The Contribution of Corporate Social Responsibility to Financial Performance:

A Factor Model of Canadian Stocks

By

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AUTHOR'S DECLARATION

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Abstract

This paper studies the effect of corporate social responsibility (CSR) on the returns of Canadian stocks. It employs the 3-factor asset-pricing model created by Fama and French (1993) and adds a new CSR factor (2x3 sorts) to examine if the explanatory power of the model is improved by the CSR factor. I, also, introduce an alternative method to create a 4-factor model (2x2x2 sorts).

The results of my tests show the CSR factor does not improve the explanatory power of the Fama French models. Furthermore, replacing HML by CSR captures no more excess returns and I conclude that corporate social responsibility is not a priced factor in Canadian capital markets. In addition, the 3-factor model (based on Rm-Rf, SMB, HML) generates the exactly same results as Fama-French (1993 and 2015) models. Finally, I find that large firms, especially big size-low BE/ME companies, tend to be more "ethical".

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Contents

Chapter 1: Introduction

In recent years, the concept of corporate social responsibility (CSR) has attracted more attention. Many companies have allocated more resources to respond to the growing interest for CSR (Mc Williams & Siegel, 2000). In 2010, large US companies spent an estimated $28 billion on sustainability initiatives. Furthermore, around 80% of Global Fortune 250 companies generated CSR reports in 2010 (Di Giuli & Kostovetsky,2014).

The demand that companies enhance their economic, social and environmental operations and be more accountable and transparent (Tsoutsoura, 2004) drives corporations to create environmental policies, update their employee relations strategies, and become more responsive to social trends of the societies in which they operate.

Much research has focussed on the benefits associated with being a socially responsible firm. For example, it is claimed that CSR reduces risk (Oikonomou et al.,2012; Bassen et al., 2006), while social "irresponsibility" increases risk ((Hong & Kacperczyk, 2009; Robinson et al. 2008). The relationship between risk and CSR, and the effect of social responsibility on the cost of capital, firm valuation and stock performance will be discussed in more detail in the literature review that follows.

Even if managers do not recognise the benefits of CSR, they still might decide to integrate CSR in the operations of their companies to create a positive public image. It is argued that reputation is directly related to the value of companies and positive reputation can be achieved by responding to the expectation to become more socially responsible (Robinson et al.,2008). Researchers have

also shown that socially responsible companies have more positive media images (Cahan et al.,2015).

Whether companies prioritize CSR initiatives to create positive public image or to take advantage of the benefits that CSR polices provide for companies, they are responding to the demands of their stakeholders. (e.g., Kim et al. ,2012;Tsoutsoura, 2004; Robinson et al.,2008).

More costumers may consider the environment when they buy a new product; companies may stop buying from suppliers that employ child labor; employees may look for more than a salary in their jobs; and more investors may select their investments based on ethical concerns.

For the segment of investors who are interested in ethical investments, achieving higher returns and standing by their ethical values seem like competing goals. Clearly, as positive financial returns are the main purpose of any investment, the ethics-concerned investor needs to know if there is a cost associated to being socially responsible.

In response to this question, many studies in the fields of finance and CSR have focused on the relationship between ethical investing and financial performance. More specifically, they investigate whether there is a correlation between CSR and firm level equity returns. The large body of literature that studies this relationship has generated mixed results. The results of these studies can be classified into three groups. Some studies find that SRI portfolios outperform conventional funds and there is a positive correlation between the socially responsibly selection of the stocks and the excess return of the portfolios (Edmans ,2011; Derwall et al ,2005; Kempf and Osthoff ,2007; Byus et al. ,2010 ;Aktas et al. ,2011).

A second group concludes that there are no relationships between ethical sorts and returns of companies, suggesting that SRI selection has no effect on the financial performance of portfolios

(Statman & Glushkov,2009; Bauer et al. ,2005; Diltz,1995; Bauer et al.,2006; Blanchett, 2010). Finally, some studies suggest ethical investors have to accept lower returns on their investments. For example, Nofsinger and Varma (2014) find that the financial performance of SRI in non-crisis periods underperforms compared to conventional funds, while in crisis periods, they outperform conventional funds.

The detailed examination into the root causes of the disagreement among scholars on this topic is beyond the scope of this paper. However, it could be-among other reasons- attributed to the difference in stock selection methods of these studies, their approach in defining social responsibility variables, and the models they have created. For example, one common practice in these studies is to use ethical and conventional mutual funds as proxies for their socially responsible and conventional portfolios. However, the affect of fund managers' skills on the financial performance of these portfolios cannot be ignored (Kempf and Osthoff , 2007).

This lack of consensus reveals that more work in this area must be done. In this paper, I offer a relatively new approach to study this research question. I create an asset-pricing model that uses a CSR factor in explaining asset returns using Canadian equity data. This model is designed based on the Fama and French (1993) three-factor asset-pricing model. I employ their methodology to form portfolios and create control factors. Modified models are also introduced to adjust for differences between Canadian and U.S. financial markets. The adjustments in these models are also consistent with Fama and French (1993) model.

In the following section, I review the work of some scholars in the field of corporate social responsibility and finance. Next, I define my research question and design models to study that question. Finally, I test the performance of the models and compare the results with some well known financial models.

Chapter 2: Literature Review

My thesis is that the social responsibility of firms is a priced factor in explaining equity returns. As investors increasingly demand that firms enhance their economic, social and environmental operations (Tsoutsoura, 2004), SRIs are growing in size, number and assets under management. This rapid growth confirms the need for more study on the financial performance of SRIs. The aim of my research is to find out whether SRI investments outperform or fall behind compared to conventional funds and to determine the factors that are contributing to the different (or similar) returns.

My literature review begins by discussing CSR as a broad topic, discussing the importance of CSR in recent years, and the reasons why firms find it important and beneficial for their operations. Then, the discussion will focus on the utility that CSR provides for investors. This helps to narrow down the topic by focusing on CSR from the perspective of the investors only, rather than any other stakeholders. In the third step, I will discuss the risk associated with investing in SR firms and stocks.

In the next major step, this paper will discuss SR factors and how they have been selected, examined and perceived in previous research studies. Next, the discussion will focus on the impact of SR factors on firms through the cost of capital. While my thesis aims to consider this impact directly, the cost of capital allows me to consider this impact indirectly. In other words, it allows me to implicitly examine the results that I would expect to see in my thesis. Furthermore, this step connects SR factors to SRI and allows me to bring the concepts together in a narrative.

In the final step, I discuss SRIs and the contradictory findings of the studies written on the performance of SRI funds. I will examine the three broad findings based on the performance of SRI compared to benchmarks: SRIs outperforming benchmarks, SRIs having similar returns (no correlation), and SRIs having different performance in different situations. Finally, I will provide three explanations as to why different studies have reported contradictory results.

2-1. Corporate Social Responsibility

Corporate social responsibility has received a lot of attention in recent years due to the dramatic growth in the number of mutual funds, institutes and publications that are encouraging firms to enhance their operations based on the social responsibility factors. (El Ghoul et al., 2011) There is a growing demand for transparency and it is expected that firms continuously enhance their economic, social and environmental operations (Tsoutsoura, 2004). Also, CSR is no longer limited to large corporations and it is needed that all businesses align themselves with its practices (Kim et al. ,2012).In fact, CSR is being promoted to the core operations of companies and is considered next to finance, accounting and marketing operations (Kim et al. ,2014). In recent years, many companies have allocated more resources to respond to the growing interest for CSR (Mc Williams & Siegel, 2000).

There is support for the notion that both managers and investors are increasingly interested in CSR. (Cahan et al., 2015; Kim et al. ,2012).The United Nation's Principles of Responsible Investment (PRI) project, which promotes responsible investing according to environmental and social performance factors, is supported by more than 1,250 institutional investors.(Cahan et al; 2015).In 2008, nearly 10% of US investment funds screened their portfolios for CSR-related factors (El Ghoul et al., 2011). In 2010, 28 billion dollars was spent on sustainability by US large companies (Di Giuli & Kostovetsky,2014). Furthermore, around 80% of Global Fortune 250 companies

generated CSR reports in 2010 (Di Giuli & Kostovetsky,2014),Also, 3.07 trillion has been invested in CSR through socially responsible investing (Di Giuli & Kostovetsky , 2014) and 93% of 766 CEOs completing the UN Survey indicated CSR was an important or very important "factor for their organization's future success" (Cheng et al. ,2014).

Considering the dramatic growth and popularity of CSR practices, one might ask why corporations and businesses are so interested in these relatively new initiatives and what benefits CSR might provide for their firms. This question has different answers based on each stakeholder's perspective. Employees will receive better treatment and more benefits and perquisites. They will be more involved in decision-making processes of companies. Suppliers will be treated more fairly and CSR is better for the society as a whole. However, what are the benefits for the firm and its investors? The benefits for the investors is the focus of this research. For now, the discussion will briefly focus on the benefits for the firm itself.

There are many benefits associated with adopting CSR initiatives. First, there is the intangible benefit of the better reputation of SR firms. Robinson et al. (2008) argue that a better reputation is positively related to firm value. One method to achieve a positive reputation is through responding to stakeholders' increasing demands to behave in a socially and environmentally responsible manner (Robinson et al., 2008). In fact, CSR improves firm's positive public image. Cahan et al. (2015) finds that more socially responsible companies receive better news reports, are viewed more favorably and their media image is more positive. Mathematically, media favourability increases by 8% by moving from one standard deviation below to one standard deviation above the mean of CSR (Cahan et al., 2015). Also, CSR initiatives have a stronger relationship to positive media image for companies that have higher incentives to improve their image (Cahan et al., 2015). In other words, managers actively manage their CSR practices to change their media image.

(Cahan et al., 2015). This notion is more applicable to sin companies especially during seasoned stock offerings (Cahan et al.,2015).

Another benefit of CSR is the lower risk for firms. Oikonomou et al. (2012) find that CSR is "negatively and weakly associated" to systematic risk, but "corporate social irresponsibility" is "positively and strongly related to financial risk." The impact of CSR on risk along with its effects on the cost of capital, firm valuation and stock performance will be discussed later in this paper.

CSR is valued by investors to the degree that even membership in a sustainability index is favoured by investors. Robinson et al. (2008) find that being a member of Dow Jones Sustainability Index causes the share price to rise permanently and the increase in price is more than the cost associated with the registration process. They also find that it reduces the volatility of firm's future cash flows (Robinson et al.,2008). This finding does not mean that the CSR activities of companies are not monitored by investors. In fact, CSR initiatives are not dumb indicators. Kim et al. (2014) finds that if socially responsible companies commit themselves to a high degree of transparency and do not hide their bad news, CSR reduces their stock crash risk. On the other hand, if they use CSR practices to hide their unfavorable news and distract shareholders, CSR is correlated with higher stock price crash risk (Kim et al.,2014). It is worth mentioning that it is not very likely that the managers of CSR firms misuse CSR practises. Kim et al. (2012) find that socially responsible companies are less likely to manipulate their operating activities, manage earnings though discretion or to be investigated by the US Security and Exchange Commission (SEC).

2-2. Utility

It would be helpful to find out why CSR initiatives are becoming so popular and why the number and the value of the funds that are characterized by social responsibility attributes has grown

rapidly in recent years. Regardless of the impact of these initiatives on the risk, cost of capital and equity returns, it would be useful to see if there is emotional and utility gain or loss associated with investing in socially responsible companies or funds because it would allow me to predict how investors would react to underperformance of SRI funds. If investor achieve utility gain, logically they would be less likely to sell their stocks in case they underperform compared to conventional stocks.

While Oikonomou et al. (2012) reports no utility gain or loss associated to investing in SR firms, Bollen (2007) argues that socially responsible characteristics of the SR funds provide investors with utility. Bollen (2007) further explains that the socially responsible investors' response to positive return is much larger than that of conventional investors, while their reaction to negative returns is smaller than conventional investors. Also, it is worth noting that the cash in-flow into socially responsible funds shows more reaction to the lagged positive returns than cash in-flow to conventional funds while the cash out-flow is "less sensitive to lagged negative returns" (Bollen, 2007).

2-3. Risk

As suggested by the most basic principle of finance, returns can only be considered in association with their risk and considering the return of an investment without considering its risk would be misleading. The majority of the studies that focus on the financial performance of SRIs consider risk-adjusted return. Therefore, as my thesis considers the impact of SR factors on the return of SRIs, I need to consider how risky the SR portfolio and the stocks are, compared to the conventional funds and stocks. There is a consensus in the literature that socially responsible companies are less risky and corporate social responsibility lowers risk, (El Ghoul et al. ,2011;

Oikonomou et al.,2012; Bassen et al., 2006) while sin stock and socially irresponsible firms are riskier (Hong & Kacperczyk, 2009; Oikonomou et al. 2012; Robinson et al. 2008).

Among studies that examine the impact of firm level practices related to responsibility on the different types of risk, four studies are worthy of special consideration. First, Oikonomou et al. (2012) finds that CSR is "negatively but weakly" connected to the systematic risk while socially irresponsible practices of firms "are positively and strongly" connected to systematic risk. In other words, the impact of corporate social irresponsibility on risk is much greater than the effect of CSR on risk reduction, and socially irresponsible firms are severely penalized during higher volatility times (Oikonomou et al.,2012). In the time of small instability SR firms have lower levels of market risk, while during high volatility, socially irresponsible firms show higher levels of financial risk (Oikonomou et al.,2012).

Second, Robinson et al. (2008) claim that social responsibility reduces the variability of future cash flows, while weaker social responsibility may rise financial risk because it increases the chance of legal claims against the company. Third, similar to Robinson et al. (2008), Hong & Kacperczyk (2009) argue that sin stocks face higher litigation risk and that is intensified by the social norms.

Finally, Kim et al. (2014) find that the corporate social responsibility reduces stock crash risk, but only if the SR firm does not use CSR initiatives as a means to cover up bad news. However, if CSR practices are used to cover up bad news, not only it does not reduce the risk but it could also increase the stock price crash risk (Kim et al. ,2014). CSR can reduce future stock price crash risk significantly if the company has a low corporate governance rating, and low institutional ownership.(Kim et al. ,2014).

2-4. Social Responsibility Factors

Studies utilize different methods to select the SR factors that they would like to include or exclude from their studies. One common approach is to use the Kinder Lydenberg Domini (KLD) database rating (El Ghoul et al., 2011; Verwijmeren & Derwall 2010; Kempf and Osthoff, 2007; Statman & Glushkov, 2009). For example, El Ghoul et al. (2011) relies on KLD data to examine the effect of CSR on the cost of equity, using a list of ethical (strength) and unethical (concern) factors. KLD is a database that provides rating on CSR-related items for US firms. The study uses two major categories defined by KLD: qualitative (the community, corporate governance, diversity, employee relations, the environment, human rights, and product characteristics.) and controversial (alcohol, gambling, tobacco, firearms, the military, and nuclear power) and the binary system to determine if a firm involved in any of qualitative or controversial sub-categories (El Ghoul et al., 2011). Similar to El Ghoul et al. (2011) , Verwijmeren & Derwall (2010) utilize the information from the KLD data that are relevant to employee wellbeing. KLD covers multiple subcategories for employee wellbeing. The study aggregates these indicators and creates an aggregate measure (Verwijmeren & Derwall, 2010).

However, unlike El Ghoul et al. (2011), Verwijmeren & Derwall (2010) only focuses on one SR factor, employee wellbeing, to conduct their study. In fact, it is not unusual that a study examines only one factor, especially with regards to employee satisfaction and wellbeing. Employee satisfaction is one of the social responsibility factors that has been a part of socially responsible screens for a long time, but the factor has recently received more attention and has increased in importance. For example, Edmans (2011) uses employee satisfaction as the sole social responsibility screen to consider its impact on shareholder return. Edmans (2011) argues that the reason why the attitude toward the importance of employee satisfaction changes is because of the

changes in management theories that values innovation and quality rather than traditional theories that only focused on the cost efficiency and treated the human capital like any other inputs. Using a single factor examination is also common for environmental screens (Derwall et al, 2005) and corporate governance (Chen et al.,2009). As my thesis focuses on the impact of SR factors, these studies are relevant because they show that it is possible to use only one critically important factor without damaging the quality of the study.

Another thread in the study of social responsibility and financial performance is the study of sin stocks. Hong & Kacperczyk (2009) define three categories of sin stock: tobacco, gambling and alcohol. The reason that the study includes these factors as unethical investments is due to their negative affect and their addictive attributes when they are used a lot (Hong & Kacperczyk,2009). Tobacco, unlike the two others, has not been seen as a sin investment for a long period of time (only since mid-1960s).(Hong & Kacperczyk,2009). The study also recognizes the sex and defence industries as unethical but chooses to remove them from the study due to the limited number of stocks available, and differing views among investors respectively (Hong & Kacperczyk,2009). Unlike Hong & Kacperczyk (2009), Borgers et al. (2015) uses three sets of sin stock. The core sin stocks are tobacco, alcohol and gambling (Borgers et al.,2015). They use the CRSP database to locate sin stocks and sin stocks are chosen according to SIC and NAICS codes (Borgers et al.,2015). The second set of sin stocks come from Morgan Stanley Capital Indexes (MSCI) which provides 50 indicators from 7 broader ESG categories including tobacco, alcohol, gambling, firearms, military, and nuclear power (Borgers et al.,2015). Finally, a third set of sin stocks is created by using two prior sets (Borgers et al., 2015).

The final point about SR factors (before I consider the impact of these factors on cost of capital) is the changing nature of these factors over time. KLD ratings did not consider firearms unethical

until 1998 (Kempf and Osthoff ,2007). Furthermore, Diltz (1995) and Hamilton & Statman (1993) both consider investing in South Africa and nuclear industries as unethical investments. Since the political system of South Africa has changed, investing in this country is no longer considered unethical. Today, investing in some other countries is considered unethical, but it is not common anymore to consider politics as an unethical factor. The explanation for this point might come back to the fact that the studies that considered South African firms as unethical investments at that time are not very valid and their results are not very reliable anymore. Therefore, researchers prefer to exclude political factors from their selection criteria. Another explanation might be that the new list of "bad" countries are not considered a common place to invest by western investors and therefore, these countries are naturally excluded from the selection criteria. The real reason needs more investigation but it illustrates the fluid nature of political factor. With regards to nuclear power, it is still included in the list of sin investments, but the perception of investors has improved towards nuclear industries compared to the very negative view in 1990s (Diltz,1995).

2-5. Cost of capital

It is important to consider the impact of the SR factors and the CSR practices of firms on their cost of capital and firm valuation, because cost of capital can indirectly connect SR factors to SRIs. The cost of capital and the firm valuation are the main determinants of the stock price (Lamont, 2001) and considering the impact of SR factors on them might provide useful insights. Furthermore, considering impact of SR factors on stock price is more accurate than considering the mutual fund because return is not due to managerial skills of fund managers (Kempf and Osthoff , 2007).

Many studies consider the impact of CSR on cost of equity capital of SR firms. El Ghoul et al. (2011) finds that firms with better social responsibility scores can finance equity less expensively,

while the firms that participate in unethical industries have higher cost of equity. The social responsibility factors that contribute to the lower cost of equity are employee relations, environmental policies and product strategies, while three other KLD factors (community, human rights and diversity) do not contribute to a lower cost of equity. (El Ghoul et al.,2011) Also the study shows that two unethical industries, tobacco and nuclear power, have an increased cost of equity (El Ghoul et al.,2011).

Similar to El Ghoul et al. (2011), Reverte (2012), Dhaliwal et al. (2011) and Cahan et al. (2015) find the same effect of social responsibility on the firm's cost of capital. Cahan et al. (2015) finds that the social responsibility practices affect the cost of equity through creating positive media image for firms. Reverte (2012) finds that CSR initiatives in environmentally sensitive industries have the highest impact on the cost of equity capital. Finally Dhaliwal et al. (2011) find that firms with high cost of equity capital can decrease their cost of equity capital by disclosing their social responsibility initiatives.

Consistent with El Ghoul et al. (2011) 's finding that employee relations reduces the cost of equity, Verwijmeren, and Derwall (2010) find that companies with higher employee wellbeing scores have higher credit ratings, lower leverage, and lower bankruptcy risk. For each point that employee wellbeing increases, the debt ratio decreases by 1.9 ceteris paribus. (Verwijmeren, and Derwall, 2010). Cheng et al. (2014) find that firms with better social responsibility performance have a better chance to acquire financing. The lower capital constraints comes from the higher transparency and stakeholder engagement of these companies (Cheng et al.,2014). In fact, even debt financing is more expensive for socially irresponsible firms. Goss & Roberts (2011) find that firms with weaker social responsibility practices pay more for their bank loans than firms that are

more socially responsible. Banks consider CSR concerns as a risk to their loans and, therefore, offer less desirable loan contract terms. (Goss & Roberts, 2011).

Finally, CSR in many aspects fills that gap created for the lack of corporate governance mechanisms. As previously stated CSR practices reduce crash risk especially when there is not a strong corporate governance system in place (Kim et al. ,2014). Similar to CSR, corporate governance has the same impact on the cost of capital. Chen et al. (2009) find that the firm level of corporate governance reduces the cost of equity capital in emerging markets. This result is effective even after controlling for traditional risk factors, inflation and analysts forecast issues (Chen et al. ,2009).

2-6. Socially Responsible Investing

In reviewing papers written on the financial performance of SRIs, I find that there is no consensus among the studies on the performance of SRIs. The disagreement on this matter can be attributed to the differences of the models that these studies used, the method they use to determine the financial performance, the variables that they controlled for, the method of stock selection or portfolio creation, and, as Kempf and Osthoff (2007) claim , to the managerial skill of the portfolios fund managers.

In order to be able to compare the findings of different studies, I will combine the studies based on the similar finding together and will discuss them. A large portion of the studies find that SRI portfolios outperform conventional funds and there is a correlation between the socially responsible selection of stocks and the excess return of the resulting portfolios (Edmans, 2011; Derwall et al, 2005; Kempf and Osthoff, 2007; Byus et al., 2010 ; Aktas et al., 2011). Edmans (2011) finds that there is a 3.5% four-factor alpha (excess return) associated with investing in a

value weighed portfolio of the "100 Best Companies to Work For in America". The main hypothesis associated to the excess return is that because the market is unaware of the changing nature of the firm, it does not value the employee relations (traditional view sees job satisfaction as a negative or zero value) and, therefore, if the market finds out about the correlation among employee satisfaction and excess return, the excess return will disappear gradually. (Edmans,2011).

Similarly, Derwall et al. (2005) claims that SRI improves the performance of portfolios. The two portfolios that they constructed are different on eco-efficiency (Derwall et al,2005). The study finds that the best in class strategy on eco efficiency earns a higher return than the worst in class efficiency equal to 6% from 1995 to 2003 (Derwall et al,2005). The excess return is risk and style adjusted (Derwall et al,2005). The major difference between Edmans (2011) and Derwall et al. (2005) comes back to the method of the SRI stock selection. Therefore, although their results are consistent, they are not comparable.

In order to overcome the potential effect of the mutual fund managerial skill on the performance of pre-determined portfolios, many studies form their own portfolios based on the KLD rating data. (Kempf and Osthoff, 2007; Tsoutsoura, 2004) As previously stated, KLD rates companies based on their socially responsible practices on six criteria. Using the KLD rating system provides the option to consider the correlation of SRI financial performance to each of the factors of the KLD separately. Kempf and Osthoff (2007) and Tsoutsoura (2004) both use KLD rating data to consider the financial performance of SRIs. Furthermore, Tsoutsoura (2004) uses the Domini 400 Social index as a proxy. They argue that the use of these measures prevents the subjective measurement issue that caused other studies to come up with inconsistent results (Tsoutsoura , 2004) . Similar to Edmans (2011) and Derwall et al. (2005), Tsoutsoura (2004) finds a positive

correlation between the CSR indictors and financial performance. Kempf and Osthoff (2007) use the KLD rating data to form portfolios and perform a long-short strategy. They find that their long-short strategy yields a positive four-factor alpha of 8.7 % per year (Kempf and Osthoff, 2007).

Alternatively, there is also support for the notion that the SRI selection has no effect on the financial performance of portfolios (Statman & Glushkov,2009; Bauer et al. ,2005; Diltz,1995; Bauer et al.,2006; Blanchett, 2010). One explanation for no correlation between SRI and the financial performance of the portfolio would be that the inclusion of SRI in the investment portfolio increases the return of the portfolio compared to the conventional portfolios. However, the exclusion of sin stocks creates lower return compared to the conventional portfolios and, therefore, offsets the excess return caused by considering socially responsible investing. Statman & Glushkov (2009) argue that although the socially considerate investors are leaning toward socially responsible stocks, their avoidance of sin stocks (tobacco, firearms, nuclear industries and military) offsets the advantage created by their investing in the ethical stocks. Borgers et al. (2015) also support this finding. They argue that the financial return of the classic sin stock is positive and statistically significant (Borgers et al.,2015). They claim that this result is caused by ethical investors refusing to invest in unethical stocks (Borgers et al.,2015). In addition, these higher returns do not convince the mutual funds to invest in these controversial funds to generate higher returns, mainly due to the social consideration of the fund managers (Borgers et al.,2015).

Another explanation for the lack of correlation between the inclusion of SRIs and the financial performance of portfolios is some type of unrecognized bias in the studies that show a correlation. If the researcher could examine the relationship in a bias-free-world there would be no relationship between selecting SRI and the excess return in the financial performance of portfolios. For example, Gregory et al. (1997) argues that the bias toward small cap firms exists and size of fund

as a method to match ethical and non-ethical pairs, would not control for this bias. Therefore, there is no statistically significant difference in the financial performance of the ethical unit trust against their conventional counterparts (Gregory et al. ,1997). Furthermore, Guerard (1997) attributes the excess return to the bias in the style of investment and reports no statistically significant difference in the return of ethical and unscreened stocks from 1987 to 1994.

Bauer et al. (2005) attempts to address these biases and re-determine the relation between investing in ethical fund and the excess performance. In order to do that, they used a multifactor model and controlled for book to market, size and momentum effects (Bauer et al., 2005). Furthermore, they used a database containing German, US and UK ethical mutual funds. Bauer et al. (2005) found that there was no statistically significant difference in the risk-adjusted return of SRI and conventional funds which is consistent with the finding of (Gregory et al., 1997; Guerard, 1997). In fact, they find that ethical equity indexes are not able to explain ethical mutual fund return better than standard indexes (Bauer et al., 2005). They also find that ethical investments have different investment styles compared to traditional funds. Finally, ethical funds have different styles based on their country of origin. (Bauer et al.,2005) For example, while the United States' ethical portfolios are more large caps, UK's and Germany's ethical portfolios are more tilted toward small caps compared to conventional funds, and these funds tend to be "more growth oriented and less value oriented". (Bauer et al., 2005).

Similarly, Bauer et al. (2006) try to address the small cap benchmark bias of funds in Australia by using world-scope equity indices that cover 98% of market capitalization. They find that the risk adjusted return of ethical and traditional funds are not different significantly in Australia between 1992 and 2003 (Bauer et al. ,2006).

The third and final explanation for the lack of correlation between the SRI portfolios and excess return is that the return varies based on each social responsibility factor of SRI portfolio but the aggregate impact of these factors causes the portfolio to have a return similar to the conventional return. Diltz (1995) finds that good environmental performance of firms, and excluding nuclear and weapon industries improves the performance of the portfolios while employee related factors negatively impact the portfolio performance. However, the overall performance exhibits little effect on the performance of the portfolio (Diltz,1995). Therefore, the aggregate impact of these factors has very little impact on the performance.

It is worth mentioning the finding that the financial performance of SRI can vary significantly (even over a very long period) against the conventional portfolios, as claimed by Blanchett (2010), may confirm the idea that the unique performance factors must be considered in determining the financial performance of SRIs. The study finds that there is no significant difference in return or risk adjusted return of conventional and ethical funds (Blanchett, 2010).

There is evidence of factors other than the SRIs themselves that contributes to the performance of ethical investing. In other words, there are externalities that might impact the financial performance of this type of investment. As previously discussed, there are biases that might cause the performance of the SRI to deviate from their actual returns. (Gregory et al., 1997; Guerard, 1997). Furthermore, almost all studies that examine the financial performance of SRI, control for certain internal factors such as size, book to market, momentum, etc. (Bauer et al., 2005). Also, they use multifactor models to capture more accurate results of SRI performance (Bauer et al., 2005).

Even after addressing all biases, controlling for all relevant factors, and using the most accurate models, some external factors such as stability of the market or the length of investment period

(short term vs long term) or the exclusion of certain unethical investments might affect the financial performance of SRIs.

For example, Nofsinger and Varma (2014) find that the financial performance of SRI in non-crisis periods underperforms compared to conventional funds while, in crisis periods, outperforms conventional funds. Although SRI portfolios hold newly established and smaller firms with lower volatility in return, these factors do not affect return because the study controls for all of these factors (Nofsinger and Varma, 2014). In contrast, funds that invest based on "religious principles do not outperform in crisis periods" because this screen is considered as a negative screen (Nofsinger and Varma, 2014). In fact these ESG portfolios use positive screens rather than negative to create return (Nofsinger and Varma, 2014).

This finding is consistent with Borgers et al. (2015) that argues that the negative screening of sin stocks causes the ethical considerate investor to pay a financial cost for foregoing these stocks. Borgers et al. (2015) finds sin stocks have higher expected return, face higher legal risk, and receive less coverage from analysts. Finally "the valuation ratios of sin stocks are on average 15 to 20 percent lower than other companies" (Borgers et al. ,2015).

Finally, the time-period of the investments is important in determining the return of SRIs. For example, Hill et al. (2007) form three portfolios for Asian, European and US ethical funds and determine the performance of these portfolios over the short term (3 years) intermediate term (5 years) and long term (10 years). They find that in the short term (from 2002 to 2005) only the European portfolio shows excess returns, while in the intermediate term none of the portfolios exhibit excess returns and in the long term both European and US portfolios have excess returns (Hill et al., 2007). Therefore, it can be claimed that the length of the investment as an externality can affect the performance of the SRI portfolios. These studies address the externalities that might

affect the financial performance of SRIs which are related to my thesis and it is necessary that I review the effect of these external factors to be able to control these factors in my own research study.

Chapter 3: Methodology

3-1. Research objective

The objective of this research is to determine whether the ethical considerations of companies have any effect on the financial return of their stocks and if there is an effect, what the direction of that effect is (if it is negatively or positively correlated to return). The ethical considerations are measured by the CSR rating of the companies.

Therefore, the research objective can be translated into two research questions:

1- Does corporate social responsibility affect the financial performance of SRIs?

2- If there is an effect, what is the direction of that effect?

The first question asks whether a CSR-effect exists and the second question determines whether that effect is positively or negatively correlated to return. It is worth noting that the research objective must be studied in two steps. The two questions cannot be combined into a single question to study whether CSR has a positive or negative effect on return. If, for example, the research question was formulated as, "CSR "increases" (is positively correlated to) return", the result would be ambiguous in the case where the hypothesis is rejected. (There might be a negative correlation or no correlations at all.)

To study my research questions, I follow in the spirit of Fama French (1993), building a factor model to examine if there is a CSR effect, its direction and its magnitude (if any). I measure this effect by considering whether the social responsibility factor improves the explanatory power of the model. As a part of my model design, I define "ethical" (high CSR rating) and "unethical" (low CSR rating) portfolios. These portfolios have the same weight in relation to other factors that affect return. The details of my model design are discussed in the following sections.

3-2. Data

The data are collected from Bloomberg terminal. The number of companies varies each year, but the average number of observations is 219 per year. Canadian monthly T-bill rates are used as proxies for risk-free rates. The BE/ME ratios for each year t are determined by dividing the book value for the previous year (t-1) and market capital of at the end of the previous year (year t-1). The market equity value of each firm in June of year t represents the size of each company. The financial data used in this study are from 2008 to beginning of 2015.

ESG scores provided by Bloomberg are used as proxies for CSR ratings of Canadian companies. ESG score is an integrated rating based on environmental, social, and governance performance disclosure of companies. Each of these categories has sub-categories and they are evaluated based on data collected from "company-sourced filings such as Corporate Social Responsibility reports, annual reports, company websites and a proprietary Bloomberg survey that requests corporate data directly." (Bloomberg L.P., 2014) Bloomberg ESG scores are based on combinations of more than 700 indicators (Bloomberg L.P., 2014).

TSX companies with an ESG rating which are mostly from TSX composites are included in the study. The ESG rating assigned to each company ranges from 0 to 100.The mean of ESG scores for each year is from 21.06 to 24.26 and standard deviation is between 12.64 and 14.56.

3-3. Model Creation

My model is created based on the well-known 1993 Fama-French 3-factor asset-pricing model. Given that the Fama-French model is a widely-accepted model design, I follow their methodology in creating factors for my main model. In addition, I also create modified and alternative models

to adapt to the limitations and characteristics of the Canadian stock market. These modifications will also be consistent with the Fama-French 1993 and 2015 models.

$$R_{it} - R_{Ft} = a_i + b_{1i}(R_{mt} - R_{Ft}) + b_{2i}SMB_{avgt} + b_{3i}HML_t + b_{4i}CSR_t \quad (1)$$

As can be seen in equation 1, I add a new CSR factor to the asset-pricing model to capture excess returns that are not explained by the familiar size and book-to-market factors. This CSR factor is designed based on the difference between two groups of stocks (segments) on their CSR rating which have similar book-to-market and size weights. The test of this model shows whether the contribution of this new factor in explaining excess return is statistically significant and in case this effect exists what the direction of this effect is.

This asset-pricing model is selected because of the advantages it provides in comparison to competing model designs. First, this model allows me to create low-CSR and high-CSR portfolios that are used in constructing CSR factor. These portfolios provide the opportunity to study the behaviour of "ethical" and "unethical" stocks, regardless of the results of the asset-pricing model itself. The second advantage of this model is that it allows us to study not only the existence and the direction of the CSR effect, but also the magnitude of that effect as well. Finally, this model will have the implications beyond studying the effect of social responsibility factor as it will introduce a new factor to explain return of stocks, assuming a CSR effect exists.

3-4. Underlying Portfolios

In equation (1), the two factors that are meant to control the effect of size and book-to- market equity are created from the intersection of market equity (which represents size) and BE/ME sorts. Size and BE/ME sorts form two and three segments respectively. To create size segments, all TSX composite stocks of each year t are sorted based on market capital in June of the same year. The median is used to divide the stocks into two segments. Similarly, to create BE/ME segments, TSX composite stocks of each year are sorted based on the proportion of book value to market capital. However, unlike the size groups, the BE/ME segments are created based on the book value of the previous year (t-1) and market capital of at the end of the previous year (year t-1). The 30^{th} and 70^{th} percentiles are used to create the three segments.

The CSR factor measures the effect of social responsibility and is created from the intersection of two size and three CSR segments. TSX composite stocks for each year t are sorted according to the ESG rating for the corresponding year. Similar to BE/ME, the 30^{th} and 70^{th} of the ESG rating are used to split the TSX composite stocks into three groups. TSX composite stocks in each year are also sorted based on the market equity in June of the same year. The median is used to split the stocks into two size groups.

The asset-pricing model used in this paper is based on two size and three book-to-market segments. This is due to the fact that return is impacted more by BE/ME than by size (Fama and French, 1992a).Also, given other models are introduced in this paper, I refer to the models created on the set of portfolios mentioned in this sections as Value (VL) or original models.

3-5. Independent Factors

Among the four factors used in the model to explain return, the first one is the market factor that captures the excess market return. This factor controls for the return that can be described by

market return above the risk-free rate (RF). The market return is the average return of the stocks in six value-weighted portfolios formed on size and book-to-market equity. In order to be consistent with Fama-French (1993), stock returns that have negative book value are restored. RF is the one-month Canadian treasury bill return. The excess market return is measured by subtracting the risk free rate from the return on the value-weighted portfolio. For the rest of this paper, market return and market factor will be denoted as Rm and Rm-Rf respectively.

The second independent factor in the four-factor model is the size factor that is designed to control for the portion of return that can be explained by difference in the size of stocks. This factor is built on the six size-BE/ME portfolios. As can be seen in equation 2, it is calculated by subtracting the arithmetic average of three big size-BE/ME portfolio returns from that of three small-BE/ME portfolios. The correlation between this factor and the book-to-market equity is -0.008 which is low. Note however, as Fama and French (2015) indicate, when SMB (or any other factor) controls for a characteristic such as book-to-market, it means SMB gives equal weight to low and high and "neutrality with respect to characteristics does not imply low correlation between factor returns." (Fama and French, 2015). For the rest of this paper, the size factor will be denoted by SMB, which stands for small minus big.

$$SMB = \frac{SL+SM+SH}{3} - \frac{BL+BM+BH}{3} \qquad 2.$$

The next control factor in my asset-pricing model is the book-to-market equity factor that is meant to explain the portion of return that can be attributed to the difference in the book value in proportion to the market value. This factor is created on the six size- BE/ME portfolios. Equation

3 shows that this factor is determined by subtracting the arithmetic average of two size- low BE/ME portfolio returns from the arithmetic average return on two size-high BE/ME portfolios. For the rest of this paper, the book-to-market equity factor will be denoted by HML as it is stands for high minus low.

$$HML = \frac{SH+BH}{2} - \frac{SL+BL}{2} \quad 3.$$

The final independent factor in this asset-pricing model is the social responsibility factor. This factor is added to the original model to determine whether the explanatory power of the model will be improved by introducing a new social responsibility factor and whether there is a portion of return that can be explained by the difference in approaches of companies toward social responsibility. Unlike the three prior factors, this factor is built on the six CSR-size portfolios. As equation 4 indicates, this factor is the difference between the arithmetic average of two size-ethical portfolio returns and that of two low ethically ranked CSR-size portfolios. For the remainder of this study, the social responsibility factor will be denoted by CSR.

$$CSR = \frac{SH_{CSR}+BH_{CSR}}{2} - \frac{SL_{CSR}+BL_{CSR}}{2} \quad 4.$$

Before I move on to the next section, I need to clarify an issue. The set of 6 size-CSR portfolios that are used to create CSR can, also, produce a new size factor. This factor is equivalent, but not similar, to the original SMB factor as it is created on size-CSR portfolios rather than size-BE/ME

portfolios. Please note that the original SMB factor does not control for CSR in the capturing size-effect. This new size factor is meant to explain the portion of return due to the difference in size of stocks. It is calculated by subtracting the arithmetic average of three big size-CSR portfolio returns from that of three small-CSR portfolios. For the rest of this study, this factor will be denoted by SMBcsr. I also introduce a new size factor that is created from the average of SMB and SMBcsr, as equation 5 shows. This factor is denoted as SMBavg.

$$SMB_{avg} = \frac{SMB+SMB_{CSR}}{2} \quad 5.$$

3-6. Dependent Factor

The dependent variables of the study, excess returns, are built on the intersection of 3 size and 3 BE/ME portfolios. These portfolios are created similar to the sets of 6 size-BE/ME and 6 CSR-size portfolios. Stocks of each year t are sorted on market capital in June of the same year to create three size segments. To form BE/ME portfolios, stocks of each year are ranked based on the proportion of book value to market capital. Similar to six size-BE/ME portfolios, these segments are created based on the book value of t-1 and market capital of the end of the previous year (year t-1). The selected breakpoints, leave 30% of stocks in each of the top and bottom segments.

The second set of excess return portfolios are also created from the intersection of 3 size and 3 CSR segments. These portfolios are created in the same way as 9- size-BE/ME portfolios. The only difference is that I use CSR as the second sort rather than BE/ME. The stocks of each year t are sorted based on the ESG rating for that year, to create CSR segments. The breakpoints that are

used to form CSR segments are identical to that of BE/ME segments in the set of the 9 BE/ME-size portfolios.

Please note that this study uses excess returns on nine portfolios compared to the 25 portfolios of the original Fama-French asset-pricing model. That is due to the smaller number of Canadian stocks used in this study than the U.S. Stocks in the Fama French study. Using 25 portfolios in this study leaves big portfolios with a few of stocks, which causes certain stocks to be over-weighted in the results and affects the accuracy of the model.

The dependent variables in this asset-pricing model are excess returns. According to Fama-French (1993), the dependent factor is created on size-BE/ME portfolios to determine whether HML and SMB can explain returns related to book to market equity and size respectively. For the same reason, I created portfolios on size-CSR. Similar to the market factor, stocks that have negative book value are restored in the portfolios that are used to construct the dependent variables. The behaviour of these variables are discussed in the following section. For the rest of this paper, the dependent variables will be denoted by Rt as it stands for return.

3-7. Modified Models

Other than the CSR factor that the above asset-pricing model adds to the original Fama-French model, it closely follows Fama-French (1993) and (2015) in other aspects. However, the Canadian stock market has differences that might require adjustments to the model to improve its explanatory power based on the limitations of the CSR rating method and the number of the Canadian companies that are rated.

In this section, I discuss modifications to the original model that are both consistent with the Fama-French model and help to form size-BE/ME portfolios that are more similar to Fama-French model in the proportion of value weights and number of stocks in each portfolio.

The first modification adjusts the proportion of companies in each size group equal to that of Fama-French model. In their three-factor asset-pricing model, Fama-French (1993) used the median of NYSE as a breakpoint to create two size groups. Given that they used this breakpoint to split Amex and NASDAQ stocks as well, and most of stocks in these exchanges have smaller size compared to the NYSE median, the number of stocks in the small segment is disproportionally larger than the big group (Fama and French 1993). However, in my original model, using the TSX median creates two size groups with the same number of stocks in each group. Fama and French (1993) claims that almost the 75 percent of the combination of Amex , NASDAQ and NYSE are located in the small group in 1991. Therefore, the breakpoint in my model is adjusted to 3rd quartile to be consist with the number of stocks in Fama-French model.

Adjusting the break point for size increases the number of stocks in Small-Low, Small-Med, and Small-High portfolios. Given the stocks that are shifted from the big group to the small are larger than all stocks in the small group, they significantly affect the weighted value return of small portfolios. The same logic applies to the Small-CSRLow, Small-CSRMed, and Small-CSRHigh portfolios and it is expected that the weighted value returns of these portfolios are significantly affected by the shift in size breakpoint.

To be consistent with the portfolios that create the explanatory factors, the size breakpoint for the portfolios that form the dependent factor is also adjusted based on the proportion of stocks in each size group. In this model, around 63.34% of stocks are in the small group, 21.00% are in the medium group and the remaining 15.66% stock belong to the big group. These numbers are

determined based on the proportion of stocks in the Fama and French (1993) three-factor asset-pricing model that are in the 8 smallest, 9 medium and 8 largest of the 25 portfolios respectively.

The second method to interpret the size breakpoint in the Fama- French model is based on the value of each size group. As stated in the previous section, using the median of NYSE to split the stocks in NASDAQ, AMEX and NYSE places almost three-quarter of the combination of stocks, in these exchanges, in the small group. However, this group with a large number of stocks contains a smaller portion of the total value. Fama and French (1993) claim that it is about 8% in 1991. However, the breakpoint in this model is adjusted to 10% because using 8% leave too few stocks in the small-CSR portfolios before 2010. Also, as the number of stocks with a CSR rating fluctuates throughout the years, the 10% breakpoint reduces the standard deviation of number of stocks in each portfolio. The models created based on these breakpoints are denoted as 10/90 or modified models.

The size breakpoint for the 9 portfolios that form the dependent factor is also adjusted based on the value of stocks in each size group. In 10-90 model, the smallest stock group has a combined value of around 4.57% of the total value of stock in that year. Similarly, the next 11.9% and 83.53% value of stocks make up the medium and Big group respectively. The value of stocks in each size group is calculated by adding the value of stocks in the three-factor asset-pricing model that are in the 8 smallest, 9 medium and 8 largest of the 25 portfolios respectively.

3-8. An Alternative Model

In equation 6, the three independent factors that are meant to explain the effect of size, book-to-market equity, and CSR are built on the same set of 8 portfolios. These portfolios are created from three independent sorts on size, CSR, and BE/ME. Each sort forms two segments. To create two

size segments, all TSX composite stocks of each year t are sorted on market equity value in June of the same year. Then, the stocks are divided into two segments based on the TSX ME median.

$$R_{ia} - R_{Fa} = a_i + b_{1i}(R_{ma} - R_{Fa}) + b_{2i}SMB_a + b_{3i}HML_a + b_{4i}CSR_a \quad 6.$$

TSX composite stocks of year t are also independently sorted according to the ESG rating for the corresponding year. The median of the ESG rating is the breakpoint to divide the TSX composite stocks into two groups. Similarly, TSX composite stocks in each year are sorted based on the proportion of book value to market equity and the BE/ME segments are created based on the book value of the previous year (t-1) and market equity value at the end of the previous year (year t-1). From the intersections of these segments, 8 portfolios are created (2X2X2).

3-8-1. Explanatory Factors

The first factor that is used to explain return is the market factor that captures the market return above the risk-free rate. The market return is the weighted value return on the stocks that are used to create each of the 8 aforementioned portfolios. Also, to be consistent with Fama-French (1993), the stocks that have negative book value are restored. RF is the one-month Canadian treasury bill return. The excess market return is measured by subtracting the risk free rate from the monthly market return.

The second explanatory factor in this model is the size factor that is designed to control for the portion of return that can be explained by difference in the size of stocks. This factor is built on the eight size-BE/ME-CSR portfolios. As seen in equation 7, it is calculated by subtracting the

arithmetic average of four big size-BE/ME-CSR portfolio returns from that of four small-BE/ME-CSR portfolios. For the rest of this paper the size factor will be denoted by SMBa.

$$SMB_a = \frac{SLL_{CSR}+SLH_{CSR}+SHL_{CSR}+SHH_{CSR}}{4} - \frac{BLL_{CSR}+BLH_{CSR}+BHL_{CSR}+BHH_{CSR}}{4} \quad 7.$$

The third independent factor in this asset-pricing model is the book-to-market equity factor that is meant to explain the portion of return that can be attributed to the difference in the book value in proportion to the market value. Equation 8 shows that this factor is determined by subtracting the arithmetic average of two low BE/ME-size portfolios returns from the return of the arithmetic average of two high BE/ME-size portfolios. For the rest of this paper the book-to-market equity factor will be denoted by HMLa.

$$HML_a = \frac{SHL_{CSR}+SHH_{CSR}+BHL_{CSR}+BHH_{CSR}}{4} - \frac{SLL_{CSR}+SLH_{CSR}+BLL_{CSR}+BLH_{CSR}}{4} \quad 8.$$

The final independent factor in this four-factor model is the social responsibility factor. This factor is meant to determine whether there is a portion of return that can be explained by the difference in approaches of companies toward social responsibility. This factor is built on the eight CSR-BE/ME-size portfolios. As equation 9 indicates, this factor is the difference between the arithmetic average of two ethical size-BE/ME portfolios returns and that of two low ethically ranked CSR-BE/ME portfolios. For the remainder of this study the social responsibility factor will be denoted by CSRa.

$$CSR_a = \frac{SLH_{CSR}+SHH_{CSR}+BLH_{CSR}+BHH_{CSR}}{4} - \frac{SLL_{CSR}+SHL_{CSR}+BLL_{CSR}+BHL_{CSR}}{4} \quad 9.$$

In this model, while SMB, HML and CSR explain the effect of size, book-to-market, and CSR, each factor has built-in controls for two other factors. For example, while the CSR factor captures the effect of CSR, the CSRHigh and CSRLow portfolios also have the same size and the same BE/ME rating. These controls help to make sure that CSR factor only measures the effect of companies' ethical policies and not size or BE/ME effects.

3-8-2. Dependent Factor

Excess returns are the dependent variables of this study. Twelve portfolios are created from three independent sorts on size, book-to-market and CSR. Each of the size and BE/ME sorts form two segments while three segments are created from the sort of CSR. Stocks for each year t are sorted on market capital value in June of the same year and the TSX median is the breakpoint to create two size segments. Similar to market factor, stocks that have negative book value are restored. To form BE/ME segments, stocks from each year are sorted based on the proportion of book value to market capital. These segments are created based on the book value and market capital of the previous year (year t-1) and the median is used as the breakpoint.

TSX composite stocks of each year are also independently sorted based on ESG rating for the same year. The 33rd and 67th percentiles are the breakpoint to divide the TSX composite stocks into three groups. The intersections of these segments form the 12 portfolios. The monthly excess

return on each portfolio is determined by subtracting risk-free rate from the weighted value return of the portfolio for that month.

Each portfolio contains stocks with certain characteristics and it helps to study the behaviour of the model toward that group of stocks. For example, using the excess return of Small-Low-CSRLow portfolio as the dependent factor in my model indicates the relationship of SMB, HML, and CSR factors with small size, low CSR rating and low book-to-market value stocks.

The reason that the model uses 3 CSR segments to create excess return portfolios rather than 2 is to study how the increase in the CSR rating affects the excess return. Please note that the ideal number of dependent portfolios for this model is 18 which are created from 2 size, 3 BE/ME and 3 CSR segments. However, using 18 portfolios reduce the diversity of stocks in each portfolio, causing certain stocks to be over-weighted in the results and affecting the accuracy of the model.

Here I introduce a modified version of the model based on the value of each size group. The breakpoint in this model is adjusted, so the smallest stocks with 10% of the total value fall in the small group. This adjustment is consistent with the Fama-French 3-factor asset-pricing model. (Please refer to Modified Models section for explanation). As I move in time from the later years to the earlier years, the number of the stocks with a CSR rating decreases. If the removed stocks are randomly selected, it has little effect on the size groups. However, when the number of small stocks disproportionally decreases, it causes the median to move toward the big stocks. Subsequently, some stocks that are in the big segment in later years are shifted to the small segment in earlier years. The newly added stocks affect the return of the small size portfolios. This effect intensifies, as the size of the stocks that are added to the small group are larger than the biggest stocks in the small group.

Defining the size breakpoint based on the percentage of total value helps to control this effect. A large number of the small stocks still has a low value compared to the stocks in the big segment. Therefore, the addition of many small stocks has a minimal effect on the total value and subsequently, on the size breakpoint. Please note that this effect also depends on the percentage that is selected as the size breakpoint. Tests suggest that using a 10%-90% breakpoint minimizes this effect.

In the following section, I discuss the results of my original model, modified models and the alternative model (ALT). Each model will be used to explain excess returns on both size-BE/ME and size-CSR portfolios. I will also examine 3-factor models consisting of Rm-Rf, SMB, and each of HML and CSR factors. Furthermore, ALT model will be tested on the 12 size-BE/ME-CSR and both the 9-size BE/ME and size-CSR. Results for one of the models (75% breakpoint) will not presented that is due to the disproportional distributions of stock in the portfolios by this model. In total, the results for 9 models and 84 regressions will be discussed. The complete list of models is found in Table 2.

Table 2-List of original, modified and alternative models

The table shows the list of models that are created and examined in this paper. Panel A shows 4 modified models that are explaining excess returns on either the size-BE/ME or size-CSR portfolios. Model (1) is a 4-factor model explaining excess returns on a set of 9 size-CSR portfolios. Model (2) is a 3-factor model explaining excess returns on a set of 9 size-CSR portfolios. Model (3) is a 4-factor model explaining excess returns on a set of 9 size-BE/ME portfolios. Model (4) is a 3-factor model explaining excess returns on a set of 9 size-BE/ME portfolios. Panel B shows 4 value (original) models that are explaining excess returns on either size-BE/ME or size-CSR portfolios. Model (5) is a 4-factor model explaining excess returns on a set of 9 size-CSR portfolios. Model (6) is a 3-factor model explaining excess returns on a set of 9 size-CSR portfolios. Model (7) is a 4-factor model explaining excess returns on a set of 9 size-BE/ME portfolios. Model (8) is a 3-factor model explaining excess returns on a set of 9 size-BE/ME portfolios. Panel C shows the alterative model explaining excess returns on a set of 12 size-BE/ME-CSR portfolios.

Panel A

$$R_{size-CSRiv} - R_{Fv} = a_i + b_{1i}(R_{mv} - R_{Fv}) + b_{2i}SMB_{avgv} + b_{3i}HML_v + b_{4i}CSR_v$$ Model (1)

$$R_{size-CSRiv} - R_{Fv} = a_i + b_{1i}(R_{mv} - R_{Fv}) + b_{2i}SMB_{CSRv} + b_{4i}CSR_v$$ Model (2)

$$R_{size-BE/MEiv} - R_{Fv} = a_i + b_{1i}(R_{mv} - R_{Fv}) + b_{2i}SMB_{avgv} + b_{3i}HML_v + b_{4i}CSR_v$$ Model (3)

$$R_{size-BE/MEiv} - R_{Fv} = a_i + b_{1i}(R_{mv} - R_{Fv}) + b_{2i}SMB_v + b_{3i}HML_v$$ Model (4)

Panel B

$$R_{size-CSRit} - R_{Ft} = a_i + b_{1i}(R_{mt} - R_{Ft}) + b_{2i}SMB_{avgt} + b_{3i}HML_t + b_{4i}CSR_t$$ Model (5)

$$R_{size-CSRit} - R_{Ft} = a_i + b_{1i}(R_{mt} - R_{Ft}) + b_{2i}SMB_{CSRt} + b_{4i}CSR_t$$ Model (6)

$$R_{size-BE/MEit} - R_{Ft} = a_i + b_{1i}(R_{mt} - R_{Ft}) + b_{2i}SMB_{avgt} + b_{3i}HML_t + b_{4i}CSR_t$$ Model (7)

$$R_{size-BE/MEit} - R_{Ft} = a_i + b_{1i}(R_{mt} - R_{Ft}) + b_{2i}SMB_t + b_{3i}HML_t$$ Model (8)

Panel C

$$R_{ia} - R_{Fa} = a_i + b_{1i}(R_{ma} - R_{Fa}) + b_{2i}SMB_a + b_{3i}HML_a + b_{4i}CSR_a$$ Model (9)

Chapter 4: Summary

4-1. Model Performance

In this section, I discuss the explanatory power of the 3-factor and 4-factor models. There are different methods to determine how well a model explains returns. However, most of these methods measure the ability of a model to reduce alpha. In my context, a lower alpha (intercept in the regression) means that a higher percentage of returns is captured and explained by the independent factors in the model. In this study, I use average absolute value of intercepts and other measures to examine the explanatory power of the model. The average absolute value shows the dispersion of the intercepts around zero regardless of their directions.

Table 1 shows average absolute value of intercepts. Comparing the average absolute value of intercepts for the 10/90-3-factor model explaining size-BE/ME portfolios with that of the 4-factor model shows that the explanatory power of the model is increased by around half of a basis point. The average absolute value of intercepts for VL-3-factor model is lower than that of the 4-factor model.

I also consider the effect of removing HML factor (replacing it with CSR) on the explanatory power of the 4-factor model. As reported in table 1 the average absolute value of the 4-factor model (for both 10/90 and VL) formed on size-CSR increases after removing HML factor. These results show that CSR does not improve the explanatory power of the model either by adding it to the 3-factor model or by substituting for HML.

Table 1-Summary statistics for explanatory power of 3-factor and 4 factor models

The table shows the measures that test the explanatory power of the 3-factor and 4-factor models. The first row in each matrix reports the average absolute value of intercepts of 3-factor and 4 factor models explaining excess returns on a same set of portfolios. The second row shows the ratio of average absolute value of intercepts to dispersion of excess returns. This ratio is calculated by dividing average absolute value of intercepts by dispersion of average excess return of a portfolio from mean of the average of all portfolios in a model. The left columns are the results of modified models and the right models are the results of original models. The matrixes report:

- RTN: Modified model explaining excess returns on 9 BE/ME-Size portfolios
- RVN: Original model explaining excess returns on 9 BE/ME-Size portfolios
- RTC: Modified model explaining excess returns on 9 CSR-Size portfolios
- RVC: Original model explaining excess returns on 9 CSR-Size portfolios

	4-Factor RTN	3-Factor RTN
$\frac{\sum_{i=1}^{n}\lvert a_i\rvert}{n}$	0.205116668	0.210072738
$\frac{\sum_{i=1}^{n}\lvert a_i\rvert}{\sum_{i=1}^{n}\lvert \bar{r}_i\rvert}$	0.659484288	0.675418881

	4-Factor RVN	3-Factor RVN
$\frac{\sum_{i=1}^{n}\lvert a_i\rvert}{n}$	0.259127293	0.225068855
$\frac{\sum_{i=1}^{n}\lvert a_i\rvert}{\sum_{i=1}^{n}\lvert \bar{r}_i\rvert}$	0.679469661	0.590163455

	4-Factor RTC	3-Factor RTC
$\frac{\sum_{i=1}^{n}\lvert a_i\rvert}{n}$	0.235427276	0.312423993
$\frac{\sum_{i=1}^{n}\lvert a_i\rvert}{\sum_{i=1}^{n}\lvert \bar{r}_i\rvert}$	0.707324293	0.938655382

	4-Factor RVC	3-Factor RVC
$\frac{\sum_{i=1}^{n}\lvert a_i\rvert}{n}$	0.451124978	0.516708899
$\frac{\sum_{i=1}^{n}\lvert a_i\rvert}{\sum_{i=1}^{n}\lvert \bar{r}_i\rvert}$	1.060945357	1.215184115

We also use a measure that determines the percentage of return that is not explained by models. This ratio is calculated by dividing average absolute value of intercepts by dispersion of average excess return of a portfolio from mean of the average of all portfolios in a model.

As reported in table 1, this measure is consistent with the results of average absolute value of intercepts. The 10/90- 3-factor model explaining size-BE/ME portfolios leaves 67.5% of the returns unexplained while the percentage of unexplained returns for the VL-3-factor model is 59%. The range of my results for this measure (from 59% to 67.5%) is within the same range as findings of Fama and French (2015) for their 3-factor model which is from (54% to 68%).The addition of the CSR factor reduces this measure for VL models while it slightly improves for 10/90 model. Please note that average absolute value of intercepts shows the same patterns for 4-factor models formed on size-BE/ME.

The results for 3-factor and 4-factor models formed on size-CSR (4 models) are also reported. These results show that the explanatory power of models decrease as I remove the HML factor from the 4-factor model (replacing HML by CSR in 3-factor model). The reduction of explanatory power is more significant for the VL model on size-CSR. However, the model with the least explanatory power still explains the returns better than the CAPM. In short, the 3-factor model (on Rm-Rf, SMB, HML) provides the best explanatory power which is equivalent to the power of Fama and French 3-factor model in explaining returns.

4-2. RTN:9-Size-BE/ME Portfolios

In the previous section, I discussed the explanatory power of the models. Here, I study the behaviour of each explanatory factor in explaining excess returns. Table 3 reports the slopes of each variable of the model explaining the excess return on 9 portfolios formed on size and BE/ME.

The upper left corner matrix (Matrix A) reports the intercepts of the 3-factor model. The first column of the matrix is the intercepts of low BE/ME portfolios. The results in this column is consistent with the well-known results of Fama-French (1993) and (2015) for the same sorts. The intercept of Small-Low portfolio is negative and the intercept of Big-Low portfolio is positive.

The 4-factor model, also, has the same pattern as 3-factor model (and original Fama French model) when it comes to low BE/ME portfolios. However, the negative intercept of Small-Low portfolio decreases from -0.28 to -0.31 for 4-factor model compared to 3-factor model and positive intercept of Big-Low portfolio increase from 0.24 to 0.30 (Matrix A and B). This is an important result. The smaller negative intercept and the larger positive intercept mean that the absolute values of the intercepts increase in 4-factor model compared to the 3- factor model.

The larger absolute value shows that adding the CSR factor reduces the explanatory power of the model. In a perfect model where factors completely explain returns the intercept is zero. The pattern of large intercepts in the 4-factor model is also demonstrated by Big-High and Big-Low portfolios which confirms my claim.

Comparing the intercepts of my 3-factor model with that of Fama and French (2015) for big and high BE/ME portfolios shows the same pattern (Matrix A). The intercepts of Big-High and Big-Med are negative while the intercept of Big-Low portfolio is positive. These findings replicate the finding of Fama-French model despite using Canadian data over a different time period. Also, in the results reported by Fama and French the intercept of Big-High and Small-High portfolios (with the exception of the smallest portfolio) are negative while the intercept of the Med-High portfolio is positive. This pattern is also evident in my results. Finally, the 4- factor model shows the same patterns (Matrix B) and none of the intercepts changes the sign (either negative to positive or vice versa) compared to 3-factor model.

Table 3- Coefficient: Slopes and intercepts for 9 Size-BE/ME portfolios explained by modified model

The table shows the intercepts and the slopes of the 3-factor and 4-factor modified models explaining excess returns on the 9 size-BE/ME portfolios. The independent factors of the models are built on two sets of 6 portfolios (2x3 sorts). The first set is created from the intersections of 2 size and 3 book-to-market segments. The second set is formed on the intersections of 2 size and 3 CSR segments. The dependent variables are excess returns on the 9 portfolios created from the intersections of 3 size and 3 BE/ME segments. The left column of Panel A reports the slopes of each independent variable for the 3- factor model (Matrix A is the intercepts of each of 9 portfolios). The right column is the t-stats for the respective factor. Panel B shows the slopes of each independent variable for the 3-factor model (Matrix B is the intercepts of each of 9 portfolios). The right column is the t-stats for the respective factor.

Panel A

	Rm-Rf	SMBt	HMLt
Matrix A	Low		High
Small	-0.2773	0.035552	-0.20745
	0.583686	0.234806	0.202385
Big	0.240658	-0.07578	-0.03303

	T-Statistic		
J	Low		High
Small	-1.3357	0.136618	-0.68388
	2.69135	1.312992	0.664056
Big	1.176352	-0.61237	-0.12054

C	Low		High
Small	1.063944	1.029491	1.070044
	0.932714	0.689572	0.877969
Big	1.083893	1.049762	1.062632

L	Low		High
Small	16.53452	12.76386	11.38111
	13.8757	12.44079	9.294392
Big	17.09379	27.36805	12.51164

E	Low		High
Small	0.883763	0.751208	1.218701
	0.408306	0.471094	0.35789
Big	-0.2613	-0.05696	-0.52152

N	Low		High
Small	9.401833	6.375631	8.873283
	4.158112	5.81808	2.593555
Big	-2.82095	-1.01657	-4.20346

G	Low		High
Small	-0.0287	0.099496	0.656482
	-0.22474	-0.08678	0.481762
Big	-0.26519	-0.01425	0.763578

P	Low		High
Small	-0.48031	1.328241	7.518298
	-3.59993	-1.68587	5.491456
Big	-4.5032	-0.39989	9.680519

Panel B

Rm-Rf SMBavgt HMLt CSRt

B	Low		High
Small	-0.31168	0.008478	-0.14338
	0.489544	0.21304	0.142111
Big	0.296443	-0.11599	-0.12538

D	Low		High
Small	1.053515	1.002697	1.049585
	0.924712	0.681487	0.842681
Big	1.067353	1.077843	1.041633

F	Low		High
Small	0.949867	0.83311	1.176142
	0.544554	0.514768	0.493608
Big	-0.30836	-0.05018	-0.37254

H	Low		High
Small	-0.08552	0.067252	0.578482
	-0.24452	-0.11464	0.488863
Big	-0.23282	-0.03331	0.82674

I	Low		High
Small	-0.23182	-0.14609	-0.24122
	-0.1415	-0.11846	-0.03326
Big	0.148213	-0.08458	0.149943

T-Statistic

K	Low		High
Small	-1.48713	0.032946	-0.42247
	2.38306	1.180849	0.475495
Big	1.439859	-0.94887	-0.41822

M	Low		High
Small	15.64693	12.12837	9.626487
	14.01183	11.75806	8.776593
Big	16.13736	27.44564	10.81497

O	Low		High
Small	9.540599	6.814896	7.295149
	5.580243	6.006394	3.476712
Big	-3.15284	-0.86419	-2.61586

Q	Low		High
Small	-1.40773	0.901612	5.880592
	-4.10657	-2.19221	5.643267
Big	-3.90141	-0.94024	9.513954

R	Low		High
Small	-2.90759	-1.49231	-1.86835
	-1.81071	-1.72606	-0.29251
Big	1.892388	-1.81871	1.314732

The slopes of Rm-Rf factor (3-factor model) are shown in Matrix C. The slopes of this factor for all 9- portfolios are close to 1 which is consistent with the results of Fama and French (2015). The 4-factor model, also, has the same pattern (Matrix D).

Matrix E shows the slopes of SMB factor for each of the 9 portfolios in 3-factor models. These slopes precisely follow the pattern of return in Fama-French 3-factor model. As they describe it, the small portfolios have "strongly positive" slopes and big portfolios demonstrate "slightly negative slopes (Fama and French, 2015). The slopes of SMB factor for 4-factor model, also, show the same pattern as reported in Matrix F.

Matrix G shows the slopes of HML factor in the 3-factor model. Low BE/ME portfolios have negative slopes while that of high BE/ME portfolios are strongly positive. This pattern is similar to the slopes of the HML factor in the Fama-French 1993 model. Examining the slopes of HML concludes the factors in the three-factor model. My 3- factor model confirms the findings of the Fama-French 3-factor model, despite the differences and limitations of the Canadian stock market data I employ.

Matrix H shows the slopes of HML for the 4-factor model. The slopes of HML must be discussed along with the slopes of CSR factor. The HML factor-while it controls for SMB- does not control for the effect of CSR stocks in the 10/90 model. This might affect the slopes of HML. As previously discussed, the ALT model is designed to tackle this issue, which will be discussed later. For now, I study how the slope of HML in 3-factor model is different from that of the 4-factor model.

Comparing the slopes of HML factor for 3 and 4-factor models shows that the slopes of small stock portfolios in the 4- factor model is smaller compared to the same slopes in the 3-factor model

and the slopes of these portfolios for CSR is negative. However, the slope of big portfolios in 3-factor model is smaller than that of 4-factor model and the slopes of CSR factor for big stock portfolios are positive. The directions of CSR slopes that are negative for small and medium portfolios and positive for large portfolios show that big firms have higher CSR rating. The slopes of CSR factor will be discussed further when I study my 3-factor model formed on Rm-Rf, SMB and CSR in the next section.

4-3. RTC:9-Size-CSR Portfolios

Table 4 shows the slopes of independent variables that explain return on the 9-portfolios formed on size-CSR. Matrix B reports the intercepts of the 4-factor model. There are fewer negative intercepts in this model and almost all intercepts (with the exception of Small-CSRMed) are relatively low. This shows that the model adequately explains the returns on size-CSR portfolios.

In the previous section, I examined how adding the CSR factor to the 3-factor model (Rm-Rf, SMB, HML) affected the intercepts. Now, I consider whether removing the HML factor from the 4-factor model helps the model (Rm-Rf, SMB, and CSR) to better explain the excess returns. Comparing the intercepts of the 3-factor model in matrix A with that of the 4-factor model shows that removing the HML factor increases the absolute value of the intercepts for big portfolios. Also, it has the same effect on the small stocks (except for Small-CSRMed). These results show that eliminating the HML factor reduces the power of the model to capture the excess returns for both small and big portfolios.

Matrix D shows the slopes of Rm-Rf factor for the 4-factor model. Similar to RTN model, the slopes of this factor are close to unity. Also, the slopes of Rm-Rf for the 3-factor model are almost

Table 4- Coefficient: Slopes and intercepts for 9 Size-CSR portfolios explained by modified model

The table shows the intercepts and the slopes of the 3-factor and 4-factor modified models explaining excess returns on the 9 size-CSR portfolios. The independent factors of the models are built on two sets of 6 portfolios (2x3 sorts). The first set is created from the intersections of 2 size and 3 book-to-market segments. The second set is formed on the intersections of 2 size and 3 CSR segments. The dependent variables are excess returns on the 9 portfolios created from the intersections of 3 size and 3 BE/ME segments. The left column of Panel A reports the slopes of each independent variable for the 3- factor model (Matrix A is the intercepts of each of 9 portfolios). The right column is the t-stats for the respective factor. Panel B shows the slopes of each independent variable for the 3-factor model (Matrix B is the intercepts of each of 9 portfolios). The right column is the t-stats for the respective factor.

Panel A

	Rm-Rf	SMBcsrt	CSRt
Matrix A	CSRLow		CSRHigh
Small	0.136117	-0.68356	0.499458
	0.296581	0.233466	-0.04533
Big	0.406019	0.368218	-0.14307

	T-Statistics		
J	CSRLow		CSRHigh
Small	0.767059	-2.4714	0.742733
	1.018276	1.412163	-0.12964
Big	1.520536	0.913537	-1.15399

C	CSRLow		CSRHigh
Small	1.089199	1.234362	1.105729
	0.840173	0.676365	0.716267
Big	1.086347	1.00026	1.023626

L	CSRLow		CSRHigh
Small	21.21667	15.42634	5.683778
	9.971147	14.14156	7.080946
Big	14.06286	8.578068	28.54056

E	CSRLow		CSRHigh
Small	1.037105	0.992289	0.799081
	0.759176	0.399975	0.707211
Big	-0.36412	-0.45232	-0.02734

N	CSRLow		CSRHigh
Small	12.26414	7.528405	2.49358
	5.469693	5.076835	4.244335
Big	-2.86153	-2.35484	-0.46272

G	CSRLow		CSRHigh
Small	-0.64363	-0.55554	0.229123
	-0.60256	-0.29783	0.245522
Big	-0.52764	0.023699	0.129072

P	CSRLow		CSRHigh
Small	-8.60875	-4.76724	0.808703
	-4.91034	-4.27582	1.66663
Big	-4.69001	0.139551	2.471081

Panel B

Rm-Rf SMBavgt HMLt CSRt

B	CSRLow		CSRHigh
Small	0.109767	-0.81127	0.027479
	0.331081	0.232192	0.05863
Big	0.320945	0.15273	-0.07475

D	CSRLow		CSRHigh
Small	1.118829	1.178412	0.825797
	0.840612	0.725643	0.736931
Big	1.021538	0.902689	1.052878

F	CSRLow		CSRHigh
Small	1.054833	1.071072	1.152986
	0.675082	0.431587	0.547251
Big	-0.29059	-0.22245	-0.09384

H	CSRLow		CSRHigh
Small	0.03859	0.202545	0.623925
	0.070607	-0.05976	0.02634
Big	0.093126	0.148529	-0.05979

I	CSRLow		CSRHigh
Small	-0.43171	-0.31264	0.497609
	-0.40022	-0.25142	0.446358
Big	-0.58927	-0.08623	0.12368

T-Statistics

K	CSRLow		CSRHigh
Small	0.624066	-3.15206	0.045223
	1.067431	1.459981	0.156541
Big	1.173135	0.36631	-0.61311

M	CSRLow		CSRHigh
Small	19.80013	14.25183	4.230318
	8.436181	14.20257	6.124646
Big	11.62295	6.739194	26.88119

O	CSRLow		CSRHigh
Small	12.62443	8.760243	3.994369
	4.581746	5.712641	3.075847
Big	-2.23596	-1.12314	-1.6202

Q	CSRLow		CSRHigh
Small	0.756945	2.715037	3.542529
	0.785375	-1.29648	0.242632
Big	1.174393	1.229028	-1.69179

R	CSRLow		CSRHigh
Small	-6.45198	-3.19315	2.15272
	-3.39195	-4.15563	3.132834
Big	-5.66208	-0.54364	2.666675

the same as the 4-factor model which shows that this factor does not contribute to the above explained changes.

The results for SMB for the 3 and 4-factor models, as they are demonstrated in Matrix E and F respectively, show the same patterns. The slopes of SMB factor for small portfolios are strongly positive while the slopes for big portfolios are negative. Given HML and CSR factors in the 4-factor model and CSR factor in the 3-factor model all control for SMB, it is not unexpected that removing HML does not effect the pattern of SMB slopes.

As matrix I shows, the slopes of CSR factor (of the 4-factor model) for all CSRLow and CSRMed portfolios are negative, but they are positive for CSRHigh portfolios. Similarly, the 3-factor model shares the same pattern (Matrix G). This shows that removing the HML factor does not affect the direction of the CSR factor. However, it changes the magnitude to some degree. The slopes of small and medium portfolios go down, while the slopes of big portfolios increase after removing the HML factor.

4-4. RVN:9-Size-BE/ME portfolios

Matrix B of table 5 shows the intercepts of the 4-factor model. The results for the big portfolios confirm the findings of the Fama-French 3-factor model. However, it fixes the well-known problem of having a negative intercept for the small-low portfolio. That is consistent with the explanation provided in methodology section, for the effect of breakpoints on the behaviour of portfolios.

Matrix A shows the intercept of the 3-factor model. It demonstrates that the 3-factor model explains the excess returns better than the 4-factor model for most portfolios, confirming the results of the previous models.

Table 5- Coefficient: Slopes and intercepts for 9 Size-BE/ME portfolios explained by original model

The table shows the intercepts and the slopes of the 3-factor and 4-factor original models explaining excess returns on the 9 size-BE/ME portfolios. The independent factors of the models are built on two sets of 6 portfolios (2x3 sorts). The first set is created from the intersections of 2 size and 3 book-to-market segments. The second set is formed on the intersections of 2 size and 3 CSR segments. The dependent variables are excess returns on the 9 portfolios created from the intersections of 3 size and 3 BE/ME segments. The left column of Panel A reports the slopes of each independent variable for the 3- factor model (Matrix A is the intercepts of each of 9 portfolios). The right column is the t-stats for the respective factor. Panel B shows the slopes of each independent variable for the 3-factor model (Matrix B is the intercepts of each of 9 portfolios). The right column is the t-stats for the respective factor.

Panel A

Rm-Rf SMBv HMLv

Matrix A	Low		High
Small	0.453039	0.237654	0.021437
	0.65101	0.31519	-0.0589
Big	0.197108	-0.08184	-0.00943

T-Statistic

J	Low		High
Small	1.248212	0.666453	0.074606
	2.902472	1.779457	-0.23653
Big	0.933938	-0.71066	-0.03605

C	Low		High
Small	1.106042	0.838468	1.114809
	0.927727	0.786774	1.081057
Big	1.054112	1.027932	1.075178

L	Low		High
Small	9.92509	7.658094	12.63642
	13.47134	14.46687	14.13847
Big	16.26712	29.07078	13.38191

E	Low		High
Small	0.897528	0.834067	1.242332
	0.231834	0.296664	0.637326
Big	-0.18966	-0.00797	-0.48189

N	Low		High
Small	6.303273	5.961988	11.02089
	2.634647	4.269184	6.523349
Big	-2.29059	-0.17646	-4.69394

G	Low		High
Small	-0.11917	0.04558	0.757216
	-0.25812	-0.02706	0.528792
Big	-0.23037	-0.02418	0.707246

P	Low		High
Small	-1.09362	0.425751	8.77782
	-3.83312	-0.50881	7.072649
Big	-3.63567	-0.6994	9.002259

Panel B

Rm-Rf SMBavgv HMLv CSRv

B	Low		High
Small	0.474272	0.403572	-0.05456
	0.599103	0.224326	-0.09094
Big	0.236605	-0.08586	-0.16291

D	Low		High
Small	1.054124	0.78103	1.053303
	0.908196	0.773481	1.045314
Big	1.062392	1.030321	1.091668

F	Low		High
Small	0.94271	0.742918	1.391674
	0.319704	0.406365	0.71684
Big	-0.23944	-0.00904	-0.32678

H	Low		High
Small	-0.19183	-0.01157	0.647254
	-0.27599	-0.05685	0.474793
Big	-0.21193	-0.02467	0.746562

I	Low		High
Small	-0.16427	0.138626	-0.46059
	-0.09627	-0.23512	-0.19909
Big	0.121893	-0.01667	-0.0685

T-Statistic

K	Low		High
Small	1.282491	1.152536	-0.19005
	2.698959	1.34681	-0.36497
Big	1.11151	-0.73288	-0.58125

M	Low		High
Small	9.294197	7.272678	11.96244
	13.34038	15.14153	13.67858
Big	16.27297	28.67506	12.70034

O	Low		High
Small	5.8722	4.887314	11.16624
	3.317712	5.620032	6.627039
Big	-2.59113	-0.17769	-2.68585

Q	Low		High
Small	-1.76883	-0.11265	7.687685
	-4.23964	-1.16392	6.4976
Big	-3.39488	-0.71807	9.083323

R	Low		High
Small	-1.24938	1.113454	-4.51216
	-1.21979	-3.97017	-2.24718
Big	1.610506	-0.4001	-0.6874

The slopes of Rm-Rf for the 3-factor and the 4-factor models are demonstrated in Matrix C and D, respectively. Similar to the previous models, the slopes for the both models are close to 1 and the difference between them is negligible. Also, the slopes of SMB factor repeat the patterns of the previous models and that of Fama-French 1993 and 2015. They are strongly positive for small portfolios and negative for big portfolios.

As demonstrated in matrix G, the pattern of slopes for HML factor in the 3- factor model is similar to the pattern of this factor in the RTN models and the Fama-French (1993) three-factor model; the negative slopes for growth portfolios and positive for value portfolios. The 4-factor model also shows the same pattern (see Matrix H). However, the effect of adding CSR factor is reflected in the magnitude of the slopes. The slopes are lower for the small and medium portfolio while they are greater for the large portfolios.

Matrix I shows the slopes of CSR. As reported for RTC model, the slopes are negative for small and medium portfolios. However, the slope of Big-low portfolio is positive. This portfolio contains stocks of firms that Fama and French 1993 calls "big, successful "companies. Based on my results, these companies tend to be more "ethical". This result seems logical as these firms have more resources to spend on CSR compared to resources available to small firms

4-5. RVC:9-Size-CSR Portfolios

As seen in Matrix B of Table 6, the intercepts of the 4-factor model have the same directions as RTC 4-factor model. However, the absolute values of their magnitudes are higher, specifically for small portfolios. I also compare the intercepts of the 4-factor model with that of the 3-factor model to examine how the removal of the HML factor affects the explanatory power of the model. Matrix A shows that the absolute values of the intercepts for all big portfolios and Small-High portfolio

Table 6- Coefficient: Slopes and intercepts for 9 Size-CSR portfolios explained by original model

The table shows the intercepts and the slopes of the 3-factor and 4-factor original models explaining excess returns on the 9 size-CSR portfolios. The independent factors of the models are built on two sets of 6 portfolios (2x3 sorts). The first set is created from the intersections of 2 size and 3 book-to-market segments. The second set is formed on the intersections of 2 size and 3 CSR segments. The dependent variables are excess returns on the 9 portfolios created from the intersections of 3 size and 3 BE/ME segments. The left column of Panel A reports the slopes of each independent variable for the 3- factor model (Matrix A is the intercepts of each of 9 portfolios). The right column is the t-stats for the respective factor. Panel B shows the slopes of each independent variable for the 3-factor model (Matrix B is the intercepts of each of 9 portfolios). The right column is the t-stats for the respective factor.

Panel A

	Rm-Rf	SMBcsrv	CSRv
Matrix A	CSRLow		CSRHigh
Small	0.144974	-0.94683	1.626475
	0.631761	0.322429	0.132207
Big	0.489744	0.213052	-0.14291

	T-Statistic		
J	CSRLow		CSRHigh
Small	0.89244	-3.07621	2.080099
	2.328681	1.930291	0.377697
Big	1.476976	0.529479	-1.16362

C	CSRLow		CSRHigh
Small	0.960102	1.037494	0.784394
	0.808475	0.687867	0.836808
Big	1.013142	0.971252	1.052492

L	CSRLow		CSRHigh
Small	19.61407	11.18642	3.329135
	9.889735	13.66636	7.933686
Big	10.13995	8.010455	28.44015

E	CSRLow		CSRHigh
Small	0.952556	1.160332	0.845766
	0.413108	0.3417	0.378188
Big	-0.17993	-0.15258	-0.08825

N	CSRLow		CSRHigh
Small	13.28879	8.543427	2.451275
	3.450853	4.635946	2.448506
Big	-1.22977	-0.85936	-1.62849

G	CSRLow		CSRHigh
Small	-0.68913	-0.67335	1.766519
	-0.36407	-0.25531	0.148413
Big	-0.31539	-0.02221	0.105629

P	CSRLow		CSRHigh
Small	-10.5875	-5.45995	5.638435
	-3.34922	-3.81476	1.058188
Big	-2.3739	-0.13773	2.146547

Panel B

Rm-Rf SMBavgv HMLv CSRv

B	CSRLow		CSRHigh
Small	0.15661	-1.16093	1.143584
	0.607331	0.310888	0.200135
Big	0.353054	0.047518	-0.08008

D	CSRLow		CSRHigh
Small	1.060636	1.016981	0.624194
	0.822595	0.721908	0.870102
Big	0.928879	0.892234	1.073188

F	CSRLow		CSRHigh
Small	0.975003	1.185036	1.044716
	0.388276	0.373867	0.24408
Big	-0.12681	-0.03506	-0.12072

H	CSRLow		CSRHigh
Small	-0.07306	0.325925	0.606983
	0.06352	-0.02719	0.030748
Big	0.186605	0.15959	-0.07154

I	CSRLow		CSRHigh
Small	-0.56122	-0.48981	1.844909
	-0.2874	-0.22003	0.265503
Big	-0.35355	-0.08614	0.102037

T-Statistic

K	CSRLow		CSRHigh
Small	1.039436	-4.096	1.53521
	2.168035	1.882596	0.544105
Big	1.061836	0.116134	-0.66483

M	CSRLow		CSRHigh
Small	22.95293	11.69932	2.732201
	9.574607	14.25374	7.712985
Big	9.10898	7.110057	29.05139

O	CSRLow		CSRHigh
Small	14.90666	9.631245	3.230681
	3.192845	5.215156	1.528577
Big	-0.87856	-0.19736	-2.30868

Q	CSRLow		CSRHigh
Small	-1.65341	3.921212	2.778585
	0.773211	-0.56142	0.285051
Big	1.913761	1.330005	-2.02545

R	CSRLow		CSRHigh
Small	-10.4762	-4.86049	6.965785
	-2.88549	-3.74738	2.030134
Big	-2.99062	-0.59209	2.382605

go down while it increases for Small-Low portfolio. This result reveals the contribution of the HML factor in the explanatory power of the 4-factor model.

The slopes of Rm-Rf for both the 3-factor and the 4-factor models are close to unity, which is consistent with both RTC 3 and 4-factor models. These results are shown in matrix C and D respectively. The slopes of SMB factor for both the 3 and 4-factor models show the same pattern as RTN models. They are strongly positive for small portfolio while big portfolios have negative slopes.

As reported in matrix G and I, the slopes of CSR factor for both 3 and 4-factor models for all CSRLow and CSRMed portfolios are negative, but they are positive for CSRHigh portfolios. Also, the slopes of small and medium portfolios decrease, while the slopes of big portfolios increase after removing HML factor. This shows that eliminating HML factor has no effect on the direction of CSR factor but it slightly affects the magnitude of the slopes. These results are consistent with my findings for RTC models.

4-6. ALT: 12-Size-BE/ME-CSR Portfolios

In this section, I discuss the behaviours of the alternative model. Compared to the pervious models, ALT model uses a different method to design both the excess return portfolios and the explanatory factors. The excess returns are explained using 12 portfolios formed on size, BE/ME, and CSR while the original models use 9 portfolios created on size and each of BE/ME and CSR. Similarly, the independent factors are created from the intersections of independent sorts on size, BE/ME, and CSR (2x2x2 sorts) which is different from 2x3 sorts on size and each of BE/ME and CSR. The different design method makes it difficult to compare the detailed results of this model with

the previous ones. However, the results are completely consistent and confirm the findings of the 2x3 models.

Matrix A in Table 7 shows the intercepts of the ALT model. The intercepts are positive for all portfolios except 3 CSRMed portfolios and one CSRhigh portfolio. This result is consistent with the findings of RTC (explaining size-CSR excess returns) and RTN models (explaining size-BE/ME portfolios). For example, in RTC model, CSRMed-Small portfolio has a negative intercept and, also, in the RTN model, the intercept of Small-Low portfolio is negative. Therefore, the intercept of CSRMed-Small-Low portfolio is negative. Similarly, the intercepts of all portfolios, that are equivalent to the combinations of RTC and RTN portfolios with negative intercepts, are negative.

Please note that although I show that the alternative model generates the same results as previous models, it does not always have to be the case. The portfolios of this model do not contain the exact same set of stocks as RTC and RTN (12 portfolios vs. 9 portfolios) nor do they use the same factors to explain the excess returns.

The study of the slopes shows the familiar patterns. Matrix B demonstrates the slopes of Rm-Rf factors. These slopes show more and less similar pattern as the previous models. Also, the slopes of SMB factor are positive for small portfolios while they are negative for big portfolios which is similar to the previous models. The slopes of HML and CSR factors (see matrix D and E) are not surprising either. The HML factor has negative slopes for low portfolios and positive for high portfolios. Similarly, the slopes of CSR portfolios are negative for all CSRLow and CSRMed portfolios and positive for almost all CSRHigh portfolios.

Table 7- Coefficient: Slopes and intercepts for 12 Size-BE/ME-CSR portfolios explained by ALT model

The table shows the intercepts and the slopes of the 4-factor ALT model explaining excess returns on the 12 size-BE/ME-CSR portfolios. The independent factors of the models are built on a set of 8 portfolios (2x2x2 sorts). The set is created from the intersections of 2 size, 2 book-to-market, and 2 CSR segments. The dependent variables are excess returns on the 12 portfolios created from the intersections of 2 size and 2 BE/ME, and 3 CSR segments. Panel A reports the slopes of each independent variable for the 4- factor model (Matrix A is the intercepts of each of 9 portfolios). Panel B shows the t-stats of each independent variable for the 4-factor model (Matrix B is the intercepts of each of 9 portfolios).

Panel A

	Low				High		
Matrix A	CSRLow		CSRHigh	A	CSRLow		CSRHigh
Small	0.499892	-0.29788	0.059922	Small	0.016468	-0.2394	1.090348
Big	0.692213	-0.17397	0.048194	Big	0.657516	0.06259	-0.14043
B	CSRLow		CSRHigh	B	CSRLow		CSRHigh
Small	1.027961	0.890238	1.652126	Small	1.10052	1.210547	1.032501
Big	0.651264	1.443624	0.914785	Big	1.06405	0.531087	1.131786
C	CSRLow		CSRHigh	C	CSRLow		CSRHigh
Small	0.951323	0.8542	0.89924	Small	0.840578	0.819065	0.633555
Big	-0.16317	-0.13314	-0.05353	Big	-0.32522	-0.08194	-0.0676
D	CSRLow		CSRHigh	D	CSRLow		CSRHigh
Small	-0.07579	-0.24647	-1.49857	Small	0.334152	0.802635	0.949707
Big	-0.03502	-1.07126	-0.18412	Big	0.460399	0.42852	0.420866
E	CSRLow		CSRHigh	E	CSRLow		CSRHigh
Small	-0.39084	-0.29487	-0.6495	Small	-0.84854	-1.0065	0.224354
Big	-0.082	-1.71779	0.462426	Big	-0.72176	-0.09555	0.217493

Chapter 5: Conclusions

A considerable number of studies in the U.S-and a far fewer number in Canada- have discussed the relationship between CSR and the financial performance of stocks. However, the results of these studies are equivocal and contradicting. Some studies find that SRIs outperform conventional funds while many other studies report no correlation or negative correlation. This lack of consensus shows the need for more study on this topic.

In this study, I discuss the effect of CSR on returns of stocks, empirically, by creating 3-factor and 4-factor asset-pricing models. Multiple design methods are used to create these models. In the first approach, the independent factors are built based on two sets of 6- portfolios. These 6 portfolios are created from the intersections of 2 size and each of 3 book-to-market, and 3 CSR portfolios (2x3 sorts). The dependent variables are two sets of 9 portfolios built from the intersections of 3 size and each of 3 BE/ME portfolios and 3 CSR portfolios (3x3 sorts). The second design method (to create modified models) uses the same sorts but different breakpoints to create the independent and dependent variables.

My final method to design the factor model (ALT model) is based on a set of 8 size-BE/ME-CSR portfolios to create independent factors and a set of 12 size-BE/ME-CSR portfolios to design the dependent factors. The set of 8 portfolios are created from the intersections of 2 size, 2 BE/ME, and 2 CSR portfolios. The 12 excess return portfolios are built from the intersections of 2 size, 2 BE/ME, and 3 CSR portfolios.

The results of my tests show that almost all combinations of the 4-factor models and 3-factor models produce the same patterns for RM-Rf, SMB, HML and CSR factors. The slopes of the

market factor for almost all portfolios are close to one. Also, the slopes of SMB factor for small portfolios are strongly positive and the slopes for big portfolios are negative. The HML factor for low BE/ME portfolios has negative slopes and that of high BE/ME portfolios are strongly positive. For 4-factor models, the slopes of CSR are negative for small and medium portfolios. However, the slopes of most CSR High portfolios are positive.

Furthermore, the 3-factor model (based on Rm-Rf, SMB, HML) generates the same intercepts and slopes patterns as Fama-French (1993 and 2015) models. Also, the behaviours of the excess returns examined on size-CSR-BE/ME are equivalent to the combination of the behaviours of the corresponding portfolios on size-CSR and size-BE/ME.

In addition, analysing the behaviour of CSR factor shows that large firms tend to be more "ethical". This result sounds logical since large firms, especially, big size-low BE/ME companies have more resources available to spend on CSR initiatives. This result also shows that CSR is yet to be promoted to the core operations of firms. Companies do not prioritize to invest in CSR initiatives when there are competing expenditures for companies' financial resources.

I find the CSR factor does not improve the explanatory power of the models, and the addition of a CSR factor does not provide a better description of excess return. Also, replacing HML by CSR captures no more returns. Therefore, I conclude that CSR is not a priced factor in Canadian capital market. This result is confirmed by multiple models that, despite their different design methods, all provide the same explanation of excess returns.

Finally, the field of CSR is relatively young and is still growing in Canada. CSR initiatives are not fully practiced by all Canadian companies, and there is no reliable CSR rating for many Canadian firms. This creates a data constraint for my research both in terms of number of months and number

of companies that can participate in my study. As the number of firms that practice CSR increases and the CSR sector gradually reaches the maturity stage, the role of CSR might be promoted to an essential activity of most Canadian companies. A future research project could replicate these results, when data is available for more companies and for a longer period, to verify whether my results are generalizable.

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