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Performance, risk profile, and diversification potential of Islamic Equity Indices

A comprehensive study of the indices of the S&P BMI Shariah Series

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Introduction

According to the Pew Research Center (2011), the Muslim population in Europe has grown from 29.6 million people in 1990 to 44.1 million in 2010. By the time we reach 2030, 8.0% of the European population will be of Muslim faith. On a worldwide scale, Muslim population currently account for 23.4% of the planet's inhabitants and it will most likely expand to 26.4% by 2030. A rapid growth of such a specific demographic segment of the population brings around its load of societal changes and opportunities. According to another reliable source, (PwC, 2013), the assets under management of the Islamic banking industry will most likely reach $3 trillion by 2017 and therefore account for 1.6% of the global banking industry. It would require the industry of Islamic banking to sustain a Compound Annual Growth Rate, or average annual growth rate, of 20% during 13 years in order to satisfy the whole of the Muslim population in banking services in 2030. Although the Muslim population is arguably the principal target of Islamic banking institutions, the recent crisis and failures of the banking system in Western economies has driven investors to seek alternatives ways of investing, with a stronger ethical focus. This constitutes a tremendous challenge for Western societies. The recent launch of the Islamic Finance University Certificate by the LSM is a striking illustration of this recent awareness. Universities, but also finance institutions are trying to leverage this emerging sector. Banking establishments in the United Kingdom and Luxembourg are leading the way. These two nations are the first in Europe to have issued sovereign Sukuks, the Islamic equivalent of the conventional sovereign bonds, and are the two leading financial centers for Islamic products with respectively $19 billion and $4 billion of reported assets (UK Government, 2014). According to the same source, more than 20 international banks active in the UK are now offering Islamic finance services to their customers. In Luxembourg, not less than 33 Shariah compliant funds are present and manage close to $2 billion (Ouaich, 2013). Other European nations are also jumping on the bandwagon and successfully attracting Islamic institutions. No later than last month, the first entirely Islamic bank opened its doors in Germany and expects 21% of the Muslim population of Germany to be interested by its services (RT, 2015). In

Spain or Belgium, although only to a marginal extent, Islamic banks such as Chaabi Bank have entered the market of Islamic banking.

I first read about the problematic and the opportunities brought by Islamic finance in Europe two years ago, in an article published in the Belgian economic magazine "Trends Tendance". As far as I remember the author explored the current state of Islamic banking institutions in Europe and concluded that the lack of them would cause our nations to miss great economic opportunities. I decided to investigate the concept of Islamic finance more deeply and soon discovered a whole financial system with its own norms and values. I began to follow the latest publications and to take a deeper interest in the different forms of investments offered to Muslims willing to respect the Shariah principles. As investing in equity has been ruled as being permissible by several Islamic scholars, it has rapidly gained an important share of the total investments made by Muslims. Western financial institutions have become aware of the importance gained by this form of investment and they have started to compute Islamic Equity indices in order for private investors, or funds, to assess the performance of their equity returns. Dow Jones first launched the Dow Jones Islamic Market World Index in May 1999 along with a series of regional indices. Other providers soon followed: MSCI launched its MSCI Global Islamic Indices in 2007, FTSE launched its FTSE Shariah Global Equity Index Series in 2007 as well, and S&P finally launched its S&P Global BMI Shariah Indices in 2008. There have been many studies undertaken by academics and professionals about the performance of those Islamic Equity indices. They have produced several and often contradicting results. Unable to make up my own mind regarding Islamic indices, I decided that the best way to learn more about their performance and risk profile would be to actually conduct my own study. Therefore this thesis sets off to discover whether, through the exclusion of certain types of securities, Islamic indices are better to earn a similar return than conventional indices while reducing their level of risk.

Through the analysis of the BMI Shariah Index Series computed by S&P between July 2009 and June 2015, we discover that it is actually possible for Muslim investors to invest in Shariah-compliant equities without being penalized. They do not earn a return lesser than regular indices and even tend to be less risky. The returns of the Islamic and regular indices are not different from one another. The majority of

Islamic indices have a variance lower than the one of their equivalent and this result is significant for 3 of them. We also find that, out of sixteen, only seven pairs of indices are cointegrated and thus move together in the long-term. This is a sign that Islamic indices can possibly move away from their conventional equivalent. The potential investor must bear this conclusion in mind.

In the first section I will focus much of time on explaining what the concept of Islamic Finance exactly is. I will contextualize my research by reviewing the funding principles of Islamic Finance as well as the goals it pursues. In order to understand the current shape of the system I will go through the different steps of the history of finance institutions in Islam and show from where do they draw their rulings. In the second section the current state of the literature about the performance of Socially responsible investments, Faith-based investments, and Islamic investments in equity will be presented. The third section of this thesis consists of the core of the analysis. It contains the different objectives that the analysis pursues as well as the presentation of all the metrics and ratios that will be used in order to evaluate the performance of Shariah-compliant equity indices. This third part closes on the presentation of all the results. In the final part of this thesis I will present the limitations as well as the implications of the results. The conclusions that one can draw from this analysis will be presented last.

4.

Part 1: Introduction to Islamic Finance

1. Islamic Banking and Finance

1.1 Islam and sources of Islamic Law

The majority of the funding principles of Islamic Finance have been written in accordance with the main tenets of the Shariah, the Divine Law of Islam. The Shariah finds its inspiration in two main publications: the Quran and the Sunnah. The former was dictated to the prophet Muhammad by Allah himself and constitutes the principal source of Shariah. It defines every Muslim's faith and is the benchmark for how their lives should be organized. However it is not targeted on the individual's behavior but rather tackles broad economical, societal issues. The second publication is the Sunnah: it is not the voice of Allah but rather a transcript of the sayings, actions and silent approvals of its prophet Muhammad collected by spontaneous authors during the 9th century. Aside from these two major publications, other sources of Islamic Law are *Ijma* and Q*iyas*. *Ijma* are the decrees that are derived from the unanimous consent of principal Muslim scholars on any religious issue. "*Qiyas* is a method that uses analogy (comparison) to derive Islamic legal rulings for new worldly developments" (Shanmugam & Zahari, 2009, p. 14) that have yet to be defined in the Quran or Sunnah. As these interpretations are by definition subjective, it may bring about some controversies in the assessment of Shariah compliance of some financial instruments, as we will later see. It is valuable to highlight that, in Islam, there is no overarching governing body such as the Catholic Church for Catholics all around the world. Therefore all rules and interpretations stem directly from the different sources of law highlighted here above.

All these different sources were used to draw up the main tenets of the Shariah that are at the center of the *Halal* (lawful) and *Haram* (unlawful) differentiation. Some behaviors such as prostitution, gambling, adultery, or the consumption of narcotics, alcohol, or pork is forbidden. This division of licit and illicit actions also extends to Islamic Finance where interests, uncertainty and gambling are banned. I will develop these concepts in the following sections.

1.2 Origins of Islamic Finance System

The origins of the banking system as we know it is relatively recent. History is rich of examples of rather simple banking institutions in the pre-coinage era. According to Naik (2014), the use of public establishments such as temples or palaces as exchange platform for borrowers and lenders extends back to the 8th century B.C.E. As modern money had yet to be invented, commodities and more particularly grain, livestock and crops served as the principal currency. In the absence of a writing system, clay tokens shaped as the underlying asset were given to lender – the merchant in the case of a deposit – by the borrower in order for the former to reclaim its principal at term. The advent of modern forms of money followed a couple of centuries later. It is commonly assumed that the first real coins were probably minted around the period 640 - 630 BC (Davies, 2005). Their utilization rapidly extended throughout Greece and Persia. Thanks to the global acceptance of minted currency, the banking system developed itself across Europe and the Middle East. Despite the presence of banks throughout Antiquity and Middle Ages (Shanmugam & Zahari, 2009), the oldest existing bank only came centuries later. Monte dei Paschi Di Siena was originally established as an instrument to assist the poorest people of Siena and has been in service since 1472. Other banking institutions promptly emerged across Europe: the Berengberg Bank was created in Hamburg in 1590, the Sveriges Riksbank was founded in Sweden in 1668, and 4 years later the first English institution, C. Hoare & Co. was established.

As the Quran, from which much of the requirements of the contemporary Islamic Banking System emanate, is believed to have been dictated to Muhammad in the beginning of the 7th century C.E., manifestations of the first Islamic banks are recent. The earliest financial Islamic institution appeared in Egypt in 1963. The Mit-Ghamr Islamic Savings Bank was launched in the region of the same name in Egypt by Ahmad El-Najjar. The role of this bank was defined in three principles: “first, to act as an efficient intermediary between the supply and demand of capital; second, to act as an educational center for economic efficiency, saving education and banking habit; and third, to set a dynamic factor in mobilizing the idle capital for investment, thus, reducing the problems of capital formation.” (Chachi, Origin and Development of Commercial and Islamic Banking Operations, 2005, p. 16) The bank’s assets grew

rapidly and the success of the project was such that it got expanded to other regions in Egypt. However, under Nasser's regime, Islam was viewed as part of the heritage of the country and was not used as a foundation for law and government (Islamopedia, 2011). Therefore as soon as the story of their successful expansion throughout Egypt broke out, the government had them shut down only four years after the launch of the project, probably afraid they would serve the interests of the recently banned Muslim Brotherhood. In 1971, another Islamic bank, interestingly called the Nasser Social Bank, was opened in Egypt with the social goal of serving the poorest class of the population. The establishment was declared "an interest-free commercial bank, although its charter made no reference to Islam or Shariah." (Ariff, Islamic Banking, 1988, p. 2) Three years later, in 1974, the Islamic Development Bank was founded in Jeddah, Saudi Arabia. It served mainly as an intergovernmental bank and is the first materialization of a real collaboration on the financial level between Islamic nations. Earlier in Asia, in 1963, a similar experiment had been successfully conducted in Malaysia with the opening of the Pilgrims Savings Corporation. Its first objective was to assist Muslims in the growth of their capital in order to afford their pilgrimage to Mecca, the *Hajj*. In Western countries, long before banking institutions started to offer Islamic products and services to their clients, the first Islamic Mutual Fund, Amana Mutual Fund, had already been created in the United States, in 1989 (Saturna Capital, 2015). As far as banks are concerned, it is only in 2004 that Al Rayan Bank, formerly the Islamic Bank of England, established itself in England as the first and only entirely Shariah-compliant retail bank (Al Rayan Bank, 2015).

As one can see, the foundation of Islam-oriented banking institutions is a relatively new trend in the world of modern finance. Nonetheless it has experienced spectacular growth in the recent years. Ernst & Young (2014) reports that the participation banking assets of the Islamic banking industry has been growing at a CAGR of 17% over the 2009-2013 period with some countries such as Indonesia reaching a CAGR of more than 80% for 2013 only. Abdullah & Chee (2010) argue that this outstanding growth has been helped by a series of subsequent economic events. They identify the 1973 Oil Crisis, the US reaction to 9/11 and the 2008 Subprime Crisis. The market crashes following the Oil and the Subprime Crisis contributed to undermine the public's confidence in conventional banking and fostered the quest for alternative

forms of investment. Regardless of those events, the size of the demand and potential market are some of the main forces pulling the growth of Islamic banking. According to Research and Markets (2012) the global banking industry will have $163 trillions of assets under management in 2017. However, even with the sensational growth that it is currently enjoying, the Islamic banking industry will be, at best, managing $3 trillions of assets by then, roughly 2% of the world's assets. Knowing that the current global Muslim population is estimated at 23% by the Pew Research Center (2015) and is expected to experience the largest growth rate of all religions, it displays the magnitude of the unserved markets awaiting the advent of Islamic banking.

1.3 Goals of Islamic Finance System

As Islamic Finance stems from the Islamic law, the Shariah, its goals extend much further than the sole efficient functioning of the economic activity. Non-economic goals have to be considered. It can be argued that economic systems such as capitalism or communism were also created with the greater good of the population in mind but the Islamic system goes even further by legislating on the issue. Irfan (2014) quotes Mufti Taqi Usmani, a renowned Muslim scholar, on the possibility brought by Islamic finance to rebuild the bridge between the actual capitalist system and its original objective of greater good. According to Abdullah & Chee (2010), the goals of the system are sufficiency and peace, which need to be achieved through the eradication of fear and hunger from society and by ensuring that every individual's needs are met. Shanmugan & Zahari (2009, p.5) argue that the main goal of Islam is "economic justice through equitable distribution of resources" and that this goal cannot be reached through conventional finance instruments. In order to reach that fair allocation of resources, Islamic scholars have derived, from the Quran and other sources of law, some rules that act as funding principles of the Islamic financial system. I will now review them in the next sections.

1.4 Prohibition of Usury or Interest – *Ribā*

The prohibition of *Ribā* (or *Riba*) is the first and foremost prohibition brought by the Holy Quran in Islamic Finance. Unlike the prohibition of *Garar* or *Maysir* that may be subject to more controversy and discussion, the one of *Riba* is unanimously accepted among Islamic scholars and jurists.

In capitalist economies, it is commonly accepted that interest rate is the universal tool used to compute the remuneration of capital. It is the materialization of the intrinsic risk linked to the change of ownership of the principal and of the underlying investment. Therefore, as risk increases, one can expect to enjoy a higher interest rate. However, as the Quran forbids transaction based on immaterial assets and encourages risk sharing, this type of mechanism is prohibited in Islamic finance. This notion is called *Riba* and can be translated in English as *usury*. As Western Europeans familiar with the omnipresence of interest-bearing instruments in our financial system, the interdiction of this fundamental mechanism may convey several interrogations regarding its pragmatic implications. How does the treatment of deposit works? How are commercial transactions handled? Etc.[1]

Contrary to common beliefs Islam is not the first religion to forbid the use of interest rates. In the catholic religion, mentions of the banning of interests – referred to as usury, date back as far as the Old Testament. As it appears in the New International Version (2011) of the Holy Bible:

> *"Do not take interest or any profit from them, but fear your God, so that they may continue to live among you. (Leviticus, 25:36)"*

Interestingly enough, one can encounter a different point of view in the New Testament:

> *"Well then, you should have put my money on deposit with the bankers, so that when I returned I would have received it back with interest. (Matthew, 25:27)"*

The meaning of the term interest has changed over time and has become accepted in the Jewish and Catholic culture. However, the term usury still is a synonym of excessive interest and remains a sin. In relatively more recent history, the Church has had a position somewhat similar to the stand adopted by Islam. As Pope Benedict XIV (1745) states in its 1745 Encyclical to the Italian Clergy:

[1] These concerns are not in the scope the present study but are still valuable for any reader interested in the functioning of Islamic banking institutions. The chapter 3 of Venardos (2005) answers these questions thoroughly. Available at: http://www.iefpedia.com/english/wp-content/uploads/2009/12/Islamic-Banking-and-Finance-in-South-East-Asia.pdf

> *" […] they might convince themselves that other just contracts exist, for which it is permissible to receive a moderate amount of interest. Should any one think like this, he will oppose not only the judgment of the Catholic Church on usury, but also common human sense and natural reason."*

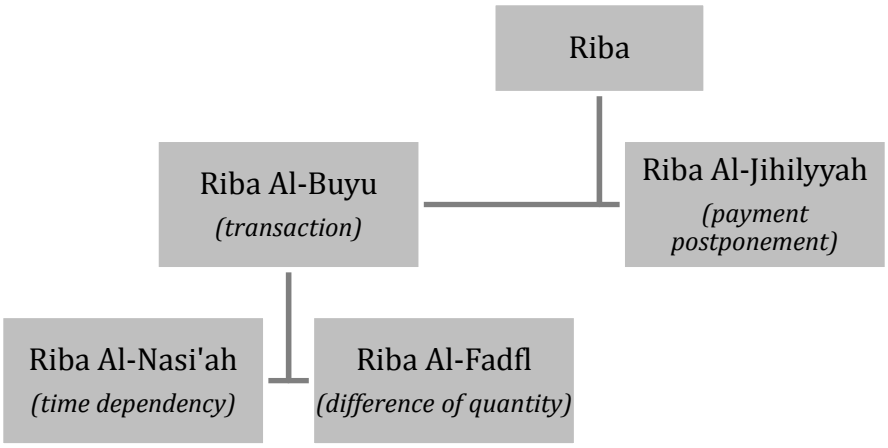
However, nowadays, the presence of interest in Christian societies has become so ubiquitous that its legitimacy can no longer be questioned. The question of interest also surfaces in Judaism. The Torah states that interests cannot be charged when lending money to a fellow Jew. However this practice is acceptable when lending money to a foreigner (Stein, 2006). This is the historical and religious interpretation. However, reality in Jewish institutions is similar to Christian practices.

All religions started with the principle of protecting the poorest people from exploitation and ensuring that capital owners did not take advantage of them. Islam also proceeded by integrating those precepts into the Holy Book and therefore committing to them. The Quran, provided by The Islamic Computing Centre is plentiful of passages that refer to *Riba*:

> *"002.275 Those who devour usury will not stand except as stand one whom the Evil one by his touch Hath driven to madness. That is because they say: "Trade is like usury," but God hath permitted trade and forbidden usury. […]"*
>
> *"002.278 O ye who believe! Fear God, and give up what remains of your demand for usury, if ye are indeed believers."*

The Imam Muslim advances even further and ranks the sin of consuming usury among the seven most dreadful sins of Islam (Muslim ibn al-Hajjaj, 874). As such emphasis is put on the matter, it is normal to wonder: what exactly constitutes *Riba*?

Figure 1: Types of Riba



The Quran defines two types of *Riba: Riba Al-Buyu and Riba Al-Jihilyyah. The Riba Al-Buyu* encompasses all types of *Riba* that stem from a sale transaction. It can itself be subdivided into *Riba al-Nasi'ah* and *Riba Al-Fadhl.* The former is has its origin in the time dependency of the sale transaction. It materializes when the exchange of the goods involved in the transaction is not done on the spot but rather on a deferred basis: a merchant sells ten kilograms of corn for $1 to be paid in two weeks. The latter aspect of *Riba al-Buyu* stems from the difference of quantity to be exchanged in a transaction: the exchange of one kilogram of superior quality corn for two kilograms of inferior quality corn results in *Riba Al-Fadhl.* The second type of *Riba* is concerned with the loan aspect of a transaction. *Riba Al-Jihilyyah* arises when the postponement of the repayment the principal of a contracted loan implies a penalty or the contraction of a larger loan.

It is interesting to highlight that profit is not forbidden; an contrarily to interest, it is even encouraged by the Quran:

> *"004.029 O ye who believe! Eat not up your property among yourselves in vanities: But let there be amongst you Traffic and trade by mutual good-will: Nor kill (or destroy) yourselves: for verily God hath been to you Most Merciful!"*

Interest has become so ubiquitous in our society that it can sometimes be confused with the notion of profit. Asutay & Marzban (2012) offer a comparison between the

two concepts that will help intensify the contrast. Whereas interest is associated with the idea of return on a capital profit is all about the return on a project. Similarly, when interest is guaranteed and is usually fixed, the profit goes hand-in-hand with the risk of loss and the return is seldom predetermined.

This notion of interest prohibition can seem unclear to the unfamiliar reader but it is to be bared in mind, as I will later show how it constitutes one of the underlying principle of the equity screening for the creation of Shariah-compliant indexes.

1.5 Prohibition of Uncertainty – *Gharar*

In the case of *Gharar,* the definition of whether a deed is *Halal* is not as clearly defined as with the *Riba.* The Arabic word *Gharar* could literally be translated into English as hazard, deceit, uncertainty, or fraud. *Gharar* arises when one of the parties involved in a transaction could be subject to an unfair outcome stemming from the uncertain nature of the contract, either in the nature of the underlying asset or the probability of the outcome. "The rationale of Prohibition of G*harar* is to ensure full consent and satisfaction of the parties in a contract." (Alwosabi, 2008, p. 1) That full consent can only be achieved through the full disclosure of information, perfect knowledge and the absence of deceit. It is one of the primary goals of the inclusion of the *Gharar* in the Quran:

> *"083.001 Woe to those that deal in fraud,-*
>
> *083.002 Those who, when they have to receive by measure from men, exact full measure,*
>
> *083.003 But when they have to give by measure or weight to men, give less than due.*
>
> *083.004 Do they not think that they will be called to account?*
>
> *083.005 On a Mighty Day,*
>
> *083.006 A Day when (all) mankind will stand before the Lord of the Worlds?"*

One can however argue that any transaction involves some degree of uncertainty: the good purchase may not be up to the advertised standards, it may broke more rapidly that one could expect, etc. Therefore, the Quran differentiates between two kinds of

Gharar: minor and major *Gharar*, respectively *Gharar Yasir* and *Gharar Fahish.* The former is an insignificant type of *Gharar* and will not render null the validity of the contract. Alwosabi (2008) defines three conditions under which it is permitted: a) the uncertainty is modest, b) the contract is charitable, such as a gift or inheritance, and c) there is a public need for the contract. The latter aspect of *Gharar* is a more significant form and is therefore considered as a sin and forbidden. For example, Ahmad and Ibn Majah narrated on the authority of Abu Said Al Khudriy: *"The Prophet (pbuh) has forbidden the purchase of the unborn animal in its mother's womb, […]."* (El-Gamal, 2010) In this transaction, the quality, or even existence, of the underlying asset is unknown. It is therefore a sin to get involved in such trade transaction. An alternative solution would to be to purchase the pregnant animal as a whole: the object of the transaction would then be defined and the contract absent of *Gharar.* According to Abdullah & Chee (2010) there are 4 main concepts from which *Gharar* can arise from: a) the uncertainty of ownership or possession, b) the inadequacy of information, c) interdependent and conditional contracts, and d) games of chance.

In the modern financial system, these 4 concepts are highly present. They make illegal to Muslims several instruments such as insurance policies and derivatives. As the triggering of an insurance contract is conditional to an external element whose emergence is uncertain, the agreement is not *Gharar-free* and should thus be banned. Furthermore the insurance contractor may be paying a periodical fee during a long period of time without ever being awarded the insurance. The opposite situation may very well be true. These result in a genuinely imbalanced transaction and should therefore be avoided. Derivatives, and more particularly forwards and futures, may be based upon a good that has yet to materialize at the time of the transaction. For that reason, derivatives are considered as a *Haram* product and are banished from the Islamic banking system.

As the essence of this dissertation is to get a better understanding of Islamic Equity Indexes and their performance, it is worthy to question the impact of the prohibition of uncertainty – *Gharar,* on the role of the stock market in Islam. The stock market is often pictures as well-informed professionals selling and buying virtual parts of a company whose valuation may rise or fall. The purchase of stocks can also be

regarded as the acquisition of a share of ownership of a company at a predefined price with the long-term objective of actively participating in the development and growth of the company. The value of the previously mentioned stock will indeed fluctuate according to the law of supply and demand in an uncertain manner but not more than would any other good, such as a house or a car, prone to market forces. However, throughout the whole process, the contract of sale will be straightforward and without ambiguity. "If it is, the element of *Gharar* will be absent and the deal will be lawful." (Sheikh DeLorenzo, 2002) Abdullah & Chee (2010) suggest that the approach of the trader to the stock market is of importance. In day-trading strategies, the provider of capital will invest in a stock or other instrument for a short period of time, often only for a few hours. He will usually liquidate all its positions by the end of the day. Undoubtedly the goal of such strategy is not the participation to the development of the underlying company but the immediate accumulation of wealth. As such, "day-trading is considered speculation, and is thus *Haram.*" (Abdullah & Chee, 2010) Several professionals and scholars such as Owais (2011) and Elasrag (2011) sympathize with such qualification of day-trading activities. However for El-Gamal (2010), the angle from which one considers day-trading can change the picture. Indeed if it is deemed as being another variation of trading in that case there is no rationale to forbid it. However as day-trading is the prerogative of a handful of skilled professionals it often generates important losses for the casual trader. It is therefore considered as a waste of wealth and should be considered as *Haram.* Short-selling is the sale of an asset that is not owned by the seller but merely borrowed from someone else. As such, the underlying asset is not tangible and that practice is therefore banned as well.

1.6 Prohibition of Gambling – *Maysir*

One narrower application of *Gharar* is the prohibition of gambling, known as *Mayisir.*

> *"002.219 They ask thee concerning wine and gambling. Say: "In them is great sin, and some profit, for men; but the sin is greater than the profit." They ask thee how much they are to spend; Say: "What is beyond your needs." […]"*

These two concepts often go hand-in-hand. As it is often the case, gambling results in a party making a profit and the other a loss: the outcome of such transaction being frequently decided by chance. Critics might associate the stock market to a form of gambling but in that particular case, knowledge, information and investment of personal assets are rewarded. Therefore a distinction ought to be made and the speculation that relies on skills and publicly available knowledge is not forbidden contrarily to the "one involving an effortless gain similar to a gambling scheme or activity." (Masood & Ghauri, 2015, p. 58)

1.7 Profit-Loss Sharing Principle

One of the overarching principles of Islamic finance is based on the concept that any profit or loss must be shared between the different parties. Most of the instruments used in Islamic banking respect this principle. Contrarily to the interest-based systems, actors will not be rewarded according to a fixed rate of return but rather according the efforts, financial or physical, that they put into the transaction. That is a borrower whose projects turns out to be a success does not have to pay any interest fee to the lending institutions but is entitled to share profits according to a pre-established ratio. However, in case of a failure of the borrower's project, the bank may very well end up with nothing else but regrets.

1.8 Financing Methods

Before analyzing the different investment channels that are available to Muslim investors, I believe it is worthy to rapidly review what the principal financing methods of Islamic Finance are. Islamic scholars have defined a number of vehicles that are authorized and that one can use to finance oneself. The first category of instruments is based on the crucial concept or Profit-Loss sharing between the capital provider, the bank, and the client, the manager or entrepreneur. In *Musharakah*, the two parties sign an agreement to raise capital together and to divide profits or losses according to the amount of their engagement. It is similar to a joint-venture and the bank has to carefully assess the quality and reliability of its newly found business partner. In *Mudarabah*, the underlying concept is roughly the same except for the fact that the capital is solely provided by the bank. Profits are shared according to a predefined ratio but losses are the sole responsibility of the capital provider, unless

negligence can be imputed to the manager. This concept reinforces the need for a thorough due diligence process for the bank. Other forms of financing, based on trade, also exist. Mark-up contract, or *Murabahah,* is an instrument for the purchase and resale of a good or other commodity between a buyer and a bank. Both parties agree on the price of the asset and on a fixed margin. The bank will buy the asset on behalf of the client who is expected to reimburse the principal plus the agreed margin on delivery. However the most common form of mark-up contract involves the deference of the reimbursement that is then often paid in installments (El-Gamal, 2010). This type of contract is referred to as *Bai Bithaman Ajil.* Leasing contracts, referred to as *Ijarah,* are allowed in Islamic Finance and are highly similar to the leasing contracts of western societies. It refers to a contract where the owner of a good will sell the right to use the good rather than the good itself. The leaser and the lessee agree on a fixed monthly or annual fee and on the duration of the contract. El-Gamal (2010) tells us that one of the most important contrasts between Islamically permitted leasing and conventional financial leasing is that the leasing agency must have the ownership of the leased object for the duration of the entire lease. An alternative form involves the reduction of the share of ownership of the leaser as time passes where the lessee finds itself with the full ownership of the good at maturity. These three forms of financing instruments constitute the majority of financing alternatives for Muslims. According to Abdullah and Chee (2010), the reason is that scholars have reached general agreement on the underlying principles of their design. There exist other financing methods that have yet to be embraced by all Islamic legislators. These are: *Salam,* the deferred delivery of a good whose quantity and price are predefined in advance and paid for; *Istisna,* similar to *Salam* except for the fact that payments follow the advancements of the manufacturing of the good; and *Qard Hassan,* is the grant of an interest-free loan to help those in needs.

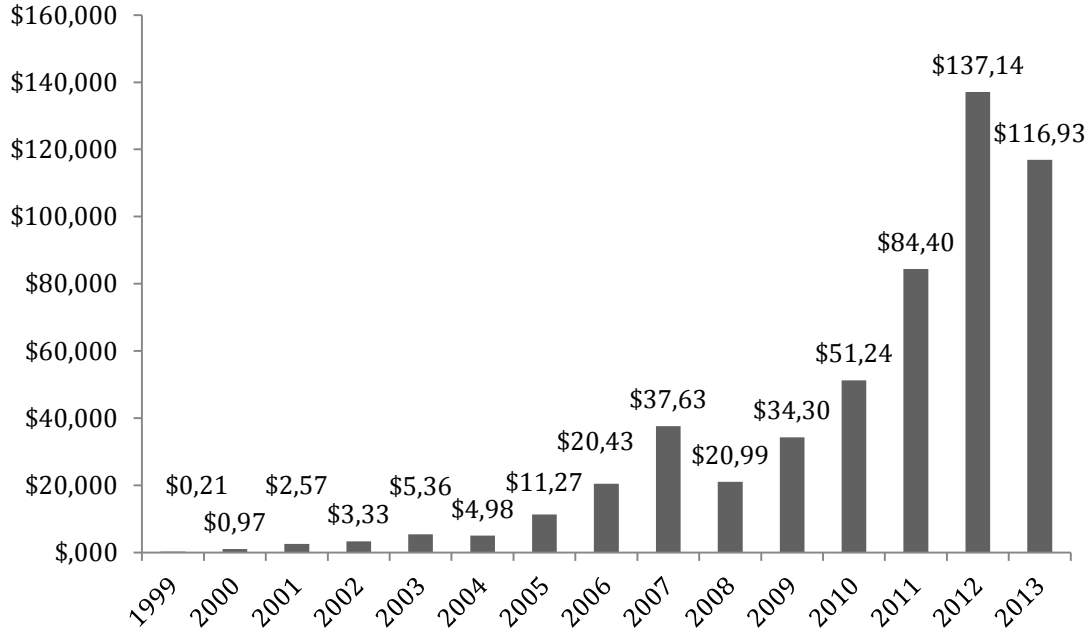
2. Lawful Investment Channels

In this section I will look at the other side of the transaction. I will review the different instruments that are available to Muslims eager to earn a return on their investment.

2.1 Fixed income instruments

One of the first instruments is the Islamic asset-backed bond, the *Sukuk*. As one can see in Figure 2 below, the market for *Sukuk* has experienced an impressive growth in the recent years.

Figure 2: Evolution of Global *Sukuk* Issuance in billion of USD



Source: Thomson Reuters

A striking illustration of the growing appetite of investors for these Shariah-compliant instruments is the recent issuance of Sovereign *Sukuk* by Luxembourg. In October 2014, the Duchy issued €200 million of five-year Islamic bond and according to Reuters (2014), the order was more than two times oversubscribed.

Traditional forms of bonds contain the element of *Riba* as they are "a claim on a portion of the company's interest-bearing debt" (El-Gamal, 2010, p. 19) and can therefore not be used by Muslim investors. However, as in any market, investors' risk aversions differ and their preferred investment vehicles vary accordingly. For those risk averse investors that choose not to invest in equity but rather in fixed income instruments, Sukuk is "a mean of subscribing to certificates which represent a right to receive a share of profits generated by an underlying asset base and that is capable of being traded on the secondary market." (Ulus, 2013, p. 2) As this definition emphasizes, the Sukuk has to be collaterized by a tangible asset base from which the cash stream will emanate either as a profit from a sale, profit from a rental or a combination of the two (Shanmugam & Zahari, 2009). These are *Sukuk al-Salam* or *Sukuk al-Ijarah.* In the case of Luxembourg, the *Sukuk* is based on an *Ijarah* structure and will be backed by government owned assets.

2.2 Equity

The other alternative for investors eager to earn a return on their capital is equity. As I have already discussed above, the issue of whether investing in shares contains the element of uncertainty – *Gharar,* has been ruled negatively by Islamic scholars and is therefore permitted. However, in order not to engage in any *Haram* activities, the Muslim investor must go through a lengthy process of due diligence. He or she has to assess several characteristics and indicators of the company whose stock he or she is considering to purchase. This assessment can be divided in a two-step model: the investor will start with the qualitative analysis of the company and then proceed with the quantitative part of the analysis. The opening step of the model deals with verifying the sector of activity of the company and whether it is *Halal.* The second step, more technical, is concerned with scanning for the presence of *Riba* or impure forms of revenues in the company's balance sheet. In the succeeding section I will develop at length the different indicators and ratio to be analyzed. As this due diligence process is a rather lengthy process for the enthusiast investor, alternatives exist. Several financial institutions such as Morgan Stanley, Dow Jones, Standard & Poor's, or Stoxx have created Shariah-compliant or Islamic indexes and Mutual Funds. These organizations undergo the same process as would the individual investor but with much greater means. The indexes are compiled to allow investors to

compare and track the performance of their own investments. These institutions assess the eligibility of companies considered to be part of the index with the assistance of independent or in-house Shariah Supervisory Boards consisting of Shariah scholars. As these indexes are at the heart of this thesis I will fully devote section 3 to the study of their origins and characteristics.

Investment institutions have also created Islamic mutual funds where the wealth of investors is invested into a panel of stocks carefully chosen by managers. The funds managers use the same methodology as financial institutions do for the creation of indices. Several studies have been dedicated to the performance of Islamic Mutual Funds with contrasting results. How et al. (2013) concluded that, out of an international sample of 387 Islamic funds, Islamic Equity Funds (IEFs) on average underperformed conventional funds by 40 basis points per month, or 4.8% per year. However they did outperform conventional funds during the 2008 sub-prime crisis. Hayat & Kraeussl (2011) analyzed a sample of 145 IEFs over the period 2000 to 2009 with a similar outcome. They come to the similar conclusion that IEFs underperform their Islamic but also the conventional equity benchmarks. Vandendriessche (2010) conducted a match-pairs analysis pairing an IEF with a conventional fund according to the geographic area of investment, the age and the size. Her findings are that the SC-funds have had, over the two periods studied, similar performances than their conventional counterparts. Studies focusing on funds of a sole country, particularly Malaysia, have reached somewhat different conclusions. Abdullah et al (2007) find that their sample of Malaysian Islamic unit trust funds performed better than the sample of conventional funds in a bearish market while the opposite is true in a bullish market. Alhenawy et al. (2010) reach the same conclusion for the funds based in Saudi Arabia. More recently, Bhatti & Mansor (2011) suggest that, in Malaysia, both their portfolios outperformed the market return but that there is not any statistically significant difference between the two fund samples.

Although Islamic mutual funds are primarily targeted at Muslim investors they do not prohibit the participation of investors of other faiths. Data on funds investors is rather difficult to obtain. However, an indication of the growing popularity of Islamic investment products in Europe is the fact that the Sovereign *Sukuk* issued by Luxembourg last year (see previous section) was subscribed by 20% of European

investors. (Bank Negara Malaysia, 2015) According to Reuters (2015), Luxmbourg also holds the third spot in the ranking of nations hosting the largest number of Islamic mutual funds.

3. Islamic Equity Indexes

3.1 Screening methods

As we have seen in the previous section, in order to guarantee the Shariah compliance of the investment, a certain number of rules have to be respected. The compliance with those rules depends of the intrinsic characteristics and financial indicators of the company in which the investment is made. Therefore, these have to be assessed and ruled upon by a group of experts, a Shariah governing body. This is the process of *Shariah screening*.

The first stage of the screening process is concerned with the sector-based analysis, also called the qualitative screening. Under Shariah principles, a certain number of commercial activities are defined as not permissible or *Haram* for Muslims. Therefore any company active in gambling and speculation, pornography, alcohol, tobacco, pork-related products, insurance companies (due to the heavy presence of *Riba* and *Gharar*), etc. cannot be considered for further investment by the Muslim believer.[2] This distinction between licit and illicit activities can thus appear as a straightforward filter that is to be applied in order to exclude unlawful securities. However business firms whose primary activity is *Halal* may "engage in activities or have a subsidiary or an investment in another company, which may be involved in non-Shariah compliant businesses." (KhatKhatay & Nisar, 2007, p. 52) The distinction is then not as clear as before and legitimate questions arise: how is the sector of activity of a company defined? Should the main business activity define the whole company? Should subsidiaries be taken into account? If yes, what is the permissible amount of unlawful revenues? Etc. These issues will be discussed in the following section.

The second stage of the screening process, also called quantitative screening or financial ratio screening, deals with different corporate indicators in order to better

[2] For a detailed list of sectors prohibited by S&P, please refer to Appendix 1

understand the financial structure of the company and its compliance with Shariah. A better knowledge of the financial structure is required to assess to which extent the element of *Riba* is prevalent within the company. The methodologies used by financial institutions may vary but the intention is the same: exclude all companies whose structure is heavily impacted by the presence of interest. In order to systematize the approach to the screening process, several ratios have been defined. The principal controversy of the quantitative screening process concerns the choice of the denominator of those ratios. Should a company use the total assets or the market capitalization? I will present one methodology; the one used by the S&P Global BMI Shariah family, and will later compare it with others. The first ratio deals with the indebtedness of the company. Highly leveraged companies, entities with a much larger proportion of debt than equity, create more value for their shareholders than conventionally structured firms when investments pay off, as the cost of equity remains the same. However, if investments were to fail, interest payments and capital reimbursement would have a highly negative impact on the company, as they constitute a fixed commitment that has to be honored. Overall leverage enlarges both profits and losses and is therefore considered to be more risky. Islamic finance aims at restricting the level of risk and uncertainty (*Gharar*) of an investment and therefore places a cap on the acceptable level of debt of a company. It is measured through the "Total interest-based debt / Market Value of Equity (36-month average)" ratio and is limited to 33%. An Islamic-compliant firm whose leverage is limited will – ceteris paribus – suffer less when the economic context is unfavorable but also rip less profit when the situation is more favorable. This is in line with the literature briefly reviewed in section 2.2.

The second and third ratios are concerned with the extent to which a company's assets are liquid. "Liquid assets are current assets elements and may include cash and cash equivalents, short-term investments and accounts receivables." (Derigs & Marzban, 2008, p. 288) Therefore the second ratio focuses on the level of cash and interest-bearing securities. For Muslim individuals, one of the five pillars of Islam is the *Zakah*: an annual tax on savings to favor the fair distribution of wealth among the population and to encourage individuals "not to accumulate their savings as liquid (cash) assets." (Abdul-Rahman, 2010, p. 35) The same reasoning is transposed to the

corporate world through the limitation of 33% of the ratio “cash plus interest-bearing securities / Market Value of Equity (36-month average)”.

The third and final criterion used by the S&P Global BMI Shariah family is the accounts receivables ratio. One of the main concepts of Islamic finance is that cash and debts can only be exchanged at par value. According to Khatkhatay & Nisar (2007), companies are composed assets and liabilities and the quoted price of the company can be considered as representing the value paid for the underlying assets and liabilities. Therefore, if the majority of the assets are accounts receivable then, to respect the Shariah guidelines, the exchange of the security could only be done at par value. And in order for this condition to be respected, Usmani (2002) introduces two conditions: the illiquid share of the assets cannot be ignorable, and the price of the share should be more than the value of the liquid assets of the company to reflect the value of the illiquid assets. Whereas the latter is fairly obvious, the former part requires some legislation. According to the same authors, the level of illiquid assets ought to be 51% at least. He bases his conclusion on the juristic principle that “the majority deserves to be treated as the whole of a thing.” (Usmani, 2002, p. 144) Several financial institutions approach the issue from the opposite angle and to avoid the superiority of cash and debt, Shariah boards limit the amount of accounts receivable that a company can hold. In the case of the S&P, it has to be inferior to 49% of the market value of equity (36-month average).

In addition to those three ratios, it is common to add a fourth indicator in order to increase the compliance of the index or the fund. Islamic scholars advise to analyze to which extent revenues originating from interest-based instruments are present in the total revenues. It is customary to limit the interest and non-compliant income to 5% of total revenue. The thinking behind this ratio is that, nowadays, the role of banks has become significantly important. All firms have bank accounts and without access to an exclusively Islamic banking institution, the probability to earn nominal interest is high. This is the type of income that is considered unlawful. Similarly, it is nearly inconceivable for a hotel or airline operating in Western economies not to serve alcohol to its customers. The revenue that stems from the sale of such product is, just as interest income, considered *haram* and cannot excess the threshold. This ratio has

been adopted by several Shariah boards, including S&P, with the exception of the Dow Jones and MSCI.

Finally, a fifth practice is commonly encountered in the Islamic financial industry. The share of the revenues that stems from non-Shariah-compliant instruments has to be cleaned and thus donated to charity. The index provider supplies a dividend purification factor in order for investors to identify that share of revenues and to clean their income from the element of *Riba.* It is calculated by multiplying the dividends by the share of non-permissible revenues in total revenues. This practice is recognized by most scholars. However there is an ongoing debate on whether the gains made through capital gains should be purified. When investing in a fund, the investor can assume that the purification process will be taken care of by the Shariah Board. However, as the fund managers are willing to increase their revenues in order to attract more investors, they may leave that responsibility to the fund subscribers. Therefore "the investment returns one derives from a fund must all be purified as they are not dissimilar to company shares and dividends." (Elgari, 2000, p. 78)

3.2 Controversies

Several academic papers have tackled the issue of comparing the different screening methodologies used by indexes providers or mutual funds as well as their impact of the universe of permissible securities. Derigs & Marzban (2008), whose research is often used as a reference, analyzed the guidelines defined by Shariah boards of five indexes providers (DJIM, FTSE, S&P, MSCI, and HSBC) and 4 funds (Amiri, DIB, Azzad, and Meezan). As for the qualitative screening, they conclude that aside from some minor differences, namely in defense and biotechnologies, the breadth of permissible business sectors is homogeneously defined across financial institutions. The other potential source of variation is the extent to which any involvement in an unlawful sector is permissible. They find that S&P, DJIM, and Azzad automatically exclude all companies presenting any implication whatsoever in non-compliant activities whereas other index providers are more tolerant. This is also due to the type of classification used during the screening process. Most funds and index providers will use the Global Industry Classification Standard (GICS) or the Industry Classification Benchmark (ICB). These two standards are highly similar and assign a

unique code to a company according to its area of activity. Therefore a company active in different activity sectors could be labeled as *Halal* even though a large percentage of its revenue stems from *Haram* activities. Sengupta (2012) illustrates this paradox with the case of LVMH group that is classified as "clothing and accessories" under the ICB standard despite the fact that more than 15% of its revenues emanates from its "Wine & Spirits" division. An alternative to those two standards, preferred by both Derigs & Marzban (2008) and Sengupta (2012), is the Standard Industry Classification (SIC). According to such procedure, each company is assigned several codes depending on all the sectors in which it is active. It is therefore more precise and ensures better Shariah compliance.

The consensus over the use of financial ratio is not remotely close to the one of the qualitative ratio. Several sources of discordance are present starting with the value of the ratio in itself. A review of the 4 main Islamic index providers (DJ, MSCI, FTSE, and S&P) reveals that there seems to be a convergence towards the one-third ratio. Indeed, whereas DJ, FTSE, and S&P use the value of 30% for the indebtedness and the cash level ratios, MSCI uses 33.33%: a relatively comparable value. The value of one third and the use of those ratios is not explicitly stated in any source of law but, according to Obaidullah (2005), is rather an hypothesis derived from the following hadith:

> *"The Prophet PBUH advised Abu Bakr RAA not to donate more than One-Third of his wealth, and commented that "One Third is too much".."*

Even though some financial institutions, such as the Securities Commission of Malaysia[3], still refuse to use this *hadith* as a source of law, there seems to be some convergence between the major index providers. However, when analyzing the third ratio, accounts receivables over market value of equity (36-month average), large variance appears. Whereas DJ and MSCI stick to their previously chosen rule of one third, S&P and FTSE use the value of 50%. The rationale behind that choice is the juristic principle highlighted earlier: "The majority deserves to be treated as the whole thing". At its creation, the MSCI Barra Index Series adopted an even more liberal

[3] The Security Commission of Malaysia is well known for taking a much more liberal approach to Shariah screening. According to a study by Rahman et al. (2010) only 198 out of 565 companies listed on Bursa Malaysia as Sharia compliant would earn a compliant status if the Dow Jones screening criteria were followed. For details concerning its current screening methods, please refer to Appendix 2

approach by fixing this ratio at 70% (Abedeen, Salman, & Htay, 2013). The reasoning behind it is inspired from the *hadith* mentioned here above but taken the other way around. Another point of interest brought to light by Khatkhatay & Nisar (2007) is the relevance of the use of the receivables ratio. The authors claim that viewing a company as a set of assets and liabilities is incorrect. There are several intangible assets such as brand image, access to resources, clientele, etc. that do not appear on the balance sheet but that constitute value. Therefore, "the value paid for a publicly traded equity is driven by market expectations of the future". (KhatKhatay & Nisar, 2007, p. 71) The whole rationale behind using the balance sheet assets in order for the market price to reflect the intrinsic value of the company is flawed. The two consultants call for a moratorium on the use of such ratio.

The main point of tension that remains in the world of Islamic screening is concerned with the appropriate denominator that ought to be used for the computation of the financial ratio. There exist two discernable schools of thoughts: the first one uses average market capitalization (or a variation of it) whereas the second one encourages the use of total assets. The decision between those two denominators is not absent of consequences. As Asutay & Marzban (2012) concluded through their analysis of the top 200 large cap companies in the US and Japan, the use of market capitalization or total assets in the ratios results in large discrepancies in asset universe size, constituents, asset allocation and return and risk. Out of five US companies that pass the screening process with one of the methodology, one would however not pass using the other one. In Japan, this number leaps to 29%. These results are close to the ones previously landed by Hassan & Mahlknecht (2011) in their analysis of the top 5000 worldwide capitalizations. They conclude that around 20% of the companies would pass the quantitative screening with the use of one denominator but not the other. Another study by Pok (2012) focused on the screening methodologies of Dow Jones, FTSE and S&P and compared the strength of their screening process. Under the market capitalization methodology of the Dow Jones and S&P, respectively 12.16% and 16.77% of the companies of the original asset pool make it through. When the total asset methodology of FTSE is considered, this number surges to 63.10%. The choice of a denominator or the other is not absent of consequences. Coming back to Asutay & Marzban (2012), in terms of return and risk, while

differences undoubtedly exist, it is rather difficult to predict in what direction. Market capitalization provides a better return Japan while the total assets technique lands better results in the US.

The advocates of the use of market capitalization argue that this technique better represents the real value of the company, as it is perceived on the market. There are indeed some arguments that support their rationale. A company's balance sheet does not always reflect the real value of the company as assets such as brand, intellectual property or clientele are not included. The use of total assets would likely result in an undervaluation. Additionally, as balance sheets are often published once a year, the screening process can only take place annually and is based on a mere snapshot of the value of the company at the time. Using market capitalization enables constant monitoring and reviewing of the compliance status of a firm. However constant reviewing can cause a company to become unlawful, from a Shariah standards point of view, from one day to the other. This would give rise to important monitoring costs for index providers and funds managers. For individual investors, a change in the compliance status of a security would cause them to withdraw the security from their portfolio. This would push the market price of the share down and worsen the quality of the ratio. On the other hand, backers of the use of total assets as a denominator claim that their methodology is less sensitive to seasonality and market speculations. Argument to which financial institutions using market capitalization have answered by increasing the time span used to compute the average market value of equity from 12 months to 24 months for the DJ and 12 months to 36 months for S&P. (Dow Jones, 2011) The use of total assets is also based on a "trusted accounting perspective" (Derigs & Marzban, 2008, p. 291) and can be explicitly broken down. However, the same authors argue that if the methodology used to compute the total assets are different, the ratios are senseless. Finally Hassan & Mahlknecht (2011) illustrate the volatility issue by showing that over the 2008-2009 period, AT&T would have been compliant using the total assets but not according its market capitalization. This is the result of the volatility of market capitalization when the economic context is negative and of a high share of liquid assets. The opposite phenomena can be observed in sectors where intellectual property and pipeline projects, non tangible

assets, strongly influence the valuation of the firm, such as in the pharmaceutical or biomedical industries.

The different controversies highlighted here above have been the rationale for different authors to propose alternatives to the actual screening methodologies. Driven by the variations in classification highlighted by Derigs & Marzban (2008), that he himself defines as "compliance inconsistency", Widiyanti (2012) theorizes a more liberal approach and argues that "with respect to compliance a fund which itself invests in multiple companies has to be evaluated the same way as a conventional independent company". (Widiyanti, 2012, p. 4) In other words, the fund manager or index provider should adopt a portfolio-based approach and assess the compliance of the overall portfolio rather than those of the individual companies shaping it. Although they preserve the first qualitative filter and exclude equity from companies active in *haram* commercial activities, all others securities would be virtually candidate for the new portfolio. They conclude that by building the efficient frontier for different portfolios under the constraints that the weight of an asset be less than 10% and that the number of assets included in the portfolio be at most 40, the newly built portfolios perform better than their Shariah-compliant counterparts. At the other hand of the spectrum, Khatkhatay & Nisar (2007) had, before Derigs & Marzban (2008), reached the conclusion that there existed important variance among screening methodologies and that improvement were required. Their 2007 paper is a plea for a more conservative approach to Shariah screening. According to them, any companies involved even mildly in any non-compliant business should be excluded from the universe of potential assets. They recommend that the acceptable level of indebtedness be scaled down by at least 20% and that the income earned through interests be brought down from 5% to 3%. Finally, the level of interest-based assets should not be more than 10% of total assets.

28.

Part 2: Literature Review

In this section, I will review the current state of the literature regarding Socially Responsible Investment indices and their performance. I will then focus on Islamic Equity indices – indices that respect the Shariah principles and that are viewed by many authors as a subset of SRI indices.

1. Socially Responsible Investment

According to the Forum for Sustainable and Responsible Investment (2015), Socially Responsible Investment can be defined as "an investment discipline that considers environmental, social and corporate governance (ESG) criteria to generate long-term competitive financial returns and positive societal impact." Screened funds, and more particularly SRI funds, have existed for almost a century but they truly started to gain momentum when major funds providers started to screen out companies with stakes in South Africa, in order to pressure the end of apartheid. (Thomson Reuters, 2013) Since then, the discipline has been successful in attracting always more adepts. It is now a field that investors and researchers cannot ignore as, according to the Global Sustainable Investment Alliance (2015), sustainable investment now represent 30.2 percent of the total amount of assets under professional management in the worldwide economy (minus LATAM). It grew by more than 60 percent between 2012 and 2014 to reach $21.4 trillion. Although this recent peak in popularity has driven many authors to take an interest in the matter, studies of the performance of SRI funds or indices have been around for a long time.

Meir Statman was one of the first authors to take an interest in the actual performance of Socially Responsible Investment. In his first paper on the matter, Statman (2000) analyses the performance of the Domini Social Index (DSI), an index of socially responsible companies launched in May 1990. The index excludes companies that extract more than 2 percent of their revenues from military weapons, alcohol or tobacco products, or gaming products or services. KLD, the index provider, also applies a qualitative filter. The returns of the index are compared with those of the S&P500 for an eight-year window. Both raw and risk-adjusted returns of the index are higher. The author also concludes that returns corrected for excessive standard deviation, the eSDAR, were higher for the DSI. On the other hand, the socially

responsible Index is slightly riskier than the S&P500. In the rest of his paper Statman (2000) uses those two indexes as performance benchmarks for the analysis of the returns of 31 socially responsible mutual funds. Socially responsible screening is subjective by nature, as investors' values differ. The chosen funds pool was created based on the most commonly used objective screens such as the exclusion of tobacco, gambling, weapons, etc. The returns of all socially responsible funds trailed both the DSI and S&P500. When the investigation is shifted towards the comparison with similar conventional mutual funds of identical asset size, the performance of socially responsible funds was better than that of the conventional funds. However, the difference was not statistically significant. These results are in line with those of an anterior study conducted by Hamilton et al. (1993). In a more recent a more recent paper, Statman (2005) widens the scope of his research and, while keeping the Domini 400 Social Index in the index universe, includes the Calvert Social Index, the Citizens Index, and the U.S. portion of the Dow Jones Sustainability Index. Although those indexes assign different weights to screening criteria and therefore are composed of different stocks, they all fall in the category of Socially Responsible Indexes. The shift to indexes rather than funds is motivated by the willingness of getting rid of any potential bias that could stem from management fees or the fund manager's ability to pick stocks. Although none of these results were statistically significant, overall returns of the Socially Responsible Indices seemed to be higher than those of the S&P500 on the entire period. However, during the 2000 dotcom crisis, the S&P500 performed better. Schröder (2005) reproduces Statman's study but with an even wider universe of SRI indices. He analyses the performance of 29 SRI indices with their benchmarks and concludes that for all, but two, the return differences are not statistically relevant. Those two divergences can, however, be explained through backward-looking bias: an approximation introduced by the backwards calculation of returns prior to the index creation. As for the riskiness of the SRI indices, most of them exhibit a significantly higher level of risk. Finally, 8 of the 29 SRI indices do not display any difference in risk nor in return compared to the benchmark. There seems to be convergence towards non-significant differences among the conclusions of the different studies highlighted above. However most of these date from the 1990's or early 2000's and are therefore quite outdated. As those

studies do not account for the 2007-2008 subprime crisis, the relevance of their conclusions is fairly limited.

Amenc & Le Sourd (2010) provide us with an update on the performance of SRI indices after the recent financial crisis. They review the results of their previous study realized in 2008 adding two years of data. They compare the performance of 10 Socially Responsible indices with their conventional benchmarks. They find out that in for Europe and the Euro Zone the SRI indices slightly underperform but not significantly. On a worldwide basis the results are opposite with the SRI somewhat overperforming but not enough to be statistically significant. They also conclude that the correlations of the SRI indices with their benchmarks were strong.

Recently, Polívka & Pesík (2013) reproduced the same analysis under the current economic reality. The authors chose 9 major SRI indices focusing on the global economy, Europe or North America. They compared the performance of the SRI indices with their conventional counterparts using the excess standard-deviation-adjusted return (eSDAR). All indices earn different returns compared to their benchmark but both positive and negative differences are observed. The null hypothesis cannot be rejected and the differences do not hold statistically. Once again the authors (2013) conclude that investing in Socially Responsible indices does not require any sacrifice from the investor. Several studies such as Managi et al. (2012), Ortas et al. (2012) and Latinovic & Obradovic (2013) also reach the conclusion that any difference in returns between SRI indices and the benchmark is not statistically relevant.

Revelli & Viviani (2014) have conducted a meta-analysis of the current literature on Socially Responsible Investment by reviewing 85 studies and 190 experiments in order to discover whether the inclusion of ethical, social, and CSR interests in portfolio management was likely to deliver higher results than traditional modern portfolio investment practices. The 20 years of publication reviewed allowed them to conclude that “there is no real cost or benefit to investing in SRI but that the level of performance clearly depends on the methodological choices made by researchers to consider the matter”. (Revelli & Viviani, 2014, p. 14)

One can conclude that applying socially responsible screens does not hinder the performance of the SRI indices. Conclusions from previous studies do not exhibit any convergence except for the absence of statistically significant differences in terms of performance. This is interesting as one of the effects of those screens is to reduce the available pool of securities and thus, according to modern portfolio theory, reduces the potential for diversification of risk. One could therefore expect those SRI indices to be more risky than their conventional counterparts and to be compensated by higher returns. However, as the review of previous studies show, it is not the case.

2. Faith-based Investment

Faith-based investment aims at encompassing religious beliefs in the screening process of SRI and excludes stocks that do not respect the guidelines established by the fund or the index. Although considered as being a subset of SRI, Forte & Miglietta (2007) highlight that it is not rare to find Faith-based funds or indices that are not compatible with the Socially Responsible mindset. They illustrate their claim with the *AveMaria* mutual fund that is based on the respect of the regulations of the Catholic Church. The fund excludes all companies that grant social benefits to non-marital partner. Regardless of its legitimacy, such specification goes against the Socially Responsible principle of non-discrimination towards employees or customers. (Forte & Miglietta, 2007) Studies over the performance of this unique category of investment are scarce. Boasson et al. (2004) are pioneers in the field. In their first paper they analyze the financial risk-return characteristics of five Faith-based mutual funds. They conclude that the performance of the screened funds is similar to the one of unrestricted funds. Boasson et al. (2006) replicate their analysis of 2004 by using Carhart's multi-factor model in order to explain the return of the five same Faith-based funds. Their results indicate that the alphas are not statistically different from zero and the funds neither outperform nor underperform the market. To the best of my knowledge, these studies represent the whole of the current literature on the performance of non-Islamic Faith-based investment.

3. Shariah-compliant Investment

After this brief review of the literature concerning Socially Responsible and Faith-based investments, I will now dive into what constitutes the core of my research:

Islamic Equity indices. I believe it is constructive to start this section of the literature review with papers that encompass both the Socially Responsible and Islamic aspects of the investment strategy in order to bridge the two concepts. BinMahfouz & Hassan (2013) are the first to analyze a hybrid form of index encompassing characteristics of both Islamic and SRI indices. Islamic indices are concerned with the exclusion of businesses whose production is unlawful according to Shariah standards. However, externalities such as social and environmental footprint are not accounted yet accounted for. In 2006, Dow Jones launched the first Islamic Sustainable index in order to make up for this conceptual void. The authors set out to analyze whether this inclusion of sustainable concerns to the Islamic index has a positive impact. BinMahfouz & Hassan (2013) first investigate the performance and the systematic risk of Islamic and sustainable indices before moving on to the examination of the characteristics of the newly launched Islamic Sustainable index. With regards to empirical results, the returns of the four indices – the conventional, the Islamic, the Sustainable, and the Sustainable Islamic – are not statistically different from one another. This is confirmed by the CAPM and Fama-French. Islamic and Sustainable Islamic indices present, respectively, the lowest and second lowest exposure to systematic risk. According to the authors (2013), the inclusion of the sustainability matter in the Islamic screening process does not expose the Muslim investors to an increased level of risk. Although this study is the first to study the performance of this hybrid form of index, several researchers, before them, have taken an interest in the evaluation of the performance of Islamic indices against both their conventional and sustainable counterparts.

One of the first researchers to include both sustainable and Islamic indices in the data set was Hussein (2004) that conducted an analysis of the FTSE Global Islamic index, the FTSE4Good index, and the FTSE All-World index. Through market-adjusted returns and Jensen's alpha, the author is able to conclude that on the overall period, returns of the Islamic index do not differ from the conventional nor the sustainable indices. However during the bull period of 1996-2000, the Islamic index yields significant positive abnormal returns. Opposite results are discovered in the bear period. These results are confirmed through a long-run performance using cumulative returns and Buy and Hold returns. Hussein (2004) assumes that a possible explanation

for such behavior of Islamic indices is the exclusion of liquor firms that tend to perform especially well in bear periods.

In the same year, Hakim & Rashidian (2004) assume that the lower diversification of the Islamic index will impact negatively its beta and increase it. However as Hashim (2008) reminds in his own analysis of the paper, beta is a measure of the systematic risk and cannot be diversified. Therefore, the hypothesis according to which low diversification would result in a greater beta is not sound. Nevertheless the authors find out that the Islamic index displays lower returns and a higher level of risk in comparison to the sustainable index. The level of systematic risk of the former is almost twice as important as the one of the latter. If one examines risk-adjusted returns, then the performance of the Islamic index is in line with the market. The authors of the research conclude by stating that the Islamic index is "competitive with the broad stock but underperforms the socially responsible index with similar investment restrictions." (Hakim & Rashidian, 2004, p. 14)

According to Hashim (2008), the level of risk of Islamic indices has always been a subject of intense discussion among scholars and researchers. His study aims to answer several questions such as: What is the risk of Islamic indices? How does it compare to the market? How are their returns compared to those of conventional indices? He selects the FTSE Global Islamic index as the object of the study and the FTSE All-World and the FTSE4Good as benchmarks. The CAPM is used to check whether alpha is null and beta equal to the unit. On the overall period, all three indices beat the benchmark but are not significantly different. In the bear period, only the FTSE4Good earn significant positive returns. Concerning the betas, they are all positive and both the Islamic and sustainable index display a much higher beta than the conventional index. This is in line with the conclusion of Guyot (2008) but in opposition with Ahmad & Albaity (2008). When the author checks whether the higher level of risk is compensated for by higher returns, he finds out that, although the risk of the Islamic index is lower than the risk of the sustainable, it still earns larger returns. The risk-adjusted performance of the Islamic index is thus better than the sustainable.

Kok et al. (2009) merely analyze whether the Islamic indices produced by DJ and S&P offer opportunity for diversification. The added value of their study lies in the

introduction of Sustainable indices such as the Dow Jones Sustainability Index and the FTSE 4 Good Sustainability Index in the cointegration testing. Kok et al. (2009) explore whether Islamic funds outperform conventional funds by measuring the performance of a portfolio of assets when a Shariah fund is added. Results show a significant improvement in performance when the Shariah fund is included.

Ahmad & Albaity (2011) reciprocate the study conducted by Kok et al. (2009) with a stronger emphasis on the potential leverage effect, their reaction to market stimuli, of these indices. They use the conventional, sustainable and Islamic indices of the FTSE and Dow Jones family. Their research explores three different issues: the performance of the returns, the existence of risk premium, and the presence of leverage effect. Through the GARCH analysis, they conclude that there exists no significant difference in terms of returns between similar indices of the different families. Next they focus on the risk premium that sustainable indices and Islamic indices could have over the benchmark but conclude that there is no risk-return trade-off in any of these indices. Finally, they find evidence of leverage effect in all 4 constrained indices. “It means that the impact of a bad news is greater than the one of positive news.” (Ahmad & Albaity, 2011, p. 6927) The FTSE family also requires more time than the Dow Jones in order to revert to the mean after volatility shocks.

As we have seen, several authors have tackled the issue of comparing the performance of SRI indices and Islamic indices with varying results. Forte & Miglietta (2007) were among the first ones to draw the academic world's attention on the possible synergies between SRI and Islamic indices. They first conducted a qualitative study on the similarities and differences between SRI and Islamic investments. They highlight some major differences between the two classes of stocks such as the presence of ratio in the Islamic world and the lack of systematic guidelines in the SRI methodology. Furthermore, several countries that are on the blacklist for human rights respect and, thus, that are to be excluded from SRI indices are Islamic countries. On a quantitative basis, they carried out a cointegration analysis to inspect whether the two types of indices displayed opportunities for diversification. Their conclusions are straightforward. The FTSE Islamic is not cointegrated neither with the FTSE Developed nor the FTSE4 Good. Forte & Miglietta (2007) conclude that Islamic indices display a singular econometric profile. Forte & Miglietta (2011)

confirmed these results by reproducing their previous study. All these differences have resulted in Islamic indices to be categorized as an independent branch of SRI with its own characteristics. The previously highlighted study of BinMahfouz & Hassan (2013) is an attempt to reconcile Islamic and SRI indices.

Bhatt & Sultan (2012) took an interest in the relationship between corporate leverage and stock performance. They started their study from the common assumption that firms with low corporate leverage also enjoy a lower level of risk, as they are less prone to be impacted by the credit market. Since Shariah screening aims at removing firms with a ratio of debt greater than one third and therefore highly leveraged, the authors want to check whether Shariah-compliant firms can promote flight to safety in a recession period. In order to test their assumption, Bhatt & Sultan (2012) took the Fama - French asset pricing model and added a LEV factor (the average of the difference of the returns on high leveraged portfolio minus the returns on low leveraged portfolio) similar to HML and SMB. Then they conducted several regression to see which of these four factors: the market risk premium, book to market, size, or leverage better explained the returns of almost 4000 stocks that are categorized as Islamic, conventional or socially responsible. They find out that the inclusion of the Leverage factor seems to weaken the explanatory power of other factors. Although excess market returns is the most important explanatory factor, its importance is decreased and replaced by the Leverage factor in crisis period. According to the authors, another finding is that Islamic and conventional stocks behave in a similar manner in terms of sensitivity to economic risk factors. On the other hand, SRI stocks appear to be less sensitive to "the economy-wide leverage risk factor". (Bhatt & Sultan, 2012, p. 113) Therefore they offer a safe heaven in a downturn economy.

As one can conclude from the studies highlighted above, the relationship between SRI and Islamic indices is unclear. Whereas some authors ((Kok et al., 2009), (Forte & Miglietta, 2007), (Forte & Miglietta, 2011)) find an absence of cointegration between the two families of indices, other researches such as Kok et al. (2009) again find evidence of cointegration between the conventional and Islamic indices. With regards to the performance, on the overall period BinMahfouz & Hassan (2013), Hussein (2004), Hashim (2008), and Ahmad & Albaity (2011) find no significant difference in

terms of total returns between the Islamic and Socially Responsible indices. However, some variations in terms of risk adjusted-returns or risk levels are found by Hussein (2004), Hakim & Rashidian (2004), Hashim (2008), and Bhatt & Sultan (2012). These differences in terms of characteristics allow us to classify Islamic indices in a category of their own. Logically, several authors have dedicated them entire studies. The following section will be divided according to the conclusions reached in the different papers that I will review.

Absence of differences of performance

Ahmad & Albaity (2008) were some of the first authors to take an interest in the study of the performance of the Islamic indices on the Bursa Malaysia. They ran a whole battery of tests in order to assess risk-adjusted performance, cointegration as well as causality. The authors conclude that there exists no significant difference in terms of risk-adjusted performance: the Islamic index does earn a marginally lower return but, in line with the modern portfolio theory, this is compensated by a lower level of risk.

Girard & Hassan (2008) analyze the performance of five Islamic indices of the FTSE family, namely FTSE Islamic Global Index, FTSE Islamic Asia Pacific Index, FTSE Islamic Americas Index, FTSE Islamic Europe Index, and FTSE Islamic South Africa Index, against their corresponding benchmarks. They employ a variety of measures such as the Sharpe and Treynor ratio, the cost of diversification, the net selectivity, etc. They also check for the persistence through the Carhart's four factor pricing model, a modified version of Fama and French model to account for momentum anomaly. Finally they use Johansen cointegration test to determine long-term relationships between the markets. The authors conclude that although FTSE Islamic indices display higher returns over the 1998-2006 period, they also present higher risk. This is already an interesting contrast to the conclusion of Ahmad & Albaity (2008) for the Malaysian stock exchange. Overall, the difference is not statistically significant and Islamic indices cannot be judged as being different from their conventional counterparts.

Another similar study is the one conducted by Guyot (2008) about the performance and cointegration of the Dow Jones Islamic indices. He chose 10 geographically-focused indices that he compares to their benchmark. Performance is studied through

Jensen's alpha, the Fama-French CAPM, Sharpe ratio, and finally the excess Standard Deviation Adjusted Return. Statistical tests do not allow for the rejection of the null hypothesis of similar performance. When returns are adjusted to the level of risk of the index the previous conclusion still holds: there is no significant difference between the indices. The author concludes his analysis by stating that, for Muslim investors, the cost of observance in null.

In a similar fashion to their 2008 paper about the performance of the FTSE Islamic indices, Girard & Hassan (2011) explore the performance of 7 indices of the Dow Jones Islamic Market family. The methodology is highly similar and Sharpe ratio, Treynor ratio as well as Jensen's alpha are used. They then use the Fama-French to control for time and style variability. Finally, they end by analyzing the potential of Islamic indices for diversification through testing for cointegration between the Islamic indices and their counterparts. As many authors have previously concluded, Girard & Hassan (2011) find no significant differences between Islamic and non-Islamic over the overall 1996-2005 period. Although they outperformed the conventional indices between 1996 and 2000, Islamic indices failed to do so in the 2001-2005 window. "Similar reward to risk and diversification benefits exist for both types of indexes." (Girard & Hassan, 2011, p. 27) This is a similar conclusion to the one reached by Hussein (2004) about the underperformance of Islamic indices in crisis period.

Lobe et al. (2012) extend previous studies by analyzing the performance of a wider panel of 155 Islamic indices around the world. Through the use of the Sharpe ratio, the CAPM, and the more accurate Carhart's four-factor model, they conclude that Islamic indices do not differ from their conventional counterparts. Although alphas of some country-specific indices show statistically significant positive differences, it cannot be concluded that Islamic indices outperform their benchmarks. A deeper analysis of bull and bear markets enables the authors to conclude that a third of Islamic indices significantly outperform during bear markets. No significant variation is discernable during bull periods.

Following the increase in the number of Shariah-compliant companies listed on the Bombay Stock Exchange, Dharani & Natarajan (2012) decided to undertake an analysis of the performance of the Islamic indices listed on the Indian exchange

platform. According to their analysis, they are left with a universe of 935 potentially Shariah-compliant stocks. That is only 27% of the companies listed on the Indian Stock Exchange but almost 60% of the total market capitalization. Consumer, healthcare and Information technology are among the most represented sectors. They selected a portfolio of 27 stocks that they then compared to an Islamic index and two conventional indices. They conclude that there exists no significant difference in returns either between the individual stocks and the indexes or between the indexes themselves. The risk level measured by the beta is highly different with roughly half the stocks being more risky than the Shariah index. The different null hypotheses of the absence of difference of returns are therefore not rejected. In India, investing in Shariah-compliant stocks does not impeach Muslim investors from reaching the same level of performance as normal investors.

Ashraf (2013) aims at analyzing whether the recent outperformance of Islamic funds is due to managers' picking skills or to Shariah screening. Through the CAPM theory and a multi-equation framework the author tests for difference in the alpha and beta of Islamic indices compared to their conventional counterparts. He uses a pool of 29 IEI aggregated by MSCI, Dow Jones, FTSE and S&P. Under both methodologies, single equation and a variation of the Fama-French multi-equation framework, Islamic indices do not exhibit any abnormal returns. They have the same risk-return characteristics and the only performance deviation stems from the higher relative riskiness of Islamic indices.

Oktariza & Setiawan (2013) build on the general assumption that Shariah-compliant investors are likely to earn suboptimal market returns and concentrate their analysis on a sole domestic market, similarly to Dharani & Natarajan (2012) with the Indian market, the Indonesia Stock Exchange. They compare the risk and return as well as the risk-adjusted return of Shariah-compliant stocks and conventional stocks. They construct two portfolios of 30 stocks taken from negatively correlated sectors: one Shariah-compliant and the other not. They find no significant difference in returns, standard deviation or beta between their two portfolios. The same conclusion can be drawn for risk-adjusted measurements such as Treynor or Sharpe. They later proceed to examine the relationship between stock returns and several financial ratios such as

EPS, NPM, ROE, and PBV. They find that the returns of Shariah-compliant firms and classic firms are influenced by the same variables, ROE being the most important one.

Arshad & Rizvi (2014) enquire into the risk sharing virtue of Islamic investing. Prior to the study of volatility and correlation, they examine the descriptive statistics of five sector-focused Islamic and 4 traditional indices of the Dow Jones family. They conclude that there exist no differences between the two families of indices.

Significant differences of performance

If, on the one hand, some authors conclude of the absence of any statistically significant differences in the performance of Islamic and conventional indices, on the other hand, some researchers are less convinced that those families of indices behave in a similar fashion. We have already seen that, among the previous studies that concluded an absence of difference in performance over the whole period at stake, some researchers found different results for subperiods of higher or lower economic activity. This is the case of Hussein (2004) that concluded that, during the bull period of 1996-2000, the Islamic index yields significant positive abnormal returns. He unveiled opposite results in the bear period. This discovery is endorsed by Hassan & Girard (2011) that concluded that although they outperformed the conventional indices between 1996 and 2000, Islamic indices failed to do so in the 2001-2005 window, that is the bear period. The research conducted by Lobe et al. (2012) tells us quite a different story as they conclude that a third of Islamic indices significantly outperform during bear markets. However, during bull periods, there are no observable differences in conventional and Islamic indices' behaviors. Several authors also find differences between the two families of indices.

Higher performance on overall period

This is the case of Hussein (2005) that wanted to to test the assumption that faith-based screening, and more particularly Shariah screening, reduces the potential for diversification and therefore, according to modern portfolio theory, lower returns. The author focuses his analysis on the FTSE Global Islamic and the Dow Jones Islamic Market indices. The period of study is divided in two bull periods (pre- and post-dotcom crisis) and a bear period. He examines raw returns, risk-adjusted returns, as well as long-run performance. Islamic indices perform as well as their conventional

benchmarks over the entire period and after the crisis. Furthermore they also earn statistically significant abnormal returns in the first bull period. Overperformance that they fail to keep during the crisis period. The author concludes that the assumption that Shariah investing offers inferior investment performance has to be rejected.

Antoniou et al. (2005) conducted a rather straightforward performance analysis of the Dow Jones Islamic Market index by using the CAPM, the Fama-French models, and Carhart's modified four-factor model. They conclude that the Dow Jones Islamic index displays greater returns than the conventional index. Through the use of the three methodologies highlighted above, the authors are able to confirm the statistical significance of the results. The null hypothesis of similar performance is therefore rejected. This study confirms the results found by Hussein (2005) during the same year.

Hussein & Omran (2005) conducted a similar study to the one Hussein (2004) undertook with the FTSE Islamic Index family one year earlier. Assessing the performance of the Dow Jones Islamic Index family, the author finds somewhat comparable results. They analyze the results of the DJIMI as well as 13 subindices of the Islamic indexes family computed by Dow Jones for the 1995-2003 period. They further separate that period into two subperiods respectively called bull and bear periods. Aside of raw and market-adjusted returns, they use Sharpe and Treynor ratios as well as Jensen's alpha to evaluate monthly results. For the long-term performance, Cumulative Abnormal Returns and Buy-and-Hold Abnormal Returns are the models of choice. On the short-term performance, the DJIMI yields significant, at 10% and 1% levels, positive abnormal returns for the overall and the bull periods respectively. These results hold for all the subindices of the DJIM family. The analysis lands opposite results in the bear period, although not statistically significant. The authors also disprove the common belief that the abnormal returns in bull markets are supported by the technology sector. The returns of the Islamic technology index do not differ from returns from other Islamic indices. The short-term performance analysis is confirmed through the conclusions of the long run performance. Through the wealth relative metrics they conclude that, during the bull period, an investor would have been able to invest 21% less in an Islamic index and yield the same return than with a conventional index. During the bear period, the difference is of 11% in

favor of the conventional index. The scope of their study does not include the analysis of the causes of such underperformance of Islamic indices during the bear period but they put different hypothesis forward such as September 11th or the exclusion of alcohol companies. According to Hussein & Omran (2005) the leverage ratio of the firms also has a role to play in the performance disparities of Islamic indices.

Through a brief analysis of the performance of the DJIMI, Cherif (2008) confirms the fact that the Islamic index overperformed its conventional counterpart between 2005 and 2008. The index also displays a slightly more important level of systematic risk.

The conclusion of Cherif (2008) differs from the one reached by Al-Zoubi & Maghyereh (2006). They set out to analyze the relative risk performance of Islamic indices compared to conventional indices. They select the DJIMI and the Dow Jones World Index and conduct "two symmetric models and one asymmetric model to estimate risk-measures for both indices." (Al-Zoubi & Maghyereh, 2007, p. 238) Their results suggest that the level of risk of the Islamic index is much less than of the conventional. They attribute that conclusion to the profit-and-loss sharing principle of Islamic finance. However, as it is argued by BinMahfouz & Hassan (2013), it is highly unlikely that this lower level of risk would stem from the PLS mechanism. Indeed, the PLS mechanism is a mechanism applied by Islamic finance and not by the companies forming the index. Although Islamic screening eliminates the "less healthy" companies it does not require them to apply the PLS Islamic principle. Although their results hold, the underlying reasons are to be found somewhere else.

Willing to discover the impact of the credit crunch on the performance of European indices, Alam & Rajjaque (2010) set about building three different portfolio based on the S&P Europe 350: all constituents of the S&P Europe 350, the same index minus the financial firms, and the S&P Europe 350 Shariah Index. They based their reasoning on the assumption that, because of the exclusion of the financial firms from the assets universe, Islamic indices are not affected as badly as other securities in crisis times. However, is this due only to the exclusion of financial firms, and the second index should therefore display similar characteristics, or is it due to other parameters? An observation of the overall return allows them to conclude that the Islamic index has outperformed the other during the 2006-2009 period. Furthermore, the difference in returns between the non-financial and the Islamic index is large. It

seems to confirm the existence of other influential parameters. When considering risk-adjusted measurements, the non-financial index dominates the other two. It confirms the assumptions that the financial sector was the one creating the volatility during the crisis. Through a rapid look at Jensen's alpha, the authors conclude that the null hypothesis of similar performance is rejected and therefore Shariah guidelines lead to the formation of a better index.

Lean & Parsava (2012) explore the performance of two Islamic indices on the Bursa Malaysia in comparison with three conventional counterparts. They construct six pairs of indices to analyze and find out, through the CAPM, that Islamic indices earn excess return in comparison with an investment that would bear a similar level of risk. Islamic indices on the Bursa Malaysia are characterized with high risk-adjusted returns and low risk over the entire period. This result is different from Guyot (2008) that found a higher level of total risk for Islamic indices. They argue, similarly to Ahmad & Albaity (2008), that the exclusion of uncertain and risky investments result in a lesser exposure to risk.

This more recent study is one among many that aims at investigating the impact of the crisis on the performance of indices. Ho et al. (2013) aim at providing empirical evidence on the risk-adjusted performance of 12 Islamic indices during a 11-year window that has seen two major financial crisis: the dotcom and the global financial crisis. Although both types of indices seem to underperform the benchmark, Islamic indices do relatively better than their conventional counterparts on the overall period. In terms of risk-adjusted returns, Islamic indices perform better than traditional ones during crisis periods thanks to their lower volatility and betas. In the aftermath of the crisis periods, results are mixed and positive returns can be earned from both types of indices. The main takeaway of their analysis is the better resilience of Islamic indices in bear markets. This is interestingly contrasting with Hussein (2004, 2005) and Ahmad & Ibrahim (2002).

In light of the results of their studies, these authors adopt what could be considered as a positive viewpoint on the Islamic indices. By excluding companies whose ratio and indicators are not in line with those commonly used by index providers, Islamic equity indices suffer less form the poorer performance of bad stocks. Although they may not enjoy the higher performance of highly leveraged companies, it can be

argued that less leveraged companies are more likely to adopt a conservative style of management and therefore be less prone to risky behavior and poor performance.

Lower performance on overall period

Several researchers have approached the field of Islamic investing with a much less optimistic mindset. Indeed, they rightfully claim that, by applying several layers of screens in order to select only Shariah-compliant stocks, the universe of potential candidates for the investor's portfolio is substantially reduced. Their reasoning follows the modern portfolio theory and concludes that as the pool of potential securities is reduced, the prospects of diversification grow smaller, and the systematic risk of the screened portfolio is not optimally diversified away. A handful of studies seem to support their conclusions.

Ahmad & Ibrahim (2002) conducted a comparative analysis of the performance of the Syariah Index and the Composite Index of the Kuala Lumpur Stock Exchange. They used several ratios such as the adjusted Sharpe ratio, Treynor ratio or the adjusted Jensen's alpha in order to measure risk-adjusted performance. Although their study was conducted over a three-year period and focused on Malaysia only, it can be concluded that the Syariah index underperformed its conventional counterpart. Indeed the Composite index earned a superior raw return as well as higher risk adjusted returns during the whole period. The Islamic index slightly overperformed and underperformed during the growing and declining phases respectively. However this difference is not significant from a statistical point of view. They attempt to rationalize such result by hypothesizing that "the value of stocks approved by the Syariah Committee might have not been acknowledged by market participants yet." (Ahmad & Ibrahim, 2002)

As I presented earlier, the study of Ahmad & Albaity (2008) concluded that, although not statistically significant, there was an underperformance of Islamic indices in comparison with their conservative equivalents.

Al-Shakfa & Lypny (2011) constructed equally-weighted portfolios of 5, 10, 20, 30, or 40 Shariah-compliant stocks and measured their risk. They then built a secular portfolio of the same number of stocks whose weights are found by maximizing the return for the same level of risk as the Islamic portfolio. They analyze the

performance of those paired portfolio for the 2000-2006 period and find that almost "three-quarters of the secular portfolios dominate their Islamic counterparts." (Al-Shakfa & Lypny, 2011, p. 105) From this conclusion they derive that the cost of observance, that is the cost of following Shariah principles fluctuates between 32 and 61 basis points per month. This is to be put in contrast with the conclusion of Guyot (2008) that finds that the cost of observance is null. They then monitor how the performance of those portfolios was impacted by the 2007-2009 crisis and conclude that Islamic portfolios slightly outperformed their counterparts during that period. Their conclusion of undeperformance of Islamic indices for the overall period still holds. Another interesting goal of their study was the analysis of the reliability of their forecasts. On that matter, the ratio of portfolios identified as outperformers during the first period over the number of ones that actually do outperform during crisis is widely different for secular and Islamic. The performance of secular is much more predictable than Islamic. They conclude that, according to them, "despite a shift in returns in favor of Islamic portfolios during the crisis, the fraction of secular portfolios outperforming in accordance with expectations far exceeds the fraction of Islamic portfolios doing so". (Al-Shakfa & Lypny, 2011, p. 108)

Cointegration

There is one final type of studies that has been the focus of a smattering of studies. As some authors have come to the conclusion that Shariah-compliant securities showed better resilience during crisis times, one can assume that they offer an opportunity for diversification. The diversification potential of Islamic stocks can be tested for through statistic tests and a handful of researchers have taken upon the objective of testing the hypothesis.

Hakim & Rashidian (2002) are among the first authors to tackle that issue. They test whether the DJIMI is cointegrated with the Wilshire 5000 index, an index constructed with the 5000 largest US capitalizations. One of their first observation is that, although it benefits from a much smaller assets universe, the DJIMI seems to be less risky that the W5000. This is confirmed by the Sharpe ratio. According to the authors, the risk performance of the Islamic index is relatively competitive. As far as the cointegration is concerned, there is no trace of any between the DJIMI and the W5000. Whereas the latter is strongly impacted by the 3-m TBill, the former is not.

They end up their analysis by focusing on the causality of the relationship. Although the developers of the DJIMI claim that it has a strong correlation with the market, Hakim & Rashidian (2002) reach the conclusion that this is not the case. The DJIMI is impacted by factors that are unrelated to the broad market or interest rates.

Coming back to the study conducted by Guyot (2008) on 10 geographically-focused indices of the Dow Jones family, he is eager to discover how the pairs of indices evolve in time in comparison to each other. He tests for cointegration and uncovers the fact that indices are not cointegrated. Although the pairs may behave similarly on short periods of time, the absence of similar fluctuations on longer periods suggest the existence of different external variables of influence.

This result is similar to the one reached by Kok et al. (2009). They tested for cointegration between the main Islamic, conventional and sustainable indices of the Dow Jones and FTSE families. The authors conclude that the FTSE index family is the only group that exhibits opportunities for diversification. On the other hand, the Dow Jones indices demonstrate cointegration.

Arouri et al. (2014) are among the first authors to test for cointegration with data coming from several families of indices. Indeed they search for cointegration and efficiency between pairs of indices of four different providers: Dow Jones, MSCI, FTSE, and S&P. Cointegration is examined through the Augmented Dickey-Fuller test and efficiency through the Lo and Mackinlay variance ratio test. They find that there is not any cointegration between the Islamic and the conventional indices for the Dow Jones and S&P families. These results confirm the ones of Girard (2008). On the other hand, the FTSE and MSCI indices are cointegrated and move together in the long term. The cointegration of the FTSE indices is interestingly contrasting with the results of Kok et al. (2009). The efficiency analysis concludes that both categories of indices have the same tendencies. That is they have the same level of (in)efficiency. Interestingly, they also discover that the indices with the higher level of efficiency (Dow Jones and S&P) are the ones that use market capitalization as denominator in the computation of financial ratios.

Risk sharing is one of the most important concepts behind Islamic finance. According to that principle, equity seems as a great alternative for investing. Arshad & Rizvi

(2014) set about to examine whether this investing style is more or less risky than others. They study the volatility and the correlation of Islamic indices with their conventional counterparts. They use four conventional and five Islamic indices of the Dow Jones family. The study of the correlations reveals that Islamic indices experience low correlations with the financial indices. These low correlations are even lessened during financial crisis. According to Arshad & Rizvi (2014), "Islamic equity indices provide not complete insulation but dampened negative effect (p.177) from financial turmoil.

Masih & Park (2015), in a similar fashion to Kok et al. (2009), set up to explore whether the Dow Jones Islamic Market Index represents an opportunity for diversification compared to some major indices. They start from the assumption that Islamic indices display a lower beta due to the exclusion of highly leveraged firms and are thus less risky than conventional indices. Their results show the absence of cointegration between the DJIM and the DAX, HnangSeng, and Kuala Lumpur Composite. That is a portfolio composed of both DJIM and one of those three indices would display diversification effect. On the other hand, the S&P and the DJIM are cointegrated and the influence of the S&P over the DJIM is strong.

Masih & Park (2015) are not the only one to find that there exist some cointegration between traditional and Islamic indices, Ahmad & Albaity (2008) test for similar behavior between the main Islamic index and its benchmark on Bursa Malaysia. The null hypothesis of the absence of cointegration is rejected and the two indices move together in the long-term. Furthermore they will influence one another, as causality is bidirectional.

Girard & Hassan (2008) conducted a thorough analysis of the FTSE Islamic indices. I presented the results of the performance earlier. As far as cointegration is concerned, the multivariate cointegration analysis allows them to conclude that Islamic indices and traditional indices of the FTSE family are integrated for the overall period.

Albaity & Mudor (2012) examine the behavior of four indices: the DJIMI, FTSE Bursa Malaysia Hijrah Shariah index, DJ Industrial Average (DJINA), and Kuala Lumpur Composite index (KLCI). Contrarily to what most researchers have so far focus on, Albaity & Mudor (2012) check for cointegration not between an Islamic and

a non-Islamic index but rather between Islamic indices on the one hand and between conventional indices on the other hand. As anticipated they find no cointegration between DJINA and KLCI. A reasonable result as KLCI is invested in almost only local Malaysian stocks. The causality is established to be from the DJ indices towards the KL indices. Once again, nothing unexpected as it is much more probable that securities from the DJ indices be included in the KL indices than the other way around. The authors conclude that investing in Islamic stocks does not offer any superiority other than the investor's peace of mind. However this study is rather slim in terms of data and its conclusions are to be taken with caution.

For the matter of performance, a pattern seems to emerge out of the conclusion of the different authors. The authors that concluded of a difference of performance between Islamic and conventional indices can be split within two distinct categories: those that concluded of a superior performance of Islamic funds in bull markets and an inferior performance in bear markets; and those that concluded the opposite. Interestingly, the studies of the first type were all conducted using data that included the 2000 dotcom crisis. Hussein (2004, 2005), Hussein & Omran (2005), and Hassan & Girard (2005) all reached that conclusion. The latter type of studies included much more recent data and focused on the 2008 subprime crisis. They were conducted by Alam & Rajjaque (2010), Lobe et al. (2012), and Ho et al. (2013). One of the conclusions that one can draw from such observation is that Islamic indices showed better resilience in crisis periods but this is only true for the 2008 crisis. To the best of my knowledge, there is no study focusing on such problematic. Some hypotheses that can be formulated are that the asset pool back in 2000 was probably not large enough to have diversification and to hold in the midst of the dotcom crisis. It is also possible that the Shariah screening process was too strict at the time and it limited the diversification required to hold up in tough times.

Part 3: Analysis

1. Research Objectives

As Muslims, and other investors, become more familiar with the different features of Islamic finance, investments in equity are on the rise. The demand for tools and performance indicators rises with them. Equity indices created by independent financial institutions help investors gain a better understanding of the performance of their investments. Indices also come handy in the computation of the increasingly demanded ETFs. Through this study, I aim at providing a thorough understanding of the risk and performance profile of Islamic Equity indices in periods of more favorable economic activity.

I wish to extend the scope of previous researches by using a much wider range of indices. With the exception of Girard & Hassan (2008) and a few others, most prior papers have often focused on a handful of indices and often with a global focus. The FTSE Global Islamic index or the Dow Jones Islamic Market index have been studied by several authors and now present little interest. This is the reason why I decided to focus my attention on the most recent data of the S&P Global BMI Shariah family. Due to the periodic revisions of securities compliance, using the most recent data is always valuable as the asset universe is highly likely to change from one month to the other. Thanks to data from 16 different country indices, the focus is kept on the global economy while enabling an in-depth analysis of countries discrepancies. Whereas previous studies often focused on a small number of performance and risk metrics such as Alpha, Beta, Sharpe ratio, or cumulative returns, modern statistical software will allow me to analyze several ratios that are often misrepresented in portfolio analysis such as the Information ratio or Sortino ratio.

These are among the reasons why I believe this study is valuable and in tune with its times.

2. Methodology

In order to draw sound conclusions about the performance and risk profiles of Islamic Equity indices, I will conduct a thorough analysis by using a wide range of metrics and ratios. I will now review those measures available in the PerformanceAnalytics package of the statistics software R.

2.1 Risk measures

Mean absolute deviation

The mean absolute deviation is calculated by taking the absolute value of all the distance between each return and the average return and dividing the total sum by the number of observations:

$$\text{Mean absolute deviation} = \frac{\sum_{i=1}^{n} |r_i - \bar{r}|}{n}$$

Variance

The variance is calculated by summing the squared deviations of all returns from the average return and by dividing the sum by the number of observations:

$$\text{Variance } \sigma^2 = \frac{\sum_{i=1}^{n} (r_i - \bar{r})^2}{n}$$

By squaring all the differences, it helps get rid of the negative signs but it makes it difficult to have sound resonance as it is not expressed in the same unit as the data.

Standard deviation

The standard deviation is a measure of variability and therefore of risk. It is calculated by taking the square root of the variance:

$$\text{Standard deviation } \sigma = \sqrt{\frac{\sum_{i=1}^{n} (r_i - \bar{r})^2}{n}}$$

Covariance

The covariance measures to what extent the portfolio/asset *i* and its benchmark move together. In the case of a positive covariance, the asset and its benchmark move in the same direction. If it is negative, they move in opposite directions. Finally, if the covariance is null, they are said have no relationship.

$$\text{Covariance} = \frac{\sum_{j=1}^{n}\left(r_{ij} - \overline{r_i}\right) \times \left(r_{Mj} - \overline{r_M}\right)}{n}$$

Correlation

The correlation standardizes the covariance by scaling it between -1 and +1. A correlation of +1 means that the asset and its benchmark move perfectly together.

$$\text{Correlation} = \frac{Covariance}{\sigma_i \times \sigma_M}$$

The correlation can also be expressed as the ratio between the systematic part of the risk – the part that cannot be diversified, and the total risk of the portfolio *i*.

$$\text{Correlation} = \frac{\beta_i \times \sigma_M}{\sigma_i}$$

2.2 Distribution

Skewness

It is highly unlikely that the distribution of the returns of an index will be normally distributed and therefore have a skewness equal to zero. Measuring the skewness of the distribution will reveal whether there exist more extreme values either on the right or the left tail. These distributions will be respectively positively or negatively skewed. It is basically a measure of the asymmetry of the distribution of the returns. Several measures of skewness exist:

$$\text{Fisher's skewness} = \sum \left(\frac{r_i - \bar{r}}{\sigma_P}\right)^3 \times \frac{1}{n}$$

$$\text{Sample skewness} = \sum \left(\frac{r_i - \bar{r}}{\sigma_{S\,p}}\right)^3 \times \frac{n}{(n-1) \times (n-2)}$$

Kurtosis

Kurtosis is used in order to gain a better understanding of the shape of the distribution of the returns. It will reveal whether the distribution is more peak-shaped rather than flat. A kurtosis higher than 3, which is the kurtosis of the normal distribution, is called leptokurtic and is synonym of a higher peak in the middle as well as thicker tails on the sides. On the other hand, if it is lower than 3, it is called platykurtic and it will be flatter with thinner tails.

$$\text{Pearson's kurtosis} = \sum \left(\frac{r_i - \bar{r}}{\sigma_P}\right)^4 \times \frac{1}{n}$$

Excess kurtosis is often used to facilitate the understanding of the measure:

$$\text{Excess kurtosis} = \sum \left(\frac{r_i - \bar{r}}{\sigma_P}\right)^4 \times \frac{1}{n} - 3$$

$$\text{Sample kurtosis} = \sum \left(\frac{r_i - \bar{r}}{\sigma_{S\,p}}\right)^4 \times \frac{n \times (n+1)}{(n-1) \times (n-2) \times (n-3)}$$

According to Bacon (2008), investors will seek securities whose returns present positive skewness and low kurtosis.

Skewness-Kurtosis ratio

The Skewness-Kurtosis ratio is merely the Skewness divided by the Kurtosis:

$$\text{Skewness-Kurtosis ratio} = \frac{S}{K}$$

This ratio is often used hand-in-hand with the Sharpe ratio in order to rank portfolios. Alternatively, the Adjusted Sharpe ratio automatically adjusts for Skewness and Kurtosis. The higher the ratio the more interesting the asset is for the investor.

2.3 Regression analysis

Beta

The beta of an asset illustrates the intrinsic risk of an asset, the part of risk that cannot be diversified away and is called the systematic risk. This is to be put in opposition with the unsystematic risk, or specific risk of an asset, that can be reduced by increasing the diversification of a portfolio. The beta measures the volatility of a security in comparison to the global market. That is, if an asset has a beta of 0.5, it will be twice less volatile than the market. When the latter will gain 10%, the security will only earn 5%. A beta smaller than 1 is therefore considered as being less risky as it is less subject to volatility than an asset with a beta superior to one. According to the Capital Asset Pricing Model, there exist a linear relation between an asset's returns and its beta. The more risky a security is, the greater its beta and the greater the expected return. One of the main critics of the beta is that it is based solely on historical data. The risk profile of the company may be much different today than it used to be during the last five years on which the beta was computed. This difference is not integrated into the beta and, therefore, it has little forecasting power. According to Ross (1993) merely a third of the scientific literature about the beta was able to find significant empirical relationships between the expected returns of a stock and its beta. Another concern is how the beta is computed: it is computed by regressing the excess returns of the asset against the excess returns of the market portfolio. But which benchmark is to be chosen as a market portfolio? There is not a single index that will correctly replicate the fluctuations of the market as a whole. Some alternatives to beta have been introduced. It is the case of the Fama-French (1992) model that uses two additional factors to describe stock returns. They realized that two types of stocks, namely small caps and value stocks, were able to outperform the market. They thus introduced the SMB (Small Minus Big caps) and HML (High Minus Low book-to-market ratio) to account for it. Although one can conclude that beta alone is not a good tool to anticipate the future returns of a security, it is still a valuable tool to compare how two portfolios relate together and to the whole market. Moreover, if the portfolio is well diversified, its beta is a valuable measure of risk.

Jensen's alpha

In his 1967 paper, Jensen focuses on the evaluation of the predictive ability of a funds manager. He is willing to discover whether it is possible to evaluate if the manager is capable of earning higher returns than what would be expected given the level of risk of its portfolio. The two previous measures that were presented, namely the Sharpe and Treynor ratio, were relative measures of risk: they would allow an investor to make up its mind by showing whether portfolio A was better than portfolio B or vice versa. Jensen's alpha is an absolute measure of performance. It is thus possible to evaluate the performance of a fund or an index according to an absolute standard and no longer in comparison to its peers. The model used by Jensen has its roots in the Capital Asset Pricing Model that Sharpe (1964) and Treynor (1965) previously helped build. Jensen develops the original equation of the CAPM to reach the equation:

$$r_i - r_F = \beta_i[r_M - r_F] + \varepsilon$$

This equation tells us that the risk premium realized on the portfolio j is a linear function of its systematic risk, the realized returns on the market portfolio, the risk free rate, and a random error. According to Jensen (1967), this equation can also be used to predict the systematic risk of any individual security or unmanaged portfolio. However when trying to evaluate actively managed portfolios, caution is required. Indeed if the manager is superior at forecasting, he will often select securities with a $\tilde{e}_{jt}$ superior to zero and his portfolio will realize a return larger than the "normal risk premium for its level of risk". (Jensen, 1967) The graphical materialization of such superiority is a regression that would not pass through the origin of the axis. Therefore, Jensen introduces a constant, called α, into the equation. This constant is the intercept of the regression equation of the CAPM and is the excess return adjusted for systematic risk (Bacon, 2008):

$$r_i - r_F = \alpha + \beta_i[r_M - r_F] + \varepsilon$$

The parameter α will symbolize the manager's ability to forecast stock prices or, more precisely, the average incremental rate of return that is due to such ability. If the manager possesses that ability, then α will be positive. However, the reason behind a positive alpha is not the sole manager's knowledge but can also stem from what Jensen calls a positive bias. Indeed as the estimates of α and β are interlinked, if the

estimated risk parameter $\hat{\beta}$ is unbiased then α will also be unbiased. However, if the manager possesses the ability to forecast securities movements, "α will be positive and the estimated risk parameter will be biased downward" (Jensen, 1967).

And in order to keep the regression line going through the point, alpha will be biased upward. So basically, the ability of a manager to forecast security movements or the undervaluation of the β_j will result in a positive α_j.

$$\alpha = r_i - r_F - \beta[r_M - r_F] + \varepsilon$$

Modified Jensen's alpha

The modified Jensen's alpha is rather similar to the Treynor ratio except that the numerator is not the excess return but rather the Jensen's alpha. It is then divided by the specific risk:

$$\text{Modified Jensen's alpha} = \frac{\alpha}{\beta}$$

Treynor ratio

Sharpe (1966) claims that, between 1954 and 1963, almost 90 percent of the variance of the funds that were present in his sample could be explained through its comovement with the Dow Jones industrial Average. The reasoning that motivated Treynor's choice to create a different ratio is in direct line with Sharpe's observation. Because of the strong relationship between the portfolios' returns and the market, the way the changes in the portfolios are impacted by the fluctuations of the market could be used as a proxy of the total variability of the portfolio. In order to capture this influence of the market returns on the portfolio returns, Treynor substitutes the standard deviation of the Share ratio by the portfolio's beta:

$$\text{Treynor} = \frac{r_i - r_F}{\beta_i}$$

This ratio is the excess return that the portfolio has earned relatively to the non-diversifiable, systematic risk that it is subject to. It is interesting to note that the Treynor ratio is only meaningful when used with portfolios that are relatively well

diversified. Because it only uses the beta in order to capture the risk, it will not capture "the portion of variability that is due to the lack of diversification" (Sharpe, 1966), or in other words, the unsystematic risk. Sharpe (1966) also tested whether the Treynor ratio had a better forecasting power than Sharpe ratio. Although the difference is not really significant, he finds out that, for a fund that was in the better performing half, the probability to remain in the same half is 12 to 5, whereas it was 11 to 6 with the Sharpe ratio. There is a possibility that, in the case of Islamic Equity Indices, the lack of diversification of the index due to the filtering process results in less meaningful Treynor ratios. However, as the this ratio has a better explanatory power than Sharpe's, its use is still relevant, as it will bring more practical soundness regarding future performance for investors willing to invest in IEIs.

An interesting development of the Treynor ratio is its relationship with the Sharpe ratio. For a portfolio that is perfectly diversified, it does not matter much which ratio is used, as they will land the same result. Indeed, the Treynor ratio only takes into account the systematic part of the risk. Sharpe focuses on the total risk, that is both the systematic and unsystematic aspect of risk. However, as the unsystematic part can be diversified away, a well-diversified portfolio would only be concerned with the systematic risk and both ratios would therefore land the same result. This can easily be proven mathematically:

$$TR = \frac{r_i - r_M}{\beta_i} = \frac{r_i - r_M}{\frac{\sigma_{i,M}}{\sigma_M^2}} = \frac{r_i - r_M}{\frac{\rho_{i,M}\sigma_i\sigma_M}{\sigma_M^2}} = \frac{\sigma_M}{\rho_{i,M}}\frac{r_i - r_M}{\sigma_i} = \frac{\sigma_M}{\rho_{i,M}}SR$$

We can conclude that if one wants two portfolio *i* and *j* to have the same Treynor and Sharpe ratio, then one needs the portfolio to have the same correlation with the market, that is their systematic risk.

Appraisal ratio

The appraisal ratio, also know as the alpha-to-alpha volatility ratio, is also highly similar to one of the ratio explained earlier, the Sharpe ratio. However, in the case of the Appraisal ratio, it is the Jensen's alpha that is divided by non-market risk – the residual risk:

$$\text{Appraisal ratio} = \frac{\alpha}{\sigma_\varepsilon}$$

Hecht (2014) provides a thorough explanation of the Appraisal ratio and of why its usage can be worthy of consideration – an opinion that is shared by Bacon (2008) as well. The ultimate goal of an investor is to improve its efficient frontier. In order to do so, an asset with a positive alpha is expected to receive more investment. However, this new investment shares common traits with the existing investments. What is interesting is its uniqueness, according to Hecht (2014), that is its alpha and its regression residual. Therefore, by measuring the alpha and the volatility of the regression residual, this ratio gives us the return per unit risk of the uniqueness of the investment. Simply put, it is the extra return that you gain divided by the extra risk that you take by investing in the evaluated asset. In a nutshell, any potential investment with a higher Appraisal ratio will help improve the Sharpe ratio of the global portfolio of an investor.

2.4 Sharpe

Sharpe ratio

According to the Capital Asset Pricing Model, ex post values of a portfolio's average rate of return and standard deviation should lie along a straight line. That is, a higher level of performance should lead to a higher level of risk. In its 1966 paper, Sharpe sets off to analyze the performance of a sample of 34 mutual funds. In order to investigate the funds that do not respect the CAPM law explained here above, Sharpe created a single measure of performance that he calls the reward-to-variability ratio. The numerator shows the difference between the portfolio's average annual return and the risk free rate, that is the reward to the risk. The denominator shows the standard deviation of the annual rate of return, that is the actual risk (Sharpe, 1966). It is basically the excess return that the portfolio has generated in comparison to the actual total risk that it has to bear. From a visual point of view, that is similar to dividing the distance between the return of the risk free asset and the return of the portfolio on the abscissa by the ordinate of the portfolio. In other words, if the abscissa axis symbolizes the average return and the ordinate axis stands for the variability, it is

equal to the cotangent created by the angle between the x axis and the line between the risk free asset and the portfolio. Therefore, the higher the Sharpe ratio is, the steeper is the slope and the better the ratio return-risk is.

$$\text{Sharpe} = \frac{r_i - r_F}{\sigma_i}$$

Sharpe (1966) also evaluates the forecasting power of its newly created ratio. He finds out that although its ratio does have some power to predict future performance, it is rather limited.

M^2 Measure

"The Sharpe ratio is sometimes erroneously described as a risk-adjusted return; actually it's a ratio." (Bacon, 2008, p. 67) Therefore, two portfolios with different characteristics may land the same Sharpe ratio. In order to compare two portfolios with different risk-return characteristics, the Modigliani-Modigliani measure gives us the return of the portfolio *i* if it had the same level of risk as the benchmark:

$$M^2 = r_F + \frac{\sigma_M}{\sigma_i} \times (r_i - r_F)$$

or,
$$M^2 = r_i + SR \times (\sigma_M - \sigma_i)$$

Naturally, this newly obtained risk-adjusted return can be compared to the actual return of the benchmark. This gives us the M^2 excess return:

$$M^2 \text{excess return} = M^2 - r_M$$

A positive M^2 excess return means that for a similar level of risk, the actively managed portfolio outperformed its benchmark.

Adjusted Sharpe ratio

The Adjusted Sharpe ratio uses the basic Sharpe ratio but adjusts it for skewness and kurtosis. It adds a penalty for excess kurtosis and negative skewness. As a reminder, negative skewness appears when the left tail is longer and means several small small

gains for a few important losses. Moreover, the mode is greater than the median or the mean. An excess kurtosis is synonym of a higher peak and fatter tails.

$$\text{Adjusted Sharpe} = SR \times \left[1 + \left(\frac{S}{6}\right) \times SR - \left(\frac{K-3}{24}\right) \times SR^2\right]$$

Value at Risk and Sharpe ratio

Value at Risk (VaR) answers the basic question that many investors ask themselves: What is the most I can lose with this investment? (Damodaran, 2015) The VaR tries to answer that question by giving the maximum possible loss of an asset over a week time (or else) at a 95% (or else) confidence interval. It is the exact opposite of the upside potential measure. This probability depends on the probability distribution of the risk. One easy way to do so would to assume that returns are normally distributed. However R allows us to use several methodologies such as the historical distribution, the Gaussian or the modified Cornish-Fisher expansion. Bacon (2008) explains us that, if we assume that returns are normally distributed, one simple way to compute VaR at a 95% confidence interval is:

$$\text{VaR} = \bar{r} - 1.65 \times \sigma$$

At a 99% interval:

$$\text{VaR} = \bar{r} - 2.33 \times \sigma$$

This VaR introduces the possibility of using a modified Sharpe ratio. Instead of using the portfolio risk as a denominator, the analyst can replace it by one of the many forms of VaR that are available. Bacon (2008) calls it the Reward to VaR ratio:

$$\text{Reward to VaR} = \frac{r_i - r_F}{\text{VaR}}$$

One of the issues that investors may face with the VaR is that it does not give any information about what the loss would be outside the confidence interval. Even though the probability is slim, cautious investors will be interested to learn more about the consequences of such event. That is where the Conditional VaR, also known as Tail VaR, comes in. It is the weighted average of the VaR and the expected losses

exceeding VaR (Uryasev, 2000). It is also commonly used instead of the VaR in the Reward to VaR ratio and is called Conditional Sharpe ratio:

$$\text{Conditional Sharpe ratio} = \frac{r_i - r_F}{\text{CVaR}}$$

2.5 Relative risk

Information ratio

Highly similar to the Sharpe ratio, the Information ratio puts in relationship the excess return of a portfolio over a benchmark index with the standard deviation of the excess return (and not the standard deviation of the return of the portfolio, as it was the case with Sharpe). The standard deviation of the excess return is also called the tracking error. This similarity with Sharpe causes it to be often called modified Sharpe ratio. All the measures have to be taken on an annual basis. From a graphical point of view, it is the gradient of the line that originates from the origin, where the benchmark lies. It is among the most used ratios in order to evaluate indices or trackers.

2.6 Downside risk

Downside risk

The downside risk, also called semi-standard deviation, is concerned with the negative variability of a portfolio. It can be translated as the probability that the return of an investment will decrease and is the variability that in which investors are really interested. All returns that are under a set threshold are accounted for while those above are computed as zero. The threshold, or minimum acceptable rate, is set by the investor.

$$\text{Downside risk} = \sqrt{\sum_{j=1}^{n} \frac{min\left[\left(r_j - MAR\right), 0\right]^2}{n}}$$

Upside risk

In opposition with the downside risk is the upside risk and shows the potential of an investment.

$$\text{Upside risk} = \sqrt{\sum_{j=1}^{n} \frac{max\left[\left(r_j - MAR\right), 0\right]^2}{n}}$$

Sortino ratio

Sortino introduced a ratio that, while similar to the Sharpe ratio, only uses the downside risk as a measure of risk. Since the downside risk is the one that is relevant for investors, it is sound to use it in order to evaluate the risk-adjusted performance of a portfolio. According to Scherer (2009), it may yet help investors assess the riskiness of an investment in a better way than the Sharpe ratio as it is known to better capture risk for non-normally distributed returns.

$$\text{Sortino ratio} = \frac{r_i - r_T}{\sigma_D}$$

Omega

The Omega ratio illustrates the relationship between expected returns and expected losses. It is calculated by dividing the average of the sum of the returns that exceed a certain threshold, the upside potential, by the average of the sum of the returns that fall short of the same threshold, the downside potential.

$$\text{Omega} = \frac{\frac{1}{n} \times \sum_{j=1}^{n} \max[\left(r_j - MAR\right), 0]}{\frac{1}{n} \times \sum_{j=1}^{n} \max[\left(MAR - r_j\right), 0]}$$

It measures the likeliness that the MAR will be beaten by the return of the asset. Because it uses historical data, the Omega automatically corrects for skewness and kurtosis and is thus a better ratio than those assuming normally distributed returns.

2.7 Cointegration

Cointegration is a characteristic of times series whereby the residuals of the model linking the two variables, the error correction term, is said to be stationary. Testing for cointegration is used to determine whether two times series, in this case two equity indices, display a long-term relationship. A compelling example, provided by Chen (2011), is the one of a dog and its owner randomly walking in a street. Even though they will not follow the same path, it is highly likely that their ways will cross several times and that they are moving towards the same direction. Their paths are cointegrated. When testing two time series for cointegration, one assumes that if none of the two series fluctuates around one value, it is likely that some combination of the two does. The process is thus to test whether they hang around one value, then whether such a combination of the two does.

The first step consists of testing whether the time series is stationary. To be stationary for a time series means that it does not have a unit root and that its mean and variance do not vary over time. This type of time series is referred to as I(0). When testing two or more time series for cointegration it only takes one time series to be I(0) in order to conclude the absence of cointegration. This is determined by applying a unit root test such as the Augmented Dickey Fuller individually to each time series. It is a hypothesis test where the null hypothesis is that the time series has a unit root. If the probability is low enough, then one can reject the null hypothesis, the series is stationary, it does not have a unit root and can therefore not be cointegrated with another one. In order to determine the appropriate number of lags that is desirable, Brooks (2014) tells us that for monthly data, twelve lags are appropriate: for quarterly data, it is four. In this analysis, as the data used is taken on a daily basis, we set the number of lag to 23, the maximum authorized by the software. If the probability is above the 5% confidence interval, one has to test whether the series becomes stationary when differentiated by applying the unit root test in 1^{st} difference. If the probability is below the 5% level, then the null hypothesis is rejected and the variables are said to be I(1). Once the times series have been tested for unit root and have been determined to be stationary in 1^{st} difference, the second step, the actual test of cointegration can start. Doing so is synonym of testing whether the residual is

stationary. According to Engle & Granger (1987), if two variables are I(1), they satisfy the following equation:

$$x_{1t} = \delta_1 + \delta_2 x_{2t} + u_t$$

The term u_t is the residual that will be tested for stationarity. It can be estimated through the Ordinary Least Square method applied to the regression model here above. Once the Error Correction Term, or residual has been obtained, it is tested for a unit root through the ADF test used earlier on the individual variables. If the null hypothesis of the existence of a unit root is rejected then the residual is stationary and the two time series are said to be cointegrated. In a nutshell, two series are cointegrated if a combination of the two variables has a lower order of integration than each individually.

One of the main critics that has been thrown at the Dickey-Fuller tests is that they have low power when they conclude of the stationarity of the time series although the root is close from the non-stationarity limit. This is the reason why stationary tests, such as the Kwaitkowski test, whose null hypothesis is the stationarity of the data, are often used. Another valuable methodology in order to test for cointegration is the Johansen method. Although these two methodologies are worth considering when testing for cointegration and can be used together, they each have their own characteristics. One of the main drawbacks of the Engle-Granger setup is that it does not allow performing hypothesis testing about the cointegrating relationship. Johansen solves this issue by authorizing to "test a hypothesis about one or more coefficients in the cointegrating relationship" (Brooks, 2014). Another limitation of the Engle-Granger methodology is that it does not allow for more than one cointegrating relation. Finally, the EG test is a two-step approach to the cointegration testing. If errors are made in the regression to estimate the residuals, these errors will also appear in the unit root test. Johansen avoids this two-step procedure and thus reduces the risk of a mistake.

Although testing for cointegration may seem to be a lengthy process, it is highly valuable to determine whether a stock, or an index, offers an opportunity for diversification in comparison to its benchmark. One may wonder whether using the R-squared statistic is enough to determine the existence of a relationship between two

variables. The phenomenon of spurious regression allows us to answer negatively to that question. Simply put, it appears when two non-stationary series appear to move together and will therefore return a strong R-squared value although they are completely independent.

3. Data

Availability of data has been an important decision factor in my choice of working with the S&P Shariah family. Data had to be easily retrievable, it had to be accurate, and it needed to come with enough information to be able to conduct a due diligence process in order to assess how indices were computed, what filters were used, and who decided on them. Therefore I knew I wanted to work with one of the four main indices providers that are Dow Jones, MSCI, FTSE, or S&P. S&P had the most exhaustive offer in terms of indices as it offered more than twice the number of indices than its closest rival. Aside from sector-focused indices, they offered indices covering more than 50 regions or countries. The fact that all these indices originate from the same family guarantees that they were constructed following the same methodology. Typically analysts start from the conventional country index and review each stock in order to establish its permissiveness. Once they have applied the different filters and eliminated non-compliant stocks, they are left with a list of stocks generally equal to more or less 60% of the original index. Obviously this percentage may vary according to countries. Since all Islamic indices were computed starting from their conventional counterpart, its existence is guaranteed and it allows for the painless creation of suitable pairs for comparison. It is also important to note that, although all indices are not created according to the same weighting methodology, all pairs do respect this principle of weighting equivalence. Most of the indices are built according to a base-weighted aggregate methodology. “This means the level of an index reflects the total float-adjusted market value of all of the component stocks relative to a particular base period.” (S&P, 2015)

The S&P index family uses market capitalization as a denominator in all its ratios, which allows the Shariah board is able to review the eligibility of the stocks on a

regular basis, namely every month. Additions and deletions are made accordingly. For each index, both total returns and price returns are available. A total return index is an index that, in addition to tracking the price fluctuations of a stock, also presumes that any dividend or other cash distribution such as interest or rights offerings are reinvested back into the index. According to Investopedia (n.d.), "looking at an index's total return displays a more accurate representation of the index's performance." The reasoning behind that is that, if a stock issues dividends, the stock movements will not account for it and it will not be taken into account by a price index. By using total return indices I overcome this shortcoming.

I decided to focus my research on the aforementioned 50 country or regional indices. After cleaning the data for missing input and non-equivalence in dates, there were 16 pairs of indices left.

Table 1: Pairs of Islamic and Conventional indices

	Country	Ticker	Islamic Index	Ticker	Conventional Index
1	**Global**	SPSHXT	S&P 500 Shariah USD TR	SPXT	S&P 500 TR
2	**Asia-Pacific**	SPSHAPDT	S&P Asia Pacific Shariah USD TR	STBMAPU	Asia Pacific BMI TR Index
3	**Belgium**	SPSHBEUT	Belgium BMI Shariah TR USD	STBCBEU	Belgium BMI TR USD
4	**Brazil**	SPSHBRUT	Brazil BMI Shariah TR USD	SBBCBRUT	Brazil BMI TR USD
5	**China**	SPSHCNUT	China BMI Shariah TR USD	STBCCNU	China BMI TR USD
6	**Developed**	SPSHLCUT	Developed Large Cap Shariah TR USD	STBMWDU	Developed BMI USD TR
7	**Developed**	SPSHSCUT	Developed Small Cap Shariah TR USD	STBMWDU	Developed BMI USD TR
8	**Emerging**	SPSHEKUP	Emerging Markets Shariah TR USD	STBMEMU	Emerging BMI USD TR
9	**Europe**	SPSHEU	Europe 350 Shariah Index USD	SPEUROU	Europe 350 in USD

66.

10	**France**	SPSHFRUT	France BMI Shariah TR USD	STBCFRU	France BMI TR
11	**Germany**	SPSHDEUT	Germany BMI Shariah TR USD	STBCGYU	Germany BMI TR
12	**Japan**	SPSHJPUT	Japan BMI Shariah TR USD	STBCJAU	Japan BMI TR Index
13	**North America**	SPSHNADP	North America Shariah USD	SBBMNAU	North America BMI Index
14	**South Korea**	SPSHKRUT	South Korea BMI Shariah TR USD	STBCSKU	South Korea BMI TR
15	**United Kingdom**	SPSHUKUT	UK BMI Shariah TR USD	STBCUKU	United King BMI TR
16	**United States**	SPSHUSUT	United States BMI Sharaih TR USD	STBCUSU	USUS BMI USD TR

The reasoning behind my decision is that I wish to cover a wide range of economic areas in order to smoothen the eventual consequences of seasonality and/or punctual economic events. The daily total returns of all the stocks, both the conventional and its Islamic counterparts, were retrieved through Bloomberg for the past 6 years, starting in July 2009. That leaves us with 1561 observations for each index.

The benchmark that is employed is the S&P Global BMI TR (ticker: STBMGLU). The S&P Global BMI comprises two sub-indices that are the S&P Emerging BMI and the S&P developed BMI and covers the stock market performance of all stocks with float-adjusted capitalization of at least $100 million and that are traded for at least half of that annually. It comprises more than 11,000 stocks from 46 different countries.

4. Results

The daily closing prices of all indices were extracted form Bloomberg. Daily returns were then computed in Excel and then exported into R and converted into time series in order to enable the analysis. A short version of the results is presented in the table below. All the p-values are computed under the null hypothesis that the variance, beta, and Sharpe ratio of the Shariah index and the regular index are equal.

Table 2: Overview of the results

	SHA500	REG500	SHAASPAC	REGASPAC	SHABEL	REGBEL	SHABRA	REGBRA
Annualized Return: Geometric mean	15,85%	16,94%	8,26%	8,84%	6,57%	14,13%	-3,50%	-3,09%
Variance	0,0092%	0,0099%	0,0103%	0,0098%	0,0195%	0,0189%	0,0282%	0,0288%
p-value	6,98%		18,62%		24,48%		34,42%	
Volatility (%)	15,22%	15,82%	16,09%	15,73%	22,18%	21,81%	26,67%	26,94%
Beta	0,929	0,969	0,585	0,558	1,267	1,266	1,337	1,328
p-value	0,16%		27,67%		96,01%		79,83%	
Daily Jensen's Alpha (arith/arith) (%)	0,015%	0,017%	0,007%	0,010%	-0,029%	-0,002%	-0,067%	-0,064%
Treynor ratio	0,17	0,17	0,14	0,16	0,05	0,11	-0,03	-0,02
Sharpe ratio	0,066	0,067	0,036	0,039	0,025	0,045	0,000	0,001
p-value	93,69%		90,25%		37,57%		97,47%	
Omega	1,15	1,16	1,06	1,06	1,04	1,10	0,97	0,98

	SHACHI	REGCHI	SHAEME	REGEME	SHAEUR	REGEUR	SHAFRA	REGFRA
Annualised Return: Geometric mean	11,56%	8,94%	4,91%	6,95%	7,69%	5,92%	9,38%	8,13%
Variance	0,0138%	0,0157%	0,0087%	0,0094%	0,0139%	0,0174%	0,0201%	0,0244%
p-value	0,44%		5,22%		0,00%		0,01%	
Volatility (%)	18,65%	19,92%	14,80%	15,42%	18,75%	20,95%	22,50%	24,79%
Beta	0,733	0,735	0,832	0,884	1,145	1,304	1,318	1,520
p-value	92,91%		0,13%		0,00%		0,00%	
Daily Jensen's Alpha (arith/arith) (%)	0,013%	0,005%	-0,018%	-0,013%	-0,022%	-0,035%	-0,020%	-0,033%
Treynor ratio	0,16	0,12	0,06	0,08	0,07	0,05	0,07	0,05
Sharpe ratio	0,043	0,033	0,025	0,032	0,031	0,024	0,032	0,028
p-value	67,75%		76,30%		75,25%		83,31%	
Omega	1,08	1,06	1,02	1,04	1,05	1,03	1,06	1,05

	SHAGER	REGGER	SHAJAP	REGJAP	SHADVL	REGDVL	SHADVS	REGDVS
Annualised Return: Geometric mean	11,16%	10,43%	8,59%	7,63%	12,80%	12,95%	15,83%	12,95%
Variance	0,0220%	0,0234%	0,0124%	0,0135%	0,0075%	0,0082%	0,0106%	0,0082%
p-value	11,41%		5,08%		3,93%		0,00%	
Volatility (%)	23,54%	24,27%	17,67%	18,42%	13,78%	14,40%	16,36%	14,40%
Beta	1,394	1,483	0,334	0,349	0,955	1,015	1,106	1,015
p-value	0,01%		62,37%		0,00%		0,00%	
Daily Jensen's Alpha (arith/arith) (%)	-0,017%	-0,023%	0,022%	0,018%	0,004%	0,002%	0,008%	0,002%
Treynor ratio	0,08	0,07	0,26	0,22	0,13	0,13	0,14	0,13
Sharpe ratio	0,036	0,033	0,035	0,031	0,059	0,058	0,062	0,058
p-value	91,68%		85,51%		94,96%		87,25%	
Omega	1,07	1,07	1,06	1,05	1,12	1,12	1,14	1,12

	SHANAM	REGNAM	SHAROK	REGROK	SHAUK	REGUK	SHAUS	REGUS
Annualised Return: Geometric mean	12,86%	13,61%	12,97%	10,53%	9,61%	10,94%	15,71%	16,62%
Variance	0,0096%	0,0101%	0,0236%	0,0203%	0,0149%	0,0141%	0,0096%	0,0103%
p-value	16,59%		0,17%		15,53%		7,20%	
Volatility (%)	15,56%	15,95%	24,37%	22,62%	19,36%	18,86%	15,54%	16,13%
Beta	0,988	1,019	0,746	0,731	1,155	1,149	0,970	1,010
p-value	1,16%		69,37%		72,90%		0,23%	
Daily Jensen's Alpha (arith/arith) (%)	0,003%	0,005%	0,023%	0,013%	-0,014%	-0,009%	0,014%	0,016%
Treynor ratio	0,13	0,13	0,17	0,14	0,08	0,09	0,16	0,16
Sharpe ratio	0,054	0,055	0,039	0,035	0,036	0,040	0,064	0,065
p-value	94,79%		86,15%		83,10%		95,58%	
Omega	1,11	1,12	1,08	1,07	1,07	1,08	1,15	1,15

4.1 Returns

The average daily return, the annualized return as well as the global return over the 6-year period of study were computed using both the geometric and arithmetic methodologies. A first examination of the results presented in Appendices 4 and 5, reveals that all indices but one have earned a positive return over the time frame.

Brazil being the exception with a annualized geometric return of -3.50% and -3.09% for the Islamic and Regular indices respectively.

However, as economic activity and stock markets have been experiencing an upward trend in the recent years, earning a positive return does not carry much information about the performance of the index. When the global returns of the indices are examined in light with those of the benchmark, the S&P Global BMI TR, few bear the comparison. The returns of the benchmark range between 12.29% and 12.85% on an annualized basis varying according to the number of observations. For Islamic indices, returns vary from as low as -3.50%, for Brazil, up to 15,85% for the S&P 500. As far as the Regular indices are concerned, annualized returns fluctuate from -3.09% to 16.94%. Overall only 10 indices, 5 from each category, have earned a higher return than the benchmark. Furthermore, it is mostly regional indices covering areas such as North America or Developed economies that succeed in beating their benchmark. The top three performers for each categories were the S&P 500, Developed Small Cap and US for the Islamic indices and the S&P500, the US and Belgium for the Regular indices. This evidence seems to indicate that, with the exception of Belgium, the lack of diversification of national indices limits their earnings. In order to test for the strength of those observations, hypotheses testing has been conducted using Welch's t-test for unequal variances. P-values returned by those tests are rather large and therefore none of these differences are important enough to be significant from a statistical point of view. The testing results are presented in Appendix 6. Another interesting use of the returns is to analyze whether the Shariah index was able to better perform than its conventional counterpart. Interestingly enough, the regular index earned larger returns in barely more than half of the case. It leaves us with a total of 7 Islamic indices, namely in China, Europe, France, Germany, Japan, Developed Small Cap, and South Korea, beating their equivalent. Once again, these differences were not statistically significant.

In light of those primary results, the positive viewpoint, the rationale that the exclusion of unlawful securities does not harm the Muslim investor, which was supported by Ahmad & Albaity (2008), Lean & Parsava (2012), and Ho et al. (2013), seems to also be favored by these first evidences.

4.2 Risks

Commonly employed measures of risk include standard deviation, volatility, variance, and M^2 Measure. All of them were computed using both Excel and R and landed similar results. These are presented in Appendix 7 and 8. In terms of standard deviation, all indices with the exception of the Developed Large Cap Shariah present a larger risk than the benchmark. This result was to be expected as the limited diversification of our indices makes them highly vulnerable to seasonality or sudden variations. If we compare between the two members of a same index family, standard deviation are highly similar because they are expressed on a daily basis and are therefore rather small. However a deeper look reveals that more than half of the Islamic indices have a smaller standard deviation than their conventional counterpart. Quite logically this result is confirmed when looking at the volatility, that is the annualized standard deviation. Only the Asia-Pacific, Belgium, Developed Small Cap, South Korea, and UK are less risky than their Islamic equivalent. In order to validate this conclusion from a statistical point of view, F-tests for differences among sample variance were used. Although these tests assume that the populations have a normal distribution, which is not true for the returns of the indices, they are still valuable thanks to the asymptotic theory. Therefore they are worthy in order to grasp the magnitude of these differences of risk and can be consulted in Appendix 9. The null hypothesis of the equality of the variances is rejected at the 5% interval for five indices. The regular Developed Small Cap and South Korea indices, for which a lower volatility had been observed, present a significantly lower variance than their Islamic equivalent. On the other hand, the China, Developed Large Cap and Europe Islamic indices own a significantly lower variance than the conventional indices. In the spirit of the modern portfolio theory, the Develop Small Cap Shariah, which is more risky than its counterpart, is compensated with the second highest returns whereas the South Korea fails to do so. The South Korea Shariah index is therefore highly risky and earns a low return, a daunting prospect for potential investors.

The M^2 Measure gives us the return of the index if it were to have the same level of risk as the benchmark; it is useful to compare the performance of two indices presenting different risk-return characteristics. With regards to that, only 8 indices of the 32 of our sample display a positive excess M^2 and, thus, outperform the

benchmark for a similar level of risk. These are the two indices from the S&P 500, Developed Large Cap, Developed Small Cap, and United States. As far as the comparison between indices is concerned, results are fairly similar to those of the returns and the 7 Islamic indices that earned a higher return also display a higher M^2 Measure. However, interestingly enough, the Developed Large Cap index that earned a higher return than its Islamic equivalent now unveils an inferior M^2 Measure. That means that, if it were not for its superior level of risk, the Developed Large Cap index would not have performed better than the Islamic index and, in terms of pure performance, the wise investor is better off with the Islamic index.

4.3 Distribution

In terms of skewness, most indices, including the benchmark, are negatively skewed: the only exception being France indices. They all present a thicker left tail and are not highly desired by investors. As one can see in Appendix 10, the kurtosis of the indices is rather diversified with 18 indices presenting a kurtosis higher than 3 and 14 of them displaying a number lower than 3. When compared together, skewness and kurtosis give us the Skewness-kurtosis ratio. Obviously this ratio is negative for all but France. In the case of a negative skewness, the investor want to have returns concentrated near the mean and thus a high kurtosis. With this in mind, one can conclude that Regular indices have a much better distribution than Islamic indices as 13 of them have a superior Skewness-kurtosis ratio. This measure will be added to the Adjusted Sharpe ratio to account for the non-normality of the returns.

4.4 CAPM

As illustrated with the M^2 Measure presented above, the risk level of an index will have an impact on its performance. Therefore, in order to assess the real performance of an asset it is customary to compute risk-adjusted metrics and ratio. The CAPM model was used with the S&P Global BMI as the market portfolio and the one-month Treasury bill return as the risk free asset.

As proven through hypothesis testing available in Appendices 11 and 12, all assets have a beta significantly larger than zero. That means that all indices are influenced to different extents by the fluctuations of the market as a whole. The less impacted indices, which are Asia-Pacific and South Korea, with a beta close or inferior to 0.5, are interestingly the most geographically isolated ones from the rest of the indices. On the other hand, approximately half of the indices have a beta superior to one indicating a higher systematic risk. These differences are all significant with the exception of SHANAM, REGNAM, and REGUS. Among those having a beta significantly superior to one, 7 Islamic indices and 8 Regular ones can be found. That leaves us with 9 Islamic indices having a beta significantly lower than one. This is tends to confirm the more conservative approach of Islamic finance and provides evidence that by excluding unlawful companies, Islamic indices are less volatile than the overall market. This is supported by the fact that, when compared between the two indices of each family, the beta of the Islamic index is lower than the one of the conventional in ten cases out of sixteen. It is even more illustrative that in 8 of those 10 pairs of indices this difference is significant from a statistical point of view. One could expect those Islamic stocks to offer inferior returns but it is not the case in half the cases: China, Europe, France, Germany, and Japan all offer higher returns than the conventional index while displaying a lower beta. This superior performance despite a higher systematic risk is due to the other measure that stems directly from the CAPM model: the Jensen's alpha. A positive alpha shows the capacity of an index to systematically outperform its benchmark. Eighteen indices display a positive alpha and therefore earn higher returns than what could be expected from their systematic risk. As an example, the S&P500, both Islamic and regular indices, exhibit a beta lower than one but still earn higher returns than the benchmark. Unsurprisingly, these indices are the ones with the higher alpha. But this is also the case for four other Islamic indices: the Developed Large Cap, North America, South Korea, and United States. However this conclusion is to be considered with caution, as none of these positive alphas are large enough from a statistical point of view. Contrarily, there are 14 indices that systematically underperform their benchmark. For 4 of them, namely SHABRA, REGBRA, REGFRA, and REGEUR, this low alpha is statistically significant at a 10% confidence interval. A helpful way to integrate those two metrics that are the alpha and the beta is the modified Jensen's alpha, the ratio of the alpha

over the beta. All the indices with a positive alpha logically have a positive adjusted alpha. However, as both parameters vary between indices it is difficult to conclude whether a higher adjusted alpha is the consequence of a higher alpha or a lower beta. As an illustration, REGUS and REGASPAC display fairly similar adjusted alpha: 0,04 and 0,047. However, their beta and alpha are respectively 1,01 and 0,558, and 3,95% and 2,64%.

Another measure derived from the CAPM is the Treynor ratio: the excess return that the index has earned relatively to the systematic risk that it is subject to. It is logical to expect return to increase as the systematic risk of the index increases. With regards to that, all indices but SHABRA and REGBRA, whom are the only indices to have earned a negative return over the six-year period, display a positive Treynor ratio. One of the reasons for these positive results is the abnormally low return of risk free assets over the 2009-2015 period. This results in higher excess returns and thus higher Treynor ratio. Nine Islamic indices have a higher Treynor ratio than their counterparts. Japanese indices have the highest of all and this is mostly due to their abnormally low systematic risk rather than their excess return.

The last measure issued from the CAPM is the Appraisal ratio. This ratio considers the uniqueness of the investment and how well it could improve the efficient frontier of the portfolio holder. It is better suited for actively managed portfolio as it evaluates the manager's ability to pick stocks. However, it is interesting to see that 14 indices have a negative Appraisal ratio and therefore would not improve the performance of the investor's portfolio. Unsurprisingly, well-diversified indices such as the S&P500 or the Developed Large Cap have a high Appraisal ratio due to their low unsystematic risk. Among the 9 pairs of indices displaying a positive Appraisal ratio, only 4 Islamic indices beat their conventional counterpart. Here, the lack of diversification and thus their higher unsystematic risk may be hurting them.

4.5 Sharpe

The Sharpe ratio is also derived from the Capital Asset Pricing Model but as it is one of the most commonly used ratio, an entire section is dedicated to it. It expresses the excess return of the index in comparison with its standard deviation, its total risk. We

start by testing whether indices have a Sharpe ratio that is actually significantly different from zero. The results, shown in Appendices 13 and 14, are quite disappointing as the null hypothesis of a Sharpe ratio equal to zero is rejected in 10 cases at the 5% level and in two more cases if we extend this level to 10%. Among those there are 6 regular indices and 6 Islamic indices. A comparison of the indices within the 16 pairs reveals mixed results. There are exactly 8 Islamic indices that perform better in terms of risk-adjusted performance for 8 that perform worse. Furthermore, this difference is never statistically significant as one can see in Table 2. It does not help us concluding much regarding their superiority or inferiority. The Sharpe ratio of the benchmark index is also different from zero at the 5% confidence interval. Although it may not be considered different from zero, the Sharpe ratio of an index can still be labeled as different from the Sharpe ratio of the benchmark, in a negative way obviously. Most of the indices are in that situation, 24 of them exactly. Among those indices that have a smaller Sharpe ratio than the benchmark, SHABRA, REGBRA, and REGEUR are significantly inferior at the 5% confidence level and two more, SHAEME and SHAEUR at the 10% level. Out of the eight indices that own a Sharpe ratio higher than the one of the S&P Global BMI, none of them is important enough to be significant even at large confidence interval. Similarly to the Adjusted Jensen's alpha or the Treynor ratio, it is difficult to blame either low excess returns or a high standard deviation and indices with diametrically different parameters may land a similar Sharpe ratio. However, Sharpe ratio helps assessing whether the return of the index is due to good performance or to an excessive level of risk. If one takes a deeper look at some indices that performed well, e.g. SHAFRA, SHAGER, REGGER, or SHAROK, one can see that their Sharpe ratio are among the lowest of all. The reason behind this is an important standard deviation and the important returns earned by those indices are, thus, simply a reward to the risks taken.

One of the main critics of the Sharpe ratio is that it is only meaningful if the returns of the index are normally distributed. In order to compensate for non-normality, other metrics can be used. These are the Sharpe ratio using Value at Risk or the Adjusted Sharpe ratio. The former uses the VaR as a denominator rather than the standard deviation of the asset, and the latter is a rather different formula that compensates for kurtosis and skewness. It adds a penalty for excess kurtosis and negative skewness. It

makes it a worthy measure when returns are not normally distributed. The different forms of Sharpe ratio as well as the Adjusted Sharpe ratio were computed through R.

Three different methodologies are available when computing the VaR or the CVaR (called ES in R): Gaussian, historical, and modified. As the Gaussian methodology uses parametric estimates, it is better adapted for limited data sets. In this situation here, with six years of daily data, historical and modified are better suited. A rapid look at the worst potential (at a 99% confidence interval) daily loss reveals that Islamic indices are much safer than their regular equivalents. Indeed 9 Islamic indices have a lower VaR than their regular index and 6 of them share the same VaR. Only the South Korean Shariah index is most likely to lose 0.1% in comparison. When the tails outside the confidence interval are considered, we obtain the CVaR and the results are somewhat similar. In this scenario, 10 Islamic indices have a smaller potential daily loss, another illustration of their more conservative nature. In absolute terms, the better performing indices are the ones that are the most diversified. The Developed Large Cap shows the most resilience, as it is the best performer in both its Shariah and Regular version for the two measures. Interestingly in the case of CVaR, the benchmark is only beaten by Islamic indices. As far as the VaR is concerned, a similar conclusion is drawn and the only way to beat the benchmark is through investing in the SHADVL. These two metrics can be used to modify the Sharpe ratio by replacing the total risk as a denominator. The ratio computed using the VaR is smaller than the one obtained using the StDev; this is logical as we now consider the worst-case scenario. Including the tails increases the denominator and reduces once again the Sharpe ratio. In terms of Sharpe ratio modified for the VaR, we now have 11 Islamic indices that perform better. However, only 9 had a smaller VaR than their counterpart. This difference of 2 indices is explained by the SHAROK, whose returns are so much larger than the REGROK that it was able to overcome its inferiority in terms of VaR. A similar situation is observed for the China and the Developed Small Cap indices. Using the CVaR as a denominator, the opposite trend is observed. Where as 10 Islamic indices had a smaller CVaR, only 8 are able to leverage it and display a higher Sharpe ratio. The lower returns of the SHACHI and the SHAEME are disastrous for its CVaR- Sharpe ratio and they lose their edge.

In terms of the Adjusted Sharpe ratio, that penalizes excess kurtosis and negative skewness, the same order of magnitude is kept in comparison with the Sharpe ratio for all but 3 pairs of indices. In the cases of the 500, South Korea and the US, whereas the Sharpe ratio of the Islamic index was smaller, the adjusted version is now larger. It reveals that the return distribution of the Islamic index is less subject to excess kurtosis and negative skewness: characteristics that are not desired by investors. We now have 11 Islamic that perform better than their counterparts.

4.6 Relative risk

Similar to the Sharpe ratio, the information ratio uses the excess return of the index over the benchmark instead of the risk free rate. As most indices did not manage to beat the benchmark, it is expected to have a majority of negative information ratio. As presented in Appendix 15, it is the case with 20 indices displaying an information ratio below zero. With regards to Islamic indices, 10 of them have performed worse than the benchmark and thus earn a negative ratio, whereas 6 earn a positive one. When one compares the performance of Islamic indices to the one of regular ones, it can be concluded that the former display a higher IR than the latter in 7 cases. However, in only 2 of these 7 cases, the IR was actually positive. As it is highly similar to the SR, it is not surprising to see that all in all 7 cases, the Islamic was also beating its equivalent with regards to the Sharpe ratio. The case of the Developed Large Cap is slightly different. Although the SHADVL had a larger SR, it now displays a smaller information ratio. The latter has strong signification as it indicates persistence in the performance. According to Grinold and Kahn (1995), an information ratio of 1 is labeled as exceptional and 0.5 is good. This is for actively managed portfolio so it is not expected to find ratios of such magnitude in our dataset. However, five indices, including one Islamic, earn an information ratio superior to 0.5. The best performing index is actually the SHADVS with an IR of 0.7. However, according to another author, Kidd (2011), it is commonly accepted that any portfolio or index with an IR above 0.2 or 0.3 for an extended period of time is considered as superior. According to that criteria, we now have 7 indices, including 3 Islamic ones, that display a superior performance.

4.7 Downside risk

The Downside risk is the one that, ultimately, will catch the eye of the potential investor. It is only concerned with the negative side of the returns and is used to compute several metrics such as the downside risk, the upside potential, the Sortino ratio or the Omega, all displayed in Appendices 16 and 17. In terms of downside risk, as the data used is on a daily basis, an analysis of the downside volatility will be more meaningful. It results that, with the exception of SHADVL, all indices display higher downside volatility than the benchmark. By investing in assets such as the Brazilian, French or even German indices, the investor stands to lose up to 15% of its investment. A noticeable trend is the superior performance of Islamic indices in terms of downside risk. Out of the 16 pairs of indices, 11 Islamic outperform their regular equivalent. This is, once again, an illustration of the more conservative mindset of Islamic investing as well as its better resilience through crisis, as previously shown by Alam & Rajjaque (2010), Lobe et al. (2012), and Ho et al. (2013).

This downside risk is to be put in perspective with the upside potential. Some might find it appropriate to invest in an asset displaying a large downside risk given its large upside potential. In order to do so, one can compute the Omega, the ratio of the upside potential divided by the downside potential. 8 Islamic indices do better than their regular counterpart. As one could expect we find some of the 11 Islamic indices with lower downside risk but also 2 new indices, SHADVS and SHAROK. Their upside potential is so high that it compensates for an important downside risk. One of the hypothesis for such result could be that, as Shariah screening excludes highly leveraged companies, it tends to exclude larger capitalization that have an easy access to debt financing. Are left smaller companies that are willing to take more risks and therefore have a higher upside potential. This is partially confirmed by the sector comparison data that S&P makes available to its customers. The percentage of companies active in information technology is of 31.8% for the S&P500 Shariah while being only 19.6% for the S&P500. This difference is due to the fact that these tech companies usually carry much less debt and therefore are more likely to make it through the Shariah screening process. Indeed, according to CSIMarket, the technology sector displays the lowest debt-to-equity ratio at 0.44. The S&P500, on the other hand, is at more than 0.80. The technology sector is typically a growth stocks

sector rather than value stocks. It means that those companies have a low book-to-market ratio and investors value according to the future earnings that they are likely to generate: their upward potential.

4.8 Cointegration

ADF unit root test were conducted on all individual time series. As it can be observed in the table below, or in more details in Appendix 18, most of the indices are stationary in 1st difference and can therefore be tested for cointegration. There are nevertheless some indices that are stationary in level, or I(0), and that cannot be cointegrated with their equivalent. Although this result can seem quite irrational, one can see that the graphs of the prices of those indices presented in Appendix 19 are almost flat. Therefore they vary around a constant mean during the 6-year period and are stationary. One can conclude that these indices do not move along with their equivalent in the long term. At the 10% confidence interval, almost half of the indices have a unit root and cannot be cointegrated. However, for more accuracy we will use the 5% confidence interval. We are left with a total of 9 indices being stationary in 1st difference. This allows us to directly conclude the absence of cointegration for 7 pairs of indices, namely Asia-Pacific, Belgium, Brazil, Emerging, South Korea and United Kingdom. The indices non-stationary in level are tested in 1st difference and are all found to be stationary when differentiated. They are thus tested for cointegration by applying the same ADF unit root test onto the Error correction term, which is calculated by regressing the Islamic index on the regular one using the OLS regression methodology. Out of the 9 pairs of indices being tested, 7 display a p-value of less than 10% and their ECT is therefore stationary. Those indices are said to be cointegrated. When this interval of confidence is brought down to 5%, this conclusion holds for only three pairs of indices: 500, Germany, and United States. Overall, out of our sample of 16 pairs of indices we find that only seven indices are cointegrated. The investor looking to diversify its portfolio would not gain by combining any of those indices with its equivalent.

The indices of the S&P family have yet to be studied and tested for cointegration by researchers. The only previous publication about the potential cointegration of the

S&P500 is from Arouri et al. (2014) and concluded that the two indices, the S&P500 Shariah and the S&P500, were not cointegrated. Our results are in contradiction with theirs. However the scope of their data was shorter than the one used in this study (1054 observations in their paper for 1509 here) and it comprised the financial crisis of 2007-2008 during which the Islamic indices displayed a better resilience.

Table 3: Results of Cointegration testing

Countries	Index type	Stationarity in level		Stationarity in 1st difference		Stationarity of the ECT		Cointegration
		ADF Test	Stationarity	ADF Test	Stationarity	ADF Test	Stationarity	
500	Shariah	0.2037	NO	0.00	YES	0.0114	YES	YES
	Regular	0.2209	NO	0.00	YES			
ASPAC	Shariah	0.0129	YES					NO
	Regular	0.0530	NO					
BEL	Shariah	0.0156	YES					NO
	Regular	0.3824	NO					
BRA	Shariah	0.0124	YES					NO
	Regular	0.0250	YES					
CHI	Shariah	0.2021	NO	0.00	YES	0.0848	YES	YES
	Regular	0.4043	NO	0.00	YES			
EME	Shariah	0.0043	YES					NO
	Regular	0.0075	YES					
EUR	Shariah	0.0580	NO	0.00	YES	0.0852	YES	YES

	Regular	0.2303	NO	0.00	YES			
FRA	Shariah	0.1146	NO	0.00	YES	0.2066	NO	NO
	Regular	0.3168	NO	0.00	YES			
GER	Shariah	0.2411	NO	0.00	YES	0.0070	YES	YES
	Regular	0.2388	NO	0.00	YES			
JAP	Shariah	0.3348	NO	0.00	YES	0.1142	NO	NO
	Regular	0.2648	NO	0.00	YES			
DVL	Shariah	0.0863	NO	0.00	YES	0.0758	YES	YES
	Regular	0.1683	NO	0.00	YES			
DVS	Shariah	0.0857	NO	0.00	YES	0.0551	YES	YES
	Regular	0.1683	NO	0.00	YES			
NAM	Shariah	0.0787	NO	0.00	YES	0.0213	YES	YES
	Regular	0.0905	NO	0.00	YES			
ROK	Shariah	0.0034	YES					NO
	Regular	0.0208	YES					
UK	Shariah	0.0342	YES					NO
	Regular	0.0596	NO					
US	Shariah	0.1723	NO	0.00	YES	0.0127	YES	YES
	Regular	0.1982	NO	0.00	YES			

Implications & Limitations

In the midst of the recent agitation around socially responsible investments and Islamic finance, this study provides the potential investor with a thorough analysis of the performance of a wide, yet incomplete, range of Islamic equity indices. These indices cover various geographical areas and can resonate with a wide audience. The covered areas are among the leading economies in the world and therefore offer a good benchmark to get a sense of how other indices could perform.

In light of the different measures and ratios used, it is impossible to conclude that Islamic equity indices systematically under- or overperform their conventional equivalents. Some Shariah indices, such as the China, or South Korea seem to perform better than their counterpart and offer a true opportunity for diversification for the Muslim investor. On the other hand, other indices such as the Emerging or the Belgium constantly underperform their counterpart and are not worth considering for investment. This leaves us with a blurry picture that does not provide a clear-cut conclusion to our research question. Nevertheless, as the study of cointegration has shown, some Islamic indices do not have a long-term relationship with their regular equivalent. Therefore, provided that they earn a fairly similar return, the Muslim investor can stay true to his faith and invest in lawful securities without being penalized for it.

One of the main limitations of this study, if not the principal one, is its lack of variety among index providers. All indices were retrieved from Standard&Poors and as we have seen earlier, the methodology used to compute Islamic equity indices is likely to influence their performance. It would be worthwhile to extend the scope even further and integrate indices from all other providers. Another valuable approach would have been to use the national benchmark such as the BEL20 or the CAC40 as a basis for comparison with the Islamic index. It has been decided not to do so as it was important to keep the same benchmark across all indices in order to enable cross-comparison between indices of the same category, e.g. Islamic or regular. Additionally, as the BMI Series is constructed using the principal market capitalization of each country, it was assumed that the national index computed by the BMI Series would offer a somewhat similar performance as the official national benchmark.

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Conclusion

At the beginning of this paper, the objective has been to discover and present what are the pragmatic implications of the Islamic religion into the world of finance. We have started by introducing the concept of Islamic finance and the different principles that are at its foundation. The prohibition of interest, of uncertainty and gambling, along with the PLS principle have been covered at length. An entire section was dedicated to the different investment channels that are available to Muslim investors. Among those, the issue of investing in equity and the computation of Islamic equity indices was thoroughly covered. It was also shown how the different screening methodologies may impact the size of the asset universe that are available for potential investment and thus, limit the opportunities for diversification. The second part was assigned to the review of the current state of the literature treating of the performance and risk profile of Socially Responsible and Islamic indices. Its principal purpose was to illustrate the absence of consensus regarding the attractiveness of Islamic indices in comparison with their conventional equivalent. The third and final part formed the core of this thesis. It was used to present the different objectives that the following analysis would try to fulfill as well as the methodology that would be used. All the different metrics and ratios along with their theoretical implications were presented before detailing the structure and origin of the data. The presentation of the results was broken down into different categories according to the type of ratios used. It comes out of it that, with regards to performance, the Islamic indices do not have anything to envy to Regular indices. Contrarily to what is commonly assumed, it cannot be said that Islamic equity indices do not perform as well as conventional indices in bullish markets. The absence of statistical difference in terms of returns combined with an overall less risky profile constitutes a clear proof. The risk-adjusted performance has also been studied. Different ratios such as the Sharpe ratio and its different variations, the Information ratio or the Omega were used in order to confirm the early feeling of equality between the two types of indices.

As a matter of fact, Standards&Poors does publish some more information regarding the performance of its Shariah indices. In June 2015, they published a report where they computed the average returns of different indices of the Shariah family. Although the indices used were the price indices, it seems that they tend to slightly

overestimate the performance of the Islamic indices. Whereas they claim that the S&P500 and its Islamic equivalent earned a similar return over the last 5 years, a claim that our data tends to confirm, they grant the Europe BMI Shariah and the Emerging BMI Shariah with a performance largely superior to the regular index. In fact, according to them, the SHAEME earned more than twice the return of the REGEME during the last 5 years. The analysis presented here shows that this is not true.

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Bibliography

Abdullah, D., & Chee, K. (2010). *Islamic Finance: Why it makes sense*. Singapore: Marshall Cavendish Business.

Abdullah, F., Hassan, T., & Mohamad, S. (2007). Investigation of performance of Malaysian Islamic unit trust funds: Comparison with conventional unit trust funds. *Managerial Finance , 33* (2), 142-153.

Abdul-Rahman, Y. (2010). *The art of Islamic banking and finance: Tools and techniques for community-based banking*. New Jersey: John Wiley & Sons.

Abedeen, Z., Salman, S. A., & Htay, S. N. (2013). Towards Standardization of Shari'ah Screening Norms and Practices. *International Journal of Humanities and Social Science Invention , 2* (11), 23-30.

Ahmad, R., & Albaity, M. (2008). Performance of Syariah and Composite Indices: Evidence from Bursa Malaysia. *Asian Academy of Management Journal of Accounting and Finance , 4* (1), 23-43.

Ahmad, R., & Albaity, M. (2011). Return performance and leverage effect in Islamic and socially responsible stock indices evidence from Dow Jones (DJ) and Financial Times Stock Exchange (FTSE). *African Journal of Business Management , 5* (16), 6927-6939.

Ahmad, R., & Mohamed, A. (2011). Return performance and leverage effect in Islamic and socially responsible stock indices evidence from Dow Jones (DJ) and Financial Times Stock Exchange (FTSE). *African Journal of Business Management , 5* (16), 6927-6939.

Ahmad, Z., & Ibrahim, H. (2002). A study of Performance of the KLSE Syariah Index. *Malaysian Management Journal , 6* (1&2), 25-34.

Al Rayan Bank. (2015). *About Us*. Retrieved May 2, 2015, from Al Rayan Bank: http://www.alrayanbank.co.uk/useful-info-tools/about-us/

Alhenawy, N., Hassan, K., & Merdad, H. (2010). Islamic Versus Conventional Mutual Funds Performance in Saudi Arabia: A Case Study. *JKAU: Islamic Economics , 23* (2), 157-193.

Al-Shakfa, O., & Lypny, G. (2011). Islamic Investment and the Cost of Observance. *Journal of Investing , 20* (2), 101-109.

Alwosabi, M. (2008). *The Prohibition of Gharar.* Bank 411.

Al-Zoubi, H., & Maghyereh, A. (2007). The relative risk performance of Islamic Finance: A new guide to less risky investments. *International Journal of Theoretical and Applied Finance , 10* (2), 235-249.

Amenc, N., & Le Sourd, V. (2010). *The Performance of Socially Responsible Investment and Sustainable Development in France: An Update after the Financial Crisis.* Nice: EDHEC-Risk Institute.

Ariff, M. (1988). Islaamic Banking. *Asian-Pacific Economic Literature , 2* (2), 46-62.

Ariff, M. (1988). Islamic Banking. *Asian-Pacific Economic Literature , 2* (2), 46-62.

Asutay, M., & Marzban, S. (2012). The impact of asset-based versus market capitalization-based Shariah screening on US and Japanese equities: an empirical analysis. *Asian and African Area Studies , 11* (2), 151-165.

Asutay, M., & Marzban, S. (2012). *The impact of asset-based versus market capitalization-based Shariah screening on US and Japanese equities: an empirical analysis.* Durham University, Asian and African area Studies. Durham: Durham Research Online.

Bacon, C. R. (2008). *Practical Portfolio Performance Measurement and Attribution.* Chichester, West Sussex, England: John Wiley & Sons Ltd.

Bank Negara Malaysia. (2015). *Europe: a rising Oportunity fo Islamic Finance.* Malaysia International Islamic Financial Centre. Bank Negara Malaysia.

Bhatt, V., & Sultan, J. (2012). Leverage risk, financial crisis, and stock returns: A comparison among Islamic, Conventional, and Socially Responsible stocks. *Islamic Economic Studies , 20* (1), 87-143.

Bhatti, I., & Mansor, F. (2011). Islamic Mutual Funds Performance for Emerging Markets during bullish and bearish: the Case of Malaysia. *2nd International Conference on Business and Economics Research.* Malaysia.

BinMahfouz, S., & Hassan, K. (2013). Sustainable and Socially Responsible Investing. *Humanomics , 29* (3), 164-186.

Boasson, E., Boasson, V., & Cheng, J. (2004). Are investment managers investing ethically at a disadvantage? *Journal of Applied Management and Entrepreneurship , 9* (4), 56-65.

Boasson, E., Boasson, V., & Cheng, J. (2006). Investment principles and strategies of faith-based funds. *Managerial Finance , 32* (10), 837-845.

Brooks, C. (2014). *Introductory Econometrics for Finance - Third Edition.* Cambridge: Cambridge University Press.

Chachi, A. (2005). Origin and Development of Commercial and Islamic Banking Operations. *Islamic Economy , 18* (2), 3-25.

Chachi, A. (2005). Origin and Development of Commercial and Islamic Banking Operations. *islamic Economy , 18* (2), 3-25.

Damodaran, A. (2015). *Value at Risk (VaR).* Retrieved July 21, 2015, from Damodaran online: http://people.stern.nyu.edu/adamodar/

Davies, R. (2005, May 25). *Origins of Money and of Banking*. (University of Exeter) Retrieved April 30, 2015, from Projects Exeter: http://projects.exeter.ac.uk/RDavies/arian/origins.html#invention

Derigs, U., & Marzban, S. (2008). Review and analysisi of current Shariah-compliant equity screening practices. *International Journal of Islamic and Middle Eastern Finance Management , 1* (4), 285-303.

Dow Jones. (2011). *Methodology Map: Islamic Indexes Dow Jones Indexes Analytics & Research.* Dow Jones Indexes.

Elasrag, H. (2011). *Principals of the Islamic finance:A focus on project finance* . Munich: Munich Personal RePEc Archive .

El-Gamal, M. A. (2010). *A Basic Guide to Contemporary Islamic Banking and Finance* . Rice University. Houston: Rice University.

Elgari, M. (2000). Purification of Islamic Equity Funds: Methodology and Sharia Foundation . *Fourth Harvard University Forum on Islamic Finance: Islamic Finance:*

The Task Ahead (pp. 77-80). Cambridge: Center for Middle Eastern Studies, Harvard University.

Engle, R., & Granger, C. (1987). Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica , 55* (2), 251-276.

Ernst & Young. (2014). *World Islamic Banking Competitiveness Report 2014–15: Participation banking 2.0.* Ernst & Young, MEGA. EY MENA.

Fama, E., & French, K. (1992). The Cross-section of Expected Stock Returns. *The Journal of Finance , XLVII* (2), 427-465.

Forte, G., & Miglietta, F. (2011). A Comparison of Socially Responsible and Islamic Equity Investments. *Journal of Money, Investment and Banking* (21), 116-132.

Forte, G., & Miglietta, F. (2007, August 1). Islamic Mutual Funds as Faith-Based Funds in a Socially Responsible Context. *SSRN Electronic Journal* .

Forum for Sustainable and Responsible Investment. (2015). *SRI Basics*. Retrieved June 9, 2015, from USSIF: http://www.ussif.org/sribasics

Girard, E., & Hassan, K. (2011). *Faith-Based Ethical Investing: The Case of Dow Jones Islamic Indexes.* Networks Financial Institute Working Paper No. 2011-WP-06. Indiana State University.

Global Sustainable Investment Alliance. (2015). *Global Sustainable Investment Review*. Global Sustainable Investment Alliance.

Grinold, R., & Kahn, R. (1999). *Active Portfolio Management: A Quantitative Approach for Providing Superior Returns and Controlling Risk* (Vol. Second Edition). McGraw-Hill.

Guyot, A. (2008). *Les préceptes de la Shariah contribuent-ils à l'efficience et à la performance des marchés d'actions? Une étude comparative des indices Dow Jones Islamic.* EUROMED Marseille. Marseille: EUROMED Marseille.

Hakim, S., & Rashidian, M. (2004). How costly is investors' compliance with Sharia? *ERF Eleventh Annual Conference* (p. 14). Beirut, Lebanon: Economic Research Forum.

Hamilton, S., Jo, H., & Statman, M. (1993). Doing well while Doing Good? The investment performance of socially responsible mutual funds. *Financial Analysts Journal , 49* (6), 62-66.

Hashim, N. (2008). *The FTSE Global Islamic and the Risk Dilemma.* American International University-Bangladesh (AIUB) , Office of Research and Publications (ORP) . AIUB Bus Econ Working Paper Series .

Hassan, K., & Mahlknecht, M. (2011). *Islamic Capital Markets: Products and strategies.* United Kingdom: John Wiley & Sons.

Hayat, R., & Kraeussl, R. (2011). *Risk and Return Characteristics of Islamic Equity Funds* . Amsterdam: VU University Amsterdam .

Hecht, P. (2014, September 29). *Appraisal Ratio Key To Evaluating Hedge Funds And Other New Investments.* Retrieved July 21, 2015, from FINAlternatives: Hedge funds & Private equity News: http://www.finalternatives.com/node/28447

How, J., Nainggolan, Y., & Verhoeven, P. (2013). The cost of being ethical: Evidence from Islamic equity funds. *Financial Management Association European Conference.* Luxembourg.

Hussein, K. A. (2004). Ethical Investment: Empirical evidence from FTSE Islamic Index. *Islamic Economic Studies , 12* (1), 21-40.

Investopedia. (n.d.). *Total Return Index*. Retrieved July 17, 2015, from Investopedia: http://www.investopedia.com/terms/t/total_return_index.asp

Irfan, H. (2014, December 4). *Could Islamic finance save capitalism?* Retrieved July 15, 2015, from The Guardian: http://www.theguardian.com/sustainable-business/2014/dec/04/could-islamic-finance-solution-capitalism

Islamopedia. (2011, July 18). *Islam and the State under Nasser*. Retrieved May 1, 2015, from IslamopediaOnline: http://www.islamopediaonline.org/country-profile/egypt/islam-and-nation-building/islam-and-state-under-nasser

Jensen, M. (1967). The performance of Mutual Funds in the period 1945-1964. *The Journal of Finance , 23* (2), 389-416.

KhatKhatay, M., & Nisar, S. (2007). Shariah Compliant Equity Investments: an assessment of current screening norms. *Islamic Economic Studies , 15* (1), 47-76.

Kidd, D. (2011). *The Sharpe Ratio and the Information Ratio.* CFA Institute. CFA Institute.

Kok, S., Giorgioni, G., & Laws, J. (2009). Performance of Shariah-Compliant Indices in London and NY Stock Markets and their potential for diversification . *International Journal of Monetary Economics and Finance , 2* (3/4), 398-408.

Latinovic, M., & Obradovic, T. (2013). The Performance of Socially Responsible Investments. *Entrepreneurial Business and Economics Review , 1* (2), 29-40.

Managi, S., Matsuda, A., & Okimoto, T. (2012). Do socially responsible investment indexes outperform conventional indexes? *Applied Financial Economics , 22* (18), 1511-1527.

Masood, O., & Ghauri, S. M. (2015). *The Rightful Way of Banking.* Newcastle: Cambridge Scholars Publishing.

Muslim ibn al-Hajjaj. (874). *The book of faith (Kitab Al-Iman)* (Vol. 1). Sahih Muslim.

Naik, J. (2014). *Beginning of the Early Banking Industry in Mesopotamia Civilization from 8th Century B.C.E.* Sambalpur University, India.

New International Version. (2011). *Holy Bible* (Vol. Leviticus 25:36). Biblica Inc.

Obaidullah, M. (2005). *Islamic Financial Services* (Vol. 148). Jeddah, Saudi Arabia: Scientific Publishing Centre, King Abdulaziz University.

Ortas, E., Moneva, J., & Salvador, M. (2012). Does socially responsible investment equity indexes in emerging markets pay off? Evidence from Brazil. *Emerging Market Review , 13*, 581–597.

Ouaich, R. (2013). Close experience in Islamic Banking - The case of Luxembourg and of France. *Islamic Banking: an oportunity for Belgium ?* (pp. 18-39). Brussels: Belgian Financial Forum.

Owais, A. (2011, June 1). *Islamic Stock Broking and Trading.* Retrieved April 29, 2015, from Islamic Finance News: http://islamicfinancenews.com/listing_article_ID.asp?nm_id=22424

Petitjean, M. (2015). Porfolio Management: Performance Measurement. Mons.

Pew Research Center. (2011). *The future of global muslim population: Projections for 2010-2030.* Washington: Pew Research Center.

Pew Research Center. (2015). *The Future of World Religions: Population Growth Projections, 2010-2050.* Washington: Pew Research Center.

Pok, W. (2012). Analysis of Syariah quantitative screening norms among Malaysia Syariah-compliant stocks. *Investment Management and Financial Innovations , 9* (2), 69-80.

Polivka, M., & Pesik, J. (2013). *Performance of the Socially Responsible Investment during the global crisis.* University of West Bohemia, Department of Economics and Quantitative Methods, Pilsen.

Pope Benedict XIV. (1745). *On usury and other dishonest profit.* Vix Pervenit, Rome.

PwC. (2013). *Islamic Finance: Creating Value.* PriceWaterhouseCoopers.

Rahman, A., Yahya, M., & Nasir, M. (2010). Islamic norms for stock screening: A comparison between the Kuala Lumpur Stock Exchange Islamic Index and the Dow Jones Islamic Market Index. *International Journal of Islamic and Middle Eastern Finance and Management , 3* (3), 228-240.

Research and Markets. (2012). *Global Banking Industry 2012–2017: Trends, Profits and Forecast Analysis.* Banking. Research and Markets.

Reuters. (2015, May 19). *Islamic mutual funds fall short of global demand -study* . Retrieved July 15, 2015, from Reuters: http://www.reuters.com/article/2015/05/19/islam-financing-funds-idUSL5N0YA04I20150519

Reuters. (2014, October 1). *Luxembourg's debut sukuk sees strong demand from government accounts*. Retrieved May 4, 2015, from Reuters Industries:

http://www.reuters.com/article/2014/10/01/luxembourg-sukuk-idUSL6N0RW0DY20141001

Revelli, C., & Viviani, J.-L. (2014). Financial Performance of socially responsible investing (SRI): what have we learned? A meta-analysis. *Business Ethics: A European Review* , 1-28.

Ross, S. (1993). Is Beta useful? *ICFA Continuing Education The CAPM Controversy: Policy and Strategy Implications for Investment Management* (pp. 11-15). New-York: Association for Investment Management and Research.

RT. (2015, April 24). *First Islamic bank in Germany to open in July* . Retrieved July 24, 2015, from RT: http://www.rt.com/business/252729-germany-islamic-bank-launch/

S&P. (2015). *S&P Shariah Indices Methodology.* S&P Dow Jones indices, McGraw Hill Financial. S&P.

Saturna Capital. (2015). *Saturna Capital*. Retrieved May 2, 2015, from Amana Mutual Trust Fund: http://saturna.com/amana/

Scherer, B. (2009). *An Alternative Route to Performance Hypothesis Testing.* EDHEC Business School, Risk Institute. Nice: EDHEC.

Schröder, M. (2007). Is there a Difference? The performance characteristics of SRI Equity Indexes. *Discussion Paper , 05* (50).

Securities Commission Malaysia. (2013, March 21). *Frequently-Asked Questions On Revised Shariah Screening Methodology.* Retrieved July 24, 2015, from Suruhanjaya Sekuriti - Security Commission Malaysia: http://www.sc.com.my/frequently-asked-questions-on-revised-shariah-screening-methodology/

Sengupta, B. (2012). *Shariah Stock Screening: a Fund Manager's Conundrum.* Cognizant 20-20 Insights. Cognizant.

Shanmugam, B., & Zahari, Z. R. (2009). *A primer on Islamic Finance.* CFA Institute. The research foundation of CFA Institute.

Sharpe, W. (1964). Capital Asset Prices: A theory of market equilibrium under conditions of risk. *Journal of Finance , XIX*, 425-442.

Sharpe, W. (1966). Mutual Fund Performance. *The Journal of Business , 39* (1), 119-138.

Sheikh DeLorenzo, Y. (2002, February 5). *Understanding Riba and Gharar*. Retrieved April 2015, from Muslim-Investor: http://muslim-investor.com/answers/riba-and-gharar.html

Statman, M. (2005). *Socially Responsible indexes: Composition, performance and tracking errors.* Santa Clara University, Leavey School of Business, Santa Clara.

Statman, M. (2000, June). Socially Responsible Mutual Funds. *Financial Analysts Journal* , 30-39.

Stein, D. (2006). *The Contemporary Torah.* University of Nebraska Press.

Thomson Reuters. (2013, August 9). *Sustainability*. Retrieved June 9, 2015, from Thomson Reuters: http://sustainability.thomsonreuters.com/2013/08/09/history-of-socially-responsible-investing-in-the-u-s/#_ftnref4

Treynor, J. (1965). How to rate management of investment funds. *Harvard Business Review , XLIII*, 63-75.

UK Government. (2014). *UK Excellence in Islamic Finance.* London: UK Trade & Investment.

Ulus, S. (2013). Fixed Income Investment (Sukuk) in Islamic Finance . *Afro Eurasian Studies , 2* (1&2), 298-305.

Uryasev, S. (2000). Conditional Value-at-Risk: Algorithms and Applications. *Financial Engineering News* (14).

Usmani, M. (2002). *An introduction to Islamic Finance.* The Hague: Kluwer Law International.

Vandendriessche, S. (2010). *Les spécificités et les performances des fonds Sharia Compliant* . Brussels: Solvay Business School.

Venardos, A. M. (2005). *Islamic Banking & Finance in South East Asia: Its Development and Future.* Singapore: World Scientific Publishing.

Widiyanti, M. (2012). A New Paradigm And New Strategies For Shariah-Compliant Portfolio Optimization: How to Practice in Indonesia. *13th Malaysia Finance Association (MFA) Conference 2012*. Malaysia.