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<u>Διπλωματική Εργασία</u>

Exchange Traded Funds as an investment product in the global market

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Υποβλήθηκε ως απαιτούμενο για την απόκτηση του Μεταπτυχιακού Διπλώματος στη Φορολογική και Χρηματοοικονομική Διοίκηση Στρατηγικών Αποφάσεων

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Abstract

The aim of the present paper is the analysis of ETFs as a financial product in the global market, as well which are their potentials, the way they trade, the main advantages and the disadvantages for investors. Moreover, main purpose is the detection of the largest ETFs in global market according their Assets Under Management, and the analysis of ESG ETFs which have become a trend and form the future for the ETF universe.

The methodology of the study to achieve the above goals is initially a literature review for the understanding of the ETFs' main characteristics and peculiarities as an investment product and the clarification of basic concepts such as the definition of ETFs, the ETF universe, the Net Asset Value, the main ETF issuers, their legal forms, their special risks, the differences between ETFs and Mutual Funds, the performance of ETFs, their valuation and some alternative ways to use them. Moreover, the categorization of ETFs according to their asset class and the detection of the top 10 of each category helped us for analyzing their performance and their investing value in exchanges.

Finally, research about ESG ETFs was conducted in order conclude into some recommendation and future challenges for the development of ESG ETFs, such as the improvement of the overall sustainability, the enhancement of the coherence, the growth of ESG ETFs emerging economies and the increase of SDG coverage of ETFs.

Keywords: Exchange-Traded Funds, Mutual Funds, Diversification, Net Asset Value, Tracking Error, Leveraged ETFs, Equity ETFs, Fixed Income ETFs, Arbitrage, ESG ETFs, SDG

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List of Abbreviations

AP=Authorized Participant

AUM=Assets Under Management

ESG= Environmental Social Governance

ETF=Exchange Traded Fund

ETN=Exchange Traded Note

CAGR= Compound Annual Growth Rate

iNAV=intraday or indicative NAV

LETF=Leveraged Exchange Traded Fund

MLPs =Master Limited Partnerships

MMFs=Money Market Fund

MPT=Modern Portfolio Theory

NAV=Net Asset Value

OTC=Over the Counter

SDGs=Sustainable Development Goals

TRS=Total Return Swap

UIT=Unit Investment Trust

Introduction

One of the simplest investment methods is indirect international funds, because direct investments require total knowledge of how the market operates as well as interpretation of information that is very complex under certain conditions. Moreover, these alternative investments are diverse, based on whether there is a bull or bear market. Identification of these periods is key for investor decision making. Exchange Traded Funds (ETFs) can be defined as open-ended investment funds, traded on a stock market, which aim to attain a certain level of performance compared with a benchmark. ETFs are passive investment vehicles, which have become increasingly popular over a short period. ETFs are units of mutual funds, which are issued by Mutual Fund Management Companies and are listed on stock exchanges.

Modern financial markets have a variety of options for investors to invest their money in. In theory, anyone can invest in any market in the world, in any commodity or bond, on a positive or negative market movement. The investment tools are now innumerable. However, most of them are complicated for some investors, but mainly inaccessible in practice for various reasons. Thus, many investors turn to collective investment companies and professionals to manage their assets.

Exchange Traded Funds, unlike actively managed Mutual Funds, are mostly passively managed. However, they enable investors to invest in a large number of options ranging from stock markets, commodities, bonds, exchange rates, real estate prices, by following the changes in indices and commodities. Under other circumstances, such investments would be inaccessible for small individual investors to make, as they would involve high commission costs, purchase of a large number of securities for reasons of diversification, opening a margin account, physical possession of goods and many other difficulties. ETFs are traded exactly as in the case of the shares of listed companies. The owner of an ETF has the right to hold a portfolio of investment products, which may consist of shares, commodities, bonds or derivative financial products, depending on the kind of the ETF. The whole idea behind their development is to enable an investor with a single move to invest in an entire market or commodity and achieve diversification. This characteristic is also the determining factor that contributed to their rapid development.

1. Exchanged Traded Funds: Introduction and Structure

1.1. ETFs – Definition

An Exchange Traded Fund (ETF) is a type of security that consists of a collection of securities, such as stocks or bonds, that truck an index (Hill, 2015). ETFs are issued by Mutual Fund Management Companies and they trade on an exchange just like stocks. They can be purchased and sold during the whole trading day, and give the chance to both institutional and private investors to have access to entire stock market in different industries of any economy all over the world and use various strategies very easily and at low cost (Ben-David et al., 2016). This investment product enables the investor to disperse the risk of his investment by using a diversified portfolio of underlying values, while his main investment goal is to reproduce the performance of a specific index (such as S&P 500, NASDAQ, Dow Jones etc.) (Ben-David et al., 2016). For instance, if someone wanted to buy the 500 stocks of the S&P 500 index, he can invest on an ETF which tracks that index with a single order and without so many commission fees (Ben-David et al., 2017). However, except for the indexes, ETFs can track various sectors, exchange rates, commodities and geographical areas (Gastineau, 2010).

ETFs combine characteristics of both mutual funds and stocks. In particular, prices vary according to Net Asset Value (NAV), as well as the classical supply and demand theory (Hill et al., 2015). However, they are traded on exchanges and ETF shares prices fluctuate the whole day in real time, as the ETF is purchased and sold, which is different from mutual funds that trade only once a day after the market closes (Kosev & Williams, 2011). ETFs can be bought from private investors just like a regular stock, at the sole expense of the transaction costs incurred (Kosev & Williams, 2011).

1.2. Origin of ETFs

The origin of ETFs is since the indexed mutual funds developed. In 1969, pension fund managers created a pension fund which involved all the shares in the New York Stock Exchange index equally (Kosev & Williams, 2011). As the pension fund's assets were fixed, no active management was required and the operating costs of the fund were low (Rosenberg et al., 2008). According to Gastineau (2001), author of the "Exchange Traded Funds Manual", the first creation of an investment product like ETF was an index fund, based on the stocks in the S&P 500 in 1989. However, although the investors showed interest, Chicago's federal court ruled that the fund functioned as futures contracts, even though they were marginalized and secured as shares (Gastineau, 2001). So, they had to be listed and traded on a futures exchange.

The next Exchange Traded Fund called Toronto 35 Index Participation Units (TIPs 35) and it was launched in 1990 by Toronto Stock Exchange (Kosev & Williams, 2011).

In 1993 was presented the S&P 500 Trust ETF (known as SPDR from the Standard & Poor's Depository Receipt, a portfolio investment agency, or "spider") by the State Street Global Investors, which tracked the S&P 500 Index (Gastineau, 2001). It was a very popular investment product and it is still one of the most actively traded ETFs (Bodie et al., 2015). The creation of "spider" led to the creation of various similar products, such as "diamonds", based on the Dow Jones Industrial Average Index (DIA), the "cube", based on the NASDAQ 100 index (QQQ), and "WEBS", the World Equity Benchmark Shares, which are shares in foreign exchange index portfolios (Bodie et al., 2015).

Exchange Traded Funds have become one of the most well-known passive investment products among both retail and professional investors, due to their high liquidity and their low transaction costs (Gastineau, 2001). The ETFs' assets have grown with a rate of 25% over the last 15 years (Balchounas, 2016). According to Hill at al. (2015), the 33% of all trading volume over the world takes place in ETFs and by 2016, the market share of ETFs exceeded 10% of the total market capitalization traded on US exchanges. Figure 1 shows that over 100 ETFs have been launched annually in the market of US since 2006.

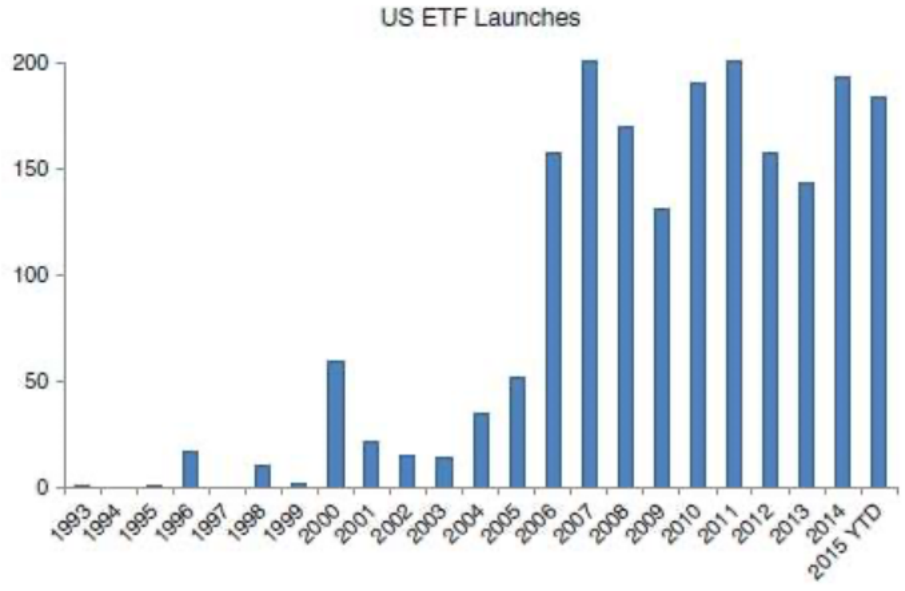

Figure 1Number of ETFs that started trading per year in the US market (Source: Balchounas, 2016)

1.3. The ETF Market

The ETF market has seen an extraordinary growth in last few years. The quantity of ETFs and the value of their underlying assets have grown dramatically. According to ETFGI (2020), the

number of ETFs worldwide increased from 453 in 2005 to 6.658 in 2019 (figure 2). This trend is likely to continue because the increasing acceptance of ETFs as sustainable investment vehicles, and if trends continue, in line with the CAGR, the number of ETFs is set to double in five years, and a lot of factors support this increase (UNCTAD, 2020).

The total value of ETF AUM has also grown from 418 billion USD in 2005 to 5.436 billion in 2019 (figure 2). This is approximately 6% of the total capitalization of the global stock market.

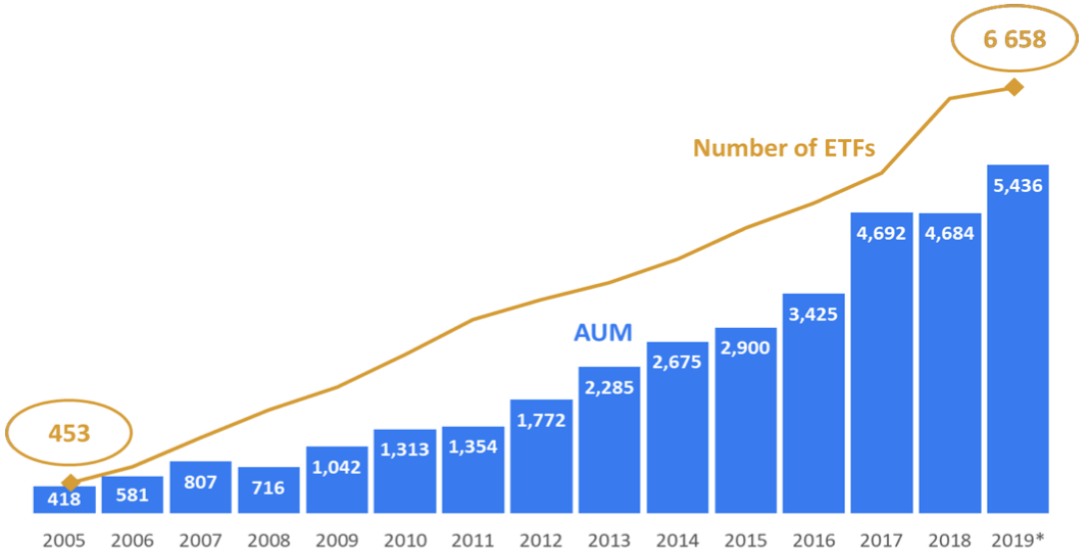

Figure 2 Number of ETFs worldwide and assets under management (AUM), 2005-2019 (Billions of dollars) Source: UNCTAD

Regarding the geographical distribution of ETFs, Europe and North America have at least the 35% of all ETFs, with only the US accounting for 30% of all ETFs in global level (figure 3). In terms of AUM, US have the most developed ETF market (71% of AUM worldwide) (Morningstar, 2018). On the other hand, Europe has the 26% of global ETFs, but accounts for 15% of global AUM. This is mainly because of Europe's geographically fragmented market and the fund providers offer the same investing products on different exchanges (Morningstar, 2019).

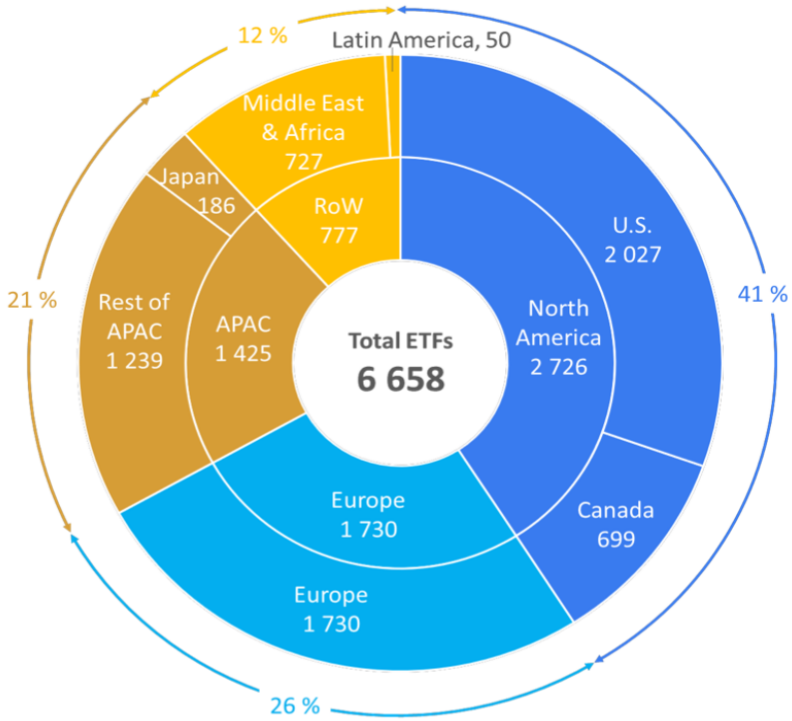

Figure 3 Regional distribution of ETFs, 2019 (Number of ETFs) Source: UNCTAD based on ETFGI

In the following figure 4 are presented all the sectors in global market in which ETFs have their assets allocation:

Figure 4 Sectors in global market in which ETFs have their asset allocation (Source: ETF database)

The operation of the market of ETFs concerns two levels:

- **Primary market.** The main activity is the creation / acquisition of shares of ETFs and the institutions involved in the process are the Special Traders, the Institutional Investors and the issuers of ETFs (Abner, 2016).

The shares of ETFs are created (redeemed) by the issuer who in return receives the basket of shares which compose the underlying index (shares of ETF) or cash (Abner, 2016).

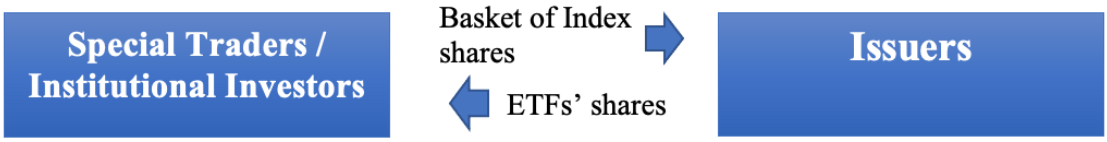

Figure 5 The operation of the primary market of ETFs

- **Secondary market.** The main activity is the trading of ETF shares of and the participants involved are the stock exchange, members, Special Traders and investors (Abner, 2016). Transactions are made through the electronic trading system of the stock exchange and the ensuring of the existence of continuous liquidity is achieved through the presence of at least one Special Trader (Abner, 2016).

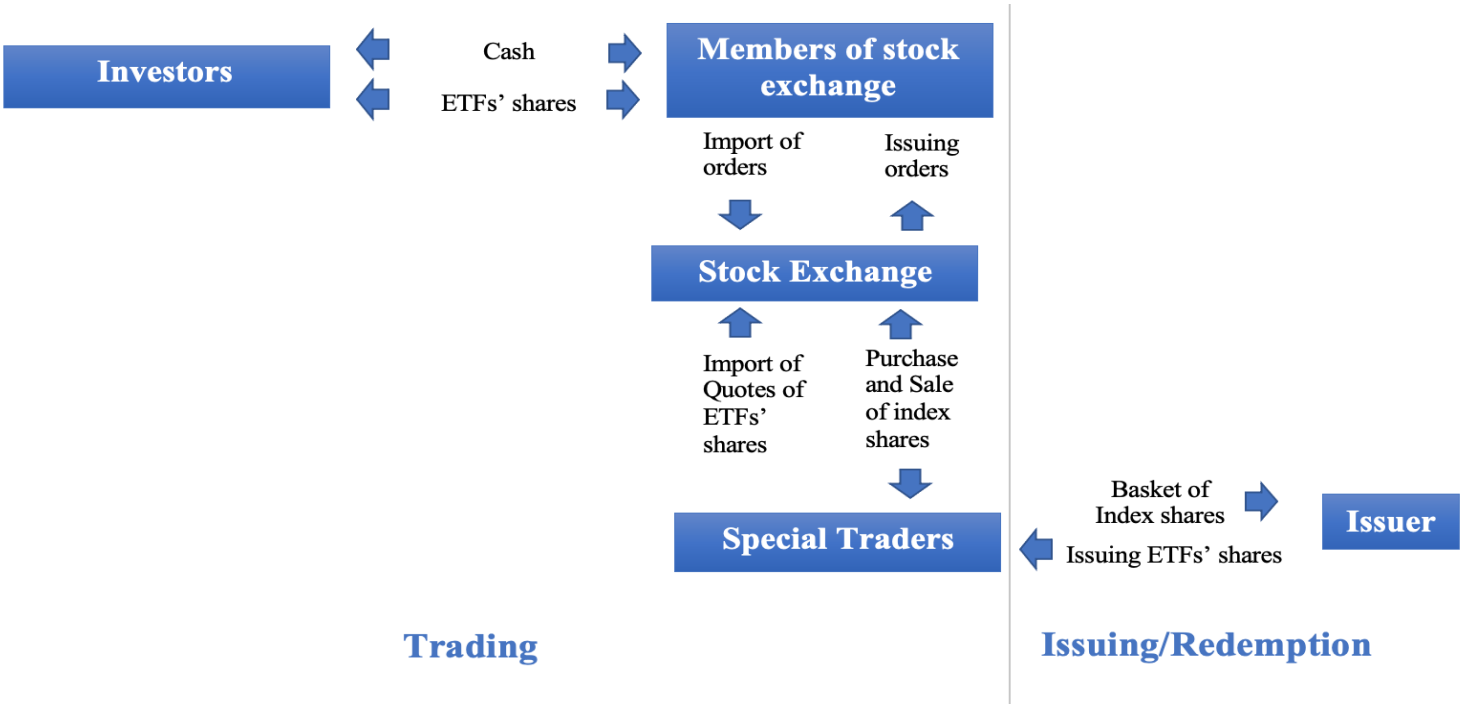

Figure 6 The operation of the secondary market of ETFs

In the following figure 7, we can see the map of the global ETF market in 2019:

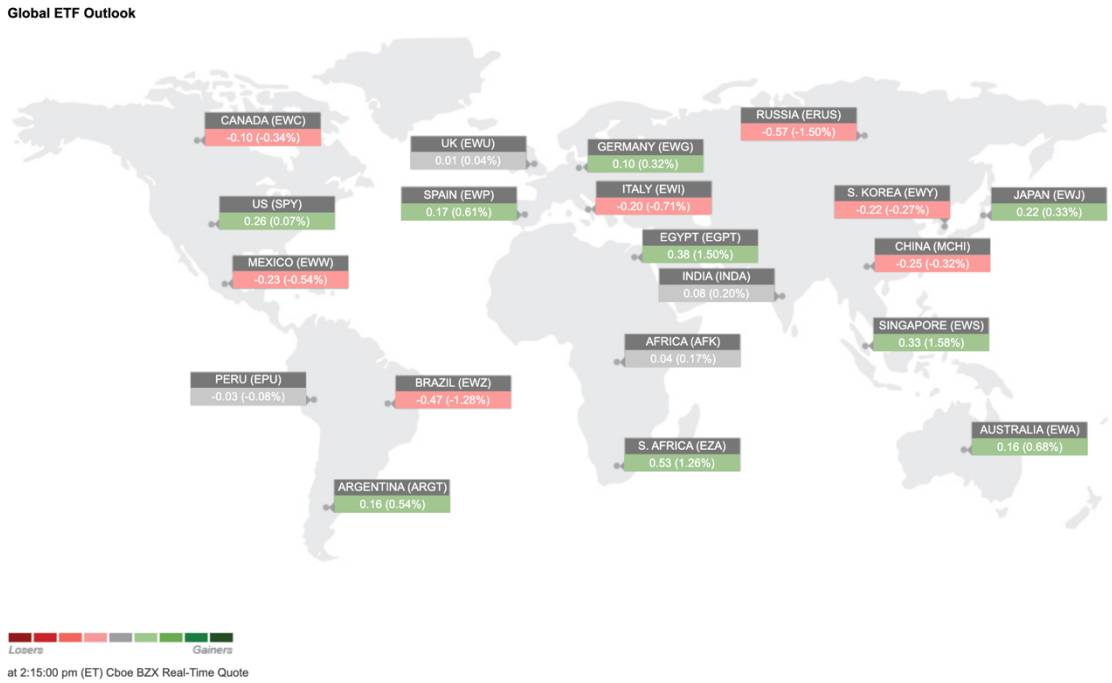

Figure 7 Global ETF Outlook (Source: ETF database)

In the following chart is presented the total amount in trillion dollars, invested in Exchange Traded Funds worldwide, for the period 2008-2018.

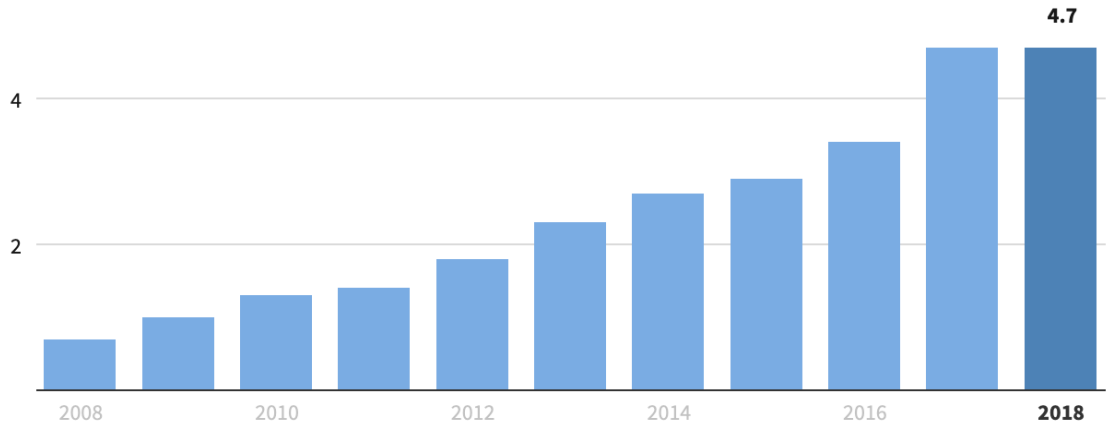

Figure 8 Cash Invested in ETFs (2008-2018) (Source: ETFGI)

1.4. Net Asset Value (NAV)

The Net Asset Value (NAV) is calculated by taking the sum of the assets in the fund, including any securities and cash, subtracting out any liabilities, and dividing that by the number of shares outstanding (Rosella and Pugliese, 2006):

$$NAV = \frac{Assets - Liabilities}{Share\ Outstanding}$$

The information about the value of NAV is daily provided by ETFs, as well as what exactly the fund is holding as underlying assets. In contrary, mutual funds do not provide information about portfolio holdings every day, but only one time every four months. ETF investors are able to examine the assets and the liabilities of the fund anytime, while NAV is such a useful measure, as it provides investors a reference point around which they can decide if it is fair enough to purchase or sell shares of the fund (Rosella and Pugliese, 2006).

Except of the daily NAV, there is also the intraday or indicative NAV (iNAV). The iNAV measures the ETF's intraday value, and for its calculation the prices used are updated for real-time market movements and published several times per minute (Rosella and Pugliese, 2006).

1.5. Advantages – Disadvantages of ETFs

Exchange Traded Funds offer several advantages over conventional mutual funds. First of all, the Net Asset Value of a mutual fund is announced only once a day, so the investors can purchase and sell its shares only after the market closes (Segal, 2019). On the contrary, the ETFs are traded during the whole day, and just like shares, can be bought on margin and sold short (Segal, 2019). ETFs offer diversification, as they give exposure to numerous equities or market segments. An ETF tracks a group of shares or even follows the returns of a country or a set of countries and allows investors to reduce risk by trading futures and options just like a stock (Segal, 2019).

ETFs also offer a potential tax advantage in comparison with mutual funds, as when big number of investors of mutual funds redeem their shares, the fund must sell securities to cover the redemptions, which can lead to goodwill taxation, which is passed on and must be paid by the remaining shareholders (Bodie et al., 2015). When some small investors want to buy a position in an ETF, they simply sell their shares to other traders, without having to sell any part of the underlying portfolio, while big investors can exchange their shares in the ETF with shares of the underlying portfolio (Bodie et al., 2015). Thus, this form of redemption avoids the imposition of a tax (Bodie et al., 2015).

ETFs are often cheaper than mutual funds. Those investors who acquire exchange traded fund shares, purchase through stockbrokers and not directly from the fund and, therefore, the capital saves the cost of making it directly available to small investors (Gastineau, 2001). This reduction in costs can be translated into a reduction in management fees (Gastineau, 2001).

Finally, ETFs have lower discount or premium in price, as they trade during the day at a price very close their actual value, which happens because they consist of underling securities and if the price is extremely higher or lower than the NAV, arbitrage will bring their price back in line (Segal, 2019).

However, ETFs have some disadvantages. Firstly, while mutual fund shares can be obtained without fees, from funds without advance payment, the ETFs must be purchased by stockbrokers for a fee (Gastineau, 2001). Moreover, as ETFs trading is done as the securities trading, their prices can deviate from NAV, in short term at least, and those deviations can easily outweigh the cost advantages that ETFs otherwise offer (Bodie et al., 2015). While these deviations are usually quite small, they can rise unpredictably when markets are under pressure (Bodie et al., 2015). When markets do not operate properly, may be difficult to measure the net asset value of ETFs portfolio, in particular in case of ETFs tracking lower marketability assets (Segal, 2019). The problem is exacerbated by the fact that some ETFs may be supported by a very small number of traders, and if they are withdrawn from the market in a time of instability, prices may fluctuate uncontrollably (Bodie et al., 2015).

Moreover, even though there are ETFs who pay dividends, their dividend yields are lower than owning a high-yield stock as the risk associated with them is lower than single stocks (Segal, 2019).

1.6. ETF issuers

According to ETF database (2020), issuer tables are rankings among ETF issuers in several metrics related to investments, such as estimated revenue, three-month returns, three-month cash flows, AUM, average ETF expenses and average dividend yield. The calculation of these metrics is based on US-listed ETFs, and these ETFs which have only one issuer. In the following table, ETF issuers are ranked according to their total revenue from their ETF activity. This metric is calculated by aggregating the estimated revenue of all the respective issuer ETFs. In order to calculate the estimated revenues from a single ETF, the ETF's expensive ratio is multiplied by the AUM. In this table are presented the top 10 ETF issuers based to their estimated revenue in 2020. The values are in US dollars.

Table 1 ETF issuers according to their estimated revenue (in US dollars)

Issuers	Revenue Rank	Estimated Issuer Revenue	# of ETFs
iShares	1	$3,382.75	376

State Street SPDR	2	$1,253.46	140
Vanguard	3	$762.21	81
Invesco	4	$755.42	221
First Trust	5	$609.96	163
ProShares	6	$365.46	132
VanEck	7	$241.91	55
Direxion	8	$167.66	79
WisdomTree	9	$132.91	67
Charles Schwab	10	$123.08	25

Source: https://etfdb.com/etfs/issuers/

According to ETF database (2020), a different ranking of ETF issuers is based on their return. Specifically, in the following table they are ranked based on their AUM-weighted average three-month return. Except of their price performance, the three-month return calculates the reinvestment of all dividends of the last three month. This ranking is very significant for the potential investors (ETF database, 2020).

Table 2 ETF issuers according to their Average three-month Return (in %)

Issuers	Return Rank	+/-	Avg. 3-Month Return (%)	# of ETFs
Roundhill Financial LLC	1	+1	32.74%	2
ARK Investment Management	2	+2	26.41%	7
ITEQ ETF Partners LLC	3	+4	24.81%	1
Renaissance Capital	4	-1	23.55%	2
Hoya Capital Real Estate LLC	5	-	23.48%	1

BMO Financial Group	6	**-5**	20.38%	19
Credit Suisse	7	**+1**	19.20%	7
SmartETFs	8	**-2**	18.34%	1
Direxion	9	**+7**	16.74%	79
Citigroup	10	**+93**	16.37%	13

Source: https://etfdb.com/etfs/issuers/

1.7. Legal forms of ETFs

The rapid growth of the ETF market, supported the creation and development of various legal forms of investment products with a related goal (Grund, 2020). These products track commodities, currencies, or other strategies. Below is a brief list of the legal structures related to ETFs according to Grund (2020):

Open-end Index Fund

The Open-end funds were secured by the "Investment Company Act of 1940" and are intended to monitor various indicators (Grund, 2020). The majority of ETFs follow this structure (open type), as it allows for greater flexibility. Dividends on such funds are reinvested immediately and paid to shareholders on a monthly or quarterly basis and it also allows derivatives to be used, portfolio optimization, and securities lending (Grund, 2020).

Unit Investment Trust (UITs)

The first and most popular ETFs, such as BLDRs, Diamonds, SPDRs, and PowerShares QQQ Trust, are organized as UITs. This type of legal form does not allow dividends to be reinvested in the fund, but retains the dividends until they are paid to the shareholders (on a quarterly or annual basis) (Grund, 2020). This mechanism causes a condition known as "dividend drag". UITs must fully copy the indicators they track, and they are not allowed to receive securities lending income and, unlike open-end funds, they have expiration dates that can vary from years to decades (Grund, 2020). The UITs were secured by the "Investment Company Act of 1940".

Grantor Trust

This type of legal structure distributes dividends directly to shareholders and allows them to regain voting rights on its underlying shares (Grund, 2020). The original shares in a grantor trust remain fixed and are not redefined (Grund, 2020). Grantor trusts were secured by the "Securities Act of 1933".

Exchange-traded Notes (ETNs)

ETNs are recorded as debt instruments that pay a yield based on the yield of a single stock or index and their functional structure of ETNs is specifically suited for specific categories of underlying items, such as commodities and emerging markets (Grund, 2020). Under current tax law, equity and commodity ETNs are taxed as prepaid contracts, which means that investors are taxed only upon sale, redemption, or expiry of their title (Grund, 2020). ETNs were secured by the "Securities Act of 1933".

Partnerships

Some investment products that track an index and are similar to ETFs function as Master Limited Partnerships (MLPs). ETF holders are required to declare their share of income, profits, losses and reductions to the tax office even if no cash has been distributed (Grund, 2020).

1.8. Physical and Synthetic ETF

ETFs can be classified into two general categories: physical and synthetic. Physical ETFs have as underlying assets individual securities or physical assets (commodities) and Synthetic ETFs consist of derivatives to provide exposure to physical ETFs (Naumenko & Chystiakova, 2015). For instance, a physical ETF that tracks the S&P 500 index, has as underlying asset individual stocks in proportion to the index, while the synthetic type of the same ETF may hold a Total Return Swap (TRS) to provide exposure to the S&P 500 index (Naumenko & Chystiakova, 2015). The ETF provider with the TRS relies on a swap counterparty, usually a financial institution such as a global bank or securities dealer, to replicate the total returns of the S&P 500 (Foucher & Gray, 2014).

The US and Europe are the two largest ETF markets globally, with $1,7 billion assets in US and €288 billion assets in Europe. Synthetic ETFs are estimated at 33% of the ETFs in European market, but just the 4% of the ETFs in US market (Meinhardt et al., 2015).

This fact is exactly represented by the following chart where it is clear that physical ETFs dominate the US ETF market for the period 2012-2018 (Foucher & Gray, 2014).

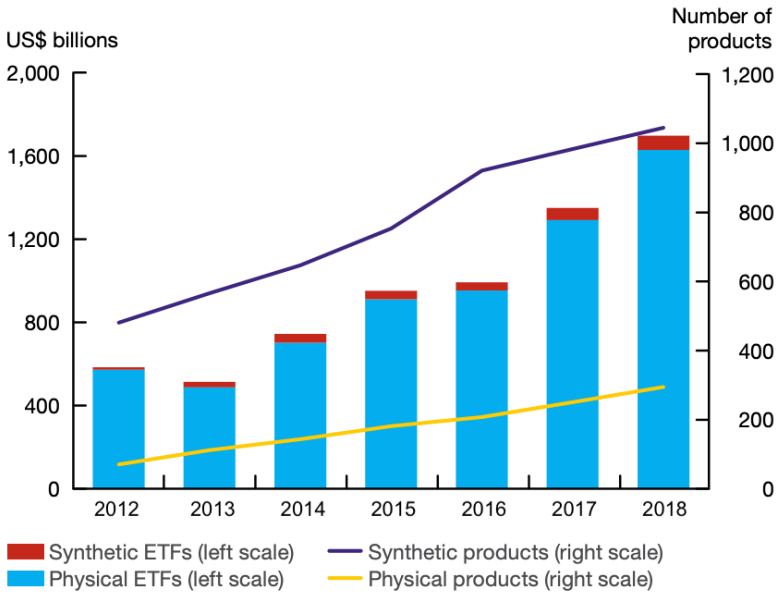

Figure 9 Physical ETFs dominate the US ETF market (2012-2018) Source: Bank of Canada

In contrary, a very large share of the ETFs in European market consists of synthetic products, as the following chart represents.

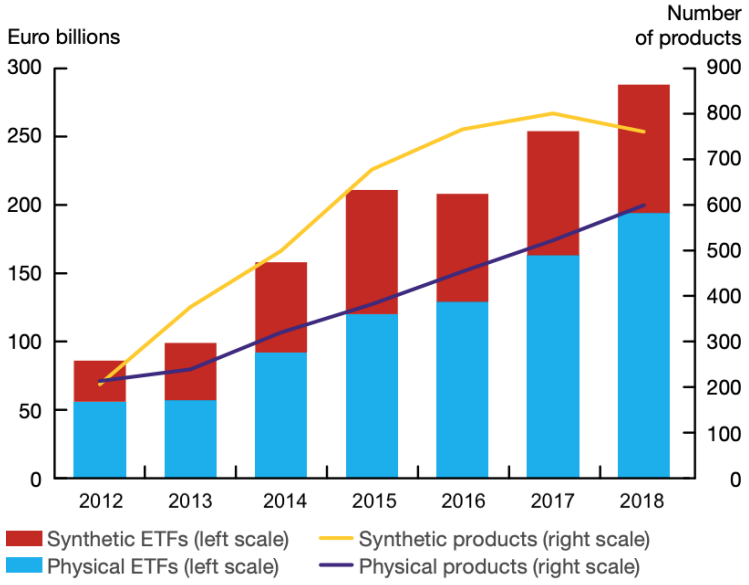

Figure 10 A large share of the European ETF market consists of synthetic products (2012-2018) Source: Bank of Canada

The swap contract means that the counterparty pays the ETF the return of the index it trucks and the dividends too (Fassas, 2014). The counterparty receives as an exchange a fee investment return of collateral posted on behalf of the ETF (Fassas, 2014). Collateral is

necessary in order to mitigate the risk of loss for investors if the swap counterparty defaults on its obligation (Meinhardt et al., 2015). This is the main risk of synthetic ETFs, the counterparty risk, and it is very important for the investors to know that this can be minimized (Meinhardt et al., 2015). Some ETF providers apply even stricter standards to their synthetic ETFs and "overcollateralize" and they guarantee that the ETF is secured by collateral worth more than its total NAV (Fassas, 2014). However, physical ETFs can also face counterparty risk, of they lend out their underlying securities in order to earn more income (Riedl, 2016).

The following figure represents the procedure of creating and redeeming shares in physical ETFs.

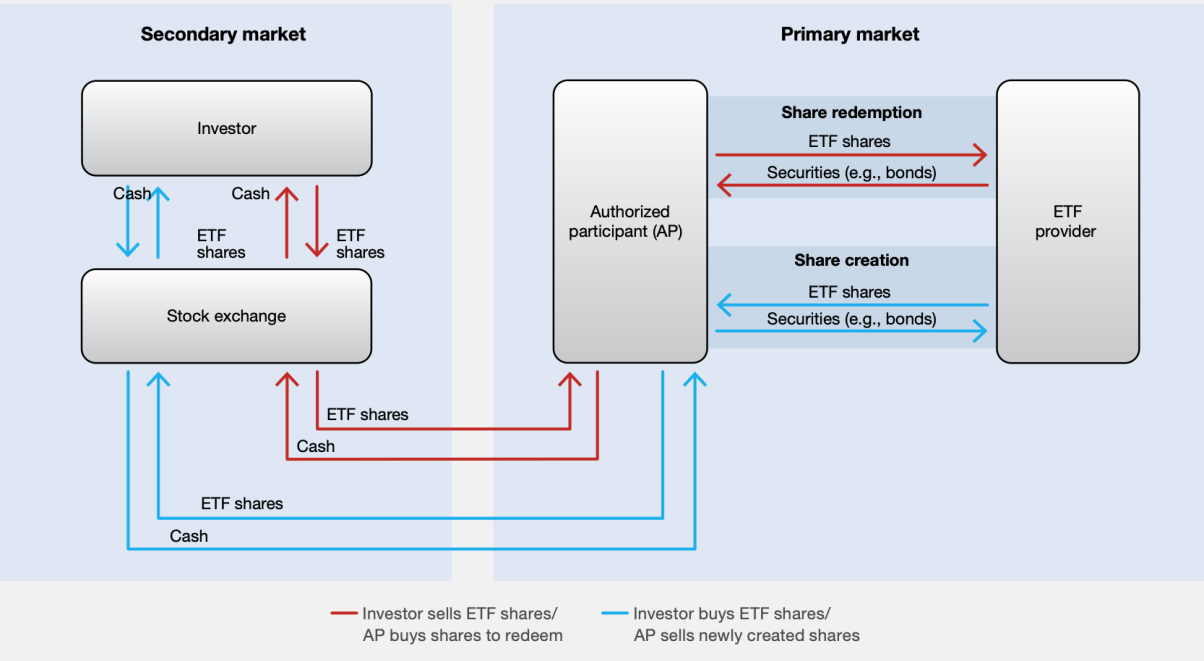

Figure 11 Physical ETFs - Simplified Process for Creating and Redeeming Shares (Source: Bank of Canada)

The next figure presents the process for creating and redeeming share for a Swap base Synthetic ETF.

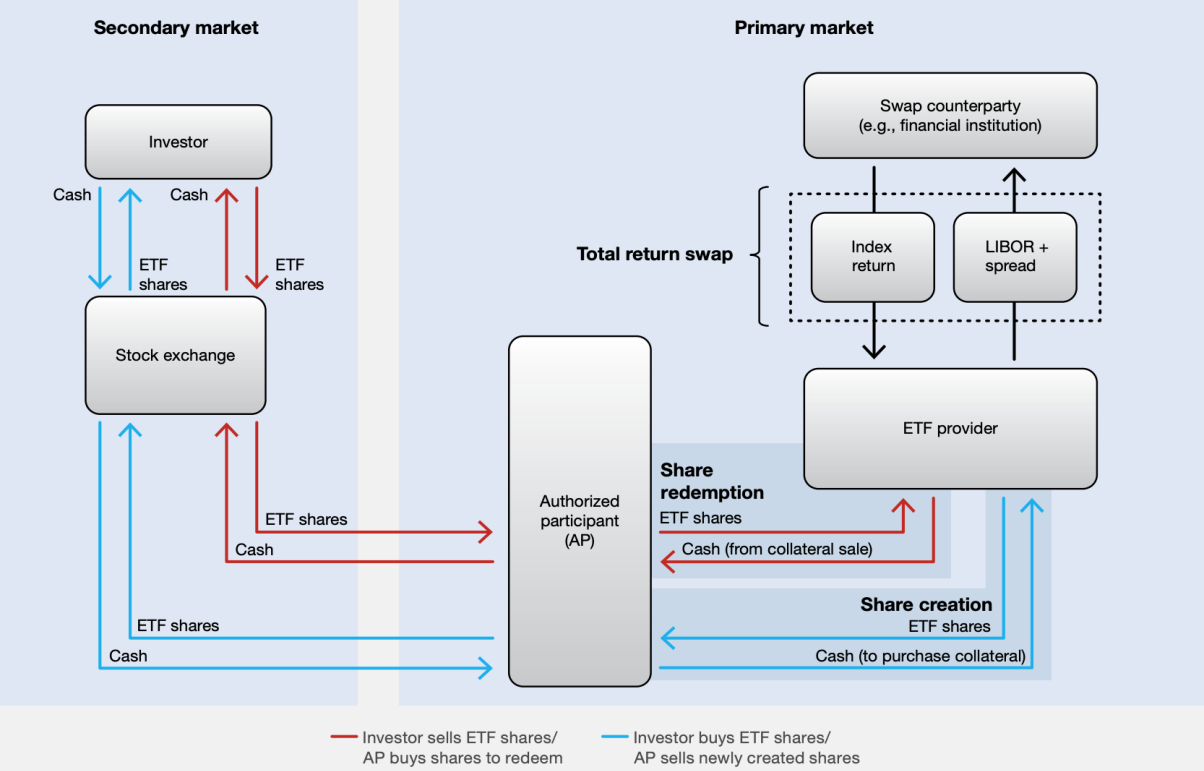

Figure 12 Swap-Based Synthetic ETFs - Simplified Process for Creating and Redeeming Shares (Source: Bank of Canada)

1.9. Special Risks of ETFs

Investors have detected numerous benefits from the creation of ETFs. They are often considered less risky financial products than other asset classes, because they offer diversification of their included underlying securities. However, ETFs carry some risk for the investor and the financial system.

1. **Liquidity risk**

Authorized participants (APs) derive some ETFs' advantages over traditional mutual funds, for instance their liquidity and a stock price closer to their NAV, however, APs can transmit liquidity shocks from the underlying assets to ETFs and vice versa (Bhattacharya & O'Hara, 2020). A shock to the underlying securities like high-yield bonds, could be created due to an increased fear of corporate defaults, that could lead APs to stop redemptions for protracted periods (Bhattacharya & O'Hara, 2020). In the other side, if multiple APs stop redemptions due to different reasons from the underlying securities, a liquidity shock to an ETF can also occur. In both scenarios, an ETF may trade at a discount to the NAV (Cespa and Foucault, 2014). If this happens for short periods of time is not so serious, but there is a potential risk for large discounts to the NAV to persist and deteriorate through the time (Cespa and Foucault, 2014).

According to Foucher & Gray (2014), one recent event took place during a period of market volatility in 2013, when an AP (Citibank) refuse to redeem shares to avoid exceeding its balance-sheet-risk limits. As other APs were able to continue redeem shares, Citibank's refusal did not cause a serious discount to the NAV for its ETFs (Foucher & Gray, 2014). In time of market instability, such as the financial crisis in 2008, some ETFs had large discounts to their NAV (figure 13).

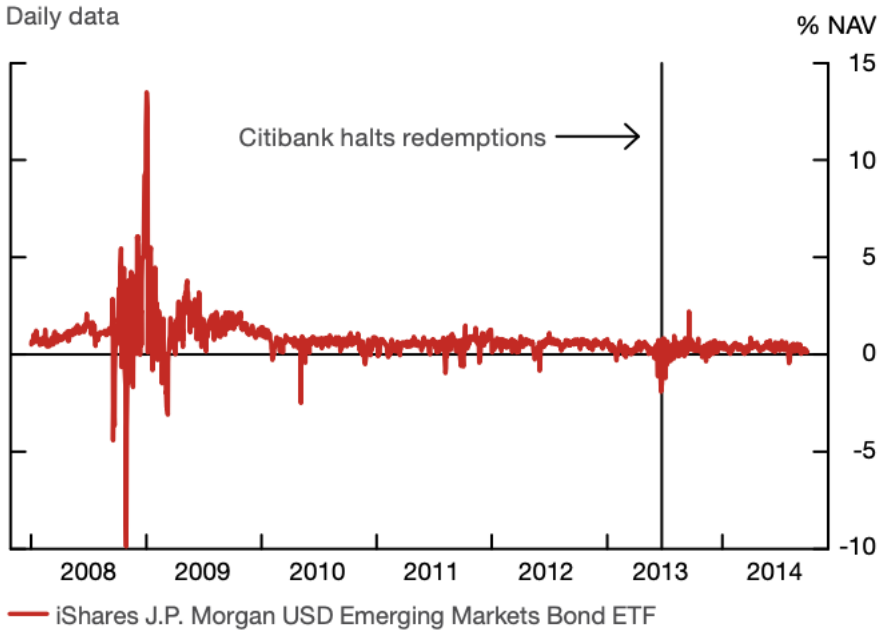

Figure 13 Less-liquid ETFs price at larger discounts to their NAV in times of stress (Source: Bloomberg, based on Bank of Canada calculations)

2. Counterparty risk

ETF investors are also exposed to counterparty risk in ETFs using derivatives (e.g. swaps) or engaging in securities lending (Amenc et al., 2012). Synthetic ETFs rely on swap counterparties to provide their underlying asset exposure, and their main advantage is that they have lower tracking error than physical ETFs, however, the investors are exposed to collateral and counterparty risk (Amenc et al., 2012). Swap transactions are automatically terminated if one of the counterparties defaults or its credit rating falls below a specific level (Grill et al., 2018). If the swap counterparty default, the ETF broker may can replace the swap with a new counterparty, but if a replacement swap is not secured, the ETF provider has to liquidate its collateral (Foucher & Gray, 2014). Physical ETFs that lend their underlying securities also expose their investors to counterparty risk and may have losses if a borrower defaults on its liabilities (Grill et al., 2018).

3. Collateral risk

In case of a counterparty default, investors would be exposed to risk associated with collateral. Both synthetic and physical ETFs that lend securities they are typically over-collateralised (Amenc et al., 2012). Collateral baskets often obtain liquid bonds and stocks, but the problem may arise when dealing with collateral from defaulting counterparties (Amenc et al., 2012). The ETF provider in order to obtain the original exposure, sells the received collateral in market that fall, given that it is more possible for counterparties to default when markets are shocked (Foucher & Gray, 2014). This would be severally problematic if collateral exposures are different form the exposure that investors expect or when the value of collateral is correlated positively with the performance of the defaulting counterparty (Grill et al., 2018).

4. **Market Risk**

Like traditional investments, ETFs face market risks. Even though ETFs provide several advantages, that can help investors mitigate the risks, in case of their underlying assets fall, they will go down to (Grill et al., 2018). Market risk is one of the most important trading costs and cannot be mitigated directly, which is because investors have to allocate their assets in portfolio in a way that reduce the exposure to a single asset or to any risk (Grill et al., 2018).

2. ETFs Categorization according to Asset Class

Nowadays ETFs are highly diversified and not limited only to the most established funds tracking the main stock market indexes (Abner, 2016). ETFs are provided by investors from all over the world with numerous asset classes and many modifications in contrary to the simple tracking of the rates of return (ETF database, 2020). The figure below shows ETF assets worldwide of different investment types in billion dollars for the period 2009-2018.

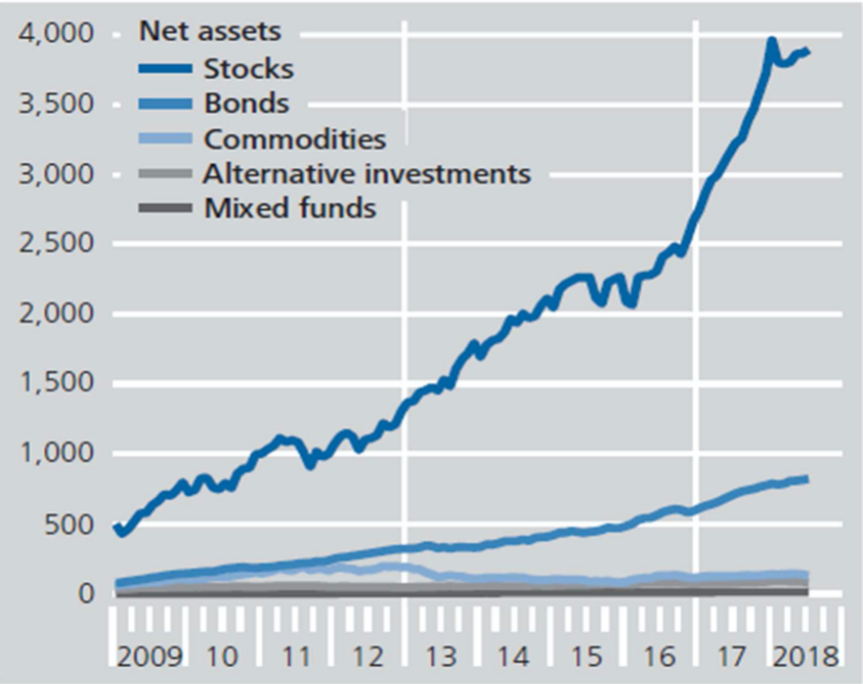

Figure 14 ETF assets worldwide by investment type in billion $, for the period 2009-2018 Source: Morningstar and Bundesbank calculation

2.1. Equity ETFs

Equity ETFs (or Stock ETFs) are assets that track a particular group of equities, similar to an index (Abner, 2016). They can track stocks of a single industry, such as energy sector, or an index of different equities, such as S&P 500, which means that investors can obtain exposure to a variety of equities and take less risk associated with single stocks (Abner, 2016).

Nowadays, if investors are interested in holding a share of the stocks market, one ETF at least is probably covering it (Bello, 2012). When they want to invest on an Equity ETF, they have to take into consideration which stocks are included in the fund and how the ETF weigh these stocks (Bello, 2012). The ETF provider is responsible to publish certain information, such as the complete list of the underlying securities the fund holds, the turnover rate and the industries that the portfolio represents (ETF database, 2020). Obviously, the number of securities is very important for investors, as a portfolio with 20 stocks will be more volatile than a portfolio with 500 holdings (ETF database, 2020). Also, the main holdings of the ETF and their weighting factors are very considerable as an ETF with a few equities weighted at the 50% of the portfolio will not be as much diversified as an ETF which included a wide variety of equities and has the heaviest weighting of an equity capped at below 5%. (Bello, 2012). The following table presents the 10 largest Equity ETFs in the world in 2019.

Table 3 World's 10 largest equity ETFs in 2019

Ticker	Name	Segment	Issuer	Expense Ratio	AUM
SPY	SPDR S&P 500 ETF Trust	Equity: U.S. - Large Cap	State Street Global Advisors	0.09%	$302.19B
IVV	iShares Core S&P 500 ETF	Equity: U.S. - Large Cap	Blackrock	0.03%	$217.01B
VTI	Vanguard Total Stock Market ETF	Equity: U.S. - Total Market	Vanguard	0.03%	$164.29B
VOO	Vanguard S&P 500 ETF	Equity: U.S. - Large Cap	Vanguard	0.03%	$163.86B
QQQ	Invesco QQQ Trust	Equity: U.S. - Large Cap	Invesco	0.20%	$137.06B
VEA	Vanguard FTSE Developed Markets ETF	Equity: Developed Markets Ex-U.S. - Total Market	Vanguard	0.05%	$75.30B
IEFA	iShares Core MSCI EAFE ETF	Equity: Developed Markets Ex-U.S. - Total Market	Blackrock	0.07%	$71.89B
VUG	Vanguard Growth ETF	Equity: U.S. - Large Cap Growth	Vanguard	0.04%	$62.28B
VWO	Vanguard FTSE Emerging Markets ETF	Equity: Emerging Markets - Total Market	Vanguard	0.10%	$61.78B

Source: https://www.etf.com/etfanalytics/etf-finder

2.2. Fixed-Income ETFs

Fixed-Income ETFs (or Bond ETFs) provide investors with access to institutional-level portfolios of bonds at a cost that was impossible the previous years (Dellva, 2001). Bonds trade over the counter by bond brokers, and for this reason private investors incur expensive bid–ask spreads when they want to buy small quantities of individual bonds (Dellva, 2001). On the contrary, bond ETFs can provide investors with the opportunity to have exposure to the bond

market in a simple and cost-effective way, with the transparency of stock trading (Kosev &Williams, 2011). This means that fixed-income ETFs are more liquid than individual bonds and mutual funds consisted of bonds, which trade at one price per day after the market closes (Kosev &Williams, 2011). This is very important, especially during times of distress, as investors can trade a portfolio consisted of bonds, even if the bond market is not properly functioning.

Bond ETFs offer some of the common features of individual bonds, including a regular coupon payment (Chen, 2020). In traditional bonds, the coupon payment happens every six months or every year (Kosev &Williams, 2011). The assets included in fixed-income ETFs, in contrast, have different maturity dates, so at any time some bonds in the portfolio may offer coupon payment (Dellva, 2001). For this reason, bond ETFs pay out interest through a monthly dividend, with the coupon value varying every month, while any capital gains are paid out through an annual dividend (Chen, 2020). Fund assets are changing all the time and do not mature (Chen, 2020).

Regulatory delays delayed the launch of the first fixed income ETFs until 2002. When the restrictions on the US Securities and Exchange Commission have eased, the number of these products increased rapidly (Lettau & Madhavan, 2018). According to Hill et al. (2015), from March of 2015 228 fixed-income ETFs managed $254 billion, or 15% of the ETF assets in the United Stated. The following table presents the 10 largest fixed-income ETFs in the world in 2019.

Table 4 World's 10 largest Fixed-income ETFs in 2019

Ticker	Name	Segment	Issuer	Expense Ratio	AUM
AGG	iShares Core U.S. Aggregate Bond ETF	Fixed Income: U.S. - Broad Market, Broad-based Investment Grade	Blackrock	0.04%	$79.46B
BND	Vanguard Total Bond Market ETF	Fixed Income: U.S. - Broad Market, Broad-based Investment Grade	Vanguard	0.04%	$61.40B
LQD	iShares iBoxx USD Investment Grade Corporate Bond ETF	Fixed Income: U.S. - Corporate, Broad-based Investment Grade	Blackrock	0.14%	$57.18B

VCIT	Vanguard Intermediate-Term Corporate Bond ETF	Fixed Income: U.S. - Corporate, Broad-based Investment Grade Intermediate	Vanguard	0.05%	$39.25B
VCSH	Vanguard Short-Term Corporate Bond ETF	Fixed Income: U.S. - Corporate, Broad-based Investment Grade Short-Term	Vanguard	0.05%	$31.96B
HYG	iShares iBoxx USD High Yield Corporate Bond ETF	Fixed Income: U.S. - Corporate, Broad-based High Yield	Blackrock	0.49%	$31.03B
BNDX	Vanguard Total International Bond ETF	Fixed Income: Global Ex-U.S. - Broad Market, Broad-based Investment Grade	Vanguard	0.08%	$30.63B
BSV	Vanguard Short-Term Bond ETF	Fixed Income: U.S. - Broad Market, Broad-based Investment Grade Short-Term	Vanguard	0.05%	$26.71B
TIP	iShares TIPS Bond ETF	Fixed Income: U.S. - Government, Inflation-linked Investment Grade	Blackrock	0.19%	$23.97B

Source: https://www.etf.com/etfanalytics/etf-finder

2.3. Commodity ETFs

Commodities are main goods used as inputs in the economy, such as basic materials, energy-related materials and food (Ferri, 2007). Food products consist of items such as coffee, sugar, corn and oats; basic materials are aluminum or steel; energy related products include natural gas, crude oil and electricity (Chen, 2020). Precious metals are a different category such as gold or silver and they are used as a store of value and a hedge against inflation (Ferri, 2007). Commodities are an asset class typically negatively correlated with the other asset classes, such as bonds or stocks (Chen, 2020). So, if stocks and bonds increase in value, commodities

increase in value, and vice versa. As a result, they offer investors a good solution for diversification (Ferri, 2007). However, it is difficult to have exposure to commodities directly at low cost and without taking too much risk (Corcoran, 2019).

Commodity ETFs have enabled investors to have exposure to commodity investing in very simple and cost-effective way (Guedj et al., 2011). There are hundreds of available ETFs that track different commodities such as precious or base metals, agricultural products and energy that range from physically backed single-commodity funds to futures-based commodity baskets (Corcoran, 2019). The biggest commodity ETF is the SPDR Gold Trust. The fund's Assets Under Management (AUM) are 30$ billion. For ETFs that hold physical commodities it is important to take into consideration the storage cost. It is not as easy to hold natural gas or crude oil as holding metals for example (Ferri, 2007). That is because some ETFs are based on derivatives and others not. The physical commodity ETFs are easy to value. Investors can see the holdings of each commodity of each ETF and the number of shares outstanding on a daily basis and calculate the value of the fund (Guedj et al., 2011). The following table presents the 10 largest commodity ETFs in the world in 2019.

Table 5 World's 10 largest commodity ETFs in 2019

Ticker	Name	Segment	Issuer	Expense Ratio	AUM
GLD	SPDR Gold Trust	Commodities: Precious Metals Gold	State Street Global Advisors	0.40%	$77.96B
IAU	iShares Gold Trust	Commodities: Precious Metals Gold	Blackrock	0.25%	$32.01B
SLV	iShares Silver Trust	Commodities: Precious Metals Silver	Blackrock	0.50%	$15.19B
USO	United States Oil Fund LP	Commodities: Energy Crude Oil	US Commodity Funds	0.79%	$4.39B
GLDM	SPDR Gold MiniShares Trust	Commodities: Precious Metals Gold	State Street Global Advisors	0.18%	$3.52B

SGOL	Aberdeen Standard Physical Gold Shares ETF	Commodities: Precious Metals Gold	Aberdeen Standard Investments	0.17%	$2.78B
PDBC	Invesco Optimum Yield Diversified Commodity Strategy No K-1 ETF	Commodities: Broad Market	Invesco	0.59%	$2.74B
UCO	ProShares Ultra Bloomberg Crude Oil	Leveraged Commodities: Energy Crude Oil	ProShares	0.95%	$1.38B
BAR	GraniteShares Gold Trust	Commodities: Precious Metals Gold	GraniteShares	0.17%	$1.32B

Source: https://www.etf.com/etfanalytics/etf-finder

2.4. Currency ETFs

Currency ETFs were created in order to provide investment exposure to foreign exchange market through a manages currency portfolio (Chen, 2019). Currency ETFs are often passively managed with underlying currency holdings in a country or a group of countries and they provide access to a market that was not easy for private investors to access otherwise (Chen, 2019). The first exchange-traded currency investment products were Exchange Traded Notes (ETNs) because they are simply structured and issuers can easily launch them under the regulatory structure for company debt, as they promise to pay out returns according to a specific index (Burney, 2012). Currency ETNs promise to pay out a sum according to the spot exchange rate of any currency relative to the dollar on a specific date (Chen, 2019).

ETFs structured of currency were created on U.S. exchanges in 2008. The first currency investment products were based on the most widely traded currencies outside the dollar, often referred as G10 currencies (Ivanov, 2015). Nowadays, currency ETFs are able to track the world's largest foreign currencies (Hafeez, 2006). They help investors to have exposure to a broad range of currencies in a cost-effective way with low risk (Burney, 2012). In the following table we can see the world's 10 largest currency ETFs in 2019.

Table 6 World's 10 largest currency ETFs in 2019

Ticker	Name	Segment	Issuer	Expense Ratio	AUM
UUP	Invesco DB U.S. Dollar Index Bullish Fund	Currency: Long USD, Short Global Basket	Invesco	0.79%	$441.40M
FXE	Invesco CurrencyShares Euro Trust	Currency: Long EUR, Short USD	Invesco	0.40%	$367.99M
FXY	Invesco CurrencyShares Japanese Yen Trust	Currency: Long JPY, Short USD	Invesco	0.40%	$249.35M
FXF	Invesco CurrencyShares Swiss Franc Trust	Currency: Long CHF, Short USD	Invesco	0.40%	$246.44M
FXA	Invesco CurrencyShares Australian Dollar Trust	Currency: Long AUD, Short USD	Invesco	0.40%	$163.76M
FXC	Invesco CurrencyShares Canadian Dollar Trust	Currency: Long CAD, Short USD	Invesco	0.40%	$138.79M
FXB	Invesco CurrencyShares British Pound Sterling Trust	Currency: Long GBP, Short USD	Invesco	0.40%	$128.42M
UDN	Invesco DB U.S. Dollar Index Bearish Fund	Currency: Long Global Basket, Short USD	Invesco	0.80%	$84.63M
USDU	WisdomTree Bloomberg U.S. Dollar Bullish Fund	Currency: Long USD, Short Global Basket	WisdomTree	0.50%	$84.29M

Source: https://www.etf.com/etfanalytics/etf-finder

2.5. Leveraged ETFs

Leveraged ETFs (LETFs) is a marketable security that uses financial derivatives and dept to amplify the return of their underlying indexes by maintaining a stable position every day (Jarrow, 2010). Their main advantage is that while traditional ETFs typically track the securities in its underlying index on one-to-one basis, leveraged ETFs aim to achieve two or three times return (Zankiewicz, 2014).

There are two types of LETFs: bull and bear. Most bull or long ETFs aim to achieve a daily return of 2:1 or 3:1 ratio of their benchmark, while bear or short ETFs try to achieve a return that is -1, -2 or -3 times of the daily benchmark return (Little, 2010). LETFs use different techniques to maintain leverage to an index return such as swaps, futures, options, borrowing or short selling (Little, 2010). However, the do not have always the promising results especially in the long run (Trainor & Baryla, 2008). Financial market regulatory authorities have recently expressed warning against these investment products, at the same time as media indicated that private investors are not able to properly evaluate the risk of investing in LETFs (Wagalath, 2014). Table 7 shows the world's 10 largest LETFs in 2019.

Table 7 World's 10 largest LETFs in 2019

Ticker	Name	Segment	Issuer	Expense Ratio	AUM
AGQ	ProShares Ultra Silver	Leveraged Commodities: Precious Metals Silver	ProShares	0.95%	$757.09M
BDCX	ETRACS Quarterly Pay 1.5X Leveraged Wells Fargo BDC Index ETN	Leveraged Equity: U.S. Private Equity	UBS	0.95%	$24.57M
BDCY	ETRACS 2x Monthly Leveraged Wells Fargo Diversified BDC Index ETN Series B	Leveraged Equity: U.S. Private Equity	UBS	1.65%	$2.92M

BIB	ProShares Ultra NASDAQ Biotechnology	Leveraged Equity: U.S. Biotech	ProShares	0.95%	$197.96M
BNKO	MicroSectors U.S. Big Banks Index 2x Leveraged ETN	Leveraged Equity: U.S. Banking and Investment Services	BMO	0.95%	$14.32M
BNKU	MicroSectors U.S. Big Banks Index 3X Leveraged ETN	Leveraged Equity: U.S. Banking and Investment Services	BMO	0.95%	$19.96M
BOIL	ProShares Ultra Bloomberg Natural Gas	Leveraged Commodities: Energy Natural Gas	ProShares	1.31%	$82.12M
BRZU	Direxion Daily MSCI Brazil Bull 2X Shares	Leveraged Equity: Brazil - Total Market	Direxion	1.29%	$195.34M
CEFD	ETRACS Monthly Pay 1.5X Leveraged Closed-End Fund Index ETN	Asset Allocation: Target Outcome	UBS	0.95%	$26.51M

Source: https://www.etf.com/etfanalytics/etf-finder

2.6. Alternative ETFs

Alternative ETFs provide investors with exposure to non-conventional investment securities. There are a lot of different alternative ETFs, such as hedge funds, options strategies, private equity or managed futures (De Santis, 2019). Alternative ETFs provide two main categories of product, absolute return funds and tactical funds, offering access to alternative patterns of returns, such as volatility-focused products (Cairns, 2013).

Investors purchase alternative ETFs in order to reduce the overall portfolio risk, due to the diversification they provide (Matos, 2018). Normally, these alternative strategies were accessed hedge funds, or direct investment through listed or over the counter (OTC) derivatives (Cairns, 2013). Through these innovative financial products many of these complex strategies have been made available to broader audience (Cairns, 2013).

Alternative ETFs offer exposure to asset classes as: Merger Arbitrage, VIX futures, Inflation Expectations, Yield curve, Low correlation. ProShares Ultra VIX Short-Term Futures ETF UVXY is the largest Alternative ETF with $1.30 billion in assets. In the last trailing year, the best performing Alternative ETF was the XVZ at 122,45%. LHA Market State Alpha Seeker ETF MSVX was the most-recent ETF launched, in 13/05/2020 (Chen, 2020). Table 8 shows the world's 10 largest Alternative ETFs in 2019.

Table 8 World's 10 largest Alternative ETFs in 2019

Ticker	Name	Segment	Issuer	Expense Ratio	AUM
UVXY	ProShares Ultra VIX Short-Term Futures ETF	Leveraged Alternatives: U.S. - Volatility	ProShares	1.65%	$1.70B
VXX	iPath Series B S&P 500 VIX Short Term Futures ETN	Alternatives: U.S. - Volatility	Barclays Capital Inc.	0.89%	$1.33B
QAI	IQ Hedge Multi-Strategy Tracker ETF	Alternatives: Absolute Returns	New York Life	0.78%	$753.18M
RPAR	RPAR Risk Parity ETF	Alternatives: Absolute Returns	Toroso Investments	0.50%	$750.11M
MNA	IQ Merger Arbitrage ETF	Alternatives: Absolute Returns	New York Life	0.77%	$690.67M
SVXY	ProShares Short VIX Short-Term Futures ETF	Inverse Alternatives: U.S. - Volatility	ProShares	1.38%	$380.33M
VIXY	ProShares VIX Short-Term Futures ETF	Alternatives: U.S. - Volatility	ProShares	0.85%	$361.19M
FTLS	First Trust Long/Short Equity ETF	Alternatives: Absolute Returns	First Trust	1.60%	$292.21M

BTAL	AGFiQ U.S. Market Neutral Anti-Beta Fund	Alternatives: Absolute Returns	AGF	2.11%	$228.93M

Source: https://www.etf.com/etfanalytics/etf-finder

3. Literature Review on ETFs

3.1. ETF Performance

There are a lot of articles and studies regarding the ETFs' performance and tracking efficiency, which is the most important element for investors buying ETFs. Ackert & Tian (2008) studied the US based American ETFs and found that their price is close enough to their Net Asset Value (NAV), while this does not happen with International ETFs. The standard deviation which exists in International Funds is correlated with momentum, size effects and lack of liquidity. Charteris (2013) found that the majority of the South African ETFs trades at a premium to their NAVs, but this divergence last just for two or three trading days. Ivanov (2013), studied the deviation of the price of American ETFs by using super-high frequency data and found that their prices have positive deviations, and he concluded that the prices of the examined ETFs are lower on average by the prices of their underlying indexes. The only exception is SPY, that its price has a negative deviation suggesting that SPY's price is higher than S&P 500 index's price. Buetow & Henderson (2012) examined a wide range of ETFs traded on US stock exchanges and found that the everyday returns of the most of these ETFs indeed track their benchmarks very closely. Nevertheless, some of them exhibited serious tracking errors and they are more important in case that ETFs have as underlying assets stocks with less liquidity (Chen, 2020). According to Mariani et al. (2009) the statistical behavior of US traded ETFs is very close to the behavior of the corresponding financial indexes that they track.

Chu (2011) examined the ETFs traded in Hong Kong stock exchange and found that are usually higher that those ETFs traded in US stock exchange. He concluded that these tracking errors have direct relationship with the expense ratios of the ETFs and negative correlation to their Assets Under Management (AUM). Petajisto (2017) examined the US traded and International ETFs and found that their prices have frequent deviation from their Net Asset Values (NAVs), and mostly for ETFs that hold international securities or securities with low liquidity. DeFusco et al. (2011) studied three American ETFs with the highest liquidity and found that the deviation of their price can be predicted and it is no zero. They concluded that they can predict

the pricing deviation duo to its stationarity while the main reasons for the price deviation are the price discovery processes and dividend accumulation and distribution. Gutierrez et al. (2009) referred that returns for Asian ETFs traded in the US, have high correlation with US stock exchange markets which shows that the price that trade the ETFs has important relationship with the location and can be influenced by it.

Rompotis (2011) studied fifty (50) index tracking ETFs for the period 2002-2007 and found that the most of the examined ETFs transcended the S&P 500, while their tracking error in relation to the underlying index is serious in short-term horizon. Wong and Shum (2010) examined fifteen (15) world ETFs, which covered the bearish and bullish market for the period 1999-2007 and concluded that the Sharpe Index results show that ETFs consistently produced higher returns in the bullish market compared to the bearish market. Both in bullish and in bearish market the tracking errors are positive, which shows that investors are likely to buy them at a premium. Sabbaghi (2011) investigated fifteen (15) green ETFs for the period 2005-2009 and found that there are positive returns from the begging to the end of 2007, negative to 2008 until 2009.

3.2. ETF vs Mutual Funds

They have been already examined in previous chapters some advantages and disadvantages of ETFs vs Mutual funds. There are a lot of studies that examine ETFs in relationship to mutual funds, as well as which are their differences and their similarities. In this chapter an attempt was made to study the literature in order to make some conclusions for these two investment products and whether they are substitutes or not. Aber et al. (2009) examine US-based ETFs and found that it is ore possible to trade at a premium than at a discount. They also made a comparison between ETFs with traditional index mutual funds that track the same indicator and found that as concerned the tracking errors, mutual funds that track an index are better than ETFs by just 2-3 basis points. Gastineau (2004) made an assessment of the performance between equity ETFs and traditional index funds and found that index funds transcend their reference point, in difference with the equity ETFs. He concluded that the lower performance of ETFs is due to the fact that their dividends are not reinvested (Gastineau, 2004). According to Ruan & Tongshu (2012), ETFs are traded in more active way, have smaller tracking errors, and have lower expense ratios and risk than mutual funds. Furthermore, equity ETFs that track stock indexes or different market sectors have higher liquidity than individual shares (Ruan & Tongshu, 2012).

Miffre (2007) suggested that ETFs are a better substitute of international index funds in terms of their return because they are cost and tax efficient and can be sold short while equity funds cannot. Hughen & Mathew (2009) assess closed-end funds and ETFs in terms of liquidity and arbitrage execution and found that they have differences in their liquidity and in how easily can be used for arbitrage. ETF returns have even closer relationship with their portfolio returns than mutual funds' returns (Sabbaghi, 2011). In addition, both types of mutual funds react to portfolio returns, but overreact to domestic stock market returns (Sabbaghi, 2011). Blitz et al. (2012) examined the performance of indices mutual funds an ETFs traded in the stock exchange market of Europe that track different equity international indices and found that ETFs underperformed their underlying indices. This underperformance is caused due to the taxation of the dividends (Blitz et al., 2012). A lot of disadvantages of the passive funds are due to the dividend taxes. Chang & Krueger (2012) examined the performance of national ETFs and closed-end funds for the period 2002-2011. They found that ETFs have lower performance than the closed-end funds' performance despite their lower expense ratios, as mutual funds have bigger average returns per annual and more efficient ratio between risk and returns (Chang & Krueger, 2012). Harper et al. (2006) made a comparison between risk and return performance of ETFs traded in foreign markets in US and closed-end national funds. They found that ETFs have higher average return and higher Sharpe ratios than country closed-end funds (Harper et al., 2006). They concluded that if someone invests in passive investment products may gain higher return than those of active investment products such as closed-end funds (Harper et al., 2006). Farinella & Kubicki (2018) studied the performance of a group of 61 ETFs and 61 mutual funds for the period 2005-2016. They found that ETFs exhibit lower tracking errors in terms of their benchmark in comparison to mutual funds (Farinella & Kubicki, 2018). They concluded that ETFs have statistically higher annual returns and lower expense ratios.

In the following table are presented in short, the main characteristics of ETFs in comparison to mutual funds in order to make easily an assessment of these two investment strategies.

Table 9 Characteristics of ETFs vs Mutual Funds

Characteristics	ETFs	Mutual Funds
Portfolio Diversification	YES	YES
Trading in the secondary market	YES	NO

Monitoring the performance of the index	YES	YES
Information – Price Diffusion	Continuous	End of day
Management	Passive	Active
Management Costs	Small	Large
Transaction Cost (purchase/sale)	Small	Large
Liquidity Capability	YES	YES
Open Sales / Borrowing of Securities	YES	NO
Numerous Products	Small	Large

3.3. ETFs valuation

The purpose of this chapter is to examine how closely ETFs follow the underlying index. It has been observed several times that there are discrepancies between an ETF and the benchmark (Abner, 2015). A simple and quick way to determine the existence of this phenomenon is to measure the performance of the ETF portfolio and then compare it with the performance of the underlying index (Liebi, 2020). Any difference between the performance of the ETF portfolio and the underlying index is known as "active return" (Liebi, 2020).

When establishing an ETF, the purpose is to design a portfolio that will achieve the performance of a benchmark (structured portfolio strategy) (Zou, 2019). The above process, ie the strategy that aims to achieve the performance of a specific indicator, is also known as "indexing strategy" (Ackert & Tian, 2008). The standard deviation of active return is called tracking error (or Backward-looking tracking error) and is a measure of risk (Ackert & Tian, 2008).

3.3.1. Risk measurement with standard deviation

The standard deviation shows us the degree to which a stock, a bond or an ETF shows volatility, ie whether their price changes (Saha, 1997). Thus, when the Standard Deviation is low it means that the prices are relatively stable and their change is not sharp, whereas when the Standard Deviation is increased, this indicates that the prices change rapidly (Saha, 1997). As an

example, if we have two ETFs, ETF A and ETF B. The formula of standard deviation is the following (Jorion, 1996):

$$S' = \sqrt{S^2}$$

$$Where, \qquad S^2 = \frac{1}{n}\sum_{i=1}^{n}\left(X_i - \underline{X}\right)^2$$

As the ultimate purpose of standard deviation could be said that it is the measurement of risk.

3.3.2. Tracking Error

Tracking error is essentially the deviation between the price behavior of a position or a portfolio and the price behavior of a benchmark (Johnson et al., 2013). This is often the case in a hedge fund, a mutual fund, but also in Exchange Traded Funds, which did not work as effectively as they should, creating an unexpected profit or loss (Johnson, 2009).

Tracking errors are reported as a percentage difference of standard deviation (Rompotis, 2011). This measures the difference between the return that the investor receives and the return of the benchmark which his investment in ETF tries to imitate (track) (Aber et al., 2009). Tracking error is affected by a number of factors, that have been modeled and we know their effect through the "multi-factors risk models" for the benchmarks (Buetow & Henderson, 2012). The manager of an ETF can assess his portfolio exposure to the various risks and then compare them with those of the reference portfolio (Johnson, 2009). Using these differences, he can estimate the "forward-looking tracking error", which is essentially the expected tracking error (Johnson, 2009).

The proof of whether ETFs closely track the benchmark or there are differences between their returns and the returns of the index can be examined by calculating the tracking error. One of the most common ways is to apply regression (Aber et al., 2009):

$$R_{pt} = a + b * R_{it} + e_{pt}$$

Where:

R_{pt} = The return of ETF portfolio, expressed in closing terms

R_{it} = The return of i index, in expressed in closing terms

α = Fixed term (percentage of investment of ETF that is not placed in the specific index)

b = The degree of regression inclination, which measures the systemic risk of ETF

e_{pt} = The returns' deviation between ETF and index

Another way to calculate Tracking error is the following:

$$TE = \sqrt{\frac{\sum_{i=1}^{n}\left(R_p - R_B\right)^2}{N-1}}$$

Where:

TE = Tracking Error

R_p = Return of Manager or Fund

R_B = Return of Benchmark

N = Number of Return Periods

In this method we use the standard yield deviation between the ETF and the underlying index.

The tracking error is expressed by the standard errors of the regression residues. The above regression further provides an indication of the return-risk relationship for the ETF, through the factor b, which measures the inclination of the regression and therefore the size of the systemic risk of the ETF (Johnson et al., 2013). When *b* is less than the unit means that it follows a defense investment strategy and clearly its returns have a lower risk than the returns of the benchmark (Johnson et al., 2013). Conversely, if b is larger than the unit, means that it follows an aggressive investment strategy and its returns pose a higher risk than those of the benchmark. (Aber et al., 2009)

3.4. Portfolio Theory and ETFs

Modern Portfolio Theory (MPT) describes how the return and risk of an investment portfolio are calculated and how investors can allocate their funds among alternative placements to optimize their return (Hamm, 2010). The main tools of the Portfolio Theory are Markowitz's portfolio selection theory, the Capital Asset Pricing Model (CAPM), the Capital Market Line and the Securities Market Line. Modern Portfolio Theory was developed in 1952 by Harry Markowitz through his work “Portfolio Selection”, published in the Journal of Finance (Hamm, 2010). Markowitz was honored for his work (along with Merton and Sharpe) with the 1990 Nobel Prize and, until the publication of Markowitz's work, investors focused on the return and risk of each security, regardless of the rest, in order to build their portfolio (Johnson & Lian, 2014). Their goal was to select the securities with the best characteristics of risk and return and to include them in their portfolio (Johnson & Lian, 2014). Markowitz proposed the selection of securities in order their portfolio to have optimal return and risk characteristics as a whole,

using diversification, regardless of the particular characteristics of the individual securities (Love, 1979).

3.4.1. Markowitz model

According to Markowitz, the risk faced by an investor is significantly reduced if he divides his wealth into more than one stock. The modern conception of portfolio theory is based on this thought. In essence, the total risk of an investor is significantly reduced if he invests his money in a portfolio of shares, against an individual share (Marling & Emanuelsson, 2012).

Examining an investment individually, its evaluation is based on its expected rate of return and the risk of investment (Popa, 2017). The risk is measured by the variation of the probability distribution of all possible returns expected from the investment (Popa, 2017). And because entities usually have more than one investment, they actually own an investment portfolio (Love, 1979). And this is because in this way we can increase the expected return or reduce the risk of our investments (especially if our investments are not correlated) (Amu & Millegard, 2009).

The Portfolio Theory, as developed by Markowitz (1952, 1959), is based on the following hypotheses:

- investors have a specific and individual investment horizon
- For investors, each individual stock is represented by a probability distribution of expected returns. The expected value of this distribution is a measure of the expected return on the stock and the fluctuation (or standard deviation) of the returns provides a measure of its risk
- an individual stock portfolio can be fully described by the expected portfolio performance and its volatility portfolio performance
- Investors follow the principle of rational investment behavior. This principle is determined by two basic assumptions: (a) the investor prefers the highest returns to the lowest for each particular level of risk and (b) the investor prefers the most reliable returns to the riskiest for each particular level of return.

If we have *n* assets and a portfolio with weights that add up to the unit. To find the set of portfolios with the minimum-variance set and the minimum variance point we consider a random average value. We ask to find the portfolio with the minimum variation that has this average price. That is:

$$min\frac{1}{2}\sum_{i,j-1}^{n} w_i w_j \sigma_{ij} \ , \qquad so\ that: \sum_{i-1}^{n} w_i \underline{r_i} = \underline{r}$$

$$\sum_{i-1}^{n} w_i = 1$$

This problem is known as the Markowitz problem. The solution is given using Lagrange multipliers. We form Lagrangian:

$$L = \frac{1}{2}\sum_{i,j-1}^{n} w_i w_j \sigma_{ij} - \lambda\left(\sum_{i-1}^{n} w_i \underline{r_i} - \underline{r}\right) - \mu\left(\sum_{i-1}^{n} w_i - 1\right)$$

We take some derivatives with respect to w_i, λ, μ and set them equal to zero. The equations we get are made:

$$\sum_{j-1}^{n} w_i \sigma_{ij} - \lambda \underline{r_i} - \mu = 0 \; for \; i = 1 \ldots n$$

$$\sum_{i-1}^{n} w_i \underline{r_i} = \underline{r}$$

$$\sum_{i-1}^{n} w_i = 1$$

The above is a system of n + 2 equations with n + 2 unknowns w_i, λ, μ.

In the above we have assumed that short selling is allowed. Otherwise, the minimization problem takes shape:

$$min \frac{1}{2}\sum_{i,j-1}^{n} w_i w_j \sigma_{ij}$$

$$so \; that: \sum_{i-1}^{n} w_i \underline{r_i} = \underline{r}$$

$$\sum_{i-1}^{n} w_i = 1$$

$$w_i \geq 0 \; for \; i = 1 \ldots n$$

and is known as a quadratic program.

3.4.2. Two-Fund Theorem

Black's (1972) two-fund theorem states that the holding rates of the various asset classes of any portfolio with minimal variation are a linear combination of the holding rates of the different asset classes of any two other holding portfolios with a minimum fluctuation. Two-fund theorem can also be used in the event that there is a restriction that the participation rates of

the various categories of assets in the portfolio do not take negative values and their sum is equal to one (Wenzelburger, 2010). This approach is called sign-constrained optimization.

If we take two solutions w^1, w^2 of the Markowitz problem we easily notice that each combination of the form $aw^1 + (1-a)w^2, -\infty < a < \infty$ is also a solution of the Markowitz problem (Waring & Whitney, 2009). But what is most important is the following.

Theorem: There are two efficient portfolios so that each efficient portfolio can be expressed in terms of average price and volatility as a combination of them. In other words, investors looking to find efficient portfolios need to invest in combinations of two negotiable mutual funds (Waring & Whitney, 2009).

The results of this theorem are very important as it essentially tells us that two negotiable mutual funds are enough to be able to construct the investment choice of each investor (Wenzelburger, 2010). Of course, this assumption presupposes that all investors are interested in the average price and the fluctuation (Waring & Whitney, 2009).

3.4.3. Capital Asset Pricing Model (CAPM)

The basic model for calculating the required return is the Capital Asset Pricing Model (CAPM). The model indicates that the required return of an ETF $E(r_e)$ is equal to the return of the risk-free security (r_f) plus a margin based on the ratio of the security (β_e) and the market risk premium ($E(r_m) - r_f$) (Tampakoudis & Soumpeniotis, 2018). The calculation equation of the expected return is the following:

$$E(r_e) = r_f + \beta_e\big(E(r_m) - r_f\big)$$

Where:

$E(r_e)$ = Required return of ETF

r_f = risk-free rate

β_e = beta coefficient

$(E(r_m) - r_f)$ = market risk premium

Beta coefficient is a relative measure of an ETF's risk and measures its volatility relative to the market. If the ETF changes just like the market, the rate b will be equal to unit. The higher the value of beta coefficient, the higher the exposure of the ETF to systematic risk or market risk and the higher the return required by investors (Tampakoudis & Soumpeniotis, 2018). The investment risk is expressed in the individual risk premium [$\beta_e (E(r_m) - r_f)$] and is the reward required by investors to assume the risk involved in each ETF. The risk premium of the securities is equal to the product of the factor b on the market risk premium ($E(r_m) - r_f$)

(Tampakoudis & Soumpeniotis, 2018). The coefficient b is calculated by dividing the correlation of the bond yields with the market yields by the fluctuation of market returns ($\beta_e = COV_{e,m}/\sigma^2_m$) (Tampakoudis & Soumpeniotis, 2018).

4. Alternative ways to use ETFs

4.1. Asset allocation

According to Miffre (2007), asset allocation is a method of diversification which positions assets among major investment categories. While asset allocation may help reduce the investment risk, it does not ensure a profit or guarantee against a loss (Miffre, 2007). The asset allocation of a portfolio is a strategy according to which it is decided the assets (cash, interest-bearing bills, government bonds, corporate bonds, commercial securities, shares, precious metals, real estate), the currencies, the investing percentage for each investment option, the time horizon and the geographical area (Amenc et al., 2010).

If we take into consideration the different issues related to active fund management, more and more asset allocating managers are likely to choose investing products that track the index closely and offer investors the total or the biggest part of the performance of a certain asset class (Hall, 2013). ETFs are now considered by asset allocators that give them the best combination of liquidity and tracking accuracy in a cost-effective way, and are chosen by both asset allocators and institutional investors when they construct their portfolios (Hall, 2013).

The main advantage of Exchange Traded Funds to asset allocators is the fact that they are simple, flexible, transparent, easily liquidated and cost effective. Furthermore, institutional investors can take advantage of the diversification of the exposure in a selected asset class through a single trade with low risk and with access to a wide variety that previously were unavailable for them (de Freitas & Barker, 2005). ETFs give the opportunity to a portfolio to be adjusted quickly and easily when market changes, giving the ability to purchase or sell a whole asset class with just a single order (de Freitas & Barker, 2005). Due to the fact that most ETFs track an index, the composition of their underlying indexes are public in regular intervals, traders are informed about their exposure in the stock exchange, ETFs are as liquid as underlying markets quote competitive prices during the day of trading (Hall, 2013).

4.2. Cash management

Before making the final decision to invest in the ETFs market, investors follow the various analyzes around this issue. The right time, according to experts, is as soon as a large inflow of money is observed. So, when they observe this change, the decision to invest in the specific

product is made. Investors have the right to invest in ETF shares in the short term, so that they can take advantage of any favorable circumstances that arise (Hill et al., 2015). In the event of an immediate liquid need, he can liquidate the ETFs without any problems (Hill et al., 2015).

4.3. Core/Satellite Strategy

In portfolio management, the core / satellite approach enables more efficient management of variance, portfolio fluctuation while at the same time allowing overperformance in relation to the market (Amenc & Goltz, 2007).

The purpose of the "core" investment is to reproduce the market performance as faithfully as possible, while the "satellite" investments achieve a better return than the market (Amenc et al., 2010). ETFs are products that offer access to a diversified portfolio at no particular cost and thus constitute the appropriate financial tool for "core" investment (Amenc et al., 2010). On the other hand, "satellite" investments are selected in such a way as to have a low correlation with the "core" investment and at the same time to achieve over-performance in relation to the market (Walsh, 2013).

Exactly how the core / satellite strategy works is shown with an example in figure 15. An investor has 100.000 € and intends to allocate 60% of his capital as a "core" investment and the remaining 40% in "satellite" investments.

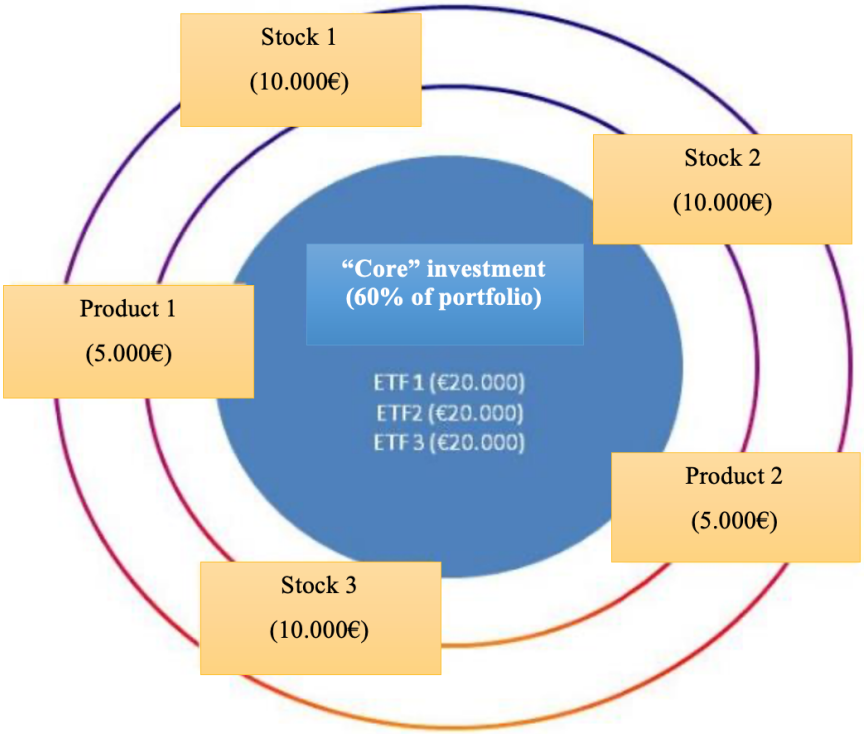

Figure 15 Portfolio "core/satellite"

4.4. Hedging

Hedging is directly connected with securities based on derivatives, such as Futures, Options, Swaps, Forwards, and Over-The-Counter (OTC) securities. Hedging is mainly used by large and sophisticated investors, due to the fact that they have to use advanced mathematical methods for the pricing of derivative investment products (Schmidt, 2020). ETFs can be used for either partial or total hedging by providing protection against sharp fluctuations in securities' values in the following alternative ways (Alexander & Barbosa, 2007):

- An investor who owns shares can hedge his risk by selling openly equal value ETFs of the stock index after he has first borrowed them.
- At the same time, an investor who holds Futures on a certain index can hedge his position by making an open sale of ETFs of equal value on the same index after first borrowing them.
- Finally, an investor who holds ETFs on a particular index may, in return for his position, openly sell futures of equal Performance Contracts on the same index.

According to Schmidt (2020), the main advantage of hedging with the use of ETFs is the fact that is accessible by small investors, who have the ability to buy or sell small increments of ETFs, but previously there were minimum requirements associated with typical protective strategies. There are a lot of ways that individual investors can use Exchange Traded Funds to hedge their portfolios:

1. Stock Market Hedging

Derivative products, such as futures and options are used by investors in order to hedge their positions in stocks or bonds and one very common and actively traded tool for the stock market are S&P 500 Index futures, which are used by a large variety of institutions, such as pension funds or mutual funds (Hill & Teller, 2010). Exchange Traded Funds such as ProShares S&P 500 (SH) move inversely to S&P 500 Index, so they can be used for hedging strategies in place of futures contracts, for taking short position in the general equity market (Alexander & Barbosa, 2008). This is because, if the stock market falls, the stock price of the inverse fund will have an increase in its value which will hedge some losses suffered by stocks in the portfolio (Schmidt, 2020).

2. Hedging with currencies

Previously, if investors wanted to hedge their investment in foreign currency, the only solution was to use currency forwards, futures or options, which are rarely available to individual investors as they are traded Over-The-Counter (Alexander & Barbosa, 2007). Forwards allow

one party to assume the risk of long position and the other to assume the risk of short position in a currency, depending on their special needs to hedging (Burney, 2012). If we suppose that investors want to hedge the foreign exchange rate risk of a long position in non-US currency investments, they purchase funds that take short position in US dollar (for example, Invesco DB US Dollar Bearish – UDN), while the other party, who is based outside of the US, can take long position in US dollars by investing in funds like Invesco DB US Dollar Bullish – UUP, in order to protect their portfolios (Burney, 2012). The accuracy when matching the value of portfolios to the hedged position depends on the investor, but as ETFs have high liquidity and, unlike options and futures, do not have expiration date, can easily make the required adjustments (Schmidt, 2020).

3. Inflation Hedging

Inflation hedging with ETFs hedges against unknown and unpredictable forces. While inflation has historically fluctuated in small areas, it can easily move up or down during an economic cycle (Alexander & Barbosa, 2007). Several investors search commodities as a type of hedging against inflation, based on the fact that if inflation increases, the price of commodities will increase too (Hill & Teller, 2010). Theoretically, even though inflation will increase, other asset classes such as equities may not be increasing, and investors can participate in growing investments in commodities (Hill & Teller, 2010). There are various ETFs that provide access to precious metals and other commodities which can be traded on a typical exchange (Schmidt, 2020). There is a wide variety of commodity ETFs such as Invesco DB Commodity Tracking (DBC) (Schmidt, 2020).

4.5. Arbitrage

Arbitrage keeps the ETFs closely aligned with the NAV of their underlying assets, unlike mutual funds that can trade at significant premiums, or discounts, to the NAV of their underlying shares (Rosenberg et al, 2008). But unlike mutual funds, ETFs trade just like a stock on a market exchange, so ETF's prices can fluctuate during the day, as investors buy and sell shares (Maluf & Albuquerque, 2013). For this reason, ETFs is an appropriate asset that can be arbitraged. These trades provide liquidity in ETFs and transparency in price. Market-makers and Authorized Participants have incentives to trade in ETF primary and secondary markets if they can benefit from arbitrage opportunities (Ackert & Tian, 2008). There is a possibility of temporary differences in the prices of different financial values due to the strong forces of supply and demand (Rosenberg et al, 2008). For example, the trading price of an ETF share

may be temporarily lower than its theoretical value (NAV / unit) or vice versa (Rosenberg et al, 2008).

The situation described above can result in a profit for the investor:

- In case the trading price of the ETF share is lower than its theoretical price (NAV / unit), if the investor buys the "undervalued" ETF shares and simultaneously sells the shares of the underlying index in the market (Hilliard, 2014).
- In case the trading price of the ETF share is higher than its theoretical price (NAV / unit), if the investor buys the shares that make up the index that monitors the ETF and at the same time sells the ETF shares in the market (Hilliard, 2014).

The above procedure of arbitrage is presented in the following figure:

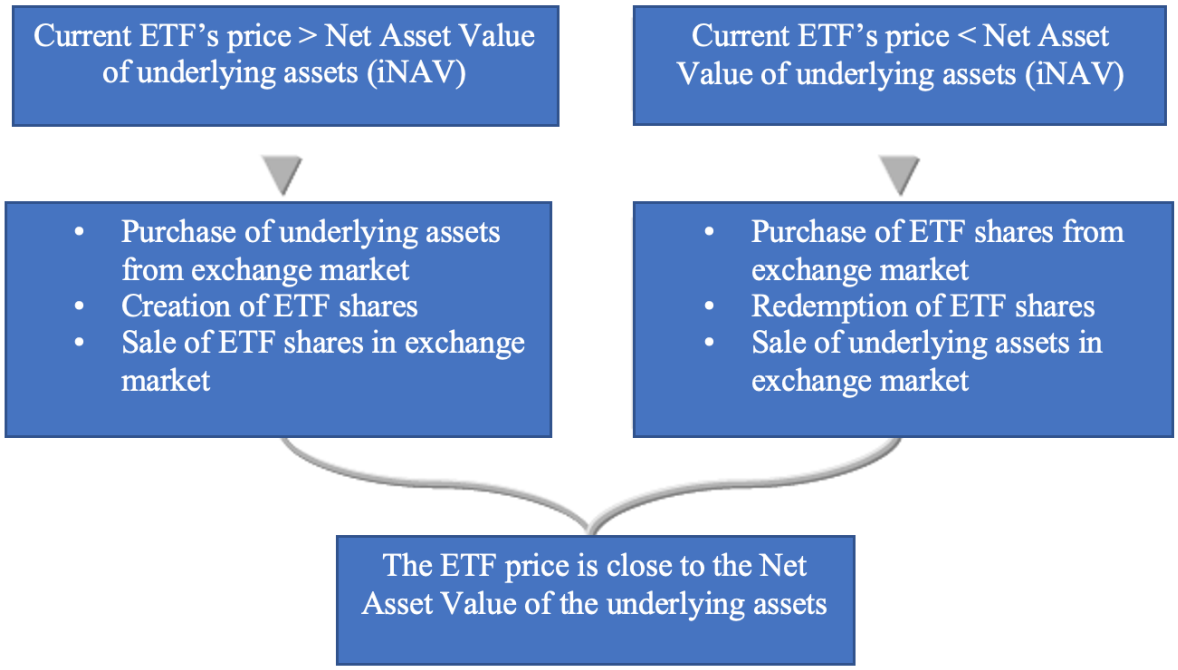

Figure 16 The arbitrage procedure in ETFs

There are two forms of arbitrage in which market-makers and APs can engage. Firstly, as it is referred above, they can benefit and make profit if they create or redeem ETF shares, if the fund's NAV has a deviation from the ETF share price (Ben-David et al., 2012). The second type of arbitrage involves quoting bid and ask prices in exchanges and the profit from the spread bid-ask (Ben-David et al., 2012). Whenever a broker submits a buy or sell order, the market makers are ready to trade and almost hedge their position to keep a corresponding book (Grill et. al, 2018).

A different ETF arbitrage strategy is if a trader takes a long position in a certain ETF and at the same time takes a short position in a similar ETF (Hilliard, 2014). For example, there are

several ETFs that track the S&P 500 Index very similar, but their intraday prices can diverge. This is known as pairs trading and the arbitrageur can gain an arbitrage opportunity when the price of an ETF is at discount in comparison to another similar ETF (Maluf & Albuquerque, 2013). However, the mentioned opportunities close very quickly, so arbitrageurs have to recognize the inefficiency and react rapidly (Zucchi, 2019).

In conclusion, ETF arbitrage is not a strategy for a long-term horizon. Such mispricings are observed for very short periods of time, and the arbitrage opportunities close rapidly within a few minutes (Maluf & Albuquerque, 2013). But both the arbitrageur and the market can take advantage of ETF arbitrage. The arbitrageur can gain from the temporary spread profit and lead the ETF market again to balance by driving the ETF's prices close to their Net Asset Value, as the arbitrage closes (Zucchi, 2019).

4.6. Transition Management

ETFs can be used during the extensive restructuring phase of a portfolio to ensure continuous investment in the market for as long as the portfolio restructuring lasts (Zucchi, 2019).

For example, in the event that an insurance fund changes manager or advisor or in the event of regulatory changes, this practice is considered appropriate in order to maintain the investment position of the fund and its value and at the same time reduce the risk, the management costs and the total costs incurred during its implementation.

5. ESG ETFs Investing

ESG Investing has as its main characteristic the making of investment decisions based on environmental, social and governance factors, apart from the purely financial ones. ESG Investing is increasingly dominating the financial markets, as both independent and institutional investors take ESG criteria into account for their investment strategies. It is now a given that the integration of ESG factors into investment decisions leads to the finding and prevention of corporate risks, as well as to the identification of competitive advantages, which otherwise would not be visible to investors who study exclusively the financial performance of the underlying securities.

According to Eurocapital (2020), the trend towards investing in mutual funds or ETFs with a high ESG score during 2020 has increased dramatically. During the quarantine period (April-June), investors internationally increased their inflows into ESG management products by $ 71.1 billion, reaching the size of total assets under management (AUM) at 40 trillion. dollars. The inflows in this quarter exceeded the total inflows in the last five years. However, the impact

of the implementation of the new investment standards is not limited to the choice of values to be invested, but also creates a pressure in the implementation of new corporate policies. Choosing a company to invest in or even choosing the products of a company that moves with a high responsibility score also pushes the competition to adopt ESG practices.

According to UNCTAD (2020), the growth of ESG ETFs shows that investors and fund markets are more aware of ESG factors, and so the ETF market. For this reason, we observe a huge growth in the number and assets under management of ESG ETFs in a global level, and now is a very strong market sector in the global ESG capital universe, regarding the growth rate and the diversity (UNCTAD, 2020).

5.1. ESG Categories

ESG ETFs are categorized in categories depending the three criteria as following:

Table 10 ESG ETFs Categories

Environmentally Responsible	Socially Responsible	Responsible Governance
Carbon intensity	Affordable Real Estate	Board flag
Fossil Fuel reserves	Education	Board Independence
Water stress	Major Disease Treatment	Board diversity
Alternative Energy	Healthy Nutrition	Entrenched Board
Green building	Global Sanitation	Overboarding
Pollution Prevention	Human Rights Violations	Shareholder rights
Water sustainability	Customer Controversies	Fund ownership
	UN Principles Violations	Poison Pill
	Catholic values	Executive Compensation
	Sharia compliant Investing	Accounting flags
	Adult entertainment	
	Alcohol	
	Gambling	
	Nuclear power	
	Weapons involvement	
	Firearms	
	Predatory lending	
	GMO involvement	

Source: https://etfdb.com/esg-investing/

5.1.1. Environmentally Responsible ETFs

"Environmentally responsible" ETFs can be assessed in three measurements: Revenue exposure to environmental impacts, serious environmental conflicts and exposure to revenue to sustainable impact solutions (this measure also falls into the social category)

"Carbon intensive" ETFs can be evaluated by one main measurement: weighted average carbon intensity.

"Fossil fuel reserves" ETFs can be assessed in two measurements: Fossil fuel reserves and high impact fossil fuel reserves. Fossil fuel reserves measure the percentage of the market value of an ETF in companies holding fossil fuel reserves.

"Water stress" ETFs can be assessed in five measures: High Water Risk Business Division, High Water Risk Geography, High Water Stress Exposure, Moderate Water Exposure and Low Water Stress Exposure.

"Energy efficient" ETFs can be evaluated in one measurement: Revenue report on energy efficiency. This measure is the ETF's exposure to energy efficiency and is calculated as the weighted average of each company's portfolio of revenue generated from energy-efficient goods and services.

"Alternative energy" ETFs can be evaluated in one measurement: Alternative energy income report. This measure is the ETF's exposure to Alternative Energy and is calculated as the weighted average portfolio of each company's revenue generated from Alternative Energy goods and services. Higher scores on this alternative energy measurement improve the ESG rating of an ETF.

"Green Building" ETFs can be evaluated in one measurement: Revenue report in Green Building. This measure is the ETF report on the Green Building and is calculated as the weighted average of each company's portfolio of revenue generated from Green Building products and services.

"Pollution prevention" ETFs can be evaluated in one measurement: Pollution revenue reporting. This measure is the ETF Pollution Prevention report and is calculated as the weighted average portfolio of each company's revenue generated from Pollution Prevention products and services.

"Water sustainability" ETFs can be evaluated in one measurement: Revenue report on sustainable water. This measure is the ETF report on Sustainable Water and is calculated as

the weighted average of each company's portfolio of revenue generated from Sustainable Water goods and services.

The following table includes broad ESG Investing scores for the top 10 Responsible Investing ETFs listed on U.S. exchanges that are currently tracked by ETF Database and they are ranked according to their ESG score.

Table 11 Top 10 ESG ETFs (Environmentally Responsible)

Symbol	ETF Name	ESG Score	ESG Score Peer Percentile (%)	ESG Score Global Percentile (%)	Weighted Average Carbon Intensity (Tons of CO2e/$M Sales)	Sustainable Impact Solutions (%)
BBAX	JOMorgan BetaBuilders Developed Asia ex-Japan ETF	8.81	95,66%	96,71%	219,65	7,87%
RNDM	First Trust Dveloped International Equity Select ETF	8.79	97,18%	96,64%	123,98	7,00%
FLCA	Franklin FTSE Canada ETF	8.78	96,94%	96,57%	263,26	1,24%
FINX	Global X FinTech ETF	8.72	97,92%	96,25%	7,27	0,44%
BBCA	JPMorgan BetaBuilders Canada ETF	8.69	96,47%	96,13%	301,09	1,47%
ESDG	iShares ESG Aware MSCI EAFE ETF	8.68	96,24%	96,11%	103,51	7,90%
USD	ProSHares Ultra Semiconductors	8.66	98,32%	96,03%	56,93	7,98%
SGDM	Sprott Gold Miners ETF	8.65	88,00%	95,97%	342,19	0,00%

ICLN	iShares Global Clean Energy ETF	8.64	92,21%	95,85%	726,5	50,43%

Source: https://etfdb.com/esg-investing/environmental-issues

5.1.2. Socially Responsible ETFs

"Socially Responsible" ETFs can be assessed in three measures: Revenue exposure to social impact, revenue exposure to sustainable impact solutions (this measure also falls within the environmental sector) and SRI exclusion criteria.

"Affordable Real Estate" ETFs can be measured in one measure: Revenue report on affordable real estate, which is the ETF's exposure to affordable real estate and is calculated as the weighted average portfolio of each company's revenue from affordable goods and services.

"Education" ETFs can be evaluated in one measurement: Revenue report on education, which is the ETF exposure on education and is calculated as the weighted average portfolio of each company's revenue generated from education goods and services.

"Treatment of major disease" ETFs can be evaluated in one measure: Revenue exposure on treatment of major disease, which is the ETF exposure to major disease treatment and is calculated as the weighted average portfolio of each company's revenue generated from major disease products and services.

"Healthy Nutrition" ETFs can be evaluated in one measure: Revenue Exposure to Nutrition, which is the ETF Nutrition Report and is calculated as the weighted average of the portfolio of each company's revenue generated by Nutrition products and services.

"Global sanitation" ETFs can be evaluated in one measurement: Revenue Exposure to Sanitation, which is the ETF's sewerage exposure and is calculated as the weighted average portfolio of each company's revenue generated from sanitary products and services.

"SME financing" ETFs can be assessed on the basis of one measure: Revenue Exposure to SME Finance, which is the ETF exposure to SME finance and is calculated as the weighted average of the portfolio of each company's revenue generated from SME Finance goods and services.

"Human rights violations" ETFs can be assessed in three measures: Human rights violations, human rights violations or watch list, and serious human rights controversies.

"Labor rights violations" ETFs can be assessed in three metrics: Labor rules violations, Labor rules or Watch List violations, and Serious Labor disputes.

"Customer Disputes" ETFs can be assessed in one measure: Serious customer disputes, which is calculated as the percentage of the market value of an ETF exposed to companies facing several serious customer disputes related to anti-competitive practices, customer relationships, marketing and advertising, privacy and data security or product security.

"UN principles Violations" ETFs can be assessed in two measurements: Global Compliance Compliance Violation and Global Compact Compliance Violation or Watchlist.

"Sharia-compliant" ETFs can be evaluated in one measure: Islamic non-compliant, which is calculated as the percentage of the market value of an ETF exposed to companies that do not comply with Sharia investment principles.

"Adult Entertainment" ETFs can be evaluated in one measurement: Adult entertainment engagement. Adult entertainment participation is calculated as the percentage of the market value of an ETF exposed to adult entertainment related companies in the categories of producers, distributors, retailers and property.

The following table includes broad ESG Investing scores for top 10 Responsible Investing ETFs listed on U.S. exchanges that are currently tracked by ETF Database and they are ranked according to their ESG score.

Table 12 Top 10 ESG ETFs (Socially Responsible)

Symbol	ETF Name	ESG Score	ESG Score Peer Percentile (%)	ESG Score Global Percentile (%)	Weighted Average Carbon Intensity (Tons of CO2e/$M Sales)	Sustainable Impact Solutions (%)
EUFN	iShares MSCI Europe Financials ETF	10.0	100,00%	100,00%	3,42	0,84%
PQDI	Principal Spectrum Tax-Advantaged Dividend Active ETF	10.0	100,00%	100,00%	141,47	1,18%
EWA	iShares MSCI-Australia ETF	9.9	100,00%	99,43%	196,6	6,67%

FLAU	Franklin FTSE Australia ETF	9.8	99,01%	99,36%	205,37	6,53%
EWN	iShares MSCI Netherlands ETF	9.77	99,72%	99,34%	51,51	4,93%
SMH	VanEck Vectors Semiconductor	9.63	99,05%	99,22%	87,77	6,56%
FKU	ProSHares Ultra Semiconductor ETF	9.55	99,15%	99,14%	187,35	6,35%
FPEI	First Trust Institutional Preferred Securities & Income ETF	9.54	95,17%	99,13%	272,54	0,81%
EWU	iShares MSCI United Kingdom ETF	9.47	98,86%	98,97%	110,21	2,43%

Source: https://etfdb.com/esg-investing/social-issues/

5.1.3. Responsible Governance ETFs

"Responsible governance" ETFs can be assessed in one measurement: Serious governance controversies, which are the percentage of the market value of an ETF in companies facing several serious governance disputes related to bribery, fraud, controversial investments, and governance structures.

"Board flag" ETFs can be evaluated in one measurement: Board flag, which is the ETF's exposure on the Board flags and is calculated as the percentage of the market value of a portfolio exposed to companies "below average" relative to its global peers based on the MSCI's evaluation of its structure and effectiveness.

"Board Independence" ETFs can be evaluated in one measurement: Lack of Independent Majority of the Board of Directors and it measures the percentage of the market value of an ETF exposed to companies that lack an independent majority of the Board of Directors.

"Board Diversity" ETFs can be evaluated in three metrics: There are no female directors, three or more female directors and females represent 30% of the directors.

"Overboarding" ETFs can be evaluated in one measurement: Overboarding, which is calculated as the percentage of the market value of the ETF exposed to companies that have been labeled as excessive directors.

"Shareholders' rights" ETFs can be assessed in six measures: negative directors vote, ownership and control flag, one share one vote, absence of annual board elections, no majority voting and significant remuneration votes.

"Fund Ownership" ETFs can be assessed in three metrics: Shareholder control, shareholder concern control and cross-shareholdings.

"Poison Pill" ETFs can be evaluated in one measurement: Poison Pill, which is calculated as the percentage of the market value of an ETF exposed to companies that have adopted shareholder rights plans.

"Executive Compensation" ETFs can be evaluated in four metrics: Pay Flag, No Pay Performance Link, Lack of Internal Pay Equity, and Executive Pay Non-Disclosure.

"Accounting flag" ETFs can be evaluated in one measurement: Accounting flag, which is calculated as the percentage of an ETF's market value exposed to companies ranked "below average" relative to their global peers on MSCI's assessment of accounting aggressiveness.

The following table includes broad ESG Investing scores for the top 10 Responsible Investing ETFs listed on U.S. exchanges that are currently tracked by ETF Database, and they are ranked according to their ESG score.

Table 13 Top 10 ESG ETFs (Responsible Governance)

Symbol	ETF Name	ESG Score	ESG Score Peer Percentile (%)	ESG Score Global Percentile (%)	Weighted Average Carbon Intensity (Tons of CO2e/$M Sales)	Sustainable Impact Solutions (%)
EUFN	iShares MSCI Europe Financials ETF	10.0	100,00%	100,00%	3,42	0,84%

PQDI	Principal Spectrum Tax-Advantaged Dividend Active ETF	10.0	100,00%	100,00%	141,47	1,18%
EWA	iShares MSCI-Australia ETF	9.9	100,00%	99,43%	196,6	6,67%
FLAU	Franklin FTSE Australia ETF	9.8	99,01%	99,36%	205,37	6,53%
EWN	iShares MSCI Netherlands ETF	9.77	99,72%	99,34%	51,51	4,93%
SMH	VanEck Vectors Semiconductor	9.63	99,05%	99,22%	87,77	6,56%
FKU	ProSHares Ultra Semiconductor ETF	9.55	99,15%	99,14%	187,35	6,35%
FPEI	First Trust Institutional Preferred Securities & Income ETF	9.54	95,17%	99,13%	272,54	0,81%
EWU	iShares MSCI United Kingdom ETF	9.47	98,86%	98,97%	110,21	2,43%

Source: https://etfdb.com/esg-investing/governance-issues/

5.2. ESG Metrics Explanation

MSCI ESG Research LLC evaluates companies with regard to their risks and opportunities around environmental issues, social and impact investing, and good governance practices. MSCI includes more than 11.800 equity and bond issuers, in more than 400.000 individual securities, leveraging their research to generate ESG ratings and measurements for approximately 24.000 ETFs and mutual funds (MSCI official website, 2021). These metrics help investors better understand and measure the viability characteristics of the overall ETF portfolio and rank or evaluate ETFs based on a wide range of ESG exposure categories. According to ESG ETF Channel (2021), the largest ESG ETF is the First Trust Preferred

Securities & Income ETF FPE with $ 7,48 billion in assets. Last year, the EST ETF with the best performance was USD at 82,94%. The most recent ETF launched at ESG was the Global X Clean Water ETF AQWA on 04/08/21.

According to MSCI ESG Research LLC there are 77 ESG metrics for ETFs, and according to them they are divided into three levels as follows:

- MSCI ESG Quality Score: Evaluates the ability of certain underlying securities to manage medium-term risks and to identify and exploit potential opportunities arising from environmental, social and governance factors.
- ESG Score Peer Percentile: Measures the way that the ESG ETF's score ranks in relationship to other funds in the same peer group.
- ESG Score Global Percentile: Measures how the ETF ESG score is ranked relative to all funds in the coverage of the MSCI ESG Fund metrics.

5.3. ESG ETFs: Trends, drivers and prospects

According to UNCTAD (2020), while the fund market worldwide increasingly embraces ESG criteria, the quantity of ESG ETFs has grown, from 39 in December 2009 to 221 in June 2019 (figure 17 presents their number and their AUM for the period 2009-2019). Especially, in 2015, we observe a net increase of 153 ESG ETFs in only four years. In 2018 the global quantity of ESG ETFs increased by 47,5%, which is a higher rate than the growth of non-ESG ETFs.

In the same way, the AUM of ESG ETFs has increased at a compound annual growth rate of 15,8% since 2009, according to figure 17. During the period 2009-2019, AUM became 4 times bigger, as it grew from 6 billion USD to 25 billion. This fact is due to the large positive net

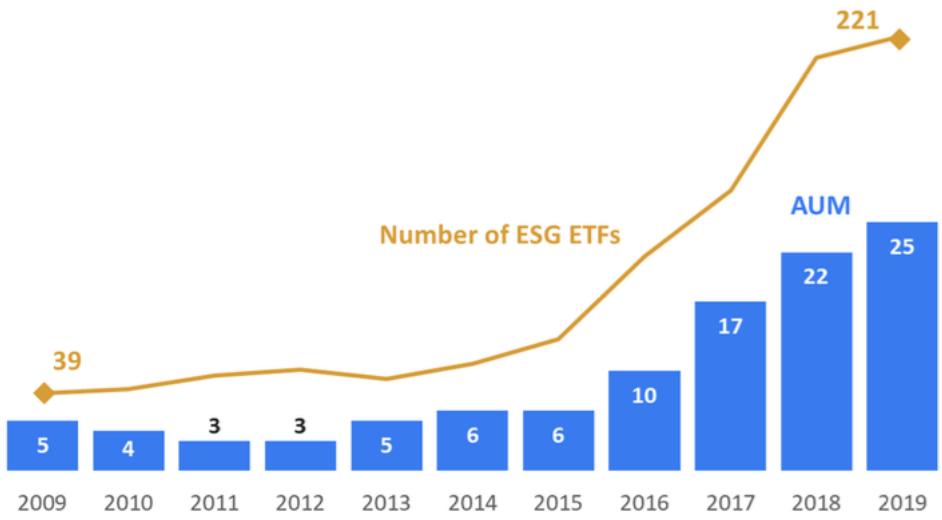

Figure 17 Number of ESG ETFs worldwide and assets under management (AUM), 2009-2019 (Source: UNCTAD)

investments during this period, which is a trend that has grown since 2015 and is dominant in Europe (figure 18).

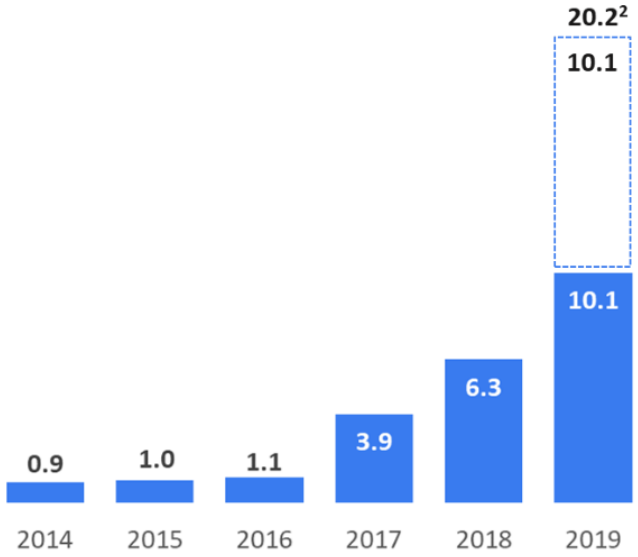

Figure 18 Net inflows of ESG ETFs worldwide, 2014-2019 (Billions of dollars)

The two main drivers for the significant growth in the number and the AUM of ESG ETFs are the following (BNP Paribas, 2019):

1. Several countries have created more appropriate regulations in order to foster more sustainable investment practices.
2. A lot of investors considered that the investment vehicles with sustainability criteria in their portfolios are "must-have" rather than "nice-to-have".

According to Morningstar (2018), there are also several other factors that supported the growth of ESG ETFs. For example, there is no systematic performance penalty for sustainable investing and there is plenty of ESG data and technological improvements in order to have a transparent market (Morningstar, 2018). In addition, a wide range of investors focus on a wider range of long-term risks and as a result, awareness around sustainable investing has increased (Morningstar, 2018). Last but not least, the ESG trend has been supported by index and investors or fund providers are responding to the rising level of demand for sustainable investing (Morningstar, 2018).

Regarding the geographical distribution of ESG ETFs, according to UNCTAD (2020), Europe has 59% of total funds (figure 19). The US account for 41% of total AUM, and Europe accounts for 56%, which is the main driver of ESG ETF growth, as an increasing number of private and

institutional investors give priority to sustainability themes in their investing products (UNCTAD, 2020).

In contrast, the US ESG ETF market is smaller than Europe's one, despite being the largest financial market worldwide. Even though this fact reflects the minor adoption of regulations with ESG criteria and integration of ESG and sustainable development considerations into investment decisions by US institutional and private investors compared with their European counterparts, both AUM and net inflows have bigger growth rate in the US the last few years (UNCTAD, 2020). This is due to the fact that private investors think that financial products with sustainability criteria, such as ESG ETFs have a lot of potential and advantages (Morningstar, 2018). For this reason, the demand has driven in a new introduction of 52 ESG ETFs during the last 3 years, which are the 75% of all ESG ETFs that exist currently in the US (UNCTAD, 2020).

According to UNCTAD (2020), despite the extraordinary increase in the last few years, the value of AUM of ESG ETFs in US and Europe accounts only for 0,03% and 0,2% of their relative stock market capitalization, and 0,31% and 1,15% of the AUM of ETFs. This fact shows that their share in ETF and fund markets is at a primary stage (UNCTAD, 2020).

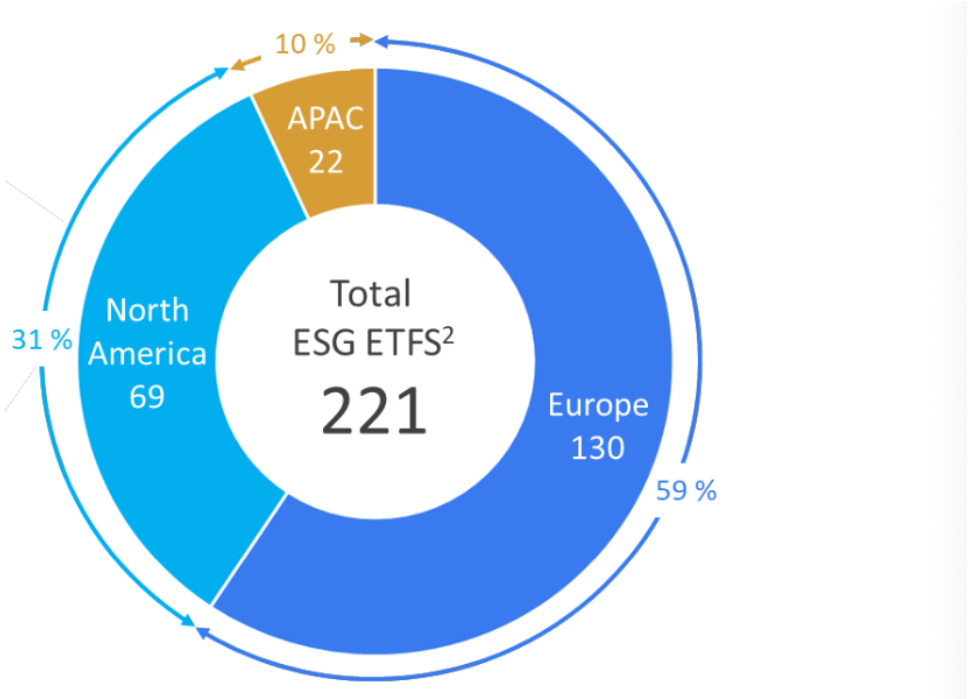

Figure 19 ESG ETFs by region, 2019 (Number of ETFs and %) Source: UNCTAD calculation based on TrackInsight data

The development of the sustainable investment market is likely to grow more, due to various factors, such as changes in the values and behavior of investors, the results of regulations and

standards, cost reduction and established economic performance (UNCTAD, 2020). EST ETFs are most expected to become a basic part of this development (UNCTAD, 2020).

Figure 20 shows three possible scenarios for the projected increase in ESG ETF assets from 2020 until 2030, and everything shows an EST ETF market of over $500 billion by 2030 (UNCTAD, 2020). With data the dynamics in sustainable investment, it is likely that ESG products could meet a turning point, where non-ESG products will be devalued to affect their negative externalities and the ESG market will increase faster than expected (UNCTAD, 2020). Some estimates suggest that in Europe, one in three funds will focus on ESG investment by 2030 (Bank of America Merril Lynch, 2019). Differently, global economic developments or the disruption of the financial market could reduce the growth rate (UNCTAD, 2020).

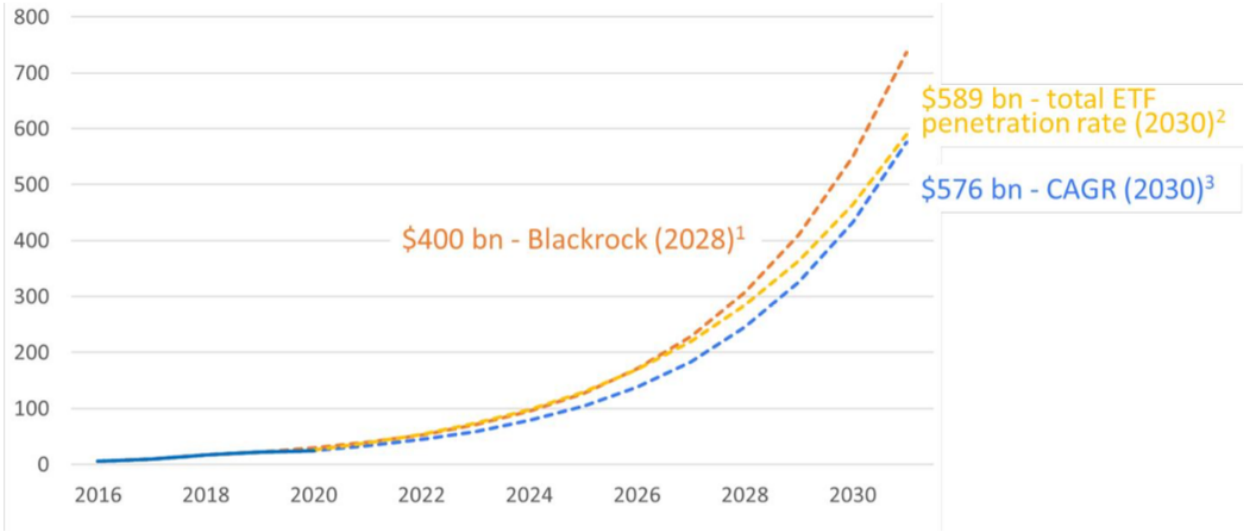

Figure 20 Projected growth of ESG ETFs, 2019-2030 (Billions of dollars) Source: UNCTAD & Blackrock

5.4. ESG integration strategies

According to the mechanism by which the underlying assets of an ETF are chosen, ESG ETFs are grouped into four strategies and the number of funds in each category is in parenthesis (UNCTAD, 2020): General integration strategy (88), best-in-class strategy (69), ESG theme strategy (49) and exclusionary screening (15).

1. "General integration strategy" refers to ETFs that incorporate important ESG criteria into the selection and investment processes to reduce risk or increase returns (UNCTAD, 2020). ETFs bearing ESG in their names usually belong to this group, and meet a wide range of ESG criteria (UNCTAD, 2020). General integration ETFs can use exclusion control in addition to the application of broad ESG criteria (Morningstar, 2018).

2. "Best-in-class or positive screening strategy" involves selecting companies or leaders with better performance in a particular industry or in various industries in terms of sustainability performance (UNCTAD, 2020). EST ETFs that follow this strategy usually use in their names words related to sustainability, for example SRI, sustainable investments or impact investments, that go beyond the conventional ESG criteria (Morningstar, 2018). Due to the variety of best-in-class approaches, the category is further divided in three subgroups: SRI, Impact and Leaders (Morningstar, 2018).
3. "ESG Theme Strategy" includes ETFs that focus only on one specific sustainability issue (such as pollution prevention or board diversity) (UNCTAD, 2020). ESG ETFs also belong to this category if they specifically focus on a single ESG factor (environmental, social or governmental) or if they are monitoring a "quasi-sector", for example renewable energy or water (Morningstar, 2018).
4. "Exclusionary screening" based on responsible investments or criteria related to sustainable development is the final strategy for integrating ESG ETFs (UNCTAD, 2020). The "exclusion" strategy may deliberately exclude assets of several companies or industries that do not meet the minimum standards of business practice based on international rules, such as the United Nations Guidelines for Business and Human Rights (UNCTAD, 2020). Although such a strategy usually excludes only one or two narrowly defined segments that are considered unsustainable, therefore they are worthwhile efforts to integrate sustainable development into investment decisions (Morningstar, 2018).

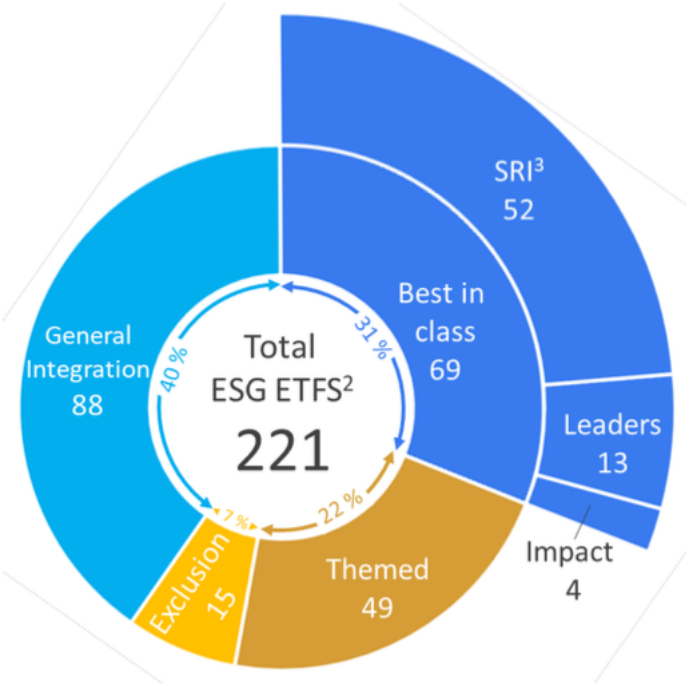

Figure 21 ESG ETFs by integration strategies (Number of ETFs and %) Source: UNCTAD calculation based on TrackInsight data

5.5. ESG ETFs financial performance

A lot of investors believe that ESG factors will increasingly affect the return on investment and that ESG ETFs can perform better than their counterparts in terms of financial performance (UNCTAD, 2020). Data from ESG index providers show that this fact is possible. For example, the MSGI Emerging Markets ESG Leaders Index has surpassed its conventional benchmark in eight to ten years (figure 22).

Initial results of an analysis of the financial performance of ESG ETFs according to UNCTAD (2020), also reveal the absence of a systematic performance penalty as a result of sustainable investments. In fact, EST ETFs performed better on average than their non-ESG counterparts in one year, as of June 24, 2019 (table 14) (UNCTAD, 2020). Certainly, such an inference is initial, as a longer period of time would be necessary to prove a systematic relation (UNCTAD, 2020).

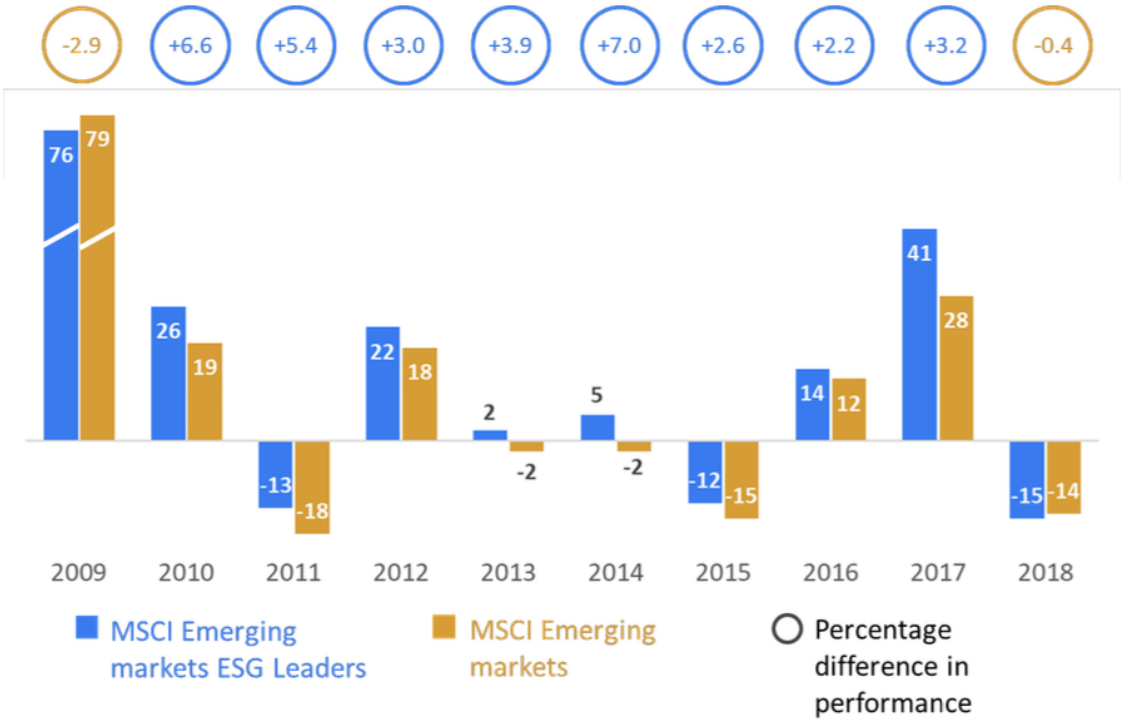

Figure 22 Financial performance: ESG index versus conventional index, 2009-2018 (Calendar-year returns and relative performance, %) Source: UNCTAD (2019)

	Average net return	Average net excess return[2]
ESG (n=213)	3.9	-0.06
Non-ESG (n=4 034)	1.6	-0.15

Table 14 Performance of ETFs (net return and net excess return), 2019 (%) Source: UNCTAD calculation based on TrackInsight data

Although, there are studies that report a strong and positive relationship between ESG criteria and financial performance (Andersson et al., 2016; Tarmuji et al., 2016), the majority of the literature has not come to any clear conclusion about whether ESG investing adds to financial measures. Most of the studies (Humphrey & Tan, 2014; Meziani, 2016) found mixed evidence regarding the relation between different factors of ESG criteria and better performance. Recent research of Seoul National University in 2020, investigates whether ESG ETFs can attract more financial flow than their conventional counterparts, by examining the relation between the inflows to these investment products and their accordance to ESG factors. According to this study ESG criteria can be methodologically studied and presented in different models (Gennadii, 2020). ESG scores is a certain way to assess and understand whether a company is compliant with sustainable investing practices and sustainable development. By using two types of regression models, the positive relationship between inflows and ESG score was

proved, as a statistically significant and positive coefficient of variables representing ESG scores was observed in the model with equity ETFs (Gennadii, 2020). On average, ETFs that incorporate ESG factors may create 2,1-3,5% of additional financial flows (Gennadii, 2020). This conclusion shows solves the dilemma regarding the impact of ESG criteria and it creates many directions relative to financial properties and other specificities of ESG ETFs.

5.6. The three challenges of ESG ETFs

Despite the rapid growth of ESG ETFs during the last two years, the share of ESG ETFs in the total quantity of ETF market, in terms of number and AUM, is still at 3,2%. ESG ETFs, in order to attract a mass market and be established as a tool for sustainable investing, have to overpass three challenges.

5.6.1. Lack of standards and high-quality data

A main challenge is the lack of common standards and framework for ESG and reporting and impact assessment, which challenge is shared by the entire sustainable investment industry (UNCTAD, 2020). This challenge creates three problems. Firstly, inconsistent data coverage across all asset categories requires investors to combine different data sources into one long and arduous process (UNCTAD, 2020). Secondly, ESG ratings between different providers may conflict with each other, due to a lack of commonly accepted standards, indicators and criteria (UNCTAD, 2020). This lack of compliance for reliable comparisons between datasets unnecessarily complicates the process of assessing investor viability (UNCTAD, 2020). Finally, current databases mainly have data gaps that prevent investors from in-depth scenario analysis and make many of them to compile and calculate the data themselves (BNP Paribas, 2019).

5.6.2. Regional imbalance

Despite the fact that developing countries account for 20% of global stock market capitalization and the quantity of ETFs in developing countries accounts for almost 30% of all ETFs, ESG ETFs almost do not exist in the developing world, with the exception of APAC (UNCTAD, 2020). Only 10% of ESG ETFs reside in emerging markets (all specifically in APAC) and only 21 ESG ETFs follow an emerging market index, corresponding to 10% of all ESG ETFs (figure 23) (UNCTAD, 2020). Of these 21 ESG ETFs that follow emerging market indices, only 5

reside in emerging markets (3 in China and 2 in the Republic of Korea), while the other 16 are based in developed countries (UNCTAD, 2020).

There are a lot of factors that are responsible for the absence of ESG ETFs in developing countries, such as the weak institutional capacity and expertise, the lack of ESG-related data, the lack of demand from investors and underdeveloped capital markets (BNP Paribas, 2019). However, the lack of ESG ETFs in developing economies should raise concerns, because it sets limits to the contingent of ESG ETFs in enhancing sustainable development, but also neglects a significant market opportunity (UNCTAD,2020).

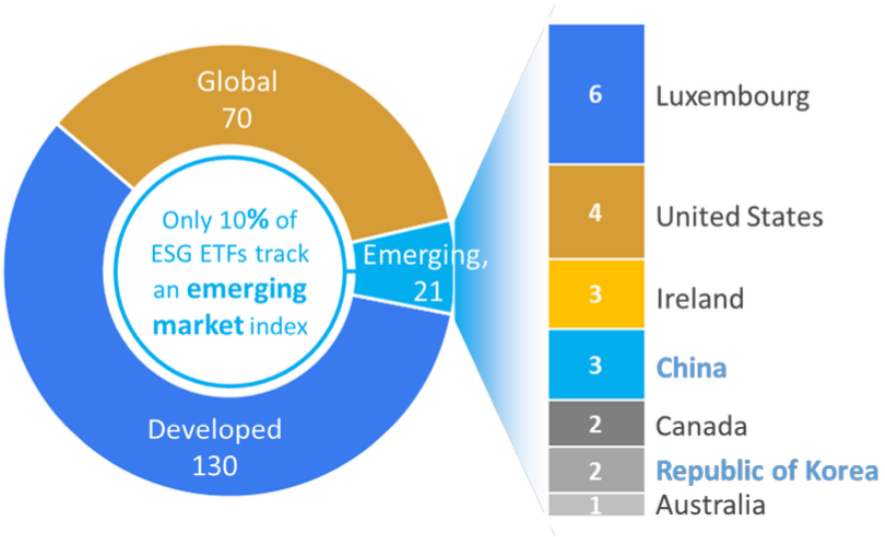

Figure 23 Number of ESG ETFs by market index exposure, and by domicile, 2019 Source: UNCTAD calculation based on TrackInsight data

5.6.3. SDG coverage

In addition to the responsible investment aim, ESG ETFs can also be adapted for SDG-oriented investments, as currently, all ESG ETFs adopt a thematic strategy target specific SBAs (figure 24) (UNCTAD, 2020). Of a group of 49 thematic ESG ETFs, that represent approximately 20% of all ESG ETFs, 42 of them focus on investments in Climate Action (SDG 13), Gender Equality (SDG 5) and Affordable and Clean Energy (SDG 7) (UNCTAD, 2020). The SDG 6 (Clean Water and Sanitation), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure) and SDG 12 (Responsible Consumption and Production) are covered by just six ESG ETFs tracking respective indices (UNCTAD, 2020).

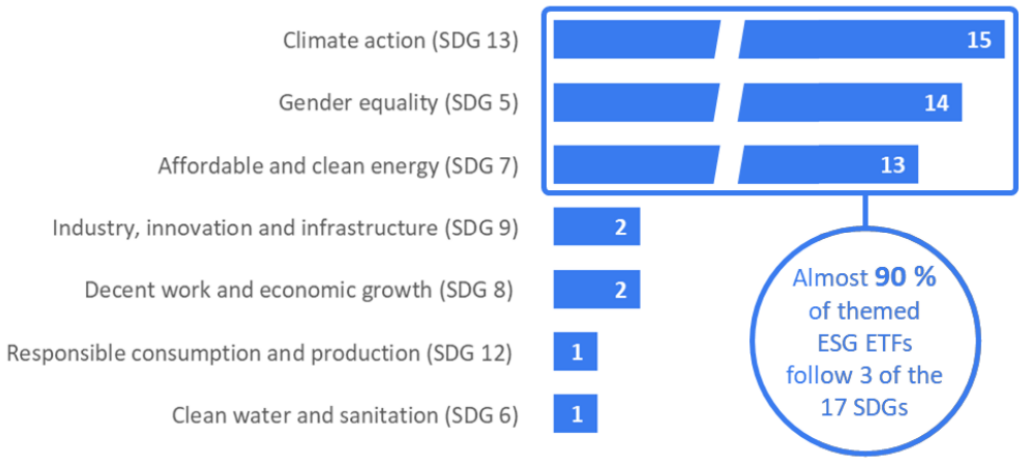

Figure 24 Ranking of SDGs by number of themed ESG ETFs, 2019 Source: UNCTAD calculation based on TrackIn sight data

The remaining 10 SDGs, most of which can also be invested, are not covered at all by ESG ETFs (figure 25), and among these SDGs are topics such as No Poverty (SDG 1), Zero Hunger (SDG 2), Good Health and Well Being (SDG 3) and Quality Education (SDG 4), which are particularly relevant to many investors (UNCTAD, 2020). It is also possible to create indicators around these issues and develop ESG ETFs to track them.

Figure 25 SDG coverage by ESG ETFs, 2019 Source: UNCTAD

5.7. Recommendations for the development of ESG ETFs

In order to enhance as much as possible, the ESG ETFs dynamics, the three challenges -lack of standards and high-quality data, regional imbalances and limited SDG coverage- mentioned above must be addressed to the most extent. For this reason, the following measures should be taken.

5.7.1. Improvement of the overall sustainability

ESG ETFs as they belong to the wider ETF market, they are not exempt from systemic risk, structural weaknesses and other challenges that are going to address the conventional ETFs. ESG ETFs will be able to thrive in case that stability and sustainable development will be dominated throughout the whole ETF market. For this aim, it is necessary for ETF providers, institutional and private investors, intermediaries and regulators to coordinate in order to erase possible systemic risk. Those risks are mostly related to lack liquidation imbalance, underlying stocks or indexes with extremely high risk, concentration of ETF providers and market sensitivity, that can affect both the ETF universe and the whole financial market.

At the same way, the development of the ESG ETFs market is based on the general enhancement and sustainable growth of the total ETF market. For this reason, the ESG philosophy and existence should not be only for the ESG ETFs, which are one specific category, but all ETF stakeholders, such as indexes or ETF issuers and providers have to take care of all ETFs to meet some certain conditions that respond to ESG criteria in a long-term horizon.

5.7.2. Enhancement of the coherence

In order to make the ratings and the evaluations of the sustainability level of ESG ETFs more coherent, some initiatives have been created, both at public and at the private level. These initiatives relate to “UNCTAD Working Group of Experts on International Standards of Accounting and Reporting (ISAR)”, “UN Sustainable Stock Exchanges (SSE) initiative”, “Global Reporting Initiative (GRI)”, “Harmonized Indicators for Private Sector Operations (HIPSO)” and “Climate Disclosure Standard Board (CDBS)”.

The majority of these initiatives work in either private or public level, so a fully worldwide platform should be created in order to concentrate all the main players to conclude on a certain group of metrics and indexes for the assessment and evaluation of ESG ETFs.

Moreover, regulators and a regional and global level should also participate for the standardization of the ESG factors and criteria, which until now are determined by the market. For this purpose, they must participate in international conferences to make concerted efforts in this issue.

5.7.3. Growth of ESG ETFs in emerging markets

If we take into consideration the fact that ESG ETF markets are dominant in developed countries, the only way to increase the investments into emerging economies is by using ESG ETFs with developing economy components. We have already realized that emerging countries are potential players for sustainable growth in financial markets if we thing about the rapid development of the "global green bond market". For this reason, the stakeholders should concentrate their efforts in this goal.

Therefore, as developing countries have experience in developing the "green bond market", they should create several sustainable regulations and enable the ecosystem so that they enhance the growth of ESG ETF market. This movement includes:

- A regulatory framework to create and apply some rules in order to assure a transparent, predictable and credible market. Investors and regulators are a bit cautious towards ETFs, due to the existence of low quality and unusual transactions sometimes. If we define a transparent and clearly determined regulatory system by establishing certain rules and standards, all the investors will become comfortable to invest in ESG ETFs.
- The growth of variety of investing products, so that emerging economies have the opportunity to achieve certain financial goals for the enhancement of ESG ETFs and ESG indexes. Side measures should be also supplied for the encouragement of sustainable growth, the variety and availability of data, reporting and sustainable services and the development of specific sectors for ESG ETFs. Moreover, these measures will facilitate the creation and development of other financial products in stock exchanges which will be specialized in sustainable growth. Finally, developing countries should be consulted by International Organizations in order to obtain the appropriate education and training on indexes, so that they will develop new financial products, sustainability factors, rating and standards.
- The mobilization of investing in ESG ETFs will be helped if some side measures would be demanded. For instance, the difficulties for investing in ESG ETFs should be decreased and some motivation should be offered to institutional investors. In addition,

the market should be opened for both individual and international investors, which will be protected and better treated.

5.7.4. Increase the SDG coverage of ETFs

ESG ETFs should definitely cover all those SDGs which are not totally covered or not covered at all. Indices providers have to coordinate with the main financial players in order to determine the index or ETF content and assess their sustainability and footprint. "UNCTAD's Institutional Investor Partnership for Sustainable Development (IIPSD)" aims to offer technical help in order to developing emerging countries' regulatory framework, stock exchanges and private key players.

Moreover, innovative indexes that track SDGs which are able to invest on, should be created. However, the development of these indexes and investment vehicles needs a lot of time and continuous investments. However, these providers who manage to develop indexes that cover the non-covered SDGs, would be able to reclaim the new demand and be distinguished in an extremely competitive market.

In addition, there are several innovative financial indexes and financial products that are related to SDGs, such as "green bonds" and "social bonds". These new products should be investigated so that new ESG ETFs can use them as underlying assets. Finally, we understand that all these sustainable investing financial products are relative and complement each other, so we have to study them using a holistic approach.

Conclusions and future challenges

In conclusion, Mutual Fund Management Companies choose a stock index and examine which of its shares seems to affect its performance and in what movement. Then, they buy shares of the index by creating a 'thumbnail' of it, at the ETF. In order for investors to prefer ETFs over stocks or Mutual Funds, MMFs have made ETFs more affordable than buying stocks on their own and safer because they provide a more diversified portfolio with greater risk spread.

However, the rapid development of ETFs has created concerns about its consequences on financial stability, as there are huge trading volumes of ETFs in comparison to their value in market and the expected risks. This very high volume of trade may create the liquidity risk during a downturn of the market.

ESG ETFs, based on corporate environmental, social and governance criteria, are investment vehicles that mobilize funds at large scale for financing the investment needed in infrastructure, agriculture, energy and public services in emerging economies. The main reasons why ESG ETFs are likely to become an appropriate investment product for sustainable growth are three. First of all, ETFs are low-cost, passively managed financial vehicles and are traded like a stock while offering investors a variety of ways to invest on specific countries or specific sectors. Secondly, ETFs that consist of underlying assets with ESG factors have an extraordinary growth in the last ten years, and primarily those that focus exclusively on ESG factors and select their assets based on their sustainability benchmarks. Third, the majority of investors in ESG ETFs are institutional investors such as sovereign wealth and pension funds or niche investment firms. This kind of investors has huge funds that are able to invest and they believe that the sustainable long-term financial performance has direct relationship with ESG performance.

There is an issue that comes from the fact that only a small quantity of ETFs is covered by ESG scores. For this reason, there is the problem of being connected with competition. This can be occurred, if we consider that the influence of ESG scores has been overestimated and if all key players, such as companies, investors and fund managers, were influenced by these scores, the power of ESG criteria would be reduced.

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