



Analysis

Fossil Fuel Divestment and Portfolio Performance

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ABSTRACT

Fossil fuel divestment campaigns urge investors to sell their stakes in companies that supply coal, oil, or gas. However, avoiding investments in such companies might impose a cost on the investor in terms of foregone potentially profitable investments and reduced opportunities for portfolio diversification. We compare financial performance of investment portfolios with and without fossil fuel company stocks over the period 1927–2016. Contrary to theoretical expectations, we find that fossil fuel divestment does not seem to impair portfolio performance. These findings can be explained by the fact that, so far, fossil fuel company stocks do not outperform other stocks on a risk-adjusted basis and provide relatively limited diversification benefits. A more pronounced performance impact of divestment can be observed over short time frames and when applied to less diversified market indices.

1. Introduction

Divestment campaigns urge investors to sell their stakes in companies that supply coal, oil, or gas. Initiated at US universities, divestment has gained traction among foundations, pension funds, faith-based organizations, governments, and others.¹ The aim is to build support for legislation and technology that reduces Greenhouse Gas (GHG) emissions by cutting down financial support for and addressing the moral legitimacy of fossil fuel production and its use (Ansar et al., 2013; Ayling and Gunningham, 2017). As of September 2017, \$5.53 trillion of institutions' Assets under Management (AuM) has been committed to divest from at least one type of fossil fuel.²

The call for divestment closely relates to scientific and political debate about the need for global action to avert dangerous anthropogenic climate change (Arbuthnott and Dolter, 2013; Gross, 2015; Van den Bergh and Botzen, 2015). Additionally, it links to debate about the role of finance in the transition towards a low-carbon economy (Busch and Hoffmann, 2007; Campiglio, 2016; Scholtens, 2017). The divestment movement contends that investors should do their part by considering the ecological impacts of the activities they finance next to traditional risk-return measures, and therefore withdraw investments in publicly listed coal, oil, and gas companies (Ritchie and Dowlatabadi, 2014).

Conforming to the moral call to divest, however, can be costly and/or problematic for investors (see Ritchie and Dowlatabadi, 2015; Eurosif, 2016). Modern Portfolio Theory (Markowitz, 1952) suggests that constraining an investment portfolio would reduce opportunities for diversification and thereby impair financial performance. Fossil fuel companies indeed make up a large part of major benchmark indices. Yet, so far, the financial implications of fossil fuel divestment have not been systematically analyzed. Recently, reports have claimed that divestment comes with substantial costs (Cornell, 2015; Fischel, 2015), while others have suggested that it improves portfolio performance (Heaps et al., 2016). However, these reports apply ad hoc methods and measures, and focus on highly specific samples and study periods, which might explain their opposite conclusions. As divestment may reduce investment returns and thereby affect society at large, it is timely to rigorously study its impact on portfolio performance.

We construct US investment portfolios with and without fossil fuel company stocks, using industry classifications and the Carbon Underground 200 list. We investigate the differential in portfolio risk and performance of fossil-free and unconstrained portfolios by comparing the variance, the Sharpe and Sortino performance ratios, and four-factor adjusted alphas over the period 1927–2016. Our results suggest that fossil fuel divestment has not significantly impaired financial performance of investment portfolios.

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This paper makes three contributions to the academic and societal debate about fossil fuel divestment. First, in the scarce literature on fossil fuel divestment we have not found a comprehensive systematic analysis of the financial dimension of divestment. Our analysis is firmly grounded in Modern Portfolio Theory and covers a broad market over an extensive time horizon. Furthermore, we employ various definitions of fossil fuel divestment and assess the sensitivity of our results to different study periods, investment indices, and model specifications. Secondly, we complement the Socially Responsible Investing (SRI) and screening literature (Humphrey and Tan, 2014; Lobe and Walkshäusl, 2016) by looking into an increasingly relevant application of screening: fossil fuel divestment. Lastly, we contribute to the debate about the implications of improved corporate carbon performance for financial performance. Generally, the literature has found that companies with lower (relative) carbon emissions have a superior financial performance (Busch and Lewandowski, 2017). On the investment side, a recent stream of literature investigates the carbon footprint of portfolios in an attempt to quantify the investor's exposure to 'carbon risk': the perceived financial risks associated with the transition from high- to low-carbon sources (Andersson et al., 2016; De Jong and Nguyen, 2016). Andersson et al. (2016) find that carbon footprint reductions of up to 50% are possible while keeping a minimal (negligible) tracking error. Our study takes the opposite perspective. Given the observed call to divest fossil fuel stocks, we assess financial costs (i.e., underperformance) when answering to it.

This paper proceeds as follows. Section 2 provides a theoretical framework for screening in relation to investment portfolio performance, and highlights our contribution to the literature. The methodology and data are described in Sections 3 and 4 respectively. Section 5 presents the results and discusses implications in light of the divestment and screening debate. Section 6 concludes.

2. Socially Responsible Investing and Diversification Costs

2.1. Theoretical Framework

Fossil fuel divestment can be regarded as a specific way of Socially Responsible Investing (SRI), namely exclusion (see Revelli and Viviani, 2015). Through SRI, investors aim to align ethical and financial concerns and consider the 'social damage' that their investment objects might cause (Dam and Scholtens, 2015). A common approach to achieve this is withholding investments in harmful or controversial activities (Eurosif, 2016; Global Sustainable Investment Alliance, 2016). The divestment campaigns frame fossil fuel production as such activity.

Modern Portfolio Theory (Markowitz, 1952; Roy, 1952; Tobin, 1958) implies that any constraint that reduces the investible universe will leave investors with a less efficient portfolio (Galema et al., 2008; Rudd, 1981). Divestment thus may impose an inefficiency, a cost, by increasing idiosyncratic (diversifiable) risk which is not fully compensated by higher returns. We can define the 'diversification costs' following from divestment as the difference in risk-adjusted returns on a fossil-free portfolio and the unconstrained portfolio. Diversification costs are a function of the number of stocks in a portfolio and the correlation between stock returns (Markowitz, 1952). Hence, the largest diversification costs are expected from the exclusion of a large set of stocks which has a low correlation with other market investments.

Secondly, SRI implies that some investors' utility function may depend on non-financial attributes too. The divestment movement, in fact, treats stocks of fossil fuel companies as 'sin stocks', i.e. stocks of companies involved in controversial activities that investors commonly stay away from (see also Luo and Balvers, 2017; Hong and Kacperczyk, 2009). As with sin stocks, a reduction of demand for fossil fuel company stocks and excess demand for non-fossil stocks can be expected to reduce prices of the former category (underpricing) and increase prices of the latter (overpricing) (Dam and Scholtens, 2015; Fama and French,

2007; Heinkel et al., 2001). Investors would thus be willing to pay a higher price for non-fossil stocks and would expect a lower return on their investment for a given risk level. When fossil fuel company stocks are systematically screened, this differential should be detectable as risk-adjusted outperformance (positive alphas) of fossil fuel portfolios and underperformance (negative alphas) of fossil-free ones. As such, we expect additional outperformance (underperformance) of fossil fuel (fossil-free) portfolios in the period divestment takes place.

The prevalence of fossil fuel industry screening, however, seems low. Formally, the divestment movement started in 2011 (Ayling and Gunningham, 2017) and so far it appears that a relatively small share of total AuM applies exclusionary screens on the fossil fuel industry. Screening of the industry through other forms of SRI, such as green or thematic investments and best-in-class screening, does not seem to happen systematically on a large scale either. As a result, fossil fuel stocks are unlike some sin stocks, such as tobacco stocks, which have been structurally avoided by investors for long time frames. This suggests that demand for fossil-free company activity might best be taken as given (contrary to Luo and Balvers, 2017), even though the effects from a growing preference for fossil-free investments may become more important in the future.

Still, portfolio diversification is not only constrained because of social norms but because of practical or behavioral reasons as well, suggesting there could be a compensation for idiosyncratic risks next to systematic risks (Fu, 2009; Goyal and Santa-Clara, 2003). Accordingly, fossil fuel company stocks may receive additional returns due to high litigation and reputational risks (cf. Hong and Kacperczyk, 2009) and industry and environmental challenges, such as the need for a radical transition towards low- or zero-carbon sources (Ansar et al., 2013; Busch and Hoffmann, 2007). An important consideration in this respect is the appropriate pricing of carbon risk (Andersson et al., 2016; De Jong and Nguyen, 2016; Liesen et al., 2017). For example, a key concern is the risk that future stringent public policy will devalue or 'strand' fossil fuel reserves (Ansar et al., 2013). In fact, some reports advocate divestment based on a prediction of strong declines in the stock prices of fossil fuel companies (see Leaton, 2011 and subsequent reports).³ Battiston et al. (2017) and Dietz et al. (2016) study the financial implications of various climate policy scenarios and arrive at material impacts.

Lastly, and relatedly, standard asset pricing models may imperfectly capture the risk characteristics of the fossil fuel industry. For instance, the industry's exposure to perceived (ir)responsibility or 'sustainability' risk as well as energy price risk may systematically affect stock returns, while these factors are not being captured by standard asset pricing models (Driesprong et al., 2008; Scholtens, 2014).

2.2. Empirical Literature

So far, the empirical SRI literature has found little to no negative impact of ethical constraints (screening) on portfolio performance (Bello, 2005; Humphrey and Tan, 2014; Lobe and Walkshäusl, 2016; Trinks and Scholtens, 2017). Financial implications of screening might relate not only to the amount or market capitalization of the stocks excluded, but also to the correlation between the returns on the excluded and remaining investment categories, and to whether excluded stocks show outperformance due to screening (see Section 2.1).

We complement the SRI and investment performance literature (see Revelli and Viviani, 2015) by systematically analyzing the risk and

³ This work builds on findings by Allen et al. (2009) and Meinshausen et al. (2009) that in order to keep the increase in global mean temperature below 2 °C, a commitment ratified in the Paris Agreement, up to 80% of current proven fossil fuel reserves must be left unused. McGlade and Ekins (2015) highlight the incommensurability of current and planned coal, oil, and gas production in different regions with the 2 °C limit. However, Griffin et al. (2015) do not find a corresponding strong negative impact of the above publications on US oil and gas companies' stock prices.

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