



Environmental protection strategies by socially responsible ETFs

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Abstract

While stock markets are chiefly concerned with profits, many executives understand Environmental degradation, and climate change comes with real financial risks. Increasing risks of climate change must be taken very seriously. Investors and companies all around the world are expressing growing concerns over social issues such as climate change. The transition to renewable energy, changing energy consumption behavior, and increasing environmental performance could be some solutions to save our planet. In addition, some index providers rank companies based on how ethically they operate. So, the good news is that there are accessible and affordable exchange-traded funds for people who want to invest without sacrificing their principles. This paper investigates how socially responsible ETFs' follow ESG principles (environmental, social, and governance), and their solutions can help us to protect the environment.

Keywords: Environmental protection strategies,

1 Introduction and literature review

climate change has become a predominant topic across businesses due to its possible detrimental effects on society. For example, since the energy sector being one of the biggest greenhouse gas emitters, a drastic switch to green energies is important to fulfil the goals set by environmental protection organizations. One of the solutions to gain more benefit from green finance is to apply ETFs. With their numerous advantages, ETFs can be considered as an appealing investment tools for making funds flow from investors to energy companies. However, with investor's main motivation remaining financial performance, interest in such investments is dependent on risk-adjusted returns. There are many studies that related to ETFs but just few about green ETFs or ETF's solutions for saving environment (Feyereisen and et a., 2021). Also, there are many publications that are focused on ESG issues (environmental, social and governance characteristics). In

this section, we focus on some of researches that related to ETFs and environment.

What is ETF? An exchange traded fund (ETF) is a type of security that tracks an index, commodity, sector, or other asset, which can be purchased or sold on a stock exchange like as a regular stock. An ETF can be structured to track anything from the price of only one commodity to a large and diverse collection of securities. ETFs can even be structured to track particular investment strategies (Investopedia). A famous example is the SPDR S&P 500 ETF (SPY), which tracks the S&P 500 Index.

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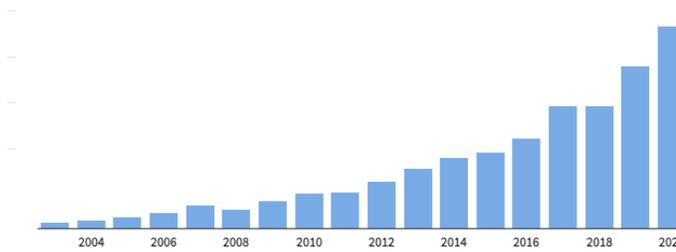


Fig. 1 The dollar amount, in trillions, invested in exchange-traded funds worldwide.

There are various types of ETFs available to investors that can be used for income generation, speculation, price increases, and to hedge or partly offset risk in an investor's portfolio. Below are several examples of the types of ETFs (Investopedia):

- Bond ETFs might include government bonds, corporate bonds, and state and local bonds—called municipal bonds.
- Industry ETFs track a particular industry such as technology, banking, or the oil and gas sector.
- Commodity ETFs invest in commodities including crude oil or gold.
- Currency ETFs invest in foreign currencies such as the Euro or Canadian dollar.
- Inverse ETFs attempt to earn gains from stock declines by shorting stocks. Shorting is selling a stock, expecting a decline in value, and repurchasing it at a lower price.

What are Environmentally Responsible ETFs and their metrics? Environmentally Responsible ETFs can be evaluated across three metrics: Revenue Exposure to Environmental Impact, Severe Environmental Controversies, and Revenue Exposure to Sustainable Impact Solutions. In this table we can find some ETF' names and their sustainable impact solutions.

Symbol	ETF Name	Sustainable Impact Solutions (%)
KGRN	KraneShares MSCI China Clean Technology Index ETF	70.97%
ACES	ALPS Clean Energy ETF	64.23%
ICLN	iShares Global Clean Energy ETF	60.31%
TAN	Invesco Solar ETF	59.47%
SMOG	VanEck Vectors Low Carbon Energy ETF	56.25%
CTEC	Global X CleanTech ETF	55.90%
QCLN	First Trust NASDAQ Clean Edge Green Energy Index Fund	55.89%
RNRG	Global X Renewable Energy Producers ETF	48.73%
FAN	First Trust ISE Global Wind Energy Index Fund	40.83%

Fig. 2. Names of some of Environmentally Responsible ETFs and their sustainable impact solutions

As we mentioned there are many studies in this field. For instance, Israeli and et al. 2017, examine whether an increase in ETF ownership is associated with a decline in pricing efficiency for major commodity components. Their experiments show that an increase in ETF ownership is associated with (1) higher transaction costs (spread offers and market liquidity), (2) an increase in "stock return synchronization", (3) a decrease in "future earnings response coefficients", and (4) Overall, their findings support the view that increased ETF ownership could lead to higher transaction costs and lower profits from information acquisition, leading to lower information prices for companies become infrastructure.

Da and et al. 2018, provide new evidence that supports the idea that arbitrators can help return profits through arbitrage funds (ETFs). Using a large sample of US stocks ETFs, they document the relationship between ETF activity measures and repayments in both funds and stocks after controlling a large number of variables and fixed effects and taking advantage of "discontinuities" between stocks. This effect is even more pronounced among small and non-liquid stocks. An examination of the correlation between ETF returns and stock beta delays provides evidence of price change, suggesting that some compensation for ETF profits may be excessive.

Folger and et al. 2020, studied ETF performances. Their results show that a higher level of ETF performance does not protect investments from financial losses during a severe recession. These results help the research by exposing the weaknesses of current stability scores and ranking methods to provide an initial RI analysis during COVID-19 epidemic.

Arunanondchai and et al. 2019, studied ETFs and comparing their performance. In this paper, by analyzing the effects outside the supply sample of ETFs and comparing their performance with similar functions in the future, the usefulness of ETFs in dealing with tail risk in the markets of crude oil, gasoline, heating oil and natural gas is investigated. The experimental distribution method and the nuclear core method are used to estimate the minimum hedge (VaR) and minimum waiting (ES) ratios for long and short hedges. Their results show that futures contracts are a better hedging instrument to cover tail risk in the crude oil and heating oil markets, while ETFs provide better protection against a downside risk in the gasoline and natural gas markets.

Da Dalt and et al. 2019, studied overconfidence and stock market. Their findings are consistent with the hypothesis that households are overconfident about trading in common stock, that delinquent behaviors when trading stocks are more reasonable than trading in ETFs, and that households are more likely to trade in ETFs in the long run.

Zhao and et al. 2018, studied portfolio management decisions. This paper attempts to investigate whether accurate predictions of neural network (NN) models can lead to statistically and economically significant benefits in portfolio management decisions. To achieve this goal, three NNs, namely Perceptron Multilayer, Recurrent Neural Network and Psi Sigma Network (PSN), are used to predict the daily returns of three stock exchanges (ETFs). The statistical and trading performance of NNs is calculated using traditional self-aggression models. In the next step, a new dynamic asymmetric (NNC) model is introduced to capture the dependency structure in ETF efficiencies. Based on the above, using the traditional mean variance method and the CVaR portfolio optimization approach, weekly balanced securities are obtained and compared. In terms of results, PSN performs statistically and commercially better than all models. In addition, when it comes to modeling dependence on ETF efficiency, it does not perform statistically better than symmetric concentric couplings. The proposed NNC model leads to significant improvements in the portfolio optimization process, while predicting covariance for asymmetric dependencies between ETFs also improves the performance of the securities obtained.

Kaur and et al. 2020, studied performance of foreign exchange (ETF). This paper examines the relative performance of foreign exchange (ETF) funds against gold and gold futures in the Indian scenario using a series of common and threshold consolidated

statistics. The results show that gold and pure gold ETFs as well as gold ETFs and gold futures converge in the long run. Also, it seems that moving in current and future prices leads to ETF prices, thus paving the way for the implementation of profitable trading strategies in the ETF. This study further explores the possible reasons that could address the relative inefficiencies observed in ETF prices. Another study by Almudhaf and et al. 2020, article aims to examine the pricing efficiency of exchange traded funds (ETFs) compliant with Saudi (i.e., Islamic market) law (Almudhaf and et al., 2020).

The study introduces a comparative inverse model of krill-local support vector regression (RKH-LSVR). The Creep Flock Reverse Adjustment Algorithm (RKH) is a new meta-axis optimization method inspired by the behavior of Creep flocks. In RKH-LSVR, RKH optimizes support vector regression (LSVR) parameters with local weight by balancing the search between local and global optimizations. The proposed model applies to the forecast and daily trading of six ETF stocks during the period 2010-2015. Trade program to validate the resistance of the studied algorithm and provide empirical evidence in favor of or against the Adaptive Market Hypothesis (AMH). In terms of results, the RKH-LSVR outperforms its counterparts in terms of statistical accuracy and trading efficiency, while the performance of variable trading with the studied models confirms AMH theory (Sermpinis and et al., 2017).

In another paper, using clean or conventional energy ETF groups, researchers examine the portfolio performance of energy-related ETFs under periods of market turmoil and market uptrend. They examine seven slightly popular investment strategies for the constant rotation of assets, evaluate their performance with appropriate returns and risk metrics, and control their performance with a set of different parameters. The effects of the 2008 financial crisis and the fall in oil prices in 2014, as well as the interaction with out-of-industry ETFs for the energy industry, have been examined. They find that a portfolio of total ETFs generally outperforms two separate portfolios with clean and regular ETFs separately. They discuss the potential consequences both from the perspective of potential investors but also the potential future growth of clean energy-related assets (Alexopoulos, 2018).

Using the Markov switching model for 2007 - authors examine the relationship between variable risk and return between four tradable funds on the water exchange – Power Shares water resources portfolio, global water stocks, ISE First Trust Water Index Fund and global index Water Guggenheim S&P 2015. Transmission probabilities created in this paper show that the probability of switching between regimes 1 and 3 is high and low, respectively. In addition, they find that the specific risk for most traded funds on the stock exchange shifts from low volatility (regime 2) to very low volatility (regimes 1 and 3). Our study also

found that the beta coefficients are positive and the total values are less than 1. Therefore, it seems that investing in water has a less systematic risk and has a positive effect on the return on index funds traded on the water exchange during different regimes (Tularam and et al., 2016).

The funds traded on the gold exchange help investors to generate returns based on the movement of the underlying commodity. In the current scenario, gold ETFs are emerging as one of the best ETFs for investments. The aim of this study was to determine the causal relationship between the spot price of gold, SENSEX and the ten selected items of BSE gold. The final prices of gold ETFs, SENSEX and gold prices were collected during 2015-2018. This study used ADF root test, convergence test and Granger causality test to investigate the causal relationship. The results of this study showed that six out of ten ETFs of gold have a significant causal relationship with the price of gold and only two projects have a significant relationship with BSE SENSEX during 2015-2018. This study concluded that gold ETFs are heavily influenced by gold price movements. Therefore, an investor must understand the pricing dynamics of the underlying ETF asset (Irwin and et al., 2011).

Another article examines the price deviation of the Asian Stock Exchange (ETF) in terms of market sentiment. By implementing a dynamic cross-trading strategy and a buy-and-hold strategy, this paper finds that investing in overnight price returns can generate significant abnormal profits in trading. The surplus yield from the dynamic strategy to buy and hold separates the impact of the market's tendency for the ETF price to deviate from key movements. By studying the relationship between changes in surplus returns and market sentiment, the paper found that ETF price deviation is highly influenced by market sentiment and its effect is greater during times of financial crisis and distress (Ma and et al., 2018).

The empirical study uses monthly total net asset data for the years 2004-2017. Our methodological framework is a combination of innovation dissemination models and technology alternatives. The results reported in this study show that ETF emissions have occurred in both countries. Emissions and growth rates vary - in Japan the ETF market was in its early stages of exponential growth, while in South Korea it was close to reaching the expected maximum saturation. The results of the analysis of the alternative between the largest group of innovative funds - ETF stocks and open-end funds clearly show that the trend of "changing" open-end funds to ETFs is easily traceable in both countries. Substitution trends were observed gradually and inversely (Marszk and et al., 2018).

The purpose of another paper is to empirically examine the fluctuations and overflow of returns between exchange traded funds (ETF) and the relevant benchmark indices in India. In this paper, time series data is used which consists of the value of ETF

stocks and the return of the relevant index (Chandrasekaran and et al., 2019).

This study examines the role of beta along with a wide range of risk characteristics as determinants of ETF flow and ETF trading in the tradable sectors of the stock exchange (ETF). The results show that the relationship between beta and ETF (ETF) trade is decreasing (increasing) and U-shaped (reverse U-shaped). These findings, consistent with the low-risk document anomaly, suggest that investors may perceive low-beta ETFs as fewer desirable options than high-beta ETFs. The shape of the relationship between beta and investor activity shows that it is more important for investors to use low beta than to achieve high beta (Peltomäki, 2017).

Another study examines the relationship between fluctuations in stock market indices and trading volume of traded funds on their stock exchange (ETF). Using both ordinary least squares and generalized aggressive conditional heteroskedasticity approaches, authors show that contemporary S&P 500 ETF trading volume is a major determinant of S&P 500 fluctuations in both monthly and daily frequencies. On the other hand, the vector self-aggressor estimate shows a two-way expensive causality between the S&P 500 fluctuations and the S&P 500 ETF trades. Repeat analysis of other market indices and relevant ETFs that track these indices confirm the strength of these findings (Xu and et al., 2017).

2 Socially Responsible ETFs

There are many socially responsible ETFs that allow investors to invest with ESG principles in their mind. In this part we collect some of them.

1- iShares MSCI KLD 400 Social ETF (ticker: DSI):

With \$2 billion in assets, this iShares fund is one of the most popular socially responsible investment ETF. In addition, it's also a substantial fund across all categories with serious size and volume. Benchmarked to an index of about 400 large U.S. companies that includes Microsoft Corp. (MSFT) and Facebook (FB), this fund is designed to feature companies that post above-average ratings on ESG characteristics. Investors should be aware that this socially responsible ETF is pretty biased toward technology stocks; roughly 45% of holdings are either in information tech or communications. That may be good or bad, depending on your personal goals, but is worth noting.

2- Vanguard ESG U.S. Stock ETF (ESGV)

It is smaller in size than DSI with about \$1.3 billion in total assets under management. In addition, this socially responsible ETF from Vanguard is tied to a much larger group of holdings with nearly 1,500 total components. It has a similar focus to the prior

fund, as it includes U.S. companies with above-average ESG ratings; however, it includes a bunch of smaller names given the depth of the lineup of stocks. That may appeal to some investors, since top holdings remain old favorites such as Apple (AAPL). But further down the list are a host of relatively unknown stocks across all sectors of the U.S. economy.

3-iShares ESG MSCI EAFE ETF (ESGD)

This is another solid option as socially responsible ETFs. However, it excludes companies in the U.S. and Canada to take a more global approach to the ESG investing strategy. The result is a diverse group of almost 500 companies across geographies and sectors, including Swiss consumer giant Nestle (SWX: NESN) and Japanese automaker Toyota Motor Corp. (TYO: 7203). Investors should know that some companies in regions like Europe are even more progressive in their environmental, social and corporate governance efforts given greater regulation. For instance, in 2017, the U.K. enacted legislation that requires any business with 250 or more employees to publicly report its gender pay gap.

4- SPDR SSGA Gender Diversity Index ETF (SHE)

Perhaps best known for its 2016 debut that featured the "Fearless Girl" statue of a ponytailed tyke staring down Wall Street's famous bronze bull, this socially responsible ETF focuses on companies that feature better-than-average female representation on their executive committees compared with others in their industry. This doesn't mean a perfect balance of men and women, however. Top position PayPal Holdings (PYPL) has only four women on its leadership team of 11 people, for instance. That said, this ratio is better than its peers. And as representation of women in leadership continues to improve, so will the gender diversity of constituent stocks in this ETF.

5- Invesco Solar ETF (TAN)

With more than a decade of trading history, this solar energy ETF is among the oldest options for individual investors looking to invest in a more socially responsible way. With top stocks in this narrow subsector such as First Solar (FSLR) and SolarEdge Technologies (SEDG), TAN is a great way to gain exposure to the solar energy trend without going all-in on a single company. Of course, a laser focus on a group of 28 specialized holdings with basically the same business model is not without its risks. Solar sales are prone to volatility from year to year, and so is this ETF.

6- SPDR S&P 500 Fossil Fuel Reserves Free ETF (SPYX)

If you care about going green but also want a broader range in your portfolio beyond renewable energy stocks, the SPDR S&P 500 Fossil Fuel Reserves Free ETF is a good option. SPYX simply takes all the oil, gas and fossil fuel companies from the list

of stocks out of the popular S&P 500. That leaves the ESG investor with about 460 stocks that make up a typical index fund, save for the exclusion of energy giants such as Exxon Mobil Corp. (XOM). It's an interesting approach that incorporates a more diverse group of companies.

7- iShares MSCI USA ESG Select ETF (SUSA)

This socially responsible ETF is growing fast in popularity because of its "select" strategy, through which it places stricter requirements on components. With only 145 holdings in its portfolio, investors are not simply getting an S&P 500 fund that excludes Big Oil and Big Tobacco – you'll instead find a top cut of the biggest companies that truly take ESG issues seriously. Big tech names such as Apple are well-represented, with about 29% of assets in that sector, but there are also some names that may surprise you. For example, take home-improvement company Home Depot (HD) or consulting firm Accenture (ACN). This gives you a shorter list, but it's a decently diversified one to avoid relying on just the top few holdings alone (money.usnews.com).

3 Conclusion

When it comes to socially responsible investing, the environment is at the top of investors' minds. One of the solutions to gain more benefit from green finance is to apply ETFs. In fact, there are different ways to invest in green stocks, such as buying individual companies, mutual funds that hold green stocks and finally green-focused exchange-traded funds. With their numerous advantages, ETFs can be considered as an appealing investment tool for making funds flow from investors to energy companies. However, with an investor's main motivation remaining financial performance, interest in such investments is dependent on risk-adjusted returns. In This paper, we show how socially responsible ETFs' follow ESG principles (environmental, social and governance), and their solutions can help us to protect the environment.

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