Islamic Finance: a Markowitz and a Capital Asset Pricing Model approach

SUPERVISOR
Prof. Saverio Massi Benedetti

CO-SUPERVISOR
Prof. Domenico Curcio

CANDIDATE
Roberto Russo
677481

Academic Year 2016/2017
# Table of Contents

Introduction ........................................................................................................................................... 3

Chapter 1: A presentation of the Islamic Finance .................................................................................. 5

1.1. Principles and instruments ............................................................................................................. 5  
   1.1.1. Definition and main requirements ............................................................................................ 5  
   1.1.2. Islamic financial instruments .................................................................................................. 12  
1.2. Development of Islamic Finance in the global financial system .................................................. 24  
   1.2.1. Islamic banking, capital markets and insurance industries ...................................................... 27  
   1.2.2. A comparison between Islamic and conventional finance ..................................................... 45  
1.3. Islamic Finance in Italy .................................................................................................................. 49  
   1.3.1. Regulation and supervision ..................................................................................................... 51

Chapter 2: The implementation of a Markowitz optimization on an Islamic portfolio ....................... 53

2.1. Introduction to the Markowitz Portfolio Theory .............................................................................. 53

2.2. The optimization process ............................................................................................................... 57  
   2.2.1. Considerations ......................................................................................................................... 57  
   2.2.2. The construction of three portfolios: Islamic, European and Italian based ............................ 60  
   2.2.3. A view of past performances ................................................................................................ 65  
   2.2.4. Implementation and results of the optimization ..................................................................... 79

Chapter 3: The systematic risk in the Islamic Finance ........................................................................ 85

3.1. Introduction to the Capital Asset Pricing Model ............................................................................. 85

3.2. The analysis of the βs on Islamic banks ......................................................................................... 90

Conclusions ........................................................................................................................................... 111

References ............................................................................................................................................ 113

Summary ............................................................................................................................................. 116
Introduction

This final paper is about Islamic finance and everything is behind it. During last year, I started to glance at this possible theme due to my studies in the Arabic language and thanks to a couple of articles related to Islamic finance that have aroused interest in me. I always wanted, for my final thesis, to talk about something new, something that would have left me with a broader knowledge. Islamic finance perfectly matched what requested by myself: it is something not very discussed, especially in Italy, generally it is not something empirically and analytically developed and it is something very important nowadays in the world we live. As we know many new investors are from the Middle East area or from South-East Asia, but which are the principles that drive these people? Or how do they apply them? Or what are the results and the empirical evidences? I wanted to answer these questions and, moreover, doing so adding two theories, the Markowitz Portfolio Theory and the Capital Asset Pricing Model, from the subject that mostly mattered to me during these two years of master’s studies and mostly fascinates me for my future career: Asset Management.

Final aim of this paper is to apply Islamic finance to these two theories and see the results, comparing and analyzing them to conventional finance to understand the different behaviors and this Islamic phenomenon.

At the beginning of the work, many attempts on the assets to analyze with the Markowitz optimization and the CAPM have been tried. Thus, many portfolio optimizations and many regressions have been done among Islamic banking equities, Islamic equity indexes, Islamic bonds and commodities in order, at the end of this phase, to reach the results that could isolate the best the differences between an Islamic financial system and a conventional one. At the end, the assets chosen were banks. They represent the pure essence of modern finance, since they provide every financial activity, so that it would have been easier to evidence Islamic financial performances. Moreover, data available for these Islamic companies are wider than other kinds of Islamic financial institutions.

The paper opens itself with a chapter addressed to the description of Islamic finance, its definition, its principles, its prohibitions, its instruments, its developments through the years, its regulations, its comparisons with conventional finance and a brief discussion on the rules for an Islamic financial institution in entering the Italian market (until now, in Italy, there’re still not Shari’ah compliant institutions).

The second and third chapter represent the core of this composition.

The former, after a short description on the Markowitz’s theories, creates three different portfolios, each composed solely by banking equities, each representing Islamic, European and Italian banks’ returns and each with a time period from July 2003 to January 2017. The entire optimization process will be executed
for each portfolio and, before showing the efficient frontiers and the efficient portfolio compositions, an analysis of the risk-return profiles of the portfolios will be done, i.e. analysis of standard deviations, means, returns, Var, skewness, statistical distributions and correlations. After the entire Markowitz process will be completed, answers will be given to explain the results obtained: even with a lot of volatility in their value indexes, the portfolio of Islamic banks will result more efficient than portfolios of European and Italian banks.

In the last chapter, the systematic risk affecting Islamic banks will be analyzed. A brief introduction on the Capital Asset Pricing Model will be computed. Then, with the same data used previously, regressions will be run to analyze the betas on each set of assets and on each bank, both Islamic and conventional. As always, a comparison will be carried out between banks. In this final chapter, since it relates to the systematic risk, an analysis on how Islamic banks have been affected during the 2007-2009 crisis will be shown, trying to explain the different achievements reached by Islamic banks during that historical phase.
Chapter 1: A presentation of the Islamic Finance

1.1. Principles and instruments

1.1.1. Definition and main requirements

“Islamic finance doesn’t mean you must be a Muslim to operate it, it is simply an ethical way to do finance”. These were the first words of Tirad Al-Mahmoud’s speech (CEO of Abu Dhabi Islamic Bank) during a conference about Islamic finance at the Italian Parliament in January. Thus, before giving real definitions of what Islamic finance means, this paper wanted to solve the concerns behind it.

An Islamic financial system is the one that suits with the Islamic religious law, also called Shari’ah law. According to this definition, under Islam, there are no possibilities for an economy independent from religious criteria.

Thus, the Shari’ah law does not apply only to the private life of Muslims, but it includes principles used by the community for every area of life. That’s why Islamic Finance has been defined a type of finance in compliance with the Shari’ah law.

Everything starts from two sources of the Shari’ah: the Quran and the Sunna, saying and actions of the Prophet Muhammad transmitted in the form of the hadeeth. The problems they leave are that they do not cover all the questions of the contemporary Muslim community, so that there is need for other sources of law.

These include the Islamic jurisprudence (fiqh), based on the judgments of some experts in specific cases, and the experts’ consensus of various schools of thought (ijma). The rationale behind these two sources of law is that the ummah (Muslim community) itself becomes a source of law. However, there are controversies due to different schools of thought and differences in the interpretation of laws, that can have significant implications for the development of Islamic finance. The lack of harmonization of Islamic rules, as it has been said with different schools and views, gives in some cases rise to uncertainty on critical issues, for example if certain financial instruments are compliant or not with the Shari’ah1.

Islamic finance, even if it uses old kinds of contracts, is a young phenomenon and it is still considered a niche.

From a historical point of view, the origin of a real financial system in the Islamic countries is near the end of the 19th century, when western banks started to open branches in their colonies. Due to mistrust of the locals and the failure of those banks to meet the Shari’ah principles, this first attempt didn’t succeed.

---

First Islamic theoretical financial models started in the 1950s with the independency of many Muslim countries from western states. Having an Islamic financial system was seen as a segment of the Islamic economy to back an Islamic social order and to be an alternative to liberalism and socialist plans. Many Muslim economists had first feelings on the foundation of a banking system based on the Quran’s law that was most suitable to economic needs of the Islamic population. Afterwards, in this context, the first real Islamic bank started to operate: the Ghamr Savings Bank, a typical rural bank in the city of Mit Ghamr in Egypt. It was founded by the Egyptian economist Ahmad Al-Najjar, who had been inspired by the European cooperative banks, introducing for the first time the Islamic principles. It was the first institution to apply Shari’ah laws such as the prohibition of interest rates or the application of profit-loss sharing.

Many banks started to rise in different places, like Malaysia, Pakistan and North Africa, and most of the attempts operated just in the retail division to meet the needs of the real Muslims people. Mostly, they were born to re-discover the Islamic identity after years of colonization especially in North Africa.

Islamic financial institutions continued to grow in the 70s, together with the growth of oil’s price, and so, especially in the Gulf countries, with incoming huge amount of money. The need of investing and addressing these petrodollars triggered the real development and the exponential growth of the Islamic finance. The Gulf Cooperation Council (GCC) backed this growth of Islamic banks, increasing rapidly in this way the number of Islamic financial institutions. In 1975, the birth of the Islamic Development Bank represented the first union among institutions and governments in the development of the Islamic finance. Today, it still backs economic projects, mostly to develop sectors like agriculture, industrial and infrastructure.

After these years, the Islamic financial system started to be perceived in a different way comparing to the past: there has been a diversification of products and players and an increase of the cross-border dimension. Islamic finance was no longer seen as the opponent of the global financial system, but a complete part of it2.

In the 80s many banks started also to rise in countries as Iran, Pakistan and Sudan. Primarily, Iran was the first country to Islamize its own legal and economic system. In other countries, such as Malaysia, Saudi Arabia, Kuwait and the other Gulf countries, it was followed a more temperate line with a mix of Islamic financial system and the conventional one already in force.

In the 90s the interest for the Islamic finance started to grow in western markets; many conventional banks opened branches and cross-border services inside Muslim countries in compliance with the Shar’ah law. Federal Reserve, Bank of England, IMF and World Bank started to take care of the phenomenon and in the 1995 two Shari’ah compliant Islamic indexes were launched (Dow Jones Islamic index and Financial

---

Times Islamic index). The debate grew also in the academic world and many universities started researches to analyze this system.

According to professor Hamaui, professor of Islamic finance at Cattolica University in Milan, the reasons for this growth are linked to the underdevelopment of the Muslim countries, to the real answer Islamic finance gives to the needs of firms and households, to the failure of western economies and financial institutions, to the strong faith of Muslims, to the Arabic revolutions and to the growth of Islamic governments.

Regulation and accounting problems arose together with the growth of new Islamic banks. That’s why in the 1991 in Bahrain, the Accounting and Auditing Organization for Islamic Institutions took place with the aim of developing accounting rules in compliance with the Islamic finance. In the last decade, many authorities were born and within these, a major role is played by the Islamic Financial Services Board (ISFB) based in Malaysia, the most important authority that coordinates, regulates and gives standards.3

After this endless growth, Islamic finance saw a phase of standstill during the last years of the 90s, due to the decrease of oil’s revenues and a more general instability of the Middle East area. 9/11 gave the final word to this phase. The fear of Muslims created by this attack, pushed many Islamic investors to let their savings go back to their own countries and so inside the Islamic banks because of a fear of “freezing” the bank accounts and other measures taken by western states.

---

3 Banca d’Italia, Occasional papers number 73 (2010), Questioni di economia e finanza, finanza islamica e sistemi finanziari convenzionali, p. 7
Today, Islamic finance provides a huge number of religious compliant financial services to Muslim communities but moreover it is an alternative for non-Muslims clients looking for ethical investments and a better risk diversification. El-Gamal, an Egyptian economist, in 2001 suggested that “the “Islamic” in “Islamic finance” should relate to the social and economic ends of financial transactions, rather than the contract mechanisms through which financial ends are achieved”.

The main requirements of the Islamic finance are directly related to this being a moral finance and this following the laws of Shari’ah.

The *Quran* contains explicit rules regarding the economic and financial system: the holy prohibition that defines the shell of the financial system is the principle stating that “money cannot generate money” and wealth and profit are legitimate only ahead of Allah through hard-working.

These principles turn out to influence the authorization of both the returns and the instruments. The first principle to highlight is the prohibition of *ribā* (interest or gain). In the *Shari’ah* law, the interest is seen as something not justified, one of the seven sins most severe, and for this it is convicted by the *Quran* and by the Sunna.

The notion of *ribā*, literally meaning increase or surplus, is object of many arguments among the different schools of thought, this because the *Quran* convicts the interest without specifying the nature. Today, *ribā*, for the Muslims, includes every form of interests, even though it was born as a limitation of the usury. The Council of Islamic Ideology in 1980 underlined that “*ribā covers the interest in all its outcomes without differences among loans for business or production, for personal or commercial purposes, among private or public debtors/creditors or among low and high interests.*”

Deeper, there are 2 kinds of *ribā*: the *ribā al-nasīa* and the *ribā al-fadl*:  

- *ribā al-nasīa* is the *ribā* applied for the debt, so when money is exchanged for other money. It derives from *nasa’a* which means postpone, and it refers to the time given to the borrower to pay back the loan plus a premium. Thus, the prohibition of *ribā al-nasīa* refers to the ban of the *Shari’ah* to establish ex ante a positive return for the loan, justifying it with the wait of the lender for the loan granted. Due to *Shari’ah*, only the risk justifies a predetermined positive return and not just the wait;
- *ribā al-fadl* is the *ribā* applied in exchanges, whatever they are done within money or goods. Business is legitimated but it is regulated in order to avoid any form of unfairness and dishonesty during the trade, in particular on the different terms of the exchange concerning the quality and the quantity of the goods traded. Thus, *ribā al-fadl* is meant as increase with the respect to the pure value of the good exchanged, considered as unfair return for one counterparty. Among these abuses, there is a list given

---

4 Council of Islamic Ideology (1980), *Council report*, p. 1  
5 Muhammad Umer Chapra (1985), *Towards a Just Monetary System*
by Prophet Muhammad that includes returns based on the use of unfair tools, on barter and on the deferred exchange.

Even though, as it was said, there are many different schools of thought regarding Islamic finance, most of the theorists agree on the fact that Islamic tradition doesn’t deny the principle of making money from the loan lent, but it refuses the predetermined aspect of the interest. In Islamic finance, there cannot be a return without taking risks, and, thus, those who do not want to have risks, has the only right to receive back the loan, nothing more.

The fundamental problem of these scholars is finding a consensus on the scope of interest rate, considered as an unjustified increase. Some of these scholars argued that ribā refers to an old pre-Muslim practice and, thus, it should not apply to all forms of interest.

Having defined this first principle, there was the need for Islamic legal experts and economists to define a different approach for the interest, to achieve a risk-return frontier more efficient and fair. There is no consensus among scholars on how to identify the criterion for acceptability or non-acceptability in accordance with the Shari‘ah law with regards to the prohibition of ribā. Divine prohibition of usury does not, in fact, ban every return on capital or trade.

The prohibition of ribā must be also filled in a wider Islamic consideration on the economy that, starting from the second half of the XXth century, had the aim to create an economic order where the fundamental principles were equity and the relationship between financial and economic assets in a trade. Therefore, the principle of Profit and Loss Sharing (PLS) has been defined, in order to regulate the financial instruments in compliance with the Shari‘ah law (mudā́raba and mushā́raka contracts that will be shown later).

This principle that dates back to the beginning of Islam, is an equity-based one, where the unique possible forms of gain are the profits reached with investments (ex-post) and not with an ex-ante interest. Loans are permitted if the interest is linked to the profit or loss obtained from the investment and the predetermined rate is replaced with a profit commensurate with the result of a real economic activity. For Islam, it is profit rather than interest that is closer to its sense of ethics and fairness.

The PLS principle implies a real cooperation among lender/creditor and borrower/debtor, in contrast with the maximization of profits and the minimization of losses that relate to the conventional financial system, where it tends to differentiate risks rather than sharing them.

---

6 Banca d’Italia, Occasional papers number 73 (2010), Questioni di economia e finanza. finanza islamica e sistemi finanziari convenzionali, p. 9
The ban of *ribā* gives limits to profits received from authorized financial instruments or trades. Thus, the conditions for an instrument or a trade to be considered compliant with the *Shar’ah* law have to be released.

The first condition for an instrument in order to be authorized is the commitment to rely on a real asset, that once again derives from the Islamic principle that is impossible to make money from money. The principle of money being worthless, thus, not only denies the returns based on interest, but also denies the pure financial deals, like debts based on interests or bonds or securitizations.

However, not all real assets are authorized to be exchanged and, among these, two assets have to be highlighted:

- assets based on uncertainty (*gharar*), forbidden by the *Quran*, that gain advantages from the missing information of the counterpart. The prohibition of *gharar*, or more precisely excessive *gharar*, implies that every deal must be free from uncertainty, with regards both on the incomplete information on the price and on the object of the deal, as on the uncertainty of the contract related to random events (hazard: *maysir*). *Gharar*, since it is a situation in which one party gains unfair advantages from different values of the deal, implies two kinds of *ribā al-fāḍl* previously described: the disloyal volunteer doubt and the uncertainty in the contract that makes risky the long-term exchange. Sometimes, it also happens that the asset of the deal is not known from the seller or it doesn’t even exist.

Uncertainty related to the unknown of the asset traded, makes the deal similar to a gamble (*maysir*), convicted from the *Shari’ah*. To the base of the ban of *maysir*, there is the principle from *Quran* in which future events are only in the hands of Allah and they can’t be changed from any human actions.

Financially speaking, the two areas where *gharar* applies are insurance and derivatives. That’s because it is paid a premium (or price) for a good or service that does not exist yet and so it is uncertain (like an injury or a profit given by the derivative). However, each kind of contract bears a minimum level of uncertainty it can be made null. For this reason, *gharar* is a relative prohibition, that applies only if relevant, while *ribā* is absolute. Indeed, many new forms of contracts are rising inside Islamic finance that, even though it denies derivatives, it allows some contracts to sell assets not yet available like *salam* or *istisnā*, or even some insurance contracts (*takaful*), based on mutual forms of cooperation to build an insurance system very similar to the conventional mutual insurance.

---

7 Il Sole 24 Ore (November 29th, 2008), *Crisis, the Islamic banks protected by the Shari’ah*
8 Roni Hamau, Marco Mauri (2009), *Economia e finanza Islamica*, il Mulino, chapter 1
Participants in the *takaful* pay a sum of money to a mutual cooperative fund, which is then used for compensation if necessary. The *takaful* company acts as the manager of the fund;

- Non-legal assets. Even though Muslims must invest in real assets, not every branch is allowed. The Islamic principle of *harām* (lawful) grants that financial instruments will always be far from illegal goods forbidden by the *Quran*, as the supply and production of alcohol, tobacco and pork, the trade of weapons, pornography and gambling.

All these principles listed can be resumed as follows: Bans deriving from religious prohibitions:

- Trades in which the underlying asset is not tangible but matches another bond, as the case of repos and securitized bonds with underlying financial assets, or matches a right, as the case of commercial papers and options;

- Trades in which the underlying asset belongs to economic areas considered not legal (*harām*) from Islamic law, like alcohol, tobacco, pork, weapons or gambling;

- *Ribā* is forbidden, so that financial assets whose return depends on interest rates, currencies, indexes are prohibited;

- Give the ban of *maysir*, financial assets whose return relies on random future events are also forbidden.

Then there are debatable trades that can be authorized in the Islamic system:

- If the underlying asset does not exist during the agreement or it will be delivered whenever in the future, the condition to make the contract efficient is that the payment must be given at the moment of the agreement of the contract. For example, futures or forward contracts are banned because the delivery of the asset and its payment will happen in the future;

- Gain from trades can be determined during the agreement (ex-ante) only if the owner of the contract takes a risk, related for example to the ownership of an underlying good or service.

Some scholars added economic arguments to the religious motivation for the prohibition of *ribā*: interest-free finance could lead to full employment of resources, while interest-based finance would be more volatile and instable and, so, damaging for the economic development. In an interest-based system, the most important criterion for the credit allocation is the creditworthiness of the borrower, while, in an Islamic financial system, it is productivity of the project that is in charge as most important criterion. Having such financial system would surely encourage lines of credit for productive projects⁹.

---

1.1.2. Islamic financial instruments

In this part of the paper, different financial instruments in compliance with the Shari‘ah law will be presented.

Islamic financial system developed through years a broad range of Shari‘ah compliant instruments, and to make sure they meet these laws, Islamic industry made use of contracts acceptable under traditional Islamic legal doctrine\(^9\).

Let’s start with a focus on the main banking Islamic instruments. Due to the lack of norms universally accepted and due to the low standardization of the contracts used, the rank and description of the instruments utilized for raising money from depositors and for using it isn’t easy\(^10\).

The main banking instrument, the one in which all banking systems are based on, is the deposit, with whom the banks raise money from the savers in order to finance their systems.

While in conventional banks, the deposit is an instrument with the aim of both saving and short-term investing, Islamic finance is a two-level system, consisting of a banking system with 100% guaranteed short-term deposits and an investment banking system for long-term deposits\(^11\). More precisely, the two kinds of deposits offered by Islamic banking systems are the bank account deposits without purpose of investing and not remunerated (\textit{wādī‘a}), and on the other side the investment deposits (\textit{hisābāt al-istithmār}).

1) The guaranteed deposits - \textit{wādī‘a}

This type of bank account gives safe custody of money, however without any form of remuneration/interest of the capital. It’s a free-deposit that lies on an Islamic custody contract called \textit{amānā} (trust), that in the Islamic market law it represents a deal where one side guarantees the property on a trustee mandate. These guaranteed deposits are instruments related to the traditional need of management of payment from the savers and they fulfil a fundamental function of preserving liquidity.

---

\(^9\) Banca d’Italia, Occasional papers number 73 (2010), \textit{Questioni di economia e finanza, finanza islamica e sistemi finanziari convenzionali}, p. 10

\(^10\) Porzio C. (2009), \textit{Banca e Finanza Islamica}, Bancaria Editrice

\(^11\) Porzio C. (2009), \textit{Banca e Finanza Islamica}, Bancaria Editrice
Connected with these deposits, there are, as in conventional banking systems, series of services such as debit/credit card or checks or bank transfers.\(^\text{12}\)

2) Investment accounts - *hisābāt al-istithmār*

This second bank account entrusts a bank the management of savings to realize investments, without any protection of the nominal value of the deposit. Differently from *wadī’a*, the ownership of money deposited is transferred to the bank and the withdrawal can be done only at maturity. Moreover, the risk connected with the investment justifies a gain, in the form of sharing the earnings of the bank and it is not connected with an interest rate.

Practically, these deposits are set in mutual contracts (*mudāraba*): the depositor shares the risk of the investment since the account is remunerated proportionally to profits deriving from the use of the related funds and there is no form of guarantee on the capital deposited in case of losses.

Mainly, there are two forms of investment account: the restricted *mudāraba*, where the funds raised are allocated to finance specifics assets, and the unrestricted *mudāraba*, in which the bank can use the money raised to finance any kind of asset. It can be stated that this last type of account turns out to be an equity investment, where the money of savers is used to finance the bank.

Second kind of banking instruments are those related to the use of capital. Islamic banks have plenty of instruments compliant with the *Shari’ah* law. These techniques of financing are usually divided in two categories, depending on the level of risk shared: contracts based on profit and loss sharing used for investing (mutual contracts), and the ones not based on PLS principle, also called mark-up contracts, used to finance real activities.

1) Mutual contracts

Mutual investment contracts have a basic principle according to which, since every counterparty of the contract (bank, investor and saver) generates capital for the project, they have to share the risk of the investment, so that they share both profits and losses. There are no collaterals and there are two kinds of mutual contracts:

- *Mudāraba*: in this contract the producer, called the *rab al-māl*, gives the capital to the partner, the *mudārib*, that is in charge of managing the business and he does not invest anything in terms of

\(^{12}\) Cherif K. (2008), Analyse des produits financiers Islamiques, travail de Bachelor de la Haute Ecole de Gestion de Genève
capital. Both parties involved share profits, while losses are just for the producer. The duties of the mudārib are not to pay back a fixed amount as in conventional loans, but a floating amount depending on the performance of the investment: in case of losses, the mudārib has to repay to the producer the capital used minus the loss, while in case of a positive management, profits are distributed among the two parties depending on the relationship fixed in the contract.

*Mudāraba* is essentially used to regulate investment accounts within depositors and banks and to finance local corporations, where the bank assumes the role of the producer and the firm the mudārib, that is in charge to take advantage from its professional skills to gain the best possible result. In this way, the bank focuses only on the feasibility of the project and on its probability of success and not on the creditworthiness of the client, as in the conventional banking system.

The depositor is similar to an investor in mutual contracts and, in terms of risk-return profile, he is between the shareholder and the conventional depositor: he risks as the former the capital injected and, as the depositor, he does not have rights to vote. This arises corporate governance problems because the depositor doesn’t control the capital deposited and the moral hazard risk. Thus, since Islamic banks are very dedicated to the reputational risk and to cover the volatility of investment accounts’ returns, the Islamic banking system provides buffers to use in case the returns were not competitive.

- *Mushāraka*: it literally means “sharing”. Differently from *Mudāraba*, in this contract two parties inject the capital, whatever it is (money, real estates, lands, copyrights and so on), and they both share profits and losses. It is a typical sharing contract, similar to joint-ventures, where the bank and the entrepreneur establish a company (*shārika*).

The *Mushāraka* contract was used in the Middle Ages to facilitate the joint ownership of properties or a commercial enterprise.

A typical *Mushāraka* contract is the *Mushāraka mutanāqisa*, especially suitable for small firms, where year by year the bank receives a decreasing share of incomes, while the customer re-acquires an increasing share of the capital of his corporate.

*Mushāraka* contract is mostly used to finance long-term real projects and it is considered from the majority of Islamic scholars the purest form of Islamic finance.

The differences in *Mudāraba* and *Mushāraka* can be resumed in table 1.1.1. below:

---

13 Rony Hamaui, Cattocalica Univeristy, *slides of Islamic finance class*

2) Non-mutual contracts

Beside mutual contracts, Islamic banking uses some real credit instruments, based on the acquisition of a good on behalf of a client and on the transfer of the right of ownership after the reimbursement of the initial amount. These non-mutual contracts are frequently called mark-up contracts, because the bank balances the risks connected on the ownership of the underlying good applying a fixed predetermined margin profit. In the time-lapse existing within the purchase of the good on behalf of the client and the redemption of the good from the client, the Islamic financial broker is the owner of the good and takes the risks connected with the management of the asset. From this aspect, we can distinguish the mark-up contract from the prohibition of *ribā* because it is tied to a financial procedure and not to the time of the trade.

Nevertheless, some Islamic legal experts, especially in the Middle East, do not back these contracts because they don’t include any type of profit and loss sharing and represent real forms of indebtedness. There can be distinguished two kinds of non-mutual contracts: exchange contracts (*murābaha*, *salam* and *istisnā’*) and contracts with the transfer of the usufruct, or leasing contracts (*ījāra*).

<table>
<thead>
<tr>
<th></th>
<th>Mudāraba</th>
<th>Mushāraka</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Injection of capital</strong></td>
<td><em>Capital is provided by one party</em></td>
<td><em>Each member provides the capital</em></td>
</tr>
<tr>
<td><strong>Management of the investment</strong></td>
<td><em>Mudārib manages the account</em></td>
<td><em>Each member manages the firm</em></td>
</tr>
<tr>
<td><strong>Losses</strong></td>
<td><em>Rab al-māl bears the losses</em></td>
<td><em>Each member shares the losses</em></td>
</tr>
<tr>
<td><strong>Profits</strong></td>
<td><em>Members gain with the PLS scheme</em></td>
<td><em>Members gain with the PLS scheme</em></td>
</tr>
</tbody>
</table>

*Table 1.1. – Mudāraba and Mushāraka. Source: Ponzio (2010)*
- **Murābaha**: this contract consists in the purchase of a good on behalf of a client with deferred payment, in one or more solutions. This purchase belongs to banking contracts because it is the bank that acquires goods for the client and it is initially the owner. The ownership is then transferred to the client at the moment of the payment of the redeem, paying to the bank the price of the good plus a mark-up. The following contracts are also similars: *bay 'al-mu‘ajjal*, instant sale of an asset in return for the payment of money at a future date; commodity *murabahh*, where the customer enters into a *murabaha* transaction with a bank, requesting it to purchase a particular commodity; the client takes the direct responsibility of the trade with the supplier of the good. To avoid the risk for the bank that the client denies to accept the good, it is used to give the client the role of broker of the bank (figure 1.1.2. below explains better this contract);

- **Salam**: if in the *Murābaha* the bank was the supplier that is going to be reimbursed with a deferred payment, in the *Salam* contract the bank becomes the client that has acquired a good that will be delivered at a certain term and, so, with a deferred delivery. *Salam* diverges from *Murābaha* since the good acquired from the bank does not yet exist or it is not yet in the ownership of the seller client.

---


16 Banca d’Italia, Occasional papers number 73 (2010), *Questioni di economia e finanza. finanza islamica e sistemi finanziari convenzionali*, p. 12
Until it does not have the availability of the good, the bank can’t proceed to the sale, and, thus, it is exposed to the risk of depreciation of the commodity, linked to markets where it usually doesn’t own sufficient knowledges to forecast the price of the good. Thus, the bank strives for limiting or canceling this exposure, joining parallel markets, such as other Salam contracts in which the bank goes short, and having as object the same underlying of the contract in which it went long: doing so the bank realizes a profit gaining, at the moment of the agreement, a return equal to the price of the sale of the parallel contract plus a mark-up, net of the purchase price of the initial contract.

It has to be clear that this gain, due to Islamic rules, must be justified by the ownership of the good and its relative risks. As for Murābaha, the date of delivery and the amount of the mark-up are established and communicated to the client before the agreement.

This strategy tries to eliminate the market risk.

- **Istisnā’**: this contract is used to finance the construction of infrastructures among determined dates. As for salam, the good doesn’t exist yet at the moment of the agreement, but differently from the salam, at the moment of the agreement nothing has to be paid from both parties. If during the construction phase, there will be increases in the cost of raw materials, the agreed price cannot be changed unless there is an agreement between parties. Moreover, in the Istisnā contract the purchaser has the possibility to refuse the good in case it is not in compliance with the required project.

  When the bank is the seller there is a parallel market to hedge its exposure: the Istisnā contract is together with another Istisnā contract with the same underlying, in which the bank becomes the purchaser with a third party to meet specific requests of the client of the initial contract. The bank gains from the difference in the short and in the long position. This return is justified from the participation of the bank as entrepreneur in charge of executing the works relating to the project. Istisnā is most suitable when backing the development of the industries and in financing the production of gas, electricity, energy resources or public goods as public buildings, streets and other.

  Let’s remember that the purchase of goods that do not exist yet is forbidden by the Islamic laws (gharar), so when salam and Istisnā apply, the acquired good must be standardized, in order to be easy to identify its quality and quantity, the date and place of the exchange must be specified clearly and that the price of the good must be paid at the moment of the agreement. While in the salam contract these needs are met, in Istisnā the price is paid at the end and the standardization of the good might be complex.

- **Ijāra**: an Islamic bank can stipulate with its clients lease contracts for a real estate or tangible goods in its ownership. These contracts allow the clients to use a good in exchange of the payment of a series of rents. The value of these rents, fixed and stipulated at the moment of the agreement of the contract,
together equal the value of the acquired good plus a mark-up, as a profit for the risk linked to the ownership.

There is also the possibility for the client to redeem the good at the end of the contract, as in the conventional leasing contracts.

Same as other non-mutual contracts, risks connected to the ownership are taken by the bank, so every loss is up to the bank.

---

**Figure 1.1.3. Ijara contract. Source: Al Hilal Bank**

---

**Figure 1.1.4. Shari'ah compliant contracts. Source: Rony Hamau’s slides**
Islamic banking systems provide for each bank a committee composed by Shari’ah Scholars that must certify that the banking activity is in compliance with the Islamic principles and it gives opinions through fatwe.

The common opinion among Islamic jurists is that non-mutual financial instruments should be an exception to the rule, because of the uncertainty of the interest-based techniques and the trade-based techniques, both based on a predetermined return. But, as also confirmed by a research of the Islamic University of Malaysia$^{17}$, many works showed that, despite the ideas of Islamic jurists, non-mutual contracts take a high share inside the balance sheet of Islamic financial institutions. The low incidence of PLS contracts can be linked to three reasons: some financing operations do not take into account profits’ sharing; in some countries/industries the presence of information asymmetries and the connected problems of moral hazard could be relevant to discourage the use of partnership contracts; the competition could push Islamic banks to offer conventional interest-based contracts, especially where the two models coexist in the same rule of law$^{18}$.

From the liability side, according to Chang and Liu, the investment deposits are the main contracts to raise money from the savers.

Islamic banking contracts and principles have been shown until now. While the consensus around these instruments is largely recognized among Islamic scholars, economists and legal experts, more difficult for these experts was to give a definition of financial markets in compliance with the Shari’ah law. This difficulty is essentially connected to the fact that for long time Islamic finance has remained bordered to banking activities. Just in the last years, Islamic financial markets have started to develop themselves. Now in this part, Islamic equity indexes and Islamic bonds will be presented.

1) Islamic equity indexes

Generally speaking, the investment in equities is considered compliant from Islamic legal experts. However, many scholars underline the deep difference among an Islamic partnership (mushāraka), that assumes a complete participation to the economic project, and a more modern conventional partnership. Islamic equity indexes linked to markets and areas are Islamic versions of the main global equity indexes submitted with an Islamic filter, that basically operates in two ways$^{19}$:

---

$^{17}$ M. Anwar, International Islamic University of Malaysia, *Islamicity of banking and modes of Islamic banking*.

$^{18}$ Banca d’Italia, Occasional papers number 73 (2010), *Questioni di economia e finanza, finanza islamica e sistemi finanziari convenzionali*, p. 13

- Industrial screening: shares of firms that have for subject the production of illegal goods are considered themselves illegal, or firms that have relationships with banks and financial institutions that allow the interest, make their shares also illegal;
- Financial screening: the equity investment has to respect some financial ratios with the aim of checking that the credit/debit part of the equities is lower than the part relating to real goods.

\[
\frac{Total\ debt}{Equity + Debt} < 33\%
\]

\[
\frac{interest\ income}{total\ revenues} < 5\%
\]

\[
\frac{receivables}{Total\ Assets} < 45\%
\]

In few words, there is an attempt to avoid investments in corporates too much in debt or that have an excess of liquidity not allocated.

The preference for equity investments is very close to the concept of sharing the risk in the Islamic economic vision. Islamic capital markets are, for this, very addressed to equity markets, where there are some national authorities in charge of monitoring the level of compliance of shares within indexes, issuing periodically a list of the compliant shares based on the industrial and financial screenings. More specifically, the management of each Islamic equity index is supervised by a Shari’ah Board that evaluates if shares of a firm can be or not be listed on the market. For investment decisions, in order to decide the assets to own in portfolios, investors can rely on the Islamic indexes, that are likely to be the benchmark for the management of portfolios. In 1999, the Dow Jones Islamic Market Index and the Financial Times and London Stock Exchange Global Islamic Index were launched, as already mentioned in the first paragraph, with the aim of monitoring the trend of the main listed shares.

One last aspect to be highlighted is related to purification: any illegal return is identified and addressed to charity.

2) Islamic bonds - Sukuk

Regarding bonds, the prohibition of ribā made necessary to implement financial instruments being capable of substituting conventional bonds. To go over it, the sukuk reproduces the same cash flows as in
conventional bonds (coupon and repayment of the face value at maturity), relying on sharing the risk of the investment and not on the interest\textsuperscript{20}.

Practically,\textit{sukuk} are bonds issued by national governments and Islamic public authorities through the securitization of assets: the Special Purpose Vehicle (SPV) receives from the issuer the asset that it is going to sell through\textit{sukuk} notes, then subscribed by investors. Funds raised are then invested in projects compliant with the\textit{Shari`ah}, through an Islamic contract/instrument, agreed between the vehicle and the issuer on behalf of the investor. The ownership of assets and, thus, the exposure to risks connected to this ownership justify the profit. At maturity of the bond, investors receive the face value of the capital (at fixed price already agreed), while the ownership of the asset is transferred again to the issuer.

The AAOIFI has standardized until now 15 different type of bonds, such as\textit{sukuk al-mushāraka}, deriving from the transformation of corporates’ assets in bonds, and the\textit{sukuk al-ijāra}, that has as underlying a real estate leasing contract. Generally, the several types of the existing sukuk can be grouped in two categories, according to the contract of the underlying:

\begin{itemize}
  \item \textit{Sukuks} asset-based (\textit{igārah sukuk}), that have as underlying assets some non-mutual activities that return a fixed profit (usually the mark-up) and are close to conventional asset-backed securities;
  \item \textit{Sukuks} equity-based (\textit{mushārakah or mudārabah sukuk}), that, instead, have as underlying assets some mutual activities that return a floating profit based on a profit and loss sharing.
\end{itemize}

According to Standard and Poor’s outlook of 2014, The Gulf Countries were the biggest issuers of\textit{sukuk} as shown from figure 1.1.5. below.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{sukuk_issued_2014.png}
\caption{Sukuk issued – geographical distribution. Source: Standard and Poor’s}
\end{figure}

Let’s give a resume of the main differences among conventional bonds and\textit{sukuk}:

\textsuperscript{20} Miglietta F. (2012), \textit{Bond Islamici alla conquista dei mercati. Opportunità, rischi e sfide dei sukuk}
- **Sukuk** rely on real underlying assets and not financial ones;
- **Sukuk** give to the owner a right of property and not a financial right to have cash flows;
- There’s no credit relationship between the issuer and the investor but a contractual relationship that depends on the contract used;
- **Sukuk**’ returns do not depend on forecasts of interest rates but from the returns of the project financed or from the volatility of prices;
- The issuer has limits in using the assets because he is also the project manager of the underlying asset.

Furthermore, **sukuk** offer advantages in terms of governance to investors, because the shell of the relationship among parties results to be more stable due to the role of the SPV in the management of the cash flows, and, also, in terms of managing liquidity: securitization makes future cash flows in instant cash flows for the issuer, and offers the possibility to exchange **sukuk** on a secondary market.

It must be underlined that, conversely from equities, **sukuk** can be issued from the same public authorities or private companies that issued conventional bonds, and that there’s no need to be Muslim to issue them.

Issued for the first time in Malaysia in 2000, **sukuk** are the niche that has registered the highest increasing rates in the last 15 years: issuances have increased from 0.8 billion of dollars in 2002 to 37 billion in 2007 and 50 in 2010\(^21\).

3) Islamic investment funds

The management of savings in conventional investment funds has pieces of not-compliance with the **Shari’ah** law: from one side the Islamic fund cannot have in its portfolio financial instruments for which it is paid a fixed interest, and from the other side there is the screening of shares in which the funds can invest.

Furthermore, the speculative profile and the high level of leverage that characterize some conventional funds (hedge funds), make them not compliant with **Shari’ah**.

Managerially speaking, the shell of these Islamic funds has been set through the **mudāraba** composition, where underwriters give the capital to invest, while the manager shares the results of the fund with the other members. Another form of Islamic fund is the **wikālah**, where the manager acts as **wakil** (broker) on behalf of the underwriters, receiving a fixed return, usually as a percentage of the fund’s value\(^22\).

\(^{21}\) Standard & Poor’s, 2010 Report
\(^{22}\) S. Sandami, University of Leicester (2006), *Islamic mutual funds analyzed for Dubai Islamic Bank*
According to some researches, there are at least 1200 Islamic funds in compliance with the Shari’ah, with a capital managed of at least 50 billion of dollars and about 500 instruments\textsuperscript{23}. The most common Islamic funds are equity funds. Next to these, there are various kind of funds linked to real and tangible assets, especially linked to real estate trades, and funds related to real estate leasing. There are also funds that invest in real goods as commodity funds. Bonds’ funds, that invest in real estate sukuk, have been introduced few years ago, even though they are spreading rapidly.

From a geographical point of view, investments are focused especially in Asia and Middle East, but, also in Europe and US, asset management companies start to create their own funds: UBS, BNP, Pictet and Permal were the first to launch Shari‘ah compliant funds.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1_1_6.png}
\caption{Number of Islamic funds worldwide.}
\end{figure}

\textsuperscript{23} IFSB (2016), Islamic financial services industry stability report 2016, p. 21
1.2. Development of Islamic Finance in the global financial system

After having introduced the Islamic financial principles and instruments, some data about the growth and the development of this system will be shown.

Before going deeper to the analysis of Islamic banking and capital markets’ developments, this paragraph gives a glance of the general development and size of the Islamic financial system through the years, presented thanks to recent reports of Islamic banks, rating and consulting companies.

Initially delimitated to Muslim countries, Islamic finance today is growing fast also outside Islamic borders. Beside cultural, economic, financial and political variables that are stimulating the growth, there is also an increasing interest from western economic and financial systems, that saw the potentialities of the Islamic finance not only as an alternative to the conventional financial system, but also as a factor ables to stimulate growth.

According to data released by the Islamic Financial Services Board (IFSB), the global Islamic financial services industry reached an overall total value of 1.88 trillion of dollars at the beginning of 2015 (see table 1.2.1 for details), developing in a series of economic, industrial, geopolitical, financial challenges.

In comparison with the report of 2015, so with an analysis of 2014’s data, the global sukuk outstanding has declined by 1.4% (USD 294.7 billion in 2014), while Islamic funds’ assets have decreased by 6.3% (75.8USD billion in 2014). In contrast, takaful contributions is increased by 8.4% (21.4USD billion in 2014), while regarding the most important segment, banking assets have grown moderately at 1.4% (1.48 USD trillion in 2014). The reason for this modest performance could be related to the depreciations in the exchange rates in key financial markets as Iran, Malaysia and Turkey24.

Do not forget that this amount of assets traded in the markets, even though it represents a huge amount, is still less than 5% of the total global financial assets.

24 IFSB (2016), Islamic financial services industry stability report 2016, p. 7
Table 1.2.1. Islamic finance segments by region (USD billion, 2015). Source: IFSB 2016 report

<table>
<thead>
<tr>
<th>Region</th>
<th>Banking Assets</th>
<th>Sukuk Outstanding</th>
<th>Islamic funds’ assets</th>
<th>Takaful Contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>209.3</td>
<td>174.7</td>
<td>23.2</td>
<td>5.2</td>
</tr>
<tr>
<td>GCC</td>
<td>598.8</td>
<td>103.7</td>
<td>31.2</td>
<td>5.2</td>
</tr>
<tr>
<td>Mena</td>
<td>607.5</td>
<td>9.4</td>
<td>31.2</td>
<td>10.4</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>24</td>
<td>0.7</td>
<td>1.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Others</td>
<td>56.9</td>
<td>2.1</td>
<td>15.2</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>1496.5</td>
<td>290.6</td>
<td>71.3</td>
<td>23.2</td>
</tr>
</tbody>
</table>

Table 1.2.2 below gives the growth in terms of Islamic assets (USD billion dollars) in the last 20 years until the 1.88 trillion dollars reached in 2015.

Table 1.2.2. Growth of global Islamic Assets in billion dollars. Source: Bloomberg and KFH

An interesting chart to show is figure 1.2.1 that gives the number of jurisdictions reached by Islamic finance and the ratio among Islamic banking and total domestic banking assets.
As shown by the chart, Iran and Sudan are the only countries providing fully Shari’ah compliant banking systems.

The minimum level of share to consider the Islamic banking system as systematically significant is 15%. Djibouti is the last country to obtain this result.

From this chart, it can be easily seen that the majority of Muslim countries share both Islamic financial systems as conventional western banking systems, with just four countries that share at least 50% of total banking assets as given by Islamic banking system.

Last interesting chart to present to have a general view of Islamic finance is figure 1.2.2. below that gives the shares of Global Islamic Assets.

*Figure 1.2.1. Source: ISFB report 2016*
1.2.1. Islamic banking, capital markets and insurance industries

The Islamic banking sector continues to be the dominant segment, representing the 80% of the global Islamic financial assets. As shown in the previous tables, all these banking assets account for almost 1.5 trillion dollars, with a y-o-y growth of a moderate 1.4%, due as said to depreciations of several Islamic exchange rates.

An interesting analysis is done by seeing the previous figure 1.2.1 and looking at the expansion of Islamic banking services in the domestic market share. The figure indicated that 17 jurisdictions have experienced an increase in market share for Islamic banking between 2014 and 2015 (first quarter). The GCC countries have, moreover, backed more the penetration of the Islamic banking sector, as for example Oman that from the 0% in 2012 achieved the 6.5% of the 2015. Saudi Arabia reached 49% of the total banking assets, Qatar and Kuwait have almost 39% and 26%. Bahrain has 13.5% share for Islamic banking services in its domestic banking market. These GCC growths have sometimes backed, as the Bahrain case, by government policies to support Islamic finance. The Central Bank of Bahrain has addressed the Bahraini Islamic banks to explore mergers in order to create relevant institutions in terms of size. In the UAE, where there was at the first quarter of 2015 a share of 18.4%, the central bank has decided to
include *Shari’ah* compliant securities in the range of instruments it accepts as collateral for accessing liquidity.\(^{25}\)

Pakistan is another country where strong demand from the population, combined with the regulatory support, is rapidly growing the Islamic banking sector with a 11% of market share, with central bank’s forecasts for 2018 of 15% share of its total banking assets, as reported by IFSB.

Talking about the Sub-Saharan African region, IFSB measured how Islamic banking services have been offered across many countries in the last years, including Kenya, Senegal, Niger, Nigeria and South Africa, with new Islamic banking laws and regulations also in Morocco and Algeria.

The top ten Islamic banking jurisdictions by assets account for 92.1% of the global Islamic banking industry (IFSB report).

To conclude the section dedicated at the view and growth of Islamic banking assets, chart 1.2.3. below gives a trend for the last 7 years for the Islamic banking growth.

![Islamic Banking Assets Growth Trend 2008-2015](image)

**Figure 1.2.3. Source: IFSB Workings**

IFSB continues its research with an analysis of the growth of Islamic banking assets, financing and deposits patterns across 11 Islamic banking systems, including Bahrain, Bangladesh, Indonesia, Jordan, Kuwait, Malaysia, Pakistan, Qatar, Saudi Arabia, Turkey and UAE, that account for 71.6% of the total Islamic banking assets.

\(^{25}\) **IFSB (2016), Islamic financial services industry stability report 2016, p. 10**
The chart above gives the compound growths for each sector in different periods. The most interesting period to consider is 2008-2014, also the longest, that tells us that all the three sectors in the sample analyzed at least grew by 15%. It is worth to mention that assets had a slowdown considering the two periods among 2008 and 2014. This is due to exchange rate depreciation in emerging markets, falls of economic growths, low energy prices and also weaker investors. Comparatively, the financing and deposit sectors did better, with Islamic financing growing constantly through years, and Islamic deposits reaching higher levels of growth.

Last chart below about Islamic banking regards the growth from 2013 to 2014 of these three sectors among 9 of the 11 countries analyzed.

---

Doubtless, there are some peaks as financing activities in Pakistan, with a compound growth of 30%, Bangladesh, with a growth of almost 23%, Malaysia, 20% of growth with a broader government agenda to reach 40% in 2020, Kuwait with a 17.5% of annual growth, and the UAE with a growth of 25%. Pakistan has also higher levels of growth in the other two sectors, due to a general development of Islamic finance in the country.

Growing awareness of Shari’ah compliant propositions and greater acceptance by the general public are key factors driving Islamic banking growth in the UAE and Bangladesh.

Jordan experienced a negative rate of financing growth in 2014, mainly linked to one major Islamic bank in the sample. 

IFSB made also reports and forecasts about the global economic situation, that could end in affecting the resilience of Islamic banking systems. The downside risks to the world economy become more pronounced in the wake of weakening commodity prices, a slowing Chinese economy and reducing financial inflows to the emerging markets. Global trade’s growths are reported to mark down for 2016 and 2017, due to a recovery of Chinese economy.

In this paragraph, the resilience of Islamic banks during a normal period (2011-2014) is analyzed, while in the last chapter the resilience of these banks linked to periods of crises will be analyzed.

The IFSB analyzed 59 Islamic banks across 11 Islamic banking markets, the ones already selected few rows above, and it has given results in terms of profitability, asset quality, capitalization, structure of funding, leverage, liquidity and financing exposure.

Here below, only the most interesting results will be presented.

In terms of profitability 4 key factors were analyzed in this sample: ROA, ROE, Net Profit Margin and Cost to Income for the 2013 and 2014. Let’s take a look of results with the chart below.

<table>
<thead>
<tr>
<th>Return on Assets</th>
<th>Return on Equity</th>
<th>Net Profit Margin</th>
<th>Cost to Income</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2014</strong></td>
<td>0.95%</td>
<td><strong>2014</strong></td>
<td>8.96%</td>
</tr>
<tr>
<td><strong>2013</strong></td>
<td>0.89%</td>
<td><strong>2013</strong></td>
<td>8.89%</td>
</tr>
</tbody>
</table>

Table 1.2.3. Selected Islamic finance stability indicators. Source: IFSB 2016 Report

Profitability of the Islamic banking industry faced a recovering trend after its decline in 2009 (see figure 1.2.6.). The data above, indeed, prove how the profitability levels slowly increased among 2013 and 2014 in all the four indicators. Both ROA and ROE increased by 6-7 basis points.

---

27 IMF (2016), *World Economic Outlook, January*
Although profitability rates improved, country level performances displayed mixed results. According to the report of IFSB, the profitability levels in the GCC countries improved with the exception of Saudi Arabia, due to new consumer finance rules issued by the Saudi Arabian Monetary Agency in 2014. Other GCC markets, like Bahrain, Kuwait, Qatar and the UAE, registered improvements in their ROA, with the UAE also improving its 2008 ROA (1.34% in 2008 and 1.35% in 2014), however its ROE is still below the 2008 level.

Bahrain improved its levels due to an accelerated credit demand in the country, largely supported by retail banks. However, despite the recovery, Standard & Poor’s downgraded the country’s sovereign rating from BBB to BBB-. Elsewhere, such as in South-East Asia, profitability levels of Indonesia and Malaysia declined, with significant drops especially in ROE levels. Indonesia went from 11.6% of 2013 to 5.9% of 2014, while Malaysia’s ROE was 8.8% comparing to the 10.5% of 2013.28

Dealing with liquidity, its management changes according to regions. Based on the CIBAFI Global Islamic Bankers’ Survey entitled “Risk Perception, Growth Drivers, and Beyond”, for instance GCC countries did not consider liquidity management as a primary concern, due to strong liquidity positions of most banks of the region. However, improving liquidity positions still remains a priority for all the countries.

An interesting reason to decreasing liquidity is given by a study of PwC that analyzed and suggested four areas of weakness, namely: (a) difficulty of executing trades; (b) reduction in market depth; (c) increase in volatility; and (d) bifurcation in liquidity – that is, a reduction in liquidity in assets which have traditionally been less liquid29.

---

28 IFSB (2016), Islamic financial services industry stability report 2016, p. 84
According to IFSB, in 2015 and 2014, liquidity conditions of Islamic banks have worsened, with increasing financing-to-deposit ratios (FDRs) and lower short-term asset–liability ratios (SALRs), as shown by the following two charts.

**Islamic Banking Average Total Financing to Deposits**

*Figure 1.2.7. Source: IFSB 2016 Report*

**Islamic Banking Short-term Asset–Liability Ratio**

*Figure 1.2.8. Source: IFSB 2016 Report*
Another important banking measure is the capitalization. Islamic banking capitalization has always been much higher than conventional banks. In the last chapter, it will be shown the differences among the western and the Islamic capital adequacies and Tier 1 capital during the 2008 crisis, now charts and tables will be presented to show the Islamic banking capitalization for the last years.

![Islamic Banking Average Capital Adequacy Ratios](image)

*Figure 1.2.9. Source: IFSB 2016 Report*

The average total capital and Tier-1 capital adequacy across the Islamic banking sample stood at 15.79% and 13.89%, respectively, still above the capitalization levels imposed by the respective national regulators.

Analyzing individually the Capital adequacies and Tier 1 Capitals of the countries in the sample, the 2016 IFSB Report states that the GCC countries had the highest regulatory capital levels, even though in deceasing levels as all general trends\(^{30}\).

Leverage is the last Islamic banking area this paragraph deals with. Debt might have financial instability implications for domestic and global financial systems. The leverage ratio is the capital that should be held as a percentage of assets on a bank’s balance sheet. It indicates the capacity of banks on managing debt.

According to the IFSB 2016 Report, Islamic banks have maintained modest levels of leverage exposure over the years, reaching an average of 10.68% as at end-2014 (see figure 1.2.10 below). Individual country levels show similar sustained trends over the past few years.

---

\(^{30}\) IFSB (2016), *Islamic financial services industry stability report 2016*, p. 95
After a deep analysis of the Islamic banking and its development through the last years, it is time now for analyzing and discussing another important Islamic financial sector: Islamic capital markets; in particular, three sectors will be discussed that most interest the world today: Sukuk (Islamic bonds), Shari’ah compliant equities and Islamic funds.

IFSB 2016 Report claims in its capital markets’ paragraph “Although finishing with resilient performances towards the end of 2014, the three sectors of the Islamic capital markets (ICM) have experienced some volatile movements and setbacks recently, including contractions in returns and asset values. This is akin to the trends observed in the global capital markets, particularly in those markets characterized as emerging, underpinned by a moderation in the global economic growth with risks shifting to the emerging markets and its associated macroeconomic rebalancing pressures. These factors, plus certain political decisions have also impacted the growth momentum of the ICM in 2015.”

Even though there has been this volatility in Islamic capital markets, they still continue to attract foreign investors and issuers, with increasing trends in the last 10 years.

Charts below give resumes for these results.

---

31 IFSB (2016), Islamic financial services industry stability report 2016, p. 13
As it can be seen, there is a constant growth through this last 10 years (CAGR 19.56% among 2009 and 2014) with some volatility, due as said to government policies or exchange rates movements. For example, the Central Bank of Malaysia in 2015 has stopped its short-term liquidity management program and, so, new issuance of sukuk, and considering that this country is the biggest issuer of Islamic bonds (57.6% of market share), the USD total value naturally decreased in 2015\textsuperscript{32}.

The sectors of issuances are also interesting to present with chart 1.2.12 below showing that governments and financial services were the most issued sectors in 2015 (43.48% and 34.43% respectively).

Figure 1.2.13 gives, instead, the changing trend in terms of maturity of the issued sukuk for the last 5 years. While in 2010 the majority of the bonds were issued with maturity of less than one year, in 2015 60% of new issues had maturity between 3 and 10 years. This is also mostly due to government policies, as, in particular, Malaysia strongly backed long-term issuances.

\textsuperscript{32} IFSB (2016), Islamic financial services industry stability report 2016, p. 96
When dealing with bonds, it is important to show the yields they offer, their changes and the comparison among different nationals’ bonds, in order to have a full understanding of their performances.

IFSB 2016 Report offers (see figure 1.2.14. below) a comparison between US Government yields and Islamic sukuk yields, considering the changes (in bps) for the last two years.

Figure 1.2.12. Source: Bloomberg, IFSB 2016 Report

Figure 1.2.13. Source: Bloomberg, IFSB 2016 Report

When dealing with bonds, it is important to show the yields they offer, their changes and the comparison among different nationals’ bonds, in order to have a full understanding of their performances.

IFSB 2016 Report offers (see figure 1.2.14. below) a comparison between US Government yields and Islamic sukuk yields, considering the changes (in bps) for the last two years.
According to IFSB, the reason for higher changes in Islamic USD sukuk is due “on account of a number of global, regional and national factors. On the global front, the meetings of the US Federal Reserve’s Open Market Committee (FOMC) were closely followed by investors in anticipation of possible US interest rate increases. Towards the end of 2015, with increased expectations of a US interest rate increase, yields on US Dollar sukūk instruments have generally increased year-on-year across various jurisdictions, while on a regional level, the emerging markets sell-off has continued into 2015, the trend pushed forward by an improving US economy and depreciations in emerging market currencies. This has led to foreign investors offloading local-currency bonds and sukūk in favour of US and other “safe-haven” currency-denominated Treasury and government securities. In addition, some prominent issuers of sukūk, notably Bahrain, Saudi Arabia and Turkey, have seen a rise in the yields expected for both bond and sukūk instruments, as a result of macroeconomic pressures and other jurisdiction-specific factors.”


33 IFSB (2016), Islamic financial services industry stability report 2016, p. 17
Islamic listed equity securities, as already said, are a subset of broader global stock markets. Thus, volatility and changes in the prices in global stock markets have an impact also on Islamic markets. *Shari‘ah* screenings attempt to exclude those securities not in compliance with *Shari‘ah* principles, thus, this makes Islamic equity indexes smaller than the conventional ones.

According to IFSB 2016 Report, “In recent years it appears that *Sharī‘ah*-compliant equity indices have outperformed their larger conventional peers, largely due to their different sectoral composition”. (see table 1.2.4 below).

In reporting these performances, it must be underlined the different composition of the two indexes: DJ Islamic is composed by 2,653 stocks for a total capitalization of 23,181 billion dollars, while the DJ Global index is composed by 7,285 stocks that together amount for 51,797 USD billion\(^34\).

<table>
<thead>
<tr>
<th></th>
<th>Dow Jones Global Index</th>
<th>Dow Jones Islamic Market Index</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2015 (YTD)</strong></td>
<td>-4.23%</td>
<td>-3.08%</td>
</tr>
<tr>
<td><strong>3yr</strong></td>
<td>23.5%</td>
<td>25.7%</td>
</tr>
<tr>
<td><strong>5yr</strong></td>
<td>32.8%</td>
<td>37.6%</td>
</tr>
<tr>
<td><strong>10yr</strong></td>
<td>37.5%</td>
<td>59.9%</td>
</tr>
</tbody>
</table>

*Table 1.2.4. Total Returns of Dow Jones Global Index vs Dow Jones Islamic Market World Index. Source: IFSB 2016 Report*

The comparatively better performances of DJ Islamic is partially attributable to its constituent stocks, which, following *Sharī‘ah* principles, have abstained from investments in the conventional financial sector. DJ Islamic major exposure is to technology (23.1%) and health care (19%) sectors, whereas DJ Global major exposure is to financial (22.4%) and industrial (13.0%) sectors\(^35\).

Availibility of Islamic indexes/equities enables the growth and development also of Islamic funds.

As already mentioned in the first paragraph, there are at least 1200 Islamic funds in compliance with the *Shari‘ah* law, that have grown from 800 in 2008 to these 1200 in 2015 (50% of growth).

Interesting charts to show are the Islamic Fund Assets by Domicile (Figure 1.2.15) and the composition of these funds by assets (Figure 1.2.16)

---

\(^{34}\) Dow Jones, IFSB  
\(^{35}\) IFSB (2016), *Islamic financial services industry stability report 2016*, p. 21
Last Islamic financial sector to present is the *takaful* (Islamic insurance) market. Since this financial market is not the main object of this paper, a brief presentation will be just made.

According to Swiss Re, the global insurance market had a fair growth in 2014. The global real premium growth has been 2.9% in advanced economies, while 7.4% in emerging countries, both these results driven mainly by the growth of the Chinese industry and better sale performance in Europe and Japan.  

Similar to the global growth of the insurance sector, the global *takaful* industry also had a growth in 2014 (15.5% YoY) compared to 2013, when the market reached its lowest level (2.8% of y-o-y growth including Iran). Chart 1.2.17. below gives the growths of the last 7 years, not considering Iran due to not fully available data.
The decomposition of growth rates is also useful to see (see. Figure 1.2.18.)

According to the 2016 IFSB Report in its takaful section, and considering only a sample of available data regarding takaful contracts, “gross contributions growth rates were positive in both the conventional and takāful sectors with significant variation over the regions in 2014. In the GCC region, both conventional and takāful sectors had positive growth rates of nearly 15. On the other hand, growth of the takāful industry was astounding in the East Asia and Pacific (EPAC) region compared to the conventional segment. In 2014, takāful grew at 19.4% in this region, the highest growth rate globally, thanks to a figure of over 25% in Malaysia, while growth in the conventional segment remained at 0.7% in that year. In spite of the fact that the takāful industry kept pace with its conventional counterpart in Algeria, it is the
ten-fold growth performance of the takāful sector compared to the conventional sector in Egypt (22.4% in takāful and 2.2% in conventional insurance) that accounted for the robust growth in takāful in North Africa. Conventional segments outperformed the takāful sector only in the South Asia (SASI) region in 2014, though to a limited extent. As regards other regions, the conventional sector contracted in the Levant, while the takāful sector grew by around 12.8% in 2014. This is mostly due to contraction of the conventional sector in Turkey (in both nominal and USD terms).”

As already computed for the banking sector, it is interesting to see the share of Takaful assets, in this case gross premiums, over the total Insurance domestic gross premiums for a range of selected countries (see chart 1.2.19. below).

The share indicates that the gross premiums exceed 15% only in Saudi Arabia, Iran, Bahrain, Malaysia, Kuwait, Qatar and Bangladesh. However, low penetration rates in the other countries below the threshold, combined with high population growths and a rising middle class, indicate that there is a great opportunity for a further growth of the takāful sector.37

37 IFSB (2016), Islamic financial services industry stability report 2016, pp. 24-26
As regards to the *takaful’s* resilience and stability, it is important to underline it because this sector helps to secure both its own health as the stability of other segments which have connections with the insurance sector.

Resilience for the insurance sector may be defined as its ability to deal with shocks that can affect profits, balance sheets and investment decisions, and the way it recovers from the effects of shock periods.

First of all, let’s remember that the insurance industry works differently from the banking sector: for example, the life insurance segment typically collects long-term funding from its clients and invests these funds in medium/long term financing. Thus, there is a negative duration mismatch. Furthermore, in general insurance, clients have no option to withdraw their funds, so insurance companies are much less exposed to liquidity risks.

According to the Deutsche BundesBank 2014 Monthly Report, resilience in the insurance sector can be evaluated in two categories: external conditions, that refer to economic and regulatory conditions that affect the industry overall, and internal conditions, more related to internal structure and operational aspects of the industry.

Evaluation of internal conditions requires the analysis of financial ratios and balance sheets of operators, hence, a couple of charts are shown according to the analysis made by the IFSB 2016 Report on a sample of 4 countries due to the availability of data.

The first figure (1.2.20.) presents the risk retention ratio in general *takaful* for the 2010-2014 period, defined as the ratio of net premiums to gross premiums, and it is a reflection of the insurers’ underwriting strategy as it shows what portion of the risk is passed to the reinsurer operator.

Figure 1.2.21. shows ROAs for the selected countries for the period considered. Low levels of ROA might be referred to increasing costs or slower global growth or decline in oil prices.

Last interesting chart (1.2.22. below) to show is the investment composition for aggregate funds.

- Malaysia
- Saudi Arabia
- Qatar
- Pakistan

Figure 1.2.20. Source: IFSB Workings


- Malaysia
- Saudi Arabia
- Qatar
- Pakistan

Figure 1.2.21. Source: Takaful Operators, IFSB Workings
The IFSB 2016 Report concludes its workings with final considerations. Overall, the global Islamic banking sector, which accounts for almost 80% of the global Islamic financial system, remains concentrated in few Middle Eastern and Asian countries, particularly susceptible to current macroeconomic up and down, thus ranked by international ratings agencies with cautious outlook. However, the Islamic banking sector, as the Board declared, appears to be sufficiently capitalized above minimum regulatory requirements, to have a deteriorated short-term liquidity ratio and a large exposure to the real estate sector that is decreasing. In this situation, it becomes important for policymakers to conduct and to require robust stress tests to identify possible area of vulnerability.

Regarding Islamic capital markets, despite weak investor feelings in global capital markets, the demand for new sukuk issuances has remained consistent, with an increasing gap between the demand and the supply of these Islamic bonds. In general, the sukuk market has shown resilience and there have been no instances of defaults since 2010.

For the takaful sector, it is more difficult to give a general view due to limited available data. Nevertheless, the takaful sector appears relatively robust, its position has been enhanced by advances in solvency regulation in key markets and with gradual expansion.
1.2.2. A comparison between Islamic and conventional finance

Practically, which are the main differences between Islamic and conventional finance? What are the risks of Islamic products? Is Islamic finance really an ethical way to invest? How is an Islamic bank’s balance sheet composed? This paragraph gives answers to these questions.

Islamic financial products are essentially based on particular principles that are used in varying combinations, and have some distinct features that differentiate from conventional financial products. First of all, let’s analyze the risks associated with Islamic finance with those faced in the western financial system (see table 1.2.5).

As already mentioned in the first chapter, Islamic financial systems have developed a wide range of instruments compliant with the Shari’ah law. In contrast to conventional finance, Islamic finance extends its scope beyond the traditional role of financial intermediation by acting as a property developer, providing funding via equity injections for customers or by trading in tangible assets.

The key distinguishing feature of an Islamic financial institution is its underlying contractual relationship with its customers.

Generally, financial risks faced by Islamic finance are similar to those of conventional finance, but with additional elements that require consideration when managing its financial risks. Credit risk refers to the probability of default of the counterparty, that may fail to meet its obligations. For what regards Islamic finance, since there are Profit and Loss Sharing contracts, losses might also occur in case of low revenues for sharing-based assets.

Market risk for an Islamic financial institution may arise in the form of unfavorable price movements, such as regarding equity and commodity prices, benchmark rates, foreign exchange rates, yields and volatility in the value of tradable or leasable assets. Portfolios of conventional financial institutions consist mainly of loans, financial leases, equities, commodities, bonds and so on, thus, the exposure to real economic sectors is not direct but follows from non-performing loans. Credit and market risk are therefore two of the most important risks of such portfolios. In contrast, Islamic banks mostly purchase real assets and sell them with deferred payments that include a mark-up, thereby creating an asset based financial transaction, and, so, not dealing entirely with interest based instruments. This doesn’t mean Islamic institutions are immune from interest rate risks, but this exposure occurs indirectly via price mark-ups used for deferred sale and lease-based transactions. Moreover, the asset-based nature of Islamic finance

---

38 European Central Bank, Occasional Paper Series n. 146, June 2013, *Islamic Finance in Europe, p. 32-33*
means that Islamic banks will always be exposed to a certain inflationary pressure when trading in real assets.\textsuperscript{39}

Similar to conventional finance, Islamic finance also faces the challenge of managing its assets and liabilities mismatch.

Operational risk is the risk of loss resulting from external risks or from the inadequacy or failure of internal processes, including the risk of failure of technology and systems. Islamic finance faces the same operational risk of the conventional finance but moreover, it also faces the risk of contracts not being in compliance with \textit{Shari‘ah} principles and the fiduciary risk.

<table>
<thead>
<tr>
<th>Type of financial risk</th>
<th>Items of concern for conventional banks</th>
<th>Items of concern for Islamic banks</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{Credit risk}</td>
<td>Default value at risk</td>
<td>Default value at risk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Income expectation for sharing-based assets</td>
</tr>
<tr>
<td>\textit{Market risk}</td>
<td>Volatility of market variables</td>
<td>A lower degree of market volatility</td>
</tr>
<tr>
<td>\textit{Liquidity risk}</td>
<td>Maturity mismatches</td>
<td>Maturity mismatches</td>
</tr>
<tr>
<td>\textit{Operational risk}</td>
<td>Hardware/system problems and fraud</td>
<td>Hardware/system problems and fraud</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compliance with \textit{Shari‘ah} rules</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fiduciary risk</td>
</tr>
<tr>
<td>\textit{Legal risk}</td>
<td>Compliance with local legal framework</td>
<td>Compliance with local legal framework</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compliance with \textit{Shari‘ah} rules</td>
</tr>
<tr>
<td>\textit{Capital structure}</td>
<td>Level of capitalization</td>
<td>Level of capitalization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Composition of capital instruments issued by the institution</td>
</tr>
</tbody>
</table>

\textit{Table 1.2.5. A comparison of the financial risks facing conventional and Islamic banks. Source: KFH Research}\textsuperscript{39}

\textsuperscript{39} European Central Bank, Occasional Paper Series n. 146, June 2013, \textit{Islamic Finance in Europe}, p. 34-35
Second question to answer is if there is a real connection among ethical and Islamic investments. According to the Islamic scholar Baljeet Kaur Grewal, ethical investments refer to an approach that integrates social and environmental concerns into investment decision and making processes, whereby firms that meet certain standards of corporate social responsibility are identified and selected for the investment. Islamic financial institutions take into account mostly non-financial factors when analyzing firms to invest in. As already mentioned, this includes analyzing different initiatives, environmental management, product safety and other company behavior, and most important making industrial screening, excluding firms in industries such as alcohol, tobacco, gambling and weapons. In conclusion, Islamic finance seeks to promote activities that are beneficial to the planet and to remove those that may prove harmful.

Lastly, how is an Islamic balance sheet computed? Thanks to various researches, it is presented a typical Islamic bank balance sheet (see tables 1.2.6. and 1.2.7. below).

For the Islamic banking system, the core business is mainly represented by mudāraba contracts, used both for raising funds with the investment accounts as to invest these funds for long-term assets, while for the conventional banking system is the credit activity. Thus, mudāraba are considered deposits and, hence, liabilities, but in the Islamic financial system they are distinct liabilities with the respect to the other ones. Indeed, the liability side of the balance sheet is based on the two-windows model, where liabilities are divided in two windows: one for granted financial deposits, with a 100% reserve, and one for not granted investment accounts (table 1.2.6.).

---

40 European Central Bank, Occasional Paper Series n. 146, June 2013, Islamic Finance in Europe, p. 36, Roni Hamaui, Marco Mauri (2009), Economia e finanza Islamica, il Mulino, Muhammad Umer Chapra (1985), Towards a Just Monetary System
<table>
<thead>
<tr>
<th>Islamic Bank</th>
<th>Conventional Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deposits:</strong></td>
<td><strong>Deposits:</strong></td>
</tr>
<tr>
<td>- Retained (wadi'a)</td>
<td>- Demand deposits</td>
</tr>
<tr>
<td></td>
<td>- Debts with other financial institutions</td>
</tr>
<tr>
<td><strong>Investment deposits:</strong></td>
<td><strong>Long-term deposits</strong></td>
</tr>
<tr>
<td>- Restricted/unrestricted</td>
<td></td>
</tr>
<tr>
<td>- With different maturities</td>
<td></td>
</tr>
<tr>
<td>- With other banks or retail</td>
<td></td>
</tr>
<tr>
<td><strong>Equity (mushāraka)</strong></td>
<td><strong>Equity</strong></td>
</tr>
<tr>
<td><strong>Debts</strong></td>
<td><strong>Debts</strong></td>
</tr>
<tr>
<td><strong>Other Liabilities:</strong></td>
<td><strong>Other Liabilities:</strong></td>
</tr>
<tr>
<td>- Solidarity fund (zakā)</td>
<td></td>
</tr>
</tbody>
</table>

Table 1.2.6. Main liabilities of an Islamic and a conventional bank. Source: Saidane (2011), Bahrain Islamic bank’s balance sheet

For what concerns the asset side, Islamic banks do not hold credit assets, but they have a wide range of real assets, with different maturities and risk-return profiles. Beyond these contracts, inside the Islamic balance sheet, there are conventional assets, financial services, inventories, bonds (sukuk) and loans to other banks (table 1.2.7).

<table>
<thead>
<tr>
<th>Islamic Bank</th>
<th>Conventional Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cash and reserves</strong></td>
<td><strong>Cash and reserves</strong></td>
</tr>
<tr>
<td><strong>Interbank loans (commodity murābaha)</strong></td>
<td><strong>Interbank loans</strong></td>
</tr>
<tr>
<td><strong>Sukuk</strong></td>
<td><strong>Bonds and derivatives</strong></td>
</tr>
<tr>
<td><strong>Non-equity investments:</strong></td>
<td><strong>Non-equity investments:</strong></td>
</tr>
<tr>
<td>- Cost-plus sales (murābaha)</td>
<td>- Loans</td>
</tr>
<tr>
<td>- Deferred purchases (salam and istisnā)</td>
<td>- Leasing</td>
</tr>
<tr>
<td>- Leasing (ijāra)</td>
<td></td>
</tr>
<tr>
<td><strong>Equity investments:</strong></td>
<td><strong>Equity Investments:</strong></td>
</tr>
<tr>
<td>- Profit share (mudāraba)</td>
<td>- Joint Venture</td>
</tr>
<tr>
<td>- Joint-venture</td>
<td>- Other investments</td>
</tr>
<tr>
<td>- Other investments</td>
<td></td>
</tr>
<tr>
<td><strong>Financial services and fixed assets</strong></td>
<td><strong>Financial services and fixed assets</strong></td>
</tr>
</tbody>
</table>

Table 1.2.7. Main Assets of an Islamic and a conventional bank. Source: Saidane (2011), Bahrain Islamic Bank’s balance sheet
1.3. Islamic finance in Italy

In the last 15 years, the western attention to the Islamic finance model has always been increasing. From one side, conventional financial institutions have developed Islamic products, services and institutions, and from the other side, many US and European intermediaries (i.e. Citigroup, Deutsche, HSBC, UBS, Standard Chartered) have created “Islamic windows”, also called subsidiaries or branches (internal offices legally and economically independent), that offer Islamic financial products and services.\(^{41}\)

For what concerns the European Union, this growth of the Islamic finance has also been backed by the fact that the Muslim community accounts for 4.6% (17 million people) of the total population.\(^{42}\) The European country that mainly opened itself to Islamic finance is the UK. Italy is one of the most rapidly developing markets in Europe. According to market data, it hosts almost 1.5 million Muslim people, which represents 32.9% of the total foreign resident population and 3% of the total national population.\(^{43}\) Islamic retail banking deposits among Italy’s diverse Muslim community reached 5.8 USD billion and generated revenues of 218.6 USD million in 2015, with these figures rising to 33.4 USD billion and 1.2 USD billion respectively by 2050\(^{44}\).

It is, anyway, clear that Italy is most interested to Islamic finance for 3 main reasons:\(^{45}\):

- The Italian supply of Islamic financial products and services;
- The collection of Islamic people’s money through Italian issuers and intermediaries, and through the use of conventional financial instruments in compliance with the Shari’ah law;
- The investments implemented in Italy from Islamic investors with the conventional financial laws.

While this last profile, since it is governed by the conventional financial laws, doesn’t suppose many problems, for the first two activities it is worth to dedicate a paragraph to better explain their regulation and compliance to the Italian laws.

\(^{41}\) IMF (2007), *Introducing Islamic banks into conventional banking system*
\(^{42}\) The Pew forum of religion and public life (2010), *Muslim Networks and Movements in Western Europe, Analysis.*
\(^{43}\) Caritas/Migrantes (2011), *Il 21° dossier statistico immigrazione, Oltre la crisi, insieme*
\(^{44}\) European Central Bank, Occasional Paper Series n. 146, June 2013, *Islamic Finance in Europe, p. 27*
\(^{45}\) CONSOB (2014), *Quaderni Giuridici, La finanza Islamica nel contesto giuridico italiano, p. 36*
1.3.1. Regulation and supervision

With regards to the second point above (the supply of Islamic financial products by Italian and non-Italian institutions), there’s the necessity to wonder about the compatibility of the Italian and conventional laws with the Islamic products.

To answer it, it is useful the IOSCO (International Organization of Securities Commissions) 2004 and 2008 Report, declaring that there are no compatibility problems among Islamic financial services and conventional ones, and, so, that there’s no need to generate any specific rule due to the fact that aims and principles of the IOSCO can be applied also for Islamic finance.46

The Organization in particular underlined how, since the disclosure of the information material is a main principle of the regulation, any kind of Islamic financial product must be combined by the communication of the information material to deliver to investors.

Most importantly, if there are Shari’ah compliant financial products, the material should include the disclosure of Shari’ah advisors, their role and their duties, and the declaration that the products offered are Shari’ah compliant.47

These principles are, also, underlined by the more general sentence of the Financial Services Authority (FSA) “no obstacles, but no general favors”48 (to Islamic financial firms). The UK, in granting the authorization to Islamic banks, agreed to give them the same level of protection offered to non-Islamic banks. The same principles apply to Islamic banks: capital and liquidity adequacy, the sound and prudent management, integrity of the operating and control systems.49

Going back to the Italian system, the Bank of Italy, in 2010 in a paper related to the Islamic finance, discussed the regulation problems of an Islamic financial institution entering the Italian market. According to art. 10 of the TUB (Testo Unico Bancario), “banks are those subjects whose reserving activity is the banking one, but that can carry out also other financial activities that are not covered by the rule of law in favor of other intermediaries.”

This definition of banking activity might host the Islamic banking model, as bank specialized in financial services.

The Islamic bank entering the Italian market would be undergone to the supervisory authority, executed by the Bank of Italy, in accordance with the European directives and having regard for the sound and

47 IOSCO (2008), Analysis of the application of Iosco’s objectives and principles of security regulation for Islamic securities products, p. 18
48 FSA (2007), Islamic Finance in the UK, Regulation and Challenges
49 Khan and Porzio (2010), Islamic Banking and Finance in the European Union
prudent management of the subjects supervised, for the general stability, for the efficiency and competitiveness of the financial system, and for the compliance with credit and financial laws.\textsuperscript{50} The main reference criterion for the prudential supervision of Islamic financial institutions would be its capital. Mainly, the opening of an Islamic bank in Italy is possible provided that rules and the supervision are applied. The same opening might also happen through the launch of a subsidiary of an Islamic bank already existed in a EU Member State. In this case, the Member State authority should notice the opening to the Bank of Italy, with the respect of the European passport.\textsuperscript{50}

However, the acceptance of a guarantee scheme for the depositors is an essential prerequisite for receiving the banking authorization.

This participation is mandatory for the banks authorized in Italy (art. 96 TUB), and under no circumstances Islamic banks could be an exception. Nevertheless, according to MiFID (2014/65/CE Directive), any intermediary granting investment services and activities having as object Islamic financial instruments, must provide safeguards to guarantee an appreciation of the same instruments with the aim to both give a precise disclosure to their clients, as to fulfil a precise assessment of adequacy of the service/activity offered.\textsuperscript{51}

The supply in Italy of an Islamic financial product by both an Islamic and an Italian institution (first point of the introduction), sets a first general understanding problem: connecting Islamic products to the juridical conventional financial categories, both Italian and European, of “financial product” (art. 1 TUF), “financial instrument” (art. 1 TUF) and “equity value” (art. 1 TUF).

Once this analysis is computed, the supply for undertaking and selling Islamic financial products in Italy must undergo the legal aspects concerning with the supply proceeding, disclosure laws, the content of the prospectus and its issuance (art. 94 TUF).

According to art. 93 of the TUF, in case of public offer promoted by a subject having its legal office in Italy or in an EU Member State, the content of the prospectus diverges according to the fact that it is attributable or not to “EU financial instruments”. If it goes into the category of EU financial instrument (such as could be Islamic equities, funds and sukuk), the prospectus shall be drafted in compliance with the EU laws that govern the subject.

\textsuperscript{50} Banca d’Italia, Occasional papers number 73 (2010), Questioni di economia e finanza, finanza islamica e sistemi finanziari convenzionali, pp. 44-45

\textsuperscript{51} CONSOB (2014), Quaderni Giuridici, La finanza Islamica nel contest giuridico italiano, p. 36
If the financial product does not follow any EU financial instrument (i.e. non-standardized Islamic products), the issuer shall draft an information prospectus whose content must be authorized by the CONSOB\(^5\). Thus, it can be declared that the main Islamic financial products (i.e. equities, sukuk and funds) can be attributed to the general category of *EU financial instrument*, while, in case of a non-standardized Islamic financial product offer, the issuer shall draft a prospectus whose content must be authorized by the national competent authority (art. 94 TUF).

\(^{52}\) CONSOB (2014). *Quaderni Giuridici, La finanza Islamica nel contest giuridico italiano*
Chapter 2: Implementation of a Markowitz optimization on an Islamic portfolio

2.1. Introduction to the Markowitz Portfolio Theory

To start the analysis of this work, a brief theoretical description of the Markowitz Portfolio Theory needs to be done.

Harry Markowitz during the 1950s was the first economist to develop a model to derive the expected rate of return for a portfolio of assets and an expected risk measure. He showed how powerful and meaningful the variance of a portfolio is and how to derive the risk-return profile in order to build the best portfolio selection. Furthermore, he derived the formula for computing the variance of a portfolio of assets. This variance formula not only revealed the importance of diversifying to reduce the total risk of a portfolio but also showed how to diversify.

However, also the problems the model carries with itself will be highlighted. The Markowitz model is based on mostly five assumptions:

- Investors consider each investment as presented by a probability distribution of expected returns over some period;
- Investors maximize one-period utility;
- Investors estimate the risk of the portfolio as the variability of expected returns;
- Investors base decisions solely on risk-return profile;
- For a given level of risk, investors prefer higher returns to lower returns and for a given level of expected returns, investors prefer less risk to more risk.

Having said these five assumptions, the Markowitz Portfolio Theory states that a single asset or a portfolio of assets is considered to be efficient if no other asset or portfolio of assets offer higher expected returns with the same risk, or lower risk with the same expected return\(^5^3\).

In order to arrive to the Markowitz optimization, first, the formula for the mean and variance of a portfolio has to be described\(^5^4\).

\[
E(R_{\text{port}}) = \sum_{i=1}^{n} w_i E(R_i)
\]

---

\(^5^3\) Brown, Reilly (2016). *Analysis of investments & management of portfolios, 10\(^{th}\) edition*, Cengage Learning, Chapter 7

\(^5^4\) Harry Markowitz (March 1952), *The Journal of Finance, Vol. 7, No. 1, Portfolio Selection, pp. 81*
Or in a matrix form:

\[ E(R_{port}) = w^T E \]

where \( w_i \) is the percentage of the asset \( i \) in a given portfolio or, in matrix form, is the vector \( w = [w_1, ..., w_n] \) \( \text{Nx1} \) of portfolio weights and \( E(R_i) \) is the expected rate of return for asset \( i \) or in matrix form is the vector of expected returns \( E = [E(R_1), ..., E(R_n)] \) \( \text{Nx1} \).

The variance is a measure of the dispersions of possible rates of return around the expected rate of return, more generally it is considered as uncertainty of future outcomes.

\[
\sigma_{port} = \sqrt{\sum_{i=1}^{n} \sum_{j=1}^{n} w_i w_j \text{Cov}_{ij}}
\]

Or in matrix form

\[
\sigma_{port}^2 = w^T V w
\]

Where \( \sigma \) is the standard deviation of the portfolio or, if squared, it is the variance of the portfolio, \( \text{Cov} \) and \( V \) are the covariances between the rates of return for assets \( i \) and \( j \), where \( \text{Cov}_{ij} = r_{ij} \sigma_i \sigma_j \) and \( r \) is the correlation coefficient between the assets of the portfolio. Thus, the formula of the standard deviation states that the less the correlation within the assets, the less the covariance of the portfolio and, so, the less will be the risk of the portfolio. Aim of the model is to reach the efficient frontier, and, according to the Markowitz definition of efficiency, the efficient frontier represents the set of portfolios with the maximum rate of return for every given level of risk, or the minimum risk for every level of return.\(^{55}\)

The portfolio optimization problem that will enable to find the portfolio that minimizes the variance for a given level of expected return \( \mu \), can be formulated as follows\(^{56}\):

---

\(^{55}\) See page above for the precise definition.

\(^{56}\) Harry Markowitz (March 1952), *The Journal of Finance, Vol. 7, No. 1, Portfolio Selection, pp. 81-89*
\[
\begin{align*}
\min_w \frac{1}{2} w^T \Sigma w &= \min_w \sigma^2 \\
\text{s.t.} w^T E &= \mu \quad \text{gives the target level of expected return} \\
w^T 1 &= 1 \quad \text{to have the sum of the weights equal to one}
\end{align*}
\]

Any numerical solution is obtained by applying the optimization above or, even better, adding constraints. The whole process can be easily implemented with the help of any financial software as Matlab, R or Excel.

The resulting portfolio weights minimize the variance for a given level of expected return and moreover, the variance of the variance minimizing portfolio can also be calculated with the formula that makes it a specific quadratic function of the expected portfolio return\(^{57}\).

\[Variance(R_{port}) = a\mu^2 + b\mu + c\]

Drawing the quadratic function, where on the x-axis there is the variance of the variance minimizing portfolios and on the y-axis there is the expected portfolio return, we obtain the typical portfolio frontier, where the lower part of the graph is by definition not efficient, while the upper side is the so-called efficient frontier of the portfolio.

Even though the Markowitz Model is rigorous from a mathematical point of view, it is easily implemented and it is still one of the most used models in the investment community but, as it was said, there are some problems with the standard Markowitz Theory\(^{58}\):

- The mean-variance model is a one period approach, so no new information is incorporated in the estimation and dynamic rebalancing is not allowed;
- There’s no consideration of leverage;
- The model is not robust, so the Markowitz efficient portfolios are “estimation error maximizers”, which means that small differences in the parameters may result in completely different portfolio allocations;
- Efficient portfolios are often unreasonable and unstable\(^{59}\).

\(^{57}\) Chi-Fu Huang, Robert Lintzenberger, Foundations for Financial Economics, chapter 3

\(^{58}\) Campbel R. Harvey (2006), Global Asset Allocation and Stock Selection, University of Duke

\(^{59}\) Fischer Black and Robert Litterman (1992), Financial Analysts Journal, Global Portfolio Optimization, p. 28
To improve the model, during the years, some adjustments were made both on the optimization process (Heuristic Approaches) in order to adjust it, as well as on the inputs estimated (Bayesian Approaches). While Heuristic techniques try to adjust the optimization adding some constraints or through a resampling method as developed by Michaud in its 1998 study⁶⁰, the Bayesian techniques, for example the Black-Litterman Model, adjust the inputs, improving the views on the estimates to get a more robust model. Indeed, Black and Litterman, in their paper about Global Portfolio Optimization in 1992, expressed this new idea of improving the views stating that “If the investor has no particular views about asset returns, he can use the neutral values given by the equilibrium model. If the investor does have one or more views about the relative performances of assets, or their absolute performances, he can adjust equilibrium values in accordance with those events. Furthermore, the investor can control how strongly particular view influences portfolio weights, in accordance with the degree of confidence with which he holds the views.”⁵⁹

---

2.2. The optimization process

2.2.1. Considerations

Developing a portfolio analysis is never easy, there are always many questions and considerations that may arise during the analysis. Especially when talking about a theme such as Islamic Finance and moreover from a mathematical view as this paper does, the primary aim must be to list all the problems, considerations and caveats the analysis met during the time-lapse of the research.

“There is, however, relatively little empirical analysis of the role of Islamic banks in financial stability. A number of papers discuss risks in Islamic financial institutions, but do so in theoretical terms instead of through analysis of data, while empirical papers on Islamic banks focus on issues related to efficiency”61. This is represented in one of the first paragraphs of an IMF’s paper related to Islamic Banks and it clearly states that, until now, it has always been impossible or rare to find empirical analysis on the role of Islamic Finance, but only theoretical papers discussing the risks in Islamic financial institutions.

A few lines later, the paper continues “This paper attempts to fill the gap in the empirical literature on Islamic banking”. This final paper shares the exact same purpose of the IMF paper, to show how theories about Islamic Finance result in numbers and to show a feasible comparison between Islamic and European banking systems. Furthermore, this paper takes into account only banks because they represent the core of modern financial systems, since they provide every financial activity, from investment activities to commercial and retail banking activities. Thus, to better analyze Islamic finance, taking into consideration banks, and more specifically Islamic banks, it helps us to figure out Islamic financial behaviors and principles as effectively as possible.

In order to make this paper as close as possible to us, the comparison will be done among a sample of Islamic, European and Italian banks, selected due to the availability of the data and the length of such samples. All the data in this paper has been downloaded from Bloomberg.

After having introduced the aim of this paper, a list of considerations about Islamic Finance needs to be highlighted in order to understand how they might affect returns:

- First of all, considerations about Islamic countries, especially those in the Middle East area, must be done. Even after years of relationships, it still remains a “closed” world politically speaking, where many economic, political and social policies are hidden or not yet updated to the modern world;

---

- Many Islamic countries in the last thirty years faced or are still facing periods of wars, crises and developments. Places like the Emirates, Qatar, Bahrain years ago didn’t even exist. Kuwait faced an invasion from Iraq, Libya is dealing with instability since Gheddafi’s death, the same for Egypt. Even worse the situation for the sub-Sahara’s Nations, troubled by years of wars, terrorism and poverty. Pakistan, one of the most important Islamic country wasn’t even considered an emerging State few years ago. Iran just went out from an international ban and doesn’t have available data on its banking system. Obviously, all this influences the returns of banks and indexes\(^{62}\);

- Then, going ahead to more economic reasons, unlike European countries where the majority of the States share a unique monetary policy and more generally a unique view about the economy, the Islamic countries analyzed in this paper each share their own monetary policies and their own ideas even if some of them share borders as the Gulf countries. It doesn’t exist a Gulf Economic Community as we have here in Europe. For sure there are Treaties among countries but nothing that makes them united in an economic meaning;

- The fact that Islamic Finance is considered an ethical way to make money means that returns over Islamic banks and indexes are strictly influenced by the real economy and not by the market\(^{63}\). That’s why, as it will be shown, in period of real economic growth the returns tend to increase exponentially and, in the other way, they tend also to decrease more in period of political and economic crises rather than in financial crises;

- Many governments, especially in the Gulf area, are directly connected with financial institutions, meaning that they directly finance and insert liquidity inside these corporates; even this fact of being directly backed by National Governments tends to manipulate the returns and not to have clear reasons behind them;

- Financially speaking, the influence of all these political and economic situations, together with the principles of the Shari’ah law explained in the first chapter, turn in various factors. First, as shown in tables 2.2.1 and 2.2.2 below, interbank rates used to hedge returns of portfolios are higher with the respect of the west ones; and considering the formula of the hedge where the final return is given by the pure return in the home currency minus the national interbank rate plus the interbank rate of the currency selected to cover the return (i.e. the Libor USD as the case of this paper), it comes up that returns of the Islamic world decrease quickly\(^{64}\).

\[
\text{Return hedged} = R_{\text{home currency}} - \text{home interbank} + \text{LiborUSD}
\]

---

\(^{62}\) Greg Botelho (2015), *What’s happening in the Middle East and why it matters*, CNN

\(^{63}\) See the Baljeet Kaur Grewal’s words of paragraph 1.2.2.

\(^{64}\) European Commission (2008), *Economic papers 299, Hedging and invoicing strategies to reduce exchange rates exposure.*
Then, the less experience of the management, the prohibition to use many risk management instruments as derivatives and limitations of the Islamic finance in using credit risk monitoring systems, it means that in period of crises it is still tough for Islamic banks to recover their losses.\footnote{IMF Working Paper (2008), \textit{Islamic Banks and Financial Stability: An Empirical Analysis}}

- Many Islamic countries do not have developed financial regulations, but just national committees providing guarantees to the \textit{Shari‘ah} law. This may result in easier and faster processes of investment for credit institutions, due to the lack of bureaucracy and rules, as sometimes it might be tougher and slower work through new financial instruments due to the approval process of these committees;

- Practically, data available in financial software as Bloomberg or BankScope aren’t 100% precise and there are months or years of missing information.

<table>
<thead>
<tr>
<th>Table 2.2.1. Islamic Interbank rates. Source: Bloomberg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average (07/2003-01/2017)</strong></td>
</tr>
<tr>
<td><strong>Saudi Interbank</strong></td>
</tr>
<tr>
<td><strong>Dubai Interbank</strong></td>
</tr>
<tr>
<td><strong>Qatar Interbank</strong></td>
</tr>
<tr>
<td><strong>Morocco Interbank</strong></td>
</tr>
<tr>
<td><strong>Pakistan Interbank</strong></td>
</tr>
<tr>
<td><strong>Egypt Interbank</strong></td>
</tr>
<tr>
<td><strong>Bahrain Interbank</strong></td>
</tr>
</tbody>
</table>

| **Libor USD**                                           | 1.521% |
| **Euribor**                                             | 1.423% |
| **Libor UK**                                            | 2.314% |
| **Japan Interbank**                                     | 0.199% |
| **Switzerland Interbank**                               | 0.44%  |
| **Sweden Interbank**                                    | 1.66%  |

\footnote{Table 2.2.2. – Western Interbank rates. Source: Bloomberg}
2.2.2. The construction of three portfolios: Islamic, European and Italian based

Purpose of this paper is to apply to Islamic finance two of the most important theories, the Markowitz Portfolio Theory and the CAPM. More precisely this will be carried out through a set of Islamic banks. In doing so, in this chapter, three different sets of assets will be constructed, each composed only by banks, for mainly two reasons: to take a look at their past performances and to build Markowitz optimizations to glance at the three different efficient frontiers and compositions. This attempt will not tell us which of the three sets is the best in general in which to invest, due to the considerations already made in the paragraph above, i.e. political and social crises in some Islamic countries or different currencies and economic policies used in the Islamic world or high levels of Islamic interbank rates to hedge the returns, and due to the problems of the Markowitz Model, as the lack of robustness that may make the following analysis less robust.

Let’s remember the hypothesis of the Markowitz theory:
- Investors want to maximize the expected returns;
- Investors are risk adverse, where the measure of risk is the standard deviation.
- Therefore, investors will increase the risk only if they receive higher expected returns.

To implement and develop the Markowitz optimization there is a process to follow:

1) Asset classes in which to invest must be selected, not hundreds but a selected number of them, since, mathematically speaking, the optimization process presented in the introduction would be more complicated;
2) Estimate of the expected returns for each asset classes;
3) Estimate of the risk of asset classes;
4) Implementation of the optimization process and graphical construction of the efficient frontier and efficient compositions.

In this work, three different selections of assets will be analyzed: one made by Islamic banks, one composed by a mix of European banks and lastly one made just by Italian banks.

Before analyzing individually each composition, general details on the constructions must be given:
- It is a portfolio of monthly net returns downloaded from Bloomberg;
- The time lapse used for the portfolios goes from July 2003 to January 2017. This is due only to the availability of Islamic data in Bloomberg and in BankScope.
- Only banking equities have been used as asset classes. There are no bonds, sukuks, cash, commodities or other financial instruments;

---

- In order to avoid different currencies, every return expressed in local currency has been hedged with the dollar.

Now, with the help of tables and graphs, let’s see how in Excel these portfolios have been built.

As reported in figure 2.2.1 for the Islamic sample, 22 banks have been included, each with a weight of 0.455% in order to have the sum equal to 1, from Saudi Arabia, Morocco, Qatar, United Emirates and Bahrain. Banks from other Muslim countries have not been included, based solely on the fact that political and economic situations affecting states as Egypt, Libya, Nigeria, Yemen, Syria and so on, might influence negatively returns and hide the rationale behind Islamic finance.

![ISLAMIC EQUITY MARKET PORTFOLIO](image)

*Figure 2.2.1 – Islamic Portfolio composition. Personal work*

<table>
<thead>
<tr>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Islamic banks’ returns</strong></td>
<td><strong>0.66%</strong></td>
</tr>
</tbody>
</table>

*Table 2.2.3. Islamic Portfolio mean and standard deviation. Personal work*
Table 2.2.3. above finds the monthly expected return and the standard deviation for the period considered. The results have been processed in Excel with the simple formulas “=mean(returns)” and “=std(returns)”.  

Next step is computing the covariance matrix of the assets, built on a 14 years sample (considering monthly returns, n = 163) with 22 parameters. 

Table 2.2.4 below gives a glance of it. 

<table>
<thead>
<tr>
<th>Bank Name</th>
<th>Country</th>
<th>Code</th>
<th>Mean</th>
<th>Std</th>
<th>Covariance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doha Bank</td>
<td>Qatar Bank</td>
<td>Qatar</td>
<td>0.00216</td>
<td>0.00284</td>
<td>0.00216</td>
</tr>
<tr>
<td>Qatar Bank</td>
<td>AlAhli Bank</td>
<td>Qatar</td>
<td>0.00208</td>
<td>0.00264</td>
<td>0.00208</td>
</tr>
<tr>
<td>AlAhli Bank</td>
<td>Abu Dhabi Bank</td>
<td>UAE</td>
<td>0.00206</td>
<td>0.00262</td>
<td>0.00206</td>
</tr>
<tr>
<td>Abu Dhabi Bank</td>
<td>Commercial Dubai</td>
<td>UAE</td>
<td>0.00206</td>
<td>0.00261</td>
<td>0.00206</td>
</tr>
<tr>
<td>Commercial Dubai</td>
<td>Qatar Islamic Bank</td>
<td>Qatar</td>
<td>0.00206</td>
<td>0.00260</td>
<td>0.00206</td>
</tr>
<tr>
<td>Qatar Islamic Bank</td>
<td>National Bank of Abu Dhabi</td>
<td>UAE</td>
<td>0.00206</td>
<td>0.00259</td>
<td>0.00206</td>
</tr>
<tr>
<td>National Bank of Abu Dhabi</td>
<td>National Bank of Dubai</td>
<td>UAE</td>
<td>0.00206</td>
<td>0.00258</td>
<td>0.00206</td>
</tr>
<tr>
<td>National Bank of Dubai</td>
<td>Credit du Moroc Bank</td>
<td>Morocco</td>
<td>0.00206</td>
<td>0.00257</td>
<td>0.00206</td>
</tr>
<tr>
<td>Credit du Moroc Bank</td>
<td>United Arab Bank</td>
<td>UAE</td>
<td>0.00206</td>
<td>0.00256</td>
<td>0.00206</td>
</tr>
<tr>
<td>United Arab Bank</td>
<td>Arab National Bank</td>
<td>UAE</td>
<td>0.00206</td>
<td>0.00255</td>
<td>0.00206</td>
</tr>
<tr>
<td>Arab National Bank</td>
<td>Bahrain Islamic Bank</td>
<td>Bahrain</td>
<td>0.00206</td>
<td>0.00254</td>
<td>0.00206</td>
</tr>
<tr>
<td>Bahrain Islamic Bank</td>
<td>National Bahrain Bank</td>
<td>Bahrain</td>
<td>0.00206</td>
<td>0.00253</td>
<td>0.00206</td>
</tr>
</tbody>
</table>

Table 2.2.4. Covariance matrix for Islamic portfolio. Source: Excel – Personal work

Last step, as it will be shown in few paragraphs, is the optimization, processed with Matlab software to have it as precise as possible.

Going ahead to the European portfolio, the same process is repeated with the same weights and same calculations. Even this set is equally weighted (0.455% for each asset) and composed by 22 banks, selected due to availability of data and to have a wide range of countries. These include Italy, Spain, UK, France, Ireland, Switzerland, Sweden and Germany as shown in figure 2.2.2 below.

Table 2.2.5 provides a list of returns table 2.2.6. next column shows the covariance matrix (again, n = 163).
EUROPEAN EQUITY MARKET PORTFOLIO

Figure 2.2.2 European portfolio composition. Personal work

Table 2.2.5. European portfolio mean and standard deviation. Source: Excel – Personal work

| European banks’ returns | -0.09% | Standard deviation | 8.63% |

Table 2.2.6. European portfolio covariance matrix. Source: Excel – Personal work

Last but not least is the Italian portfolio, equally weighted (0.8334% for each asset), composed by 12 banks, due to availability of data and in this case also because of the size of the institutions.
Figure 2.2.3 shows the composition of the sample, while tables 2.2.7 and 2.2.8 present mean, standard deviation and covariance matrix.

![Diagram](image)

**Figure 2.2.3. Italian portfolio composition. Personal work**

<table>
<thead>
<tr>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.14%</td>
<td>7.21%</td>
</tr>
</tbody>
</table>

*Table 2.2.7. Italian banks mean and standard deviation. Source: Excel – Personal work*

<table>
<thead>
<tr>
<th></th>
<th>Intesa</th>
<th>Unicredit</th>
<th>MPS</th>
<th>Unipol</th>
<th>Pop Sondrio</th>
<th>Carige</th>
<th>Finnat</th>
<th>Ifis</th>
<th>Profilo</th>
<th>Banco di Desio</th>
<th>Banco di Sardegna</th>
<th>Mediolanum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intesa</td>
<td>0.00921</td>
<td>0.008668</td>
<td>0.0071</td>
<td>0.0068</td>
<td>0.00367</td>
<td>0.005</td>
<td>0.004</td>
<td>0.004</td>
<td>0.0053</td>
<td>0.00389944</td>
<td>0.003035</td>
<td>0.00575955</td>
</tr>
<tr>
<td>Unicredit</td>
<td>0.00867</td>
<td>0.013822</td>
<td>0.0093</td>
<td>0.0089</td>
<td>0.00474</td>
<td>0.007</td>
<td>0.004</td>
<td>0.005</td>
<td>0.0064</td>
<td>0.00545842</td>
<td>0.002651</td>
<td>0.00663847</td>
</tr>
<tr>
<td>MPS</td>
<td>0.0071</td>
<td>0.009302</td>
<td>0.019</td>
<td>0.0077</td>
<td>0.00493</td>
<td>0.01</td>
<td>0.005</td>
<td>0.005</td>
<td>0.0067</td>
<td>0.00568416</td>
<td>0.003986</td>
<td>0.00604498</td>
</tr>
<tr>
<td>Unipol</td>
<td>0.00682</td>
<td>0.00889</td>
<td>0.0077</td>
<td>0.015</td>
<td>0.00428</td>
<td>0.004</td>
<td>0.004</td>
<td>0.005</td>
<td>0.0059</td>
<td>0.00455355</td>
<td>0.004109</td>
<td>0.00652721</td>
</tr>
<tr>
<td>Pop Sondrio</td>
<td>0.00367</td>
<td>0.004738</td>
<td>0.0049</td>
<td>0.0043</td>
<td>0.00456</td>
<td>0.004</td>
<td>0.002</td>
<td>0.003</td>
<td>0.003</td>
<td>0.00309138</td>
<td>0.000932</td>
<td>0.0031561</td>
</tr>
<tr>
<td>Carige</td>
<td>0.00472</td>
<td>0.006785</td>
<td>0.0095</td>
<td>0.0044</td>
<td>0.00448</td>
<td>0.013</td>
<td>0.003</td>
<td>0.003</td>
<td>0.0056</td>
<td>0.00441195</td>
<td>0.002807</td>
<td>0.00429168</td>
</tr>
<tr>
<td>Finnat</td>
<td>0.00381</td>
<td>0.004397</td>
<td>0.0052</td>
<td>0.0038</td>
<td>0.00232</td>
<td>0.003</td>
<td>0.007</td>
<td>0.003</td>
<td>0.0049</td>
<td>0.003478</td>
<td>0.004324</td>
<td>0.00288709</td>
</tr>
<tr>
<td>Ifis</td>
<td>0.0037</td>
<td>0.004888</td>
<td>0.0047</td>
<td>0.0051</td>
<td>0.00267</td>
<td>0.003</td>
<td>0.003</td>
<td>0.007</td>
<td>0.0032</td>
<td>0.00283668</td>
<td>0.002002</td>
<td>0.0034091</td>
</tr>
<tr>
<td>Profilo</td>
<td>0.00526</td>
<td>0.006417</td>
<td>0.0067</td>
<td>0.0059</td>
<td>0.00305</td>
<td>0.006</td>
<td>0.005</td>
<td>0.003</td>
<td>0.0142</td>
<td>0.00369527</td>
<td>0.003215</td>
<td>0.00509289</td>
</tr>
<tr>
<td>Banco di Desio</td>
<td>0.0039</td>
<td>0.005458</td>
<td>0.0057</td>
<td>0.0046</td>
<td>0.00309</td>
<td>0.004</td>
<td>0.003</td>
<td>0.003</td>
<td>0.0037</td>
<td>0.00737872</td>
<td>0.002803</td>
<td>0.00321419</td>
</tr>
<tr>
<td>Banco di Sardegna</td>
<td>0.00304</td>
<td>0.002651</td>
<td>0.004</td>
<td>0.0041</td>
<td>0.00093</td>
<td>0.003</td>
<td>0.004</td>
<td>0.002</td>
<td>0.0032</td>
<td>0.00280343</td>
<td>0.01604</td>
<td>0.00366894</td>
</tr>
<tr>
<td>Mediolanum</td>
<td>0.00576</td>
<td>0.006638</td>
<td>0.006</td>
<td>0.0065</td>
<td>0.00316</td>
<td>0.004</td>
<td>0.003</td>
<td>0.003</td>
<td>0.0051</td>
<td>0.00321419</td>
<td>0.003669</td>
<td>0.00789459</td>
</tr>
</tbody>
</table>

*Table 2.2.8. Italian portfolio covariance matrix. Source: Excel – Personal work*
2.2.3. A view of past performances

Before seeing the results of the optimization process, it is interesting to show some analysis in terms of returns and risk on the period selected for the three sets taken into consideration. First, considering again the period analyzed, so from July 2003 to January 2017, this paper wants to highlight how if someone had started to invest 1$ at the end of June 2003, how much this dollar would have become at the end of January 2017. Furthermore, to see how banks behaved during the crisis, the same thing was done but starting to invest from July 2008 to April 2010. To do so, the so called Value Index was used as technique, that in Excel with a simple formula tells us how this dollar grows month by month during a period of time.

\[
$Value_t = (1 + Return_t) \times value_{t-1}
\]

Where the initial value at June 2003 is the initial investment of 1$. After having analyzed how each bank (previous paragraph) performed in terms of mean and standard deviation, graphs have been made in order to show the value trends for each financial institution during the period considered. First, how the three compositions behaved and performed will be shown (remember that in each set, banks are equally distributed).
More precisely, as table 2.2.9. shows, if someone had invested on an equally weighted portfolio of Islamic banks, after the period of time considered he would have ended up with 121% of the amount invested, while on the European side with a loss of 53.3% and a loss of 47.9% of the amount invested for the Italian portfolio. Obviously, as the figure above shows, having these ups and downs as for the Islamic case, it will turn to deliver high standard deviations and skewness, as it will be shown few lines later.

<table>
<thead>
<tr>
<th>Investment on June 2003</th>
<th>Value on January 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Islamic Portfolio</td>
<td>European Portfolio</td>
</tr>
<tr>
<td>$1$</td>
<td>$1$</td>
</tr>
<tr>
<td>$2.21 = 121%$</td>
<td>$0.467 = -53.3%$</td>
</tr>
</tbody>
</table>

Table 2.2.9. Portfolios’ performances. Source: Excel – Personal work

As it can be seen from figure 2.2.4 above, the Islamic sample had a massive growth (500%) in its returns during the first period from 2003 to crisis of 2008, linked to the “gold” phase of the first years of XXI
century that brought to the collapse of the bubble\textsuperscript{67}. That’s because, as it was said already, Islamic Finance is strictly correlated to real economy and it is well known how that period was florid for the growth of real estate market, industries, GDPs, inflation and so on\textsuperscript{68}.

Especially in the Gulf countries, the period from 2003 to 2006 overlaps with development programs financed by national authorities to increase their reputation in the world. Some examples are the massive real estate projects in cities like Dubai, Abu Dhabi and Doha, done to attract tourists, foreign investors and rich people\textsuperscript{69}. Then, the same countries invested a lot of money in Airlines company such as Etihad, Emirates and Qatar Airways, today three of the top 10 airline companies, to build hubs in order to be the connection point among continents\textsuperscript{70}. Not to underestimate, also the fact that every nation of the Islamic portfolio in that period started to create private equity funds, mutual funds, hedge funds to invest all over the world.

Other interesting analysis to present in order to have a more general view of past performances of each set of assets include some measures of risk as standard deviation, semi-standard deviation, VaR and skewness (see table 2.2.10 below).

The first measure, standard deviation, shows the dispersion of possible rates of return around the mean during a certain period of time\textsuperscript{71}. It can be calculated daily, monthly or annually. Semi-standard deviation improves the former measure, since it is the quantity of dispersion for the values of a data set falling below the observed mean or target value. As the formula below shows, semi-standard deviation is the square root of the semi-variance, which is found by averaging the deviations of observed values that have a result that is less than the mean\textsuperscript{72}. This statistical indicator is perfect when you want to measure the downside risk of a market. As for the standard deviation, it can also be calculated daily, monthly or annually.

\[ \text{semi} - \sigma = \sqrt{\frac{\sum_{i=1}^{n} (\min(X_i - \mu, 0)^2)}{n}} \]

Where \( X_i \) is the observed value \( i \) and \( \mu \) is the mean.

\textsuperscript{67} IMF (2014), \textit{IMF staff discussion note, Economic Diversification in the GCC: Past, Present and Future}
\textsuperscript{68} Economy Magazine, attached to Panorama magazine, May 2017, Dubai, \textit{eterno paradiso dei petrodollari}, p. 34
\textsuperscript{69} Government of Dubai, \textit{Dubai History}
\textsuperscript{70} Air Travel Intelligence (OAG – 2015), \textit{The growth of Gulf Airlines}
\textsuperscript{71} Brown, Reilly (2016). \textit{Analysis of investments & management of portfolios, 10th edition, p. 12}
The first two risk measures, during the period analyzed, considered the values of each sample and it can be seen from the table that the Islamic portfolio had the lowest annual standard deviation and semi-standard deviation, calculated on a monthly basis (20.32% and 11.34% respectively), meaning that, among the three sets of assets, it had the lowest dispersion from the mean, and thus, the lowest level of risk during the period considered. The European portfolio was the one with the highest standard and semi-standard deviation, still found annually (29.88% and 18.48%).

However, in order to have a wider judgement, it is important for an investor seeing the skewness, i.e. the asymmetry from the normal distribution in a set of statistical data. Negative or positive skewness depend on whether data points are skewed to the left and negative, or to the right and positive of the average data. Skewness is extremely important to finance and investing, since, understanding whether a sample of data

---

Table 2.2.10. Portfolios’ risk return analysis. Source: Excel – Personal work

---

is skewed or not, an investor can better estimate if a given future data point will be more or less than the mean.

Looking the analyzed value indexes, only the European portfolio has a positive skewness, meaning that it has a longer right tail in their distributions. Figures below help to better understand the empirical distributions of each set and to better understand their skewness.

**Islamic banks' portfolio empirical distribution**

*Mean = 0.66%*

*Figure 2.2.5. Source: Excel – Personal work*

**European banks' portfolio empirical distribution**

*Mean = -0.09%*

*Figure 2.2.6. Source: Excel – Personal work*
Another interesting measure to show is the Value at Risk, whose model is able to estimate the potential losses. The VaR is defined as: for a given portfolio, time horizon, and probability $p$, the $p$-VaR is a threshold loss value, such that the probability that the loss on the portfolio over the given time horizon exceeds this value is $p^{74}$. Thus, the Value at Risk is the percentage of losses, with a given confidence level, I should not exceed over a period of time.

To calculate the VaR, there are some key assumptions to be met: there must be given a time horizon and a confidence level. The confidence level states that the probability of higher losses is $1$ - the confidence level. Once these conditions are satisfied, the Value at Risk is a useful statistical technique utilized to measure and quantify the potential loss within an investment portfolio over a specific time frame.

Given this definition, the VaR is calculated as a proxy as follows$^{75}$:

$$\text{VaR} = \bar{R} - k \times \sigma$$

Where $\bar{R}$ is the average return, “$k$” is the value related to the confidence level chosen and $\sigma$ is the standard deviation. This proxy applies if returns are normally distributed. If not, the VaR is calculated as the percentile of each empirical distribution under which the loss might occur.

For each set of assets, both the entire time horizon (2003-2017) and a 1-year horizon (evaluated always on a monthly basis) have been used to evaluate the VaR, with a confidence level of 98%. Since the three


samples are not normally distributed, the VaR has been evaluated with the excel formula 
"= percentile(matrix; level of confidence)".
The Islamic portfolio has a 1-year VaR of -8.83%, meaning that with an amount invested of x, with a 
confidence level of 98%, the potential loss would have been 8.83% of the investment x. In contrast, the 1-
year VaRs for the European and Italian portfolios are -19.64% and -22.23% respectively. Thus, amid the 
three equally weighted portfolios, the Islamic is the one with the lowest VaRs, thus, the one with lowest 
potential losses.

Last chart below (Figure 2.2.8.) shows the risk-return dispersion for the Islamic and the European banks, to have a glance of how returns behaved and if each composition followed a determined path or not.

According to the graph, both the two sets had some negative returns due to negative performances of their 
banks, but it can be seen that the majority of the Islamic banks are in a higher position, i.e. meaning that 
returns for the period considered were higher of their opponents, and they are more grouped in a 
circumstantial area (among the 5% and 15% of standard deviation). On the other side, the European 
portfolio has more negative returns and, also, riskier financial institutions.

![Risk-Return dispersions of banks](image-url)

*Figure 2.2.8. Source: Excel – Personal work*
Now, it will be repeated the same value index process but for the second period analyzed (June 2008 – April 2010), so that we can look at how these three portfolios behaved in a period of crisis.

Figure 2.2.9. Portfolio's performances 2008-2010. Source: Excel – Personal work

Figure 2.2.9. clearly shows, and it is confirmed numerically by table 2.2.11. below, how having invested from 2008 in the Islamic portfolio, it would have left the investor with less than the other two portfolios. More precisely, with a loss of 49.9% of the amount invested, while, respectively, with a loss of 30.2% and 28.3% for the European and Italian portfolios. A huge crash with the respect to the previous results.

<table>
<thead>
<tr>
<th>Investment on June 2008</th>
<th>Islamic sample</th>
<th>European sample</th>
<th>Italian sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value on April 2010</td>
<td>0.501$ = -49.9%</td>
<td>0.698$ = -30.2%</td>
<td>0.717$ = -28.3%</td>
</tr>
</tbody>
</table>

Table 2.2.11. Portfolios’ performance 2008-2010. Source: Excel – Personal work

The IMF’s research already mentioned in the previous paragraphs could have implicitly given an explanation to this downfall.

First of all, the lack of experience in period of credit crises and the fact that Islamic finance does not tend to coordinate sufficiently its credit risk monitoring systems and its risk management instruments are the primary and main reasons of this fall.

Going back to the IMF’s work, the z-score was used as primary dependent variable to measure the individual bank risk. Its main characteristic is that it is inversely related to the probability of a bank’s insolvency, so the higher the z-score, the lower the probability of insolvency.
It is calculated as follows:

\[ z = \frac{(k + \mu)}{\sigma} \]

Where \( k \) is equity capital and reserves as percent of assets, \( \mu \) is average return as percent of assets and \( \sigma \) is standard deviation on assets. Thus, the z-score practically measures the number of standard deviations a return has to fall in order to delete equity. That’s why a higher z-score means a lower upper bound of insolvency risk.

For the financial world, the z-score is an important risk of measure because objectively measures the risk of insolvency, calculating the risk that a bank runs out of capital, no matter the risk strategy of banks.

IMF examined a sample of 100 Islamic banks and 512 “commercial banks”, i.e. not-Islamic, dividing them in Small and Large due to their assets and taking the period of the analysis from 1993 to 2004, considering all the Islamic countries such as Bahrain, Bangladesh, Brunei, Egypt, Gambia ecc…

Moreover, the authors with a simple OLS regression showed the impact on the risk of other economic factors, including also a dummy variable that takes value of 1 if the bank in question is an Islamic bank, and 0 otherwise. As dependent variable, the z-score was used, while as independent variables specific variables, time-varying industry variables, interaction variables between type of bank and industry variables and vectors of macroeconomic variables were used, plus, at the end, the residuals.

The statistic results for the z-score are as follows in table 2.2.12:

<table>
<thead>
<tr>
<th></th>
<th>Large Commercial banks</th>
<th>Large Islamic banks</th>
<th>Small Commercial banks</th>
<th>Small Islamic banks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Z-Score</strong></td>
<td>24.5</td>
<td>13.2</td>
<td>200.1</td>
<td>35.8</td>
</tr>
<tr>
<td><strong>Z-score excl. outliers</strong></td>
<td>19.5</td>
<td>12.9</td>
<td>17.2</td>
<td>25</td>
</tr>
</tbody>
</table>


The z-score excluding outliers deletes the 1st and 99th percentile of the distribution, and as it can be seen the difference is significant, especially, for small banks.

Thus, not considering outliers, small Islamic banks show a higher z-score than small commercial banks, but if outliers were included, the result is completely reversed. In the case of Large banks, Islamic ones have a lower z-score even without outliers.
With the regression, it has been confirmed that large Islamic banks tend to be less stable than large commercial banks, while small Islamic banks tend to be more stable than small commercial banks. These results suggest that Islamic banks are less stable when operating on a large scale, giving as a plausible explanation that it is more complex for Islamic banks to adjust their credit risk monitoring system as they become bigger. The same applies for their credit risk management. Of course these lacks when talking about large banks apply even worse when there are periods of crises such as from 2008 to 2010.

Now, let’s focus on single banks’ performances, instead of analyzing portfolio’s performances. As before, each comparison will be done both for a wider period, from June 2003 to July 2017, as for the period of crisis, from June 2008 to April 2010. This time the comparison will be done only among Islamic banks and Italian banks. To be more precise, there are three different comparisons as table 2.2.13. shows graphically:

- Qatari banks vs six Italian banks;
- UAE banks vs the same six Italian banks;
- Saudi banks vs the six Italian credit institutions.

<table>
<thead>
<tr>
<th>Qatari banks vs six Italian banks</th>
<th>UAE banks vs the same six Italian banks</th>
<th>Saudi banks vs the six Italian credit institutions</th>
</tr>
</thead>
</table>

Table 2.2.13. Personal work

---

First, with the help of the figures and graphs below, it is shown the value index from 2003 to 2017.

Figure 2.2.10. Qatari vs Italian banks 2003-2017. Source: Excel – Personal work

Figure 2.2.11. UAE vs Italian banks 2003-2017. Source: Excel – Personal work
All the three figures confirmed what the comparison between portfolios showed. Due to economic and financial reasons assumed before, Islamic banks performed better than the Italians (except for a couple of Saudi banks), with huge peaks during the first 5 years of the period analyzed. Speaking about this, Qatar Islamic Bank almost reached a return of 1900% of the initial amount, while Dubai Investment gained a return of 1700% of the investment. On average during this short period, all the Islamic banks reached a return of at least 500-600%.

With table 2.2.14. above, let’s see in detail the results of the analysis.

<table>
<thead>
<tr>
<th></th>
<th>Qatari banks</th>
<th>UAE banks</th>
<th>Saudi banks</th>
<th>Italian banks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Investment on June 2003</strong></td>
<td>1$</td>
<td>1$</td>
<td>1$</td>
<td>1$</td>
</tr>
<tr>
<td><strong>Average Value on January 2017</strong></td>
<td>4.04$ = 304%</td>
<td>3.19$ = 219%</td>
<td>1.07$ = 7%</td>
<td>0.6% = -40%</td>
</tr>
</tbody>
</table>

Table 2.2.14. Results for single banks’ performances 2003-2017. Source: Excel – Personal work
Same process as before, it will be shown how each bank behaved and performed during a period of crisis, from June 2008 to April 2010.

Figure 2.2.13. Qatari vs Italian banks from 2008 to 2010. Source: Excel – Personal work

Figure 2.2.14. UAE vs Italian banks from 2008 to 2010. Source: Excel – Personal work
Figure 2.2.15. Saudi vs Italian banks from 2008 to 2010. Source: Excel – Personal work

These 3 figures above, 2.2.13., 2.2.14. and 2.2.15., confirm what was just said about the z-score and the credit risk system of Islamic banks: in period of economic crises, such corporates tend to react worse than more experienced banks.

Table 2.2.15. below shows the final values for each sub-sample of banks.

<table>
<thead>
<tr>
<th></th>
<th>Qatari banks</th>
<th>UAE banks</th>
<th>Saudi banks</th>
<th>Italian banks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Investment</strong></td>
<td>1$</td>
<td>1$</td>
<td>1$</td>
<td>1$</td>
</tr>
<tr>
<td><strong>on June 2008</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Average Value at</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>April 2010</strong></td>
<td>0.5$ = -50%</td>
<td>0.24$ = -76%</td>
<td>0.68$ = -47%</td>
<td>0.67% = -33%</td>
</tr>
</tbody>
</table>

*Table 2.2.15. Results for single banks’ performances 2008-2010.*

It is worth to mention that Saudi banks tend, more than Qatari and UAE banks, to perform closer and similarly to the Italian ones. That could be linked to the fact Saudi financial institutions are more developed and have more experience in managing the credit risk than Qatar and United Arab Emirates. Don’t forget the fact that these Islamic banks are strongly correlated to real economy and this is one of the
main reason of the crash during the period of crisis. In fact, as each value index showed, Islamic banks didn’t start to fall in 2007 when the financial crisis began, but they did after the first months of the 2008, so when a more general economic crisis arose.

Thus, after these analysis and data, and as it will be shown in the last chapter, we can say that Islamic banks are directly related to real economy, achieving huge optimal results when there are florid economic periods while, instead, suffering a lot when there are downfalls of economic variables. In terms of risk, Islamic banks performed better than their conventional opponents, with lower levels of standard and semi-standard deviation with respect to European and Italian credit institutions. However, due to lack of experience, credit risk management systems and instruments, crises tend to weaken Islamic banks, especially large ones.

2.2.4. Implementation and results of the optimization

The last part of the chapter is the most important for the analysis of this paper. It regards the Markowitz optimization process in Matlab and the results achieved with it. These include the efficient frontiers for each portfolio and the optimal compositions.

How mathematically the optimization works has been already basically described, now the Matlab code to implement it will be shown.

```
1   m = [...]; % create the mean vector of the portfolio
2   C = [...]; % create the covariance matrix
3   p = Portfolio; % Matlab code for the optimization
4   p = setAssetMoments(p, m, C); % Matlab code for the optimization
5   p = setDefaultConstraints(p); % Matlab code for the optimization
6   pwgt = estimateFrontier(p, 10); % gives the optimal portfolios inside the endpoints
7   display(pwgt); % shows the optimal portfolios
8   plotFrontier(p); % plot of the efficient frontier
```

*Figure 2.2.16. Matlab code for the optimization. Source: Matlab – Personal work*
Figure 2.2.16. above gives an example of how easy it would be the Markowitz optimization run in Matlab. Importing data of asset or portfolio returns, then Matlab handles mean, covariance, optimization, efficient frontier and efficient portfolio.

Figure 2.2.17. below shows the efficient frontiers of the three portfolios.

![Efficient frontiers](image)

*Figure 2.2.17. Efficient frontiers of the three portfolios. Source: Excel – Personal work*

Before making any consideration, let’s remember that these efficient frontiers are not giving unanimous results on the effects of Islamic finance, but it is an empirical attempt to compare three different sets of assets and analyze the results.

Furthermore, let’s remember the outcomes of the Markowitz theory: when running a Markowitz optimization there are problems with the model, for example there aren’t enough constraints to make the optimization stable or the views on the estimates may not be the best ones to make the model robust. Thus, you can obtain different results just by slightly changing the period of time or adding some constraints.

Returning to our analysis, efficient frontiers above clearly state that with these portfolio optimizations, the given Islamic banks are the efficient ones. In fact, as Markowitz’s statement about efficiency declares “a single asset or a portfolio of assets is considered to be efficient if no other asset or portfolio of assets offers higher expected returns with the same risk, or lower risk with the same expected return”. Thus, according to Markowitz, this is the case of the Islamic portfolio since at each given expected return there

---

isn’t a lower level of risk while, on the other side, at each given standard deviation it offers always the highest expected return.

Figures below will give a view on how efficient portfolios are composed in each sample analyzed.

**Italian efficient portfolios**

![Italian efficient portfolios](image)

*Figure 2.2.18. Italian efficient portfolios. Source: Excel – Personal work*

**Islamic efficient portfolios**

![Islamic efficient portfolios](image)

*Figure 2.2.19. Islamic efficient portfolios. Source: Excel – Personal work*
The compositions of the efficient portfolios give an even more interesting result. If for the efficient frontiers it is hard to give unanimous considerations, when talking about compositions it is easier to see and read the results.

Usually, as already mentioned by the Black-Litterman paper, portfolios very diversified are reached with some improvements of the Markowitz optimization, like improving the views or, according to the Heuristic methods, also enhancing the process with a re-sample.

Thus, the efficient portfolios of the Islamic banks’ sample (figure 2.2.19. above) represent an interesting result, reaching the diversification.

In fact, as the figure shows, for each efficient portfolio there are at least 10 different assets, while glancing the European and the Italian compositions, it is easy to see less diversified portfolios, especially for the Italian one.

But what drives the efficient portfolios? How are they built? Which calculation is there behind the compositions?

Since efficient portfolios compositions give a view on how much portfolios are diversified, and diversification means less correlation within assets, it can be stated that correlation drives these compositions.

Of course, seeing the results, Islamic banks are going to be less correlated than their opponents but a wider outlook of correlations among the analyzed financial institutions will make the situation clearer.
Table 2.2.17. below resumes means of the single correlations between banks in each portfolio.

<table>
<thead>
<tr>
<th>Mean of correlations</th>
<th>Islamic portfolio</th>
<th>European portfolio</th>
<th>Italian portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27.13%</td>
<td>57%</td>
<td>48.53%</td>
</tr>
</tbody>
</table>

*Table 2.2.17. Mean of correlations. Source: Excel – Personal work*

These numbers show as the correlations of the European and Italian banks are doubled with the respect to the Islamic banks. An interesting result, but the considerations done until now has to be always remembered, i.e. risk measures of the Islamic banks’ value index, the different Islamic political and economic situations compared to European ones. For example, European banks are directly correlated due to the same currency used (almost), same monetary policies, same financial regulations and most important an Economic Union, so a more general correlation. After all, that 27.13% of the Islamic banks has to be highlighted since, even though they share the same Shari’ah law and almost same economic policies, states that they are not correlated.

An interesting datum also concerns the frequency of these correlations. Tables below make a recap of this.

**ISLAMIC CORRELATIONS**

<table>
<thead>
<tr>
<th>Upper limits</th>
<th>Frequency (n=484)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>152</td>
</tr>
<tr>
<td>0.2</td>
<td>76</td>
</tr>
<tr>
<td>0.3</td>
<td>74</td>
</tr>
<tr>
<td>0.4</td>
<td>62</td>
</tr>
<tr>
<td>0.5</td>
<td>34</td>
</tr>
<tr>
<td>0.6</td>
<td>14</td>
</tr>
<tr>
<td>0.8</td>
<td>50</td>
</tr>
<tr>
<td>1</td>
<td>22</td>
</tr>
</tbody>
</table>

**EUROPEAN CORRELATIONS**

<table>
<thead>
<tr>
<th>Upper limits</th>
<th>Frequency (n=484)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0</td>
</tr>
<tr>
<td>0.2</td>
<td>2</td>
</tr>
<tr>
<td>0.3</td>
<td>10</td>
</tr>
<tr>
<td>0.4</td>
<td>48</td>
</tr>
<tr>
<td>0.5</td>
<td>90</td>
</tr>
<tr>
<td>0.6</td>
<td>154</td>
</tr>
<tr>
<td>0.8</td>
<td>150</td>
</tr>
<tr>
<td>1</td>
<td>30</td>
</tr>
</tbody>
</table>

*Table 2.2.18. Islamic and European Frequency of correlations*
Easily, it can be noticed that for the Islamic side, between 0 and 0.1 of the correlation there is a number of 152 observations (one third of the total sample), while within the same limits the number of European correlations is 0. 60% of the European correlations are among 0.5 and 0.8, while on the same limits in the Islamic case only 13% of the sample lies there. From the data showed it is easy to understand why the compositions of the efficient portfolios behave in that way. Islamic banks reached during these almost 14 years better levels of correlations as any investor would want and, thus, giving as result diversification.
Chapter 3: The systematic risk in Islamic Finance

3.1. Introduction to the Capital Asset Pricing Model

Before analyzing the systematic risk in the Islamic Finance, it is necessary to understand which theories are behind this concept in order to embrace and better comprehend this risk and the analysis that will be done in the next paragraph.

Everything starts from two major theories that have been derived for the valuations of risky assets: the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT). For the purpose of this chapter, the evaluation of the systematic risk in a single factor model, less relevance to the latter theory (APT) will be given.

Because the grounds of the capital market theory lay directly on the Markowitz portfolio theory, the discussion of the CAPM starts from the last steps of the Markowitz efficient frontier. However, capital market theory extends portfolio theory by developing a model for pricing all risky assets. The final result, the CAPM, will allow to determine the required rate of return for any risky asset, and it will be directly subordinated, as it will be shown, to the systematic risk, i.e. the macroeconomic risk affecting every portfolio.

As for any theory, it is necessary to list a set of assumptions for the Capital Market Theory, initially developed by William Sharpe in a 1965 paper. Given that the CAPM is directly build on the Markowitz portfolio theory, it requires the same assumptions plus additional ones:

- All investors are Markowitz-efficient investors who seek to invest in tangent points on the Markowitz efficient frontier, whose exact position of these tangent points will depend on the individual investor’s risk-return utility function;
- Investors can borrow or lend any amount of money at the risk-free rate of return (RFR);
- All investors have homogeneous expectations; that is, they estimate identical probability distributions for future rates of return;
- All investors have the same one-period time horizon, i.e. one month, one year or six months;
- All investments are infinitely divisible, which means that it is possible to buy or sell fractional shares of any asset or portfolio;
- There are no taxes or transaction costs involved in buying or selling assets;
- There is no inflation or any change in interest rates;

---

Capital markets are in equilibrium\(^7^9\).

Clearly, some of these assumptions are unrealistic, but, since a theory should be judged on how well it explains and helps us predict behavior in the real world, let’s focus on what’s new on this theory: the concept of risk-free asset, that is simply an asset with zero variance, therefore an asset with zero risk and no movements from its mean and, thus, an asset that lies on the vertical axis of a risk-return graph. Therefore, remembering the formula of the covariance among two assets, a risk-free asset would have zero covariance with all other risky assets, consequently also zero correlation and it would provide the risk-free rate of return (RFR).

But, practically, what happens to the expected rate of return and the standard deviation of returns when you combine a risk-free asset with a portfolio of risky assets, such as those existing on the Markowitz efficient frontier?

Like any other expected return for a portfolio of two risky assets, the expected rate of return that includes a risk-free asset is simply the weighted average of the two returns\(^8^0\):

\[
E(R_{port}) = w_{RF}R_{FR} + (1 - w_{RF})E(R_i)
\]

Where \(w_{RF}\) is the portion of the portfolio invested in the risk-free asset and \(E(R_i)\) is the expected rate of return for the asset \(i\).

Recalling the formula of the variance for a two-asset portfolio, \(\sigma^2_{port} = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2r_{1,2}\sigma_1\sigma_2\)

and substituting the risk-free asset for security 1, and the risky asset for security 2, the formula becomes

\[
\sigma^2_{port} = w_{RF}^2\sigma_{RF}^2 + (1 - w_{RF})^2\sigma_i^2 + 2w_{RF}(1 - w_{RF})r_{RF,i}\sigma_{RF}\sigma_i
\]

Since we know that the variance of the risk-free asset is equal to zero, the latter formula can be adjusted as:

\[
\sigma^2_{port} = (1 - w_{RF})^2\sigma_i^2
\]

and where the standard deviation of the portfolio is the square root of the variance above. Thus, the standard deviation is the linear proportion of the standard deviation of the risky asset\(^8^1\).


Now, substituting the asset \( i \) with the market portfolio \( M \), the portfolio with all available investments opportunities with their capitalizations as weights, and implementing few mathematical steps in the formula shown above for the expected return between a risk-free asset and a risky portfolio, the primary result of the capital market theory is now presented below:

\[
E(R_{port}) = RFR + \sigma_{port} \left[ \frac{E(R_M) - RFR}{\sigma_M} \right]
\]

This risk-return relationship can be interpreted as the return for an investor who allocate its money between a riskless security and the risky Market Portfolio, and he expects a return equal to the risk-free rate plus a compensation, the so called risk premium \((E(R_M) - RFR)/\sigma_M)\), for the number of risk units \(\sigma_{port}\) he accepts. This first-grade risk-return relationship, that graphically represents the straight tangent line to the efficient frontier, whose starting point is the RFR on the vertical axis, is normally called the Capital Market Line (CML). As explained by the original paper by William Sharpe in the Journal of Finance, in equilibrium, capital asset prices adjust so that the investor is able to attain any desired point along the Capital Market Line, obtaining higher expected rate of return on his holdings only by incurring additional risk.\textsuperscript{81}

Because all individual risky assets are a part of the market portfolio, their rates of return can be described in relation to the returns of the Market Portfolio using the following linear model\textsuperscript{81}:

\[
R_{it} = a_i + b_i R_{Mt} + \varepsilon
\]

Where \( R_{it} \) is the return for asset \( i \) during period \( t \), \( a_i \) is the constant term for asset \( i \), \( b_i \) is the slope coefficient for asset \( i \), \( R_{Mt} \) is the return for the Market portfolio during period \( t \) and \( \varepsilon \) is the random error term.

The variance of returns for a risky asset can be similarly described as\textsuperscript{68}:

\[
Var(R_{it}) = Var(a_i + b_i R_{Mt} + \varepsilon) \rightarrow 0 + Var(b_i R_{Mt}) + Var(\varepsilon)
\]

Where \( Var(b_i R_{Mt}) \) is the variance of return for an asset related to the variance of the market return, or the asset’s systematic risk, and cannot be diversified away. Moreover, \( Var(\varepsilon) \) is the residual variance of return for the individual asset that is not related to the market portfolio, also called non-systematic risk or idiosyncratic risk, erasable with a completely diversified portfolio.

\textsuperscript{81} Brown, Reilly (2016). *Analysis of investments & management of portfolios, 10th edition*, Cengage Learning, pp. 198-203
More precisely, the systematic risk is the variability in all risky assets caused by macroeconomic variables, such as variability in growth of money supply, interest rate volatility, variability in industrial production and inflation, country risk or liquidity risk, variability in labor income or investment growth.\(^{82}\) Then, the standard deviation for the return \(i\) is directly related to macroeconomic risks or market risks. Unfortunately, capital market theory is an incomplete explanation for the risk-return relationship because in its definition of variance, it embraces also the idiosyncratic risk that can be diversified away. Thus, investors cannot expect to be compensated for any portion of risk that they could have diversified away and, so, the CML should be based on the assumption that the investors only hold fully diversified portfolios, for which total risk and systematic risk are the same thing. The limitation of the capital market theory is that the CML cannot provide an explanation for the risk-return trade-off for individual risky assets because the standard deviation will contain a substantial amount of non-systematic risk.

In this sense, the Capital Asset Pricing Model allows investors to evaluate the risk-return trade-off for both diversified portfolios and individual securities. To do this, the CAPM re-defines the total risk as only the systematic risk, measured by the beta coefficient, that calculates the level of a security’s systematic risk.\(^{83}\) Furthermore, the CAPM indicates what should be the expected or required rates of return on any risky assets.

Now, recalling that the CML expressed the risk-return relationship for fully diversified portfolios is:

\[
E(R_{port}) = RFR + \sigma_{port} \left[ \frac{E(R_M) - RFR}{\sigma_M} \right]
\]

The logical and mathematical step to derive the CAPM would be to replace the \(\sigma_{port}\) with the standard deviation of the single security in order to evaluate the expression for any individual risky asset. However, to do so, the portion of risk that could be diversified away has to be considered and, thus, it has not to be taken into account. One way to do this, i.e. to include only the portion of risk in security \(i\) that is systematically related to the risk in the market portfolio, is the multiplication of \(\sigma_i\) with the correlation coefficient between the returns to security \(i\) and the market portfolio \((r_{i,M})\). Inserting this and rearranging the expression above, the CAPM expression becomes\(^{83}\):

\[
E(R_i) = RFR + \left( \frac{\sigma_i r_{i,M}}{\sigma_M} \right) \left[ E(R_M) - RFR \right]
\]

\(^{82}\) Cochrane, Jagannathan and Wang (1996)

where \( \frac{\alpha_{i,t} - \mu_{i}}{\sigma_{i}} \) is the beta coefficient. The higher the beta, the higher will be the systematic risk compared to the market and the higher will also be the correlation between the asset \( i \) and the market. With a \( \beta \) equal to 1, the security \( i \) perfectly replicates the risk of the market. With a beta equal to 0, it means there’s no correlation between the security \( i \) and the market and, thus, the CAPM does not explain the investment.

This new first-grade risk-return relationship is called Security Market Line and intersects the vertical axis at the risk-free rate point.

In conclusion, there are two important differences between the CML and the SML. First, the CML measures the risk by the standard deviation of the investment, while the SML considers only the systematic risk. Secondly, the CML can be applied only to portfolio holdings that are already fully diversified, while the SML can be applied to any individual asset or portfolios of assets.\(^\text{84}\)

Practically speaking, how do investors calculate the systematic risk for an asset or portfolio? The systematic risk input of an individual asset is derived from a regression model, computable with any financial software or excel:

\[
R_{i,t} = \alpha_i + \beta_i R_{M,t} + \epsilon
\]

Where \( R_{i,t} \) is the rate of return for asset \( i \) during period \( t \), \( R_{M,t} \) is the rate of return for the market portfolio \( M \) during \( t \). \( \alpha_i \) (also called excess return) is the difference between estimated return and expected return, \( \beta_i \) is the beta coefficient and \( \epsilon \) is the error term.\(^\text{84}\)

The expression above is usually called the \( \beta \) pricing model or beta-representation, where \( R_{M,t} \) is independent from the asset \( i \) and it depends on the volatility of the market. It is called the market price of risk. \( \beta_i \) is the quantity of risk.\(^\text{85}\)

The alpha or excess return can be both positive (the security is undervalued), and, thus, it increases the rate of return, or negative (the security is overvalued), and it tells us if the security \( i \) is outperforming or not the market (with alpha positive yes). If the alpha is zero, the security is on the SML and it is in line with its systematic risk.

Doubtless, the CAPM is a financial masterpiece that provides a risk-return relationship still used every day, but relaxing its assumptions, running tests on it, looking at practical results of this model, there is no unanimity about the efficiency of the Capital Asset Pricing Model.

What we once believed is that the CAPM is a good measure of risk and assets average returns are explained by their beta. But practically, there are strategies with high average returns without large betas.


Many times the CAPM does not work, with theories trying to explain why. One of them is the one it has already been introduced at the beginning of the paragraph: the Arbitrage Pricing Theory, the multifactor extensions to the Capital Asset Pricing Model. This latter theory developed by Stephen Ross in 1976, basically provides the return for a security \( i \) as function of multiple risk factors instead of one as the CAPM does (the market risk). Thus, instead of having one beta coefficient, according to the APT, there are many sensitivities, each of them measuring the correlation between the security \( i \) and the given risk factor\(^86\).

\[
R_t = \alpha_i + \beta_1 F_{1,t} + \beta_2 F_{2,t} + \beta_3 F_{3,t} + \cdots + \beta_k F_{k,t} + \varepsilon
\]

### 3.2. The analysis of the βs on Islamic banks

Aim of this final chapter is to analyze the systematic risk in the sample of banks already taken into account in chapter two, and to compare them to the samples of European and Italian banks. To do so, as explained in the previous paragraph, the coefficient that measures the systematic risk is the beta, slope of the linear relationship between expected return and return of the reference market. The analysis will be carried out as follows: the main measures resulted from the regressions for evaluating the beta will be shown, i.e. beta and alpha coefficients, the \( R^2 \), levels of significance and graphs of dispersion, both for the portfolios as a whole and for each single bank. A comparison among the “conventional” and “Islamic” measures will be then provided. Lastly, a series of explanations, motivations and concerns will be drafted in order to explain the results obtained with the analysis. Purpose of this work is to analytically show if the Islamic finance and, more precisely, the analyzed Islamic banks are safer in terms of systematic risk, i.e. the macroeconomic risks affecting the market, compared to their conventional opponents. Moreover, once this comparison will be done, this chapter wants to explain how these Islamic financial institutions achieved the results, which percentage of Islamic finance is behind them, which are the instruments used to reach them, which were the consequences in

---

periods of crises. Essentially, goal of this final chapter is to try to analytically show what is the impact of the systematic risk on the Islamic finance to have a better view on how Islamic banks behave.

First of all, let’s remember how the three samples of the second chapter are composed (figures 3.2.1., 3.2.2. and 3.2.3. below).

**ITALIAN EQUITY MARKET PORTFOLIO**

![Italian Equity Market Portfolio Diagram](image1)

*Figure 2.2.1. Source: Excel – Personal work*

**EUROPEAN EQUITY MARKET PORTFOLIO**

![European Equity Market Portfolio Diagram](image2)

*Figure 3.2.2. Source: Excel – Personal work*
The procedure for evaluating the beta coefficient starts from the linear model for calculating the rate of return for an asset \( i \) during a period \( t \):

\[
R_{i,t} = \alpha_i + \beta_i R_{M,t} + \epsilon
\]

Running a regression where the returns of the reference market during a given period represent the X variable and the Y variable is constituted by the returns of a given portfolio or asset. The results give us the beta coefficient, i.e. the quantity of risk, the alpha, i.e. the excess return, and all the statistical measures that allow us to better understand the results obtained.

For the samples considered above, the same period given in the second chapter has been taken into account (07/2003 to 01/2017). As X variable, the monthly returns of the MSCI World Index, a standard

---

benchmark used to analyze the global market returns, have been used. As Y variable, the returns already used in chapter two of each portfolio and each bank have been taken into account, both for the Islamic side as for the European and Italian side. Excel and Matlab software have been used to run the regressions. Starting from the beta analysis of the three portfolios, table 3.2.1. below summarizes the main stats of the regressions.

The following comparisons will be done only between the Islamic and the European sets of banks, since they have the same number of assets. For the Italian portfolio, stats will be released just to show the results of the work. Nevertheless, the considerations will take into account also the Italian banks.

<table>
<thead>
<tr>
<th>Portfolios vs MSCI World Index from 07/2003 to 01/17, n = 163</th>
<th>B</th>
<th>α</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Islamic Portfolio</td>
<td>0.5859</td>
<td>0.0035</td>
<td>18.20%</td>
</tr>
<tr>
<td>European Portfolio</td>
<td>1.5393</td>
<td>-0.0092</td>
<td>58.3%</td>
</tr>
<tr>
<td>Italian Portfolio</td>
<td>0.9885</td>
<td>-0.0067</td>
<td>34.39%</td>
</tr>
</tbody>
</table>

Table 3.2.1. Stats measures given by the regression. Source: Excel and Matlab – Personal work

With a first view of the measures above, it is clear that the Islamic Portfolio has the lowest beta (0.5859), while the European Portfolio’s beta (1.5393) triples the Islamic one and it is 50% higher than the risk of the market. The beta of the Italian Portfolio (0.9885) almost perfectly replicates the reference market.

Another interesting chart to show when dealing with beta regressions is the graph of dispersion, i.e. the graph that shows the position of each Y variable with the respect of its X variable. Furthermore, the Excel function shows also the CAPM equation \( R_{t,t} = \alpha_l + \beta_l R_{M,t} \) that unites the coefficients above.
**Figure 3.2.4. Italian dispersion**

\[ y = 0.9885x - 0.0067 \]

**Figure 3.2.5. Islamic dispersion. Source: Personal work**

\[ y = 0.5859x + 0.0035 \]
It is important to underline that the $R^2$ is not significant for all the three portfolios considered, however the European sample provides an acceptable coefficient (58.3%), while the Islamic one gives the lowest $R^2$ (18.2%) among the three portfolios. Practically, according to one definition by Stock and Watson in “Introduction to Econometrics”, the $R^2$ is the ratio between the variability of data and the accuracy of the model used. Thus, it is a coefficient with maximum value equal to 1. The closer this coefficient is to 1, the more accurate is the model; the closer the $R^2$ is to 0, the less the X variables predict the Y variables’ value. But, it has to be specified that the $R^2$ does not state if a variable is statistically significant or not, it is simply a measure of accuracy of the model regressed.

The t-stat and the p-value define the significance. The former is the coefficient we get with the regression (for example the alpha or the beta) divided the standard error, i.e. an estimate of the standard deviation of the coefficient and it can be thought as a measure of the precision with which the regression coefficient is measured. The p-value is the probability of seeing a result as extreme as the one we are getting with the regressions run. The lower the p-value, the higher the probability of being correct.

For the regressions run for the three portfolios considered, with 1 degree of freedom for the model and 161 for the residual, the p-values for the beta coefficients are all below or equal 0.05% (0.05% for the

---

88 James Stock, Mark Watson (2005), *Introduction to the econometrics*, Pearson Education p. 174
Islamic set, while 0.02% and 0.03% for the European and Italian sets respectively), meaning that the data did not occur by chance.

Going to what it cares more for the purpose of this chapter, the beta, let’s see more in detail what it is and what it measures.

As already explained earlier, mathematically the β is \( \left( \frac{\sigma_i r_i M}{\sigma_M} \right) \), thus the standard deviation of the security \( i \) times the correlation coefficient among the security and the market, everything divided by the standard deviation of the market. Recalling the definition of correlation, the β can also be written as \( \frac{\text{Cov}_{iM}}{\sigma_M} \). \(^{89}\)

That’s why in the first paragraph it was said that if a security has the beta equal to one, it replicates the market: with a correlation coefficient equal to one, i.e. the two securities have a perfect linear relation and move in the same direction, and the two standard deviations are equal to each other, the beta automatically becomes one. The security \( i \) moves in the same direction of the reference market.

As a consequence, if we compare two betas from two different regressions having the same X variable (the market), obviously, the model with higher beta will have a higher relation with the X variable. This effect of two securities being highly correlated can be seen also from the graph of the dispersion, where the two variables tend to be very close to the tendency line since, indeed, they have a high linear relation.

With a beta higher than one, for example 2 or 3, since the correlation coefficient can be maximum 1, it means that the standard deviation of the security \( i \) is two or three times higher than the standard deviation of the market. Thus, the security \( i \) will be two or three times riskier than the market.

On the contrary, with a decreasing beta, it means that it is also decreasing the linear relation between the security and the market, so that also the risk of the asset is going to be lower than the market.

After having discussed and shown the betas and the other main measures obtained by the regressions, it is time now to deeply analyze how each single financial institution, both Islamic and conventional, behaved in terms of Capital Asset Pricing Model.

The following tables will provide in detail the beta, alpha and \( R^2 \) for each bank.

---

<table>
<thead>
<tr>
<th>Islamic banks vs MSCI World Index from 07/2003 to 01/17</th>
<th>$\beta$</th>
<th>$\alpha$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Doha Bank</strong></td>
<td>0.8644</td>
<td>0.0036</td>
<td>11.19%</td>
</tr>
<tr>
<td><strong>Qatar Bank</strong></td>
<td>0.7097</td>
<td>0.01475</td>
<td>5.83%</td>
</tr>
<tr>
<td><strong>AlAhli Qatar Bank</strong></td>
<td>0.5001</td>
<td>0.00983</td>
<td>3.23%</td>
</tr>
<tr>
<td><strong>Qatar Islamic Bank</strong></td>
<td>0.7097</td>
<td>0.01475</td>
<td>5.83%</td>
</tr>
<tr>
<td><strong>Dubai Investments</strong></td>
<td>1.1365</td>
<td>0.0134</td>
<td>12.12%</td>
</tr>
<tr>
<td><strong>Dubai Bank</strong></td>
<td>0.837</td>
<td>0.014</td>
<td>6.64%</td>
</tr>
<tr>
<td><strong>Shuaa Capital</strong></td>
<td>1.35102</td>
<td>0.0083</td>
<td>9.98%</td>
</tr>
<tr>
<td><strong>Abu Dhabi Bank</strong></td>
<td>0.8109</td>
<td>0.00873</td>
<td>8.6%</td>
</tr>
<tr>
<td><strong>Commercial Bank of Dubai</strong></td>
<td>0.423</td>
<td>0.0071</td>
<td>3.47%</td>
</tr>
<tr>
<td><strong>National Bank of Abu Dhabi</strong></td>
<td>0.5956</td>
<td>0.00932</td>
<td>6.38%</td>
</tr>
<tr>
<td><strong>Alawwal Saudi Bank</strong></td>
<td>0.53709</td>
<td>0.00173</td>
<td>5.07%</td>
</tr>
<tr>
<td><strong>Saudi British Bank</strong></td>
<td>0.37154</td>
<td>0.00287</td>
<td>3.28%</td>
</tr>
<tr>
<td><strong>AlRajhi Bank</strong></td>
<td>0.6727</td>
<td>0.0055</td>
<td>7.22%</td>
</tr>
<tr>
<td><strong>Saudi Investments</strong></td>
<td>0.6097</td>
<td>0.001</td>
<td>6.71%</td>
</tr>
<tr>
<td><strong>Arab National Bank</strong></td>
<td>0.8209</td>
<td>0.0006</td>
<td>12.75%</td>
</tr>
<tr>
<td><strong>AlJazira Bank</strong></td>
<td>0.6959</td>
<td>0.00431</td>
<td>5.77%</td>
</tr>
<tr>
<td><strong>Riyad Bank</strong></td>
<td>0.4597</td>
<td>-0.0024</td>
<td>5.40%</td>
</tr>
<tr>
<td><strong>Attijarifawa Bank</strong></td>
<td>0.1041</td>
<td>-0.0027</td>
<td>0.46%</td>
</tr>
<tr>
<td><strong>BMCE Moroc</strong></td>
<td>0.20633</td>
<td>-0.0029</td>
<td>1.35%</td>
</tr>
<tr>
<td><strong>Credit du Moroc</strong></td>
<td>0.1567</td>
<td>-0.0099</td>
<td>0.64%</td>
</tr>
<tr>
<td><strong>Bahrain Islamic Bank</strong></td>
<td>0.2386</td>
<td>-0.0136</td>
<td>1.26%</td>
</tr>
<tr>
<td><strong>National Bank of Bahrain</strong></td>
<td>0.06673</td>
<td>-0.0123</td>
<td>0.26%</td>
</tr>
</tbody>
</table>

Table 3.2.2. Islamic banks main stats from the CAPM regression. Source: Excel and Matlab – Personal work
### European banks vs MSCI World Index from 07/2003 to 01/17

<table>
<thead>
<tr>
<th>Bank Name</th>
<th>β</th>
<th>α</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banca Mediolanum</td>
<td>1.069</td>
<td>0.0014</td>
<td>26.28%</td>
</tr>
<tr>
<td>Banca MPS</td>
<td>1.289</td>
<td>-0.02808</td>
<td>15.9%</td>
</tr>
<tr>
<td>Unipol Banca</td>
<td>1.2728</td>
<td>-0.01498</td>
<td>19.61%</td>
</tr>
<tr>
<td>Banca Pop di Sondrio</td>
<td>0.5214</td>
<td>-0.0021</td>
<td>10.82%</td>
</tr>
<tr>
<td>BBVA</td>
<td>1.3501</td>
<td>-0.00475</td>
<td>43.76%</td>
</tr>
<tr>
<td>Santander Bank</td>
<td>1.3977</td>
<td>-0.0048</td>
<td>46.12%</td>
</tr>
<tr>
<td>Deutsche Bank</td>
<td>1.6464</td>
<td>-0.00826</td>
<td>43.28</td>
</tr>
<tr>
<td>Commerzbank</td>
<td>1.8199</td>
<td>-0.01355</td>
<td>34.55%</td>
</tr>
<tr>
<td>Banca Intesa San Paolo</td>
<td>1.302</td>
<td>-0.0026</td>
<td>33.4%</td>
</tr>
<tr>
<td>Banca Unicredit</td>
<td>1.7974</td>
<td>-0.0152</td>
<td>42.43%</td>
</tr>
<tr>
<td>Credit Agricole</td>
<td>1.5409</td>
<td>-0.00293</td>
<td>37.43%</td>
</tr>
<tr>
<td>BNP Paribas</td>
<td>1.2932</td>
<td>-0.0002</td>
<td>39.18%</td>
</tr>
<tr>
<td>Societe Generale Bank</td>
<td>1.7922</td>
<td>-0.0031</td>
<td>47.59%</td>
</tr>
<tr>
<td>Barclays</td>
<td>1.7531</td>
<td>-0.0048</td>
<td>33.5%</td>
</tr>
<tr>
<td>Lloyd’s Bank</td>
<td>1.4274</td>
<td>-0.01695</td>
<td>29.36%</td>
</tr>
<tr>
<td>HSBC</td>
<td>0.8557</td>
<td>-0.01023</td>
<td>35.08%</td>
</tr>
<tr>
<td>Royal Bank of Scotland</td>
<td>1.7735</td>
<td>-0.0266</td>
<td>33.33%</td>
</tr>
<tr>
<td>Standard Chartered</td>
<td>1.3961</td>
<td>-0.0101</td>
<td>31.02%</td>
</tr>
<tr>
<td>Swedbank</td>
<td>1.6342</td>
<td>0.0001</td>
<td>45.85%</td>
</tr>
<tr>
<td>Bank of Ireland</td>
<td>3.139</td>
<td>-0.0109</td>
<td>31.03%</td>
</tr>
<tr>
<td>Allied Irish Bank</td>
<td>2.6574</td>
<td>-0.02743</td>
<td>24.34%</td>
</tr>
<tr>
<td>Credit Suisse</td>
<td>1.1403</td>
<td>0.0038</td>
<td>28.58%</td>
</tr>
</tbody>
</table>

Table 3.2.3. European banks main stats from the CAPM regression. Source: Excel and Matlab – Personal work
### Table 3.2.4. Italian banks main stats from the CAPM regression. Source: Excel and Matlab – Personal work

<table>
<thead>
<tr>
<th>Bank</th>
<th>Average β</th>
<th>Average α</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banca Intesa San Paolo</td>
<td>1.302</td>
<td>-0.0026</td>
<td>33.4%</td>
</tr>
<tr>
<td>Banca Unicredit</td>
<td>1.7974</td>
<td>-0.0152</td>
<td>42.43%</td>
</tr>
<tr>
<td>Banca MPS</td>
<td>1.289</td>
<td>-0.02808</td>
<td>15.9%</td>
</tr>
<tr>
<td>Unipol Banca</td>
<td>1.2728</td>
<td>-0.01498</td>
<td>19.61%</td>
</tr>
<tr>
<td>Banca Pop di Sondrio</td>
<td>0.5214</td>
<td>-0.0021</td>
<td>10.82%</td>
</tr>
<tr>
<td>Banca Carige</td>
<td>0.7602</td>
<td>-0.0217</td>
<td>7.98%</td>
</tr>
<tr>
<td>Banca Finnat</td>
<td>0.5735</td>
<td>0.00139</td>
<td>8.11%</td>
</tr>
<tr>
<td>Banca Ifis</td>
<td>0.7404</td>
<td>0.0105</td>
<td>15.29%</td>
</tr>
<tr>
<td>Banca Profilo</td>
<td>1.1987</td>
<td>-0.0072</td>
<td>18.34%</td>
</tr>
<tr>
<td>Banco di Desio</td>
<td>0.7447</td>
<td>-0.00245</td>
<td>13.64%</td>
</tr>
<tr>
<td>Banco di Sardegna</td>
<td>0.5937</td>
<td>0.00085</td>
<td>3.99%</td>
</tr>
<tr>
<td>Banca Mediolanum</td>
<td>1.069</td>
<td>0.0014</td>
<td>26.28%</td>
</tr>
</tbody>
</table>

### Table 3.2.5. Average coefficients from the regressions analyzed. Source: Personal work

<table>
<thead>
<tr>
<th>Category</th>
<th>Average β</th>
<th>Average α</th>
<th>Average R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Islamic banks</td>
<td>0.58536</td>
<td>0.00346</td>
<td>5.61%</td>
</tr>
<tr>
<td>European banks</td>
<td>1.6395</td>
<td>-0.0092</td>
<td>34.08%</td>
</tr>
<tr>
<td>Italian banks</td>
<td>0.9885</td>
<td>-0.0067</td>
<td>17.94%</td>
</tr>
</tbody>
</table>
Table 3.2.5. above confirms what it has been said for the samples’ coefficients. Islamic banks averaged 0.585 for the beta coefficient, i.e. the quantity of risk, with maximum two peaks (Shuaa Capital and Dubai Investments) above 1. Moreover, they also tended to beat the market, having an average alpha of 0.0035, and with 16 on 22 banks in the sample that had a positive alpha.

The European banks confirm to have a beta that triplicates the Islamic one and that is 50% higher than the beta of the market (1). Only two banks, Banca Popolare di Sondrio and HSBC, are below 1 (0.5214 and 0.856 respectively), and with the two Irish banks (Bank of Ireland and Allied Irish) that reached betas of 3, meaning that they were exposed three times more the risk incurring the reference market. With these latter results, it is easy to connect and understand why Ireland and the Irish banks have been so affected during the 2007 and 2010 crises, two periods that saw the Irish economy collapsing due to the fact, as confirmed by data, that it was highly correlated with the market risk.

Looking at the Italian side, the banks almost perfectly replicated the MSCI World Index (beta equal to 0.9885), and with 60% of the sample that had a negative alpha and very close to zero, meaning that in their effective returns they didn’t beat the market in the period considered and moreover, since the average alpha was close to zero (-0.0067), it is confirmed that they perfectly tried to follow the global market index during this 14 years.

To look more deeply and more accurately on how the betas singularly behaved, it is interesting to glance the frequency of this coefficient (tables 3.2.6. below), in order to better see how the quantity of risk distributed through portfolios.
Islamic banks’ betas distribution

<table>
<thead>
<tr>
<th>Upper limits</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>3</td>
</tr>
<tr>
<td>0.4</td>
<td>3</td>
</tr>
<tr>
<td>0.6</td>
<td>5</td>
</tr>
<tr>
<td>0.8</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>1.2</td>
<td>1</td>
</tr>
<tr>
<td>1.4</td>
<td>1</td>
</tr>
<tr>
<td>1.6</td>
<td>0</td>
</tr>
</tbody>
</table>

European banks’ betas distribution

<table>
<thead>
<tr>
<th>Upper Limits</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>0</td>
</tr>
<tr>
<td>0.4</td>
<td>0</td>
</tr>
<tr>
<td>0.6</td>
<td>1</td>
</tr>
<tr>
<td>0.8</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>2</td>
</tr>
<tr>
<td>1.4</td>
<td>7</td>
</tr>
<tr>
<td>1.6</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3.2.6. Source: Excel – Personal work

Table above tells us that for the Islamic banks, 60% of the betas were among 0.4 and 0.8, and with a broader 72% between 0 and 0.8. Moreover, the highest upper limit is 1.4. If we consider the same number of banks, but this time European ones, only 5% of the sample is among 0 and 0.8, while 72% of the betas is between 1.2 and 2. Furthermore, it is important to underline that, even with only one bank, the highest upper limit for the European sample is 4.

Now, after having presented the results of the analysis, it is time to understand if, in the real world, these data are confirmed or not and why the Islamic finance behaves in a different way in terms of beta.

First of all, let’s answer the questions “is it true that Islamic finance is less affected by the world market?” or “are there historical evidences that confirms it?”

Let’s consider the 2007-2008 crisis, one the most recent and powerful financial crisis, and let’s see how the Islamic finance and Islamic financial institutions behaved.

The second chapter has already confirmed how the Islamic portfolio, indeed the Islamic banks, in 2007 and at the beginning of 2008 were not still affected by the crisis, but they were still reaching high peaks of returns while their conventional competitors started to fall. Nevertheless, the Islamic banks were much more affected by the economic real crisis of 2009, but this is something we already explained and that will also be resumed later. Let’s focus on the first part of the crisis, the financial one.
There are many papers and official publications that show graphically that the Islamic financial institutions were less affected by the crisis than the conventional ones. Khawla Bourkhis and Mahmoud Sami Nabi in a paper released by the Economic Research Forum showed the trend of ROA and ROE for both the Islamic banks as the conventional banks for the last 20 years (Figure 3.2.7. and 3.2.8. below).

**Trend of ROAA**

![Trend of ROAA](image)

*Figure 3.2.7. Khawla Bourkhis and Mahmoud Sami Nabi, Economic Research Forum, working paper no. 616 (2011), Have Islamic banks been more resistant than conventional banks to the 2007-2008 financial crisis?*

**Trend of ROAE**

![Trend of ROAE](image)

*Figure 3.2.8. Figure 3.2.7. Khawla Bourkhis and Mahmoud Sami Nabi, Economic Research Forum, working paper no. 616 (2011), Have Islamic banks been more resistant than conventional banks to the 2007-2008 financial crisis?*
Hasan and Dridi, two major Islamic economists, found that in the 2007-2008 period Islamic banks had a lower impact on their profitability, while the growth of their credits and assets was still strong (Figure 3.2.9 below).

![Change in profits, credit and assets from 2007 to 2008](image)

*Figure 3.2.9. Hasan and Dridi's analysis*

Even the Islamic Financial Services Board in the 2010 Stability Report released a chart that better explains the behavior of the top 10 Islamic banks vs the top 10 conventional banks during the 2007-2008 period (Figure 3.2.10. below).

![Change in market capitalisation, net profit and equity from 2007 to 2008](image)

*Figure 3.2.10. Islamic Finance and Global Financial Stability Report*
It has been shown and proved that Islamic finance and its financial institutions had a lower impact during the 2007-2008 financial crisis, even though they reacted much worse during the real economic crisis of 2009.

Reasons and explanations will be now provided to explain why this happened and how Islamic banks reached these results:

- **Correlation with the market:** as already explained and analyzed, Islamic banks tend to be less correlated with the market risk (low betas). Moreover, table below also shows the level of correlation between the returns of each of the three sample and the returns of the MSCI World Index. The Islamic portfolio provides a correlation coefficient of 0.43, while the conventional European banks are much more correlated with the market (0.76);

<table>
<thead>
<tr>
<th>Banks’ returns vs MSCI World Index</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Islamic set</td>
<td>0.4266</td>
</tr>
<tr>
<td>European set</td>
<td>0.7635</td>
</tr>
<tr>
<td>Italian set</td>
<td>0.5864</td>
</tr>
</tbody>
</table>

Table 3.2.7. Source: Excel – Personal work

- **Islamic financial screenings:** as explained in the first chapter, Islamic investors and Islamic equity indexes have limitations for investing and for going public: there are both industrial as financial screenings to respect.

For example, it is forbidden by the *Shari’ah* law to invest or to issue shares relating to alcohol, pornography, weapons and, most importantly to financial institutions that do not provide the *ribā* prohibition. Thus, since the financial crisis has been provoked by American financial institutions that provided financial instruments with a predetermined non-justified return, it is likely to think that Islamic banks were not much affected by the financial crisis since they could not invest in such institutions\(^90\). Moreover, if we consider the financial screenings, i.e. the equity investment must respect some financial ratios such as total debt/capital less than 33% or interest income/total revenue less than 5%\(^91\), Islamic banks and more in general Islamic financial institutions can only invest in low leveraged equities, thus, the ones that are likely to be less affected during financial crises;

- **Islamic principles and prohibitions:** let’s first remember what were the causes of the 2007-2008 crisis: lack of transparency in the financial market, an excessive trust from the firms to the ratings

---

\(^{90}\) Napoleoni L. (2009), *Economia canaglia, il lato oscuro del nuovo ordine mondiale*, il Saggiatore, Milano

\(^{91}\) Roni Hamaui, Marco Mauri (2009), *Economia e finanza Islamica*, il Mulino
provided by the rating agencies, the collapse of the subprime mortgages instruments, the failure in the use of derivatives instruments and a high level of the debt that brought to the bubble burst. On the contrary, for example, the Islamic prohibition of *gharar* (uncertainty) prevents Islamic financial instruments from having lack of transparency, or from being too elaborated as the ones created by the securitization of assets. Therefore, in the Islamic finance there’s no packaging and selling the risk and the *gharar* prohibition allowed Islamic banks to be less affected during the crisis.

Another typical example of Islamic prohibition that helped the Islamic finance to overcome the financial crisis is the prohibition of *ribā*, that contributes to fight high levels of leverage and to eliminate the problem right to the source of the pain;

- **Different levels of leverage:** as already stated earlier, a cause of the 2007-2008 financial crisis was the high level of debt in the markets. Well, both data downloaded from Bloomberg and an IMF analysis show how Islamic and conventional banks had different levels of debts in that period and how these leverage exposures affected differently the profitability.

If we look at the liquidity ratios provided by Bloomberg for the banks analyzed in this paper, for example for three Saudi banks as Riyad Banks, Saudi Investments Bank and AlJazira Bank the Debt/Capital ratio was 47%, 44% and 22%, respectively, during the 2008, while, looking at three European banks as Barclays, Deutsche Bank and Santander, the same ratio during the 2008 was 92%, 89% and 88%, respectively, so double with respect to Islamic banks. A 2010 IMF paper confirms these levels and, moreover, with a regression analysis, useful to explain the factors affecting changes in profitability between Islamic and conventional banks during the 2007-2008, the Monetary Fund found that higher investment portfolio and leverage have a negative impact on profitability. Hasan and Dridi, the authors of the IMF paper, used an OLS regression to find what were the factors affecting the profitability in 120 Islamic banks (the sample excludes Iran) and in 120 conventional banks. The results tell us that with a one percent higher investment-to-asset ratio or a one percent higher assets-to-capital ratio lead to a decline in profitability by 1.8 and 12.2 percent, respectively. The fact the Islamic banks have smaller investment portfolio and lower leverage explains in part their better performance in 2008: the model shows that profitability is likely to increase by about 44% if the bank is an Islamic one.

---

93 Durmus Yilmaz (2009), *Islamic Finance: during and after the global financial crisis*, Central Bank of Republic of Turkey
- *The lower exposure to interbank rates and markets:* during the 90’s and 00’s new sources of funding for banks have been developed. Banks had the possibility to finance their activities lending money each other in the form of short term debt (wholesale funding), through interest rates called interbank rates. As suggested by Giavazzi and Amighini, this new technique of raising money may provoke systematic and systemic risks among financial institutions\(^\text{95}\). The weakness of this wholesale funding has been noted during the crisis, when banks stopped to lend money each other, leaving many banks without funds and cash to finance their activities and triggering the so called “run on banks” phenomenon.

In Islamic finance, the share of funds raised in the interbank markets is marginal, mainly because of two reasons: first of all, this form of loan is considered a non-justified loan by the *Shari’ah* law, because the interest is predetermined and not justified since there aren’t underlying assets. Thus, Islamic countries discourage this form of funding, providing high interbank rates so that it becomes unsuitable for banks to lend money each other\(^\text{96}\). Then, this new form of market is still naïve and not developed in the Islamic financial system, thus, the interbank instruments do not reach a significance level that may bring to a systemic distress\(^\text{97}\).

Thus, there is a low systemic risk, a low probability of contagious among Islamic banks, as already proved by the table of the correlations in chapter two (here below re-proposed) for the sample of analyzed banks.

**ISLAMIC CORRELATIONS**

<table>
<thead>
<tr>
<th>Upper limits</th>
<th>Frequency (n=484)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>152</td>
</tr>
<tr>
<td>0.2</td>
<td>76</td>
</tr>
<tr>
<td>0.3</td>
<td>74</td>
</tr>
<tr>
<td>0.4</td>
<td>62</td>
</tr>
<tr>
<td>0.5</td>
<td>34</td>
</tr>
<tr>
<td>0.6</td>
<td>14</td>
</tr>
<tr>
<td>0.8</td>
<td>50</td>
</tr>
<tr>
<td>1</td>
<td>22</td>
</tr>
</tbody>
</table>

**EUROPEAN CORRELATIONS**

<table>
<thead>
<tr>
<th>Upper limits</th>
<th>Frequency (n=484)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0</td>
</tr>
<tr>
<td>0.2</td>
<td>2</td>
</tr>
<tr>
<td>0.3</td>
<td>10</td>
</tr>
<tr>
<td>0.4</td>
<td>48</td>
</tr>
<tr>
<td>0.5</td>
<td>90</td>
</tr>
<tr>
<td>0.6</td>
<td>154</td>
</tr>
<tr>
<td>0.8</td>
<td>150</td>
</tr>
<tr>
<td>1</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 3.2.8. Distribution of correlations among Islamic and conventional banks

\(^{95}\) Francesco Giavazzi, Alessia Amighini (2010), *Macroeconomics: a European Perspective*

\(^{96}\) See first paragraph of chapter one for more details

\(^{97}\) 2010 Bahrain Islamic Bank’s balance sheet
- Profit and Loss Sharing principle: as explained in the first chapter in listing the Islamic financial instruments, each contract, instrument, equity and bank account follow the Profit and Loss Sharing principle, i.e. each party of a deal, whatever their nature, shares both profits as losses. Thus, for example, taking the bank account, the main liability for a bank that uses it to raise money from the households, it gives a great stability to an Islamic financial institution, since the losses are backed and shared by each shareholder and depositor of the bank. Some economists as Milton Friedman in the 60s and Kindleberger in the 80s hoped to apply this banking system to the American one, due to the multitude of banking crises affecting the country. Sharing the market risk, it avoids the decline of Islamic banks’ balance sheets in case of financial crises (Khan, 1987; Ahmed, 2002; Cihak and Hesse, 2008) because it allows banks to transfer the credit risk from the asset to the liability side: if their investments perform badly or if some events reduce their returns, the bank undergoes a loss that would immediately be transferred to the investors. Let’s remember that also the Islamic banking system provides 100% short-term guaranteed deposits (wadi’ā contracts), thus, the risk would only be transferred to those who decided to invest in risky assets. As a consequence, since the returns of depositors is strictly connected to the returns of the banks’ assets, there is no more a mismatch problem between assets and liabilities (Van Greuning and Iqbal names this Islamic phenomenon as “pass-through”) and, thus, the liquidity and insolvency risk are avoided.

In case of Islamic mutual contracts between, for example, a bank and a borrower firm, the fact the financial duties of the borrowers are not predetermined and fixed, but they are variable, it solves the credit risk problem, since the capital and the interests to pay back from the firm to the bank change according to the firm’s revenues. Thus, only the growth of the real economy makes profits.

- Capital adequacy: thanks to the Basel accords, banks are required to have capital buffers of specific quality types, calculated in relation to the risk the bank runs, in addition to sufficient capital for company law and licensing purposes. Capital buffers aim to ensure that the money attracted from the depositors can be repaid. Thus, capital buffers consist of instruments on the liability side of the balance sheet that are available to absorb unexpected losses, both in a going concern (Tier 1 capital), as well as in a gone concern scenario. The higher the capital buffers hold by a bank, the higher the possibility to absorb losses and, thus, the higher the probability to survive in periods of crises. It has already showed in chapter one the capital adequacy for all the Islamic banks (Iran excluded) through an analysis made by the Islamic Financial Services Board in its 2016 Stability Report. Figure 3.2.11.

---

98 Roni Hamau, Marco Mauri (2009), Economia e finanza Islamica, il Mulino
100 Maher hasan and Jemma Dridi (2010), The effects of the Global Crisis on Islamic and Conventional banks: a comparative study, IMF working paper
below takes into account the same chart but considering only the 2007-2010 period. As it can be seen, the Total Capital Adequacy for the 2007-2008 is in a high position, 23% and 22% respectively, meaning that during the financial crisis, Islamic banks could absorb unexpected losses with 20% of its capital. Moreover, it can be also noted that the Total Capital Adequacy and the Tier 1 Capital (the most liquid instruments to absorb losses) are very close each other, so that in case of financial crises the Islamic banks can easily recover its situation due to the presence of highly liquid instruments.

![Islamic Banking Average Capital Adequacy Ratios](image)

*Figure 3.2.11. Source: IFSB 2016 Stability Report*

Possible explanations have been made available to clarify why the betas of Islamic banks are lower than their conventional opponents. Obviously, this does not translate into a definition of perfection when dealing with Islamic finance. Indeed, as already mentioned many times, Islamic banks and more generally Islamic finance is not immune to risks. It is true that it is less affected by financial crises, but it is even truer that it is more affected by real economic crises (the proof has been given in chapter two with the z-score analysis).

Few rows above, this paper dealt with the direct relation between the Islamic contracts and the real economy, with banks’ returns depending on the growth of the real sector. To give a proof of this sentence, it is worth to show the trend of the Kuwait Finance House’s returns from 1978 to 2008 (figure 3.2.12. below). The PLS principle turned out in: a null return during 1984 with the downfall of the real estate market, low returns during the beginning of the 90s after the Iraqi invasion and a significantly higher return during the 00s with the economic boom.
The next two graphs are even more interesting since they show the profitability and the non-performing loans during the 2009 crisis, the real economic part of the wider 2007-2009 crisis. Islamic banks were much more affected in terms of both profitability (almost -50% against a -15% reached by conventional banks) and non-performing loans, where, in each country, Islamic banks had higher percentages of bad loans than conventional banks, due to the fact that each loan afforded by Islamic institutions is directly related to real economic projects.
Figure 3.2.14. Sources: Bankscope, banks’ annual reports, and IMF 2010 Working paper
Conclusions

We have reached the end of this work. The aim that drove me along the writing of this paper was to comprehend the principles behind Islamic finance and to apply in such financial system two of the most important financial theories to understand, practically, which results an investor may obtain if investing in an Islamic way.

To do so, after a first chapter where basic definitions and principles about Islamic finance have been given, the Markowitz Portfolio Theory and the Capital Asset Pricing Model have been used since, academically, they provide the best ways to allocate investments and to measure the systematic risk behind a series of assets.

As stated, the first chapter was about the main definitions, principles, prohibitions, requirements, developments, strengths and weaknesses of the Islamic finance. What was better understood is that Islamic finance is based on the fact that money cannot generate money, and everything, according to Quran, has to be justified in front of Allah. Thus, it is a religious and ethical way of making finance with, certainly, modern developments required by the contemporary financial system. As a consequence, each economic and financial instrument follows the Shari’ah law (the Islamic religious law). How Islamic finance developed through the last 10 years has been also shown, from what concerns profitability, capital adequacy, size, assets and countries involved, reaching incredible results in terms of amount of money in circulation (but still less than 10% of the global wealth). The last paragraph sentenced that nothing specifically new has to be done to embrace Islamic capitals and investors here in Italy.

In the second chapter an attempt to apply the Markowitz Portfolio Theory into a portfolio of 22 Islamic banks was carried out. The aim of the attempt was to analyze the efficient portfolio frontier and the efficient portfolio composition, reached through the portfolio optimization, and to compare the results to a sample of 22 European banks. It has been found that, in this specific set of Islamic banks and through the period going from 07/2003 to 01/2017, the given Islamic banks performed much better in terms of efficient frontier (the Islamic efficient frontier was higher than the European one) and especially in terms of portfolio compositions, where the Islamic sample was highly diversified. These results, as confirmed by official papers, statistical and financial analysis computed by myself, are related to the fact that Islamic banks are less correlated between them and to the fact that Islamic banking assets had higher returns during the period selected.

The last chapter has focused on an analysis of the systematic risk, i.e. the macroeconomic risk affecting the market, into the same sample of Islamic banks debated in chapter two. To do so, the Capital Asset Pricing Model has been applied. After a brief description of the model, a calculation of the betas, i.e. the
coefficient that measures the quantity of risk in a given asset/portfolio, was implemented among the Islamic, European and Italian portfolios to analyze how much affected by the systematic were the banks during the given period.

The regressions computed showed lower betas (portfolio average less than 1) for the Islamic banks in comparison with their conventional opponents. Thus, this means that the analyzed Islamic banks tended to be less affected from the reference market risk (MSCI World Index) during this 14 years period. A practical evidence has been found in their returns, showing that, during the 2007-2008 financial crisis, the Islamic banks were not so affected by markets’ falls. More evidence was found in official papers released by Islamic and international authorities, international rating agencies or consulting companies that displayed profitability, losses and leverage graphs for Islamic banks during the first part of the crisis: the levels found showed that Islamic banks performed better than conventional ones.

Possible explanations and reasons to this phenomenon, always with the help of official declarations and analysis, were given: less correlation with the global market, since Islamic banks had a correlation with the MSCI World index of 0.43; instruments and principles more moral than those inside conventional finance, i.e. industrial and financial screenings, profit and loss sharing principles, prohibition of uncertainty, transparency and non-justified interests; higher capital adequacy ratios (during the 2007-2008 crisis more than 20% of Tier 1 Capital); lower debt ratios, where the Debt/Capital ratio on average for the Islamic banks was less than 50% during the crisis.

In conclusion, investing in an Islamic way it has, surely, its benefits and strengths, with great results obtained up to now by Islamic financial institutions. However, there are, still, many weaknesses and lacks that have to be filled by Islamic national authorities. For example, Islamic finance is very correlated with real assets, thus, as happened in 2009 with the real economic crisis, Islamic financial institutions tend to react worse than conventional institutions when affected by real distress. Moreover, there is a lack of Islamic financial international rules and each Shari’ah law is performed differently among Islamic states and authorities, resulting, for example, in bad managements of risks.

What that can be surely stated is that Islamic finance is still a world to discover and that it represents an opportunity rather than a disadvantage for our world.
References


Banca d’Italia, Occasional papers number 73 (2010), Questioni di economia e finanza, finanza islamica e sistemi finanziari convenzionali.


Caritas/Migrantes (2011), Il 21° dossier statistico immigrazione, Oltre la crisi, insieme.

Cherif K. (2008), Analyse des produits financiers Islamiques, travail de Bachelor de la Haute Ecole de Gestion de Genève.

Chi-Fu Huang, Robert Lintzenberger, Foundations for Financial Economics.

Durmus Yilmaz (2009), Islamic Finance: during and after the global financial crisis, Central Bank of Republic of Turkey.

Economy Magazine, attached to Panorama magazine, May 2017, Dubai, eterno paradiso dei petrodollari.


Francesco Giavazzi, Alessia Amighini (2010), Macroeconomics a European Perspective.


Il Sole 24 Ore (November 29th, 2008), Crisis, the Islamic banks protected by the Shari’ah.


James Stock, Mark Watson (2005), *Introduction to the econometrics,* Pearson Education.


M. Anwar, International Islamic University of Malaysia, *Islamicity of banking and modes of Islamic banking.*


Muhammad Umer Chapra (1985), *Towards a Just Monetary System.*


Roni Hamaui, Marco Mauri (2009), *Economia e finanza Islamica,* il Mulino.


The Pew forum of religion and public life (2010), *Muslim Networks and Movements in Western Europe, Analysis.*


Websites

https://bisb.com/


http://www.pwc.com/

https://www.standardandpoors.com
Summary

Islamic finance: a Markowitz and a Capital Asset Pricing Model approach

Chapter 1: a presentation of the Islamic finance

This final paper is about Islamic finance and everything is behind it. As we know many new investors are from the Middle East area or from South-East Asia, but which are the principles that drive these people? Or how do they apply them? Or what are the results and the empirical evidences? I wanted to answer these questions and, moreover, doing so adding two theories, the Markowitz Portfolio Theory and the Capital Asset Pricing Model, from the subject that mostly mattered to me during these two years of master’s studies and mostly fascinates me for my future career: Asset Management.

Final aim of this paper is to apply Islamic finance to these two theories and see the results, comparing and analyzing them to conventional finance to understand the different behaviors of this Islamic phenomenon.

An Islamic financial system is the one that suits with the Islamic religious law, also called Shari’ah law. According to this definition, under Islam, there are no possibilities for an economy independent from religious criteria.

Thus, the Shari’ah law does not apply only to the private life of Muslims, but it includes principles used by the community for every area of life. That’s why Islamic Finance has been defined a type of finance in compliance with the Shari’ah law.

From a historical point of view, the origin of a real financial system in the Islamic countries is near the end of the 19th century, when western banks started to open branches in their colonies. Due to mistrust of the locals and the failure of those banks to meet the Shari’ah principles, this first attempt didn’t succeed.

First Islamic theoretical financial models started in the 1950s with the independency of many Muslim countries from western states.

In the 90s the interest for the Islamic finance started to grow in western markets; many conventional banks opened branches and cross-border services inside Muslim countries in compliance with the Shari’ah law. Federal Reserve, Bank of England, IMF and World Bank started to take care of the phenomenon and in the 1995 two Shari’ah compliant Islamic indexes were launched (Dow Jones Islamic index and Financial Times Islamic index).

Today, Islamic finance is also an alternative for non-Muslims clients looking for ethical investments and a better risk diversification. El-Gamal, an Egyptian economist, in 2001 suggested that “the “Islamic” in “Islamic finance” should relate to the social and economic ends of financial transactions, rather than the contract mechanisms through which financial ends are achieved”.

The main requirements of the Islamic finance are directly related to this being a moral finance and this following the laws of Shari’ah. The first principle to highlight is the prohibition of ribā (interest or gain). In the Shari’ah law, the interest is seen as something not justified, one of the seven sins most severe, and for this it is convicted by the Quran and by the Sunna.

Deeper, there are two kinds of ribā: the ribā al-nasīa and the ribā al-fadl: the prohibition of ribā al-nasīa refers to the ban of the Shari’ah to establish ex ante a positive return for the loan, while ribā al-fadl is meant
as increase with the respect to the pure value of the good exchanged, considered as unfair return for one counterparty.

The prohibition of ribā must be also filled in a wider Islamic consideration on the economy that, starting from the second half of the XXth century, had the aim to create an economic order where the fundamental principles were equity and the relationship between financial and economic assets in a trade. Therefore, the principle of Profit and Loss Sharing (PLS) has been defined, in order to regulate the financial instruments in compliance with the Shari’ah law. The PLS principle implies a real cooperation among lender/creditor and borrower/debtor, in contrast with the maximization of profits and the minimization of losses that relate to the conventional financial system, where it tends to differentiate risks rather than sharing them.

The first condition for an instrument in order to be authorized is the commitment to rely on a real asset, that once again derives from the Islamic principle that is impossible to make money from money. However, not all real assets are authorized to be exchanged and, among these, two assets have to be highlighted: assets based on uncertainty (gharar), forbidden by the Quran, that gain advantages from the missing information of the counterpart. The prohibition of gharar, or more precisely excessive gharar, implies that every deal must be free from uncertainty. Secondly, non-legal assets. The Islamic principle of harām (lawful) grants that financial instruments will always be far from illegal goods forbidden by the Quran, as the supply and production of alcohol, tobacco and pork, the trade of weapons, pornography and gambling.

Islamic financial system developed through years a broad range of Shari’ah compliant instruments, and to make sure they meet these laws, Islamic industry made use of contracts acceptable under traditional Islamic legal doctrine.

The main banking instrument, the one in which all banking systems are based on, is the deposit, with whom the banks raise money from the savers in order to finance their systems. While in conventional banks, the deposit is an instrument with the aim of both saving and short-term investing, Islamic finance is a two-level system, consisting of a banking system with 100% guaranteed short-term deposits and an investment banking system for long-term deposits. More precisely, the two kinds of deposits offered by Islamic banking systems are the bank account deposits without purpose of investing and not remunerated (wadī’a), and on the other side the investment deposits (hisābāt al-istithmār).

Second kind of banking instruments are those related to the use of capital. These techniques of financing are usually divided in two categories, depending on the level of risk shared: contracts based on profit and loss sharing used for investing (mutual contracts), and the ones not based on PLS principle, also called mark-up contracts, used to finance real activities.

While the consensus around these instruments is largely recognized among Islamic scholars, economists and legal experts, more difficult for these experts was to give a definition of financial markets in compliance with the Shari’ah law. This difficulty is essentially connected to the fact that for long time Islamic finance has remained bordered to banking activities. Just in the last years, Islamic financial markets have started to develop themselves.

Islamic equity indexes linked to markets and areas, are Islamic versions of the main global equity indexes submitted with an Islamic filter, that basically operates in two ways:

- Industrial screening: shares of firms that have for subject the production of illegal goods are considered themselves illegal, or firms that have relationships with banks and financial institutions that allow the interest, make their shares also illegal;
Financial screening: the equity investment has to respect some financial ratios with the aim of checking that the credit/debit part of the equities is lower than the part relating to real goods.

Regarding bonds, the prohibition of ribā made necessary to implement financial instruments being capable of substituting conventional bonds. To go over it, the sukuk reproduces the same cash flows as in conventional bonds (coupon and repayment of the face value at maturity), relying on sharing the risk of the investment and not on the interest. Issued for the first time in Malaysia in 2000, sukuks are the niche that has registered the highest increasing rates in the last 15 years: issuances have increased from 0.8 billion of dollars in 2002 to 37 billion in 2007 and 50 in 2010.

From what concerns investment funds, from one side the Islamic fund cannot have in its portfolio financial instruments for which it is paid a fixed interest, and from the other side there is the screening of shares in which the fund can invest. Furthermore, the speculative profile and the high level of leverage that characterize some conventional funds (hedge funds), make them not compliant with Shari’ah.

Managerially speaking, the shell of these Islamic funds has been set through the mudāraba composition, where underwriters give the capital to invest, while the manager shares the results of the fund with the other members. According to some researches, there are at least 1200 Islamic funds in compliance with the Shari’ah, with a capital managed of at least 50 billion of dollars and about 500 instruments.

Beside cultural, economic, financial and political variables that are stimulating the growth, there is also an increasing interest from western economic and financial systems, that saw the potentialities of the Islamic finance not only as an alternative to the conventional financial system, but also as a factor ables to stimulate growth.

According to data released by the Islamic Financial Services Board (IFSB), the global Islamic financial services industry reached an overall total value of 1.88 trillion of dollars at the beginning of 2015, developing in a series of economic, industrial, geopolitical, financial challenges.

Chapter 2: Implementation of a Markowitz optimization on an Islamic portfolio

Purpose of this paper is to apply to Islamic finance two of the most important theories, the Markowitz Portfolio Theory and the CAPM. More precisely, to do so through a set of Islamic banks. In doing so, in this chapter, three different sets of assets will be constructed, each composed only by banks, for mainly two reasons: to take a look at their past performances and to build Markowitz optimizations to glance at the three different efficient frontiers and compositions.

Furthermore, this paper takes into account only banks because they represent the core of modern financial systems, since they provide every financial activity, from investment activities to commercial and retail banking activities. Thus, to better analyze Islamic finance, taking into consideration banks, and more specifically Islamic banks, it helps us to figure out Islamic financial behaviors and principles as effectively as possible.

In order to make this paper as close as possible to us, the comparison will be done among a sample of Islamic, European and Italian banks, selected due to the availability of the data and the length of such samples. All the data in this paper has been downloaded through Bloomberg.

To implement and develop the Markowitz optimization there is a process to follow:
1) Asset classes in which to invest must be selected, not hundreds but a selected number of them, since, mathematically speaking, the optimization process presented in the introduction would be more complicated;
2) Estimate of the expected returns for each asset classes;
3) Estimate of the risk of asset classes;
4) Implementation of the optimization process and graphical construction of the efficient frontier and efficient compositions.

Before analyzing individually each composition, general details on the constructions must be given:
- It is a portfolio of monthly net returns downloaded from Bloomberg;
- The time lapse used for the portfolios goes from July 2003 to January 2017. This is due only to the availability of Islamic data in Bloomberg and in BankScope.
- Only banking equities have been used as asset classes. There are no bonds, sukuks, cash, commodities or other financial instruments;
- In order to avoid different currencies, every return expressed in local currency has been hedged with the dollar.

As reported in figures below for the Islamic sample, 22 banks have been included, each with a weight of 0.455% in order to have the sum equal to 1, from Saudi Arabia, Morocco, Qatar, United Emirates and Bahrain.

Figure 2.2.1. – Islamic Portfolio composition. Personal work
Going ahead to the European portfolio, the same process is repeated with the same weights and same calculations. Even this set is equally weighted (0.455% for each asset) and composed by 22 banks, selected due to availability of data and to have a wide range of countries. These include Italy, Spain, UK, France, Ireland, Switzerland, Sweden and Germany.

Last but not least is the Italian portfolio, equally weighted (0.8334% for each asset), composed by 12 banks, due to availability of data and in this case also because of the size of the institutions.

Figure 2.2.2. – European Portfolio composition. Personal work

Figure 2.2.2. – Italian Portfolio composition. Personal work
It is also interesting to show some risk-return analysis on the period selected for the three samples taken into consideration.

First, considering again the period analyzed, so from July 2003 to January 2017, this paper wants to highlight how if someone had started to invest $1 at the end of June 2003, how much this dollar would have become at the end of January 2017. Furthermore, to see how banks behaved during the crisis, the same thing was done but starting to invest from July 2008 to April 2010.

To do so, the so called Value Index was used as technique, that in Excel with a simple formula tells us how this dollar grows month by month during a period of time.

First, how the three compositions behaved and performed will be shown (remember that in each set, banks are equally distributed).

The first two risk measures, during the period analyzed, considered the values of each sample and it can be seen from the table that the Islamic portfolio had the lowest annual standard deviation and semi-standard deviation, calculated on a monthly basis (20.32% and 11.34% respectively), meaning that, among the three sets of assets, it had the lowest dispersion from the mean, and thus, the lowest level of risk during the period considered. The European portfolio was the one with the highest standard and semi-standard deviation, still found annually (29.88% and 18.48%). See Table below for details.

![Value Index - historical performances](image)

*Figure 2.2.4. Portfolio performances 2003-2017. Source: Excel – Personal work*
If, instead, we analyze the value index of each bank, comparing the Islamic and the Italian ones, due to economic and financial reasons, Islamic banks performed better than the Italians (except for a couple of Saudi banks), with huge peaks during the first 5 years of the period analyzed. Speaking about this, Qatar Islamic Bank almost reached a return of 1900% of the initial amount, while Dubai Investment gained a return of 1700% of the investment. On average during this short period, all the Islamic banks reached a return of at least 500-600%.

The last part of the chapter is the most important for the analysis of this paper. It regards the Markowitz optimization process in Matlab and the results achieved with it. These include the efficient frontiers for each portfolio and the optimal compositions.

Figure below shows the efficient frontiers of the three portfolios.

<table>
<thead>
<tr>
<th>07/2003 – 01/2017</th>
<th>Islamic banks’ value index</th>
<th>European banks’ value index</th>
<th>Italian banks’ value index</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual Standard Deviation</strong></td>
<td>20.32%</td>
<td>29.88%</td>
<td>24.96%</td>
</tr>
<tr>
<td><strong>Annual Semi-Standard Deviation</strong></td>
<td>11.34%</td>
<td>18.48%</td>
<td>15.39%</td>
</tr>
<tr>
<td><strong>Skewness</strong></td>
<td>-14.78%</td>
<td>17.09%</td>
<td>-11.95%</td>
</tr>
<tr>
<td><strong>VaR (98% confidence)</strong></td>
<td>-10.13%</td>
<td>-20.04%</td>
<td>-16.32%</td>
</tr>
<tr>
<td><strong>1 year VaR (98% confidence)</strong></td>
<td>-8.83%</td>
<td>-19.64%</td>
<td>-22.23%</td>
</tr>
<tr>
<td><strong>Maximum value</strong></td>
<td>6.07$</td>
<td>2.33$</td>
<td>2.78$</td>
</tr>
</tbody>
</table>
Efficient frontiers above clearly state that with these portfolio optimizations, the given Islamic banks are the most efficient. In fact, as Markowitz’s statement about efficiency declares “a single asset or a portfolio of assets is considered to be efficient if no other asset or portfolio of assets offers higher expected returns with the same risk, or lower risk with the same expected return”.

Figures below will give a view on how efficient portfolios are composed in each sample analyzed.

**Italian efficient portfolios**

![Efficient frontiers](image)

*Figure 2.2.5. Efficient frontiers of the three portfolios. Source: Excel – Personal work*

*Figure 2.2.6. Italian efficient portfolios. Source: Excel – Personal work*
The compositions of the efficient portfolios give an even more interesting result. If for the efficient frontiers it is hard to give unanimous considerations, when talking about compositions it is easier to see and read the
results. The efficient portfolios of the Islamic banks’ sample (figure 2.2.7. above) represent a great result, reaching the aim of every investor in the world: diversification.

In fact, as the figure shows, for each efficient portfolio there are at least 10 different assets, while glancing the European and the Italian compositions, it is easy to see less diversified portfolios, especially for the Italian one.

**Chapter 3: The systematic risk in Islamic Finance**

Aim of this final chapter is to analyze the systematic risk for the sample of banks already taken into account in chapter two, and to compare them to the samples of European and Italian banks. To do so, the theory that explains the systematic risk is the Capital Asset Pricing Model, developed by William Sharpe in 1964. According to this theory, the coefficient that measures the risk affecting the reference market is the beta, slope of the linear relationship between expected return and return of the reference market. The analysis will be carried out as follows: the main measures resulted from the regressions for evaluating the beta will be shown, i.e. beta and alpha coefficients and the $R^2$, both for the portfolios as a whole and for each single bank. Lastly, a series of explanations, motivations and concerns will be drafted in order to explain the results obtained with the analysis.

Purpose of this work is to analytically show if the Islamic finance and, more precisely, the analyzed Islamic banks are more safety in terms of systematic risk, i.e. the macroeconomic risks affecting the market, compared to their conventional opponents.

The procedure for evaluating the beta coefficient starts from the linear model for calculating the rate of return for an asset $i$ during a period $t$:

$$R_{i,t} = \alpha_i + \beta_i R_{M,t} + \varepsilon$$

Running a regression where the returns of the reference market during a given period represent the X variable and the Y variable is constituted by the returns of a given portfolio or asset. The results give us the beta coefficient, i.e. the quantity of risk, the alpha, i.e. the excess return, and all the statistical measures that allow us to better understand the results obtained.

For the samples considered above, the same period given in the second chapter has been taken into account (07/2003 to 01/2017). As X variable, the monthly returns of the MSCI World Index, a standard benchmark used to analyze the global market returns, have been used. As Y variable, the returns already used in chapter two of each portfolio and each bank have been taken into account, both for the Islamic side as for the European and Italian side. Excel and Matlab software have been used to run the regressions.

Table 3.2.1. below summarizes the main stats of the regressions.
Let’s first see more in detail what the beta is and what it measures.

Mathematically, the $\beta$ is \( \left( \frac{\sigma_{iM}}{\sigma_M} \right) \), thus the standard deviation of the security $i$ times the correlation coefficient among the security and the market, everything divided by the standard deviation of the market.

Thus, if a security has the beta equal to one, it replicates the reference market: with a correlation coefficient equal to one, i.e. the two securities have a perfect linear relation and move in the same direction, and the two standard deviations are equal to each other, the beta automatically becomes one. The security $i$ moves in the same direction of the reference market. As a consequence, if we compare two betas from two different regressions having the same X variable (the market), obviously, the model with higher beta will have a higher relation with the X variable.

With a beta higher than one, for example 2 or 3, since the correlation coefficient can be maximum 1, it means that the standard deviation of the security $i$ is two or three times higher than the standard deviation of the market. Thus, the security $i$ will be two or three times riskier than the market.

On the contrary, with a decreasing beta, it means that it is also decreasing the linear relation between the security and the market, so that also the risk of the asset is going to be lower than the market.

Table 3.2.1. shows that Islamic banks averaged 0.585 for the beta coefficient, i.e. the quantity of risk, with maximum two peaks (Shuaa Capital and Dubai Investments) above 1. Moreover, they also tended to beat the market, having an average alpha of 0.0035, and with 16 on 22 banks in the sample that had a positive alpha.

The European banks had a beta that triplicates the Islamic one and that is 50% higher than the beta of the market (1). Only two banks, Banca Popolare di Sondrio and HSBC, are below 1 (0.5214 and 0.856 respectively), and with the two Irish banks (Bank of Ireland and Allied Irish) that reached betas of 3, meaning that they were exposed three times more the risk incurring the reference market. Looking at the Italian side, the banks almost perfectly replicated the MSCI World Index (beta equal to 0.9885), and with 60% of the sample that had a negative alpha and very close to zero, meaning that in their effective returns they didn’t beat the market in the period considered and moreover, since the average alpha was close to zero (-0.0067), it means that they perfectly tried to follow the global market index during this 14 years.

Now, after having presented the results of the analysis, it is time to understand if, in the real world, these data are confirmed or not and why the Islamic finance behaves in a different way in terms of beta.

Let’s consider the 2007-2008 crisis, one the most recent and powerful financial crisis, and let’s see how the Islamic finance and Islamic financial institutions behaved. The second chapter has already confirmed how the

<table>
<thead>
<tr>
<th>Monthly returns vs MSCI World Index from 07/2003 to 01/17</th>
<th>Average $\beta$</th>
<th>Average $\alpha$</th>
<th>Average $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Islamic banks</td>
<td>0.58536</td>
<td>0.00346</td>
<td>5.61%</td>
</tr>
<tr>
<td>European banks</td>
<td>1.5395</td>
<td>-0.0092</td>
<td>34.08%</td>
</tr>
<tr>
<td>Italian banks</td>
<td>0.9885</td>
<td>-0.0067</td>
<td>17.94%</td>
</tr>
</tbody>
</table>

Table 3.2.1. Average coefficients from the regressions analyzed. Source: Personal work
Islamic portfolio, indeed the Islamic banks, in 2007 and at the beginning of 2008 were not still affected by the crisis, but they were still reaching high peaks of returns while their conventional competitors started to fall. Nevertheless, the Islamic banks were much more affected by the economic real crisis of 2009. There are, also, many papers and official publications that show graphically that the Islamic financial institutions were less affected by the crisis than the conventional ones.

Reasons and explanations will be now provided to explain why this happened and how Islamic banks reached these results:

- **Correlation with the market:** as already explained and analyzed, Islamic banks tend to be less correlated with the market risk (low betas). Moreover, table below also shows the level of correlation between the returns of each of the three sample and the returns of the MSCI World Index. The Islamic portfolio provides a correlation coefficient of 0.43, while the conventional European banks are much more correlated with the market (0.76);

<table>
<thead>
<tr>
<th>Banks’ returns vs MSCI World Index</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Islamic set</td>
<td>0.4266</td>
</tr>
<tr>
<td>European set</td>
<td>0.7635</td>
</tr>
<tr>
<td>Italian set</td>
<td>0.5864</td>
</tr>
</tbody>
</table>

*Table 3.2.2. Source: Excel – Personal work*

- **Islamic financial screenings:** as explained in the first chapter, Islamic investors and Islamic equity indexes have limitations for investing and for going public: there are both industrial and financial screenings to respect.

For example, it is forbidden by the *Shari‘ah* law to invest or to issue shares relating to alcohol, pornography, weapons and, most importantly to financial institutions that do not provide the *ribā* prohibition. Thus, since the financial crisis has been provoked by American financial institutions that provided financial instruments with a predetermined not justified interest (derivatives), it is likely to think that Islamic banks were not much affected by the financial crisis since they could not invest in such institutions. Moreover, if we consider the financial screenings, i.e. the equity investment must respect some financial ratios such as total debt/capital less than 33% or interest income/total revenue less than 5%, Islamic banks and more in general Islamic financial institutions can only invest in low leveraged equities, thus, the ones that are likely to be less affected during financial crises;

- **Islamic principles and prohibitions:** let’s first remember what were the causes of the 2007-2008 crisis: lack of transparency in the financial market, an excessive trust from the firms to the ratings provided by the rating agencies, the collapse of the subprime mortgages instruments, the failure in the use of derivatives instruments and a high level of the debt that brought to the bubble burst.

On the contrary, for example, the Islamic prohibition of *ghurar* (uncertainty) prevents Islamic financial instruments from having lack of transparency, or from being too elaborated as the ones created by the securitization of assets. Therefore, in the Islamic finance there’s no packaging and selling the risk and the *ghurar* prohibition allowed Islamic banks to be less affected during the crisis;
- **Different levels of leverage:** as already stated earlier, a cause of the 2007-2008 financial crisis was the high level of debt in the markets. Well, both data downloaded from Bloomberg and an IMF analysis show how Islamic and conventional banks had different levels of debts in that period and how these leverage exposures affected differently the profitability. If we look at the liquidity ratios provided by Bloomberg for the banks analyzed in this paper, for example for three Saudi banks as Riyad Banks, Saudi Investments Bank and AlJazira Bank the Debt/Capital ratio was 47%, 44% and 22%, respectively, during the 2008, while, looking at three European banks as Barclays, Deutsche Bank and Santander, the same ratio during the 2008 was 92%, 89% and 88%, respectively, so double with respect to Islamic banks. A 2010 IMF paper confirms these levels and, moreover, with a regression analysis, useful to explain the factors affecting changes in profitability between Islamic and conventional banks during the 2007-2008, the Monetary Fund found that higher investment portfolio and leverage have a negative impact on profitability. Hasan and Dridi, the authors of the IMF paper, used an OLS regression to find what were the factors affecting the profitability in 120 Islamic banks (the sample excludes Iran) and in 120 conventional banks. The results tell us that with a one percent higher investment-to-asset ratio or a one percent higher assets-to-capital ratio lead to a decline in profitability by 1.8 and 12.2 percent, respectively. The fact the Islamic banks have smaller investment portfolio and lower leverage explains in part their better performance in 2008: the model shows that profitability is likely to increase by about 44% if the bank is an Islamic one.

- **The lower exposure to interbank rates and markets:** during the 90’s and 00’s new sources of funding for banks have been developed. Banks had the possibility to finance their activities lending money each other in the form of short term debt (wholesale funding), through interest rates called interbank rates. As suggested by Giavazzi and Amighini, this new technique of raising money may provoke systematic and systemic risks among financial institutions. The weakness of this wholesale funding has been noted during the crisis, when banks stopped to lend money each other, leaving many banks without funds and cash to finance their activities and triggering the so called “run on banks” phenomenon.

In Islamic finance, the share of funds raised in the interbank markets is marginal, mainly because of two reasons: first of all, this form of loan is considered a non-justified loan by the *Shari’ah* law, because the interest is predetermined and not justified since there aren’t underlying assets. Thus, Islamic countries discourage this form of funding, providing high interbank rates so that it becomes unsuitable for banks to lend money each other. Then, this new form of market is still naïve and not developed in the Islamic financial system, thus, the interbank instruments do not reach a significance level that may bring to a systemic distress;

- **Profit and Loss Sharing principle:** as explained in the first chapter in listing the Islamic financial instruments, each contract, instrument, equity and bank account follow the Profit and Loss Sharing principle, i.e. each party of a deal, whatever their nature, shares both profits as losses. Thus, for example, taking the bank account, the main liability for a bank that uses it to raise money from the households, it gives a great stability to an Islamic financial institution, since the losses are backed and shared by each shareholder and depositor of the bank. Sharing the market risk avoids the decline of Islamic banks’ balance sheets in case of financial crises (Khan, 1987; Ahmed, 2002; Cihak and Hesse, 2008) because it allows banks to transfer the credit risk from the asset to the liability side: if their investments perform badly or if some events reduce their returns, the bank undergoes a loss that would immediately be
transferred to the investors. Let’s remember that also the Islamic banking system provides 100% short-term guaranteed deposits (wadī‘ā contracts), thus, the risk would only be transferred to those who decided to invest in risky assets. As a consequence, since the returns of depositors is strictly connected to the returns of the banks’ assets, there is no more a mismatch problem between assets and liabilities (Van Greuning and Iqbal names this Islamic phenomenon as “pass-through”) and, thus, the liquidity and insolvency risk are avoided.

In case of Islamic mutual contracts between, for example, a bank and a borrower firm, the fact the financial duties of the borrowers are not predetermined and fixed, but they are variable, it solves the credit risk problem, since the capital and the interests to pay back from the firm to the bank change according to the firm’s revenues. Thus, only the growth of the real economy makes profits;

- **Capital adequacy**: thanks to the Basel accords, banks are required to have capital buffers of specific quality types, calculated in relation to the risk the bank runs, in addition to sufficient capital for company law and licensing purposes. The higher the capital buffers hold by a bank, the higher the possibility to absorb losses and, thus, the higher the probability to survive in periods of crises. Figure 3.2.11. below takes into account the Islamic capital adequacy during the 2007-2010 period. As it can be seen, the Total Capital Adequacy for the 2007-2008 is in a high position, 23% and 22% respectively, meaning that during the financial crisis, Islamic banks could absorb unexpected losses with 20% of its capital.

Moreover, it can be also noted that the Total Capital Adequacy and the Tier 1 Capital (the most liquid instruments to absorb losses) are very close each other, so that in case of financial crises the Islamic banks can easily recover its situation due to the presence of highly liquid instruments.

Possible explanations have been made available to clarify why the betas of Islamic banks are lower than their conventional opponents. Obviously, this does not translate into a definition of perfection when dealing with Islamic finance. Indeed, as already mentioned many times, Islamic banks and more generally Islamic finance is not immune to risks. It is true that it is less affected by financial crises, but it is even truer that it is more affected by real economic crises.