SOLACTIVE
German Index Engineering

NET PAYOUT YIELD – THE BETTER DIVIDEND STRATEGY?

White Paper

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Research, Solactive AG

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INTRODUCTION

This white paper is all about cash flows towards the shareholders – namely dividend payments and share buybacks (net of share issuances), both of which are tools that corporate managers can use to redistribute company profits to investors.

We quickly brush up on theory, and attempt to bring net payout yield (NPY) into the limelight as a more complete measure of the total amount paid back to shareholders, since net payout yield accounts for both dividends and net buybacks.

We then compare the strategy of dividend investing with its proposed counterpart: net payout investing. Back-tests show that a portfolio of high net payout yield stocks would have outperformed a basket of high dividend yield stocks since 2007 in the developed markets, as well as in the United States and Eurozone separately, in bull or bear markets.

Furthermore, we explore a version with stability filters. Picking only high yielding stocks may lead to a selection of companies with payouts that are eventually not sustainable. For investment strategies focusing on payouts, it makes sense to exclude companies with deteriorating earnings or balance sheet data. The same is true for companies that have already exhibited a decrease in annual net payouts. Using stability filters proves beneficial to performance and volatility in our back-tests.

Moreover, central banks now discuss a ban/cut on buybacks and dividends for financials due to the COVID-19 crisis. Therefore, we look at a version of the strategy excluding financials, which demonstrates improved risk and return figures.

Selecting only the stocks that display high dividend or net payout yields often leads to a deviation from the market sector allocation. Thus, we build sector neutral versions of both strategies (dividend and net payout investing), which outperform their 'plain vanilla' siblings (see **Appendix 4**).

Before going into details, the following table summarizes the results for the NPY index version that applies stability filters and excludes financials. As financial institutions may be restricted in paying out cash, including them could cause undesired results and create unnecessary turnover in the future. Further, we see it as a standard to use stability filters in payout-oriented investment strategies.

Table 1: Overview of the NPY-version with stability filters excluding financials, in comparison to the benchmarks. Developed Markets & United States in USD, Eurozone in EUR. Total return, from May 2nd 2007 until September 30th 2020

TR, May-07 to Sep-20	DM	US	EUR
NPY-Index Mean Return p.a.	6.60%	8.75%	4.52%
NPY-Index Volatility	16.01%	19.72%	18.63%
NPY-Index avg. Net Payout Yield*	6.94%	8.10%	5.40%
Benchm. Mean Return p.a.	5.79%	8.59%	1.88%
Benchm. Volatility	17.50%	20.64%	21.62%
Benchm. avg. Net Payout Yield*	4.16%	4.20%	3.60%

*Based on the trailing yields as of selection dates

BUYBACKS & DIVIDENDS

When investors buy shares of a company, they become its co-owners and are thus entitled to receive part of the firm's (future) profits.

Dividends immediately come to mind as a means to redistribute company earnings back into the shareholders' pockets. But dividends are not the only tool to do so.

Buybacks (also called **share repurchases**) represent another way for company managers to pay out cash to investors. When a firm buys back some of its stock, it is implicitly inflating the price of the remaining stock. The reduced number of shares outstanding in the market implies that each share is now worth a greater percentage of the corporation. In other words, the same corporate "success" will be distributed among a lower number of shares outstanding, improving per-share measures of profitability. In addition, increased demand for the stock can also lead to higher prices.

On the other hand, **share issuances** have the opposite effect, diluting the value of the shares already present in the market. Therefore, in the context of this paper, it makes sense to consider share repurchases net of share issuances.

Net payout yield (also known as total shareholder yield) is the percent that a company sends back to its shareholders through both dividends and share buybacks (net of share issuances).

$$Dividend\ Yield = \frac{Total\ Cash\ Dividends}{Market\ Capitalization}$$

$$Net\ Payout\ Yield = \frac{\begin{matrix} Total\ Cash\ Dividends \\ +\ Share\ Buybacks \\ -\ Share\ Issuances \end{matrix}}{Market\ Capitalization}$$

From this perspective, it can be argued that net payout is the more complete measure to quantify the total amount given back to shareholders.

The way in which we calculate the yields is described in more detail in **Appendix 1**.

BUYBACKS & DIVIDENDS – STATISTICS

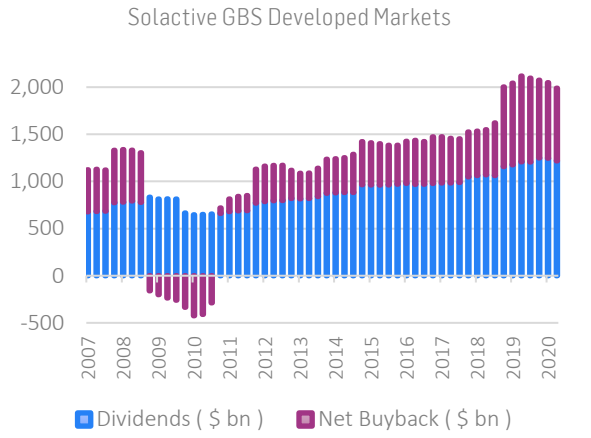
Having established that both are a means to a similar end, we now examine the extent to which dividends and buybacks have been used.

As a starting point to our analysis, we look at all stocks within the (historical) composition of the Solactive GBS Developed Markets Large & Mid Cap Index, which covers 85% of the developed markets float market-cap and includes around 1,600 stocks as of each quarterly selection date.

As of August 2020, the latest available reported annual figures reveal that these companies distributed around USD 900 bn to shareholders through buybacks (net of issuances), alongside USD 1.2 tn by way of dividends. For reference, the total free-float market capitalization of these around 1,600 stocks amounted to USD 41.5 tn in August 2020, implying an annual dividend yield of 2.93%, an annual net buyback yield of 1.85%, and an annual net payout yield of 4.79%.

Looking at previous years, we can observe that the only years in which net buybacks (summed up over the whole market) were either negative or low relative to dividends are the years following the global financial crisis in 2008 (see Exhibit 1 below).

Exhibit 1: Total USD amounts of Dividends and Share Buybacks (net of Share Issuances) over the last twelve months at each quarterly selection date, of all stocks within the Solactive GBS Developed Markets Large & Mid Cap Index



Net buybacks are not to be neglected if the focus is measuring total payout towards shareholders.

We then divide our analysis into two subsets of the developed markets: the US and the Eurozone. To do so, we use the (historical) compositions of two Solactive indices: GBS United States Large & Mid Cap Index (around 550 stocks), and GBS Developed Markets Eurozone Large & Mid Cap Index (approx. 220 stocks), each benchmark covering 85% of the free-float market cap in its respective region.

A quick glance reveals that buybacks in the US far exceeded those in the Eurozone (see Exhibits 2 and 3). This comes as no surprise, as buybacks offer tax advantages compared to dividend payments in the US, while no such tax advantages are present in many countries of the Eurozone.

Within our US benchmark, the latest available reported data (last twelve months) as of August 2020 shows that net buybacks exceeded USD 600 bn, surpassing the total dividend payments of just over USD 500 bn. In the same timeframe, the cumulative free-float market capitalization of these 550 companies was approx. USD 27 tn. Therefore, investing in the entire benchmark would have delivered an annual dividend yield of 1.93% and an annual buyback yield of 2.26%, implying an annual net payout yield of 4.19%.

At the same time, the 220 companies in the Eurozone universe paid out a total of EUR 170 bn in the form of dividends, alongside a relatively small amount of EUR 20 bn through net buybacks. The joint market-cap of all these stocks was just over EUR 4 tn in 2019, indicating an annual market-level dividend yield of 4.29% and an annual net buyback yield of 0.60% – i.e., a total annual net payout yield of 4.89%. Additionally, it seems that 2019 was the only year in which the stocks in the Eurozone benchmark displayed a positive net buyback amount. However, this figure represents the cumulative total net buybacks over the whole region; a couple dozen firms did in fact repurchase more of their own stock than they issued each year.

Exhibit 2: Total USD amounts of Dividends and Share Buybacks (net of Share Issuances) over the last twelve months at each quarterly selection date, of all stocks within the Solactive GBS United States Large & Mid Cap Index

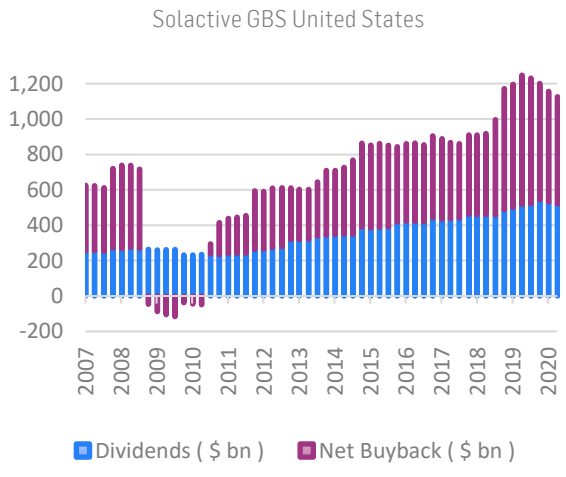
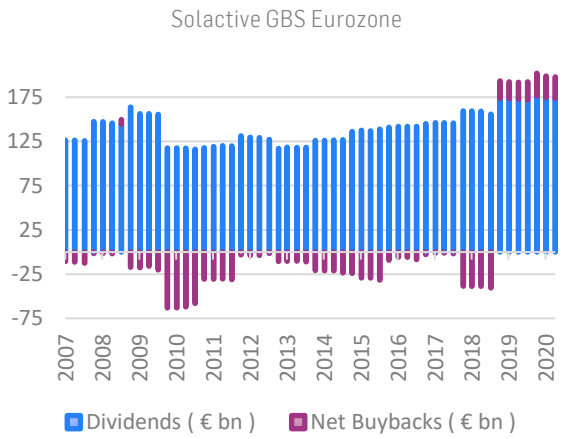


Exhibit 3: Total EUR amounts of Dividends and Share Buybacks (net of Share Issuances) over the last twelve months at each quarterly selection date, of all stocks within the Solactive GBS Eurozone Large & Mid Cap Index



NPY & DY – PERFORMANCE

Seeing that dividends are only part of the total amount given back to shareholders, we now examine how a portfolio of high dividend yield (DY) stocks would have performed compared to a basket of high net payout yield (NPY) companies since May 2007 until September 2020.

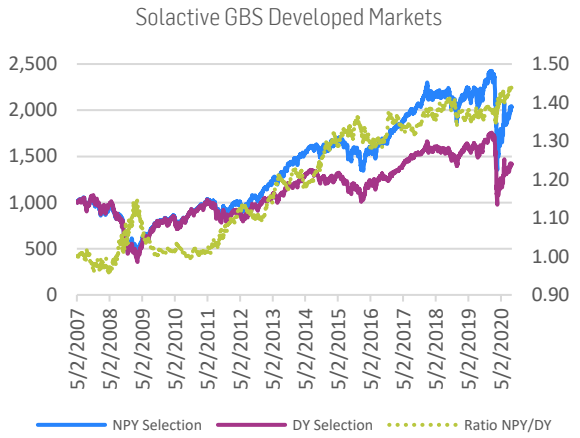
We first look at the **developed markets**, using the composition of the Solactive GBS Developed Markets Index as the starting universe. Selection and rebalance are performed quarterly based on trailing yields and the latest available figures at selection date. We create two portfolios:

- First, we select 300 stocks displaying the highest NPYs and weight them proportionally to NPY.
- Then, we select 300 stocks with the highest DYs and weight them proportionally to DY.

Over the back-tested period from May 2nd 2007 until September 30th 2020, the NPY selection would have outperformed the DY selection both in terms of risk and return. The former delivered an annualized return of 5.05% with an annualized volatility of 18.62%, while the latter returned 2.22% p.a. with a higher volatility of 19.38%. Drawdowns were also better in the case of the NPY portfolio,

exhibiting a maximum drawdown of 61.46% – preferable to that of 66.94% in the DY selection.

Exhibit 4: Back-tested performance (Gross Total Return) of an NPY Selection and a DY Selection (300 stocks each) on the Solactive GBS Developed Markets Large & Mid Cap Index



Developed Markets	NPY Selection	DY Selection
Mean Return p.a.	5.05%	2.22%
Volatility	18.62%	19.38%
Sharpe	0.27	0.11
Average Net Payout Yield*	9.99%	5.27%
Max Drawdown	-61.46%	-66.94%

*Based on the trailing yields as of selection dates

It is worth noting that both of these portfolios underperformed the market over the full period (from May 2007 to Q3 2020), which delivered an annualized return of 5.79% and a volatility of 17.50%. However, this fact only holds true if we include the timeframe following the COVID-19 sell-off in the first quarter of 2020. Up until this point in time, the NPY basket actually outperformed the market by 0.74 percentage points per annum on average since 2007, but suffered more drawdowns due to over-exposure in the financial sector, which took a relatively big hit due to the COVID-19 crisis.

More importantly, NPY not only outperformed DY by 2.63 percentage points p.a. in the same period until February 2020, but also demonstrated significantly stronger performance afterwards, with lesser drawdowns and faster recovery – as shown by the relative performance ratio of NPY/DY in Exhibit 4 (right axis), which showed an upward trend even throughout the turbulent period in 2020.

The same conclusion holds in the **US** and **Eurozone** as well: NPY outperforms DY both in terms of risk and return throughout the entire back-tested period, including the COVID-19 crisis (see **Appendix 2** for the full methodology and performance break-down in these two regions, individually).

ADDING STABILITY FILTERS

We kept our previous analysis (NPY vs. DY baskets) straightforward – merely selecting and weighting according to NPY and DY respectively – as we think that this methodology offers pure insights into the workings of these two investment strategies.

However, the focus on yields may lead to the inclusion of companies with payouts that are eventually not sustainable. Thus, investment strategies selecting companies with high dividends or high net buybacks often apply stability filters, for instance, to monitor changes of financial and balance sheet data. Obviously, worsening financials could lead to future cuts in payouts.

The aim of stability filters in combination with payout-oriented investment strategies is to exclude companies whose financial developments are deteriorating, as well as companies with unstable payouts. Companies that cannot maintain their earnings are expected to have difficulties in further generating sufficient profits to transfer cash to investors. As not only decreasing earnings, but also a reduction in net payouts are negative signals to investors, we address both by adding stability filters based on the annual net income and the annual net payout. The idea is to ensure that we do not include companies with an unsustainably high NPY.

In this light, we propose two stability filters that exclude any company if it meets one of the following criteria:

- Latest reported annual net income as of the selection day is lower than in the previous year.
- Total amount of annual net payouts as of the selection day decreased since the previous year.

The reasoning is that a company experiencing declining earnings would be more likely to cut dividends or hold off share repurchases in the upcoming period. This situation is addressed by the net income exclusion filter, which serves as a proxy for deteriorating company financials. On the other hand, investors may generally interpret decreasing payouts as detrimental. We address this scenario with the other filter, which excludes stocks of a company if it decreased the absolute amount of annual net payouts since the previous year.

We carry out the same analysis as in the previous section, constructing two baskets – one consisting of high NPY stocks and the other of high DY stocks – albeit this time we exclude any company that meets one of the adverse filters above.

We examine the **developed markets** in their entirety: out of the 1,600 companies in the Solactive GBS Developed Markets Large & Mid Cap index, only about a third pass the stability filters per selection, out of which we then construct two portfolios:

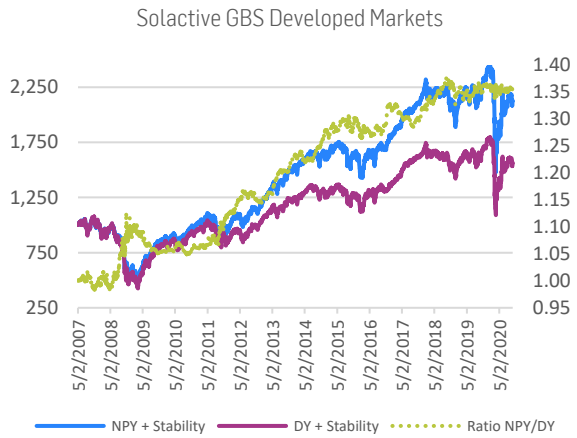
- 300 stocks displaying the highest NPYs, each weighted proportionally to its NPY.
- 300 stocks with the highest DYs, each weighted proportionally to its DY.

Selection and rebalance are performed quarterly based on trailing yields and the latest available figures at selection date. The exclusion filters work as intended and enhance the performance of both portfolios by boosting returns while lowering standard deviations.

Yet again, the NPY selection outperforms the DY portfolio, the former returning 5.68% p.a. and the latter 3.32%, with similar annualized volatilities (17.09% and 17.03%, respectively). In other words, the addition of these two filters enhances mean annualized returns by 0.63 percentage points for the NPY portfolio and by 1.10 percentage points for the DY one, while simultaneously reducing standard deviations by 1.53 and 2.35 percentage points, respectively.

Furthermore, the performance ratio in Exhibit 5 (right axis) highlights the strong outperformance of NPY over DY in all market conditions since 2007.

Exhibit 5: Back-tested performance (Gross Total Return) of an NPY Selection and a DY Selection with exclusion filters on the Solactive GBS Developed Markets Large & Mid Cap Index



Developed Markets	NPY + Stability	DY + Stability
Mean Return p.a.	5.68%	3.32%
Volatility p.a.	17.09%	17.03%
Sharpe	0.33	0.20
Average Net Payout Yield*	7.23%	4.56%
Maximum Drawdown	-56.32%	-60.50%

*Based on the trailing yields as of selection dates

The screening procedure appears to have a greater benefic impact on the dividend strategy – yet NPY still emerges victorious over DY.

Applying a similar methodology in the Eurozone and the United States leads to the same conclusion across all regions: the exclusion filters enhance the performance of each basket (NPY and DY), improving returns while lowering volatility, with NPY outperforming DY in all conditions (see full breakdown in **Appendix 3**).

EXCLUDING FINANCIALS

Due to concerns that the COVID-19 crisis could trigger hundreds of billions in loan losses, central banks are taking measures in order for banks to maintain maximum capital preservation by capping dividends and banning buybacks. In other words, banks should hold on to excess cash and not distribute it to shareholders.

As a result, we recommend a version of the NPY strategy that excludes financials altogether.

In a similar fashion with our previous analyses, we start with the composition of the Solactive GBS **Developed Markets** Large & Mid Cap Index as the investable universe, then remove financials. Selection and rebalance are performed quarterly based on trailing yields and the latest available figures at selection date. In a first step, we did not employ any other exclusion filters. Out of the remaining stocks, we construct two portfolios:

- 300 stocks displaying the highest NPYs, each weighted proportionally to its NPY.
- 300 stocks with the highest DYs, each weighted proportionally to its DY.

Over the back-tested timeframe (May 2007 to September 2020), the NPY portfolio outclassed its DY counterpart in terms of mean return per year (6.06% vs. 3.45%), for a similar – though still lower – amount of volatility (17.32% vs. 17.51%).

This version also outperformed the overall market, which returned 5.79% per year (with a volatility of 17.50%) over the same period. It is worth noting that NPY's performance lead over DY and the market was substantial up until the COVID-19 sell-off.

We find a similar result in the **Eurozone**, with the ex-financials NPY version outperforming the DY version and the market in terms of mean return (2.27%, 1.28%, and 1.88% p.a., respectively) and annualized volatility (18.60%, 18.90%, and 21.62%).

In the **United States,** we can witness the first scenario in which NPY underperforms DY, with mean annual returns 8.07% and 8.45% respectively, and volatilities of 21.42% (NPY) and 19.92% (DY). However, both fell short of the market, which yielded 8.59% per year, with a volatility of 20.64% in the same timeframe.

Building on this version, adding the income and payout stability filters further enhances NPY's performance. In other words, on top of excluding financials, we also exclude any stock if targeted by one of the filters below:

- Latest reported annual net income as of the selection day is lower than in the previous year.
- Total amount of annual net payouts as of the selection day decreased since the previous year.

In the **developed markets**, the addition of the two stability filters (on top of excluding financials) translates into NPY outperforming both DY and the benchmark. Over the back-tested period, NPY's annual mean return increases to 6.60%, while its standard deviation decreases to 16.01%. These stability filters also benefited the ex-financials version of DY, increasing return to 4.75% and lowering volatility to 16.00%.

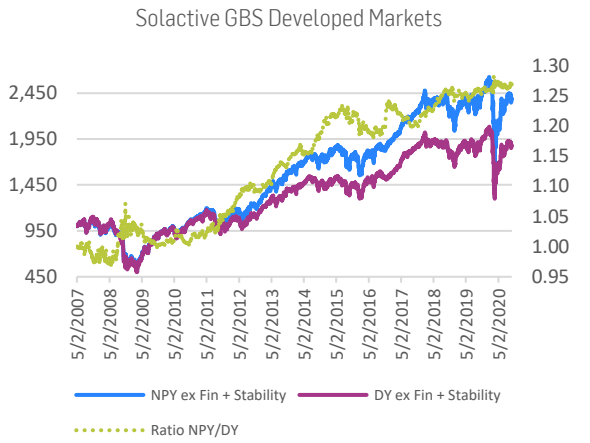
Employing the stability filters on top of excluding financials reduces the number of eligible stocks. In crisis years like 2008, 2009, and 2020, fewer than the target 300 constituents make it into the index.

In the **Eurozone**, the positive impact of the stability filters on top of excluding financials is even greater. Both strategies significantly outperform the market: NPY still manages to outperform DY in terms of annual mean return (4.52% vs. 3.92%), for a slightly lower standard deviation (18.63% vs. 18.72%). Over the same period from May 2007 to September 2020, the Eurozone market return and volatility were 1.88% and 21.62%, respectively.

Finally, this version of NPY outperforms both its benchmark and its DY counterpart in the **United States**, demonstrating a mean return of 8.75% and a volatility of 19.72% per annum. The DY portfolio delivered 7.67% with a lower standard deviation of

18.94%, whereas the market's mean return and volatility were 8.59% and 20.64%, respectively.

Exhibit 6: Back-tested performance (Gross Total Return) of an NPY Selection and a DY Selection without financials, with exclusion filters on the Solactive GBS Developed Markets Large & Mid Cap Index



Developed Markets	NPY ex Financials + Stability	DY ex Financials + Stability
Mean Return p.a.	6.60%	4.75%
Volatility p.a.	16.01%	16.00%
Sharpe	0.41	0.27
Average NPY*	6.94%	4.64%
Max Drawdown	-52.66%	-54.69%

*Based on the trailing yields as of selection dates

CONCLUSION

We have introduced net payout yield (NPY) as a more comprehensive measure of redistributing company profits towards shareholders, as dividend yield only shows half the picture.

As an alternative strategy to dividend investing, a selection of companies with a high NPY would have outperformed a portfolio of high dividend yielding stocks over a back-tested period from 2007 to 2020 in the developed markets as a whole, but also within the Eurozone and United States separately.

Exclusion filters concerning earnings and payout stability can help to avoid the selection of companies with potentially unsustainable yields. We find that stability filters improve the back-tested time series both in terms of risk and return.

As an extension to the aforementioned exclusion filters, additional financial information could be used. Although we did not observe material changes to our results from using a more sophisticated set of selection criteria (not reported in the paper), it could make sense to apply a dynamic filtering system – particularly as the stability filters are rather unforgiving, and a majority of companies fail to pass, especially during bear markets.

Currently, central banks encourage financial institutions to hold on to their capital instead of distributing it to their shareholders, due to the COVID-19 crisis. Therefore, we constructed an ex-financials version of the strategy, which demonstrated superior performance to the benchmark and to dividend investing. Adding the income and payout stability filters enhances the performance even further.

On a different note, yield strategies often deviate from the original sector allocation in the starting universe. Therefore, we also tested a sector neutral version, which proved to be an enhancement as the historical performance shows an outperformance over the 'vanilla' version. This version is shown in **Appendix 4**.

APPENDIX 1: NPY CALCULATION

In this section, we go into more detail regarding the calculation of the net payout and dividend yields used in the paper to select and weight companies.

We calculate the dividend yield of each company in the starting universe by dividing the cash dividend per share by the share price of the previous day.

$$Dividend\ Yield_{(t)} = \frac{Cash\ Dividend\ per\ Share_{(t)}}{Share\ Price_{(t-1)}}$$

If a company pays dividends several times per year, we compute separate yields for each event, using the corresponding share price of the previous day. Then, we sum up these individual yields over the last twelve months relative to each quarterly selection day. This sum then represents the annual dividend yield (if a company only pays yearly dividends, there will be only one individual yield).

This yield is then used to select and weight stocks for the dividend portfolios.

Furthermore, this dividend yield also represents an input for calculating the net payout yield – but we need one more input: the buyback yield.

We calculate the buyback yield for each company in the starting universe by tracking any changes in the number of outstanding shares, on a daily basis. However, corporate actions (e.g. stock splits, rights offerings, M&As, or spinoffs) can also have an impact on the number of outstanding shares, and need to be taken into account. All corporate actions are tracked and stored by Solactive, as these need to be taken into account for each index that Solactive calculates.

Once corporate actions have been ruled out as the cause for a change in the number of outstanding shares, the buyback yield is calculated as follows:

$$Net\ Buyback\ Yield_{(t)} = \frac{Net\ Cash\ Buyback_{(t)}}{Market\ Capitalization_{(t-1)}}$$

$$= \frac{[\ No.Shares_{(t-1)} - No.Shares_{(t)}\ ] \times Share\ Price_{(t-1)}}{No.Shares_{(t-1)} \times Share\ Price_{(t-1)}}$$

$$= \frac{No.Shares_{(t-1)} - No.Shares_{(t)}}{No.Shares_{(t-1)}}$$

Note that the buyback yield can be negative, in which case it would represent a stock issuance.

If several buybacks or issuances occur during one year, we compute separate yields for each stock buyback or issuance, then we add all these individual yields over the twelve months previous to each selection day to arrive to an annual buyback yield.

Finally, we add the annual buyback yield to the annual dividend yield to obtain the net payout yield that we use to select and weight companies for the NPY portfolio.

APPENDIX 2: US & EUROZONE NPY & DY PERFORMANCE

Previously, we have compared the performance of an NPY portfolio with that of a DY portfolio in the **d**eveloped markets in their entirety.

We extend the same analysis to the **US market**, using the Solactive GBS United States Large & Mid Cap Index as a starting universe to create two more portfolios:

- We select 100 stocks showing the highest NPYs and weight them proportionally to NPY.
- We then select 100 stocks offering the highest DYs and weight them proportionally to DY.

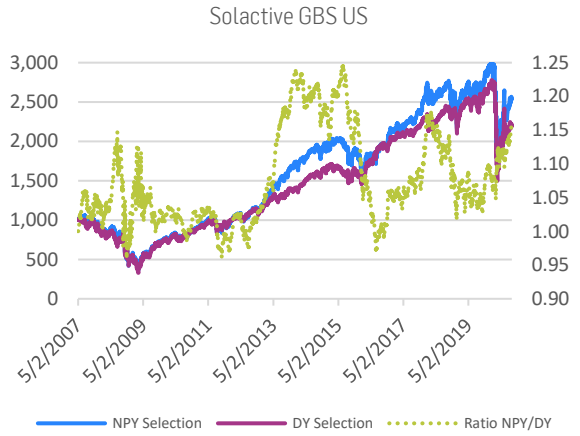
Selection and rebalance are performed quarterly based on trailing yields and the latest available figures at selection date. A similar story goes in the US market as well, with NPY outperforming DY both in terms of risk and return over the back-tested period from May 2nd 2007 to September 30th 2020. The high NPY companies would have returned 6.82% per year with an annualized volatility of 22.85%, while the high dividend stocks would have delivered a mean return of 5.67% with a higher volatility of 24.99% per annum.

Consistent with our findings in the developed markets, the NPY basket underperformed the US market (which delivered a mean return of 8.59% and a volatility of 20.64% per year) over the entire period (May 2007 to Sep 2020), but outperformed the benchmark right up to the COVID sell-off.

More importantly, NPY outperformed DY over long time periods, as suggested by the performance ratio in Exhibit 7 (right axis), which managed to hover around 1.0 during bear markets and spike to above 1.2 during bull markets.

This remark holds true especially during and after the COVID-19 crisis in Q1 2020: the net payout selection proves to be preferable to the dividend portfolio by demonstrating lesser drawdowns during the sell-off (performance ratio also didn't drop below one), and by subsequently picking up faster when the market started to recover (performance ratio gradually increases to 1.15).

Exhibit 7: Back-tested performance (Gross Total Return) of an NPY Selection and a DY Selection (100 stocks each) on the Solactive GBS Developed Markets United States Large & Mid Cap Index



United States	NPY Selection	DY Selection
Mean Return p.a.	6.82%	5.67%
Volatility	22.85%	24.99%
Sharpe	0.30	0.23
Average Net Payout Yield*	11.52%	4.16%
Maximum Drawdown	-65.61%	-67.57%

*Based on the trailing yields as of selection dates

In the same fashion, we construct two more baskets in the **Eurozone**, using the Solactive GBS Developed Markets Eurozone Large & Mid Cap Index as our investible universe:

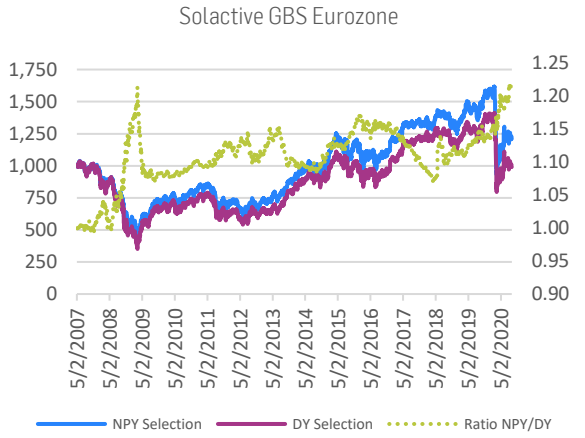
- We select 50 stocks with the highest NPYs and weight them proportionally to NPY.
- We pick 50 stocks offering the highest DYs and weight them proportionally to DY.

Over the same back-tested period from May 2nd 2007 to September 30th 2020, the NPY portfolio outshined the DY basket through higher mean returns (1.19% vs. -0.34% p.a.), reduced volatility (19.78% vs. 21.27%) and improved drawdowns (maximum of 58.78% vs 65.98%).

Yet again, the results are harmonious with those in the other two markets. Over the entire period, the Eurozone benchmark still outperformed, returning 1.88% per annum for a volatility of 21.62% and a maximum drawdown of 59.47%. Nevertheless, the NPY selection outperformed the market up to the COVID sell-off, but failed to catch up to the subsequent rally. Interestingly, the NPY selection appears to have been less risky than the overall market in terms of volatility and maximum drawdowns even during the Q1 2020 crash.

Perhaps unsurprisingly at this point, the NPY basket proved to be much more resilient than the DY portfolio during the COVID-19 sell-off. In addition, the high net payout companies gained more traction than the high dividend stocks once the markets began to recover in March 2020, with the performance ratio approaching 1.2 (see Exhibit 8, right axis).

Exhibit 8: Back-tested performance (Gross Total Return) of an NPY Selection and a DY Selection (50 stocks each) on the Solactive GBS Developed Markets Eurozone Large & Mid Cap Index



Eurozone	NPY Selection	DY Selection
Mean Return p.a.	1.19%	-0.34%
Volatility	19.78%	21.27%
Sharpe	0.06	-0.02
Average Net Payout Yield*	8.58%	6.39%
Maximum Drawdown	-58.78%	-65.98%

*Based on the trailing yields as of selection dates

APPENDIX 3: US & EUROZONE ADDING STABILITY FILTERS

Having discussed stability and sustainability of yields, we propose two exclusion filters aiming to screen out stocks with potentially unsustainable yields (re-stated below):

- Latest reported annual net income as of the selection day is lower than in the previous year.
- Total amount of annual net payouts as of the selection day decreased since the previous year.

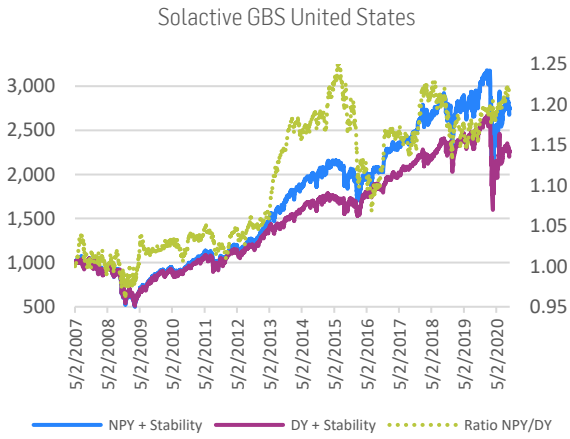
These filters proved to enhance the performance of both NPY and DY in the developed markets as a whole, improving return and volatility figures.

In the **United States**, applying the same filters also eliminates about two thirds of all 550 companies present in the starting universe (Solactive GBS United States Large & Mid Cap Index), out of which we then build our two baskets:

- 100 stocks with the highest NPYs, each weighted proportionally to its NPY.
- 100 stocks with the highest DY, weighted proportionally to their DYs.

Selection and rebalance are performed quarterly based on trailing yields and the latest available figures at selection date. Implementing the exclusion filters improves the simulated performance of the NPY and DY portfolios by 0.93 and 0.55 percentage points, respectively. Concurrently, volatility is decreased by 1.66 (NPY) and 4.25 (DY) percentage points. The maximum drawdown characteristics are also amended by 12.04 and 16.13 percentage points, respectively.

Exhibit 9: Back-tested performance (Gross Total Return) of an NPY Selection and a DY Selection with exclusion filters (100 stocks each) on the Solactive GBS United States Large & Mid Cap Index



United States	NPY + Stability	DY + Stability
Mean Return p.a.	7.75%	6.22%
Volatility	21.19%	20.74%
Sharpe	0.37	0.30
Average Net Payout Yield*	8.58%	4.62%
Maximum Drawdown	-53.57%	-51.44%

*Based on the trailing yields as of selection dates

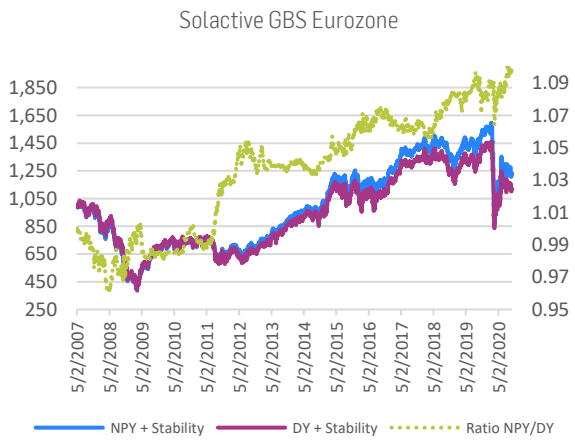
In the **Eurozone**, these filters proved to be more taxing, as under a third of companies passed (out of 220 stocks in the Solactive GBS Developed Markets Eurozone Large & Mid Cap Index). This elimination process barely leaves more than 50 companies per selection date for the creation of the two portfolios:

- 50 stocks displaying the highest NPYs, weighted proportionally to their NPYs.
- 50 stocks with the highest DY, each weighted proportionally to its DY.

Yet again, the screening process proved beneficial towards both portfolios in terms of mean return per year, namely by 0.34 (NPY) and 1.16 (DY) percentage points. On the other hand, the addition of the filters actually increased the volatility of the NPY portfolio by 0.53 percentage points, but lowered that of the DY basket by 0.81 percentage points.

As shown by the performance ratio (Exhibit 10, right axis) once more, the NPY selection offered superior performance throughout the full back-tested period from May 2007 to Sep 2020. The performance ratio barely dipped below one, except for the period of the global financial crisis in 2009.

Exhibit 10: Back-tested performance (Gross Total Return) of an NPY Selection and a DY Selection with exclusion filters (50 stocks each) on the Solactive GBS Developed Markets Eurozone Large & Mid Cap Index



Eurozone	NPY + Stability	DY + Stability
Mean Return p.a.	1.53%	0.82%
Volatility p.a.	20.31%	20.46%
Sharpe	0.08	0.04
Average Net Payout Yield*	5.75%	4.69%
Maximum Drawdown	-62.65%	-62.42%

*Based on the trailing yields as of selection dates

APPENDIX 4: SECTOR NEUTRAL VERSIONS

In its 'plain vanilla' form, the NPY strategy allocates significant weight to the financial sector (more than a third of the entire portfolio) since these companies seem to display extensive use of dividend payments as well as share repurchases.

However, during and after the COVID-19 sell-off in Q1 2020, financials took quite a blow, fighting an uphill battle against potential loan losses in a low interest rates environment.

Furthermore, technology stocks (in the universes we examined) did not extensively employ dividend payouts or share repurchases, resulting in the vanilla NPY portfolio underweighting tech stocks, which generally outperformed in 2020.

As a result, the vanilla NPY strategy (without any exclusion filters regarding net income or payout stability) underperformed its respective benchmark in 2020.

We create sector neutral versions of the strategy in each region we have previously looked at in the paper. The objective is to achieve the highest possible portfolio-level net payout yield, while aiming at a +/- 2.5 percentage points sector exposure relative to the benchmark. In our methodology, a stock without a positive NPY ratio cannot receive any weight. In all three regions, the sector neutral version proved to be an enhancement to the strategy both in terms of risk and return.

In the **developed markets**, selecting and weighting 300 NPY stocks in a sector neutral way

would have returned 5.47% per annum, with a volatility of 18.01%. This result represents an improvement of 0.43 percentage points p.a. in terms of return, and a 0.60 percentage points decrease in annualized volatility over the vanilla NPY selection – only just falling short of the benchmark's performance of 5.79% return and 17.50% volatility over the entire period from May 2nd 2007 until September 30th 2020.

In the **United States**, the sector neutral version still represents an improvement over the vanilla NPY portfolio, returning on average 7.56% per year (0.75 percentage points improvement) with a standard deviation of 22.60% (0.25 percentage points reduction) over the whole timeframe, however, still falling short of the benchmark's performance over the whole timeframe from May 2nd 2007 until September 30th 2020.

In the **Eurozone**, the sector neutral approach proved to have the biggest positive effect, demonstrating a mean return of 4.12% per year (representing an increase of 2.39 percentage points per year over the vanilla NPY version), with a volatility of 20.04% (0.26 percentage points improvement). We observe an outperformance over the benchmark, which returned 1.88% with a volatility of 21.62% annualized from May 2007 to September 2020.

DISCLAIMER

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