Master's Thesis

On The Microfoundation Of Islamic Finance

Chair of Economic Theory
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Abstract

Islamic finance serves to provide Shariah-conform financial intermediation. The main difference to a conventional financial system arises due to the prohibition of interest (*riba*) and the insistence on profit and loss sharing partnerships as opposed to mark-up contracts in providing funds to businesses and individuals. This quest is embedded in the framework of Islamic economics, which is based on the assumption that economic agents do not exclusively act in their self-interest but also consider social welfare in their decisions.

This thesis outlines the theoretical foundations of Islamic finance and summarizes empirical studies on current practices in Islamic banking. The main finding is that there is a discrepancy between the paradigmatic version of Islamic finance and the way it is currently implemented. The most substantial deviation is that profit and loss sharing contracts are only used on a low scale in Islamic banking when projects or individuals are funded.

The microeconomic analysis of Shariah-conform profit and loss sharing contracts reveals possible reasons for this discrepancy. The payoffs in such agreements are favorable for the entrepreneurs because they are partially or fully insured against losses. In addition, the profit and loss sharing contracts are subject to market inefficiencies caused by asymmetric information distribution. Adverse selection might lead to poor quality of the projects that are sought to be funded Islamic, whereas moral hazard might lead to lower recovery rates of failing projects than what would be expected if entrepreneurs provided full effort.

The conclusion is that the paradigmatic version of Islamic banking would likely imply more expensive funding than conventional banking. Part of the higher price of funding in such a system would be justified by more extensive services by Islamic banks, while some of it might arise due to market inefficiencies. The question if a truly Islamic banking system could survive hence substantially depends on the willingness to pay on behalf of the banks' customers. However, current practices have pushed Islamic banking near conventional banking and can be interpreted as an incomplete implementation of an originally capacious idea.

Contents

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Glossary of Arabic terms[1]

amanah	Trust deposit
ariya	Lending of an asset for gratituous use
bai' bithamin ajil	Mark-up sale with payment in installments
bay' al-istisna'	Sale of manufactured good
bay' al-muajjil	Deferred payment sale
bay' al-salam	Deferred delivery sale
gharar	Excessive risk
halal	Allowed due to Shariah
haram	Forbidden due to Shariah
hawala	Debt transfer
ijarah	Leasing
ijma	Consensus between Shariah-scholars
ijtihad	Rationality
itihsan	Public interest
jo'alah	Fee-based service
kifala	Shuretyship
maysir	Gambling
mudarabah	profit and loss sharing (PLS) financing contract
mudarib	Provider of effort in a *mudarabah* agreement
murabahah	Mark-up sale

[1]Depending on the English source, the Arabic terms might have a different spelling. The spelling applied throughout the thesis is analogous to Iqbal and Mirakhor (2011).

musharakah	profit and loss sharing (PLS) partnership
qard-ul-hassan	Benevolent loan
qiyas	Analogical deductions
Qur'an	Quran: sacred scripture of Islam, word of God
rabb al-mal	Provider of capital in a *mudarabah* agreement
rahn	Collateral
riba	Interest / usury / forbidden gain
Shari'ah	Shariah: fundamental religious concept / law of Islam
Sunnah	Social and legal custom and practice of the Islamic community
ummah	The worldwide Islamic communitiy
wadia	Safekeeping
wikala	Delegating

1 Introduction

In its traditional interpretation, 'Islamic finance' refers to the financial part of an all-embracing theoretical framework that is called 'Islamic Economics'. Embedded within Islamic economics, Islamic finance is not only different from conventional finance in terms of the contracts that are used but also with respect to the underlying image of human beings. Unlike in Western economic principles, Islamic economics does not use *homoeconomicus* as its underlying model of economic agents but has a broader approach. Guided by the principles of the Quran (*Qur'an*) and the Shariah (*Shari'ah*), Islamic economics assumes that individuals not only maximize their own welfare but also have an interest in the welfare of others, specifically in the prosperity of all Muslims around the world (*ummah*). This concept is sometimes referred to as *homoislamicus* (Asutay, 2007) and yields outcomes different from common Western economics. "The overriding objective of the system [Islamic economics] is social justice and specific patterns of income and wealth distribution, and consequently economic policies are to be designed to achieve these ends" (Khan, 1986, p. 2).

The theoretical framework of Islamic finance is very different from that of conventional finance, but in practice, Islamic financial institutions often operate within secular regulatory frameworks and face the same environments as conventional Western banks do, even more so as globalization has rapidly progressed over the last two decades and as many Islamic financial institutions compete directly with conventional banks.[2] "Islamic theory describes how people, groups or governments should act in a perfect Islamic community; how the [Quran] expects them to behave. The reality is that they do not act in this way" (Dar and Presley, 1999, p. 7). Islamic financial institutions operate in environments that were not designed for their business model to be implemented. Therefore, Aggarwal and Tarik (2000, p. 119) conclude that "economic incentives are shaping the structure of Islamic banking more so than are religious norms."

[2]Only in Iran, Pakistan and Sudan, conventional banking is forbidden and the whole banking sector is labeled "Islamic" (Zaher and Hassan, 2001).

Islamic banks are institutions whose operations are designed to serve an Islamic economy, whereas the environments they operate in are largely influenced by conventional economic principles. In this thesis, the Islamic ways of financial intermediation are hence analyzed in a Western economic framework even though this approach would be denied by promoters of an Islamic economic system. From a theoretical point of view, Islamic finance and Islamic economics are inseparable. However, the current practices of Islamic financial institutions suggest that the mingling of Islamic finance and Western economic principles is appropriate or that "*homoislamicus* and *homoeconomicus* are one and the same" (Maurer, 2005, p. 55).

The goal of Islamic finance is to provide Muslims with Shariah-conform financial intermediation. The most important and influential rules are the prohibition of interest (*riba*) and the promotion of profit and loss sharing (PLS). In an Islamic economic system, it is not allowed to make money out of money unless there is a risk involved that justifies profits from lending. A number of Shariah-conform standard contracts are consequently suggested by Shariah-scholars as basic building blocks for an Islamic financial system. They either govern mark-up sales or financing partnerships and provide a detailed description of how the transaction has to be structured in order to be Shariah-conform.

The empirical literature on Islamic finance suggests that current Islamic banking practices deviate substantially from the theoretical ideal in two ways. Firstly, there is a strong tendency in Islamic banking practice to use mark-up contracts instead of PLS-contracts, which violates the fundamental principle that risk sharing should be a pillar of any Islamic financial system. Secondly, whenever PLS-contracts are used in practice, they are enriched with guarantees and only short-term in nature, which violates the call for true partnerships between investors and entrepreneurs. In analyzing microeconomic characteristics of the paradigmatic versions of Islamic PLS-contracts, this thesis seeks to provide reasons for Islamic banks' reluctance to use PLS-contracts in practice.

In doing so, the focus of this thesis lies in an overall description of basic Islamic banking products, followed by a microeconomic analysis of the PLS-paradigm. Other topics that are currently discussed in Islamic banking but

lie outside the scope of this thesis are securitizations, Islamic asset indices, Islamic insurance and the globalization of Islamic financial systems.

This thesis is organized as follows: Section 2 outlines the principles of Islamic finance. This includes a description of the religious foundations as well as the most important basic principles of Shariah-conform financial intermediation. Section 3 assesses the contracts that are approved by Shariah-scholars and summarizes the basic financial products that Islamic banks construct out of these contracts. The chapter is concluded with an overview of current Islamic banking practices and empirical research on the Islamic financial industry. The goal of section 4 is to identify the incentive problems that arise with Islamic PLS-contracts. Therefore, different theoretical concepts are applied to assess their microeconomic characteristics. The section also contains references to theoretical research on Islamic banking. The thesis closes in section 5 with a discussion of the results and concluding remarks.

2 Islamic finance

Islamic finance refers to institutions that provide financial intermediation that complies with the principles of Islam. This section serves to shed light on the sources of Islamic principles as well as to give an overview of the most important Islamic codes of conduct in connection with economics and finance.

2.1 Foundations and sources of Islamic finance

The two primary sources of Islam are the Quran and the *Sunnah*. The Quran is the fundamental text of Islam and can be defined as "the book containing the speech of God revealed to the prophet Mohammed" (Kettell, 2011, p. 13). The *Sunnah* as second primary source of Islam describes habits, acts and sayings of the prophet and provides a guideline for the way Muslims should live. Both of the primary sources serve as a basis for the Shariah[3]. The Shariah is a collection of Islamic laws that govern all aspects of life. Further sources of the Shariah are *Ijma*, which means consensus between learned Shariah-scholars over a certain matter, as well as analogical deductions (*qiyas*), rationality (*ijtihad*) and public interest (*itihsan*).

In Islam, a business or a contract is in general compliant if it is not explicitly forbidden in one of the primary sources. It is therefore sufficient to be familiar with the prohibitions in the Shariah to outline the framework for Islamic finance. Due to its fundamental influence on Islamic finance, the prohibition of *riba* is separately introduced in 2.1.1 while further Islamic principles in connection with economics and finance are summarized in 2.1.2.

2.1.1 The Prohibition of *riba* and the focus on profit and loss sharing

For any contract to comply with Islamic beliefs, it must be free of *riba*. Balala (2011, p. 64) defines *riba* as "any illicitly or inequitably elicited gain

[3]The Arabic term can be translated as "the path to be followed". (Kettell, 2011, p. 13)

- the fundamental distinction between a valid and invalid contract." In its broad sense, *riba* is any unlawful gain, and contracts that grant one of the parties such a gain are invalid.

The importance of the prohibition of *riba* in connection with Islamic finance arises from the fact that interest on financial debt is nowadays considered *riba* by most Islamic leaders. Several original verses in the *Qur'an* and the *Shari'ah* (as citet eg. in Balala (2011) or Kettell (2011)) connect *riba* explicitly to asking for interest on a loan. Although general rules of what constitutes *riba* are under ongoing discussion among Shariah-scholars, in connection with Islamic finance a strict interpretation has prevailed.

In focussing on Shariah-conform financial contracts, Iqbal and Mirakhor (2011, p. 59) define the prohibited interest rate by four conditions:

- The gain is positive and ex ante fixed.
- "[I]t is tied to the time period and the amount of the loan."
- It is due regardless of the outcome of the project the loan was used for.
- Its collection is enforced by the government.

Arguments for the prohibition of interest cannot only be found in Islamic literature. Dar and Presley (1999, p. 4) provide several historical examples and show that the advocacy of prohibition of interest in the West "has been a feature of both religious teachings and nonreligious literature over several decades". Although Western financial practices nowadays are heavily based on transactions that involve interest, there are also critical voices. Even in Western literature, "interst is often equated with the exploitation of those in need".

The basic view that leads to the prohibition of interest on financial debt is that "money cannot produce money by itself just with the passing of time" (Tamer, 2005, p. 40). In Islamic finance, money is hence considered as "potential capital" that needs further inputs to become "productive capital" (Iqbal and Mirakhor, 2011, p. 66). Only productive capital is entitled to

earn a return, which is a rationale for the prohibition of fixed payments on financial loans.[4]

The Islamic framework not only forbids interest but advocates the use of profit and loss sharing (PLS) agreements, where the profit or loss that arises from a project is shared between the different inputs. It is regarded as perfectly legitimate to put money to a productive use as long as the capital provider shares the risk of the investment project with the providers of other inputs and does thus not earn a fixed return but a share in the profits in case of success. (Lewis, 2011)

To comply with Islamic principles, Islamic finance is based on contracts that are considered free of *riba*. Such contracts include mark-up agreements that provide a fixed return but involve the sale of an asset rather than a loan (see eg. *Murabahah* in 3.1.2) and joint venture agreements (see eg. *Mudarabah* in 3.1.1) that are not only free of *riba* but also comply with the demand for risk sharing. It is the latter that from a religious point of view is ideal to govern financial interaction because "the PLS-principle is unanimously accepted in the Islamic legal and economic literature as the cornerstone of financial transactions" (Aggarwal and Tarik, 2000, p. 96).

2.1.2 Other Islamic principles in trade and finance

Apart from the prohibition of *riba*, Islam prohibits transactions that involve gambling (*maysir*), speculation/excessive risk taking (*gharar*) and hoarding. According to current interpretation, the Shariah does furthermore not support the sale of debt but encourages financial transactions that have a real

[4]Other arguments for the prohibition of interest include:

- "Interest has the tendency to concentrate wealth in the hands of a few rich" (Tamer, 2005, p. 40) and that an interest-free system "would no doubt reduce the unjust distribution of wealth under the interest system" (Zaher and Hassan, 2001, p. 159).
- To forgo current consumption for future consumption alone does not entitle for a reward (Iqbal and Mirakhor, 2011).
- "The unearned nature of interest makes it exploitative of labour"(Tamer, 2005, p. 40).
- Lending is considered as a benevolent act, and the Islamic lender should therefore not expect a reward (Iqbal and Mirakhor, 2011).

asset underlying. To be Shariah-conform, a business additionally has to be *halal* (allowed). This condition prohibits any business activity that involves drugs, pork, gambling, pornography, prostitution or weaponry or any business that supports one of these *haram* (prohibited) goods or activities. (Balala, 2011)

2.2 The history of Islamic financial institutions

The emergence of Islamic banking in practice dates back to the 1960s when an interest-free savings institution (*Mit Ghamr Local Savings Bank*) was founded in Egypt. Although founded as a social welfare institution, the *Mit Ghamr Local Savings Bank* is nowadays considered the first practical experiment in Islamic banking (Iqbal and Mirakhor, 2011). The experiment grew very large and served over 250'000 depositors at its peak but did not even last until 1970. There is no consensus on whether it failed economically or was deliberately discontinued for political reasons.[5] More Islamic financial institutions were founded around that time. In Malaysia, the *Pilgrims' Savings Corporation* had the aim to provide Shariah-conform bank accounts to Muslims who were saving for the pilgrimage, while a second initiative (*Nasir Social Bank*) was started in Egypt by the government (Iqbal and Mirakhor, 2011).

Gassner and Wackerbeck (2007) identify two main reasons why Islamic banking did not emerge earlier:

- Most muslim countries were under colonial rule and did not have the freedom to create a financial system according to their own principles.
- Only by the end of the 1950s was theoretical research on Islamic banking mature enough to start practical experiments.

In 1974, the first privately owned Islamic financial institution (*Dubai Islamic Bank*) was founded in the United Arab Emirates, where the strong growth of oil revenues provided an ideal playing field for the emergence of Islamic

[5]Compare eg. Gassner and Wackerbeck (2007) and Tamer (2005)

banking (Askari et al., 2010). Another milestone in the development of Islamic banking practice was the foundation of the *Islamic Development Bank* (IDB) in 1975. The IDB's aim is to "foster the economic development and social progress of member countries and Muslim communities individually and collectively in accordance with the principles of Shariah" (Islamic Development Bank Group, 2013). Its operations are Shariah-conform and include project and trade financing, development assistance for poverty alleviation and a number of further instruments.[6]

The 1980s and 1990s saw rapid growth of Islamic finance institutions. More pure Islamic banks were founded in Muslim countries and several conventional banks established 'Islamic windows' to provide Shariah-conform banking products and participate in the growing market. The first Western bank that established a full Islamic offshoot was *Citibank*, who founded *Citi Islamic Investment Bank* in Bahrain in 1996. (Askari et al., 2010)

The last 15 years have seen continuing growth of the Islamic financial sector. Today, there exist over 300 Islamic financial institutions (Askari et al., 2010), and at the end of 2012 the Islamic financial service industry (incl. insurances) was estimated to manage around USD 1.6bn. The largest relative market shares of Islamic banks are found in Muslim countries (eg. Iran, Sudan, Kuwait, Saudi Arabia, Qatar, the United Arab Emirates, Malaysia, Syria and Bahrain), but Islamic banking has also gained market shares in major Western financial markets (eg. Switzerland, United States, United Kingdom and Australia) (Islamic Financial Services Board, 2013).

[6]The IDB expanded its operations steadily and today it unites several entities under the name of *Islamic Development Bank Group*, including the *Islamic Research and Training Institute* that was founded in 1981 and whose aim is to conduct research in applied Islamic economics, banking and finance (Islamic Development Bank Group, 2013).

3 Contracts and banking products

Islamic banking products are constructed either through direct use or a combination of Shariah-conform contracts. These contracts are the basic building blocks and are either explicitly mentioned in the religious sources or put forward by Shariah-scholars who regard these contracts as Shariah-conform. This chapter starts with a description of the basic Shariah-conform contracts, proceeds with banking products that are constructed out of these contracts and closes with a review of empirical literature that sheds light on how important these contracts and products are in current Islamic banking practice.[7]

3.1 Common contracts in Islamic finance

The religious sources of Islam contain more or less detailed descriptions of contracts that Muslims should use when conducting business. This section describes Shariah-conform contracts that are implemented in Islamic banking.

3.1.1 Profit-sharing contracts

These contracts are important in Islamic finance from a theoretical point of view. They are not only Shariah-conform but should be preferred over mark-up contracts whenever possible as these agreements are regarded as an ideal way to jointly provide resources for a project.

Mudarabah (profit and loss sharing financing agreement)

In a *mudarabah* agreement there are two strictly separated roles in the pursuit of a project. One agent provides capital (*rabb al-mal*) and the other agent (*mudarib*) manages the investment and provides skills and effort. If the project yields a profit, it will be shared between the two parties according to a predetermined ratio. No fixed amount of the profit can be agreed

[7]The description of contracts and banking products is based on Iqbal and Mirakhor (2011), Balala (2011), Gassner and Wackerbeck (2007), Kettell (2011), Vogel (2010) and Tamer (2005).

upon as this would be regarded as *riba*. The profit-sharing formula should be explicitly stated in the contract.

If the project ends with a financial loss, the *rabb al-mal* has to bear these losses up to the amount of the capital he provided. The *mudarib* is not allowed to give any guarantee that the capital will be repaid upon completion of the project. However, the *mudarib* will not receive any compensation for the effort he provided to the project, whenever the project ends with a loss.

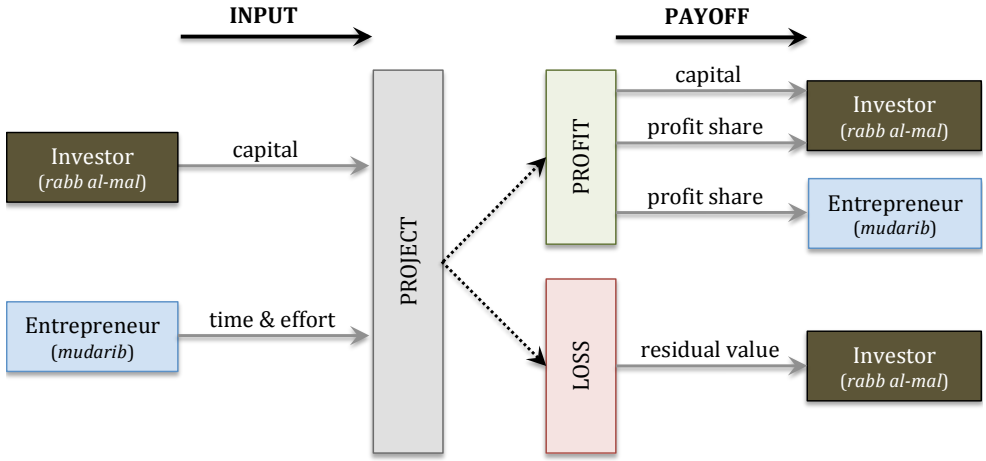

Figure 1: Structure of the *mudarabah* agreement

The management of the project is completely under control of the *mudarib*. In more strict interpretations of this condition, the *rabb al-mal* does not have any control rights. A Shariah-scholar quoted by Tamer (2005, p. 80) states that the *mudarib* "must have absolute freedom to trade in the money given to him and take whatever steps or decisions that he deems appropriate to realize the maximum gain". There is some room for interpretation regarding this restriction. More liberal interpretations are that the *rabb al-mal* is allowed to impose some upfront restrictions (Iqbal and Mirakhor, 2011) or that the *mudarib* "uses the capital in a mutually agreed fashion" (Balala, 2011, p. 28). In this case, the contract is called restricted *mudarabah*. If the *mudarib* does not invest the funds according to the restrictions, he is liable for any losses that occur.

From a Western point of view, this contract seems favorable for the entrepreneur. He receives a share of the profits, but does not have to bear any

loss that exceeds his effort. Dar (2007, p. 85) describes *mudarabah* as "essentially a skewed contract that favours the user of funds more than the capital provider." Still, the risk borne by the investor as well as the sharing of the profits renders this contract very suitable to govern financial relationships from a religious perspective. In fact, this contract is "the one that Islamic economists hold out as epitomizing the Islamic ideal" (Vogel, 2010, p. 54).

Musharakah (partnership)

A *musharakah* agreement is similar to *mudarabah* with a less strict separation of the two roles. *Musharakah* is an agreement between two partners, both of whom provide capital, management and effort to the project.

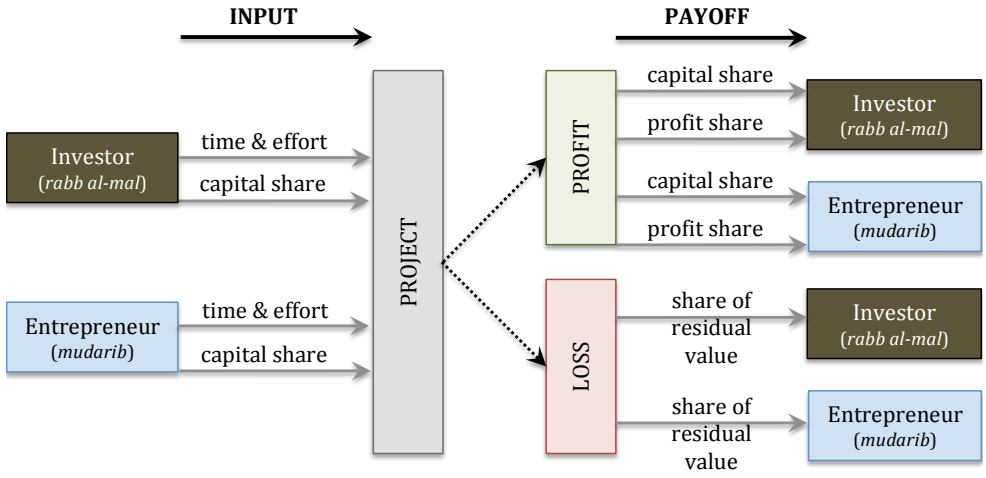

Figure 2: Structure of the *musharakah* agreement

The profit is again split in a predetermined fashion and the split has to be specified in relative terms. The profit split may deviate from the share of capital the partners provide to the project. Any losses, however, have to be split relative to the capital contribution of the partners. Projects that are governed by *musharakah* can be regarded as a joint venture in which "every partner has a right to actively participate in the affairs of the partnership" (Iqbal and Mirakhor, 2011, p. 87). The crucial difference between *mudarabah* and *musharakah* is that in the former the entrepreneur's risk of loss is bound above by the non-financial effort he provided to the project, whereas in the latter the entrepreneur shares the risk of experiencing a financial loss with the investor.

3.1.2 Mark-up contracts

Shariah-conform mark-up contracts are subject to discussions because they have similarities with interest-bearing contracts. The payment flow in a mark-up sale is not different from that of a credit sale. However, for the mark-up contracts to be Shariah-conform, some rules apply. These rules guarantee that the mark-up in either of the following contracts does not constitute *riba*. "The *Sharia'a* allows a fixed charge relating to tangible assets as opposed to financial assets because, by converting financial capital into tangible assets, the financier has assumed risks for which compensation is permissible" (Kettell, 2011, p. 91). Thus, it is the underlying of a real asset that renders these contracts Shariah-conform.

Besides the possibility to charge a fixed amount, the mark-up contracts also provide more contractual freedom than the PLS-contracts. This is because it is allowed to extend these agreements and include demand for collateral or guarantees (Vogel, 2010).

Ijarah (leasing)

Ijarah is technically a sales contract but often governs the sale of a right to use an asset and is therefore similar to what is called leasing or hiring in Western economies. The investor thereby buys an asset that the entrepreneur uses in its production process. This underlying asset should be a durable good that is not intended for immediate consumption. The entrepreneur has the right to use the asset during a predetermined period and pays a rental fee. At the end of this period, the entrepreneur returns the asset to the investor or has the option to buy the asset (*ijarah wa qtinah*). While the entrepreneur pays for the right to use the asset, the investor is responsible for the maintenance of the asset.[8] The investor owns the asset and he bears the risk of loss until all due payments are settled. This ensures that *ijarah* agreements comply with the Islamic principle that profit must be accompanied by risk bearing (Vogel, 2010).

The rental fees are usually paid in installments and can be a fixed amount or a floating amount (Iqbal and Mirakhor, 2011). It is important to recall that

[8]The responsibility for maintenance can be delegated to a third party, e.g. the entrepreneur who uses the asset (Vogel, 2010).

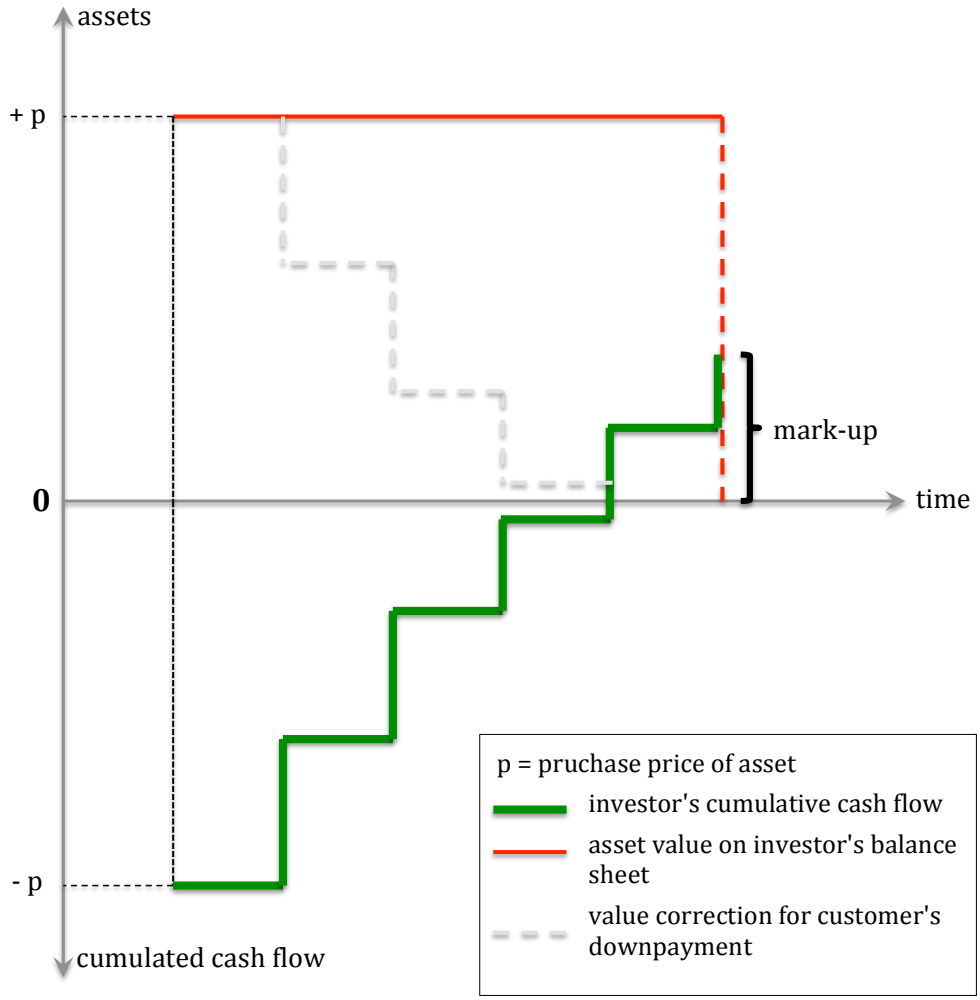

Figure 3: Investor's balance sheet and cash flow in an *ijarah wa qtinah* transaction

no additional fees can be charged if the payments are not made on schedule. Asking for default interest in case of late payment would be making money out of money and thus constitute *riba*. *Ijarah* is Shariah-conform because payments are based on the transfer of a real asset.

Bay' al-salam (deferred delivery sale)

Bay' al-salam is a sales contract where the buyer pays the full price of the goods at the time the contract is closed, whereas the seller delivers the goods at a predetermined date in the future. The goods involved have to be weighable, measurable or countable (Comair-Obeid, 1996). The two obvious

upsides of this contract are the elimination of the price risk for the buyer and the provision of capital to use in the production process for the seller.

Bay' al-muajjil (deferred payment sale)

Bay' al-muajjil is a sales contract where the seller delivers the goods at the time the contract is closed, while the buyer pays the full price of the goods at a predetermined date in the future. The payment can be made in installments. Nevertheless, no extra charges can be added for the delay of the predetermined payments.

Bay' al-istisna' (manufacturing partnership)

Sales transactions that are governed by *Bay' al-istisna'* involve an asset that has to be constructed or manufactured according to the buyer's instructions. While the price of the asset has to be fully specified in the contract, payments can be made in installments, prior to delivery or at the time of delivery. Again, it is not allowed to ask for additional payments in case of delayed payment and the price may not be altered after the contract was closed (McMillen, 2007). *Bay' al-istisna'* is suitable for construction (e.g. in infrastructure projects) or for the manufacturing of non-standard machinery.

Murabahah and bai' bithamin ajil (cost-plus sale)

Murabahah and *bai' bithamin ajil* are contracts that govern cost-plus sales. The financier buys the goods or assets that the buyer needs from the seller. He physically transfers the asset to the buyer who can use it immediately for his own purposes. The price the buyer has to pay to the financier is predetermined and usually involves a mark-up over the price the financier paid to the seller. The buyer pays the predetermined price either in full at a date in the future (*murabahah*) or in installments (*bai' bithamin ajil*). Until the buyer has paid the full price, the underlying asset remains property of the financier. *Bai' bithamin ajil*, therefore, resembles closely to *ijarah* but is more commonly used for short-term transactions.

At first glance these transactions resemble a credit sale in conventional banking. However, there are distinct differences. In a transaction governed by *murabahah* or *bai' bithamin ajil*, the financier temporarily takes the ownership of the underlying asset, which is never the case in a credit sale. The ownership ensures the following differences compared to a credit sale:

- There is always a real asset involved in the transaction. The transfer of money does not lead to debt by any party but always constitutes the payment of this asset.
- The sales are automatically collateralized. The financier owns the underlying asset until he has received the full payment of the predetermined price.

Strict interpretation of the Islamic sources would suggest that in a *murabahah* transaction, the buyer cannot be compelled to buy the asset from the bank even if he has initiated the transaction. In this regard, there seems to be consensus that the buyer can be asked to at least sign a 'promise to buy' in order to avoid that the bank buys an asset from the seller only to realize that the buyer is no longer willing to purchase this asset.

3.1.3 Other contracts

This section introduces some other contracts that are Shariah-conform and play a role in Islamic finance.

Wadia (safekeeping)

This contract is used if the owner of an asset transfers this asset to a third party which can use the asset for her purposes. The asset has to be returned to the owner immediately upon request. The liabilities that arise with an agreement according to *Wadia* depend on the compensation that is paid. It is usual that the safe-keeper is allowed to use the asset in case he pays a compensation to the owner.

Amanah (trust deposit)

The difference between *amanah* and *wadia* is that the safe-keeper is not allowed to use the asset during the time it is entrusted to him. In addition, he is forbidden to pay any compensation in an *amanah* agreement.

Qard-ul-hassan (benevolent loan)

Qard-ul-hassan describes a charitable loan to an individual in need of financing. No compensation can be asked for. The loan should not be used for consumption purposes by the beneficiary.

Ariya (lending for gratituous use)

Ariya governs a charitable act in which the owner of an asset lets someone else use this asset without charging any fee. The beneficiary is responsible for the maintenance of the asset during the time he is allowed to use it. There is no compensation due for the right to use the asset.

Wikala (delegating)

Wikala is used by an agent who wishes to allow someone else (*wakil*) to act on his behalf. The contract specifies which tasks are delegated to the *wakil* and which fee he receives for his services.

Jo'alah (fee-based service)

This contract is used to sell a service for a predetermined fee. It governs advisory, asset management or consulting agreements.

Rahn (collateral)

Under this contract the borrower of an asset defines a different asset in his property as collateral for the original agreement. If the borrower does not fulfill his payment obligations of the original contract, the lender is allowed to ask for the liquidation of the asset that was defined as collateral in a *rahn* agreement in order to receive the due payments. While either money or goods can be used as collateral, it is not allowed to use debt for this purpose (Gassner and Wackerbeck, 2007).

Kifala (shuretyship)

In a *kifala* agreement a third party is defined as guarantor for a payment that is originally due between two other parties. If the original debtor defaults, the financier has the right to demand payment from the third party that entered the *kifala*.

Hawala (debt transfer)

Hawala transfers debt from one party to another. The original debtor is completely replaced by the new debtor and has no further obligations.

3.2 Islamic banking products

For any Islamic banking product, the contracts that were introduced in the last chapter are the basic building blocks. The products are designed with the most suitable of the Shariah-conform contracts or with a combination of several such contracts. In this section, the structures of Islamic banking products are described. One of the difficulties is that "there are significant differences across countries in terms of how Shariah-compliant products are exactly structured" (Beck et al., 2010). This means that the following descriptions are not necessarily all-encompassing but concentrated on the most common products. Figure 4 is a stylized balance sheet that collects all of the products that will be described in this section.

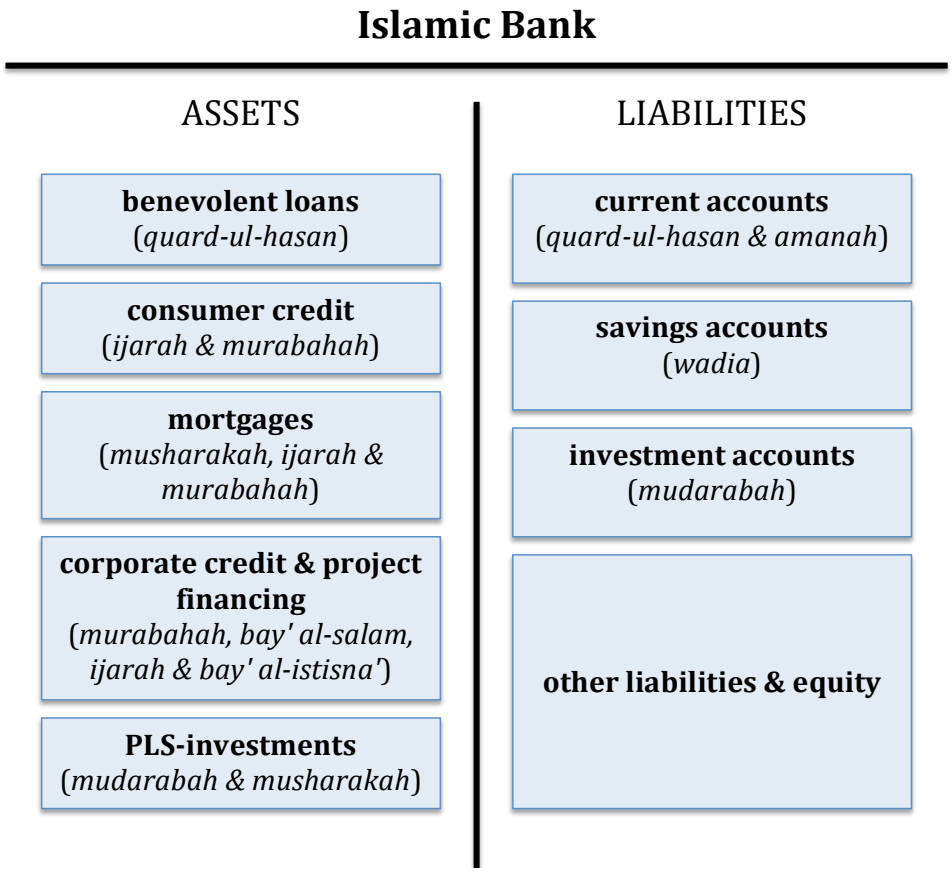

Figure 4: Overview of Islamic banking products in a stylized balance sheet

The following descriptions focus on the funding and investing of Islamic banks. In addition to these relationships, banks also provide investment

consulting or other services that are paid directly by the customer. These services are governed by contracts such as *wikala* or *jo'alah*. They are equivalent to Western banking principles and do not pose any microeconomic complications.

3.2.1 Funding/liabilities

In collecting funds, Islamic banks usually provide very similar products to depositors as conventional banks do. Depositors of Islamic banks have access to common banking services such as the use of ATMs, the execution of transfers, the use of online banking or the issuance of debit and credit cards[9] (Gassner and Wackerbeck, 2007). The difference between conventional and Islamic banking concerns mainly the returns and compensations that are paid on deposits as the prohibition of *riba* renders the payment of a predetermined interest rate impossible for Islamic banks.

Current accounts

Islamic banks implement current accounts with *amanah* or *qard-ull-hassan* contracts. Funds collected under these agreements cannot be put to use by the bank on the asset side as *amanah* constitutes a pure safekeeping agreement and *qard-ull-hasan* originally governs a benevolent loan. Furthermore, both contracts prohibit to pay any compensation and thus current accounts at Islamic banks do not yield any return. Some banks charge a fee for operating current accounts unless some minimum amount is deposited (Tamer, 2005). Both contracts governing current accounts guarantee the depositors the immediate payout of all their funds upon request.

The preliminary reason to deposit money on a current account is usually not the return it yields. The customer aims at using the services that are attached to such an account, whereas the bank offers the account to establish a relationship with the customer with the goal to provide him with other banking products. In that sense, the restrictions imposed by the Shariah do not fundamentally change the way Islamic banks interact with their customers compared to conventional banks when it comes to current accounts.

[9]The contractual construction of credit cards is introduced in 3.2.2 as a part of the discussion of consumer credit.

This changes as soon as an overdraft occurs on a current account. In conventional banking, current accounts with a negative balance constitute a form of credit on which the customer pays interest. This procedure is not Shariah-conform. Islamic banks have therefore introduced a different set of rules. It is in general not allowed to overdraw an Islamic current account. If the customer overdraws his account, he has to pay a fixed fee that is independent of the overdraft amount but increases with each transaction the customer makes as long as the account is overdrawn. The fees are often payable to charitable institutions as the bank must not make profit from the customer's squeeze. Besides, the customer will explicitly be asked to rebalance his account as soon as possible. If a customer regularly runs a negative balance on his account, the bank may decide to close the account. (Gassner and Wackerbeck, 2007)

Savings accounts

Savings accounts are very similar to current accounts and usually governed by *wadia* contracts. If an account is legally constructed with a *wadia* agreement, the bank is allowed to sign an agreement with the customer in order to use the deposited funds for its investments. In case a loss results from these investments, it must not have any consequences for the depositor (Gassner and Wackerbeck, 2007). The Islamic bank is obliged to guarantee the repayment of the funds collected with a *wadia* contract. The customer has the right to withdraw his deposits in full at anytime.

The *wadia* contract allows the bank to compensate the customers with gifts as long as this form of return is not predetermined and not guaranteed. While the bank is not obliged to make such gifts from a Shariah perspective, the gifts that are distributed in practice closely track the interest rates that conventional competitors pay to their customers (Gassner and Wackerbeck, 2007).

Investment accounts

The major share of most Islamic banks' liabilities consists of investment accounts (Tamer, 2005). The underlying contract is a *mudarabah* agreement and investment accounts hence comply with the Islamic bank's duty to focus on PLS-instruments. In this vehicle, the customer acts as *rabb al-mal* and

provides capital for the bank's (*mudarib*) ventures. *Mudarabah* contracts are valid for a predetermined period and the deposits in investment accounts thus can not be withdrawn before the date of expiration unless the customer accepts to compensate the bank for the loss caused by early withdrawal.

With standardized investment accounts, customers provide capital without exactly specifying what it must be used for. The bank invests the capital collected in standardized investment accounts at her discretion. The return on investment accounts is usually higher than on savings accounts and is a predetermined share of the bank's profit. To stabilize the relative payouts to the accountholders over time, some Islamic banks maintain special reserves. In years with low profits, these reserves provide funds to be paid out to the customers. In years with high profits, the reserves get replenished. In practice, thus, banks keep paying out 'shares in profit' even in times they realize temporary losses. (Gassner and Wackerbeck, 2007)

Islamic banks also offer specified investment deposits which provide the customer with the right to decide on the use of his funds. The life span and the return on specified investment accounts are individually negotiated and directly related to the specific project that the customer chooses to fund. This option is usually only available for large deposits and the funded project is often booked off the bank's balance sheet. (Gassner and Wackerbeck, 2007)

According to the underlying Islamic contract (*mudarabah*, see p. 9) of investment accounts, it is not allowed to guarantee the invested amount to the customer. This prevents banks from offering deposit insurance. "In practice, investment accounts represent a hybrid instrument between equity and debt" (Porzio, 2010, p. 93). Depositors have equal payoff functions as shareholders but do not have any voting rights.

Other liabilities

Conventional bonds are not Shariah-conform and not used by Islamic banks. Therefore, special Islamic bonds have been created for the Islamic financial system. A liquid inter-bank market for overnight deposits does not exist (Porzio, 2010). Nevertheless, there are typically some liabilities payable to other Islamic financial institutions in the Islamic banks' balance sheets.[10]

[10]In their quest to be Shariah-conform, Islamic banks face some difficulties in managing

However, most of the liabilities that do not originate from deposits take the form of equity (Iqbal and Mirakhor, 2011).

3.2.2 Investment/assets

For the deposits in Islamic banks to be Shariah-conform, the collected funds need to be invested in *halal* businesses. This condition holds for all forms of investing regardless of the contractual construct used to execute it. Furthermore, Islamic banks are not allowed to provide debt contracts to creditors and thus use different forms of Shariah-conform contracts to govern their relationships with creditors.

Benevolent loans

An Islamic economic system demands from the rich to support the poor. In this context, it is desirable that the poor receive loans that have a fixed repayment-schedule. These loans are benevolent and no interest can be charged. There are two possibilities for Islamic banks to foster this principle. Either they act as an intermediary and offer their depositors to invest their money directly in *qard-ull-hasan* agreements, or they use a share of their own funds to invest in *qard-ull-hasan*. These investments clearly yield a negative return and hence are only made to the extent necessary in order to be Shariah-compliant (Tamer, 2005).

Consumer Credit

Islamic banks offer credits for the purchase of durable consumer goods such as cars or furniture. For this purpose, mark-up contracts such as *ijarah* (leasing) or *murabahah* are used. The bank buys the good on behalf of the customer and either lets him use it or sells it to him. In either case, the bank will charge a price to the customer that includes a predetermined mark-up. The customer pays this price either at a later date or in installments.

There are two ways how the banks provide incentive for the customer to make his payments on time:

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their short-term liquidity. This exceeds the scope of this thesis and will not be further discussed.

- The customer must pay a fine to a social institution in case he misses out on his payment. This provides him with an incentive to pay on time, while there is no risk that any part of the bank's profit constitutes *riba*.

- The customer gets a reduction on the mark-up if he makes his payment before a specified date (Porzio, 2010). This also provides him with the necessary incentive to pay on time. However, it could be argued that this agreement is not different from charging the customer a fee in case he makes late payments.

There is a great deal of discussion on how the banks determine the mark-up involved in these agreements. It is recognized that mark-ups by Islamic banks are often pegged to interest rates determined by conventional banks such as the London Interbank Offered Rate (LIBOR). Furthermore, the agreements are structured in a way that allows the Islamic bank to adjust the mark-up in case the LIBOR changes (Kettell, 2011). In terms of financial flows, this might render these transactions very similar to a consumer credit from a conventional bank. Saeed (2011, p. 59) is critical of this procedure and states that mark-up in *murabahah* "comes dangerously close to the interest that it is presumably trying to replace." Still, the Shariah does not restrict the bank in determining the mark-up. In order to be competitive, Islamic banks have to pay attention to market conditions. The synchronous development of conventional interest rates and Islamic mark-ups does not mean that the Islamic modes of financing are equal to conventional consumer credits. The defining characteristic of these contracts is that every transaction involves the sale of a real asset and no money is paid for money.

Another form of consumer credit heavily used in Western banking are credit cards. While debit cards or charge cards are easily implementable in Islamic finance[11], it is more difficult to offer real credit cards in a Shariah-conform way. According to Gassner and Wackerbeck (2007) only one Islamic bank in Bahrain offers a credit card that thoroughly complies with Shariah rules. It is only accepted locally and intended for customers who want to buy durable

[11]This is because both agreements do not involve real credit. A debit card has to be charged before it can be used in transactions and a charge card grants an interest-free credit within a month but does not allow for deferred payment.

consumer goods. The underlying contract is in that case again based on *ijarah* and the payment with this credit card constitutes a leasing agreement between the customer and the bank.

Mortgages

Financing property with mortgages is an important product for Islamic banks. Gassner and Wackerbeck (2007) report three possible Shariah-conform constructions of such an agreement:

- If the mortgage is based on a *murabahah* contract, the bank buys the property on behalf of the customer and resells it immediately at a higher price. The customer then pays this price to the bank in installments. The price has to be fixed at the time the contract is closed, which means that the financing costs are fix.
- Mortgages based on *ijahrah* work similar. The difference is that the customer not only pays the mark-up but also a rent because the property remains in ownership of the bank until all payments are made. The financing costs may vary in this agreement. Since the bank is owner of the property, it has to pay the insurance and have the property on its balance sheet.
- In a diminishing *musharakah*, the bank and the customer constitute a joint venture. Both parties provide a share of the capital that is used to buy the property. The customer then makes periodic payments to the bank that partly consist of the rent for the share of the property the bank still owns and partly of a downpayment to reduce the bank's share of ownership.

In many countries, the sale of property triggers tax duties. This is a problem for all above mentioned forms of Islamic financing because two sales are involved although the bank owns the property only in order to fulfill the Islamic conditions of financing. Predominantly in Western jurisdictions, where Islamic finance only plays a marginal role, this is an unresolved problem. (Gassner and Wackerbeck, 2007)

Corporate credit

Islamic banks use different contracts to provide businesses with funding, depending on the term structure of the transaction.

In short-term trade transactions, banks often use mark-up contracts such as *murabahah* or *bay' al-muajjil*. Furthermore, "*bay' al-salam* today continues to play a prominent role in financing the agricultural sector even if its use has been progressively extended to the commerce of raw materials and fungible products" (Porzio, 2010, p. 97).

For medium term investments, banks use leasing-like instruments. In case it funds an investment good the customer wants to purchase, a standard leasing agreement (*ijarah*) is used. For larger projects that involve goods that have yet to be manufactured, a legal structure with two *bay' al-istisna'* (manufacturing partnership) contracts is suitable. In the first contract, which will be between the bank and the end user, the bank is seller of the manufactured good. In the second contract, which will be between the bank and the manufacturer of the good, the bank is buyer of the good. Usually the payments for the second contract are due according to the manufacturer's progress in building the good, whereas the payments in the first contract are not due until after the manufactured good has been delivered to the end user. The revenue of the bank will be the difference between the prices in the two contracts. (Gassner and Wackerbeck, 2007)

In practice, there exist many more possibilities to fund projects Shariah-compliant. These constructs can become very complicated and involve several project companies that are founded for tax reasons or to facilitate the participation of different funding parties. McMillen (2007) analyzes some of these constructs where funding for international projects is provided jointly by Islamic and conventional banks. A detailed description of these constructs exceeds the scope of this thesis. However, the project funding described in McMillen (2007) does not rely on contracts other than the ones already introduced and is mainly based on *ijarah*, *bay' al-istisna'* and *murabahah* in different combinations.

Mudarabah and *musharakah* financing

On the asset side, Islamic banks fail to thoroughly implement PLS-instruments

on a large scale. Financing based on the PLS-instruments *mudarabah* or *musharakah* have a negligible role in Islamic banking in practice nowadays. Given that PLS-agreements should be favored over debt-like instruments according to Shariah, it is nevertheless worthwhile to examine the working of PLS-instruments in practical banking.

In banking practice, *mudarabah* is usually used for trade financing or for the purchase of raw material and short-term in nature. The bank acts as *rabb-al-mal* and the entrepreneur as *mudarib*. The contracts specify which quantity of which good the *mudarib* buys with the provided capital. The goods are then sold to a third party and the resulting profit is shared between the parties according to the predetermined split. (Tamer, 2005)

In a *mudarabah* agreement, the *mudarib* does not bear any business risk, but he is liable for losses that occur due to his negligence. In practice, the banks use this stipulation to nourish the standard *mudarabah* contract with a number of conditions. These include the *mudarib's* responsibility for the correct specification and upfront description of the involved goods. Furthermore, it is the *mudarib's* duty to have the involved goods insured against all risks and to properly store them. Any losses that occur due to negligence of these terms render the *mudarib* liable. (Tamer, 2005)

In practice, the two PLS-contracts are additionally replenished with guarantees from the *mudarib* (*rahn*) or a third party (*kifala*). This practice is controversial because in their pure form, the Islamic contracts *mudarabah* and *musharakah* do not allow for any guarantee of the investor's capital as it would violate the risk sharing principle. Still, one could argue that the guarantee does not cover the invested capital but only the liabilities of the entrepreneur that might occur due to his negligence.

Similar extensions govern financing that is based on *musharakah* in practice. Both PLS-contracts as deployed in Islamic banking practice are thus augmented and supplemented in various points compared to the theoretical agreements. However, even the enhanced contracts play only a marginal role in Islamic banking practice.

3.3 Islamic banking in practice and empirical research

Islamic banking in practice is not easily assessable empirically. Firstly, the implementation differs across countries and there is a "lack of clarity whether the products of Islamic banks follow Shariah in form or in content" (Beck et al., 2010, p. 9). Secondly, there is no standardized data pool that allows for all-encompassing empirical research. Therefore, all empirical studies are thematically and geographically limited, which is reflected in the thematic separation of their discussion in the following subsections.

3.3.1 Rate of return on deposits

According to the description of investment accounts (see 3.2.1, p. 18), Islamic banks reward the depositors in investment accounts with a profit share and participate in the risk of losses due to the prohibition of guaranteeing the capital. Nevertheless, in practice, Islamic banks use two kinds of reserves to amend the investment accounts such that they closely resemble conventional deposit accounts. Firstly, an investment risk reserve absorbs potential losses such that "the probability for depositors to incur a capital loss is largely reduced" (Porzio, 2010, p. 94). Secondly, a profit equalization reserve guarantees that the fluctuation of the returns on the deposits around a desired level are not too large (Zainol and Kassim, 2012).

Given that the prohibition of *riba* includes conventional interest rates, this practice attracts attention. Chong and Liu (2009) compare conventional deposit rates with Islamic investment rates in the Malaysian market. Their empirical analysis suggests that there is a long-run relationship between the two and that the correlation is very high. In a Granger causality test they additionally find that changes in conventional deposit rates cause changes in Islamic investment rates but not vice versa and conclude that "the returns on Islamic deposit accounts are effectively pegged to the returns on conventional banking deposits because of competition" (Chong and Liu, 2009, p. 27). This is in line with Porzio (2010, p. 94), who states that "Islamic banks try to assure to PSIA [profit sharing investment accounts] a rate of return almost in line with market interest rates applied by conventional banks on similar

instruments". This is a clear indication that Islamic banks cannot rely on the depositors' religion in order to attract deposits.

Further evidence is brought forward by Zainol and Kassim (2012, p. 75), who also examine the Malaysian market and suggest that their results hint at a "profit motive among the Islamic bank depositors" because there is a "significant impact of the Islamic banks' rate of return on Islamic banks' total deposits". This means that Islamic banks cannot ignore the competition from conventional banks. Whenever the rate of return rises for conventional bank deposits, Islamic banks also increase their rates of return in order not to lose depositors.

There is no clinical judgment available on this practice. It could be argued that the contracts are still Shariah-conform and the payments to depositors at the Islamic banks' discretion. Still, when compared to the religious ideal of Islamic banking, the transformations that are common in practice are extensive. Zaher and Hassan (2001, p. 181) condemn the current practice of Islamic banks and conclude that "the element of uncertainty needed to legitimize the bargain for possible profits has been substantially reduced and, in some cases, eliminated".

3.3.2 Reluctance to use PLS-financing

Several empirical observations suggest that Islamic banks are reluctant to use PLS-contracts for their investments. The geographically most broad study on countries in the Middle East and North Africa by Syed (2012) contains data on Islamic banks' financing in nine countries[12] in 2008. His figures show that the composition of assets is heavily biased towards debt-like instruments like *murabahah* and *ijarah* in all nine countries. With the exception of Saudi Arabia, where *mudarabah* and *musharakah* account for around 30% of the assets, all countries' Islamic banks have 75% - 98% of their investments governed by mark-up contracts. Further evidence is provided by Chong and Liu (2009), who study the Malaysian market and find that only 0.5% of total financing by Islamic banks is governed by PLS-contracts.

[12]Bahrain, Egypt, Jordan, Kuwait, Lebanon, Qatar, Saudi Arabia, United Arab Emirates and Yemen

Current annual reports (2012) by several Islamic banks provide similar results. The share of PLS-financing of total project investments at *Bank Islam Malaysia* is 7.0% (BI, 2012), at *United Arab Emirates Islamic Bank* 1.3% (EIB, 2012), at *Islami Bank Bangladesh* 6.2% (IB, 2012) and at the *Islamic Development Bank Saudi Arabia* 7.5% (IDB, 2012).

In those rather few cases where PLS-financing is used, the contracts not only substantially diverge from the religiously desirable version but are also only used for short-term transactions. Together with the guarantee of deposits and the quasi-fixed returns on deposits, all of these facts suggest that "Islamic banking is currently carried out in a *hybrid way* that is somewhere between the paradigm version and conventional banking" (Zaher and Hassan, 2001, p. 183) or simply that "many Islamic banks offer financial products that, while being Shariah-compliant, resemble conventional banking products" (Beck et al., 2010, p. 7).

3.3.3 Islamic vs. conventional banking

A number of studies compare further empirical aspects of conventional banking and Islamic banking in practice. Ariss (2009) analyzes balance sheet positions of Islamic banks compared to their conventional counterparts. In his sample of banks from 13 countries during 2000-2006, he finds that Islamic banks are better capitalized than conventional banks and that they use a larger share of their funds for financing activities. Furthermore, he looks at the competitive conditions of the two banking systems and finds that concentration ratios and the Herfindahl-Hirschman Index both indicate larger market power for Islamic banks compared to their conventional competitors. The profitability of Islamic banks, however, is not significantly higher in his analysis. This might suggest that a strict separation of the two markets (conventional and Islamic) is not suitable to examine market power since it would imply that there is no competition between the two markets, which seems very unlikely. This hypothesis is supported by Mirzaei (2011), who finds that market concentration has no significant influence on the profitability of Islamic banks. In contrast to Ariss (2009), Mirzaei (2011) finds in his dataset of 175 banks in 12 Middle Eastern countries during 1999-2008 that

Islamic banks are more profitable than conventional banks, but instead of market power, "[h]igh profitability tends to be associated with banks that hold a relatively high amount of capital, have lower cost to income and liquidity ratios, and small overhead expenses" (Mirzaei, 2011, p. 73).

Beck et al. (2010) compare Islamic and conventional banks regarding their business-orientation, cost efficiency, asset quality and stability. They use data on 100 banks from 1995-2007 and their regressions suggest that Islamic banks are more efficient and have higher capitalization ratios than the conventional competitors. Apart from that, they find little significant differences between Islamic and conventional banks and their conclusion is "that either opposing effects of Shariah-compliant banking cancel each other out or that the differences between these two models are smaller than often assumed" (Beck et al., 2010, p. 22).

4 An economic analysis of the PLS-paradigm

Theoretically, PLS-contracts are one of the pillars of an Islamic financial system. Early macroeconomic research by Khan (1986) analyzes the effect of the use of PLS-contracts on the stability of a banking system. In his model, conventional banking and Islamic banking are to a large extent equivalent. The only difference is that in the paradigmatic version of an Islamic financial system, the nominal value of deposits cannot be guaranteed. Therefore, all losses on the banks' balance sheets are immediately borne by the depositors. In case of an inferior shock, this directly leads to a new stable equilibrium.

In a conventional banking system, the same outcome is only achieved through government intervention. Khan (1986) assumes that in the conventional banking system the nominal values of deposits are guaranteed and that in case that the losses exceed the banks' reserves, the government steps in to pay out depositors. "The end result of such an operation would be equivalent to that observed in the case of the Islamic banking model: the fall in real earnings of banks would be matched by a decline in real wealth, with the government intervening to ensure such an outcome" (Khan, 1986, p. 15).

The conclusion is that the indirect transmission in a conventional system is likely to impose more instability because the adjustment of nominal values is slower and the risk of bank runs higher. However, this result is driven by the fact that in the Islamic system deposits are equal to shares. As described in the last section, the practice of Islamic banking is different as the nominal values of deposits are close to being guaranteed. What follows is thus not an analysis of the effect of a perfect implementation of the PLS-paradigm, but a microeconomic overview of problems that are likely to explain the reluctance by Islamic banks to use PLS-contracts in practice.

4.1 PLS in a perfectly competitive capital market

In a basic neoclassical setting, the maximization of the firm value is a common goal to the owner and the manager of an undertaking. With the as-

sumption of a perfect capital market, no informational asymmetries arise.[13] In such an environment, any mode of financing can be fully described by its payoff structure.

This subsection focuses on the payoff structure of the Islamic PLS-contracts (*mudarabah* and *musharakah*) and compares it to conventional standard Western financing contracts (debt and equity). This basic comparison yields valuable insights by itself and serves to introduce issues that will be further discussed below in the context of asymmetric information distribution.

In all of the following payoff diagrams (figure 5 to figure 8), the black vertical line represents the break-even point for the project, i.e. the profit necessary to pay back the capital and the effort that was put into the project.[14] On the right hand side of the break-even line, the project is successful in generating profit. If the profit is on the left hand side of the break-even line, the project fails in covering all costs. For all neighboring figures in this subsection, combining the payoffs of the bank and the entrepreneur yields the project's total profit[15] as the mode of financing merely changes the distribution of profits or losses between the agents, while the project payoff remains equal in all payoff figures.

Figure 5 shows the payoff at maturity of a *mudarabah* contract depending on the outcome of the project. The figure shows that in a *mudarabah* agreement, there is a kink in the payoff function for the bank and the entrepreneur. The

[13]The full set of requirements that describe a perfect capital market in neoclassical financial theory are described by Duffner (2005, p. 84f.) based on Grossman and Stiglitz (1977) and Zimmermann (1998)):

- Competitivity: all agents have no market power and are thus pricetakers.
- Spanning: all investment projects have payoffs that are reproducible by securities traded in the capital market.
- Perfect information: payoffs of all investment projects are known by all agents.
- No-arbitrage: there is no way to realize riskless gains.

[14]The profit is defined as revenues minus investment. The effort will be part of what has to be covered with this profit. With profit defined this way, the decision problems become more visible, as the entrepreneur's effort will not be compensated in case of losses in a *mudarabah* partnership. This explains why the break-even line is on the right hand side of the point that represents zero profits. Profits of e and higher are called to 'break-even'.

[15]The line representing the sum of the bank's and the entrepreneur's payoff would be the 45 degree line shifted downward by the total effort.

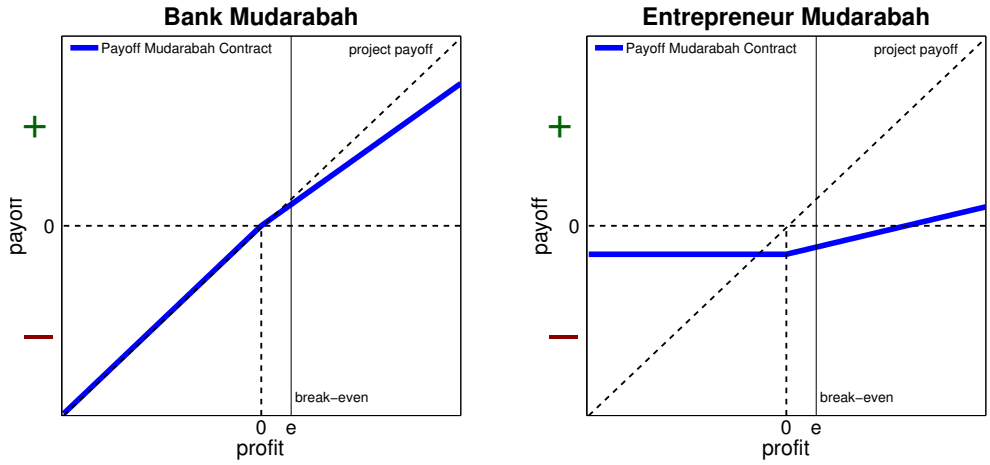

Figure 5: Payoff at maturity: *mudarabah*

kink occurs at the point the project covers the initial capital because all additional profits will be shared according to a predetermined split between the entrepreneur and the bank. While the bank will not receive all profits that exceed the initial investment, it has the risk of losing all of the invested capital.

The project will not automatically be financially successful for the entrepreneur just because it yields a positive return in total. The entrepreneur will have to ensure that the profit is large enough for his payoff to become positive. If, however, the project fails in returning the initial investment, the entrepreneur no longer has any financial risk. If the project barely fails or fully fails does not have any influence on his payoff. All he will lose in either case is the effort he provided to the project.

The payoff structure with a *musharakah* agreement (figure 6) removes the entrepreneur's indifference whenever a loss occurs. As the bank and the entrepreneur both provide capital and effort to the project, both have a continuous interest in increasing the profit over the whole range of possible outcomes. It is probably therefore that *musharakah* is regarded the purest and most favorable form of partnership in Islamic finance theory and the payoff structure of the agreement on its own does not explain why the contract should not be used in practice. To get closer to the downfall of the PLS-contracts, we will first examine the payoff structure of conventional

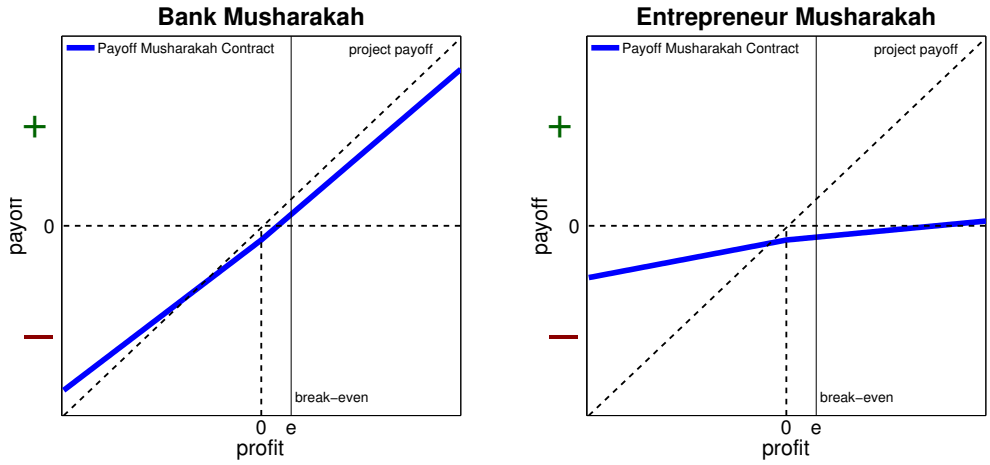

Figure 6: Payoff at maturity: *musharakah*

Western modes of financing.

Figure 7 represents the payoff structure of a standard Western debt contract. It is hereby assumed that the entrepreneur does not compensate his effort before having serviced the debt. Any profit that exceeds the initial investment plus interests will be paid out to the entrepreneur who will have to use the payoff to cover his effort before making any profits. However, he also bears the entire risk of losses and compared to the *mudarabah* and *musharakah* agreements, the volatility of the payouts dependent on the project outcome will be much higher.

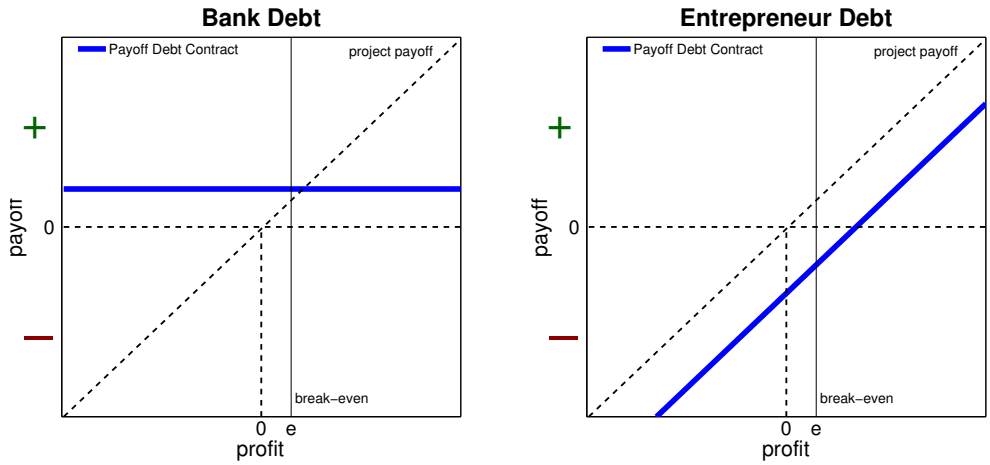

Figure 7: Payoff at maturity: debt

The bank's return is fixed in a standard debt contract and the outcome of the project has no influence on the bank's payoff.[16] The fixed payment clearly constitutes *riba* and is the most important difference between the PLS-contracts and debt.

Western equity financing (figure 8) is closer to the Islamic PLS-contracts than debt. It is hereby assumed that the entrepreneur's effort is covered before any profit will be paid out. This is a pure principal-agent relationship in which the owner of the business (bank) bears all risk, whereas the other agent is compensated for his effort but does not participate in the profit or loss of the project.

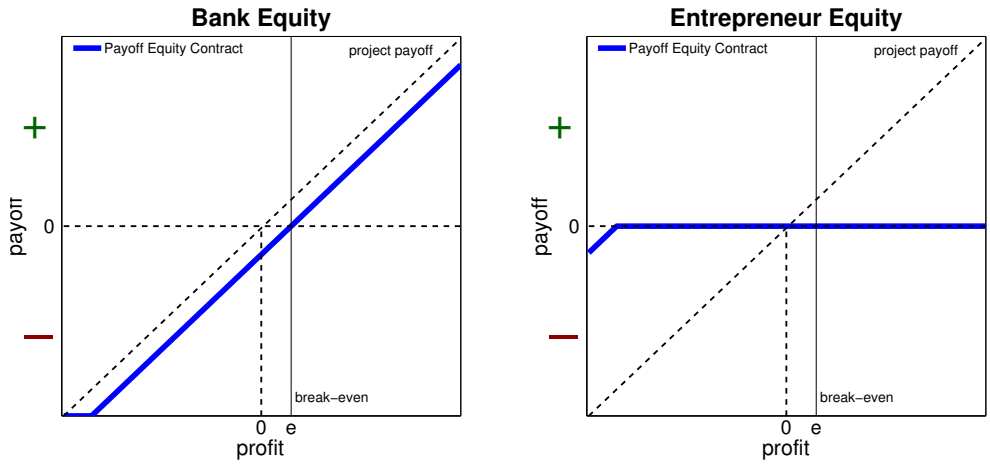

Figure 8: Payoff at maturity: equity

The payoff diagrams show that the modes of financing yield very different incentives for the bank and the entrepreneur. In fact, it is true that these incentives are exactly mirrored between the two agents when it comes to the two Western contracts: ex-post it will always be the case that the entrepreneur and the bank will prefer the opposite contract.[17] However, given that Islamic banks compete with Western banks in most of the countries they operate in, it is worthwhile to examine under which conditions *mu-*

[16] In this section, credit risk is assumed to be absent as otherwise the payoff of the bank would additionally be dependent on the entrepreneur's creditworthiness. If the project fails, the entrepreneur is assumed to service his debt with funding from outside the analyzed relationship.

[17] This is why almost every undertaking is financed by debt and equity rather than only by debt or only by equity.

darabah or *musharakah* will be preferred over debt or equity by either of the agents.

In case that a loss occurs, it is clear that ex-post the bank always prefers to be in a debt contract, whereas the entrepreneur always prefers to be in an equity contract.[18] Neither *mudarabah* nor *musharakah* will ever be preferred by one of the agents. Therefore, the interesting part is on the right hand side of the above payoff diagrams, where the preferred choice of contract depends not only on the type of the contract but also on the predetermined profit share that is agreed between the agents.

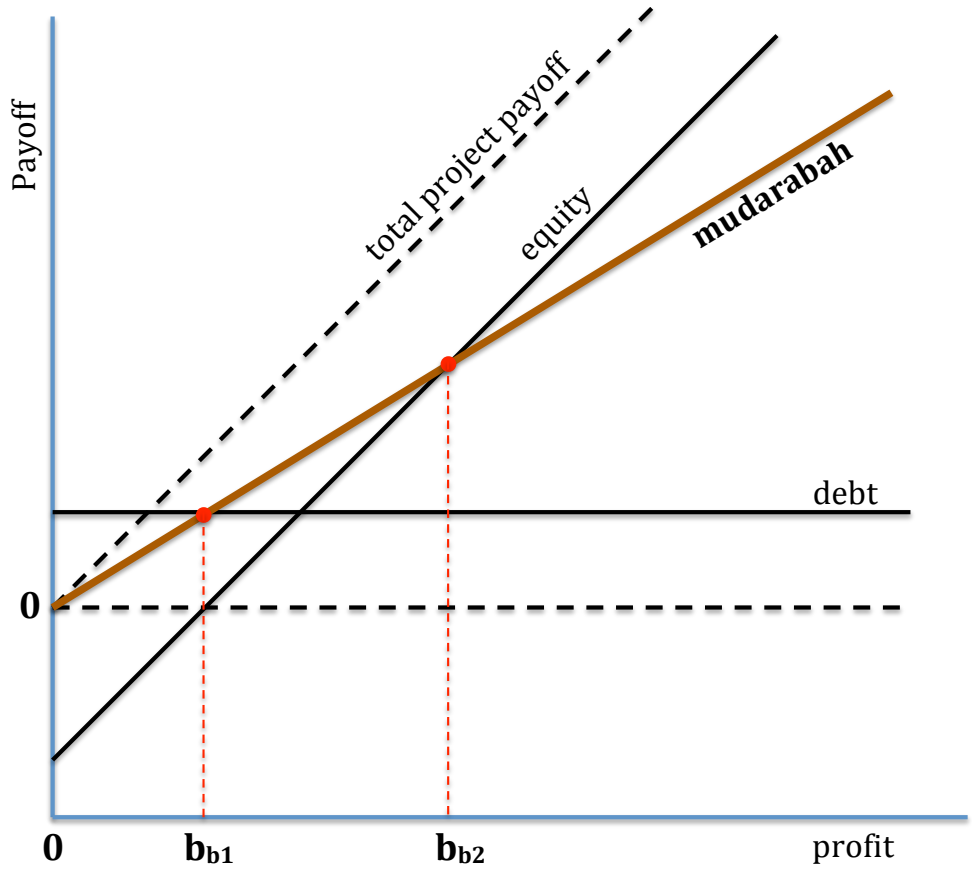

Figure 9: Payoff at maturity (bank): equity vs. *mudarabah* vs. debt

Figure 9 directly compares the payoff of debt, equity and *mudarabah* for the bank. The figure is highly stylized and reduced to cases where the profit is

[18]Remember that in case of a loss, the entrepreneur is only compensated for his effort with a Western equity contract.

positive but nevertheless yields valuable insight. Namely that the *mudarabah* contract's payoffs are higher than the payoffs the bank can generate with debt or equity participation between the two breaking points b_{b1} and b_{b2} as long as $b_{b1} < b_{b2}$. If b_{b1} were larger than b_{b2}, the bank would favor debt or equity contracts for any positive profit the project yields. In other words, the bank's payoff function in a *mudarabah* agreement has to be steep enough to cross the payoff function for debt before this is crossed by the payoff function for equity as otherwise *mudarabah* will never be favorable for the bank.

The same is true for the entrepreneur (figure 10), only the other way around and that he additionally has to cover his effort. For low profitability projects, he prefers to be financed by foreign equity because this guarantees that at least his effort is compensated. At the first breaking point (b_{e1}), his preference changes to *mudarabah* because he will participate in the profits the project yields. Finally, if the profit exceeds b_{e2}, the entrepreneur prefers debt financing as this will generate a higher payoff for him.

The steepness of the entrepreneur's as well as the bank's payoff function in a *mudarabah* agreement is governed by the profit share they agree on. Whenever the bank's payoff function gets steeper, the entrepreneur's payoff function is flatter. As the total profit of the project is fixed, it will never be the case that *mudarabah* will be favorable over debt and equity for both agents simultaneously. It is still worthwhile to examine under what conditions the payoff function for *mudarabah* is steep enough to make it favorable for either of the two agents. For this purpose, the following variables are used:

- p profit after all costs and repayment of initial investment before compensating the effort e
- i positive absolute interest rate
- e absolute cost of the effort (in *mudarabah* borne by the entrepreneur)
- s_b relative share of profit for the bank.
- s_e relative share of profit for the entrepreneur $(1 - s_b)$.

The analysis is restricted to positive payoffs which means that all payoff

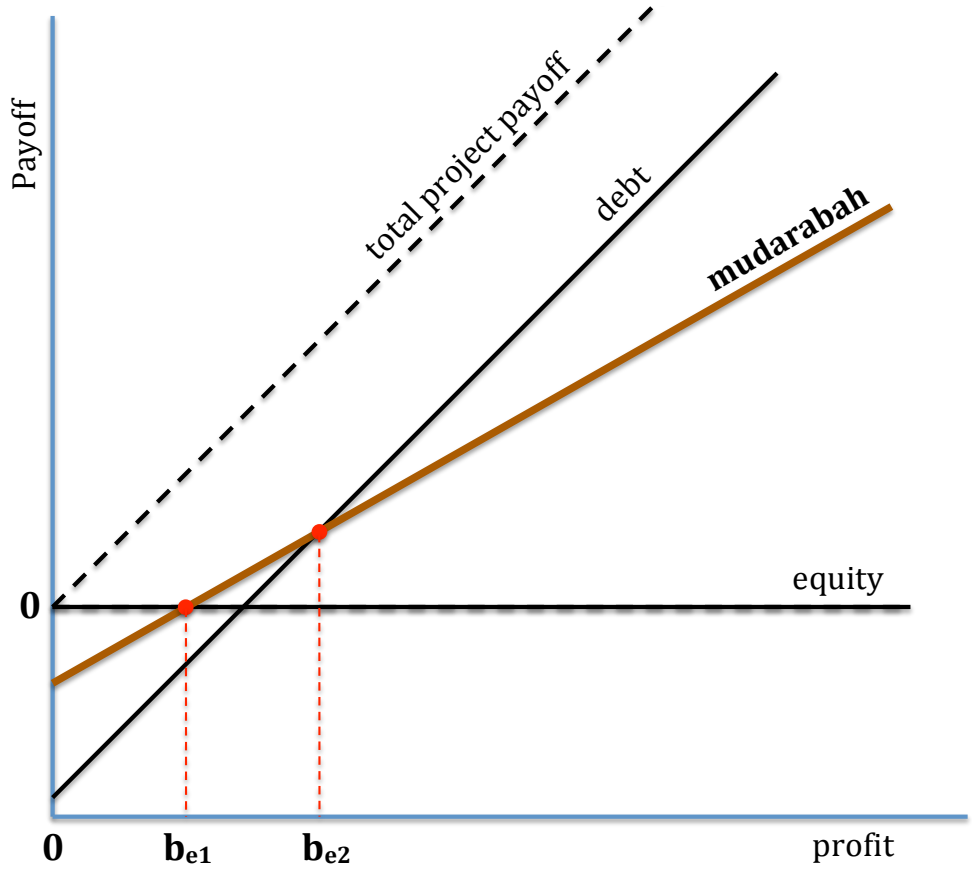

Figure 10: Payoff at maturity (entrepreneur): equity vs. *mudarabah* vs. debt

functions are linear and continuous in p. The following table collects all payoff functions ($P(p)$).

	Agent	
Contract	Bank (b)	Entrepreneur (e)
Debt (D)	$P_{Db}(p) = i$	$P_{De}(p) = p - i - e$
Mudarabah (MD)	$P_{MDb}(p) = s_b * p$	$P_{MDe}(p) = s_e * p - e$
Equity (E)	$P_{Eb}(p) = p - e$	$P_{Ee}(p) = 0$

The first breaking point for the bank (b_{b1}) is where the debt contract and *mudarabah* yield the same payoff ($i = s_b * p$) and the second breaking point (b_{b2}) is where *mudarabah* and the equity contract yield the same payoff ($s_b * p = p - e$). We look for a condition that guarantees that there exists some level of profit so that *mudarabah* is favourable for the bank ($b_{b1} < b_{b2}$) and

arrive after some transformation[19] at:

$$s_b > s_e * \frac{i}{e}$$

This sets a lower boundary to the bank's profit share in order to guarantee that b_{b1} is lower than b_{b2} so that there exists some level of profit at which the bank prefers *mudarabah* over debt or equity. Its profit share has to be higher whenever the interest it could earn in a debt contract is higher or whenever the effort the entrepreneur provides is lower.

The same procedure for the entrepreneur yields the condition:

$$s_e > s_b * \frac{e}{i}$$

Again, only if this condition holds, the entrepreneur's payoff function in a *mudarabah* contract will be steep enough to cross his payoff function for equity (at b_{e1}) before it crosses his payoff function for debt (at b_{e2}). Defining $\frac{e}{i} = \Phi$ and rewriting the two conditions yields:

- condition for the bank: $s_e < s_b * \Phi$
- condition for the entrepreneur: $s_e > s_b * \Phi$

This shows analytically that the condition for the bank and the condition for the entrepreneur can never be simultaneously fulfilled. Whenever the bank's payoff function for *mudarabah* is steep enough to be favorable at least for some levels of profit, the entrepreneur's payoff function for *mudarabah* will be too flat to be favorable at any profit and vice versa. In other words, whenever his payoff function suggests to an entrepreneur that he should favor *mudarabah* over debt and equity for a given expected profit, the bank will be better off with debt or equity for the same expected profit. An equivalent analysis of the payoff functions confirms that the same is true for *musharakah* agreements.[20]

[19] see Annex A for details.
[20] see Annex B for details.

The result shows that an unsophisticated analysis of payoff functions already indicates incentive problems with *mudarabah*. However, on several grounds it is implausible to assume this to be the main reason to explain why *mudarabah* is not sufficiently used in practice:

- An analogous analysis of debt and equity contracts would result in the conclusion that whenever the entrepreneur favors debt over equity, the bank favors equity over debt. The same reasoning would thus apply to conventional finance contracts. This counter-argument is mitigated by the fact that these contracts are almost always combined in order to reduce the drawbacks that occur with the two contracts if used in pure form.

- The environment of the analysis is not general as only expected profits are analyzed, without taking the possibility of losses into consideration. This restriction to an ex-post assessment of the contracts is far-reaching because in general the incentive structure of a financing contract would be assessed within a risk-return framework. Furthermore, the analysis of the payoff functions assumes that all due payments are paid immediately so that credit risk is absent.

These points indicate that the incentive problems visible within the payoff functions are not the sole explanation for the underuse of PLS-financing. Still, Islamic banks often compete with conventional banks that have long experience in using debt and equity contracts. It is thus conceivable that Islamic banks are reluctant to use a contract that customers will only favor over conventional products when it is underpriced from the bank's point of view. Put differently, one could argue that the entrepreneur might have to be willing to pay a higher price or receive a lower payoff in order to finance his business Islamic instead of conventional because whenever the bank is willing to offer *mudarabah* rather than debt or equity, the entrepreneur a priori knows that there must be a debt or equity contract that delivers higher returns than the *mudarabah* agreement.

To further analyze the incentive-compatibility of Islamic finance contracts, we will now leave the framework of a perfect capital market and introduce the

theoretical foundations of asymmetric information distribution in financial relationships.

4.2 Asymmetric information distribution

In the literature *mudarabah* and *musharakah* are at times compared to contracts that are similar to Venture Capital in conventional finance (see e.g. Tamer, 2005). An analysis of Islamic PLS-contracts along the lines of what the literature suggests for the analysis of Venture Capital yields valuable insights. Specifically the problems arising from asymmetric information distribution seem to play a major role in the Islamic banks' reluctance to provide PLS-financing. Aggarwal and Tarik (2000, p. 94) argue that "Islamic banks operate mostly in developing economies where financial markets are characterized by high degrees of imperfect information and rent-seeking behavior". This section is therefore based on Duffner (2005), whose description of agency problems in the context of Venture Capital financing is applied to the specific case of PLS-contracts in Islamic finance.

4.2.1 Adverse selection

The problem of 'Adverse Selection' arises before a contract is closed. One of the contracting parties has information available that is hidden to the other party. Adapted to the problem at hand, adverse selection might occur due to the fact that the entrepreneur knows more about the payoff structure of his project than the bank. If the bank cannot assess the quality of the individual projects that seek Shariah-conform financing, it will have to price the financial contracts it offers at an average price. This would be unfavorable for the entrepreneurs who have good projects as they would subsidize the bad projects in such a market. If there exists an outside option for the entrepreneurs with good-quality-projects (eg. a debt contract instead of *mudarabah*), they will leave the market. The quality of projects that seek Islamic contracts will then gradually deteriorate and the bank will have to adjust the conditions for the Shariah-conform contracts to the lower average quality of projects that seek such financing. Out of the remaining pool

of projects, this will again chase the entrepreneurs with the best projects off. This negative spiral can go on until only the worst projects would seek Shariah-conform financing which may cause the market to break down. This standard problem with asymmetric information distribution was first introduced by Akerlof (1970) who demonstrated the market break-down at the example of bad quality cars ('Lemons') in the market for used cars.

The analysis of payoff structures in 4.1 indicates a severe adverse selection problem in the market for Shariah-conform financing. Entrepreneurs with good quality projects will be tempted to seek debt-financing instead of letting the bank participate in their profit. Even more so because *mudarabah* provides the entrepreneur with a full insurance against any loss, which will attract entrepreneurs with poor-quality-projects and thus increase the price for this contract.

There are two standard solutions to the problem of adverse selection, both of which could prevent the market from breaking down. Even so, both of them contain inefficiencies and are thus labelled 'second-best'.

'Signaling' would require action from the entrepreneur with a good-quality-project. As it is disadvantageous for him that the quality of his project cannot be assessed by the bank, he would bear some costs to reveal the soundness of his projects in order to receive a better price for the financing contract. This solution is only implementable if the incentive structure is such that the entrepreneur with a bad-quality-project does not mimic the signal in order to also receive the better conditions.

The short-term trade financing that is executed in PLS-mode in reality relies on the entrepreneurs' signaling. They closely specify which goods they will buy, who they will resell it to and at what profit. However, in a complicated long-term project, signaling actions are likely either very expensive or easily imitated by entrepreneurs with low quality projects.

That the funding decisions of firms and entrepreneurs reveal their own assessment of their project, which might have strong effects on the perception of the soundness of the project by possible investors, has been known for a long time. Myers and Maljuf (1984) introduced the term 'Pecking Order Theory' to describe that entrepreneurs who issue equity signal to the mar-

ket that they do not believe in high returns. The issuance of debt, on the contrary, means that the entrepreneur is not willing to extend the ownership of the project to a broader basis. This signals trust to the market. The issuance of debt, however, is not available as 'signaling mechanism' in a *riba*-free financial environment.

The second solution is called 'Screening' and suggests that the bank would offer contracts such that the entrepreneurs have an incentive to reveal the true quality of their project to the bank. Since the Shariah-conform PLS-contracts are explicitly specified, there is not much freedom in designing contracts that yield different incentives to entrepreneurs with good or bad quality projects. Notwithstanding, as described in section 3.2.2, Islamic banks do alter the standard contracts in reality when they ask for collateral or guarantees by third parties. These measures are intended to improve the pool of investment projects that seek PLS-contracts in practice.

4.2.2 Moral hazard

The problem of 'Moral Hazard' arises after a contract is closed. Asymmetric information distribution provides the entrepreneur with the possibility to conduct 'hidden actions' (Jensen and Meckling, 1976). These are actions that yield utility for the entrepreneur but do not generate cash flow to the project. As information is asymmetrically distributed, the investor is not able to detect these actions. In case of Islamic PLS-contracts, hidden actions could take any form of diverting cash flows either through misstating the real numbers or investing in unproductive activities (wasteful spending) that raise the entrepreneur's utility.

Another serious problem in *mudarabah* is the entrepreneur's indifference with respect to the magnitude of losses. Given that the project will generate a loss, the entrepreneur will always lose the compensation for his effort but not more and is thus indifferent between high or low losses. In such a situation, moral hazard is likely to affect the entrepreneur's willingness to provide effort, as he will not get compensated.

Theoretical research on incentive problems in Islamic financing contracts is provided by Presley and Sessions (1994). They compare debt and *mudarabah* contracts in an environment where managers have superior information on their effort level. The outcome of the project depends on the manager's effort, the capital investment and a random shock. The manager decides on the level of both inputs (capital and effort) and has an incentive to substitute effort for capital because his effort is costly to him but unobservable to the investor. In this setting, they find that *mudarabah* contracts provide a welfare-improvement compared to debt. Both contracts fail in implementing the first-best solution, but *mudarabah* increases the investment level whilst inefficiently large fluctuations around this level are reduced. This result is achieved because *mudarabah* allows "to control the manager's incentive to exert effort directly"(Presley and Sessions, 1994, p. 595). While in a debt contract the relation between capital investment and capital compensation is fixed, in a *mudarabah* contract the level of effort exerted by the manager affects the relationship between capital investment and the outcome of the project. In that sense, *mudarabah* acts as a revelation mechanism.

Further theoretical research was conducted by Aggarwal and Tarik (2000), who provide a model that rationalizes the wide-spread use of debt-like instruments in Islamic banking practice. Their model has two periods and PLS-contracts ('equity') or mark-up contracts ('debt') available. The entrepreneur has a project that yields a positive expected net present value and he generates utility from diverting cash flows. This is modeled by a constant c that positively enters the entrepreneur's utility function and negatively affects the project's returns. This constant can also be interpreted as level of moral hazard that exists in the economy.

Aggarwal and Tarik (2000) solve for optimal contracts from the banks' point of view. There exists a cutoff level of moral hazard c^* such that for $c < c^*$, pure equity contracts will be optimal and the bank will only offer equity contracts. In that case diversion is low. If $c > c^*$, then diversion is higher and a combination of debt and equity contracts will be offered. Finally, there is a second cutoff level $c^{**} > c^*$ and if $c > c^{**}$ banks initially only offer debt contracts. The important insight is that the optimality of debt as a mode of financing depends on the level of moral hazard in the economy.

"This suggests that the high quantity of mark-up contracts offered by Islamic banks is a rational choice given the environment they face, one of high moral hazard. [...] We feel the informational environment will be a more important determinant of the evolution of banking and growth in Muslim countries than will attempts to impose financial systems based on specific religious principles" (Aggarwal and Tarik, 2000, p. 117/119).

4.3 Are Shariah-conform PLS-contracts too expensive?

The discussion of PLS-contracts from an economic perspective reveals sever agency problems that arise due to asymmetric information distribution and might lead to adverse selection and moral hazard. This does not necessarily mean that PLS-contracts are doomed to be marginalized.

Mudarabah and *musharakah* agreements can be and are to some extent implemented in practice. However, they are likely to be more expensive than conventional financing. The agency problems call for more extensive screening and monitoring of projects and in the case of *mudarabah*, the bank bears all potential losses. Hence, the entrepreneur has to pay not only for the financing costs but also for his limited liability. In the case of *musharakah*, the bank bears a share of losses and provides effort (e.g. knowhow) to the project. Again, this will add to the costs of the agreement and render the Islamic modes of PLS-financing more expensive than conventional financing.

It seems that the implementation of a truly Islamic financial system that relies heavily on PLS-modes of financing does not necessarily require ever more elaborate product designs by the banks, but depends more fundamentally on the entrepreneurs' willingness to pay for Islamic financing. Given that paradigmatic Shariah-conform PLS-financing contracts grant the entrepreneurs more rights than what is common in Western financial relationships, they must be more expensive. However, the current practices of Islamic banking might have gone too far in adopting Western principles, so that advantages that allow for higher prices disappeared. Or the willingness to pay on behalf of the investors is too low so that paradigmatic versions of PLS-contracts would not encounter sufficient demand.

5 Conclusion

A closer look at Islamic finance has revealed a discrepancy between theory and practice. In theory, a truly Islamic financial system is based on long-term partnerships in which investors provide capital to profitable projects that add value to the whole Islamic community. In doing so, investors bear risks and have to incur losses in order to qualify for a share of profits in successful projects. In an Islamic economy, an investor is engaged in the projects he finances and takes suitable actions to carefully choose entrepreneurs he trusts.

The analysis of Shariah-conform PLS-contracts showed that they have awkward incentive structures from the banks' point of view. The payoffs never render such a contract advantageous for the investor and the entrepreneur simultaneously, adverse selection might deteriorate the basis of entrepreneurs who seek Shariah-conform financial intermediation and moral hazard might lower the recovery rate of failing projects because entrepreneurs do not have enough incentive to limit losses. Notwithstanding, concluding that Shariah-conform PLS-contracts are useless in practice is premature. It is hardly a coincidence that *mudarabah* and *musharakah* are constructed in such a way that close monitoring and active screening are essential because these preconditions would guarantee that Islamic financing must be accompanied by close relationships between the business partners. In that sense, *mudarabah* and *musharakah* are suitable to be implemented in the theoretical setup of an Islamic economic system but less so in a conventional environment.

It is thus likely that raising funds through a truly PLS-based Islamic financial system would be more expensive than raising funds in a conventional banking system. The Shariah-conform PLS-contracts not only require more sophisticated screening and monitoring on behalf of the bank but also provide the user of funds with more financial security compared to what is common for Western financial contracts. These additional features will increase the costs of Islamic financial intermediation and therefore raise its prices. Starting with this precondition, an Islamic financial system could evolve in two ways.

An Islamic banking system could stay closely to the ideal of Islamic financial intermediation and provide entrepreneurs who are willing to pay for it with the sophisticated financing that comes with Shariah-conformity. This would likely mean that the Islamic banking industry keept playing a marginal role on worldwide financial markets. It would render Islamic financing a luxury product that is only used by entrepreneurs who have a strong preference for Shariah-conformity, while others would more often use the cheaper conventional system. However, it would also mean that Islamic banking is truly what the theoretical foundation promises: an alternative way of conducting business, not only free of *riba* but all-encompassing in its strive for being Islamic.

Empirical studies on Islamic banking suggest that the system evolved in a different direction and took the path to convergence towards conventional Western banking. The theoretical idea of the system is not thoroughly implemented. Competition of conventional banks as well as the quest for growth have undermined the Islamic paradigm of financial intermediation. There is a strong reliance on mark-up contracts and the Shariah-conform contracts have been amended in various ways. This means more potential for quicker growth, but it also leads to the conclusion that Islamic banking in practice is not that different from conventional banking but merely the incomplete implementation of an originally capacious idea.

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A *Mudarabah* vs. debt and equity

The goal is to set up conditions that guarantee that there exists some level of profit such that the payoff in a *mudarabah* agreement his higher than the payoff with a debt or equity contract. As in the main text, we define the variables and collect the payoff functions in a table.

- p profit after all costs and repayment of initial investment before compensating the effort e
- i positive absolute interest rate
- e absolute cost of the effort (in *mudarabah* borne by the entrepreneur)
- s_b relative share of profit for the bank.
- s_e relative share of profit for the entrepreneur.

	Agent	
Contract	Bank (b)	Entrepreneur (e)
Debt (D)	$P_{Db}(p) = i$	$P_{De}(p) = p - i - e$
Mudarabah (MD)	$P_{MDb}(p) = s_b * p$	$P_{MDe}(p) = s_e * p - e$
Equity (E)	$P_{Eeb}(p) = p - e$	$P_{Ee}(p) = 0$

We first analyze the bank's breaking points. The first breaking point (b_{b1}) is at the level of profit where debt and *mudarabah* yield an equal payoff ($P_{Db}(p) = P_{MDb}(p)$):

$$i = s_b * p$$

$$b_{b1} = \frac{i}{s_b} \tag{1}$$

The second breaking point (b_{b2}) is at the level of profit where *mudarabah* and equity yield an equal payoff ($P_{MDb}(p) = P_{Eeb}(p)$):

$$s_b * p = p - e$$

$$b_{b2} = \frac{e}{1 - s_b} \tag{2}$$

Whenever the first breaking point is below the second breaking point, there exists a level of profit at which the bank favors *mudarabah*[21]. We combine (1) and (2) to establish this condition:

$$\frac{i}{s_b} < \frac{e}{1 - s_b}$$

To express this in terms of the steepness of the bank's payoff function in the *mudarabah* agreement, we reintroduce $1 - s_b = s_e$ and rewrite:

$$s_b > \frac{s_e * i}{e} \tag{3}$$

For the bank to have a higher payoff from *mudarabah* than from debt or equity at some profit level, its profit share has to be higher whenever the interest it could earn in a debt contract is higher or whenever the effort the entrepreneur provides is lower.

Compared to the bank, the breaking points for the entrepreneur are defined exactly the other way around. The first breaking point (b_{e1}) is at the level of profit where equity and *mudarabah* yield an equal payoff ($P_{Ee}(p) = P_{MDe}(p)$) and the second breaking point (b_{e2}) is at the level of profit where *mudarabah* and debt yield an equal payoff ($P_{MDe}(p) = P_{De}(p)$). The condition for

[21] This becomes immediately clear from figure 9. Analytically it follows from the fact that the slope is larger for an equity contract than for a *mudarabah* contract and larger for a *mudarabah* contract than for a debt contract, while the payoff value at $p = 0$ is lowest for the equity contract and highest for the debt contract. The values are:

$$\frac{\partial P_{Eeb}(p)}{\partial p} = 1 \quad \text{and} \quad P_{Eeb}(0) = -e$$

$$\frac{\partial P_{MDb}(p)}{\partial p} = s_b \quad \text{and} \quad P_{MDb}(0) = 0$$

$$\frac{\partial P_{Db}(p)}{\partial p} = 0 \quad \text{and} \quad P_{MDb}(0) = i$$

For the entrepreneur, the same reasoning applies, only with the order of contracts mirrored.

the entrepreneur to have a level of profit where *mudarabah* is favorable is obtained as was shown above for the bank:

$$b_{e1} = \frac{e}{s_e} \tag{4}$$

$$b_{e2} = \frac{i}{1 - s_e} \tag{5}$$

$$s_e > \frac{s_b * e}{i} \tag{6}$$

All that is left now is to compare (3) and (6). Defining $\frac{e}{i} = \Phi$ and rewriting the equations yields the conditions stated in the main text:

$$s_e < s_b * \Phi$$

$$s_e > s_b * \Phi$$

This immediately shows that the two conditions contradict each other and cannot be simultaneously fulfilled. It is thus not possible to find a *mudarabah* agreement such that for both agents a level of profit exists where the payoffs are favorable compared to debt or equity.

B *Musharakah* vs. debt and equity

The goal is to set up conditions that guarantee the mere existence of some level of profit such that the payoff in a *musharakah* agreement is higher than the payoff with a debt or equity contract. The procedure is equal to the one used in Appendix A and the same variables are used. Since in a *musharakah* agreement, the bank also provides effort to the project, we will additionally define

e_b absolute cost of effort provided by the bank.

e_e absolute cost of effort provided by the entrepreneur.

e absolute cost of total effort (e_b+e_e)

The payoff functions used are as follows:

	Agent	
Contract	Bank (b)	Entrepreneur (e)
Debt (D)	$P_{Db}(p) = i$	$P_{De}(p) = p - i - e$
Musharakah (MS)	$P_{MSb}(p) = s_b * p - e_b$	$P_{MSe}(p) = s_e * p - e_e$
Equity (E)	$P_{Eeb}(p) = p - e$	$P_{Ee}(p) = 0$

We first analyze the bank's breaking points. The first breaking point (b_{b1}) is at the level of profit where debt and *musharakah* yield an equal payoff ($P_{Db}(p) = P_{MSb}(p)$):

$$i = s_b * p - e_b$$

$$b_{b1} = \frac{i + e_b}{s_b} \tag{7}$$

The second breaking point (b_{b2}) is at the level of profit where *musharakah* and equity yield an equal payoff ($P_{MSb}(p) = P_{Eeb}(p)$):

$$s_b * p - e_b = p - e$$

$$b_{b2} = \frac{e - e_b}{1 - s_b} \tag{8}$$

Whenever the first breaking point is below the second breaking point, there exists a level of profit at which the bank favors *musharakah*. We combine (7) and (8) to establish this condition:

$$\frac{i + e_b}{s_b} < \frac{e - e_b}{1 - s_b}$$

To express this in terms of the steepness of the bank's payoff function in the *musharakah* agreement, we use $1 - s_b = s_e$ and rewrite:

$$s_b > s_e * \frac{i + e_b}{e - e_b} \tag{9}$$

Compared to the bank, the breaking points for the entrepreneur are defined exactly the other way around. The first breaking point (b_{e1}) is at the level of profit where equity and *musharakah* yield an equal payoff ($P_{Ee}(p) = P_{MSe}(p)$) and the second breaking point (b_{e2}) is at the level of profit where *musharakah* and debt yield an equal payoff ($P_{MSe}(p) = P_{De}(p)$). The condition for the entrepreneur to have a level of profit where *musharakah* is favorable is obtained as was shown above for the bank:

$$b_{e1} = \frac{e_e}{s_e} \tag{10}$$

$$b_{e2} = \frac{e - e_e + i}{1 - s_e} \tag{11}$$

$$s_e > s_b * \frac{e - e_b}{i + e_b} \tag{12}$$

All that is left now is to compare (9) and (12). Substituting $s_e = 1 - s_b$ in both equations and defining

$$\frac{1}{\frac{e-e_b}{i+e_b} + 1} = \Phi$$

yields the conditions that make the contradiction visible:

$$s_b > \Phi$$

$$s_b < \Phi$$

Plagiatserklärung

Ich bezeuge mit meiner Unterschrift, dass meine Angaben über die bei der Abfassung meiner Arbeit benutzten Hilfsmittel sowie über die mir zuteil gewordene Hilfe in jeder Hinsicht der Wahrheit entsprechen und vollständig sind.
Ich habe das Merkblatt zu Plagiat und Betrug vom 22. Februar 2011 gelesen und bin mir der Konsequenzen eines solchen Handelns bewusst.

Basel, August 23rd, 2013

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