Zurich University of Applied Sciences

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School of Management & Law

ARE DIVIDEND FUNDS A FINANCIALLY VIABLE SUBSTITUTE FOR FIXED-INCOME SECURITIES IN TODAY'S LOW INTEREST RATE ENVIRONMENT?

Bachelor Thesis

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Management summary

Over the last centuries, interest rates in most of the developed economies have continuously decreased. Since bond yields are heavily linked to central interest rates, income-oriented investors have experienced a decline in annual cash flows from bond investments. Some experts advise to invest in high dividend yielding stocks or funds consisting of such stocks to achieve higher annual payouts than the bond market. However, annual payouts can only be compared if investments are adjusted for risk.

The aim of this analysis was to test if dividend funds can in fact be used as a financially viable substitute for traditional fixed-income securities in times of low interest rates by testing if dividend funds have managed to achieve similar or higher annual cash payouts without exceeding the risk/reward relationship of bond investments.

An analysis of the market of dividend funds in Switzerland and the United States was conducted to provide an overview of the characteristics of products in both markets. As a second step, the cash flows from dividend distributions were compared to coupon payments of a bond benchmark. The third part of this paper evaluated the historic returns of both asset classes using time series of monthly prices obtained from Bloomberg. The risk-adjusted performance of the securities was assessed by their Sharpe ratio, which enables comparing the performance of investments across different asset classes. Furthermore, investments were tested for abnormal returns according to the Capital Asset Pricing Model (CAPM). Additionally, the amount of abnormal returns was statistically tested for its significance by running a two-sided hypothesis test to prove if the achieved abnormal returns are statistically substantial.

The yield comparison illustrated that Swiss dividend funds have generated higher yields than the bond market. US Dividend funds yielded in average 0.27% less than the bond market. Given this small deviation, US dividend yields were described as comparable to bond yields. Funds in both market displayed a better Sharpe ratio than bond markets in recent years, but failed to produce superior Sharpe ratios over time horizons exceeding 5 years. The examined Swiss dividend fund has produced substantial negative abnormal returns over the last 10 years, while US dividend funds have generated significant abnormal returns over all applied time horizons.

Overall, Swiss dividend funds are suited to generate annual income, but the findings suggest that their risk/return profile is inferior to the bond market. US dividend funds generated comparable yields as the bond market and displayed better risk-adjusted performance. Based on historic data, US dividend funds can be used as a substitute to bond investments in normal market situations. However, rising interest rates in the US are likely to increase bond yields, which would suggest that dividend funds would be unable to generate comparable annual income in the future. Since Swiss interest rates are more likely to stay low, dividend funds remain attractive for income investors who can bear the higher risk exposure.

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Used Abbreviations

CHF	Swiss franc
m	million
NAV	Net asset value
TER	Total expense ratio
US	United States (of America)
USD	United States dollar

Technical terms

Active fund management	Stock selection of undervalued securities to outperform an investment benchmark
Bloomberg Terminal	Software to monitor and analyze real-time and historic financial market data
Blue chip stocks	Stocks issued by companies with a large market capitalization
Dotcom bubble	Period of excessive speculation from 1997 to 2001 that resulted in heavy losses in the IT sector when the bubble collapsed in the early 2000's
Expense ratio (TER)	Total cost of a fund to the investor that include management fees, commissions and other charges
Federal funds rate	US central interest rate
Fixed-income	Investment that provides fixed periodic payments, e.g. bonds
Government debt	Bonds issued by governments, e.g. US treasury bills
LIBOR	London Interbank Offered Rate, average estimated interest rate for interbank lending
Net Asset Value	Value of assets in a fund minus liabilities
Passive fund management	Stock selection based on replication of an index
Risk-free rate of return	Theoretical rate of return of an investment without risk
SPI	Swiss Performance Index, Stock index including all Swiss-Exchange traded stocks
S&P 500	Standard & Poor's 500, US stock index that includes 500 large companies traded on the NYSE or NASDAQ
Yield	Cash distributed to investors from a security as a percentage

1 Introduction

1.1 Problem set

In the current low and negative interest rate environment in the financial world it is becoming more and more difficult for income-oriented investors to generate substantial annual cash inflows with investments in traditional fixed-income securities. Interest rates have been continuously decreasing in the most important economies for the last decades due to the monetary policy of central banks (*Figure 1*) and as a result, yields on risk-free government debt and high quality corporate bonds decreased as well. The decrease of bond yields has caused cash flows from these investments to diminish substantially.

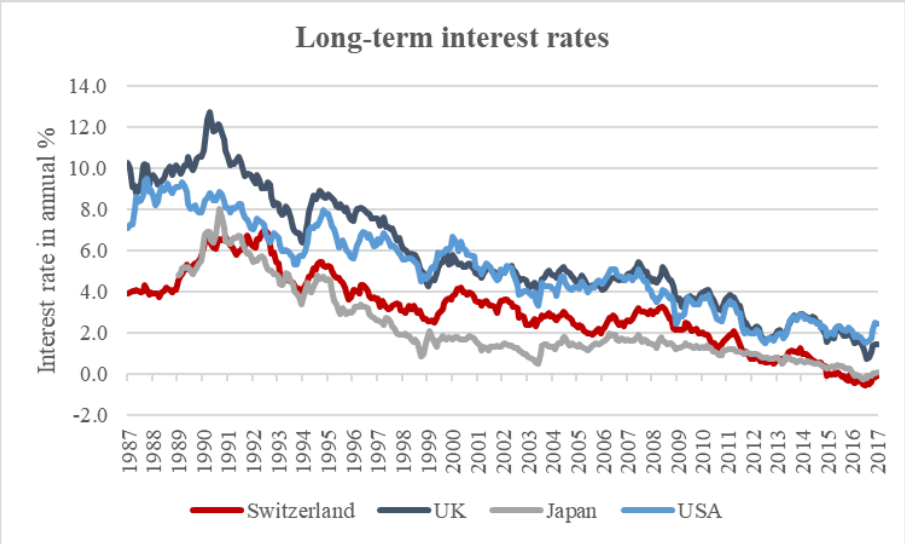

Figure 1: Long-term interest rates, January 1987 – January 2017 (OECD, 2017)

As investing in bonds has traditionally been a reliable source of annual income, this change has forced many investors to look into other investments that are able to generate comparable streams of cash flows. According to several experts on finance blogs and print media, investors could manage similar cash flows by investing in stable high-dividend paying stocks. Nonetheless, investing in stocks usually results in higher volatility and historic dividend distributions do not automatically promise continuously stable or growing future dividends. Opinions in the financial world remain divided whether or not dividend stocks or funds are suitable to substitute fixed-income investments with regard to their sustainability of cashflow streams and risk/return profile.

1.2 Introduction to high dividend yield strategies

Fund management firms praise funds with a high dividend yield strategies for various reasons. For one, previous empirical studies have discovered that strategies based on high dividend yields outperform the equity market as a whole in the long run (Société Générale, 2011). The MSCI Europe High Dividend Yield Index, an index designed to reflect the performance of equities in the parent index MSCI Europe Index with higher dividend income and quality characteristics than average dividend yields (MSCI, 2017) has outperformed the MSCI Europe by more than 150 percentage points since July 1995 (*Figure 2*).

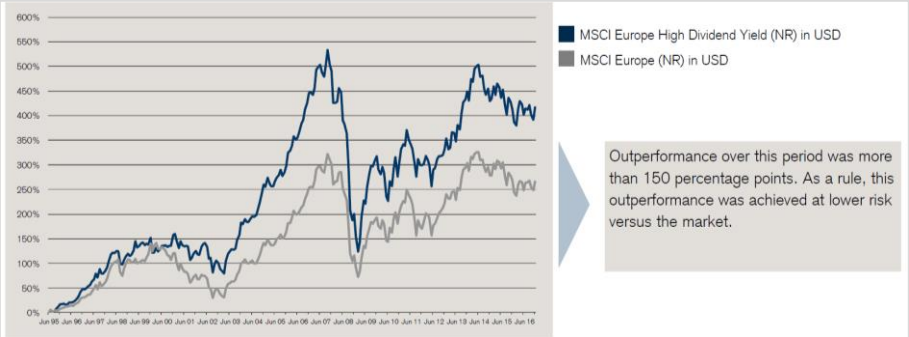

Figure 2: MSCI Europe High Dividend vs. MSCI Europe, July 1995 to December 2016 (Credit Suisse, 2017)

A study conducted by A. Keppler (1991) shows that this is not a new financial phenomenon. Keppler tested the correlation of dividend yields and total returns of companies all over the world. 18 national equity indices of different countries were observed over a 20-year period and ranked quarter-yearly by their dividend yields. The indices were then sorted into four quartiles. The study concluded that investing in the top quartile yielding country indices every 3 months generates a substantially bigger compound annual return than the other quartiles (*Figure 3*).

These findings support the theory that high yielding equities usually outperform lower yielding ones. Similar studies, such as *The Future for Investors* (Siegel, 2005), or *Triumph of the Optimists: 101 Years of Global Investment Returns* (Dimson, Marsh, & Staunton, 2002) came to similar conclusions.

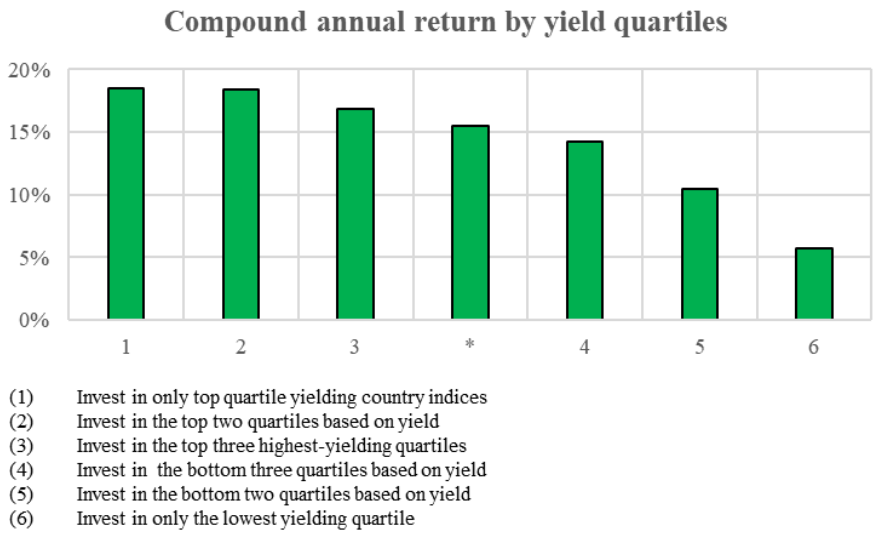

Figure 3: Compound Annual Returns based on various dividend yield strategies and the MSCI World Index (December 1969 - December 1989) (Keppler, 1991)

Although there are many different and often opposing theories of how to interpret changes in dividend payouts to investors, the general rule in the financial world dictates that growing dividends are a sign of financial health and promise good returns.

A study conducted by a research team of Credit Suisse (2006) analyzed the optimal combination of dividend yield and payout ratio as well as the contribution of dividends on total returns. The researchers divided S&P 500 stocks quarterly into equally weighted portfolio buckets as illustrated in Figure 4. By calculating and comparing annualized returns, statements on the overall performance of each bucket can be made. Back testing from January 1990 to June 2006, the portfolio with high dividend yields and low payout ratios outperformed portfolios with other any other yield / payout structure in both annualized returns (*Figure 5*) and cumulative returns *(Figure 6)*.

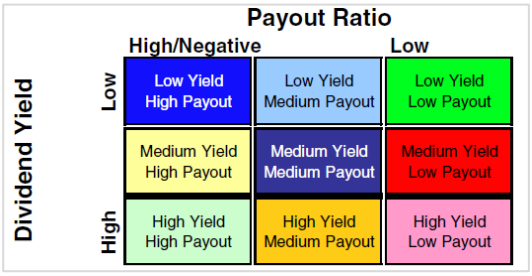

Figure 4: Portfolio Buckets (Credit Suisse, 2006)

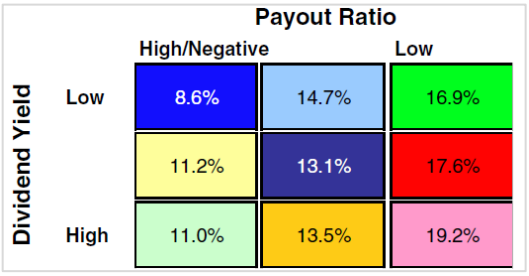

Figure 5: Annualized Returns, January 1990 to June 2006 (Credit Suisse, 2006)

Overall, Credit Suisse's quantitative analysis strengthens the investment rule established by previous studies that high dividend yielding securities outperform securities with lower dividend yields in the long term.

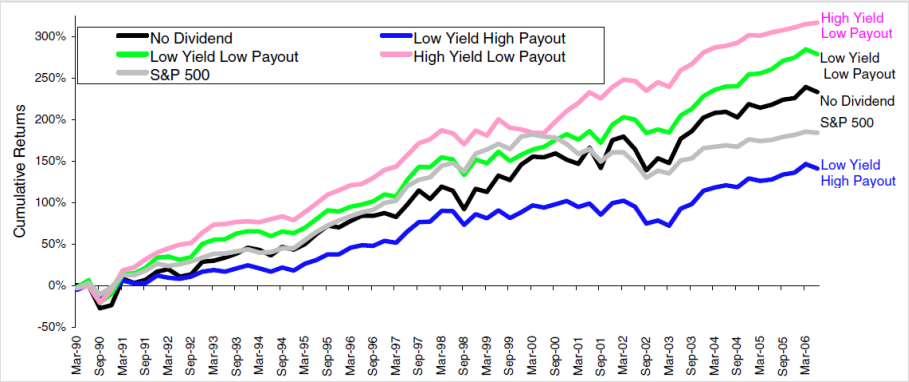

Figure 6: Dividend Yield and Payout Ratio, January 1990 to June 2006 (Credit Suisse, 2006)

In contrast to the previously mentioned studies, the Credit Suisse research paper (2006) attributes superior returns not only to higher dividend yields but rather to high dividends in combination with a low payout ratio.

All in all, previous studies agree that investing in high dividend yielding stocks is an attractive strategy to achieve above-average returns in the equity market while maintaining above average annual cash flows. However, empirical data on how dividend stocks compare to fixed-income securities with regard to their cash flow structure and risk/return profile is hard to find. The suitability of dividend strategies to replace fixed-income investing in a low interest rate environment remains unclear since investments have to be adjusted for risk before statements about

This paper serves the purpose of answering if dividend funds are in fact the fixed-income substitute that income investors are looking for by conducting a quantitative analysis.

2 Research Question and Objective

The aim of this paper is to give an answer to the question whether or not funds with a high dividend yield strategy can be used as a financially viable alternative to traditional fixed income investments in times when interest rates are low or even negative.

In this paper, dividend funds qualify as a financially viable alternative to fixed-income securities if they provide at least comparable or superior annual cash flows. Furthermore, dividend funds should achieve constant capital growth by outperforming their domestic equity market while featuring better risk-adjusted returns than the bond market.

3 Scope and Limitations

This thesis analyzes the situation in a low or even negative interest rate environment in Switzerland and the United States of America after the financial crisis in 2008.

Furthermore, the focus of this thesis is directed at investment funds following a dividend strategy rather than using single dividend paying stocks. This measure should provide a more objective scope and eliminate company specific fluctuations in stock prices and dividend payments. For the same reason, the performance and risk/return profile of the selected dividend funds will likewise be compared to Swiss and US bond indices instead of historic development of single fixed-income securities.

In order to understand the effect that low interest rates have on the suitability of dividend funds, historic data before the financial crisis will also be analyzed and complete available time series of funds and indices will be used. This should provide enough observations so that statistically substantial conclusions can be made.

4 Market Overview

4.1 Introduction

As a first analytical step in this paper, a selection of dividend funds is made for both Swiss and US markets, which will serve as a basis for this market overview. This chapter should present an overview of the available high-dividend yield instruments in the equity fund market. The analysis also provides a foundation to draw conclusions about the similarities and differences of products inside the domestic markets and between Swiss and US markets.

4.2 Methodology

In order to qualify for examination in the extent of this paper, a potential open-ended equity fund has to meet the following requirements:

- Equity fund with high dividend yield objective
- Domestic investments in either Swiss or US market
- At least annually distributed dividends

Empirical data about the composition of assets of funds following a high dividend yield strategy is gathered from publicly available information such as fund brochures and using Bloomberg Terminal reports. The data is summarized and used to analyze the asset structure and investment strategies for each fund.

4.3 Fund overview

Fund Overview				
	Ticker	**Fund**	**Assets in m** (as of 31.03.17)	
	*CHDVD SW*	iShares Swiss Dividend CH	CHF	209.01
	CSEFSDA SW	Credit Suisse (CH) Swiss Dividend Plus Equity Fund	CHF	232.14
	UDIV SW	UBS CH Equity Fund - Swiss High Dividend CHF	CHF	461.66
	VONSWEQ SW	Vontobel Swiss Dividend Fund	CHF	81.06
	ZCAD SW	zCapital Swiss Dividend Fund	CHF	377.87
	*DES US*	Wisdomtree Smallcap Dividend Fund	USD	1,975.47
	DVY US	iShares Select Dividend Fund	USD	17,107.60
	SDY US	SPDR S&P Dividend ETF	USD	15,452.48
	VIG US	Vanguard Dividend Appreciation ETF	USD	23,521.00
	VYM US	Vanguard High Dividend Yield Equity	USD	17,715.00

Table 1: Fund Overview

Asset Allocation Switzerland						
	CHDVD	***CSEFSDA***	***UDIV***	***VONSWEQ***	***ZCAD***	***AVERAGE***
Equity	99.90%	98.40%	100.00%	99.40%	91.90%	*97.92%*
Government Debt	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*
Corporate Debt	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*
Money Market	0.10%	1.60%	0.00%	0.60%	8.10%	*2.08%*

Table 2: Asset Allocation Switzerland

Asset Allocation USA						
	DES US	***DVY US***	***SDY US***	***VIG US***	***VYM US***	***AVERAGE***
Equity	99.93%	99.60%	99.82%	99.77%	99.81%	*99.79%*
Government Debt	0.00%	0.20%	0.15%	0.00%	0.02%	*0.07%*
Corporate Debt	0.02%	0.00%	0.00%	0.01%	0.00%	*0.01%*
Money Market	0.05%	0.20%	0.03%	0.22%	0.16%	*0.13%*

Table 3: Asset Allocation USA

Geo Allocation Switzerland						
	CHDVD	***CSEFSDA***	***UDIV***	***VONSWEQ***	***ZCAD***	***AVERAGE***
Switzerland	100.00%	100.00%	100.00%	100.00%	100.00%	*100.00%*
Other	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*

Table 4: Geo Allocation Switzerland

Geo Allocation USA						
	DES US	***DVY US***	***SDY US***	***VIG US***	***VYM US***	***AVERAGE***
United States	100.00%	99.32%	96.62%	99.98%	98.69%	*98.92%*
Other	0.00%	0.68%	3.38%	0.02%	1.32%	*1.08%*

Table 5: Geo Allocation USA

The funds in Table 1 have been selected to illustrate the current market situation in their issuing country. As Table 2 and Table 3 display, all selected funds almost exclusively invest in equity securities, with only a small percentage of assets invested in the money market and other instruments. Table 4 shows that all Swiss funds are completely invested in the Swiss market. In the US market *(Table 5)*, the small percentage of assets invested in countries other than the US is regarded as insignificant for this paper, as only 1.1% of total assets are in average invested in countries other than the United States. Therefore, all funds fulfill the requirements described in chapter 4.2 and are eligible for further analysis.

4.4 Dividend funds in the Swiss market

iShares Swiss Dividend CH	
Bloomberg tracker	CHDVD SW
Inception date	28/04/2014
Total Assets *(as of 31.03.2017)*	CHF 209.01m
Shares outstanding	1,975,000
Net asset value (NAV)	CHF 105.83
Number of holdings	20
Total expense ratio (TER)	0.15%
Dividend schedule	quarterly

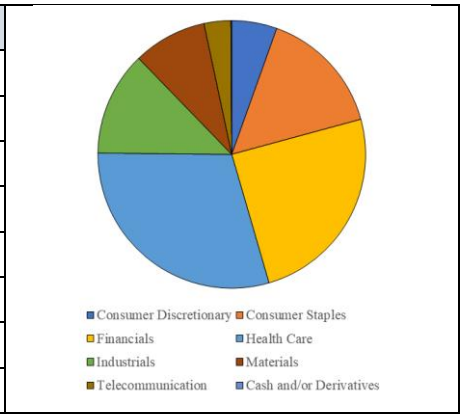

Table 6: Overview iShares Swiss Dividend CH (iShares, 2017)

The iShares Swiss Dividend CH fund seeks to track the performance of the SPI ® Select Dividend 20 Index, an index composed of Swiss companies with high dividend yields and sustainable dividend policy. The fund's focus lies on income while at the same time limiting its exposure to the Swiss market (iShares, 2017). Nestle (Bloomberg: *NESN:VX*, 15.32% of total assets), Roche (*ROG:VX*, 14.89%), and Novartis (*NOVN:VX*, 14.75%) account for the fund's top three holdings. When broken down to market sectors, the fund's largest exposure lies in Health Care (29.64%), followed by Financials (24.73%) *(Table 6).*

Credit Suisse CH Swiss Dividend Plus Equity Fund	
Bloomberg tracker	CSEFSDA SW
Inception date	24/07/2013
Total Assets *(as of 31.03.2017)*	CHF 232.14m
Shares outstanding	18,800,000
Net asset value (NAV)	12.35
Number of holdings	n/a
Total expense ratio (TER)	1.37%
Dividend schedule	annually

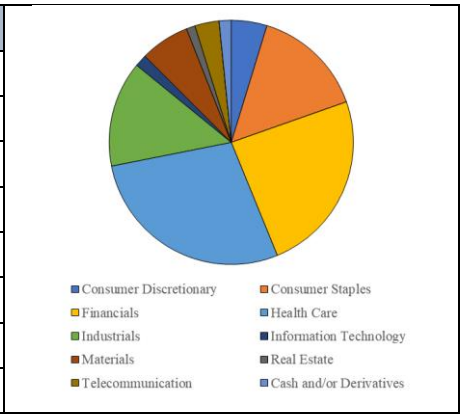

Table 7: Overview Credit Suisse CH Swiss Dividend Plus Equity Fund (Credit Suisse, 2017)

The Credit Suisse Swiss Dividend Plus Equity fund invests primarily in Swiss companies which offer a sustainable and above average dividend yield. The stock selection is based on quantitative as well as qualitative analyses (Credit Suisse, 2017). The fund aims for long term capital growth, with the SPI as a benchmark. The fund's top holdings are Nestle (14.89%), Novartis (13.96%), and Roche (12.44%) while the Health Care sector accounts for 28.04% of the total fund portfolio *(Table 7).*

UBS CH Equity Fund – Swiss High Dividend CHF	
Bloomberg tracker	UDIV SW
Inception date	06/05/2011
Total Assets *(as of 31.03.2017)*	CHF 461.66
Shares outstanding	3,016,000
Net asset value (NAV)	CHF 153.07
Number of holdings	n/a
Total expense ratio (TER)	1.51%
Dividend schedule	annually

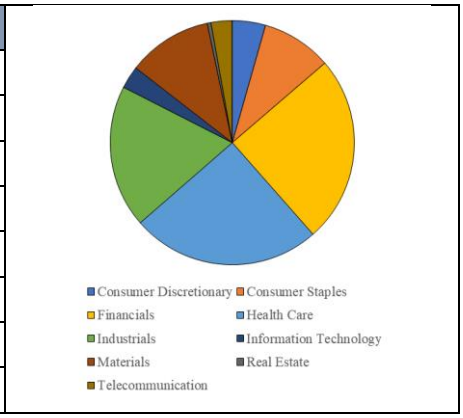

Table 8: Overview UBS CH Equity Fund - Swiss High Dividend CHF (UBS, 2017)

The UBS CH Equity fund is actively managed and invests in Swiss companies with strong fundamentals that are expected to pay sustainable dividends. The fund claims to offer better diversification than standard Swiss equity indices by limiting single stock concentration to a maximum of 10% (UBS, 2017). The fund's three largest equity positions are Roche (9.89%), Nestle (9.23%), and Novartis (9.21%). Due to the 10% maximum of single stock concentration, the weighting of these positions is considerably smaller than in the SPI index (13.86%, 18.45%, 15.07%). Nonetheless, the Health Care sector still accounts for the biggest exposure per sector with 25.1%, followed by the financial sector with a weighting of 24.8% *(Table 8)*.

Vontobel Swiss Dividend Fund	
Bloomberg tracker	VONSWEQ SW
Inception date	23/04/1996
Total Assets *(as of 31.03.2017)*	CHF 81.06m
Shares outstanding	153,500
Net asset value (NAV)	CHF 528.33
Number of holdings	n/a
Total expense ratio (TER)	1.69%
Dividend schedule	annually

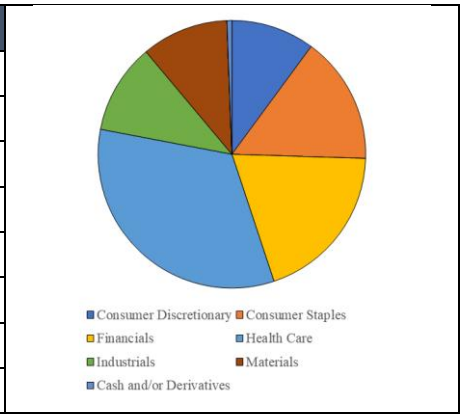

Table 9: Overview Vontobel Swiss Dividend Fund (Vontobel, 2017)

The Vontobel Swiss Dividend Fund mainly invests in companies with above-average dividend yields and offers investors access to the entire Swiss equity market and enables participation in the growth of undervalued companies (Vontobel, 2017). Vontobel uses fundamental analysis to track undervalued securities and focuses on attractive earnings growth in addition to high dividend yields.

The fund's major equity positions are Roche (15.8%), Nestle (15.4%), and Novartis (11.8%). As a result, the fund holds its biggest portion of investments in the Health Care sector, which accounts for 33.1% of total assets as of March 2017 *(Table 9).*

zCapital Swiss Dividend Fund	
Bloomberg tracker	ZCAD SW
Inception date	22/10/2012
Total Assets *(as of 31.03.2017)*	CHF 377.87m
Shares outstanding	230,000
Net asset value (NAV)	CHF 1,642.91
Number of holdings	35
Total expense ratio (TER)	1.01%
Dividend schedule	annually

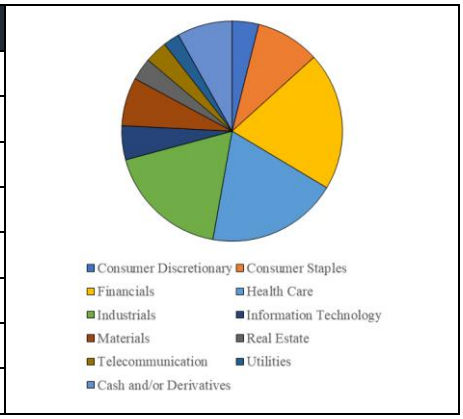

Table 10: Overview zCapital Swiss Dividend Fund (zCapital, 2017)

The fund invests in Swiss equities with attractive dividends and follows an active investment approach (zCapital, 2017). When selecting stocks, the fund management relies on a proprietary dividend analysis tool combined with fundamental research to identify investment opportunities. The fund typically invests half of its assets in blue chip stocks, and the other half in small and midsize caps. The fund's positions are rather well balanced, with its largest positions (Novartis 9.9%, Nestle 9.3%, Roche 9.2%) all accounting for less than 10% of the total fund portfolio. The fund's largest sector exposure is in Financials with 20.3% of all investments *(Table 10).*

Sector Allocation Switzerland						
	CSEFSDA	***CHDVD***	***UDIV***	***VONSWEQ***	***ZCAD***	***AVERAGE***
Consumer Discretionary	4.73%	5.46%	4.40%	10.10%	3.90%	*5.72%*
Consumer Staples	14.89%	15.32%	9.30%	15.40%	9.40%	*12.86%*
Energy	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*
Financials	24.22%	24.73%	24.80%	19.40%	20.30%	*22.69%*
Health Care	28.04%	29.64%	25.10%	33.10%	19.20%	*27.02%*
Industrials	14.01%	12.60%	18.90%	10.90%	18.00%	*14.88%*
Information Technology	1.60%	0.00%	3.00%	0.00%	5.00%	*1.92%*
Materials	6.53%	8.92%	11.20%	10.50%	7.10%	*8.85%*
Real Estate	1.17%	0.00%	0.50%	0.00%	3.30%	*0.99%*
Telecommunication	3.21%	3.23%	2.80%	0.00%	3.30%	*2.51%*
Utilities	0.00%	0.00%	0.00%	0.00%	2.40%	*0.48%*
Others	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*
Cash and/or Derivatives	1.60%	0.10%	0.00%	0.60%	8.10%	*2.08%*

Table 11: Sector Allocation Switzerland

Table 11 displays an overview of the asset allocation of all Swiss dividend funds.

4.5 Dividend funds in the US market

WisdomTree SmallCap Dividend Fund	
Bloomberg tracker	DES US
Inception date	06/16/2006
Total Assets *(as of 31.03.2017)*	USD 1,975.47m
Shares outstanding	24.55m
Net asset value (NAV)	USD 80.47
Number of holdings	693
Total expense ratio (TER)	0.38%
Dividend schedule	monthly

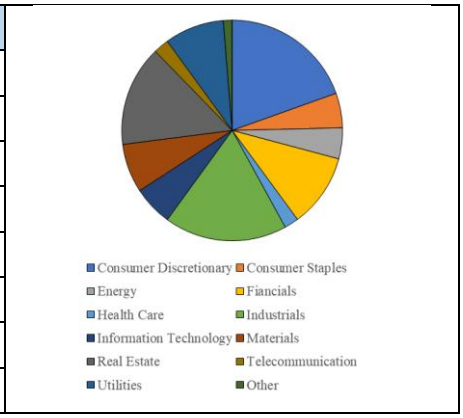

Table 12: Overview WisdomTree SmallCap Dividend Fund (WisdomTree, 2017)

WisdomTree SmallCap Dividend Fund seeks to track the investment results of dividend-paying small-cap companies in the U.S. equity market. The fund uses the WisdomTree SmallCap Dividend Index as benchmark. (WisdomTree, 2017). Because it invests in stocks of companies with a small market capitalization, which traditionally contain more risk than large cap stocks, the fund has to be well diversified. For this reason, the largest holdings make up less than 2% of total assets. The fund has its biggest sector exposure in the Consumer Discretionary sector, where 19.74% of its assets are invested *(Table 12)*.

iShares Select Dividend ETF	
Bloomberg tracker	DVY US
Inception date	11/03/2003
Total Assets *(as of 31.03.2017)*	USD 17,107.60m
Shares outstanding	187.5m
Net asset value (NAV)	USD 91.24
Number of holdings	100
Total expense ratio (TER)	0.39%
Dividend schedule	quarterly

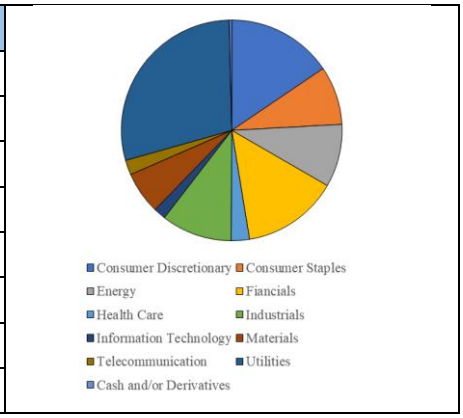

Table 13: Overview iShares Select Dividend ETF (iShares, 2017)

The iShares Select Dividend ETF seeks to track the investment results of the Dow Jones U.S. Select Dividend Index, an index composed of relatively high dividend paying U.S. equities (iShares, 2017). The fund uses a passive strategy and replicates its benchmark by investing in the same 100 stocks listed in the benchmark, with little to no divergence in

weightings. Logically, the fund's top single stock and sector holdings are almost identical to those of the benchmark.

The fund's largest portion (29.01%) is invested in the utilities sector, while stocks of the aerospace, defense, and advanced technologies corporation Lockheed Martin (*LMT:US*, 3.74% of total assets), the financial provider CME Group (*CME:US*, 2.92%), and the tobacco corporation Philip Morris (*PM:US*, 2.20%) head the top holdings list *(Table 13)*.

SPDR S&P Dividend ETF	
Bloomberg tracker	SDY US
Inception date	11/08/2005
Total Assets *(as of 31.03.2017)*	USD 15,452.48m
Shares outstanding	175.25m
Net asset value (NAV)	USD 88.17
Number of holdings	109
Total expense ratio (TER)	0.35%
Dividend schedule	quarterly

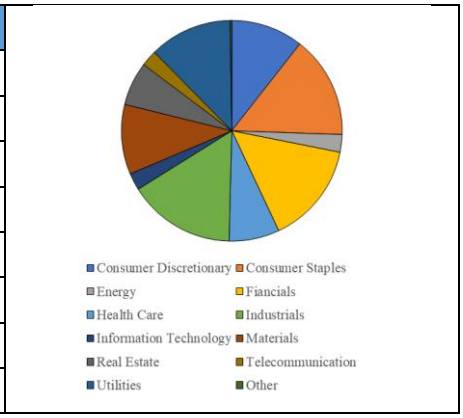

Table 14: Overview SPDR S&P Dividend ETF (State Street Global Advisors, 2017)

The SPDR® S&P® Dividend ETF seeks to provide investment results that, before fees and expenses, generally correspond to the total return performance of the S&P® High Yield Dividend Aristocrats Index (State Street Global Advisors, 2017). The fund uses a passive investment strategy, attempting to track the performance of its benchmark, and typically invests around 80% of its total assets in the securities comprising the index. In addition, the fund may invest in equity securities that are not included in the index, cash and cash equivalents, or money market instruments. Stocks of the telecommunications conglomerate AT&T (*T:US*, 1.86% of total assets), the pharmaceutical company AbbVie (*ABBY:US*, 1.77%) and the real estate investment trust Realty Income Corporation (*O:US*, 1.69%) are the fund's largest holdings. The sector Industrials is weighted the heaviest with 15.49% of assets but Consumer Staples (15.04%) and Financials (14.93%) account for almost identical asset exposure *(Table 14)*.

Vanguard Dividend Appreciation ETF	
Bloomberg tracker	VIG US
Inception date	21/04/2006
Total Assets *(as of 31.03.2017)*	USD 23,521.00m
Shares outstanding	261.55m
Net asset value (NAV)	USD 89.93
Number of holdings	188
Total expense ratio (TER)	0.09%
Dividend schedule	quarterly

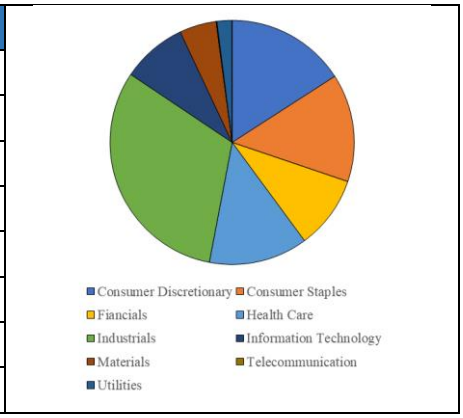

Table 15: Overview Vanguard Dividend Appreciation ETF (Vanguard, 2017)

The Vanguard Dividend Appreciation ETF seeks to track the performance of the NASDAQ US Dividend Achievers Select Index, which is comprised of a select group of 180 securities with at least ten consecutive years of increasing annual regular dividend payments (Vanguard, 2017). The fund uses a passive investment strategy and fully replicates its benchmark index. Due to the full replication of the index, the expenses involved with investing in the fund are kept very low at a TER of 0.09%. The three largest holdings of the Vanguard Dividend Appreciation ETF are made up of Microsoft (*MSFT:US*, 4.1% of total assets), the pharmaceutical company Johnson & Johnson (*JNJ:US*, 4.1%), and the food and beverage company PepsiCo (*PEP:US*, 4.0%) *(Table 15).*

Vanguard High Dividend Yield ETF	
Bloomberg tracker	VYM US
Inception date	10/11/2006
Total Assets *(as of 31.03.2017)*	USD 17,715.00m
Shares outstanding	228.70m
Net asset value (NAV)	USD 77.46
Number of holdings	428
Total expense ratio (TER)	0.08%
Dividend schedule	quarterly

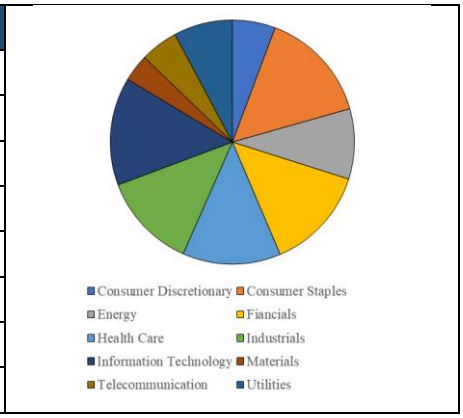

Table 16: Overview Vanguard High Dividend Yield ETF (Vanguard, 2017)

The Vanguard High Dividend Yield ETF seeks to track the performance of the FTSE High Dividend Yield Index, an index derived from the U.S. component of the FTSE Global Equity Index Series that includes global stocks with the highest dividend yields (Vanguard, 2017).

Identically to the Vanguard Dividend Appreciation ETF, the Vanguard High Dividend Yield ETF uses a passive, full-replication investment strategy. The largest holdings of this fund are stocks of Microsoft (*MSFT:US,* 5.3% of total assets), the energy corporation ExxonMobil (*XOM:US,* 3.6%), and the pharmaceutical company Johnson & Johnson (*JNJ:US,* 3.6%) *(Table 16).*

Sector Allocation USA						
	DES US	***DVY US***	***SDY US***	***VIG US***	***VYM US***	***AVERAGE***
Consumer Discretionary	19.54%	15.52%	10.58%	15.90%	5.70%	*13.45%*
Consumer Staples	5.08%	8.60%	14.96%	14.30%	14.90%	*11.57%*
Energy	4.53%	9.22%	2.59%	0.00%	9.30%	*5.13%*
Fiancials	10.77%	14.08%	14.88%	9.70%	13.70%	*12.63%*
Health Care	2.10%	2.68%	7.39%	13.10%	13.00%	*7.65%*
Industrials	17.99%	10.37%	15.72%	31.40%	12.70%	*17.64%*
Information Technology	5.82%	1.78%	2.50%	8.60%	14.30%	*6.60%*
Materials	7.15%	6.20%	10.23%	4.90%	3.60%	*6.42%*
Real Estate	14.76%	0.00%	6.41%	0.00%	0.00%	*4.23%*
Telecommunication	2.25%	2.17%	2.35%	0.10%	5.00%	*2.37%*
Utilities	8.73%	29.01%	12.15%	2.00%	7.80%	*11.94%*
Other	1.28%	0.00%	0.24%	0.00%	0.00%	*0.30%*
Cash and/or Derivatives	0.00%	0.37%	0.00%	0.00%	0.00%	*0.07%*

Table 17: Sector Allocation USA

Table 17 displays an overview of the asset allocation of all US dividend funds

4.6 Market overview conclusion

Although the funds differ in size of total assets, number of holdings, and net asset value, strategies of Swiss and US dividend funds are mostly consistent as they all try to invest in high dividend yielding stocks while looking for long term capital growth. With the exception of zCapital's Swiss Dividend Fund *(ZCAD SW)* and its US counterpart WisdomTree SmallCap Dividend Fund *(DES US),* most funds primarily invest all their assets in blue chip stocks.

Due to the limited size of the Swiss capital market and because of interchangeable strategies between the dividend funds, the top holding positions are identical for all funds and consist of Switzerland's traditional blue-chip stocks of Nestle, Roche, and Novartis. The size advantage of the US market enables US dividend funds to invest in a broader variety of companies while still maintaining its blue-chip bias. The size difference between the two markets is also evident when comparing the total assets of Swiss dividend funds *(Figure 7)* to those of US dividend funds *(Figure 9).*

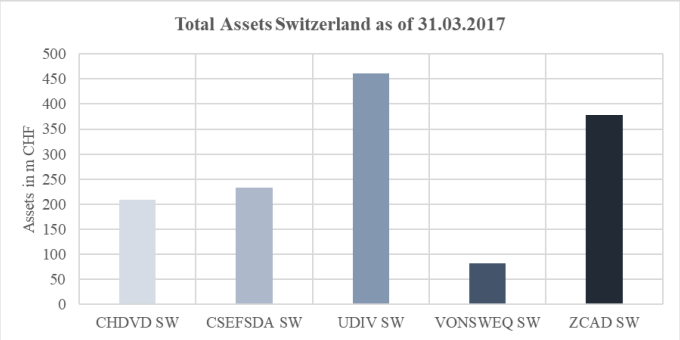

Figure 7: Total Assets Switzerland

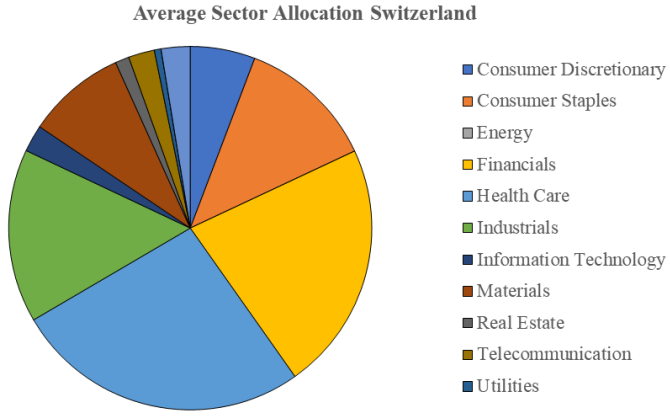

Figure 8: Average Sector Allocation Switzerland

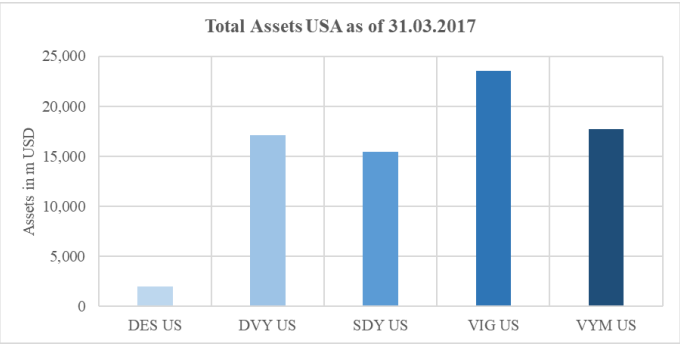

Figure 9: Total Assets USA

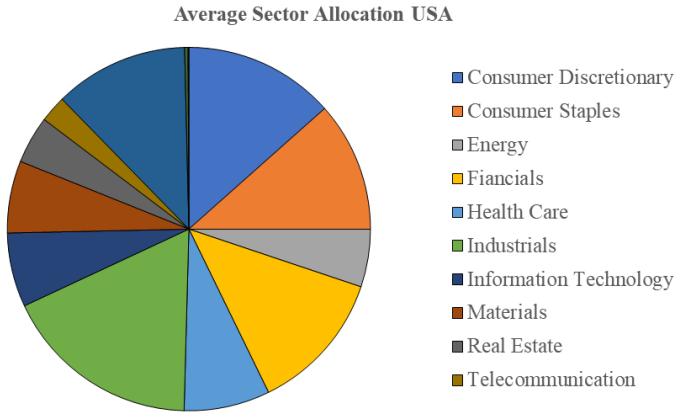

Figure 10: Average Sector Allocation USA

In terms of asset allocation, there is hardly any separation between the Swiss funds. All but the zCapital Swiss Dividend Fund hold the largest portion of assets in the Health Care sector, which corresponds to the weightings of the Swiss Performance Index, where Novartis and Roche together account for more than 35% of the index. However, Swiss dividend funds seem to invest less into consumer goods than the SPI would suggest, as the average Swiss dividend fund invests only 12.86% in Consumer Staples *(Table 11 and Figure 8)* compared to its 24.55% weighting in the SPI. This could indicate that companies in this sector pay less dividends in relation to their stock prices or that fundamental analysis predicts below average capital growth in this sector. With other large proportion of assets being distributed into the financial and industrial sectors, only a minority of assets is installed in other sectors.

Overall, the asset allocation of dividend funds in the US market is more balanced than in Switzerland as Figure 10 shows. Since the size of single companies does not affect benchmarks such as the S&P 500 as intensely as in the Swiss market, US dividend funds can track a benchmark while still diversifying their assets across various companies without accumulating holdings exceeding 5% of total assets.

All in all, it can be concluded that dividend funds in the Swiss market are very much alike and strategies are often overlapping if not identical. Better relative performance of a fund can therefore be attributed to more successful stock picking rather than to its strategy. The fact that Swiss funds declare fundamental analysis as their primary method to select stocks reflects the importance of successful stock picking in the Swiss market. US dividend funds favor a more passive investment approach and prefer to completely replicate large proportions or even fully replicate selected equity indices. This measure results in fewer transaction costs, which could explain why total expense ratios of US funds are remarkably lower than in the Swiss market.

In the US, dividend funds are more diversified than in Switzerland primarily due to a broader variety of dividend paying securities. In Switzerland, the performance of the market performance is highly sensitive to the performance of a small selection of blue chip stocks which forces all dividend funds to select similar investment strategies and asset allocations in order to compete with their benchmark index.

5 Yield analysis

5.1 Introduction

As a first step in this performance analysis, annual dividend payments of dividend funds are compared to annual coupon payments of fixed income securities. This step should provide evidence for the suitability of the cash flow structure of dividend funds to substitute traditional fixed-income payouts. As defined in the introduction, in order to support the thesis that dividend funds can be used as a substitute for fixed-income investments, the dividend fund's historical flows of annual cash payouts should be comparable or superior than those of the defined fixed-income benchmark.

As stated in chapter 4, both US and Swiss dividend funds invest almost exclusively in the domestic market. Additionally, the fund's holdings in securities other than corporate equity – for example investments in the money market, bonds or stock indices – is very insignificant. As this paper tries to test the dividend funds against their fixed-income counterparts, the dividend fund's yields have to be compared to yields of a bond index with an identical structure. A domestic, non-government investment grade (AAA-BBB rating) bond index such as the Swiss SWIBO Domestic AAA-BBB Total Return Index (Bloomberg: *SBD14T:IND*) or the US-American Bank of America Merrill Lynch US Corporate Master Index (*C0A0:IND*) were selected as the most suitable bond indices for each country. These indices fully consist of domestic high quality corporate debt and do not include government-issued debt. Because dividend funds are typically invested in high quality domestic corporate equity, these bond indices present an adequate reference in the bond market and are therefore used in this analysis

Inserting the yield figures of both dividend funds and bond indices in a scatter plot provides evidence on a historic basis on whether or not a dividend fund's yield is or has been superior to bond yields. The historic development of interest rates presented in chapter 1.1 suggests that dividend yields have surpassed bond yields somewhere around 2011-2013 when most of the financial markets experienced the most significant decrease in interest rates.

5.2 Methodology

In order to conduct an objective comparison of cash flow structure between the two security types, the annual payout is put in proportion to the security's market value. By measuring an investment's return in proportion to its costs, an investment's yield is calculated. Depending on whether nominal values or market values are used as investment costs, the definition of yield changes. The objective of the yield analysis is to compare the structure of cash flow payouts of dividend funds to those of the general bond market. In this paper, current yield figures are used as measurement of annual payouts. As market prices of bonds can change over time, an investor might pay less than a bond's par value when buying the security, similar to changing prices in the stock market. Current yield describes the proportion of an annual cash flow as part of the security's current market value:

$$Current\ yield = \frac{Annual\ cash\ inflow}{Market\ Price}$$

where:

$Annual\ cash\ inflow = Dividend\ or\ Coupon\ payments$
$Market\ price = Current\ market\ value\ of\ security$

Equation 1: Current yield

For the dividend funds selected for this analysis, the annual cash inflow is the sum of dividends per share that have gone ex-dividend over the past 12 months. The market price reflects the last price for each calendar year, thus the closing price by the end of December of each year.

$$Current\ dividend\ yield_t = \frac{D_t}{P_t}$$

where:

$D_t = Total\ dividens\ in\ year\ t$
$P_t = Last\ market\ price\ in\ year\ t$

Equation 2: Current dividend yield

A similar calculation is applied to derive a comparable current yield figure for bond indices. A bond index does not have a fixed nominal yield but rather uses a yield index to display the average nominal yield of securities in the index. This can be observed in the Swiss bond market, where the SBD14 Bond index is given as a Price index (SBD14P), Yield index (SBD14Y), and Total Return index (SBD14T). The same is true for the Bank of America Merrill Lynch C0A0 index, which includes a Price index (PRR Index Value), Total Return index (TRR Index Value), and an Effective Yield index (Effective Yield). Effective yield takes in account that US bonds pay semi-annual coupons unlike bonds in the European market where annual coupons are usual. Effective yield is used to calculate the annual rate of return based on the assumption that the first coupon payment after half a year is reinvested. The effective yield of a security is therefore higher than the nominal yield if coupons are paid more than once a year:

$$Effective\ yield = \left[1 + \left(\frac{\mathrm{i}}{\mathrm{n}}\right)\right]\mathrm{n} - 1$$

where:

$i = nominal\ coupon\ rate$

$n = number\ of\ coupon\ payments\ per\ year$

Equation 3: Effective yield

Both Swiss and US bond indices include a price index originally indexed at a value of 100, which is comparable to the face value of a single bond. The current theoretical coupon value of the index can be calculated by multiplying the value of the yield index by the face value of the index of 100. By putting this theoretical coupon payment in relation to the current price index, the current bond index yield is calculated as follows:

$$Current\ bond\ index\ yield_t = \frac{i_t * 100}{P_t}$$

where:

$i_t = nominal\ bond\ yield\ (CH)\ or\ effective\ bond\ yield\ (US)\ in\ year\ t$

$P_t = Price\ index\ in\ year\ t$

Equation 4: Current bond index yield

5.3 Yield comparison Switzerland

By applying the calculations explained in chapter 5.2, dividend yields of the selected funds as well as bond yields of the SBD14 Swiss bond index were calculated and displayed in Table 18. In addition to the dividend yields of the single funds, an average dividend yield is calculated for each year. Together with the funds' dividend yields, the average dividend yield of the funds is illustrated on a scatter plot in Figure 11. Since most of the Swiss dividend funds used in this analysis did not exist before 2011, the derived dividend yield average before 2012 only consists of the dividend yield of Vontobel Swiss Dividend Fund (*VONSWEQ*).

Yield Comparison Switzerland							
	Dividend Yield						Bond Yield
Year	**CSEFSDP**	**CHDVD**	**UDIV**	**VONSWEQ**	**ZCAD**	***Average***	**SBD14**
2007				0,41%		*0,41%*	3,24%
2008				0,91%		*0,91%*	2,26%
2009				0,90%		*0,90%*	1,89%
2010				1,56%		*1,56%*	1,65%
2011				1,95%		*1,95%*	0,94%
2012	0,91%			0,47%		*0,69%*	0,79%
2013	0,56%		2,71%	2,16%		*1,81%*	1,39%
2014	0,51%	0,34%	2,46%	2,24%	2,16%	*1,54%*	0,52%
2015	0,59%	3,13%	2,13%	2,96%	2,87%	*2,33%*	0,34%
2016	0,71%	2,70%	1,94%	0,61%	2,87%	*1,77%*	0,20%
Average	*0,65%*	*2,05%*	*2,31%*	*1,42%*	*2,63%*	*1,39%*	*1,32%*

Table 18: Yield Comparison Switzerland

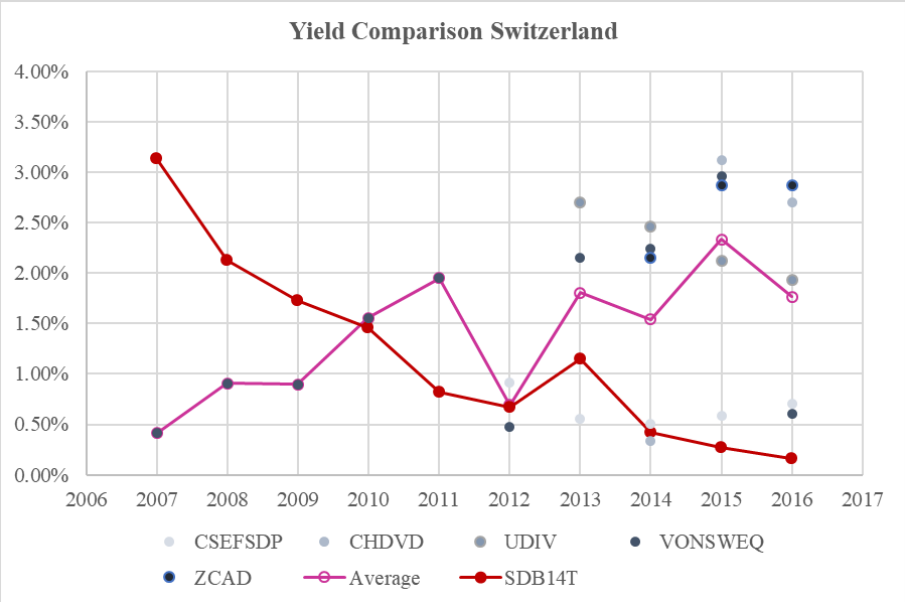

Figure 11: Yield Comparison Switzerland

5.4 Yield comparison USA

The same calculations are applied to dividend funds in the US market as well as for the US bond index C0A0. The values in Table 19 have been charted into a scatter plot in Figure 12 to illustrate the findings.

Yield Comparison USA							
	Annual Dividend Yield						Bond Yield
Year	**DES US**	**DVY US**	**SDY US**	**VIG US**	**VYM US**	***Average***	**C0A0 Index**
2007	3.78%	3.67%	5.03%	1.56%	2.66%	*3.34%*	5.80%
2008	6.09%	5.86%	5.44%	2.56%	4.29%	*4.85%*	7.50%
2009	3.60%	3.78%	3.75%	2.09%	3.07%	*3.26%*	4.75%
2010	3.57%	3.42%	3.35%	1.99%	2.58%	*2.98%*	4.04%
2011	3.38%	3.44%	3.23%	2.14%	2.93%	*3.02%*	3.85%
2012	4.04%	3.71%	3.28%	2.37%	3.23%	*3.32%*	2.78%
2013	2.44%	3.06%	3.95%	1.84%	2.81%	*2.82%*	3.37%
2014	2.68%	3.03%	4.74%	1.95%	2.78%	*3.04%*	3.23%
2015	3.04%	3.45%	6.20%	2.34%	3.22%	*3.65%*	3.70%
2016	2.74%	3.04%	3.30%	2.14%	2.91%	*2.83%*	3.42%
Average	*3.54%*	*3.65%*	*4.23%*	*2.10%*	*3.05%*	*3.31%*	*4.24%*

Table 19: Yield Comparison USA

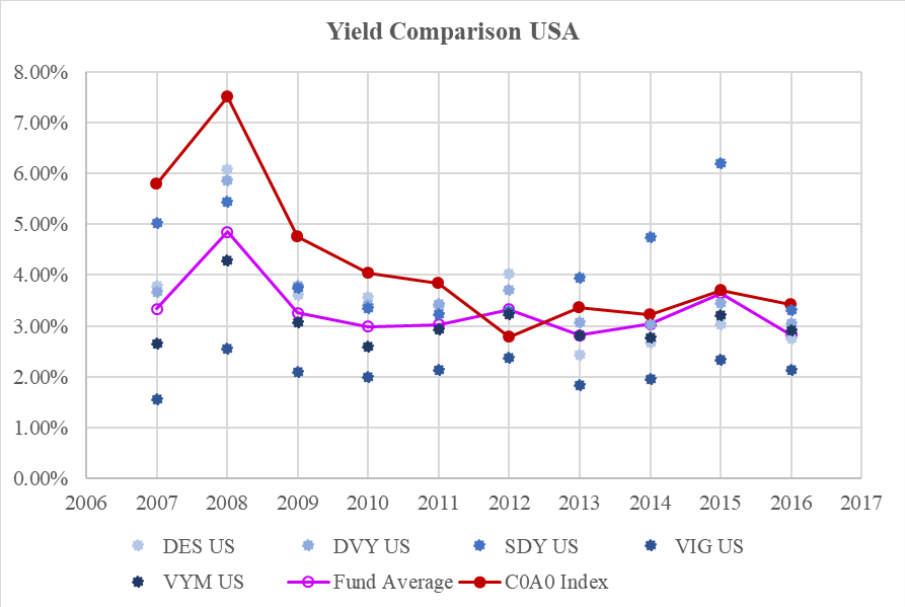

Figure 12: Yield Comparison USA

5.5 Yield analysis conclusion

Figure 11 reveals that the average dividend yield of funds with a high-dividend strategy in Switzerland has been superior to the bond yield of the SBD14 bond index since 2010. The yield gap between dividend funds and the bond market has – with an exception in 2012 – has widened ever since, as the Swiss National Bank's (SNB) negative interest rates have caused bond yields to shift towards zero percent. The average dividend yield in the market meanwhile remained rather stable between 1.5% and 2.5% since 2013.

Overall, dividend funds in the US market have failed to exceed bond yields, since the average dividend yield surpassed bond yields only once in 2012 over the 10-year period *(Figure 12)*. US bond yields have almost been cut in half since 2008 but judging by the findings in this paper, bonds in the US market still offer higher annual payouts in relation to their market value compared to dividend funds. Interest rates of the United States Federal Reserve System have declined less drastically than interest rates in Switzerland and have never reached negative interest rates. As a result, US bond yields have remained more stable compared to Swiss bond yields.

In Switzerland, the favorable dividend yields of dividend funds indicate that investors looking for regular cash flows can in fact achieve higher annual cash payouts when investing in equity funds following a dividend strategy. In the US market, yield figures alone do not provide evidence either supporting or contradicting the claim that dividend funds should be used as a substitute to traditional fixed-income securities. Although bond yields have overall been superior to dividend yields of equity funds over the observation period, the difference between dividend yield and bond yield was in average only 0.27% since 2011. In the extent of this analysis, dividend yields in the US market are therefore declared as comparable to US bond yields.

As long as the Swiss National Bank does not increase its interest rate target, Swiss dividend funds should offer higher annual cash flows over the next couple of years. In the United States, the federal funds rate has increased since the presidential elections in 2016 and is expected to increase further according to numerous forecasts. This would result in increasing US bond yields, which would not support dividend funds being used as fixed-income substitutes.

6 Return analysis

6.1 Introduction

As defined in chapter 2 of this paper, dividend funds have to provide better returns than the bond market in order to qualify as a financially viable alternative. The return analysis in this chapter should provide evidence based on the historic performance of the dividend funds and contribute to a general conclusion about the financial suitability of dividend funds to replace fixed-income securities.

6.2 Methodology

The returns and total performance of dividend funds are calculated and compared to the bond market using the following measures:

- Total return
- Excess return
- Standard deviation of returns
- Sharpe ratio
- Beta coefficient
- Jensen's Alpha

The measures total return and excess return can be used to illustrate the real performance of dividend funds and how they compare to their equity benchmark and the bond market. However, they do not take into account that the risk involved with dividend funds is likely to be higher than with bond securities. To assess the risk/return profile of the different asset classes, the volatility of the different securities is calculated using the standard deviation of returns before using the Sharpe ratio to display risk-adjusted returns. By deriving the beta coefficient or beta of the dividend funds, the relationship between total returns of dividend funds and the equity market can be expressed with a single measure. Finally, the returns of the dividend funds are evaluated based on the Capital Asset Pricing Model (CAPM) to determine if the funds have outperformed the market by achieving abnormal returns. Additionally, abnormal returns calculated using the Jensen's Alpha measure, are tested for their statistical significance by conducting a two-sided hypothesis test. In order to execute a statistically sound performance analysis, 120 monthly observations were defined as the minimum sample size. Funds with induction date later than February 2006 are therefore not subject to this analysis. As a result, only 1 Swiss dividend fund *(VONSWEQ SW)* is examined.

6.3 Total return analysis

Total return is a measurement of performance that reflects the realized actual rate of return of an investment over a given time horizon. Total return includes income such as interest paid by fixed-income investments or dividend payouts in the equity market, as well as capital appreciations in the form of market price changes of an asset. The simple return formula for total returns can be expressed as:

$$Total\ return\ (\mathrm{TR}) = \frac{(P_n - P_{n-1}) + D}{P_{n-1}} = \frac{P_n + D}{P_{n-1}} - 1$$

where:

$P_{\mathrm{n}} = Market\ value\ in\ period\ n$

$D = Income\ from\ Dividends\ or\ Interest$

Equation 5: Total return

By comparing two or more investments using total return, it is totally indifferent if the return is achieved by value appreciation or dividend payments. This enables a fair comparison between investments with different payout structures.

For the purpose of measuring the total performance of the analyzed dividend funds in the chapter 4, a time series of each security's prices is obtained from the Bloomberg financial market database and exported into Microsoft Excel for further analysis. In the extent of this paper, monthly prices are used even though they provide less observations than daily prices. The rather small daily fluctuations in prices is regarded as unsubstantial and would only synthetically increase the number of observations without providing more significant data.

The time series of dividend payments is added to the monthly closing prices which results in a new column with monthly total prices including dividends. By including the dividends into the time series' monthly total prices, the total return formula can be applied by dividing the price including dividends in period n ($P_n + D$) by the closing price in period n-1 (P_{n-1}) before subtracting 1. The time series therefore uses simple return function with Price (P) including dividends to determine monthly total returns.

6.4 Excess return analysis

The basic theory of financial markets dictates that additional risk is compensated by a higher expected return on the riskier investment compared to an investment with less risk (Markowitz, 1952).The difference between the return on an investment containing risk and the return of a risk-free investment is called risk premium. The risk premium of an investment is also called an excess return, as it describes the return exceeding the risk-free rate of return (Sharpe, 1964). The risk premium or excess return of an investment can be defined as:

$$Excess\ return = r_i - r_f$$

where:

$r_i = return\ of\ investment$

$r_f = risk\text{-}free\ return$

Equation 6: Excess return

In Switzerland, the Swiss National Bank (SNB) implements its monetary policy by fixing a target range for the three-month Swiss franc LIBOR, which lies between -1.25 and -0.25 percent since January 2015. Although LIBOR rates are not completely risk-free, it is common practice to use the Swiss Franc 3 Month LIBOR *(Bloomberg Ticker: SF0003)* rate as an indicator of risk-free return in the Swiss market. In the US market, the risk-free return is usually measured by the 10-year treasury bill yield – in theory an investment without real risk as it is a debt obligation issued by the US Government. However, as 3 Month USD LIBOR *(US0003)* and treasury bill rates are similar, this analysis uses both CHF and USD 3 Month LIBOR rates as a measure of risk-free returns. Additionally, using the same type of rate for the performance analysis in both Swiss and US markets improves the quality of comparisons and conclusions that can be made from two different market situations.

A time series of monthly rates for both CHF and USD 3 Month LIBOR is obtained from Bloomberg and used to calculate monthly excess returns for all analyzed assets (Appendix 0). The LIBOR rate is expressed as an annualized figure and hence has to be divided by 12 when using monthly data.

This results in the following calculation for a monthly excess return:

$$Excess\ return_{i,t} = Return_{i,t} - \frac{LIBOR\ rate_t}{12}$$

where:

$i = security\ in\ time\ series$

$t = month\ in\ time\ series$

Equation 7: Excess return

Excess Returns are annualized and averaged to gain an understanding of how much return above the risk-free rate an investment has generated annually over a specific period of time. Additionally, the same procedure is applied to a time series of returns of the bond indices defined as bond market benchmarks in chapter 5, as well as returns of an equity benchmark index for both Swiss and US markets. The US Standard & Poor's 500 Index *(SPX:IND)* and the Swiss Performance Index *(SPI:IND)* are selected as equity benchmark for their respective market. Both indices enable a comparison of the performance of dividend funds to the complete domestic equity market, as they include a broad range of publicly traded companies. For this reason, more selective indices such as the US Dow Jones Industrial Index *(INDU:IND)* or the Swiss Market Index *(SMI:IND)* which only reflect the top 50 (INDU) and top 20 (SMI) companies based on their market capitalization, are not used.

By comparing returns between dividend funds, equity benchmark indices, and bond indices, general conclusions about historic performance can be made. In this paper, excess returns are calculated for the following time horizons *(Table 20)*:

Time horizons for excess return analysis	
	Annualized average excess return…
6 months (6M)	...over the **last 6 months** (30.09.16 - 31.03.17)
1 year (1Y)	...over the **last 12 months** (31.03.16 - 31.03.17)
2 years (2Y)	...over the **last 24 months** (31.03.15 - 31.03.17)
3 years (3Y)	...over the **last 36 months** (31.03.14 - 31.03.17)
5 years (5Y)	...over the **last 60 months** (31.03.12 - 31.03.17)
10 years (10Y)	...over the **last 120 months** (31.03.07 - 31.03.17)
Maximum available (Max)	...**since first available data** until 31.03.2017

Table 20: Time horizons for excess return analysis

As a first measure, the development of excess returns can indicate how closely a dividend fund follows its equity benchmark. Moreover, comparing historic excess returns across different asset classes can display what investments have historically generated the highest returns. As equity investments are usually riskier than investments in investment grade corporate debt, both dividend funds and their equity benchmark should provide higher excess returns due to their higher risk-premium.

Excess Return USA							
	6M	1Y	2Y	3Y	5Y	10Y	Max
DES US	17.38%	19.26%	0.090528	9.03%	13.52%	8.15%	0.081847
DVY US	14.66%	13.46%	0.108817	10.40%	13.12%	6.25%	0.062694
SDY US	12.39%	12.51%	0.106346	10.77%	13.24%	7.88%	0.075958
VIG US	15.47%	11.67%	0.076037	8.11%	10.85%	7.19%	0.068157
VYM US	17.45%	14.26%	0.094851	9.97%	12.61%	7.34%	0.071506
SPX Index	16.52%	13.10%	0.066295	7.78%	10.47%	5.25%	0.051606
C0A0 Index	-3.94%	2.57%	0.015995	3.20%	3.62%	4.40%	0.035393

Table 21: Excess Returns USA

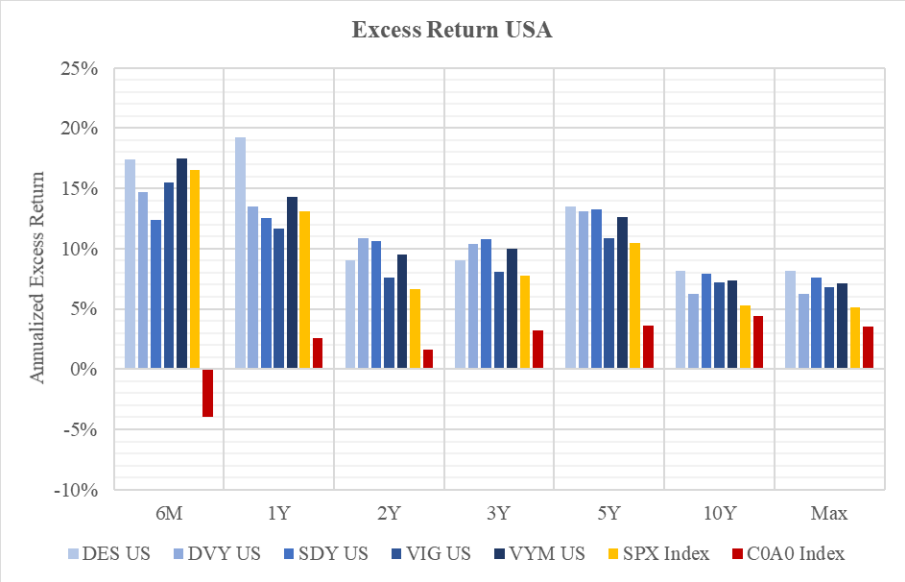

Figure 13: Excess Return USA

Excess Return Switzerland							
	6M	1Y	2Y	3Y	5Y	10Y	Max
VONSWEQ	7.57%	16.67%	5.23%	7.17%	11.16%	1.46%	5.51%
SPI Index	8.76%	15.89%	4.14%	6.68%	11.43%	3.48%	7.36%
SBD14 Index	-2.29%	-0.26%	1.44%	3.75%	2.68%	3.12%	2.96%

Table 22: Excess Returns Switzerland

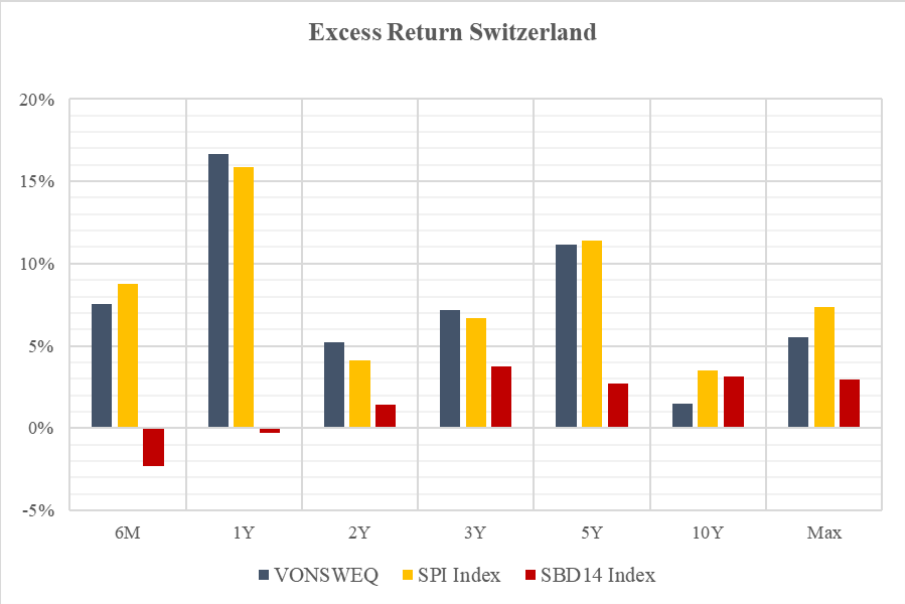

Figure 14: Excess Return Switzerland

The observations in the US market *(Table 21, Figure 13)* support the basic financial assumption that equity investments generally provide higher returns. Average annual excess returns of the Standard & Poor 500 equity index *(SPX:IND)* are higher than those of the Bank of America Merrill Lynch US Corporate Master bond index *(C0A0:IND)* across all time horizons. Figure 13 also displays that average annual excess returns of the US dividend funds usually lie a couple percentage point around annual average excess returns of the S&P 500, which can be interpreted as an indicator that the dividend funds' performance and the equity index have a strong correlation. However, this relationship is analyzed in more detail in chapter 6.7.

Observations in the Swiss market *(Table 22, Figure 14)* provide comparable results, as annual average excess returns of the equity benchmark SPI index *(SPX:IND)* are superior to those of the SWIBO Domestic Bond Index *(SBD14T:IND)* throughout all selected time horizons, while the average annual excess returns of Vontobel Swiss Dividend fund seem to be closely linked to those of the SPI while dropping below the excess return of the bond index only over the 10-year horizon.

In order to assess the development of excess returns in more detail, a series of monthly trailing excess returns is used to illustrate changes in excess returns over a 1-year and 3-year period. A 1-year trailing excess return is calculated for every month based on the annualized average of the last 12 monthly excess returns, while the 3-year trailing excess return represents the annualized average of the monthly excess returns over the last 36 months. The 1-year and 3-year trailing annualized excess returns for a random month *"n"* can be mathematically described as:

$$1 - year\ trailing\ excess\ return_n = \frac{\sum_{x=n-11}^{n} Excess\ return}{12} * 12$$

$$3 - year\ trailing\ excess\ return_n = \frac{\sum_{x=n-35}^{n} Excess\ return}{36} * 12$$

where:

$n = random\ month\ in\ time\ series$

$Excess\ return = monthly\ excess\ return\ in\ time\ series$

Equation 8: Trailing excess return

When interpreting a graphical representation of trailing excess returns, it is important to keep in mind that the trailing excess return at a certain time does not represent the annualized monthly return at this specific point in time, but rather displays an annualized average of monthly returns of the last 12, or 36 months respectively.

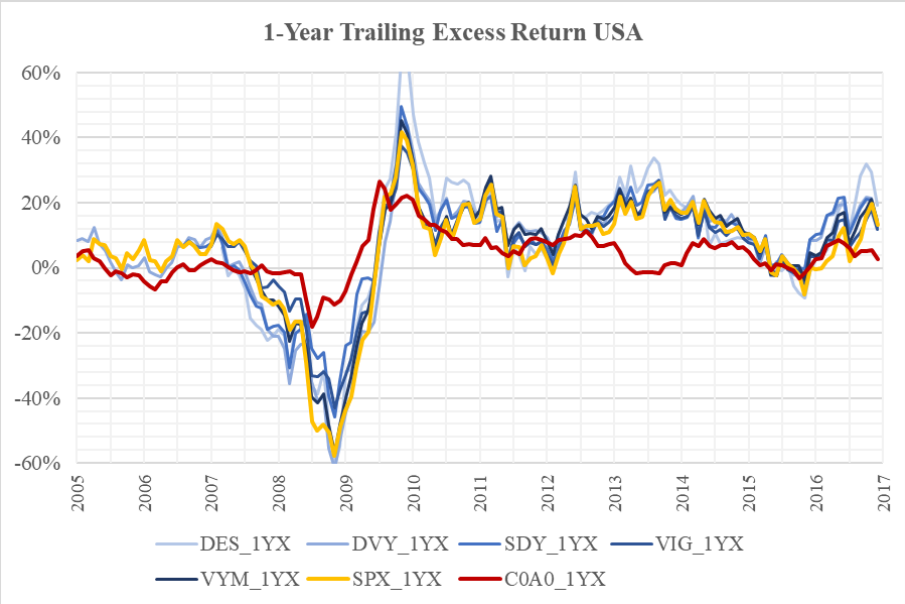

Figure 15: 1-Year Trailing Excess Return USA

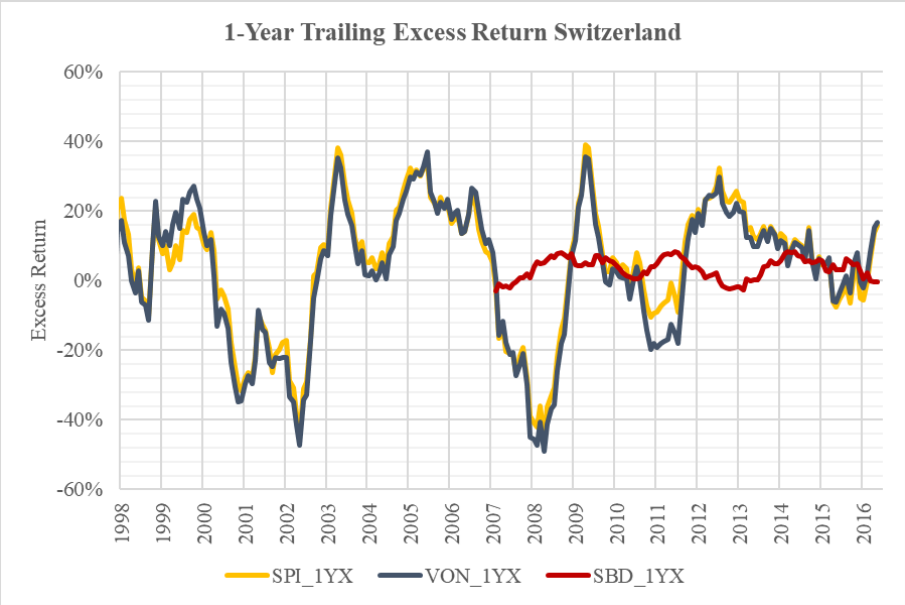

Figure 16: 1-Year Trailing Excess Return Switzerland

This becomes obvious when studying Figure 16, where negative returns during the financial crisis in 2008, caused the 1-year trailing excess return of the Vontobel Swiss Dividend Fund to reach an all-time low of 48.9% by February 2009. The enormous gap between 1-year excess returns of the Vontobel Swiss Dividend Fund *(VON_1YX)* and the SWIBO bond index *(SBD_1YX)* resulting from the financial crisis also explains why the fund's 10-year average annual excess return in Table 22 is the only one failing to exceed the excess return of the bond index.

Overall, developments in the Swiss and US market provide similar observations as Figure 15 and Figure 16 both indicate that the 1-year trailing excess returns in the equity market only drop below the 1-year training excess return of the bond market during times of financial distress. The global financial crisis of 2008 caused the 1-year trailing excess returns of dividend funds and equity indices in Switzerland and the US market to drop below the excess returns of each market's bond indices. The same effect can be observed in the Swiss market *(Figure 16)* during the European debt crisis since 2010 where Vontobel Swiss Dividend Fund's and the SPI's trailing 1-year excess returns moved below excess returns of the SWIBO Domestic Bond Index for almost 2 years. As the SWIBO Domestic Bond Index has not been inducted until the beginning of 2006, a comparison between Swiss equity and bond markets cannot be made for the time period when the Dotcom bubble burst in the early 2000's.

Judging by the data obtained over the previously mentioned periods of financial distress, it is almost certain that excess returns of equity and bond markets have behaved the same during that time.

1-year trailing excess returns can be criticized as they are too sensible to sudden reactions in the market when observing the market in the long term. In order to provide a more objective and general view on the long-term relationship of excess returns of dividend funds, equity markets as a whole, and bond markets the observation period of trailing excess returns can be increased from one to three years.

When using 3-year instead of 1-year trailing returns, the number of observations used to calculate the trailing excess return triples. This causes the curve on the line chart to flatten, as the weighting of extreme values decreases.

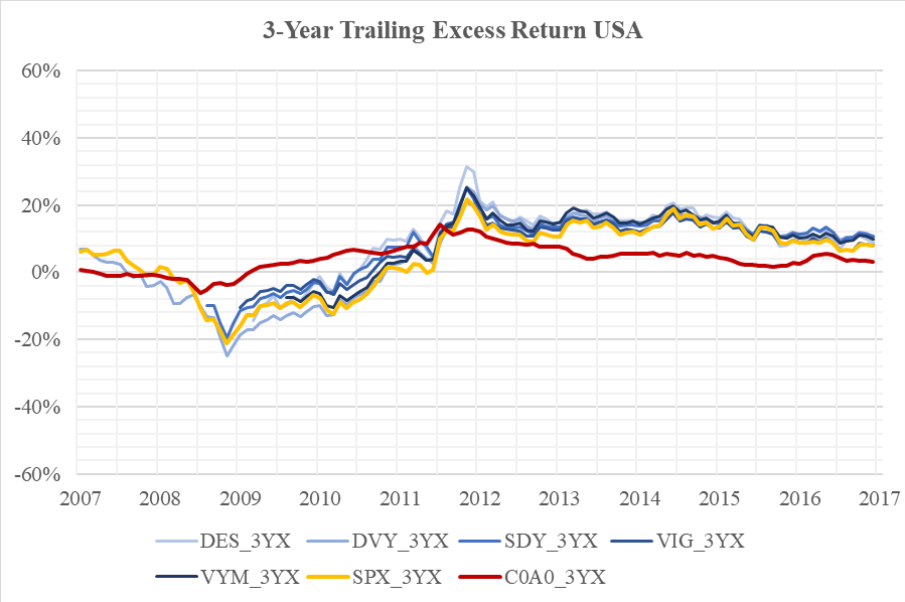

Figure 17: 3-Year Trailing Excess Return USA

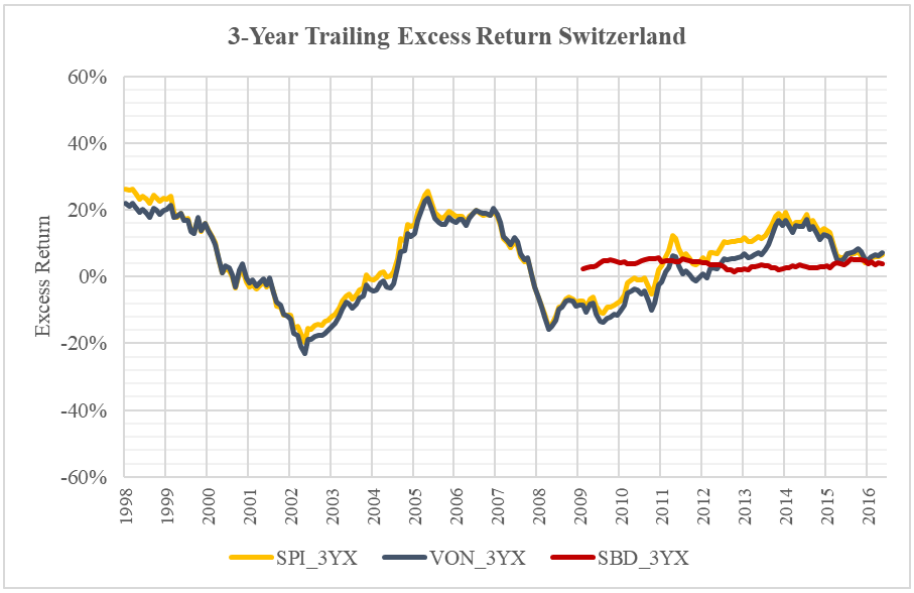

Figure 18: 3-Year Trailing Excess Return Switzerland

Using the same scale axis as for 1-year trailing excess returns, the flattening of the curves is evident in Figure 17 and Figure 18. Still, the 3-year trailing excess returns of Swiss and US dividend funds and equity indices were lower than their fixed-income counterparts in all the observations that included data from the financial crisis. However, the development since mid-2011 in both markets suggests that in every other state of markets other than complete financial disaster, dividend funds and equity indices offer higher excess returns to investors than fixed-income securities. Figure 18 supports this claim, as the 3-year trailing excess return of Vontobel dividend fund and the SPI resulting from observations during the European debt crisis did in fact decrease towards the 3-year trailing excess return of the Swiss Domestic Bond index in 2015, but never completely dropped below.

In general, the analysis of excess returns does not contradict the theory that following a dividend strategy in the equity markets is financially more attractive than investing in fixed-income securities. All funds selected for this analysis have generated higher excess returns than the bond market and only failed to exceed fixed-income returns in the short-run during times of severe financial distress. While excess returns display if and how much real return a security has generated in the past, they do not provide information about the riskiness of investments. The significance of excess returns should therefore not be overrated when making general conclusions about a security's historic performance without adjusting for risk.

6.5 Standard deviation of returns analysis

In the financial world, the most commonly used measure of risk is the standard deviation of returns. The standard deviation of returns is based on the variance of returns, which measures average squared deviation of returns from the average return. The square root of the variance, the standard deviation, can be used to measure the historic volatility of an investment. If returns of an investment are more volatile, their standard deviation and thus the riskiness of the investment itself increases. Variance and standard deviation are mathematically defined as:

$$Variance\ \sigma^2 = \frac{1}{N}\sum_{i=1}^{N}(r_i - \mu)^2$$

where:

$N = number\ of\ observations$

$r_i = return\ in\ period\ i$

$\mu = average\ return$

Equation 9: Variance of returns

The standard deviation of returns is the square root of the variance of returns. It can be expressed as:

$$Standard\ deviation = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(r_i - \mu)^2}$$

where:

$N = number\ of\ observations$

$r_i = return\ in\ period\ i$

$\mu = average\ return$

Equation 10: Standard deviation of returns

The standard deviation is calculated for same time series of returns previously used to calculate excess returns using the integrated standard deviation formula in Microsoft Excel. Similar to the excess return calculations, the standard deviation of returns is applied to the time series for the same time horizons as illustrated in Table 20.

Standard Deviation USA							
	6M	1Y	2Y	3Y	5Y	10Y	Max
DES US	18.30%	13.10%	14.58%	14.35%	13.30%	20.60%	19.92%
DVY US	7.47%	6.30%	9.06%	9.18%	9.16%	15.18%	13.68%
SDY US	9.77%	7.73%	10.85%	10.25%	9.97%	15.49%	14.62%
YIG US	7.67%	6.23%	9.83%	9.69%	9.74%	13.25%	12.75%
VYM US	17.45%	14.26%	9.49%	9.97%	12.61%	7.34%	7.15%
SPX Index	7.43%	6.15%	11.19%	10.36%	10.18%	15.30%	13.84%
C0A0 Index	4.74%	4.38%	4.03%	3.95%	4.03%	5.90%	5.47%

Table 23: Standard Deviation USA

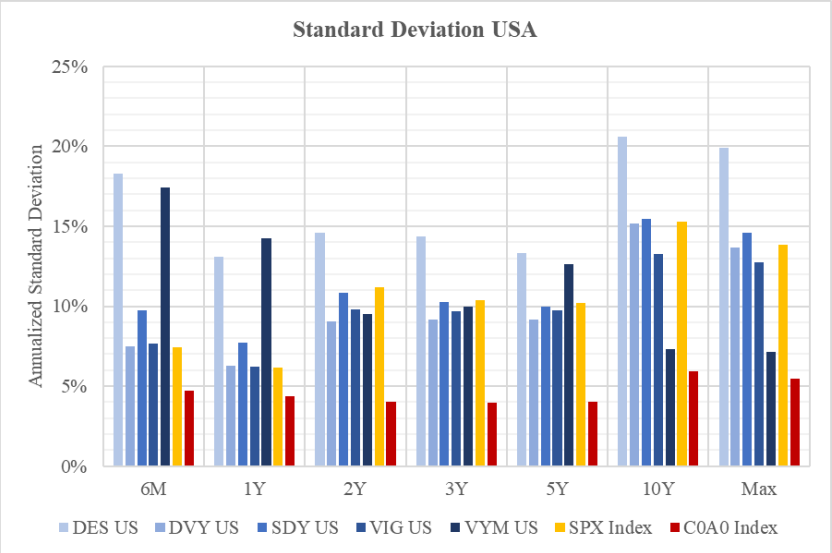

Figure 19: Standard Deviation USA

Standard Deviation Switzerland							
	6M	1Y	2Y	3Y	5Y	10Y	Max
VONSWEQ	8.62%	8.00%	12.16%	12.05%	10.96%	13.71%	15.47%
SPI Index	9.40%	8.35%	12.21%	12.15%	11.08%	13.37%	15.08%
SBD14 Index	3.60%	3.38%	3.61%	3.44%	3.23%	3.21%	3.19%

Table 24: Standard Deviation Switzerland

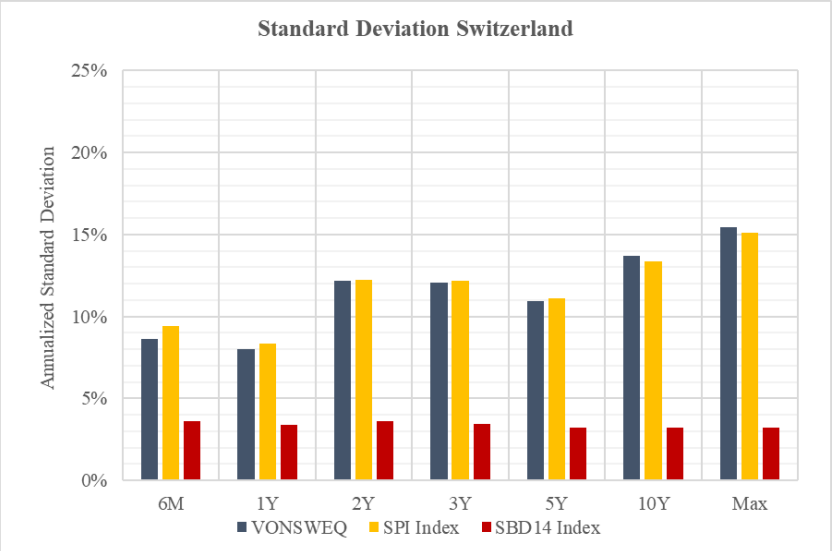

Figure 20: Standard Deviation Switzerland

The findings from Figure 19 and Figure 20 are in line with the basic concept of risk compensation. With increasing risk of an investment, the risk premium also increases as a compensation of the additional risk. As the findings in chapter 6.4 suggest, dividend funds in both US and Swiss markets generate higher returns above the risk-free rate of return. The analysis of the standard deviation of returns implies that the higher excess returns have been achieved by taking on more risk in their investments. While the standard deviation of the bond indices was stable over all time periods in both markets, the risk in the equity market has in average been the highest over a 10-year observation period and has decreased with shorter time horizons in the US and Swiss markets alike.

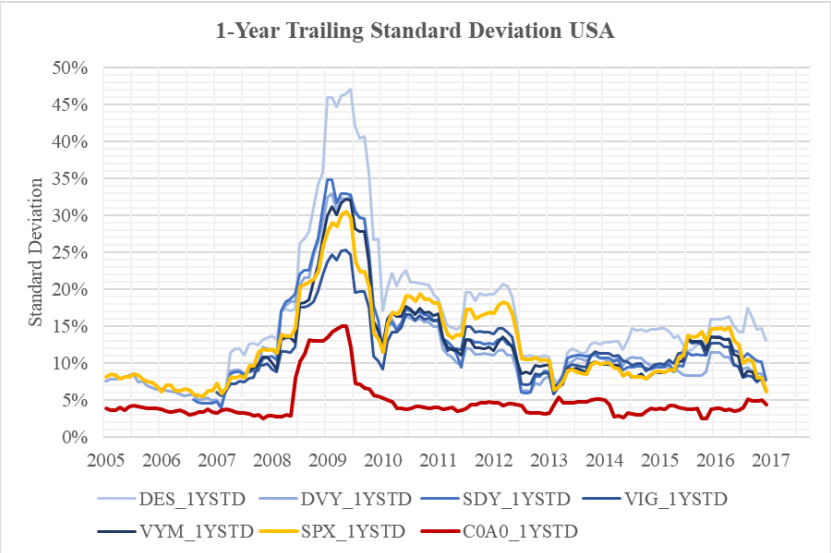

Figure 21: 1-Year Trailing Standard Deviation USA

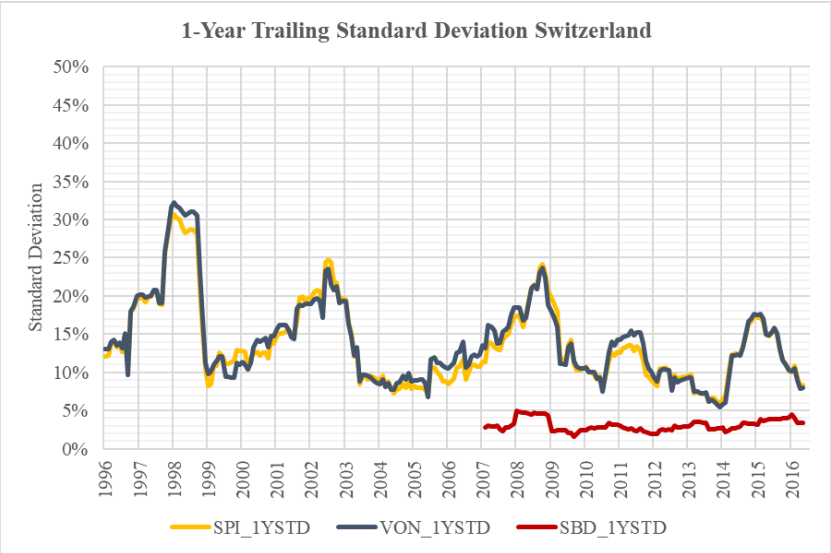

Figure 22: 1-Year Trailing Standard Deviation Switzerland

Once more, a graphic illustration of trailing standard deviations can be used to explain what caused the standard deviation of returns to be higher specific periods of time. Figure 21 and Figure 22 indicate that 1-year trailing standard deviations are highly unstable as they are extremely sensitive to short-term market movements. When analyzing the risk of an investment by calculating its historic standard deviation, the significance of 1-year trailing standard deviations is very limited as they only reflect the deviation over 12 observations. As standard deviations are usually used to predict the long-term future fluctuations of an investment, a stable standard deviation over an increased time-horizon is to be preferred.

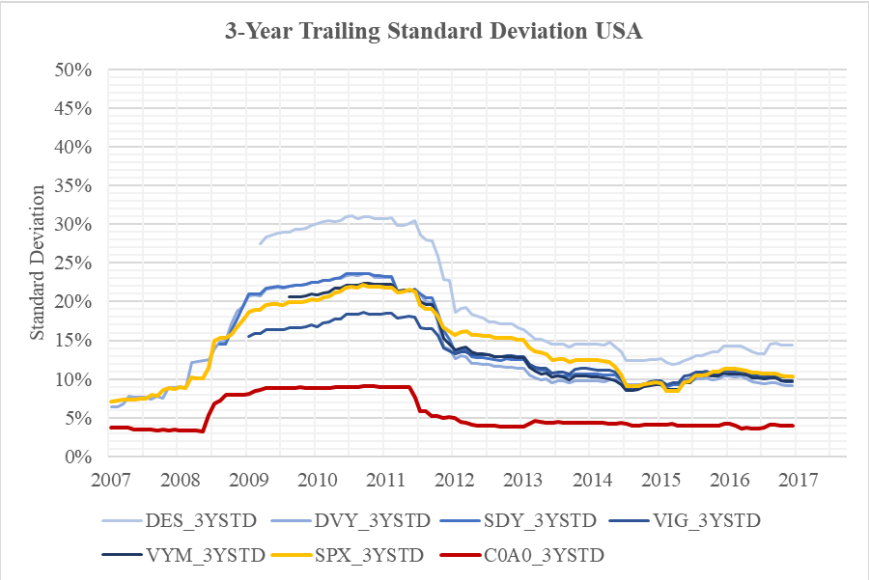

Figure 23: 3-Year Trailing Standard Deviation USA

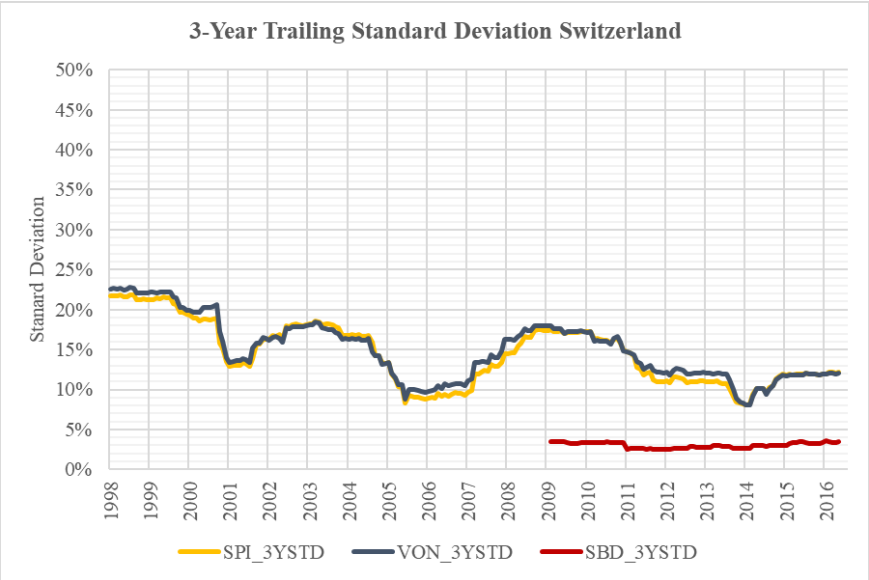

Figure 24: 3-Year Trailing Standard Deviation Switzerland

Figure 23 and Figure 24 show how the movements of the trailing standard deviation change when the time-horizon is increased from one to three years. In Figure 21, the market fluctuations during the financial crisis elevated the 1-year standard deviation in the equity market to over 35%. By using 3-year averages, the results are more consistent as the curve is less exposed to short-term market fluctuations.

Even though the level of standard deviation of dividend funds in the US market during the financial crisis is still remarkably higher than in the years before and after, the numbers are relatively stable over a period of 4 to 5 years. Starting in 2012, the 3-year trailing standard deviation starts to decline and remains stable for all assets around 10%. The WisdomTree Small Cap Dividend Fund *(DES US)* can be identified as the only fund to continuously featuring higher risk than its US dividend fund peers who closely follow risk levels of the equity index. The reason for the increased risk levels of the WisdomTree Small Cap Dividend Fund can be found in its asset selection. While the rest of the analyzed US funds primarily invest in stocks with a large market capitalization that are also represented in the S&P 500 Index, the WisdomTree Small Cap Fund invests in companies with smaller market capitalization outside of the S&P 500. While so-called small cap investments often offer more room for potential growth, they usually feature higher volatility than large cap companies which is in line with the findings in Figure 23.

The 3-year trailing standard deviation of returns of the Bank of America Merrill Lynch US Corporate Master Bond Index *(C0A0_3YSTD)* and the Swiss Domestic Bond Index *(SBD_3YSTD)* have been relatively stable just below 5%. Opposed to the US bond index, which experienced an increase in its standard deviation to 9% during observations including the financial crisis, the risk in the Swiss bond market fluctuated only slightly.

In general, dividend funds almost exactly follow risk levels of their equity benchmark with the exception of the US WisdomTree Small Cap Dividend Fund, whose risk levels are slightly higher for reasons explained above. The risk level of dividend funds and equity indices was substantially higher in both US and Swiss markets at any given time compared to the risk involved in the bond market. We can therefore conclude that other than in the analysis of excess returns, where returns of the bond index surpassed equity excess returns in times of financial distress, the equity market always features significantly higher risk independent of the market scenario.

6.6 Risk -adjusted return analysis

The previous chapters focus on information about the historic development of returns and the risk involved with dividend funds and how they compare to returns and risks of fixed-income investments. As Table 21: Excess Returns USA and Table 22: Excess Returns Switzerland indicate, excess returns of dividend funds are in the long-run far superior to excess returns in the bond market. However, the dividend funds also feature a risk measured in their standard deviation that is twice as the risk of the bond market in a normal market scenario.

As mentioned in chapter 6.4, investors demand a compensation in the form of higher returns for taking on higher risk. Returns can be risk-adjusted in order to enable fair comparison of how well the different securities compensate their risk. The most commonly used measure for risk-adjusted returns is the Sharpe ratio, named after William F. Sharpe, who first introduced this measure in an article in *The Journal of Portfolio Management* (Sharpe, 1994)

The Sharpe ratio measures the amount of excess return per unit of risk, which is usually measured by an investment's standard deviation. The mathematical formula for calculating the Sharpe ratio is defined as:

$$S = \frac{E(r_i - r_f)}{\sigma_i}$$

where:

$S = Sharpe\ ratio$
$r_i = return\ of\ investment$
$r_f = risk - free\ return$
$E(r_i - r_f) = Expected\ Excess\ Return$
$\sigma_i = Standard\ deviation\ of\ investment$

Equation 11: Sharpe ratio (Sharpe, 1994)

As this paper conducts a historic performance analysis, historic excess returns are used instead of expected future excess returns. Risk-adjusted returns are calculated by using the formula for the Sharpe ratio for the time horizons according to Table 20.

Sharpe Ratio USA							
	6M	1Y	2Y	3Y	5Y	10Y	Max
DES US	0.9500	1.4705	0.6209	0.6294	1.0161	0.3955	0.4109
DVY US	1.9643	2.1370	1.2011	1.1332	1.4324	0.4119	0.4582
SDY US	1.2684	1.6185	0.9803	1.0512	1.3281	0.5087	0.5197
VIG US	2.0176	1.8752	0.7739	0.8369	1.1141	0.5425	0.5346
VYM US	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
SPX Index	2.2232	2.1299	0.5927	0.7513	1.0280	0.3429	0.3730
C0A0 Index	-0.8307	0.5875	0.3966	0.8091	0.8971	0.7458	0.6466

Table 25: Sharpe Ratio USA

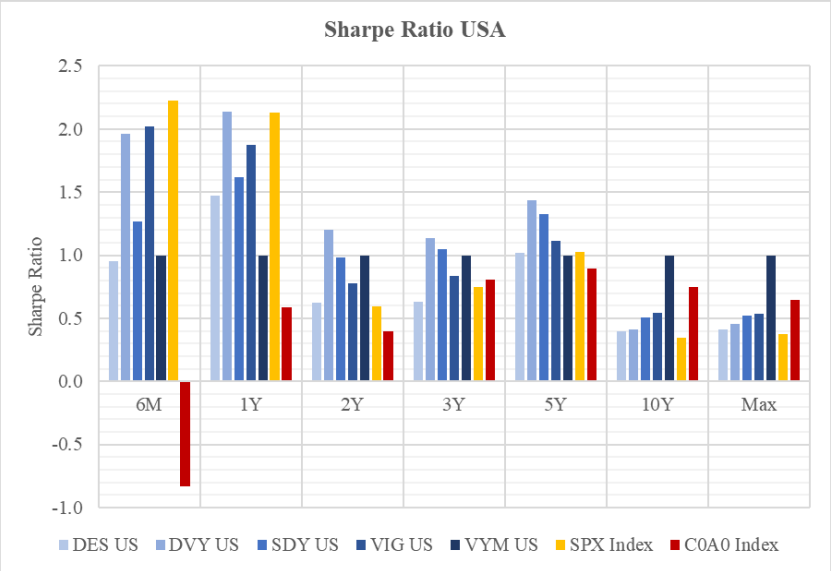

Figure 25: Sharpe Ratio USA

Sharpe Ratio Switzerland							
	6M	1Y	2Y	3Y	5Y	10Y	Max
VONSWEQ	0.8775	2.0835	0.4300	0.5949	1.0190	0.1063	0.3564
SPI Index	0.9319	1.9039	0.3389	0.5495	1.0316	0.2606	0.4877
SBD14 Index	-0.6356	-0.0780	0.3995	1.0907	0.8279	0.9732	0.9289

Table 26: Sharpe Ratio Switzerland

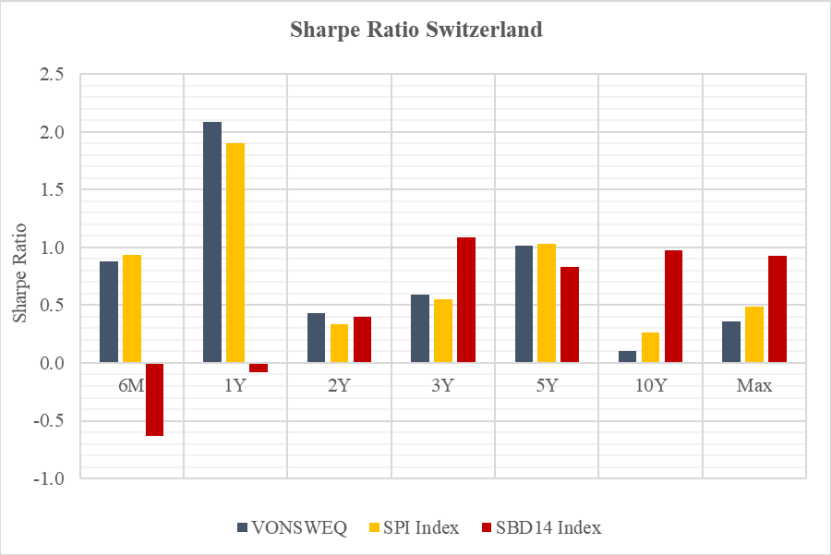

Figure 26: Sharpe Ratio Switzerland

Figure 25 and Figure 26 indicate that while there are many similarities between the US and Swiss markets in the previous sections, the relationship between risk-adjusted returns of dividend funds and the bond market is contradictory.

Over the last 5 years and shorter time horizons in the US market, 4 out of 5 US Dividend funds continuously produced better risk-adjusted returns than the Bank of America Bank of America Merrill Lynch US Corporate Master Index *(C0A0 Index)*. The exception, WisdomTree SmallCap Dividend Fund *(DES US)* failed to compensate their additional risk with more excess return over the 3-year horizon and as a consequence, produced a smaller Sharpe ratio than the US bond market.

In the case of WisdomTree's Small Cap Dividend Fund *(DES US)*, the low Sharpe ratio over the 3-year horizon can be traced back to its high standard deviation. As mentioned in the previous chapter, investments in companies with smaller market capitalizations often result in higher risks, as it is the case with the WisdomTree fund. Although WisdomTree's dividend fund achieved high excess returns throughout all analyzed time horizons, even higher excess returns would have been needed to compensate for the higher risks involved with this fund.

The US Domestic Corporate bond index *(C0A0 Index)* had a Sharpe ratio substantially higher over the 10-year horizon and slightly better over the maximum available horizon than all dividend funds. However, these time horizons include data from the financial crisis where the S&P 500 equity index lost over 50% of its value between November 2007 and March 2009 *(Figure 27)*. Large negative monthly returns over this period are such extreme outliers over the whole observation period that they still weight heavily on the 10-year average of monthly returns, which again causes low Sharpe ratios over that time.

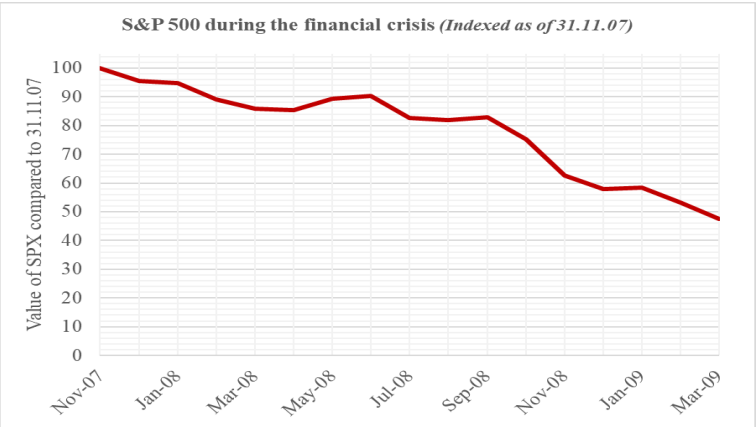

Figure 27: S&P 500 during the financial crisis

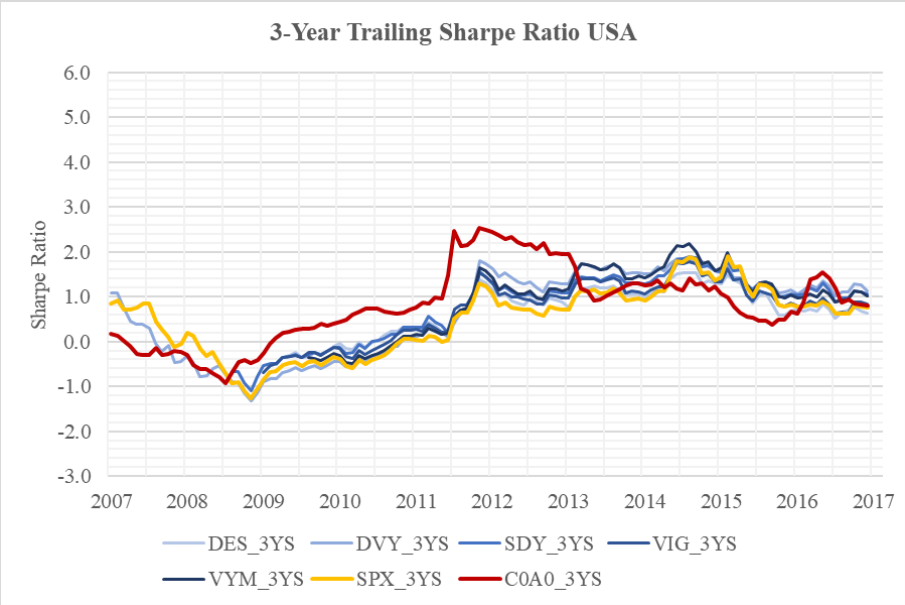

Figure 28: 3-Year Trailing Sharpe Ratio USA

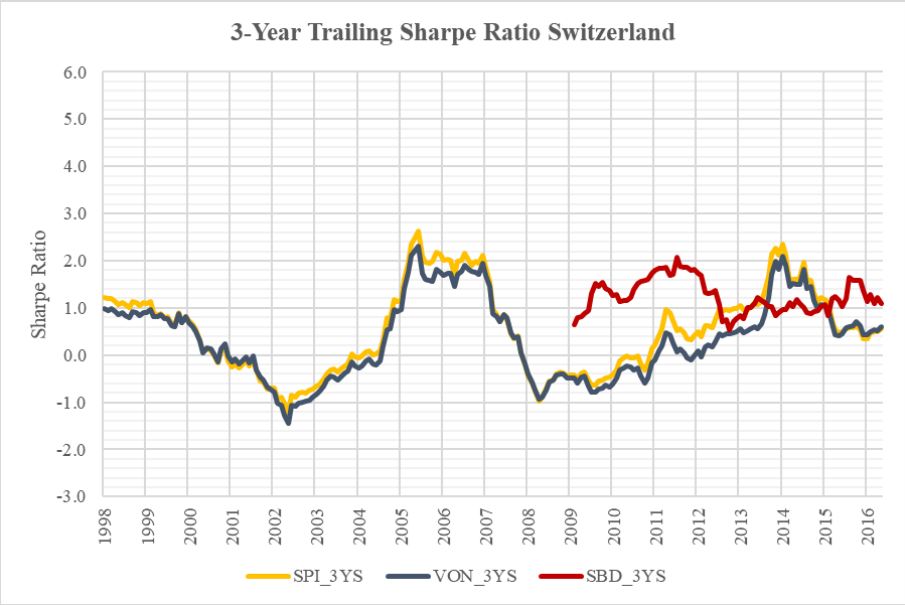

Figure 29: 3-Year Trailing Sharpe Ratio Switzerland

The 3-Year trailing Sharpe ratio in the US market in Figure 28 illustrates how heavily the long period of negative Sharpe ratios in the equity market weighs on the 10-year average. The 3-year trailing Sharpe ratio of dividend funds and equity index moved below zero for almost 4 years straight, while the bond market only displayed a negative 3-year trailing Sharpe ratio for a brief period in 2008.

In Switzerland *(Figure 29)*, the bond market *(SBD_3YS)* also displays a substantially higher trailing Sharpe ratio over the 10-year horizon than Vontobel's dividend fund *(VON_3YS)* and the Swiss Performance Index *(SPI)*. This can once again be attributed to

the financial crisis' negative impact on the equity market. Although dividend fund and equity market index produce better Sharpe ratios than the Swiss bond market over a 5-year horizon, lower excess returns with an unchanged standard deviation over a 2- and 3-year horizon caused the fund's Sharpe ratio to decline.

Overall, the findings in both markets indicate that equity investments struggle to compensate their additional risk compared to the bond market during times of financial distress. In normal times however, dividend funds in the US market have achieved historic excess returns that were high enough to compensate the additional risk compared to the bond market unlike the Swiss dividend fund, which failed to produce a higher Sharpe ratio over a long-term observation period, but achieved significantly higher risk-adjusted returns over the last year.

6.7 Beta coefficient analysis

In the Capital Asset Pricing Model, also known as CAPM, (Sharpe, 1964), (Fama & French, 2004), based on the theory of Markowitz (1952), the beta coefficient or beta describes the volatility of a stock or any other security in relation to the volatility of the whole market. A beta coefficient larger than 1 indicates that a security is more volatile than the market, which means that the security reacts more strongly to market trends. A beta coefficient smaller than 1 suggests that the security reacts more softly to market trends. Since stocks with a beta of less than 1 usually suffer smaller losses in a declining market environment, but at the same time do not achieve market returns in a growing economy, they are often called "defensive" or "non-cyclical" stocks. A beta of exactly 1 would imply that returns of the security are identical to returns of the market.

In this paper, beta coefficients are calculated to illustrate the relationship between dividend funds and the market as a whole. It is expected that the beta of dividend funds is slightly lower than 1, since most of the funds are heavily invested in high quality blue chips stocks that make up a large portion of the usual market indices or even fully replicate market indices.

A common expression for beta is:

$$\beta = \frac{Cov(r_i, r_m)}{Var(r_m)}$$

or:

$$\beta = \rho_{i,m} \frac{\sigma_i}{\sigma_m}$$

where:

$\beta = Beta\ coefficient$
$r_i = return\ of\ investment$
$r_m = return\ of\ market$
$Cov(r_i, r_m) = Covariance\ of\ r_i\ and\ r_m$
$Var(r_m) = Variance\ of\ market\ returns$
$\rho_{i,m} = Correlation\ of\ investment\ and\ market$
$\sigma_i = Standard\ deviation\ of\ investment\ returns$
$\sigma_m = Standard\ deviation\ of\ market\ returns$

Equation 12: Beta coefficient

In this paper, beta coefficients of dividend funds are calculated by applying a linear regression of returns using the ordinary least square model. The linear regression is conducted for 3-year, 5-year, 10-year, and maximum available horizon of time series of returns for dividend funds and market indices. The resulting beta for each fund and time horizon, in combination with its estimated standard error and coefficient of determination (r-squared) indicates how closely a funds followed fluctuations in the market. In order for a beta coefficient to be considered useful, the coefficient of determination, the percentage of movements of the security that can be explained by movements in the market, should be at least 0.7 (70%) or higher.

		Beta coefficient											
		3 Year			*5 Year*			*10 Year*			*Max*		
		3Y Beta	Std. Error	r-squared	5Y Beta	Std. Error	r-squared	10Y Beta	Std. Error	r-squared	Max Beta	Std. Error	r-squared
	DES US	0.5400	0.0822	*0.559392*	0.6165	0.0595	*0.6490*	0.636439	0.0353	0.7342	0.6377	0.034048	0.7342
	DVY US	0.8664	0.1240	*0.589446*	0.8914	0.0873	*0.6427*	0.854546	0.0491	0.7193	0.8530	0.043912	0.7115
	SDY US	0.9021	0.0783	0.796107	0.9256	0.0568	0.8207	0.851850	0.0460	0.7437	0.8527	0.043718	0.7395
	VIG US	1.0138	0.0582	0.899171	0.9955	0.0418	0.9072	1.119440	0.0261	0.9396	1.1210	0.025266	0.9385
	VYM US	1.0187	0.0514	0.920319	1.0057	0.0407	0.9134	0.989400	0.0274	0.9168	0.9895	0.027056	0.9164
	VONSWEQ	0.9989	0.0243	0.980322	0.9960	0.0227	0.9708	0.954839	0.0182	0.9588	0.9527	0.013058	0.9545

Table 27: Beta coefficient USA & Switzerland Overview

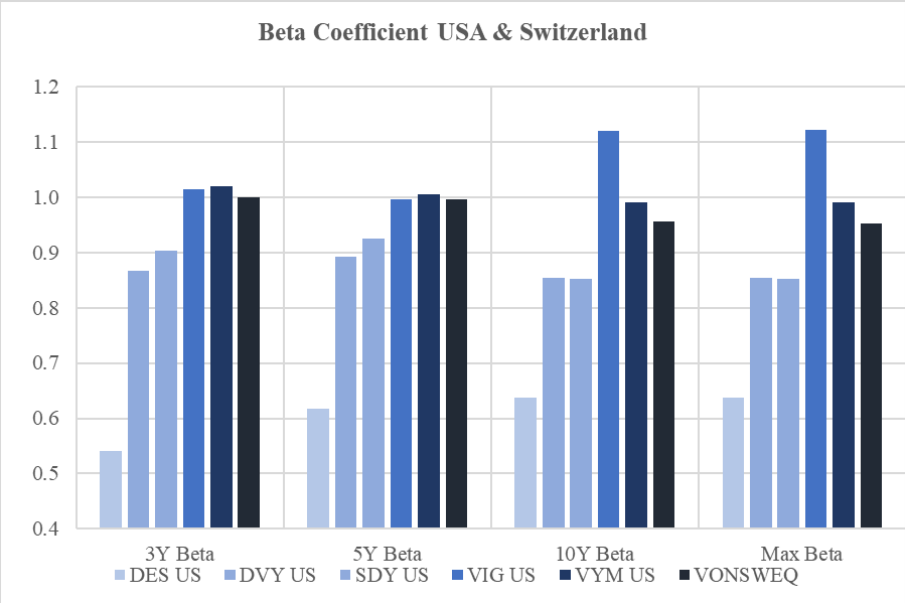

Figure 30: Beta coefficient USA & Switzerland

The findings of the beta coefficient analysis support the predictions made in the previous chapter, since the majority of funds in both markets are closely related to their equity benchmarks but overall exhibit lower systematic risk than the market as a whole *(Figure 30).* Accordingly, dividend funds can be characterized as rather defensive. The Vanguard Dividend Appreciation ETF (VIG US) is the exception, since the fund displays a beta higher than 1 over the 10-year and maximum time horizon and was therefore more volatile than the market. The high beta of this fund would have been rewarding in a bullish economy. However, as the 10-year horizon and time series maximum include the last financial crisis and markets were rather bearish, a volatility lower than the market volatility would have been favorable.

By examining the r-squared of the beta analysis, it can be concluded that all but the 3-year and 5-year beta regression of WisdomTree SmallCap Dividend Fund *(DES)* and iShares Select Dividend ETF *(DVY)*, which feature an r-squared lower than 0.7, provide enough evidence that the beta regression are statistically sound *(Table 27)*.

6.8 Jensen's Alpha analysis

According to the theory of the CAPM (Fama & French, 2004), Jensen's Alpha is used to determine the abnormal return of a security or portfolio of securities over the theoretical expected return. Using the CAPM model, the expected rate of return of an investment can be calculated based on its systematic risk, the risk-free rate of return, and the expected return of the market:

$$R_p = R_f + \beta_p(R_M - R_f)$$

where:

R_p = expected return of fund / index

R_f = risk-free rate of return

β_p = systematic risk (beta) of fund / index

R_M = market return

Equation 13: Capital Asset Pricing Model (Fama & French, 2004)

Derived from the CAPM, Jensen's Alpha can be described as a performance measure that represents the return of an investment that is not a result of general market movements. A positive Alpha would indicate that a fund has performed better than expected from the CAPM and thus outperformed the stock market from a risk-adjusted basis. Since this paper conducts a historical analysis, realized returns are used rather than forward-looking expected returns. As a consequence, Jensen's Alpha is calculated as follows:

$$Jensen's\ Alpha = R_p - \left[R_f + \beta_p(R_M - R_f)\right]$$

where:

R_p = realized return (of fund / index)

R_f = risk-free rate of return

β_p = systematic risk (beta) of fund / index

R_M = market return

Equation 14: Jensen's Alpha (Fama & French, 2004)

In this paper, abnormal returns are calculated based on a monthly basis. The realized return is derived from the time series of monthly returns of dividend funds while monthly returns of stock indices reflect market returns (Appendix 2). The 3-month USD and CHF LIBOR rates are again used as risk-free rate of return. The r-squared of beta coefficients calculated in chapter 6.7 indicate that the 10-year Beta, where the r-squared of most funds is the highest, is the most reliable estimation of the fund's beta. As a result, the 10-year Beta is used to apply the Jensen's Alpha formula in order to calculate monthly abnormal returns.

The mean of annualized abnormal monthly returns of each fund is calculated for a time period of the last 5 and 10 years, as well as for the whole time-series of monthly returns. Because different benchmarks are used for the calculation of beta and Jensen's Alpha, results of funds in the US market cannot be compared to results of Swiss funds, since they both only reflect performance relative to their domestic equity markets.

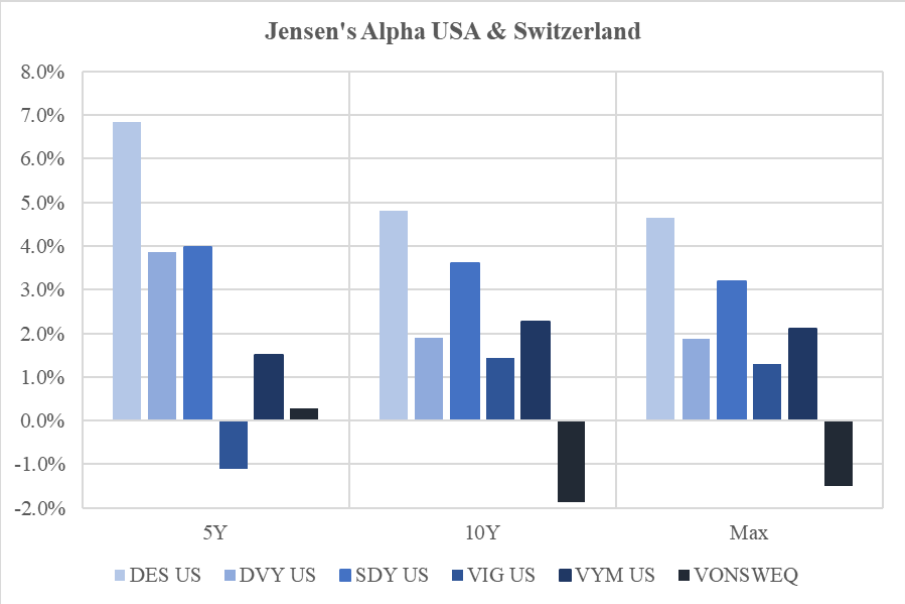

Figure 31: Jensen's Alpha USA & Switzerland

The results displayed in Figure 31 illustrate the fact that four out of five US-American dividend funds were able to outperform the stock market by realizing average annual abnormal returns over all applied time horizons. The Vontobel Swiss Dividend fund *(VONSWEQ)* accomplished a positive but small average annual abnormal returns over the last 5 years, but features a negative annual average Alpha over the last 10 years and since its inception 21 years ago in 1996. In general, a negative Alpha indicates that a fund underperformed and failed to generate returns at the same rate as the market.

The important question is however, if funds have achieved substantial and statistically significant abnormal returns. By conducting a two-sided hypothesis test, this can be statistically verified. Average annualized abnormal returns of the funds are tested against the null hypothesis that the mean of abnormal returns equals zero. The null-hypothesis H_0 and the alternative hypothesis H_1 for this test are defined as:

$$H_0: \mu = 0$$

$$H_1: \mu \neq 0$$

Equation 15: Null-hypothesis and alternative hypothesis

In this analysis, the p-value approach is used to determine if a fund's abnormal returns are significantly bigger than zero and can hence be described as substantial for any given confidence level. The p-value indicates the probability (1=100%) under which a sample mean can be found given the null hypothesis H_0. If the derived p-value is smaller than the critical p-value for a specific confidence level, the null-hypothesis H_0 can be rejected in favor of the alternative hypothesis H_1 and abnormal returns can be characterized as significantly different from zero. For a two-sided hypothesis test, the critical p-value is:

$$p^*_{(1-\alpha)} = \frac{\alpha}{2}$$

where:

$p^* = critical\ p-value\ with\ confidence\ level\ (1-\alpha)$

$\alpha = significance\ level$[1]

Equation 16: Critical p-value for two-sided hypothesis testing

[1] In practice, α is also used as an abbreviation for Jensen's Alpha. In this paper, α will only be used for significance levels in statistical hypothesis testing, Jensen's Alpha will be either be described as *abnormal returns* or abbreviated with *Alpha*.

P-values for a Student's t-test can be derived by calculating the t-value using the t-test formula

$$t_{N-1} = \frac{\bar{x} - \mu_0}{s\ /\sqrt{N}}$$

where:

$t_{N-1} = t - value\ with\ N - 1\ degrees\ of\ freedom$
$\bar{x} = sample\ mean\ of\ abnormal\ returns$
$\mu_0 = mean\ under\ null\ hypothesis$
$s = standard\ deviation\ of\ abnormal\ returns$
$N = number\ of\ observations$

Equation 17: Student's T-Test

The t-value is converted into a p-value using a statistical software. In this analysis, the p-value of annualized average abnormal returns of dividend funds is calculated using the statistics software gretl. The software enables the user to derive p-values directly from the input values "sample mean" ($\bar{x}$), "standard deviation" (s), sample size (N), and "H:0 mean" (μ_0) (Appendix 3). While the H:0 mean stays constant, the other variables are based on the time series of monthly abnormal returns. The sample size for 5 years equals 60 (months), 120 for 10 years, and the number of months available over the maximum time horizon.

As mentioned before, the null hypothesis H_0: $\mu = 0$ can be rejected for any given confidence level $(1 - \alpha)$ if the p-value of the conducted Student's t-test is smaller than the critical p-value of α in favor of the alternative hypothesis H_1: $\mu \neq 0$.

Table 28 displays the critical p-values to reject the null hypothesis with a confidence level $(1 - \alpha)$. The higher the confidence level $(1 - \alpha)$ where H_0: $\mu = 0$ can be rejected, the more significantly different μ is from 0. The asterisk indicate that a tested p-value is smaller than the critical p-value and the null hypothesis can be rejected within a confidence level of $(1 - \alpha)$.

Confidence Level (1-α)		α	p-critical
*	95%	0.05	0.025
**	99%	0.01	0.005
***	99.50%	0.005	0.0025
****	99.90%	0.001	0.0005

Table 28: Confidence levels and critical p-values for t-test

Jensen's Alpha											
		5 Year			*10 Year*			*Max*			
		Alpha	Std Dev	p-value	Alpha	Std Dev	p-value	Alpha	Std Dev	p-value	
	DES US	6.8443%	8.9428%	1.70E-07 ****	4.8011%	13.2564%	0.000125 ****	4.6371%	12.8099%	0.000070 ****	
	DVY US	3.8652%	5.6371%	0.000002 ****	1.8936%	8.0806%	0.011500 *	1.8672%	7.3602%	0.002342 ***	
	SDY US	3.9821%	4.2649%	1.09E-09 ****	3.6159%	7.9034%	0.000002 ****	3.1839%	7.4670%	3.79E-07 ****	
	VIG US	-1.1157%	3.3740%	0.013000 *	1.4450%	5.4635%	0.004480 **	1.3062%	5.4115%	0.009293 *	
	VYM US	1.5041%	2.9412%	0.000204 ****	2.2579%	4.4466%	1.66E-07 ****	2.1125%	4.3243%	2.76E-07 ****	
	VONSWEQ	*0.2793%*	*1.8899%*	*0.257000*	-1.8609%	2.8674%	9.36E-11 ****	-1.4944%	3.3834%	1.65E-11 ****	

Table 29: Jensen's Alpha hypothesis test results

The results in Table 29 indicate that all annualized average abnormal returns *(Alpha)* of the dividend funds in the US market are significantly different from zero over all evaluated time horizons. The amount of abnormal returns achieved by US dividend funds can therefore be statistically described as substantially different from zero. Since abnormal returns are positive, this leads to the conclusion that the selection of US dividend funds examined in this analysis have all managed to repeatedly achieve better returns than the US stock market as a whole, given their systematic risk.

The Swiss dividend fund Vontobel Swiss Dividend Fund *(VONSWEQ SW)* has achieved an abnormal return compared to the Swiss market over a 5-year period, but the annualized average of 0.2793% abnormal return is statistically insignificant as its p-value is bigger than the critical p-value of $\alpha = 0.05$. Over the 10-year and maximum available time series, the fund's abnormal return was negative and significantly different from 0 with a 99.9% certainty. Consequently, the Vontobel Swiss Dividend fund had underperformed the Swiss equity market with statistical significance.

7 Conclusion

Both markets that have been evaluated in the extent of this paper have experienced decreasing interest rates over the last decade, which has caused annual cash flows of fixed-income investors to continuously diminish.

The market overview provided in chapter 4 of this paper indicates that although the markets of funds following a dividend investment strategy in Switzerland and the United States of America are diverse in size and asset allocation, they still share many characteristics and use similar strategies to achieve their investment goals.

The yield analysis in chapter 5 provides evidence that dividend funds in Switzerland have successfully generated higher annual cash flows than fixed-income investments in the bond market since 2010. As interest rates in the US economy decreased more moderately than in Switzerland, the US bond market still yields substantially higher payouts than Swiss bonds. Consequently, annual yields in the US dividend fund market have exceeded yields in the US bond only once (2012) over the last five years. Nonetheless, the fact that annual yields of US dividend funds have constantly been in the same range as bond yields enables yields of dividend funds to be characterized as comparable to bond yields.

Dividend funds in both the US and Switzerland have achieved total returns and excess returns significantly higher than returns of the selected fixed-income benchmarks. Yet, when returns are adjusted for risk, none of the examined funds in either market feature a higher return per unit of risk as measured in its Sharpe ratio over all observation periods. Nevertheless, in more recent years, dividend funds have performed better based on risk-adjusted measures. US dividend funds exhibit a higher Sharpe ratios than the US bond market over the last 5 years, while the examined Swiss dividend fund displays a better Sharpe ratio over the last 2 years and a similar Sharpe ratio compared to the Swiss bond market over the last 3 years.

Overall, the US dividend funds have performed better in comparison to their equity benchmark by achieving statistically significant abnormal returns as the analysis of Beta and Jensen’s Alpha based on the CAPM demonstrated. In contrast, the Vontobel Swiss Dividend Fund either only achieved statistically insignificant abnormal returns, or significantly negative abnormal returns.

All in all, drawing a general conclusion from the findings of this paper, whether or not dividend funds can be used as a financially viable substitute to fixed-income securities, is difficult as the different aspects of the analysis present conflicting results.

In the post-financial crisis US market, the findings of this study suggest that investors could have achieved higher risk-adjusted returns by investing in dividend funds instead of the bond market. Additionally, the excellent performance of US dividend funds is emphasized by the statistically significant amount abnormal returns that have been achieved over the last 10 years. Although US dividend funds fail to yield annual cash flows superior than payouts in the bond market, dividend yields can be described as comparable since they annually yield only 0.27% less than the bond market. Based on the criteria defined in the research question, US dividend funds therefore qualify as a financially viable substitute to traditional-fixed income securities.

While dividend funds in Switzerland may present an opportunity to generate higher annual payouts than fixed-income securities, they struggle to achieve excess returns high enough to compensate for their increased risk-level above the bond market. Additionally, the statistical analysis of abnormal returns indicates that Vontobel Swiss Dividend Fund's risk-adjusted performance based on the Capital Asset Pricing Model is insufficient.

The evaluation of the Swiss dividend fund market provides insufficient data to conclude with certainty that Swiss dividend are unsuited to act as replacement for bond investments. After all, only one of the five most traded dividend funds in the Swiss market provides enough observations for a statistical analysis. It is possible that other dividend funds had performed better over the same time period and would present different results.

8 Recommendation

Investing in US dividend funds can be recommended for investors looking for long-term capital growth, as all examined funds produced above-market risk-adjusted returns. Given the fact that the United States Federal Reserve is expected to further increase its fund rate, the yield gap between fixed-income investments and dividend funds is however likely to expand as well. Unless the Federal Reserve unexpectedly deviates from its expected course, I would recommend traditional bonds over dividend funds to investors looking for investments that generate stable annual cash distributions.

Meanwhile, an increase in interest rates by the Swiss National Bank is not expected in the near future. Dividend funds should therefore remain an attractive source of annual income as their annual cash flows are superior to annual payouts in the bond market. The findings of the analysis of Jensen's Alpha however suggest that the evaluated Swiss dividend fund is not to be recommended for long-term capital growth investing since the fund produced negative historic abnormal returns. While Swiss dividend funds may not be the perfect replacement for fixed-income investments and should not be used to achieve long-term capital growth, they are well suited to generate attractive annual cash flows for investors who can bear the higher risk exposure featured in the equity market.

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10 Appendix

Appendix 1: Excel Market Overview

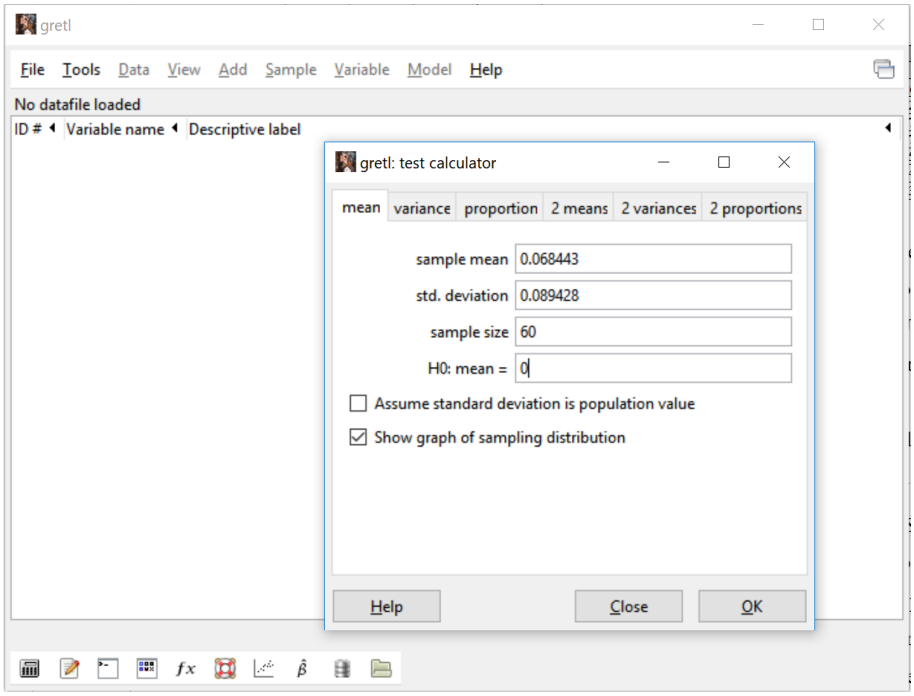
See uploaded document adalicyr_Appendix1_Market Overview.xlsx

Appendix 2: Excel Performance Analysis

See uploaded document adalicyr_Appendix2_Performance Analysis.xlsx

Appendix 3: Gretl Test statistic calculator

Example: Abnormal returns (5Y) of WisdomTree SmallCap Dividend Fund (DES US):



Continued from Appendix 3: gretl Test statistic calculator:

Null hypothesis: population mean = 0
Sample size: n = 60
Sample mean = 0.068443, std. deviation = 0.089428
Test statistic: t(59) = (0.068443 - 0)/0.0115451 = 5.92831
Two-tailed p-value = 1.7e-007
(one-tailed = 8.501e-008)