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Dividend Portfolios and Long-Term Investing

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Dividend Portfolios and Long-Term Investing

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Finally, I would like to thank the IMF Brazil-Europe class of 2015-2016 for making this unique experience unforgettable and rich of positive memories.
RESUMO

O tamanho de fundos mútuos ao redor do mundo alcançou $33.4 trilhões em termos de AUM em 2015. Parte destes fundos é investida diretamente ou em nome de investidores privados cujo objetivo é preservar a riqueza financeira futura deles/delas. Eu procurei referências literárias desde 1980 que foca na relação entre a estabilidade de dividendos e os lucros para ações ordinárias. Uma recente pesquisa analisa os benefícios de maximizar lucros de renda como ações com dividendos e títulos com cupom na tentativa de melhorar o desempenho da carteira. A teoria é aquela enfocação em ações com dividendos estáveis, o investidor pode ganhar exposição a empresas saudáveis e prósperas. No final das contas, isto deveria proporcionar o investidor uma menor exposição a risco graças à estabilidade nos fluxos provenientes de dividendos. Essa estratégia seria benéfica a investidores com uma alta aversão ao risco.

PALAVRAS CHAVE: Dividendos, Locação de ativos, Investimentos de capital, Investimentos (Finanças).
ABSTRACT

The size of mutual funds throughout the world reached $33.4 trillion in terms of assets under management in 2015. Part of these funds is invested directly or on behalf of private investors whose aim is to secure their future financial wealth. I have been following a stream of literature from the 1980’s that focuses on the relation between dividends stability and returns for equities. A recent research analyzes the benefits of maximizing returns from income such as dividend-paying stocks and coupon-bearing bonds in the attempt of improving the performance of the portfolio. The theory is that focusing on stable dividend-paying stocks, the investor is able to gain exposure to healthy and prosperous firms. Ultimately, this should provide the investor with a smaller exposure to risk thanks to a constant stream of cash flows from dividends. This strategy would be beneficial to highly risk-averse investors.

KEY WORDS: Dividends, Industry Portfolio, Asset Allocation, Long-Term Investing, Portfolio Optimization.
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Introduction

The 2015 Investment Company Fact Book estimates that the total worldwide assets invested in mutual funds and exchange-traded funds are worth $33.4 trillion. Part of this money is invested directly or on behalf of private investors looking to secure their wealth in the future. I have always been fascinated by this side of the investing world as it helps people achieve their financial goals. Whether the investors’ goal is to have enough money to cover their children tuition fees or whether it is to be able to afford a vacation home, a sound financial strategy is essential to reach the target.

Nowadays, investors can choose between an extremely wide variety of financial instruments and strategies based on their preference and risk aversion. Some strategies rely on fundamentals whereas others make use of a factor-based approach. For the development of my Master’s dissertation, I chose to focus on dividends, which I believe provide relevant features that lead to successful investing.

Dividends are a common practice in most industries and some investors take them for granted. The answer to the question “Why do corporations pay dividends?” may not be as obvious as it seems. In 1961, Merton Miller and Franco Modigliani doubted the meaning of dividends as investors could easily replicate them using their own portfolio. Additionally, they imply costs on the issuing firm and taxes on the investors who receive them. These arguments are mostly related to corporate finance but I believe it is important to assess the purpose and the reasons why many
companies decide to repay shareholders through dividends instead of buying back their own shares or investing the funds in new projects.

Easterbrook (1984) suggests that agency theory is able to explain the motivation behind dividends. In fact, he claims that dividend policies contribute to producing equilibrium between the manager’s risk aversion and the cost of monitoring him or her. A firm that pays dividends will be active in the capital markets as it needs financing, and it will undergo natural monitoring procedures during this process, which releases the company from having to bear the cost of monitoring internally.

Generally, dividends are seen as a signal that a firm is financially healthy and therefore it is able to reward its shareholders who put their money at risk. On the other hand, someone may argue that a firm that does not pay dividends signals to the market that it has innovative projects to invest in, which may lead to a higher share price reflected in higher capital gains for investors. These thoughts were first introduced in 1996 by Fisher Black who renamed the topic “The Dividend Puzzle”.

I believe that a record of stable dividends over the years can be associated with healthy firms capable of reducing the downside risk for their investors. Ultimately, the purpose of my dissertation is to use dividends’ historical record to construct dynamic portfolios capable of helping investors to achieve their financial goals. Furthermore, a portfolio efficiently exposed to dividends, may be beneficial to very risk-averse investors such as retirees, who may find a constant stream of cash flows from dividends extremely valuable.

Additionally, dividends may help investors to overlook the future resell price of the assets and to focus on the fundamentals that determine their real value.
For clarification, throughout my analysis, I often refer to the Info Sharpe ratio. This version of the common Sharpe ratio excludes the risk-free rate from the numerator and for this reason it has been referred to as Info or Raw Sharpe ratio.

The ratio is defined in the equation below, where \( \mu \) stands for the expected returns and \( \sigma \) represents the standard deviation of the returns.

\[
\text{Info Sharpe Ratio} = \frac{\mu}{\sigma}
\]  

(1)

**Literature Review**

David Blanchett and Hal Ratner, respectively head of retirement research and global head of research at Morningstar Investment Management in Chicago, recently published a paper in the Journal of Portfolio Management titled “Building Efficient Income Portfolios”. They begin by decomposing total returns into returns from income and returns from capital gains, or price returns.

\[
r^* = r_{TR}(1 - \pi) + r_1 \pi
\]  

(2)

In the equation above, \( \pi \) refers to the investor’s return preference. With \( \pi = 1 \), an investor favors income returns such as dividends from stocks and bond’ coupons. In the opposite case, with \( \pi = 0 \), the investor is indifferent about the source of return. These values include extreme scenarios where investors unconditionally prefer one type of return over the other. Nonetheless, they draw a clear picture of the key assumption that drives investors towards income-based assets.

After setting up two income return utility functions using \( \lambda = 2,5 \) as moderate risk aversion and \( \lambda = 5 \) as high risk aversion, they optimize a sample portfolio using the
Conditional Value at Risk methodology, which may be more suitable to a risk-averse investor.

Their first conclusion is that a portfolio based on income returns tends to be less diversified than an ordinary total return portfolio, mainly due to the restricted pool of asset classes that provide income such as dividend-paying stocks and coupon-bearing bonds.

The second conclusion implies that the income frontier is more heavily exposed to REITs (Real Estate Investment Trust) and Emerging Market Debt that provide attractive yields as well as a higher degree of risk. On the other hand, they find a weaker exposure to Small Cap stocks, which tend to reinvest profits rather than redistribute them in the form of dividends.

There is not much literature available with respect to income portfolios yet, though investors are beginning to value alternatives that offer less risky asset allocations, especially in moments of increased market volatility. These types of portfolios offer better risk-adjusted returns by providing a greater share of income and this makes them a viable option also for investors focused on current consumption.

Taking inspiration from the reference above, I have decided to focus on income from dividends, as explained in a later section.

As we move towards equities, there are several studies that link dividend yields and stock returns. Gombola & Liu (1993) finds that stocks with high yields and stable dividends follow a different behavior compared to simply high-yield stocks. Measuring dividend stability is not a standard procedure and it is relevant to assess the attractiveness of a company that may or may not be included in the portfolio. For
instance, dividend cuts are not perceived positively by the market and they are usually seen as a sign of decreased stability.

The theory established by Keim (1985) and Gombola & Liu (1993) was tested in the United Kingdom by three members of the Department of Management at the University of Southampton. Along with other results, Gwilym, Morgan & Thomas (2000) determined that there is an inverse relation between beta and stability. In fact, with respect to dividend yield portfolios, stocks with records of unstable dividend policies are linked with higher degrees of systematic risk. They conclude that a combination of low yield and a stable dividend track may help to signal stocks with relatively lower systematic risk.

Early evidence of the relationship between stock returns and dividend yields was provided by Blume (1980). A survey revealed that the majority of investors would prefer dividend payments even if retained earnings were reduced. This result is not consistent with the favorable treatment of capital gains at the time, but this behavior can be explained by the fact that investors expect enough returns from high-yielding stocks, to offset tax disadvantages. These findings are supported by data of high-yielding stocks, which outperformed non-dividend-paying stocks between 1946 and 1976.

In 1974, Fischer Black and Myron Scholes discussed the portfolio strategy of including dividend-paying stocks from the perspective of an individual investor. Their conclusion is that an investor may be interested in dividends for reasons that differ from the maximization of the after-tax returns. In fact, an investor who does not
acknowledge dividends may concentrate his or her portfolio rather than benefit from diversification.

Contrary to what was previously mentioned, the literature also claims that as long as the change in dividend policy is not justified by revised expectations of future earnings, the event should not impact the stock price. In conclusion, DeAngelo (1992) argues that, since managers are very reluctant about cutting dividend rates, the longer the stream of earnings and dividends paid, the more reliable the signal is.

I believe it is also relevant to spend a few words on the recent trend followed by dividend policies. Historically, they were much higher in the first half of the 20th century, and this has had a severe impact on the dividend portfolios that I have developed. A plausible explanation was their tax-free treatment in the United States until 1953, after which they became subject to various tax rates. From 1985 until 2003, they followed the individual’s income tax rate when President George W. Bush finally lowered the tax rate on dividends to 15%.

Furthermore, DeAngelo (1992) demonstrates that even though the number of dividend-paying firms has been decreasing substantially in the second half of the century, as demonstrated by Fama & French (2001), the supply of dividends has been concentrated among the highest earning firms. The reduction mainly derives from small firms that decide not to pay further dividends, but the aggregate supply has increased over the years, possibly signaling potential investment opportunities.

Dividend funds, such as those offered by Vanguard, have been extremely popular lately. As of July 2016, over 300 firms included in the S&P 500 Index were paying
dividend yields higher than a 10-year Treasury note, which has rendered equities more appealing than bonds.

A constant stream of cash flows from dividend payments decreases the risk bore by investors and with this project, I hope to demonstrate that optimizing an investor’s exposure to dividend-paying firms helps reduce the standard deviation of a portfolio and achieve a higher Sharpe ratio.
Methodology

I collect monthly returns from January 1927 until December 2015 for the 17 Industry Portfolios from Kenneth R. French’s online database, which assigns every stock in the NYSE, AMEX and NASDAQ to one of the industries. The composition of each industry cluster is explained in detail in the Appendix.

Building investment strategies on industries benefits from the advantage of further diversification. Additionally, if the strategy is beta neutral, it ensures that the long and short positions are placed on similar companies that belong to the same industry group. On the other hand, trading industries implies higher transaction costs due to the substantial number of stocks being traded and they do not provide the same liquidity as stocks or futures contracts do. For the purpose of my analysis, I do not include transaction fees as my portfolios are rebalanced on a yearly basis.

On the base of Blanchett & Ratner (2015), returns can be decomposed into capital gains and dividends and the research focuses on the benefits from the latter. Kenneth R. French’s database allows one to download the portfolio returns including or excluding dividends. The subtraction of the two series represents the share of returns coming from dividends, which I refer to as dividend returns. This is an essential block of my analysis and the starting point of most numerical computations.

Following the structure of most empirical investment strategies, the first step implies running an in-sample analysis over the entire sample period from January 1927 until December 2015. This is helpful to assess an overview of the feasibility and the impact of the strategy. Furthermore, it works as a benchmark for the
conclusions drawn by the out-of-sample analysis, which uses 5-year rolling windows over the 88 years included in the sample to compute the yearly weights.

My goal is to build portfolios that rely on dividend returns in the attempt of reducing the volatility of returns by investing in stable and financially healthy firms. The general idea is that the predictability of dividends may impact the asset allocation and improve the Info Sharpe ratio of the portfolios. Dividend-paying stocks are commonly associated with low-beta stocks, which have historically outperformed high-beta stocks.

At this point, I expect the in-sample dividend portfolios to provide signals that they have the potential to outperform the equally-weighted portfolio, which I use as a benchmark. Many studies, such as Plyakha, Uppal & Vilkov (2014), have recently shown that equally-weighted portfolios tend to outperform peers such as value-weighted portfolios. For this reason, I believe that an equally-weighted portfolio of the 17 industries is a reliable comparison. Additionally, I compute the tangency portfolios with and without the short-selling constraint in order to add robustness to the analysis.

Finally, the out-of-sample analysis reveals the true impact of dividends on the total returns of the portfolios, as it provides tests under a more realistic perspective.

I calculate the common performance statistics to assess the effectiveness of the dividend-based investment strategies. Due to the size of the sample, I compute the same statistics on subsamples to obtain unbiased results and I build two different income-based portfolios to monitor the behavior of dividends.
I begin by selecting the portfolio weights that maximize the Info Sharpe ratio of the dividend returns, creating a sort of tangency portfolio on dividends. Then, I construct a further portfolio using the ranking of the dividend yields of each industry. Moreover, I use rolling correlations and linear regressions with 6-month, 1-year and 5-year windows between dividend returns and total returns in order to test how much of the risk-adjusted returns are generated by dividends.

A vast majority of the results obtained in the analysis rely on the Sharpe ratio as a comparable measure of efficiency. A portfolio with a higher Sharpe ratio than its benchmark is considered to be the better investment among the two, given that the former provides a higher return per unit of risk.

The Sharpe ratio, as defined in Equation 2, is equal to the expected excess returns divided by the standard deviation of returns.

\[ \text{Sharpe ratio} = \frac{\mu - R_f}{\sigma} \]  \hspace{1cm} (3)

Under a statistical point of view, \( \mu \) and \( \sigma \) are not observable in the markets and must therefore be estimated. Their estimation errors are automatically reflected in the Sharpe ratio, which many investors may rely on for their investment decisions. Lo (2003) shows that these errors might overstate or understate the value of the ratio by up to 65\%. The sign difference is caused by the positive or negative serial correlation of returns. These effects are stronger in hedge funds. They report higher and statistically significant serial correlations than mutual funds, which consequently increase the estimation errors.
Equations 4 and 5 represent an approximation of the estimation errors for \( \mu \) and \( \sigma \) respectively. It becomes clear that as the sample size grows (\( T \)), the errors become smaller.

\[
\text{Var} (\hat{\mu}) \cong \frac{\sigma^2}{T} \tag{4}
\]

\[
\text{Var} (\hat{\sigma}^2) \cong \frac{2\sigma^4}{T} \tag{5}
\]

In this case, the sample includes all NYSE, AMEX and NASDAQ stocks. Additionally, assuming that the returns are independently and identically distributed (IID) allows us to relax the serial correlation bias.

**Results**

**In-sample**

I begin the in-sample analysis, which includes the monthly returns of the 17 industries from January 1927 until December 2015, by computing the weight, without short selling, to allocate to each industry as to maximize the Info Sharpe ratio of the dividend returns over the entire sample, as in Equation 6.

\[
\text{MAX}_{dr} = \frac{\mu_{dr}}{\sigma_{dr}} \tag{6}
\]

In the equation, \( \mu_{dr} \) stands for the expected dividend returns and \( \sigma_{dr} \) for the standard deviation of the dividend returns. Then, I apply the weights to the total
returns series in order to obtain the performance statistics. The process is quite severe, in fact, the strategy only gives weight to 4 industries out of 17 for the entire sample, namely Food, Mining and Minerals, Utilities and Retail Stores. Allowing short selling increases the diversification of the portfolio (see Appendix) by taking a position, long or short, on each industry but it does not provide significant improvements in terms of risk.

The equally-weighted (EW) portfolio allocates 5.88% to each industry and it generates higher annual returns than the dividend portfolios. The EW portfolio reports 14.95% annual returns compared to 13.89% and 13.33% for the Dividend Tangency portfolio with and without short selling respectively. Nonetheless, the dividend-optimizing portfolios provide a higher Info Sharpe ratio, 0.66 and 0.65 compared to 0.60 for the EW portfolio thanks to lower standard deviations, of 20.90% and 20.36%, compared to 24.89%. This means that an investor would have obtained higher returns by investing in the equally-weighted portfolio, but would have also gone through a greater degree of fluctuation.

In order to make the comparison more robust, I compute the tangency portfolio that maximizes the Info Sharpe ratio of the total return portfolio with and without the short selling constraint. As expected, both portfolios report significantly better Info Sharpe ratios driven by higher annual returns, 15.67% and 16.16%. In terms of standard deviation of returns, only the long-short in-sample tangency portfolio is able to outperform the dividend portfolios, further demonstrating the benefit of receiving a greater share of dividends throughout the investment horizon.
I expect the ordinary tangency portfolio to obtain higher Info Sharpe ratios than the Dividend Tangency portfolio as the weights of the latter are computed using the share of returns coming from dividends (*dividend returns*) and they are applied to the total returns series. Ultimately, this step decreases the power of the maximization process.

The performance statistics of all five portfolios are presented in the following table:

Table 1

<table>
<thead>
<tr>
<th>Annually</th>
<th>Dividend Tangency</th>
<th>Dividend Tangency with Short Selling</th>
<th>Equal Weights</th>
<th>Tangency Portfolio</th>
<th>Tangency Portfolio with Short Selling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>0,1389</td>
<td>0,1333</td>
<td>0,1495</td>
<td>0,1567</td>
<td>0,1616</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0,2090</td>
<td>0,2036</td>
<td>0,2489</td>
<td>0,2124</td>
<td>0,1715</td>
</tr>
<tr>
<td>Info Sharpe Ratio</td>
<td>0,6646</td>
<td>0,6547</td>
<td>0,6006</td>
<td>0,7377</td>
<td>0,9418</td>
</tr>
<tr>
<td>Monthly Max</td>
<td>0,5722</td>
<td>0,5435</td>
<td>0,6419</td>
<td>0,4214</td>
<td>0,2500</td>
</tr>
<tr>
<td>Monthly Min</td>
<td>-0,3148</td>
<td>-0,2888</td>
<td>-0,3067</td>
<td>-0,3042</td>
<td>-0,2615</td>
</tr>
<tr>
<td>Skewness</td>
<td>1,3245</td>
<td>1,3200</td>
<td>1,4140</td>
<td>0,4900</td>
<td>-0,0193</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>15,7855</td>
<td>13,8502</td>
<td>14,5920</td>
<td>6,8061</td>
<td>3,7347</td>
</tr>
<tr>
<td>Downside Risk</td>
<td>0,3305</td>
<td>0,3160</td>
<td>0,3951</td>
<td>0,3413</td>
<td>0,2687</td>
</tr>
</tbody>
</table>

Dividend portfolios provide better third and fourth moments compared to the equally-weighted portfolio. The third moment, also known as skewness, measures the asymmetry of the distribution of returns. The fourth moment, also known as kurtosis, measures the fatness of the tails of the distribution of returns and it denotes the likelihood of extreme positive or negative events.
A normal distribution has skewness equal to zero and kurtosis equal to three. The dividend portfolios report high and positive third moments, which means that the distributions are skewed on the losses side. They also show high kurtosis, not generally acceptable due to the increased likelihood of extremely negative events. At the same time, they offer lower downside risk than the equally-weighted portfolio, which is a relevant characteristic for every investor.

Furthermore, short selling has a different impact whether it is applied to dividends or to total returns. In fact, it affects negatively the dividend portfolios as the reduction in volatility is more than neutralized by a decrease in returns. Oppositely, the tangency portfolio benefits significantly from short selling, which allows it to have a more stable performance through the financial crises between 1927 and 2015.

This impact is clear in the chart below that plots the growth of $1 invested in each portfolio throughout the entire sample. The main differences between the portfolios are given by their behavior during crises as in 1932, 1975 and 2008. Short selling hedges the portfolio’s exposure during recessions and dividend portfolios seem to follow a similar path. In fact, they are less affected by the crises when compared to the equally-weighted portfolio.

The weights allocated to each industry for all five portfolios are presented in the Appendix. It is interesting to note that the long-only portfolios tend to be less diversified than the long-short portfolios regardless of the dividend optimization process, which limits in theory the pool of asset classes to choose from.

The results of the in-sample analysis lead to the conclusion that a greater exposure to dividends over the sample from 1927 until 2015 manages to reduce the
volatility of the portfolio and generate a higher Info Sharpe ratio than the equally-weighted portfolio. On the other hand, as expected, the Tangency portfolio that maximizes the Sharpe ratio benefits from the in-sample optimization process and outperforms the dividend-based counterparts.
Out-of-sample (Dividend Tangency portfolio)

On the same line, I begin the out-of-sample analysis focusing on the portfolios that maximize the Info Sharpe ratio. In order to avoid using forward looking information, I compute the weights of the dividend portfolio using 5-year rolling windows with yearly rebalancing on dividend returns (as in Equation 6). Then, I apply the weights to the total returns and I compare the results with the ordinary Tangency portfolio, which maximizes directly the Info Sharpe ratio of the total returns.
The results are intriguing, since the Dividend Tangency portfolio displays higher returns and lower standard deviations, which lead to a significantly higher Info Sharpe ratio than the ordinary tangency portfolio, 0.74 and 0.66 respectively. Additionally, rolling regressions prove that in both scenarios, as expected, dividends positively explain the returns of the portfolios.

**Table 2**

**Performance Statistics: Dividend Tangency portfolio.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Returns</td>
<td>0.1585</td>
<td>0.1651</td>
<td>0.1519</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.2131</td>
<td>0.2595</td>
<td>0.1536</td>
</tr>
<tr>
<td>Info Sharpe ratio</td>
<td>0.7437</td>
<td>0.6364</td>
<td>0.9889</td>
</tr>
<tr>
<td>Monthly Max</td>
<td>0.6766</td>
<td>0.6766</td>
<td>0.3100</td>
</tr>
<tr>
<td>Monthly Min</td>
<td>-0.2615</td>
<td>-0.2615</td>
<td>-0.1639</td>
</tr>
<tr>
<td>Skewness</td>
<td>2.4962</td>
<td>2.7232</td>
<td>0.1762</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>25.5468</td>
<td>22.0451</td>
<td>5.3322</td>
</tr>
<tr>
<td>Downside Risk</td>
<td>0.2955</td>
<td>0.2432</td>
<td>0.1678</td>
</tr>
</tbody>
</table>

Digging deeper, I realize that both portfolios generate a very similar amount of *dividend returns* equal to 3.64% per year. This value is higher than the average yearly dividend returns over the 17 industries, which is 3.28%, but it means that the superior performance of the Dividend Tangency portfolio does not result from a more efficient exposure to dividends.

My conclusion is that dividends provide benefits to investors through a stable and satisfactory performance. In the meanwhile, the methodology of maximizing the Info Sharpe ratio on *dividend returns* and on total returns does not support the hypothesis that a higher share of dividends leads to better portfolio statistics in terms of risk.
Plotting the graph of the cumulative returns of both portfolios shows that the difference in performance results from the beginning of the sample, which corresponds to the years just after the Great Depression. The behavior of the series is relatively similar throughout the rest of the sample.

**Figure 2**
**Historical Cumulative Performance**

The average 5-year beta coefficient obtained from the linear regressions of the dividends return series over the total return series is higher in the first half of the sample and it decreases over the years especially in the case of the dividend portfolio. Overall, the pattern seems to follow a cycle and the trend in recent years
has been positively sloped as proved by the launch of two new Vanguard ETFs (VIGI and VYMI) in February 2016.

The VIGI tracks the performance of the Nasdaq International Dividend Achievers Select Index, which includes high-quality ex-US companies that have the potential of increasing their dividend payouts in the near future. The second fund is the VYMI and it replicates the FTSE All-World ex-US High Dividend Yield Index. The aim is to focus on companies that are estimated to reach high dividend yields. For the past four years, Vanguard has been the top investment management firm in terms of new capital inflows. Investors have entrusted the company with their savings and the new dividend-based exchange-traded funds indicate that market participants are looking for more stable high-quality solutions and dividend-paying stocks may feature such characteristics.

The following chart is a graphical representation of the historical drawdown, or losses, of the Dividend Tangency portfolio compared to the Equally-Weighted portfolio. Volatility is a key indicator in finance and downside volatility is what risk-averse investors should be most concerned about. The negative performance of the two portfolios represented below shows that a higher and more efficient exposure to dividends leads to fewer and smaller losses.
Out-of-Sample (Rank Inverse portfolio)

My goal is to generate a portfolio capable of providing steady positive returns to investors and I plan to use dividends as the main driver for the purpose. The previous attempt indicates that this approach helps to improve the performance of the industry portfolio. On the other hand, it does not manage to generate a higher share of dividend returns than the ordinary tangency portfolio.

In order to increase the portfolio's exposure to the dividend yield, I rank the industries based on their dividend returns on a yearly basis. Then, I compute the inverse of the ranking and I divide the value by the sum of the inverses following a risk-parity methodology. This way, I give greater weight to the industries that paid more dividends in the previous year. Moreover, as mentioned in the in-sample
analysis, the strategy fulfills the need for diversification by assigning weights to each industry.

The inverse of the ranking for each of the 17 industries is represented by the notation IR and the individual weights are computed each year based on the following equation:

$$w_n = \frac{IR_{t-1}}{\sum_{i=1}^{17} IR_{t-1}}$$ (7)

The portfolio generates an average annual return equal to 14.56% with a 22.30% standard deviation and an Info Sharpe ratio of 0.65. The results appear satisfactory but the volatility is relatively higher than in the previous strategy.

Table 3
Performance Statistics: Rank Inverse portfolio.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Returns</td>
<td>0.1456</td>
<td>0.1513</td>
<td>0.1400</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.2230</td>
<td>0.2717</td>
<td>0.1600</td>
</tr>
<tr>
<td>Info Sharpe ratio</td>
<td>0.6530</td>
<td>0.5567</td>
<td>0.8747</td>
</tr>
<tr>
<td>Monthly Max</td>
<td>0.5369</td>
<td>0.5369</td>
<td>0.2599</td>
</tr>
<tr>
<td>Monthly Min</td>
<td>-0.2982</td>
<td>-0.2982</td>
<td>-0.2307</td>
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<td>Skewness</td>
<td>1.2172</td>
<td>1.3951</td>
<td>-0.2924</td>
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<tr>
<td>Kurtosis</td>
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<td>11.1209</td>
<td>4.2485</td>
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<tr>
<td>Downside Risk</td>
<td>0.3561</td>
<td>0.3015</td>
<td>0.1895</td>
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Dividends do not fluctuate as much as prices and this is one of the features that the methodology relies on to build high-quality portfolios. On the other hand, their yields have followed a decreasing path from 1927 until 2015. The average returns
from dividends among the 17 industries in the first half of the sample is equal to 4.54% per year, whereas the average in the second half is equal to 1.98% per year.

Given the size of the sample, it may be meaningful to split it into two halves and compute the performance of the portfolio in the subsamples. What I find is that most of the standard deviation is produced in the first half of the sample, generating 15.13% returns per year and 27.17% volatility. For the second subsample I report 14.00% returns and 16.00% standard deviation, leading to an Info Sharpe ratio of 0.87. The results indicate that the portfolio performs significantly better in the second part of the sample, when the returns from dividends decrease and an optimal allocation proves to be extremely beneficial.

**Figure 4**
**Historical Weights Allocation: Rank Inverse portfolio.**

![Asset Allocation Chart](image-url)
The above chart is a graphical representation of the asset allocation per industry each year. It appears that the portfolio is subject to greater changes in terms of weights in the first part of the sample. From 1969 on, the allocation becomes more stable almost resembling a dynamic version of the equally-weighted portfolio.

The beta coefficient from the linear regressions of the dividend returns over the total returns follows a similar pattern as in the previous analysis. The value is always positive and the series is negatively sloped, which confirms the trend highlighted several times in the project.

In a comparison between the new dividend portfolio and the subsamples of the equal weights portfolio, the former has a lower Info Sharpe ratio in the first subsample due to higher volatility, but it outperforms the equally-weighted portfolio in the second half. The dividend portfolio achieves 14,00% annual returns and 16,00% standard deviation (Info Sharpe ratio of 0,87), compared to 13,37% and 19,54% (Info Sharpe ratio of 0,68) respectively for its benchmark. Furthermore, the downside risk of the former is significantly lower than the equally-weighted portfolio, 35,61% compared to 39,51% over the entire sample. The difference is more significant in the second part of the sample. The complete statistics for the equally-weighted portfolio are presented in the Appendix.

Overall, the portfolio based on the dividend ranking manages to reach a higher exposure to the dividend yield. As already mentioned, the average dividend return among the 17 industries is equal to 3,28% over the entire sample, 4,54% in the first half and 1,98% in the second half. The Rank Inverse portfolio averages 4,50% and
2.92% respectively in the two halves and 3.71% over the entire sample. Moreover, these values improve the performance reported for the Dividend Tangency portfolio.

Finally, skewness and kurtosis are closer to the values for a normal distribution and they improve in the second half of the sample. In fact, the asymmetry of the distribution becomes negative, which reflects a slight tilt to the right and a greater proportion of positive returns.
At this point, the effect of being exposed in an efficient manner to dividend-paying stocks has been established. In order to add robustness to the results, I regress the returns of the Dividend Tangency portfolio and of the Rank-Inverse portfolio against the three factors in the Fama-French Model. The model adds two factors to the market-based Capital Asset Pricing Model (CAPM), namely the company size defined by the market capitalization (SMB) and the price-to-book ratio (HML).

The three factors behave similarly in both cases, showing slightly greater consistency with respect to the Rank Inverse portfolio. In the period between 1950 and 1970, the beta coefficients are close to zero or even negative. On the other hand, the estimated coefficient of the 5-year rolling regressions loses statistical significance. In fact, even though the average R-squared over the entire sample is above 85%, the period reports higher standard errors, meaning that the size of the
difference with respect to the sample is increasing and lower F statistics, which point at a greater share of unexplained variance.

From 1970 until 2007, the explanatory power of the three factors increases and the statistical significance improves confirming that a higher exposure to dividends was not necessarily the key to a better performance.

In the more recent years, the Fama-French factors’ power to explain the returns of the portfolios has decreased, leaving room to the possibility that the unexplained share of the returns is coming from the portfolios’ exposure to dividend-paying stocks.

Furthermore, Vanguard’s recent launch of two income-based ETFs suggests that investors are looking for more stable and safer ways to achieve returns. A constant stream of cash flows throughout the investment horizon represents a viable and solid option for long-term strategies. Additionally, the demographic shift to a greater proportion of older investors in the population would possibly show a greater demand for such portfolios.

There is not much literature on income-based portfolios yet and I believe they have the potential to gain attention from investors who desire to reduce their long-term exposure to risk and benefit from dividends for their current consumption.

The statistics from both income-based portfolios are presented below, along with the charts of the historical 5-year rolling beta coefficients computed based on the following multiple regression specification:

\[ r - r_f = \alpha + \beta_1 \text{MKT} + \beta_2 \text{SMB} + \beta_3 \text{HML} + \varepsilon \]  

(8)
In the equation above, \( \alpha \) is the intercept or constant, MKT is the excess market return, SMB (small minus big) stands for the excess performance of small cap stocks over large cap stocks, HML (high minus low) stands for the excess performance of high book-to-market stocks over low book-to-market stocks and \( \varepsilon \) represents the error term.

**Table 4**
Linear Regression Statistics

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Sample Average</th>
<th>Rank Inverse</th>
<th>Dividend Tangency</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta ) Coefficient</td>
<td>0,3522</td>
<td>0,3526</td>
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<tr>
<td>Standard Error</td>
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<td>0,0958</td>
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<tr>
<td>R-Squared</td>
<td>0,9511</td>
<td>0,8543</td>
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<tr>
<td>F - Statistic</td>
<td>604,4140</td>
<td>159,7099</td>
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Figure 6
Historical 5-year rolling Beta Coefficient

Dividend Tangency Portfolio
3 Factor Model Regression

Figure 7
Historical 5-year rolling Beta Coefficient

Rank Inverse Portfolio
3 Factor Model Regression
Conclusion

Dividends are most commonly known for their implications in corporate finance. The trend has been downward sloping in terms of dividend yield and their supply has been concentrated among the highest earning firms. I believe that their impact on a portfolio can be substantial as they are more predictable than capital gains are and they represent a constant stream of cash flows. Finally, investing efficiently in dividend-paying stocks provides risk-averse investors with exposure to stable and financially healthy firms.

Optimizing or maximizing returns from dividends has proven to reduce the degree of risk of the portfolio in-sample and out-of-sample. Ultimately, the strategies behave in a sound manner during crisis and they represent an alternative hedge.

The dividend-based portfolios developed in the work project show competitive statistics against the most traditional benchmarks such as the equally-weighted portfolio and the tangency portfolio. The first half of the sample is biased due to the tax free policy on dividends, which leads to a greater number of firms to increase their payout ratio and it makes the strategies become automatically riskier.

Starting from the second half of the 20th century up until current times, the supply of dividends has been concentrated into a small group of high-earning low-beta stocks. For this reason, the performance of the strategies largely improves in the second, most recent subsample.

The literature has mostly discussed dividends and their implications for companies and shareholders. The recent trend indicates an interest in the adoption
of dividends in portfolio management and there is room for future improvement in terms of investments strategies.

Nowadays, investors are exposed to an infinitely large pool of financial instruments and guidance. Their needs are shifting towards more stable and cost-efficient alternatives. In conclusion, a structured investment strategy focused on dividends may benefit risk-averse investors who find a constant stream of cash flows extremely valuable.
Reference List


**Appendix**

**Industry definitions**

<table>
<thead>
<tr>
<th></th>
<th>Industry</th>
<th>Description</th>
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<tr>
<td>1</td>
<td>Food</td>
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<tr>
<td>2</td>
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<td>Consumer Durables</td>
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<td>7</td>
<td>Cnsum</td>
<td>Drugs, Soap, Prfums, Tobacco</td>
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<td>9</td>
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<td>Steel Works Etc</td>
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<td>10</td>
<td>FabPr</td>
<td>Fabricated Products</td>
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<td>13</td>
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<td>15</td>
<td>Rtail</td>
<td>Retail Stores</td>
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<tr>
<td>16</td>
<td>Finan</td>
<td>Banks, Insurance Companies, and Other Financials</td>
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<td>17</td>
<td>Other</td>
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In Sample Weights

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<td>63%</td>
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<td>20%</td>
<td>5%</td>
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</table>

![Graph showing weights distribution]
Tangency Portfolio

Historical Weights Allocation

Asset Allocation on Tangency Portfolio

Dividend Tangency Portfolio (without short selling)

Historical Weights Allocation

Asset Allocation on Dividend Tangency Portfolio
## Equally-Weighted Portfolio

### Performance Statistics

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<td>Returns</td>
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<td>Info Sharpe Ratio</td>
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<td>Monthly Max</td>
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<td>Monthly Min</td>
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<td>Kurtosis</td>
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