | 98%   | 77%                 | 90%   | 86%   | 87%   | 88%   |
| HY Index   | 144         | 351   | 610   | 747   | 1,270 | 1,339 | 63                  | 77    | 154   | 348   | 330   |
| Mapped   | 68%         | 65%   | 83%   | 82%   | 80%   | 85%   | 56%                 | 67%   | 66%   | 74%   | 73%   |
| Agg. Universe (IG+HY)  | 704         | 1,265 | 2,307 | 3,302 | 4,996 | 6,531 | 1,065               | 1,282 | 1,761 | 2,279 | 2,660 |
| Mapped   | 82%         | 81%   | 91%   | 94%   | 93%   | 96%   | 76%                 | 89%   | 84%   | 85%   | 86%   |

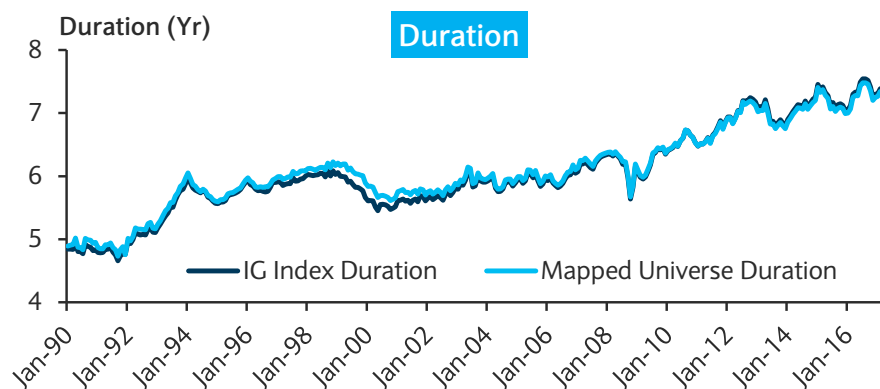
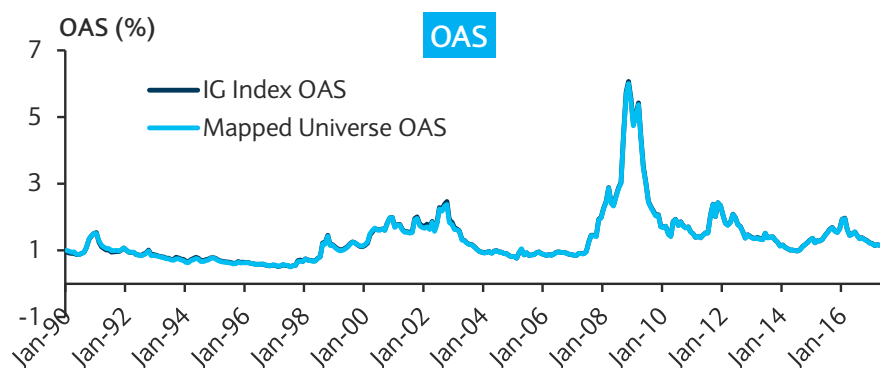
Source: Bloomberg, Compustat, Barclays Research

\*Ben Dor, A., and Xu, J., [BEAM \(Bonds in Equity Asset Momentum\) Value of Bond Market Information in Equity Momentum Strategies](#), Barclays Capital, 5 June 2014

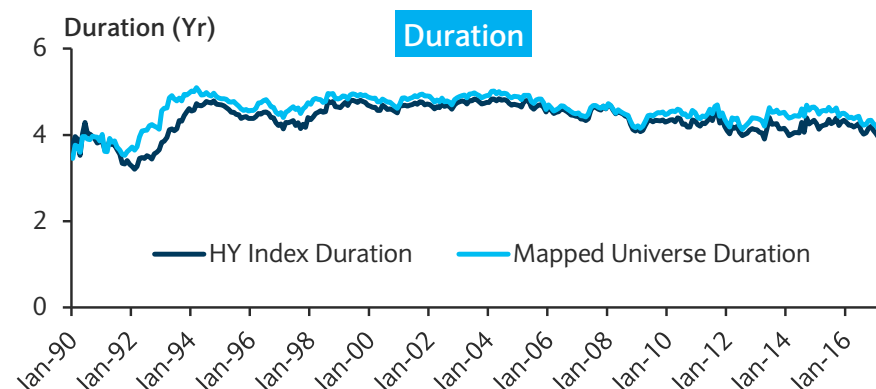
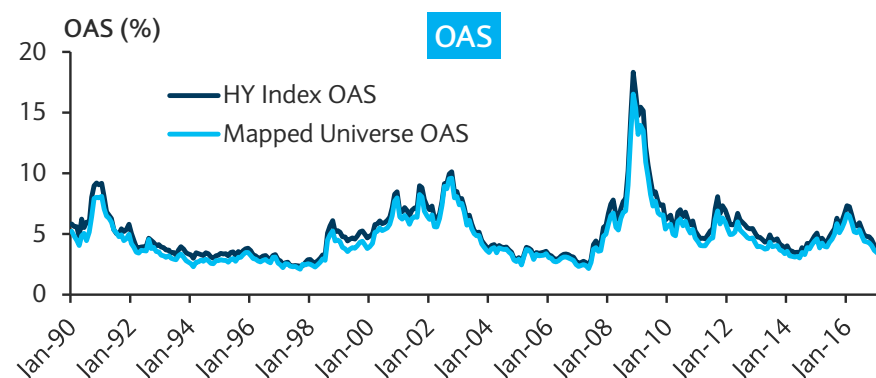
# Mapped Samples Are Similar to IG and HY Indices

- Our mapped bond universe was similar to the IG and HY indices in terms of spread and duration

## Mapped Univ. vs. Index – US IG



## Mapped Univ. vs. Index – US HY



Source: Bloomberg, Compustat, Barclays Research



# Mapped Equity Universe vs. Russell Indices

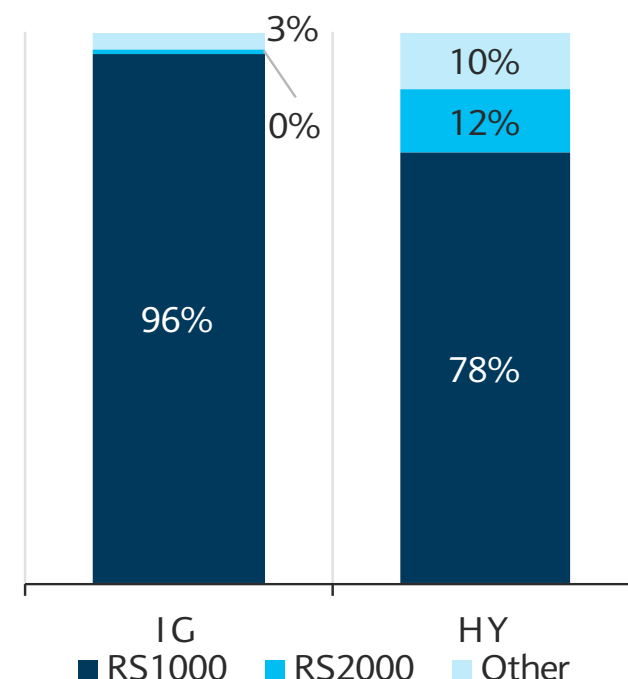
- The mapped IG (HY) equity sample had similar characteristics as the Russell 1000 (2000), but the median individual stock performance (ret and Sharpe ratio (S.R.)) was better than either index
- On average, 96% (IG) and 78% (HY) of the mapped equity sample (in terms of MV) was in the RS1000 and 0.1% (IG) and 5% (HY) was in the RS 2000

## Characteristics (Jan. 1990 – Jan. 2018)

| Characteristics    |                     |           |                  |                      |                   | Performance        |                                |                     |
|--------------------|---------------------|-----------|------------------|----------------------|-------------------|--------------------|--------------------------------|---------------------|
| Universe           | Avg. Mkt Cap (\$MI) | B/M Ratio | $\beta$ _S&P 500 | Dividend Yield (%/y) | % Paying Dividend | Median Ret. (%/Yr) | Median Stock-level Vol. (%/Yr) | Median S.R. (ann.r) |
| Mapped IG Equities | 18,144              | 0.45      | 0.95             | 2.32                 | 91%               | 12.92              | 27.77                          | 0.39                |
| Mapped HY Equities | 3,139               | 0.61      | 1.26             | 1.61                 | 39%               | 15.21              | 43.43                          | 0.31                |
| Russell 1000       | 11,759              | 0.43      | 1.03             | 2.04                 | 69%               | 12.01              | 35.07                          | 0.28                |
| Russell 2000       | 581                 | 0.55      | 1.26             | 1.38                 | 40%               | 12.21              | 50.13                          | 0.21                |

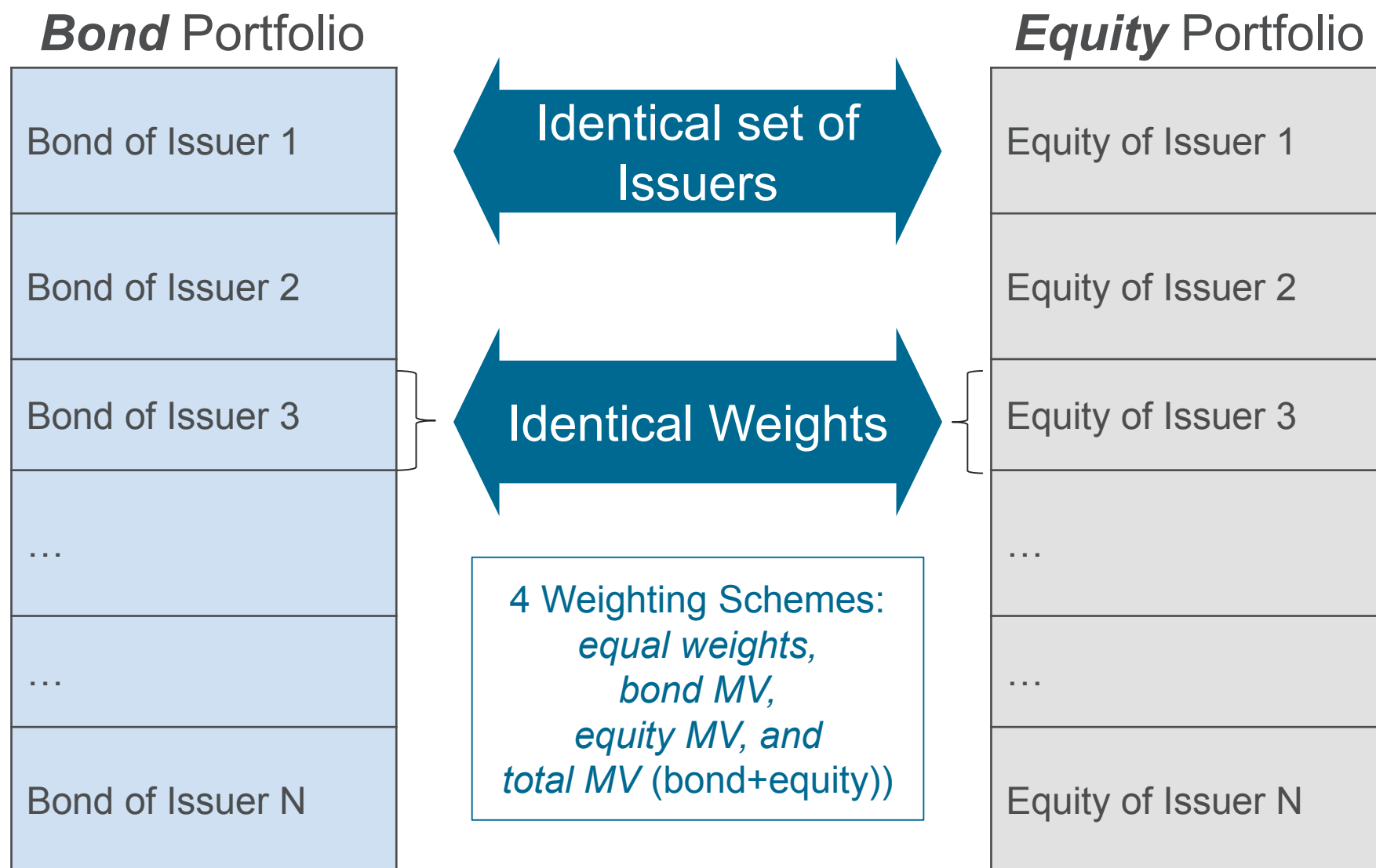
Note: B/M, beta, dividend yield, and ret. were calculated as value-weighted average for each month. Avg. Mkt cap and % paying dividend were calculated as an equally weighted average each month. The time-series averages were reported in the table. Avg. vol. and S.R. were calculated for each individual security for their entire duration in the sample and the cross-section equally weighted averages are reported in the table. Source: Bloomberg, Compustat, Barclays Research

## % of Mapped Equities that are in Russell Indices (in terms of MV)



# Step 1: Construct Mapped Bond and Equity Portfolios

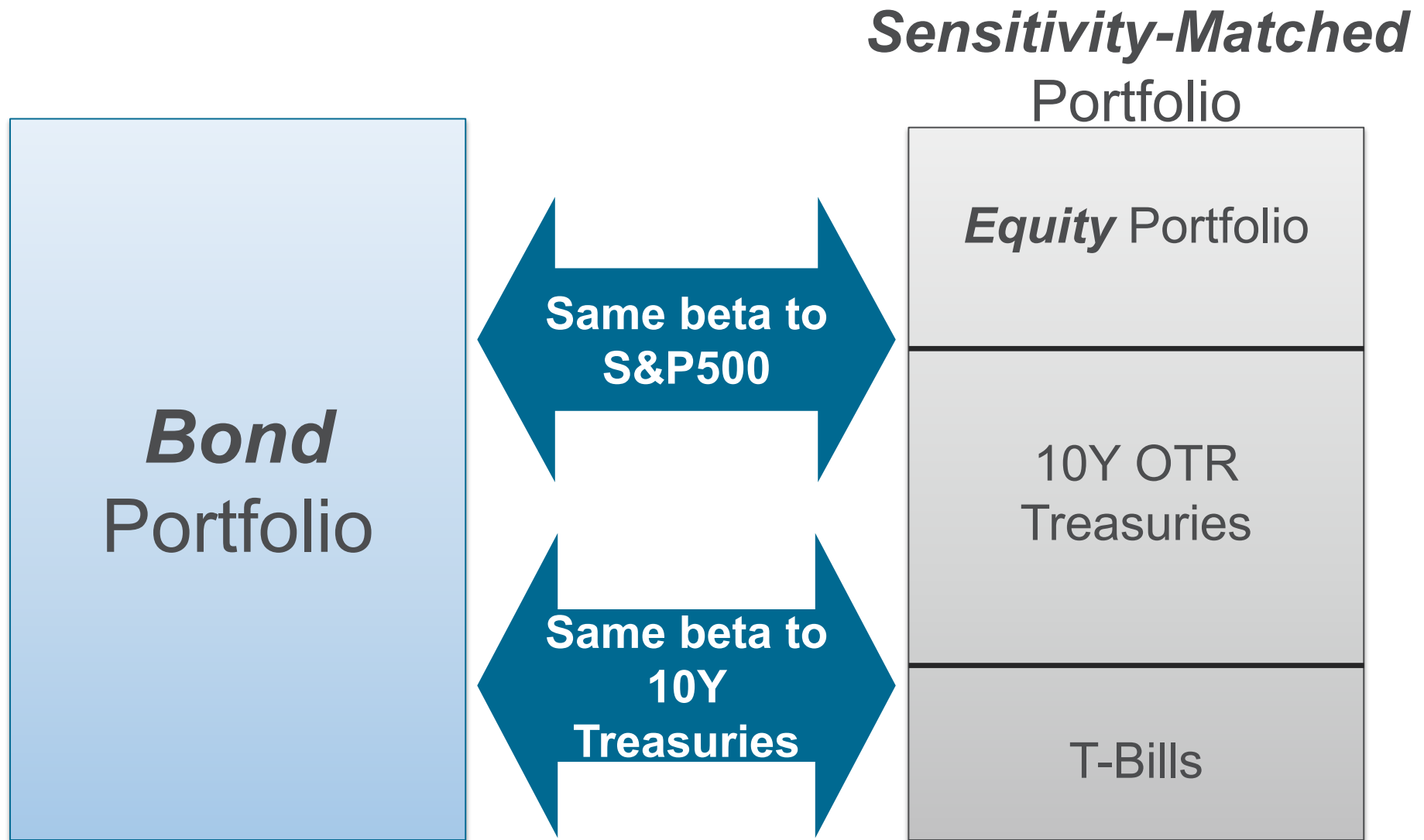
Each month, we construct two portfolios (*Bond* and *Equity*) with



Source: Barclays Research

## Step 2: Multi-Dimension Risk Matching

Each month, we construct a replicating portfolio comprised of the *Equity* port., Treasuries, and T-bills that matches the 2 factor sensitivities of the *Bond* port.



Source: Barclays Research

# Matching Portfolios by Factor Sensitivities

- Factor sensitivities were calculated using trailing 36m data
- Ex-ante sensitivities were similar across all the weighting schemes

## Pre-Formation Avg. Sensitivities

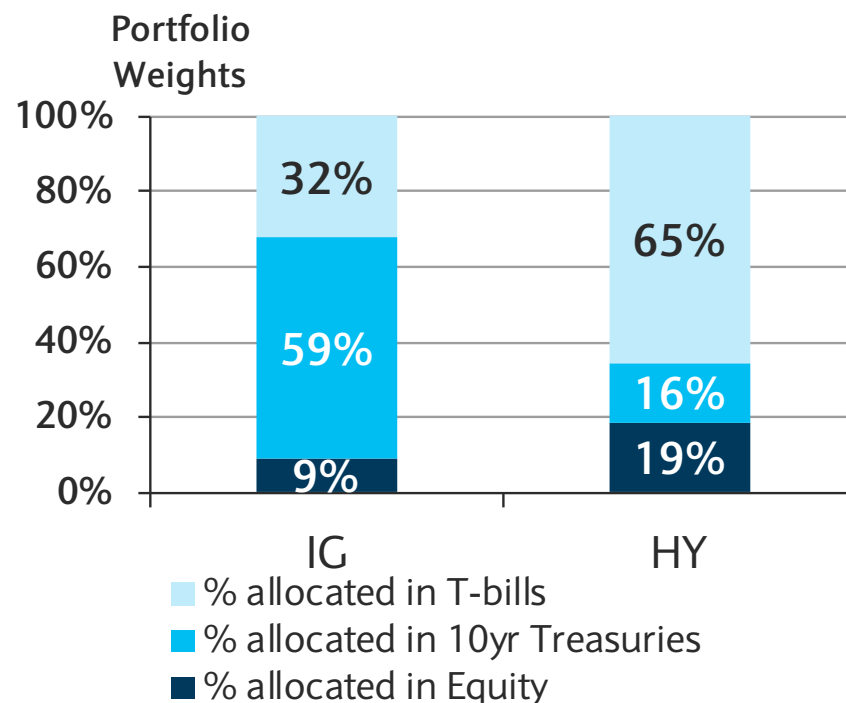
(Trailing 36m Regression, Avg. across time series from Jan. 1993 - Jan. 2018, EW, total returns used)

|    | Portfolio | $\beta_{\text{S\&P 500}}$ | % of month with 5%-significance | $\beta_{\text{10y Treasury ret.}}$ | % of month with 5%-significance | Adj. R2 |
|----|-----------|---------------------------|---------------------------------|------------------------------------|---------------------------------|---------|
| IG | Bond      | 0.09                      | 66%                             | 0.59                               | 99%                             | 75%     |
|    | Equity    | 0.95                      | 100%                            | 0.00                               | 6%                              | 85%     |
| HY | Bond      | 0.25                      | 87%                             | 0.08                               | 43%                             | 41%     |
|    | Equity    | 1.29                      | 100%                            | -0.39                              | 24%                             | 67%     |

Source: Bloomberg, Compustat, Barclays Research

## Average Portfolio Weights

(Jan. 1993 – Jan. 2018, EW)



## Post-Formation, Bond and Sensitivity-Matched Port. Had Same Exposure

- Post-formation, the *bond* and *sensitivity-matched* portfolios had no difference in their factor exposures
- Similar results across weighting schemes and in both IG and HY

### Post-Formation Portfolio Return Sensitivities (Jan. 1993 - Jan. 2018, EW, total returns used)

| Portfolio |  | Intercept   | T-Stat      | $\beta_{S\&P500}$ | T-Stat       | $\beta_{10y \text{ Treasury ret.}}$ | T-Stat       | adj. R2     |
|-----------|--|-------------|-------------|-------------------|--------------|-------------------------------------|--------------|-------------|
| IG        | <b>Bond over Sensitivity Matched Portfolio</b> | <b>0.46</b> | <b>2.08</b> | <b>-0.06</b>      | <b>-1.13</b> | <b>-0.09</b>                        | <b>-1.07</b> | <b>5.6%</b> |
|           | Bond   | 0.38        | 1.75        | 0.17              | 2.90         | 0.43                                | 5.79         | 50%         |
|           | Sensitivity-Matched Portfolio                  | -0.08       | -1.01       | 0.23              | 14.68        | 0.51                                | 11.12        | 85%         |
| HY        | <b>Bond over Sensitivity Matched Portfolio</b> | <b>0.36</b> | <b>2.40</b> | <b>-0.04</b>      | <b>-0.80</b> | <b>-0.04</b>                        | <b>-0.48</b> | <b>0.6%</b> |
|           | Bond   | 0.48        | 2.99        | 0.28              | 4.26         | 0.01                                | 0.10         | 31%         |
|           | Sensitivity-Matched Portfolio                  | 0.12        | 1.54        | 0.32              | 11.93        | 0.05                                | 1.02         | 59%         |

Source: Bloomberg, Compustat, Barclays Research

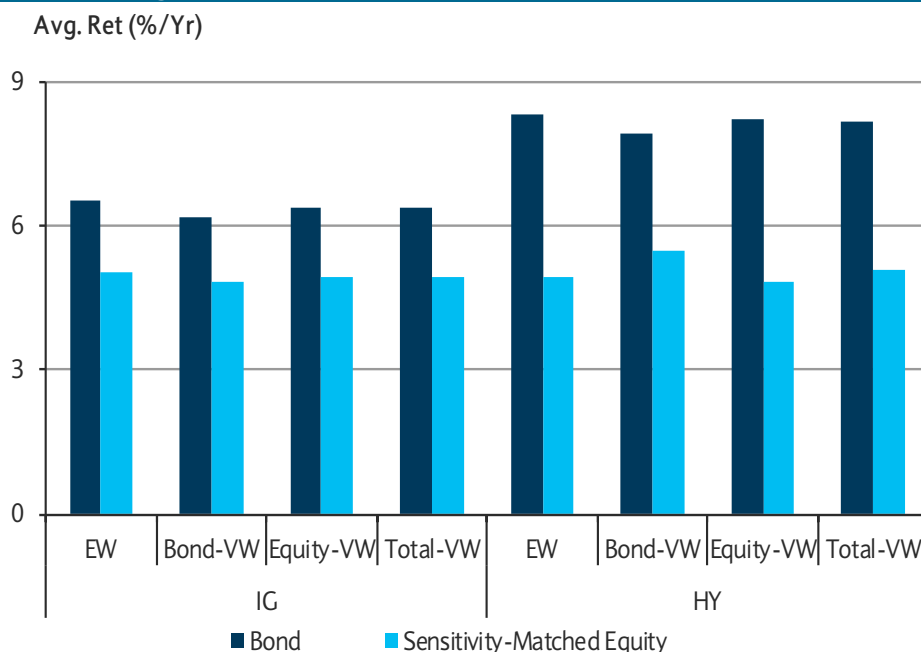
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# Portfolio-Level Performance

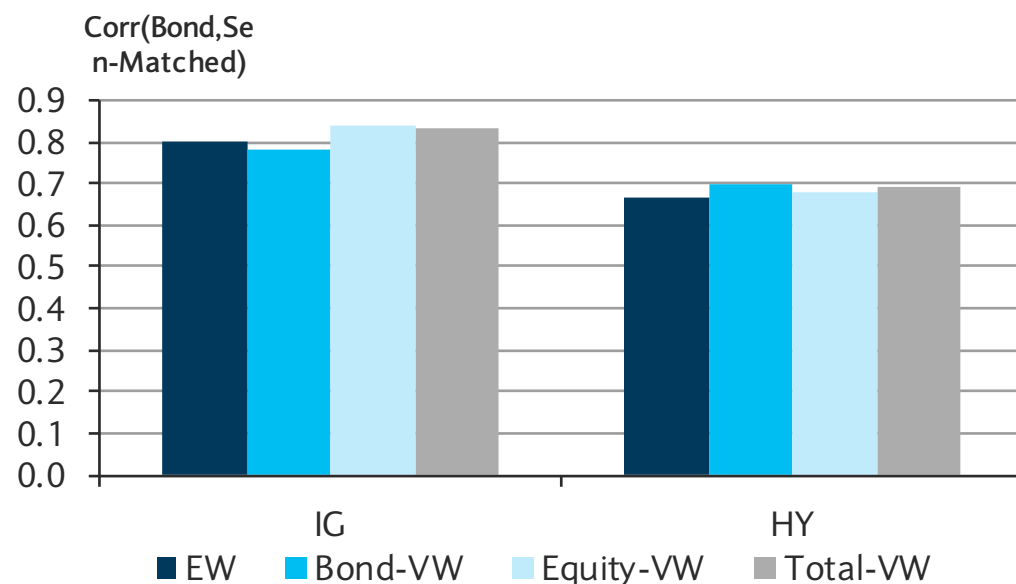
# Bonds Had Higher Avg. Returns than Sensitivity-Matched Portfolio

- Sensitivity-matched equity portfolio had almost identical factor exposures as the bond portfolios post formulation but produced much lower avg. returns, regardless of the weighting scheme in both IG and HY
- Regardless of the difference in avg. returns, the correlations were high for both IG and HY among all weighting schemes

## Avg. Ret. of Bonds vs. Sensitivity-matched Equity (Jan. 1993 – Jan. 2018, total returns)



## Post-Formation Correlation b/w Bond and Sensitivity-Matched-Equity Portfolios (Jan. 1993 - Jan. 2018)

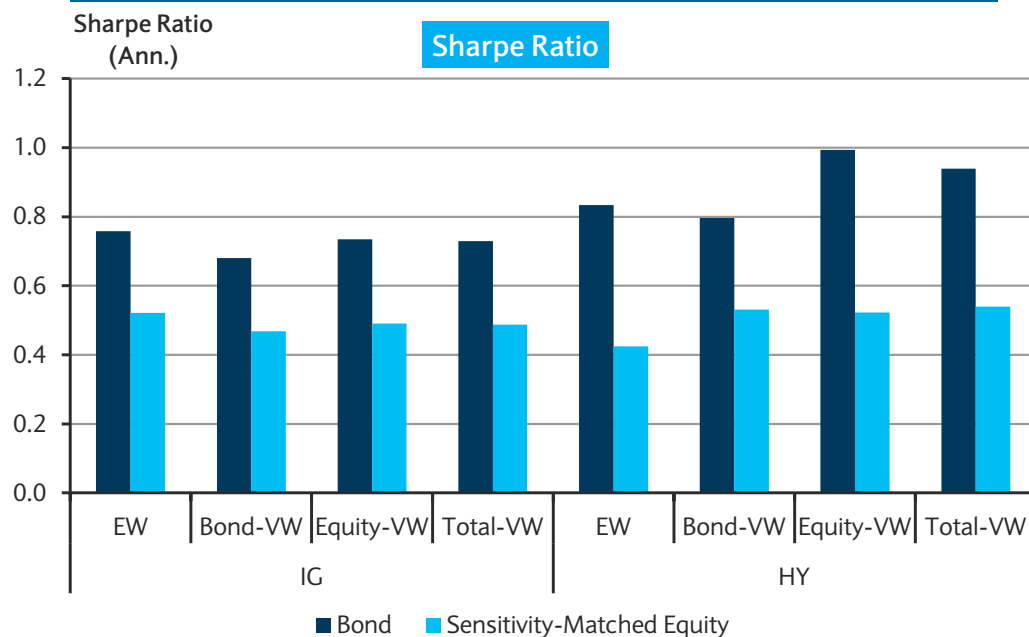


Note: the mapped bond universe has a price filter of \$40 to exclude bonds traded on recovery. Results were similar using no price filter  
 Source: Bloomberg, Compustat, Barclays Research

# Bond Portfolios Had Higher S.R. than Sensitivity-Matched Equity

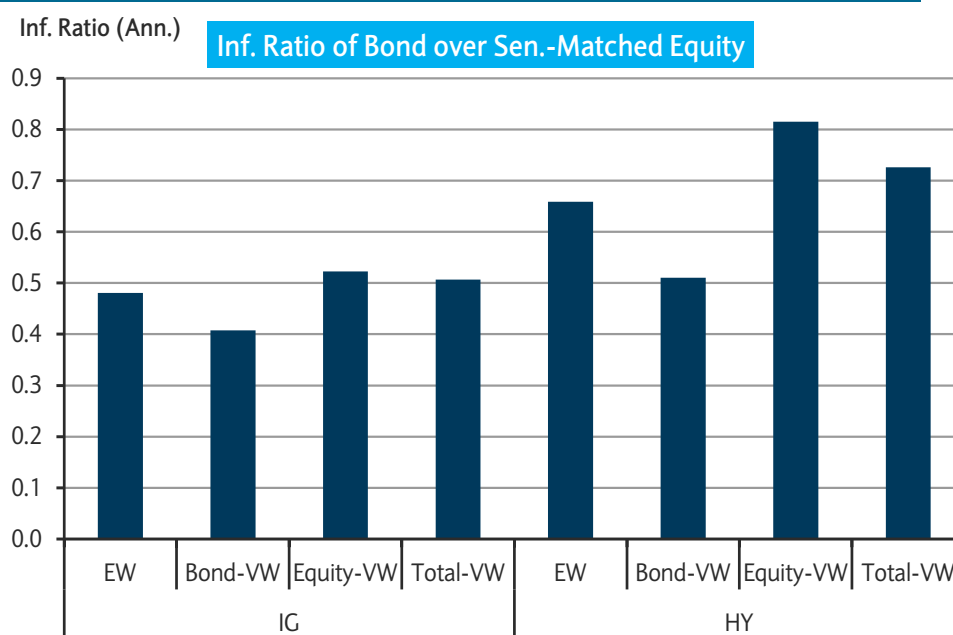
- Regardless of the weighting scheme, bond portfolios had higher S.R. on average than equity portfolios of the same company in both IG and HY
- The I.R. of bonds over sensitivity-matched equity ranged from 0.41 to 0.82 with different weighting schemes

**Sharpe Ratios of Bonds vs. Matched-Equity  
(Jan. 1993 – Jan. 2018)**



Source: Bloomberg, Compustat, Barclays Research

**Inf. Ratios of Bonds over Matched Equity  
(Jan. 1993 – Jan. 2018)**





# Bond Outperformed Sensitivity-Matched Equities

- The bond portfolios outperformed sensitivity-matched equity portfolios with
  - ✓ Higher avg. ret.
  - ✓ Inf. ratio ranges from 0.41 to 0.82
  - ✓ Regardless of weighting schemes in both IG and HY

## Performance of Bond over Sensitivity-Matched Portfolios (Jan. 1993 – Jan. 2018)

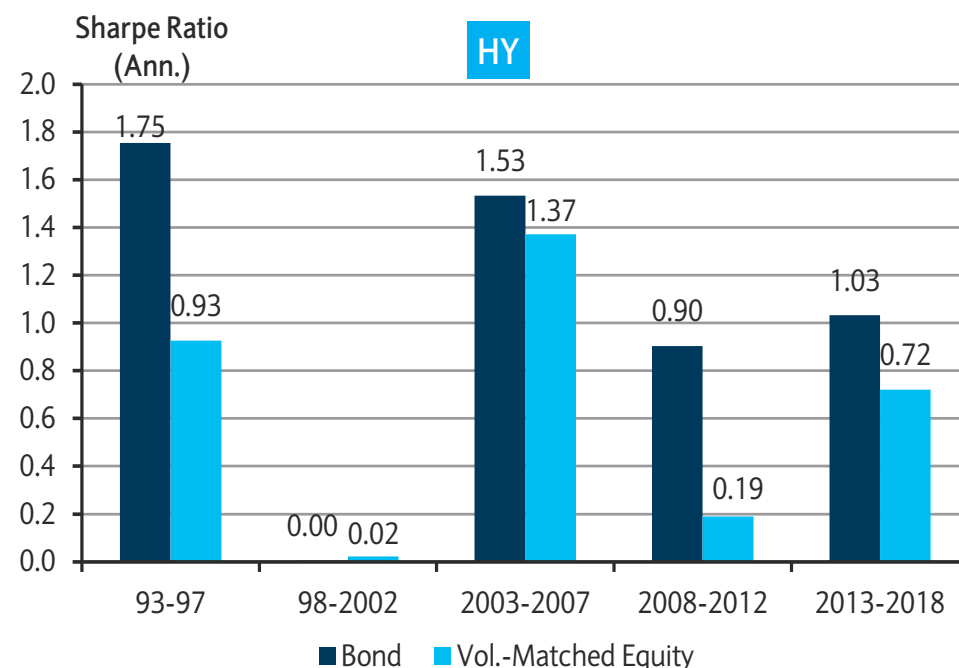
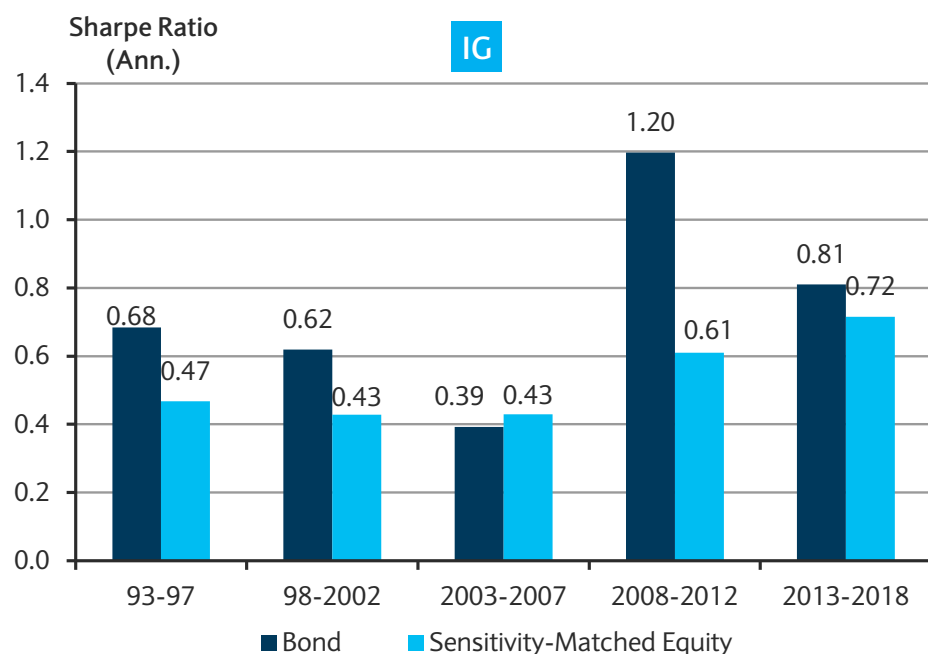
| Weighting Scheme |                       | Avg. Ret<br>(%/Yr) | Vol.<br>(%/Yr) | Inf. Ratio<br>(Ann.) | Worst<br>Monthly<br>Ret (%) | Max. DD<br>(%) | Corr (Bond,<br>Matched<br>Equity) |
|------------------|-----------------------|--------------------|----------------|----------------------|-----------------------------|----------------|-----------------------------------|
| IG               | EW                    | 1.51               | 3.13           | 0.48                 | -3.06                       | -15.29         | 0.80                              |
|                  | Bond-VW               | 1.37               | 3.36           | 0.41                 | -5.45                       | -10.31         | 0.78                              |
|                  | Equity-VW             | 1.47               | 2.82           | 0.52                 | -3.59                       | -9.99          | 0.84                              |
|                  | Total-VW              | 1.47               | 2.90           | 0.51                 | -3.88                       | -9.97          | 0.83                              |
|                  | Avg. across weighting | 1.45               | 3.05           | 0.48                 | -4.00                       | -11.39         | 0.81                              |
| HY               | EW                    | 3.39               | 5.15           | 0.66                 | -6.91                       | -15.02         | 0.67                              |
|                  | Bond-VW               | 2.45               | 4.79           | 0.51                 | -4.46                       | -11.81         | 0.70                              |
|                  | Equity-VW             | 3.37               | 4.13           | 0.82                 | -5.94                       | -9.61          | 0.68                              |
|                  | Total-VW              | 3.10               | 4.26           | 0.73                 | -5.55                       | -10.22         | 0.69                              |
|                  | Avg. across weighting | 3.08               | 4.58           | 0.68                 | -5.71                       | -11.66         | 0.68                              |

Source: Bloomberg, Compustat, Barclays Research

# Bond Outperformance Was Not Limited to a Single Period

- Bond portfolios had higher S.R. than sensitivity-matched equity portfolios in most sub-periods except 2003-2007 for IG and 1998-2002 for HY
- Sub-period performance comparison were similar in all weighting schemes

## Sharpe Ratios of Bond vs. Sensitivity-Matched Equity in Sub-Periods (EW)



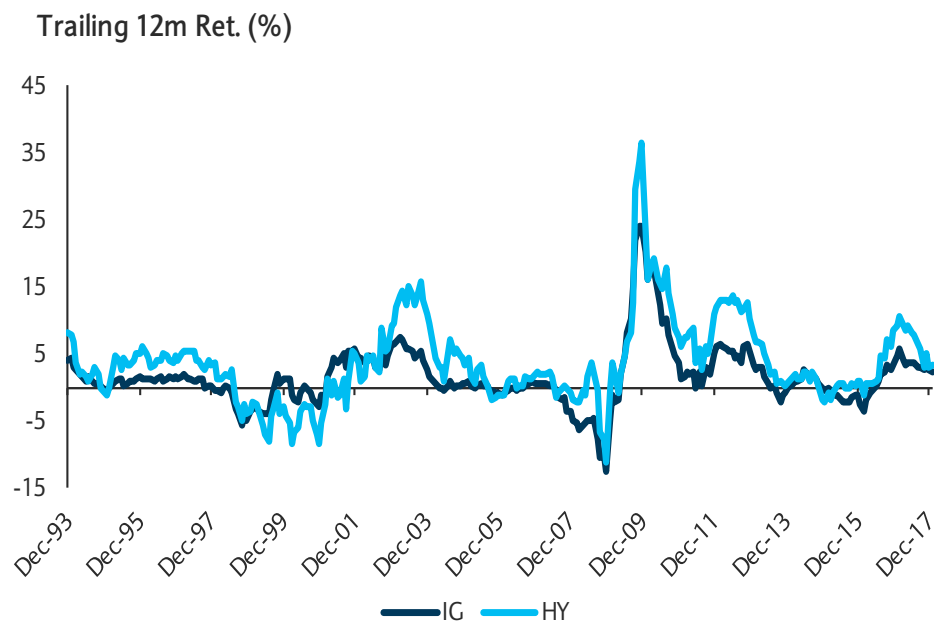
Source: Bloomberg, Compustat, Barclays Research



# But in Some Periods, Stocks Did Outperform Bonds

- Similar dynamics with all weighting schemes

## Trailing 12m Ret. Diff of Bond over Sensitivity-Matched Equity (EW)



$\text{Corr}(\text{IG}, \text{HY}) = 0.86$

Source: Bloomberg, Compustat, Barclays Research

## Trailing 36m Inf. Ratio of Bond over Sensitivity-Matched Equity (EW)

Inf. Ratio (Trailing 36m, ann.)



$\text{Corr}(\text{IG}, \text{HY}) = 0.79$

## Bond Outperformance Intact after Controlling for Macro Factors

- The intercept term is significantly positive in both IG and HY
- Inflation and term premium are significantly related to the contemporaneous bond-over-matched equity returns for both IG and HY

### Regression Coefficients of Bond-over-Sensitivity-Matched Equity on Standardized Macroeconomic Variables (EW, monthly ret., Jan. 1993 – Jan. 2018)

| Coefficients                               | IG      | HY      |
|--|---------|---------|
| Intercept (%/yr)                           | 1.56**  | 3.36*** |
| SP500 - 10Y Treasury Ret                   | -0.15   | -0.27*  |
| VIX monthly Chg                            | -0.12   | -0.24   |
| Inflation (%chg in monthly CPI)            | 0.16**  | 0.31*** |
| CFNAI Diffusion Index                      | 0       | 0.02    |
| Monthly Yield Chg (10Y Treasury)           | 0.07    | 0.08    |
| Term Premium (10Y - 2Y Treasury Yield)     | 0.15*** | 0.25*** |
| Default Premium (Baa - 10Y Treasury Yield) | 0.02    | 0.03    |
| Adj. R2                                    | 4%      | 5%      |

Note: Macroeconomic variables were standardized using time series mean and std. for easier interpretation.

Source: Compustat, Bloomberg, Chicago Fed, Bureau of Labor Statistics, Barclays Research

# Bond Outperformed Equities after Controlling for Risk Factors

- The bond portfolios significantly outperformed sensitivity-matched equity portfolios even after controlling for common risk factors (Fama-French 5 factors and Momentum)

## Regression of Bond over Sensitivity-Matched Equities on FF and Momentum Factors (Jan. 1993 – Jan. 2018)

|    |              | EW       | Bond-VW  | Equity-VW | Total-VW |
|----|--------------|----------|----------|-----------|----------|
| IG | alpha (%/yr) | 2.185**  | 1.903**  | 1.978**   | 1.972**  |
|    | Mkt Beta     | -0.032   | -0.026   | -0.025    | -0.025   |
|    | SMB Beta     | 0.017    | 0.029    | 0.035**   | 0.034*   |
|    | HML Beta     | -0.051   | -0.096   | -0.059    | -0.065   |
|    | RMW Beta     | -0.03    | 0        | -0.004    | -0.003   |
|    | CMA Beta     | -0.011   | 0.024    | 0.012     | 0.016    |
|    | MMT Beta     | -0.026   | -0.032   | -0.04**   | -0.039** |
|    | Adj. R2      | 4.78%    | 6.83%    | 7.20%     | 6.97%    |
| HY | alpha (%/yr) | 4.399*** | 3.113*** | 4.13***   | 3.823*** |
|    | Mkt Beta     | -0.043   | -0.026   | -0.031    | -0.029   |
|    | SMB Beta     | -0.026   | 0.03     | 0.02      | 0.023    |
|    | HML Beta     | -0.079   | -0.085   | -0.078    | -0.08    |
|    | RMW Beta     | -0.026   | 0.007    | -0.004    | 0        |
|    | CMA Beta     | -0.048   | -0.054   | -0.014    | -0.025   |
|    | MMT Beta     | -0.023   | -0.022   | -0.047*** | -0.041** |
|    | Adj. R2      | 3.18%    | 4.08%    | 4.78%     | 4.37%    |

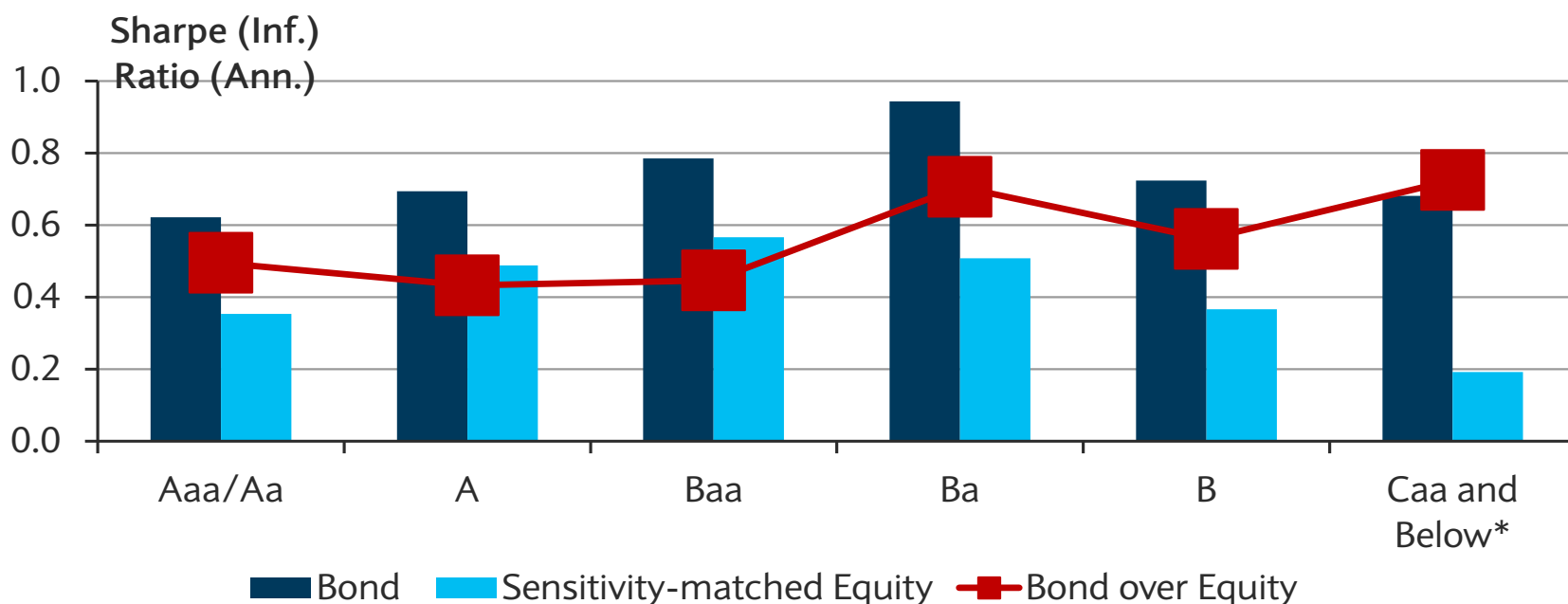
Note: \*/\*\*/\*\* indicates 10%-/5%-/1%-level of significance. Newey-West Standard Errors with 12lags were used.

Source: Bloomberg, Compustat, Ken French Data Library, Barclays Research

# Bonds had Higher S.R. than Equities across all Ratings

- In all rating categories
  - ✓ Bonds had higher S.R. than their equity counterparts
  - ✓ The bond over equity return diff. also had positive I.R ranging from 0.43 to 0.73
- Results hold regardless of weighting schemes

## Sharpe (Inf.) Ratios (Ann.) of Bond vs. Sensitivity-Matched Equity in Each Rating (Jan. 1993 – Jan. 2018, EW)

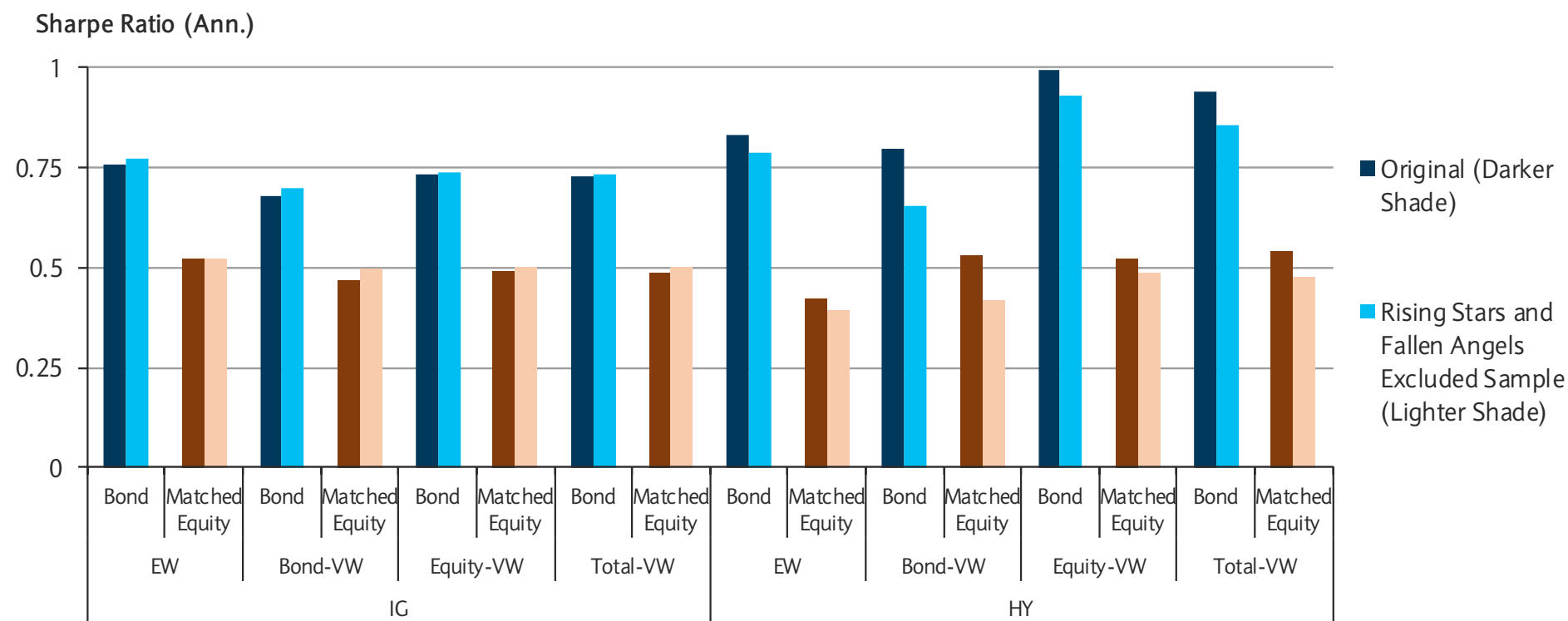


Note: The statistics shown for Caa and below are from Jan. 2002 – Jan. 2018 due to lack of observation in this rating bucket from 1993-2001.  
Source: Bloomberg, Compustat, Barclays Research

# Were Higher Bond returns Driven by Rising Stars or Fallen Angels?

- No. Excluding Rising Stars (IG bonds that were in HY in any month during previous 24m) and Fallen Angels (HY bonds that were in IG in any month during previous 24m-period) had **no material effect** on the outperformance of bonds over sensitivity-matched equities

## Sharpe Ratios of Original Sample vs. Sample excluding Fallen Angels and Rising Stars (Jan. 1993 – Jan. 2018)



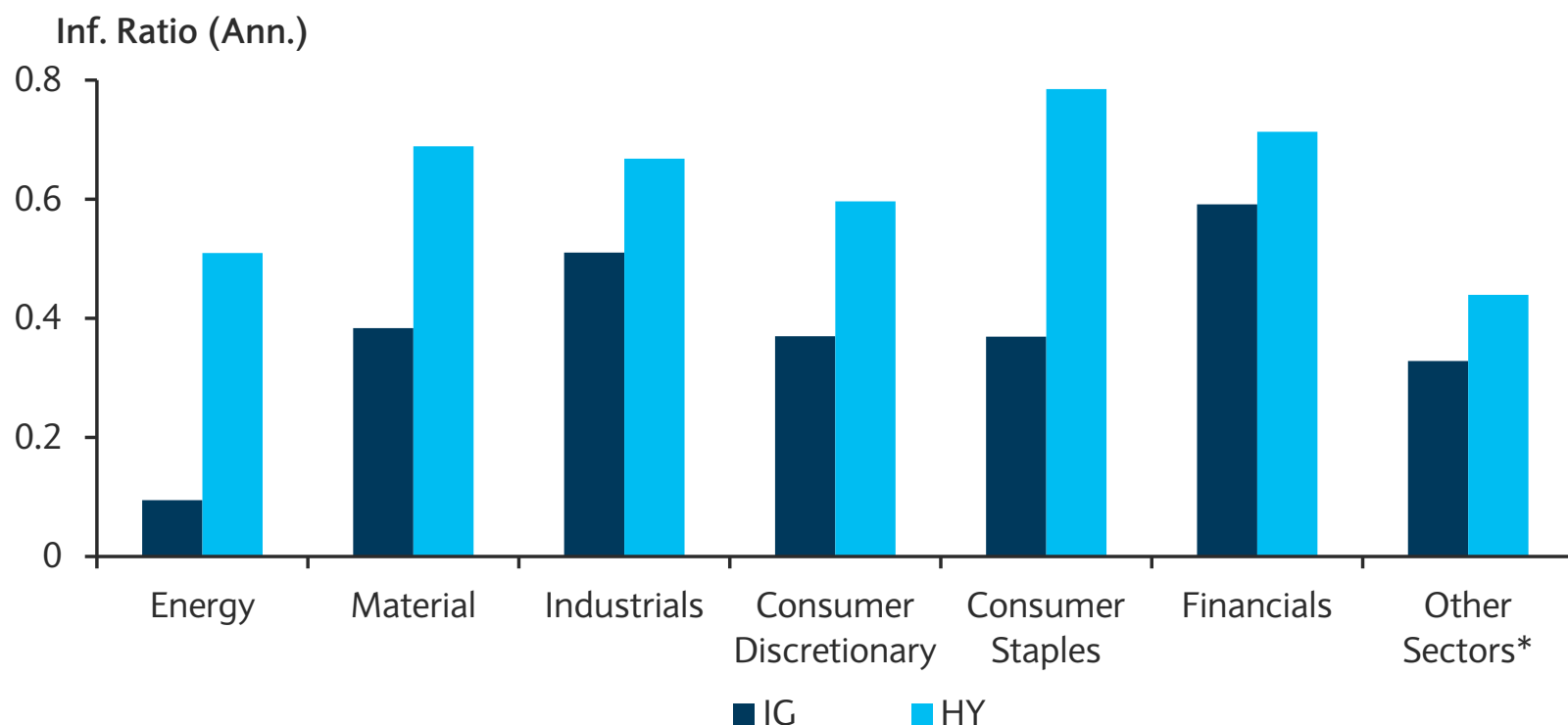
Source: Bloomberg, Compustat, Barclays Research



# Bonds Outperformed Sensitivity-Matched Equities in all Sectors

- In all GICS sectors, the bond portfolios outperformed corresponding sensitivity-matched equity portfolios in both IG and HY
- The results are similar regardless of weighting scheme

## Inf. Ratio of Bond over Sensitivity-Matched Equity Portfolios (EW, Jan. 1993 - Jan. 2018)



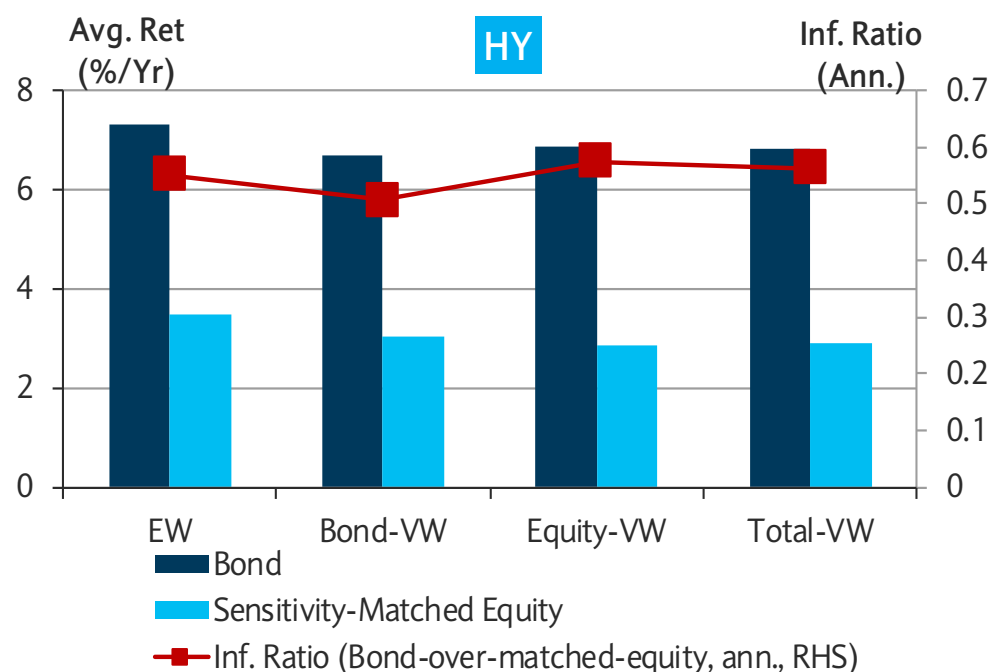
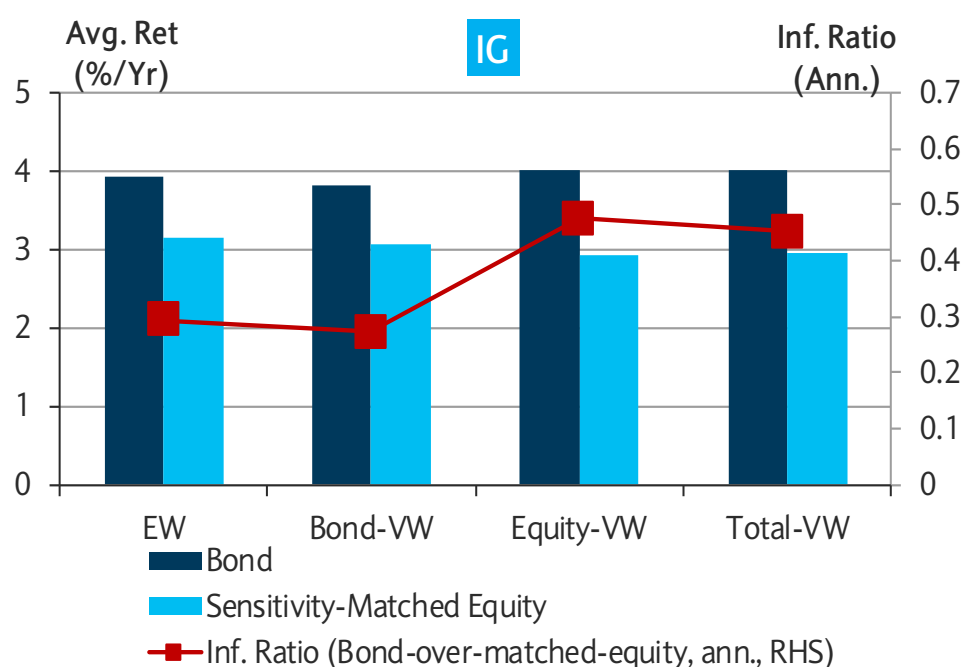
Note Other sectors include utilities, health care, information technology, and telecommunications. These sectors did not have enough observations on their own, so they were grouped together. Source: Bloomberg, Compustat, Barclays Research



# Similar Bond Outperformance in European Markets

- Similarly, in European markets, bond portfolios had higher avg. ret. and Sharpe ratios than the sensitivity-matched equity portfolios
- The Inf. ratios of bond over matched equity are about 0.4 for IG and 0.5 for HY
- The results are consistent across different weighting schemes

## Bond vs. Sensitivity-Matched Equity Portfolio Performance in European Markets (May. 2005 – Jan. 2018)



Source: Bloomberg, Compustat, Barclays Research

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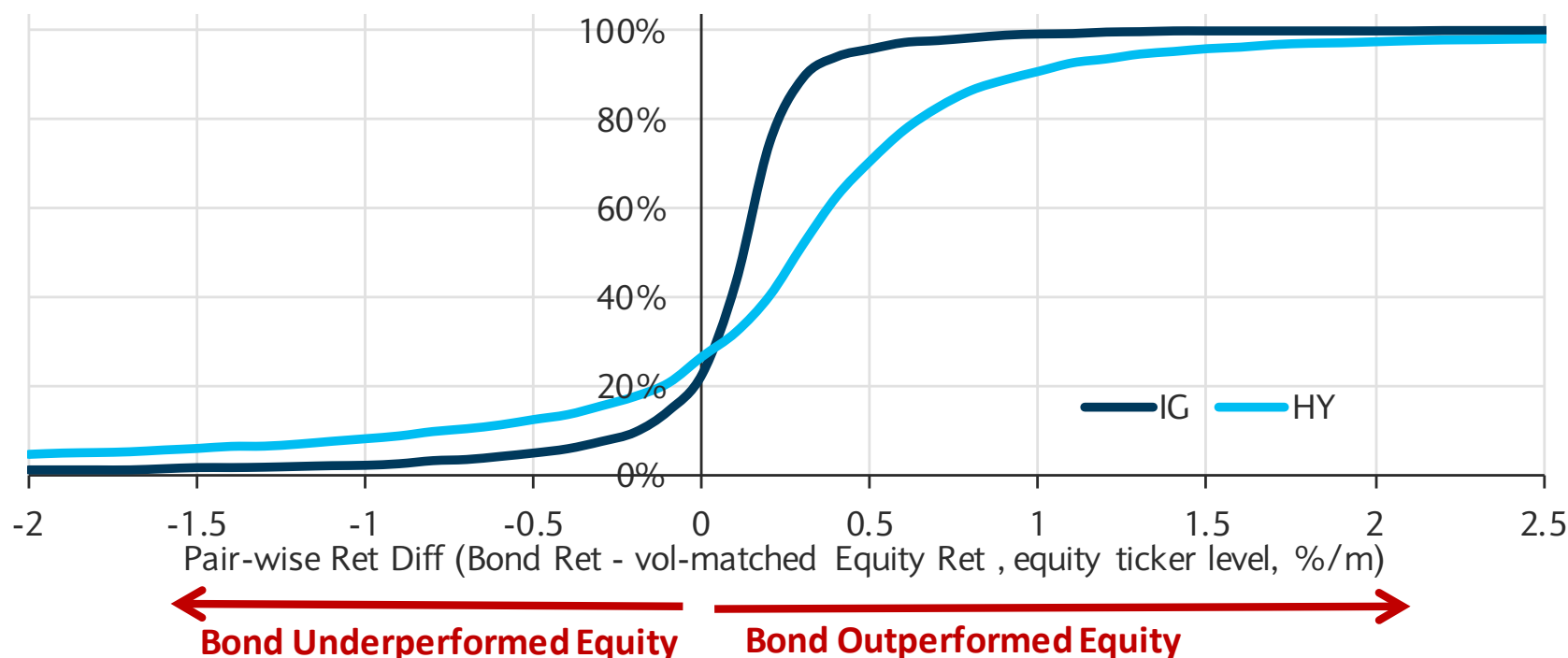
# Cross-Sectional Differences

## More than 70% of Companies Had Higher Avg. Bond Ret.

- For each company, we looked at the diff. in avg. ret. between its bond and sensitivity-matched return (applying the **same weights across the board for IG/HY**)\*
- 77% of IG and 73% of HY companies had higher avg. returns with their bonds than with their sensitivity-matched equities during 1993-2018

### Cum. Distribution of Pair-wise Ret. Diff. (EW, Jan. 1993 – Jan. 2018)

Cum. Distribution of Pair-wise Ret. Diff. (%)



Note: weights on equity, 10y treasury, and T-bills calculated monthly from EW bond and equity portfolios using sensitivity matching of two factors (S&P 500 and 10y Treasury Ret).  
Source: Bloomberg, Compustat, Barclays Research

# How Did the Hedging Work in the Cross-Section?

- Even when we apply the **same weights across the board** for the hedging portfolio of each individual company, the majority of the difference portfolio (bond over matched equity) has non-significant post-formation exposures to the two factors (S&P500 and 10y Treasuries)
- For the difference port., the magnitude of the ex-post sensitivities were small and could only explain a small % of total variation

## Post-Formation Company-Level Exposures to Factors (EW, Jan. 1993 – Jan. 2018, Company-level regressions of bond – sensitivity matched equity monthly ret on S&P 500 and 10y OTR Treasury ret)

|    |                  |        |        |        |       | Under-hedged           |                                     | Over-hedged            |                                     | % non-significant coef. |
|----|------------------|--------|--------|--------|-------|------------------------|-------------------------------------|------------------------|-------------------------------------|-------------------------|
|    |                  |        |        |        |       | Positive Coef.         |                                     | Negative Coef.         |                                     |                         |
|    |                  |        |        |        |       | % in the cross-section | % Significant (10%-level, over all) | % in the cross-section | % Significant (10%-level, over all) |                         |
| IG | beta_SP500       | -0.007 | -0.064 | -0.017 | 0.040 | 42%                    | 8%                                  | 58%                    | 18%                                 | 74%                     |
|    | beta_10yTreasury | -0.033 | -0.157 | -0.017 | 0.111 | 46%                    | 19%                                 | 54%                    | 22%                                 | 59%                     |
|    | adj. R2          | 9%     | 0%     | 5%     | 13%   |                        |                                     |                        |                                     |                         |
| HY | beta_SP500       | 0.004  | -0.129 | -0.019 | 0.113 | 46%                    | 9%                                  | 54%                    | 13%                                 | 79%                     |
|    | beta_10yTreasury | -0.010 | -0.231 | 0.008  | 0.244 | 48%                    | 15%                                 | 52%                    | 10%                                 | 75%                     |
|    | adj. R2          | 6%     | -1%    | 2%     | 9%    |                        |                                     |                        |                                     |                         |

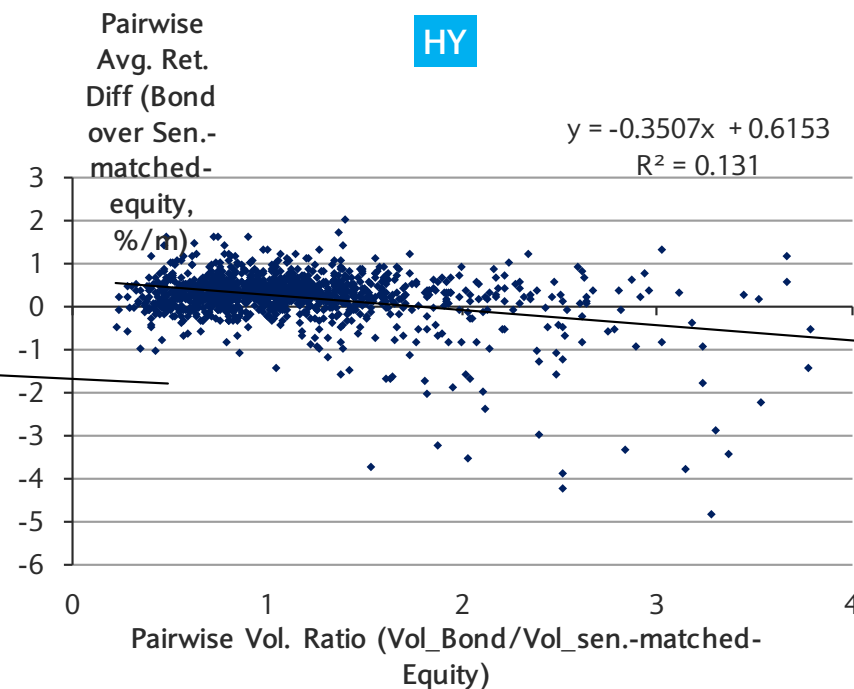
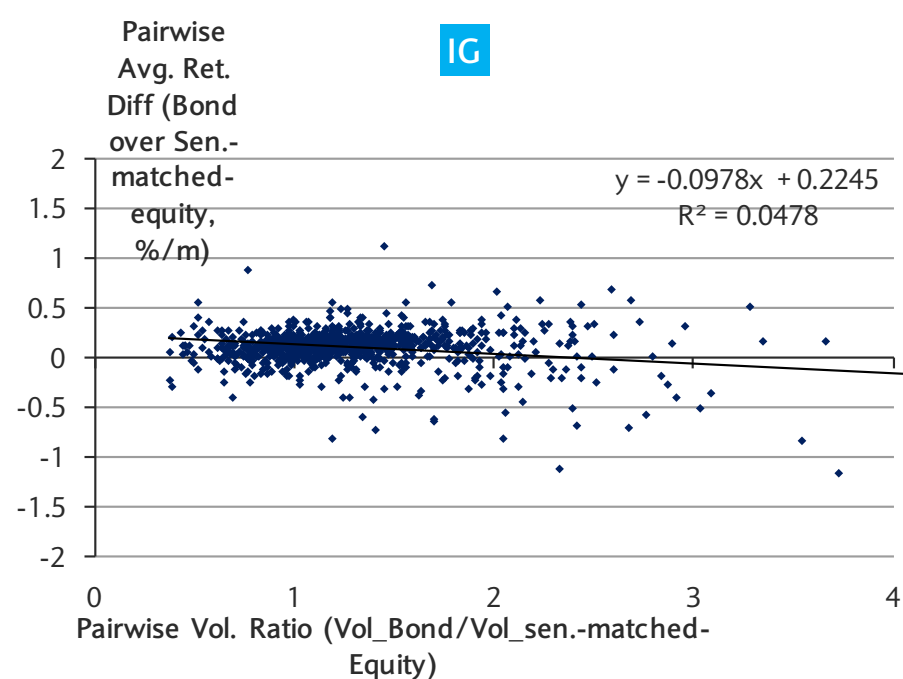
Note: weights on equity, 10y treasury, and T-bills calculated monthly from EW bond and equity portfolios using sensitivity matching of two factors (S&P 500 and 10y Treasury Ret).

Source: Bloomberg, Compustat, Barclays Research

# Scatter-Plot of Pair-Wise Vol. Ratio vs. Ret. Diff

- We applied the same weights to all individual equities (in IG/HY) every month
- In reality, different companies might need different weights for their equities to have the same factor sensitivities as the bond
- The positive diff in return could be driven by bonds having higher risk (proxied by vol)
- Scatter-plot shows that bonds with higher vol than equity did not have higher ret.

## Pair-wise Vol. Ratio vs. Ret Diff (Bond over Matched-Equity, Jan. 1993 – Jan. 2018, EW)

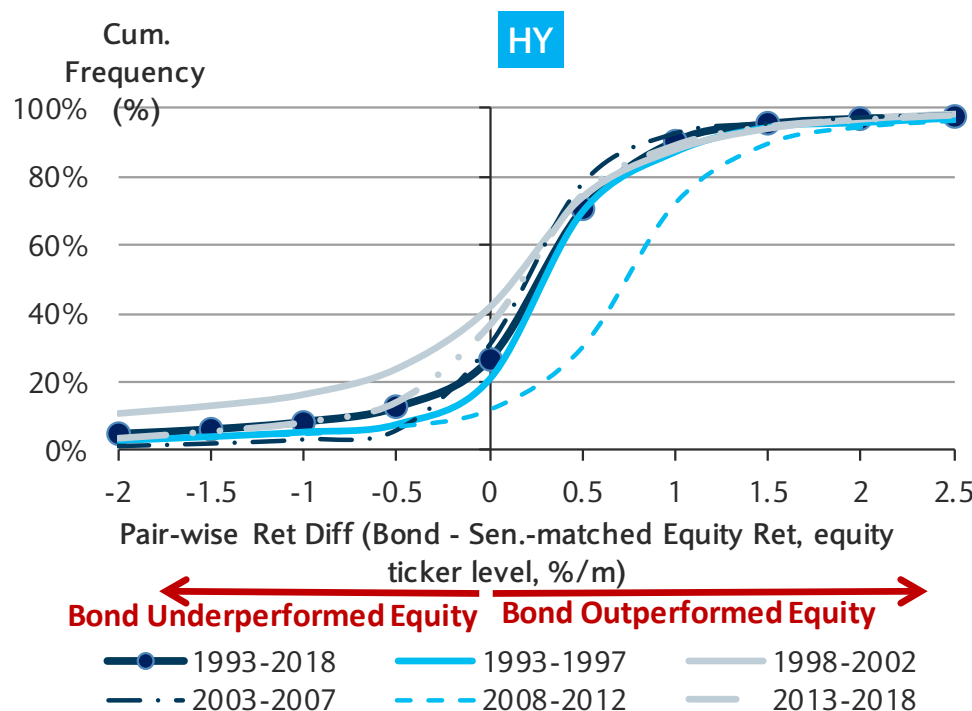
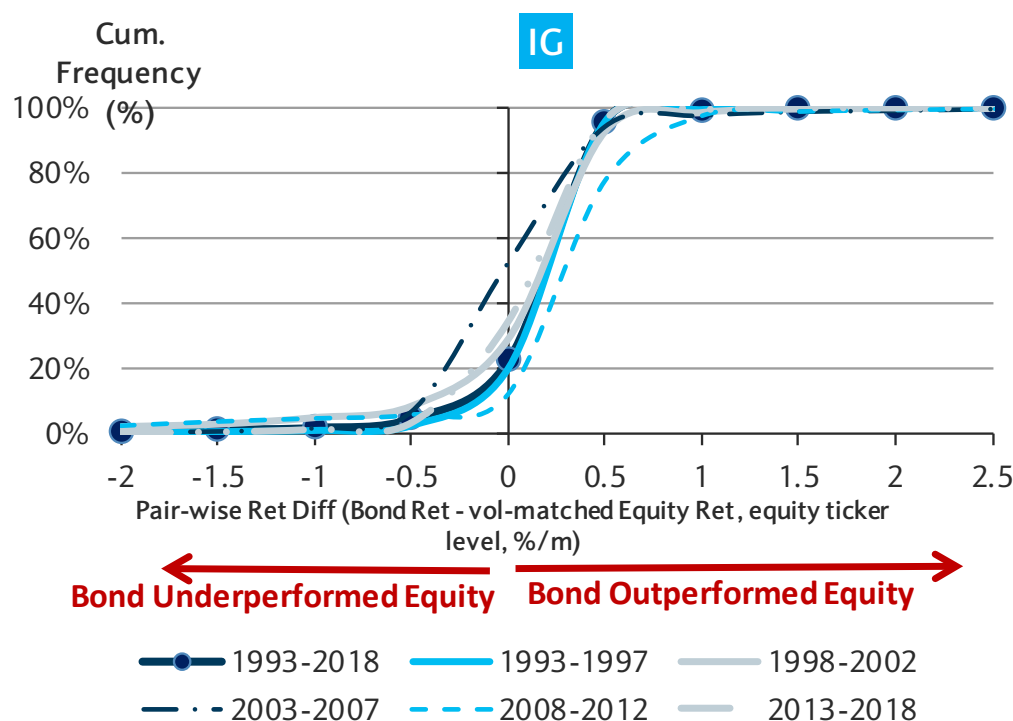


Note: weights on equity, 10y treasury, and T-bills calculated monthly from EW bond and equity portfolios using sensitivity matching of two factors (S&P 500 and 10y Treasury Ret).  
Source: Bloomberg, Compustat, Barclays Research

# % of Companies with Outperforming Bonds Varied over Time

- The fraction of companies with higher bond returns ranged from 47% (IG 2003-07) to 88% (HY 2008-12) in the sub-periods

## Sub-periods Cum. Distribution of Pair-wise Ret. Diff. (EW)

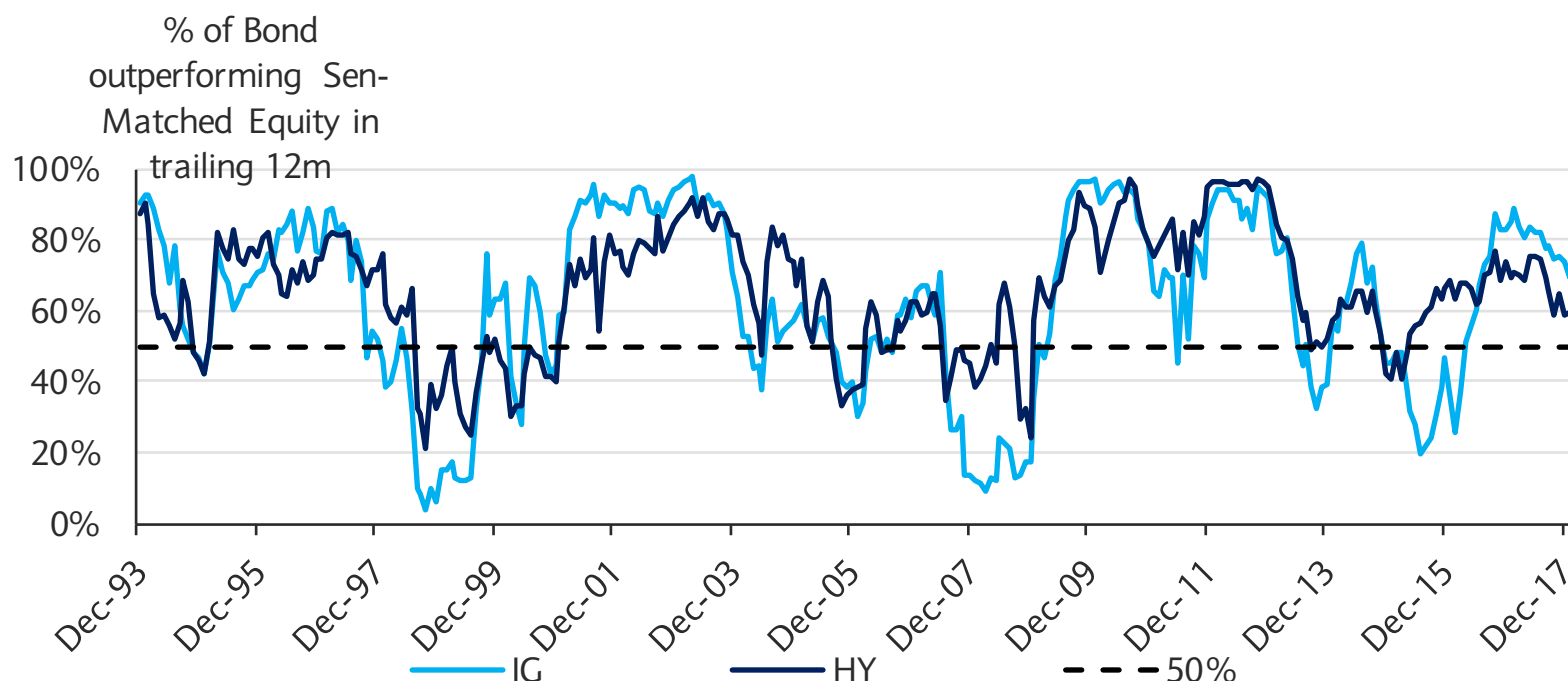


Note: weights on equity, 10y treasury, and T-bills calculated monthly from EW bond and equity portfolios using sensitivity matching of two factors (S&P 500 and 10y Treasury Ret).  
Source: Bloomberg, Compustat, Barclays Research

## % of Bond outperforming Sen.-Matched Equity Varied over Time

- Similar as the magnitude of outperformance, there is time-series variation in the cross-section of the % of companies whose bonds outperformed stocks on a risk-adjusted basis
- In each period, some stocks did better than bonds from the same company in the trailing 12m-period

### % of Companies whose Bond Outperformed Sensitivity-Matched Equity in the trailing 12m (EW)



Note: weights on equity, 10y treasury, and T-bills calculated monthly from EW bond and equity portfolios using sensitivity matching of two factors (S&P 500 and 10y Treasury Ret).  
Source: Bloomberg, Compustat, Barclays Research

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## Is Liquidity the Driver?



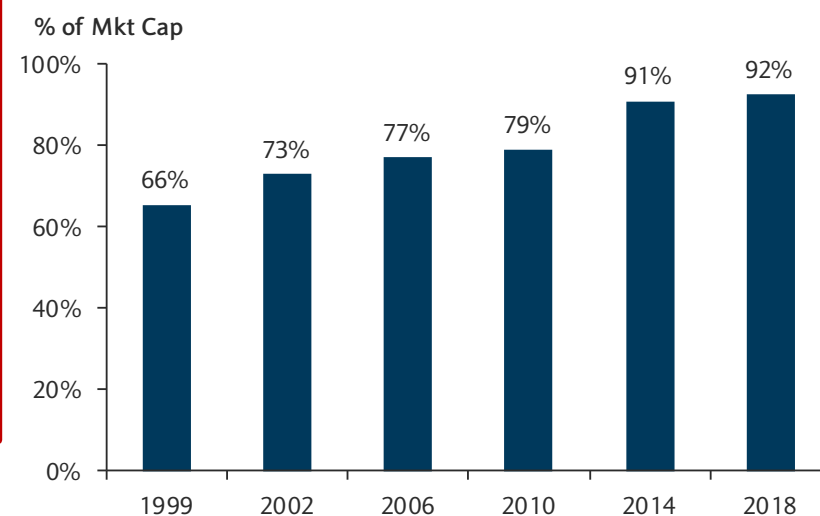
# Is Liquidity Driving the Bond-over-Equity Outperformance?

- We focus on a sub-sample with liquid bonds and equities: S&P 500 companies with publicly traded bonds included in the Bloomberg Barclays Corporate and HY index
- Bonds outperformed matched equities in a similar pattern as in IG
  - ✓ Sensitivity-matched equity had high corr. with bond portfolio
  - ✓ EW *Bond* port. outperformed sensitivity-matched equities by 1.84%/year with an I.R. of 0.52
  - ✓ Results were similar across weighting schemes

**S&P 500 Sample: Performance of Bond over Sensitivity-Matched Equity Portfolios**  
(EW, Dec. 1997 – Jan. 2018 due to availability on S&P500 constituent data)

**%Mkt Cap of S&P 500 stocks having mapped index bonds**

| Weighting Scheme | Avg. Ret (%/Yr) | Vol. (%/Yr) | Inf. Ratio (Ann.) | Worst Monthly Ret (%) | Max. DD (%) | Corr(Bond, Matched Port.) |
|------------------|-----------------|-------------|-------------------|-----------------------|-------------|---------------------------|
| EW               | 1.84            | 3.57        | 0.52              | -3.30                 | -11.99      | 0.71                      |
| Bond-VW          | 1.76            | 3.86        | 0.45              | -5.37                 | -8.50       | 0.70                      |
| Equity-VW        | 1.66            | 3.12        | 0.53              | -3.47                 | -9.23       | 0.79                      |
| Total-VW         | 1.70            | 3.24        | 0.52              | -3.79                 | -9.10       | 0.78                      |



Source: Bloomberg, Compustat, Barclays Research



Note: the coverage data are of January for each year listed.

# Another Approach: Quantifying Bonds' Liquidity using LCS

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## Liquidity as Cost of Trading:

- Liquidity Cost Score (LCS) measures the cost of an *immediate, institutional-size, round-trip* transaction, expressed as a percent of the bond's price:
  - $\text{OASD} \times (\text{Bid spread} - \text{Ask spread})$  *if quoted on spread*
  - $(\text{Ask price} - \text{Bid price}) / \text{Bid price}$  *if quoted on price*
- Launched in October 2009 for USD IG and HY corporate bonds, with history available from January 2007. Currently, LCS is computed for ~20,000 bonds
- Based on bond-level information, and published by Barclays QPS Research (see Konstantinovsky, Ng, and Phelps, 2015; Konstantinovsky, 2018; for more details)

# LCS Ranking Had Little Effect on Bond Outperformance

- Each month, we divided all issuers into low and high LCS categories and tracked their performance in a similar way
- In low and high LCS buckets, bond-over-sensitivity-matched portfolios had similar I.R. in both IG and HY and across weighting schemes
- Similar bond outperformance across LCS rankings indicates that liquidity is not a reason for bonds' outperformance over equities

Performance of Bonds over Matched Equity Portfolios by LCS Ranking  
(EW, Jan. 2010\* – Jan. 2018)

| LCS Ranking |                          | Avg. Ret<br>(%/yr) | Vol.<br>(%/Y) | Inf.<br>Ratio<br>(Ann.) | Worst<br>Monthly<br>Ret (%/m) | MaxDD<br>(%) |
|-------------|--------------------------|--------------------|---------------|-------------------------|-------------------------------|--------------|
| IG          | Low LCS (High Liquidity) | 1.45               | 1.83          | 0.80                    | -1.00                         | -2.49        |
|             | High LCS (Low Liquidity) | 2.82               | 3.47          | 0.81                    | -2.45                         | -7.11        |
| HY          | Low LCS (High Liquidity) | 3.88               | 3.09          | 1.26                    | -1.79                         | -3.79        |
|             | High LCS (Low Liquidity) | 5.96               | 5.40          | 1.10                    | -3.45                         | -7.95        |

Note: Analysis starts in 2007 due to availability of LCS data. Source: Bloomberg, Compustat, Barclays Research

## Bond Outperformance Remained Strong after Transaction Costs

- Transaction costs account for only a small part of bonds' returns, due to their long holding periods

|    | Annualized Bond Transaction Cost (%) | Average LCS (%) | Average Bond Holding Period (Yr) |
|----|--------------------------------------|-----------------|----------------------------------|
| IG | 0.16                                 | 1.07            | 5.5                              |
| HY | 0.64                                 | 1.65            | 3.3                              |

- As a result, incorporating transaction costs in bonds made only a very small difference on the bond outperformance over equities
  - ✓ The I.R. of **net** bond over sensitivity-matched equity portfolios remained strong at 0.46 for IG and 0.66 for HY
  - ✓ Results were similar across weighting schemes and (for HY) risk-matching methods

### Gross and Net Performance of Bonds over Sensitivity-Matched Equity Portfolios (EW, Jan. 2007\* – Jan. 2018, transaction costs approximated by LCS, incorporated at sales)

| IG                       |             |                     |      |  |             |                   | HY              |             |                     |  |             |                   |
|--------------------------|-------------|---------------------|------|--|-------------|-------------------|-----------------|-------------|---------------------|--|-------------|-------------------|
| Bond                     |             |                     |      | Bond over Sensitivity-Matched Equities |             |                   | Bond            |             |                     | Bond over Sensitivity-Matched Equities |             |                   |
| Avg. Ret (%/Yr)          | Vol. (%/Yr) | Sharpe Ratio (Ann.) |      | Avg. Ret (%/Yr)                        | Vol. (%/Yr) | Inf. Ratio (Ann.) | Avg. Ret (%/Yr) | Vol. (%/Yr) | Sharpe Ratio (Ann.) | Avg. Ret (%/Yr)                        | Vol. (%/Yr) | Inf. Ratio (Ann.) |
| Gross                    | 5.86        | 5.24                | 0.94 | 2.05                                   | 4.13        | 0.50              | 7.88            | 8.49        | 0.82                | 4.74                                   | 6.22        | 0.76              |
| Net of Transaction Costs | 5.70        | 5.26                | 0.91 | 1.88                                   | 4.12        | 0.46              | 7.24            | 8.62        | 0.74                | 4.10                                   | 6.25        | 0.66              |

Note: Analysis starts in 2007 due to availability of LCS data. Source: Bloomberg, Compustat, Barclays Research

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# Summary

# Key Results

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- I. On average, bonds achieved higher S.R. than equities of the same company, in both IG and HY regardless of the weighting scheme used
- II. The outperformance was evident across sub-periods, ratings, sectors, in European markets and after controlling for equity and macro risk factors
- III. Bond outperformance was not driven by their lower liquidity or higher transaction costs
- IV. The bond-over-equity performance exhibits significant variation over time and in the cross-section

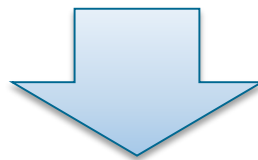
## Implications: Separating View Formation from Instrument of Execution

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- Most mandates today are asset class specific: bonds and equities are separate
- Different parts of an issuer's capital structure may be more attractive at times

A 'Unified' mandate would allow a PM to:

1. Form a view on a company
2. Find out which part of the capital structure should be used to express that view



Such a unified mandate would add another source of alpha on which PMs can capitalize, in addition to identifying mispricing across companies

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# Appendix

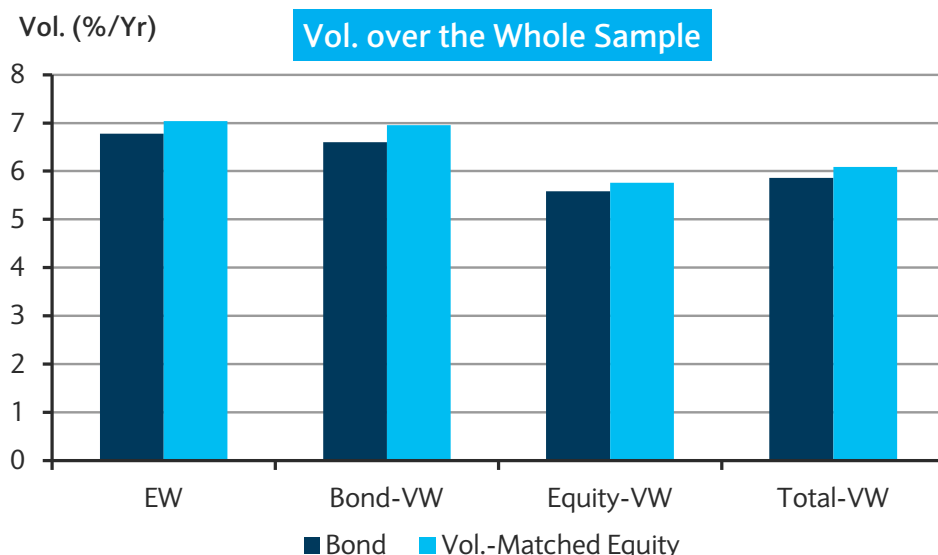
## Risk Matching Using Total Volatility



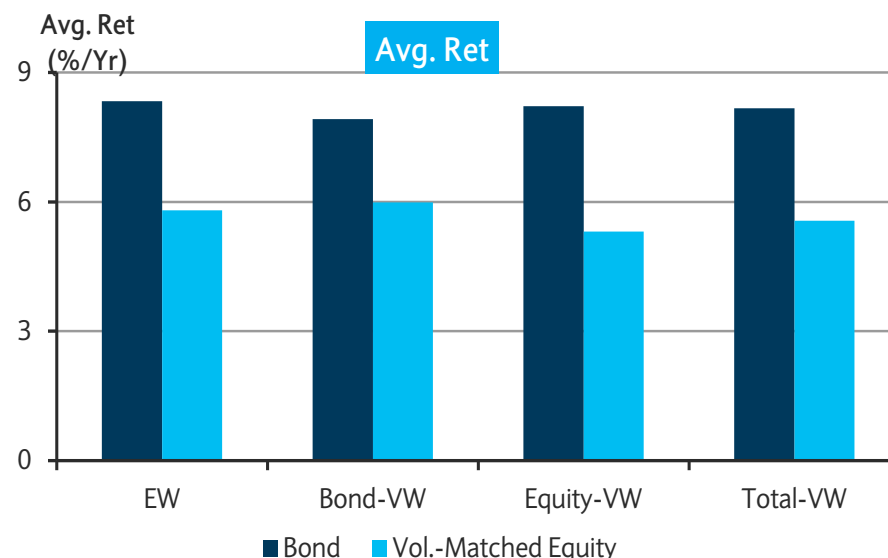
## HY Bonds Had Higher Avg. Returns than Equities Matched by Vol.

- Scaling equity returns using the ratios of trailing 36m vol. generated equity portfolios with almost identical vol. as the HY bond portfolio post-formation
  - ❖ Any excess weight is allocated to T-bills
- With similar vol., HY bond portfolios had higher average returns than the vol-matched equity portfolios, regardless of the weighting scheme

**Vol. of Bonds vs. Vol.-matched Equity  
(Jan. 1993 – Jan. 2018)**



**Avg. Ret. of Bonds vs. Vol.-matched Equity  
(Jan. 1993 – Jan. 2018)**



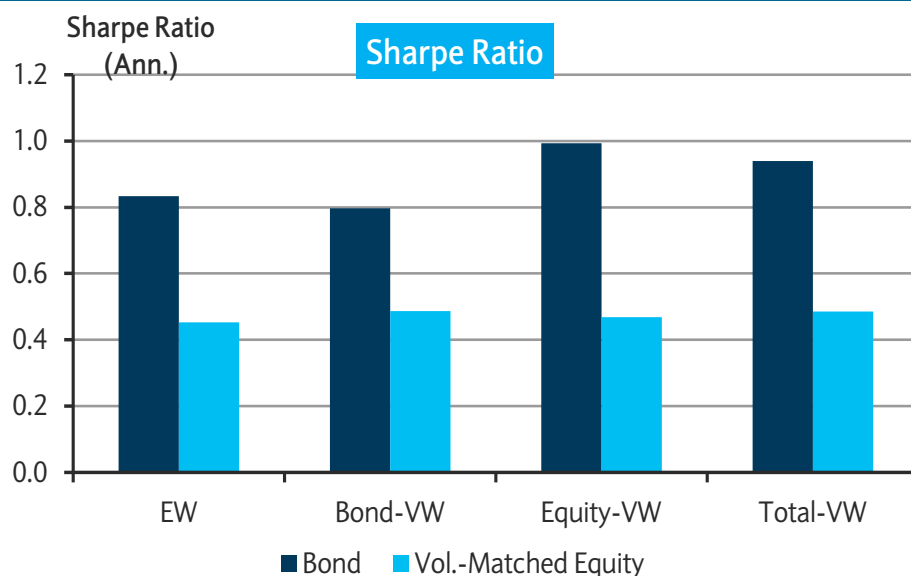
Note: the mapped HY bond universe has a price filter of \$40 to exclude bonds traded on recovery. Results were similar using no price filter

Source: Bloomberg, Compustat, Barclays Research

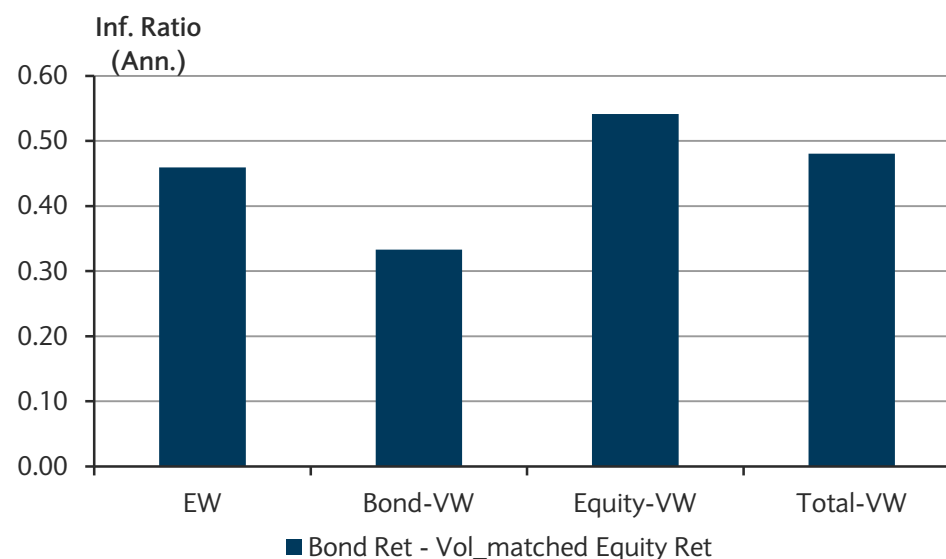
# HY Bonds Portfolios Had Higher S.R. than Vol.-Matched Equity

- Regardless of the weighting scheme, high yield bonds had higher S.R. on average than equities of the same company
- The I.R. of bonds over vol-matched equity ranged from 0.33 to 0.54 with different weighting schemes

**Sharpe Ratios of Bonds vs. Equity  
(Jan. 1993 – Jan. 2018)**



**Inf. Ratios of Bonds over Vol-matched Equity  
(Jan. 1993 – Jan. 2018)**



Source: Bloomberg, Compustat, Barclays Research

# Performance Statistics of HY Bonds vs. Vol.-Matched Equities

| Performance Statistics of Bonds vs. Equity (Jan. 1993 – Jan. 2018) |                               |                 |             |                            |                       |             |                            |
|--|-------------------------------|-----------------|-------------|----------------------------|-----------------------|-------------|----------------------------|
| Weighting Scheme   | Return Series                 | Avg. Ret (%/Yr) | Vol. (%/Yr) | Sharpe (Inf.) Ratio (Ann.) | Worst Monthly Ret (%) | Max. DD (%) | Corr. with HY bond tot ret |
| EW   | Bond                          | 8.34            | 6.78        | 0.83                       | -15.55                | -25.09      |                            |
|  | Vol-matched Equity            | 5.81            | 7.04        | 0.45                       | -8.23                 | -26.78      | 0.68                       |
| Bond-VW  | Bond                          | 7.93            | 6.60        | 0.80                       | -13.48                | -24.74      |                            |
|  | Vol-matched Equity            | 5.99            | 6.96        | 0.49                       | -8.64                 | -26.32      | 0.64                       |
| Equity-VW  | Bond                          | 8.22            | 5.58        | 0.99                       | -13.36                | -19.98      |                            |
|  | Vol-matched Equity            | 5.31            | 5.76        | 0.47                       | -7.00                 | -23.72      | 0.55                       |
| Total-VW   | Bond                          | 8.17            | 5.86        | 0.94                       | -13.39                | -21.26      |                            |
|  | Vol-matched Equity            | 5.56            | 6.08        | 0.49                       | -7.48                 | -24.31      | 0.59                       |
| EW   |                               | 2.53            | 5.51        | 0.46                       | -7.33                 | -13.49      |                            |
| Bond-VW  | Bond over Vol.-Matched Equity | 1.93            | 5.79        | 0.33                       | -6.24                 | -20.77      |                            |
| Equity-VW  |                               | 2.91            | 5.37        | 0.54                       | -6.36                 | -15.51      |                            |
| Total-VW   |                               | 2.61            | 5.43        | 0.48                       | -5.91                 | -16.75      |                            |

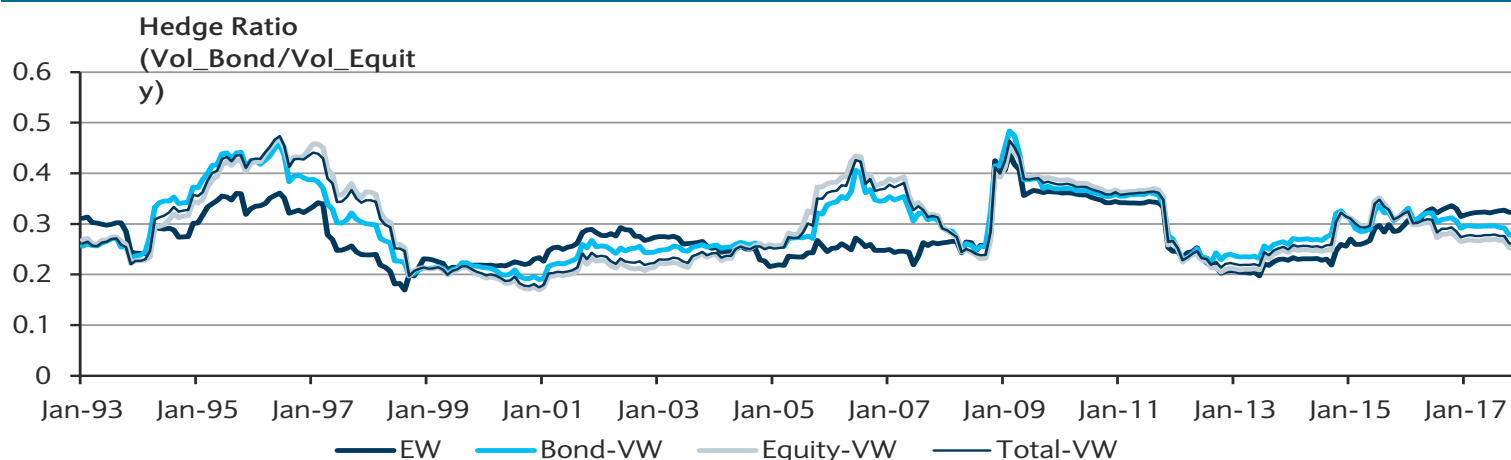
Source: Bloomberg, Compustat, Barclays Research

# Hedge Ratio Insensitive to Weighting Schemes

- The equity portfolio HR varied between 0.2 to 0.5 over time, with an average of 0.3
- The avg. HR is very similar across different weighting schemes
- In most months, the difference in HR using different weighting schemes was small

| Hedge Ratio (Jan. 1993 – Jan. 2018) |      |         |           |          |
|-------------------------------------|------|---------|-----------|----------|
|                                     | EW   | Bond-VW | Equity-VW | Total-VW |
| Avg. HR (Vol_Bond/Vol_Equity)       | 0.28 | 0.30    | 0.30      | 0.30     |
| Stdev. (HR)                         | 0.05 | 0.07    | 0.08      | 0.07     |

## Hedge Ratio over time (vol\_bond/vol\_equity, Jan. 1993 – Jan. 2018)



Source: Bloomberg, Compustat, Barclays Research

# Bond Had Higher S.R. than Equities

- Bond portfolios had higher S.R. than the equity portfolios without risk matching, regardless of the weighting scheme

## HY bonds and equity indices and portfolio returns using different weighting schemes (Jan. 1990 – Jan. 2018)

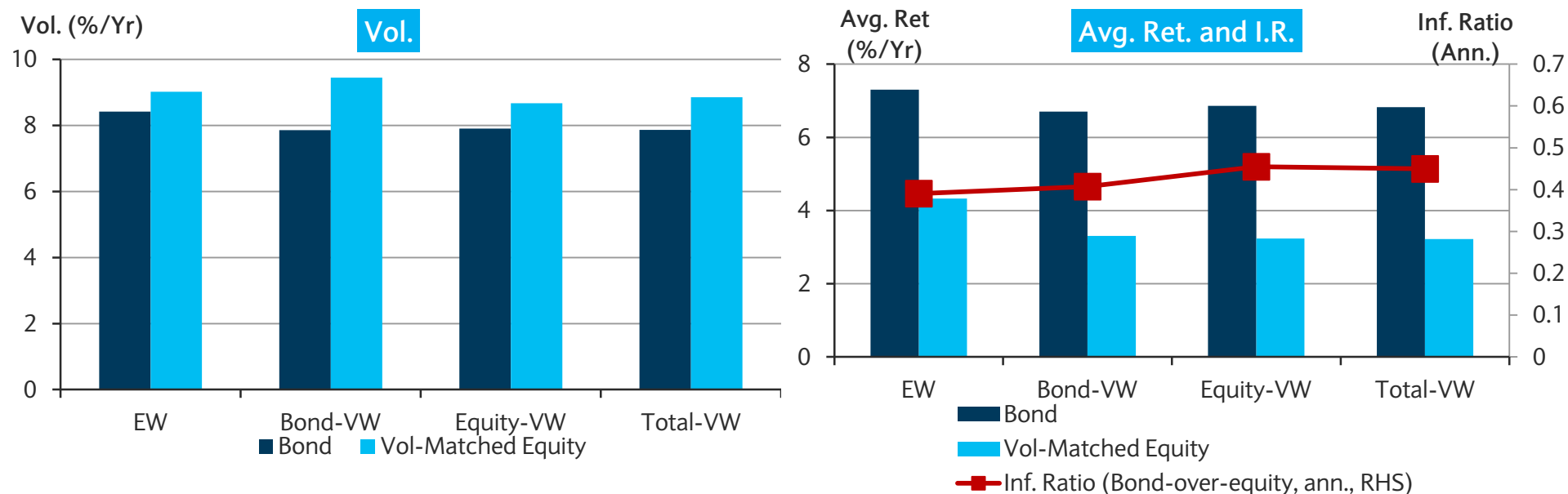
|        |                                   | Avg. Ret<br>(%/Yr) | Vol.<br>(%/Yr) | Sharpe<br>Ratio<br>(Ann.) | Worst<br>Monthly<br>Ret (%) | Max. DD<br>(%) |
|--------|-----------------------------------|--------------------|----------------|---------------------------|-----------------------------|----------------|
| Bond   | Bloomberg Barclays U.S. HY Index* | 8.70               | 7.62           | 0.75                      | -15.81                      | -31.86         |
|        | EW                                | 9.01               | 6.82           | 0.88                      | -15.55                      | -25.09         |
|        | Bond-VW                           | 8.53               | 6.47           | 0.86                      | -13.48                      | -24.74         |
|        | Equity-VW                         | 8.92               | 5.55           | 1.07                      | -13.36                      | -19.98         |
|        | Total-VW                          | 8.83               | 5.79           | 1.01                      | -13.39                      | -21.26         |
| Equity | Russell 2000 Index                | 11.19              | 18.68          | 0.44                      | -20.80                      | -52.89         |
|        | EW                                | 12.87              | 22.82          | 0.43                      | -29.80                      | -68.20         |
|        | Bond-VW                           | 13.04              | 21.53          | 0.47                      | -27.30                      | -66.32         |
|        | Equity-VW                         | 10.54              | 18.61          | 0.41                      | -26.61                      | -63.77         |
|        | Total-VW                          | 11.43              | 19.41          | 0.44                      | -26.80                      | -64.23         |

Note: the HY bond index and mapped bond universe have a price filter of \$40 to exclude bonds traded on recovery.  
Source: Compustat, Bloomberg, Barclays Research

# Similar HY Bond Outperformance in European Markets

- HY Bonds had higher S.R. than vol-matched equities
  - Across all HY Ratings
  - In all sectors
- Similarly in European Markets, bond portfolios had similar vol as vol-matched equity portfolios, but higher avg. ret for May 2005 – Jan. 2018

## Bond vs. Vol-Matched Equity Portfolio Performance in European Markets (May. 2005 – Jan. 2018)



## Sensitivity-Matching Worked Best for IG

- In IG, sensitivity-matching works the best at matching risk, since IG bonds have a substantial Treasury component
  - ✓ Sensitivity-matched equity had the highest corr. with IG bond portfolio
- Bond outperformed sensitivity-matched equities by 1.51%/year with an I.R. of 0.48
- Results were similar across weighting schemes

| Performance of IG Bond over Matched Equity Portfolios<br>(EW, Jan. 1993 – Jan. 2018) |                 |             |                     |                    |             |                            |
|--|-----------------|-------------|---------------------|--------------------|-------------|----------------------------|
| Matching Method  | Avg. Ret (%/Yr) | Vol. (%/Yr) | Sharpe (Inf.) Ratio | Worst Monthl y Ret | Max. DD (%) | Corr(Bond, Matched Equity) |
| Vol-matched  | -0.02           | 6.45        | 0.00                | -5.19              | -34.74      | 0.26                       |
| Sensitivity-Matched  | 1.51            | 3.13        | 0.48                | -3.06              | -15.29      | 0.80                       |
| Income-Matched   | -1.07           | 5.33        | -0.20               | -5.12              | -38.99      | 0.49                       |

Source: Bloomberg, Compustat, Barclays Research

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