

ISLAMIC BANKING AND WEALTH DISTRIBUTION:
AN APPLICATION OF AGENT-BASED
COMPUTATIONAL MODEL

BY

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ABSTRACT

The motivation of this study is to examine the role of both profit and loss sharing (PLS)-based and markup-based financing in wealth distribution. Historically, the objective of Islamic banking is to eliminate interest from the financial system and to promote the application of profit and loss sharing (PLS) schemes as an alternative. Nevertheless, the small number of applications of the PLS-based system currently indicates that the practice of Islamic banking institutions is far from ideal. Moreover, many empirical studies show that conventional bank lending is also able to reduce the gap in wealth distribution. Therefore, it seems that both Islamic and conventional banking systems may promote wealth distribution. Considering this research gap, the primary objective of this study is to examine the role of Islamic bank financing in wealth distribution by applying ABM as a tool of analysis. The introduction of interest-based model is to compare the results with the conventional system. The simulation results show that PLS-based financing has better performance in promoting wealth distribution than the markup-based or interest-based ones. The outcome also shows that the economy experiences higher inequality in wealth distribution, regardless the rate of interest on credit and interest on deposit. This implies that the types of financing are a key factor in determining wealth distribution, rather than merely focusing on access to finance. This research further concludes that both markup-based and PLS-based may promote wealth distribution subject to minimum threshold level of profit shared on deposit, markup on credit and profit share paid by the firm. It is also observed that there are two fundamental requirements to promote wealth distribution. First, that there is wealth transfer generated inside the system, and second, that there is an increase in the wealth of the majority of households. This research can be used as a feasibility study, particularly regarding the application of full PLS and its impact on wealth distribution. Therefore, a number of policies are proposed to promote the role of the Islamic banking industry in minimizing inequality in wealth distribution.

Keywords: *Islamic banking system, Conventional banking system, PLS based, markup based, interest based, Wealth distribution, Agent based computational model (ABM).*

خلاصة البحث

تهدف هذه الدراسة إلى فحص دور كلا التمويلين، التمويل القائم على تقاسم الربح والخسارة (PLS) والتمويل القائم على هامش الربح في توزيع الثروة. وعلى مر التاريخ، كان الهدف للمصرف الإسلامي إزالة سعر الفائدة في النظام المالي وتعزيز تطبيق مشروع تقاسم الربح والخسارة (PLS) بوصفه بديلاً من المشروع التقليدي. ولكن العدد القليل من تطبيق التمويل القائم على تقاسم الربح والخسارة (PLS) في الممارسات الحالية يشير إلى أن ممارسة المؤسسة المصرفية الإسلامية بعيدة عن الحالة المثالية. وفضلاً عن ذلك، تدل كثير من الدراسات التجريبية على أن القروض المصرفية التقليدية أيضاً قادرة على تخفيض الفجوة في توزيع الثروة. وعلى هذا، يبدو أن كلا النظامين، النظام المصرفي الإسلامي والنظام المصرفي التقليدي يمكنهما أن يعززا توزيع الثروة. وبناء على هذه المعطيات، الهدف الرئيس لهذه الدراسة كشف دور تمويل المصرف الإسلامي في توزيع الثروة من خلال تطبيق النموذج الحسابي القائم على العوامل (ABM) بوصفه أداة للتحليل. وتم تقديم النموذج القائم على الفائدة لمقارنة النتيجة بالنظام التمويلي التقليدي. وتشير نتيجة المحاكاة إلى أن التمويل القائم على تقاسم الربح والخسارة (PLS) له أداء أفضل في تعزيز توزيع الثروة بمقارنة النظام القائم على هامش الربح والفائدة. وكذلك تتضمن النتيجة أن أنواع التمويل يكون عاملاً رئيساً في تحديد توزيع الثروة بدلاً من أنه مجرد تركيز على الوصول إلى التمويل. ويلاحظ أيضاً أن هناك متطلبين أساسيين في تعزيز توزيع الثروة، أولهما: وجود انتقال الثروة الصادر داخل النظام، وثانيهما: وجود ارتفاع الثروة لدى معظم الأسر المعيشية. ويمكن أن تُستخدم الدراسة بوصفها دراسة الجدوى، خاصة في تطبيق تقاسم الربح والخسارة الكامل (PLS) وأثره في توزيع الثروة. إذن، تم اقتراح عدد من السياسات لتعزيز دور الصناعة المصرفية الإسلامية في تقليل التفاوت في توزيع الثروة.

الكلمات المفتاحية: النظام المصرفي الإسلامي، النظام المصرفي التقليدي، القائم على تقاسم الربح والخسارة (PLS)، القائم على هامش الربح، القائم على الفائدة، توزيع الثروة، النموذج الحسابي القائم على العوامل (ABM).

APPROVAL PAGE

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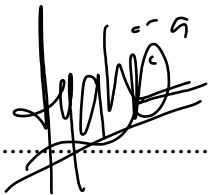
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DECLARATION

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*Unquestionably, [for] the allies of Allah there will be no fear concerning them,
nor will they grieve. Those who believed and feared Allah.*

For them are good tidings in the worldly life and in the Hereafter.

No change is there in the words of Allah. That is what the great attainment is.

And let not their speech grieve you.

Indeed, honor [due to power] belongs to Allah entirely.

He is the Hearing, the Knowing.”

(QS. Yunus 10: 62-65)

~000~

In a world of lies, you are the truth

I wanna make you see,
just what I was

I wanna bring you,
everything you ask for

I wanna hold you close
to show this third piece

No matter where you are,

For you, my greatest Father

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

The objective of Islamic banking when it was initially mooted was to eliminate interest in the financial system and to promote the application of the profit and loss sharing (PLS) as an alternative scheme of financing (Ismail 2010). The primary goal of PLS is to create a just system that will enhance equality and fairness for the good of society as a whole (Ahmad 1984, 1987; Chapra 1985; Nawab & Naqvi 1997; Rosly, Afandi, & Bakar 2003; Siddiqi 1983). Therefore, the application of PLS-based financing is expected to promote wealth distribution amongst individuals in society (Ismail, 2010; Ismail, Akbar, & Ngalim 2014), thus allowing sustainable economic development to be achieved (Čihák et al., 2013)

The unique feature of PLS in Islamic banking push it closer to and moves in tandem with real productive activities compared to conventional financial systems, and hence economic growth is more inclusive. Accordingly, the application of the risk sharing instrument in PLS is argued to be more stable against shock because Islamic banks will avoid investing in speculative financial activities which have been shown to have contributed to recent financial crises (Mehta, 2008; Smolo & Mirakhor, 2010; Ahmed, 2010; Sugema, Bakhtiar, & Effendi, 2010; Nabi, 2012; Azmat et al., 2014; Imam & Kpodar, 2015). As the features of PLS-based financing may reduce economic shock, it is argued that Islamic banks promote economic growth (Imam & Kpodar, 2015; Elhachemi & Othman, 2015; Abdul, 201a3; Farahani, Yasdan Gudarzi, & Dastan, 2013; Wild, 2015; Tabash & Dhankar, 2014; Abduh & Omar, 2015; Zirek, Celebi, & Kabir Hassan, 2016).

The current practice of Islamic banks, however, prefers to apply markup-based financing rather than the PLS-based type. Only a negligible portion of Islamic banking financing (IBF) products follows the ideal PLS mode (Chong & Liu, 2009; Khan, 2010; Dusuki & Abdullah, 2007). For instance, from 189 total number of Islamic financial institutions under Islamic Financial Services Board (IFSB), total financing based on the PLS scheme (Mudharabah and Musyarakah) in the fourth quarter of 2018 was only around 5 percent (figure 1.1). Meanwhile, total financing based on the markup scheme (Murabahah contracts) on average reached more than 85 percent.

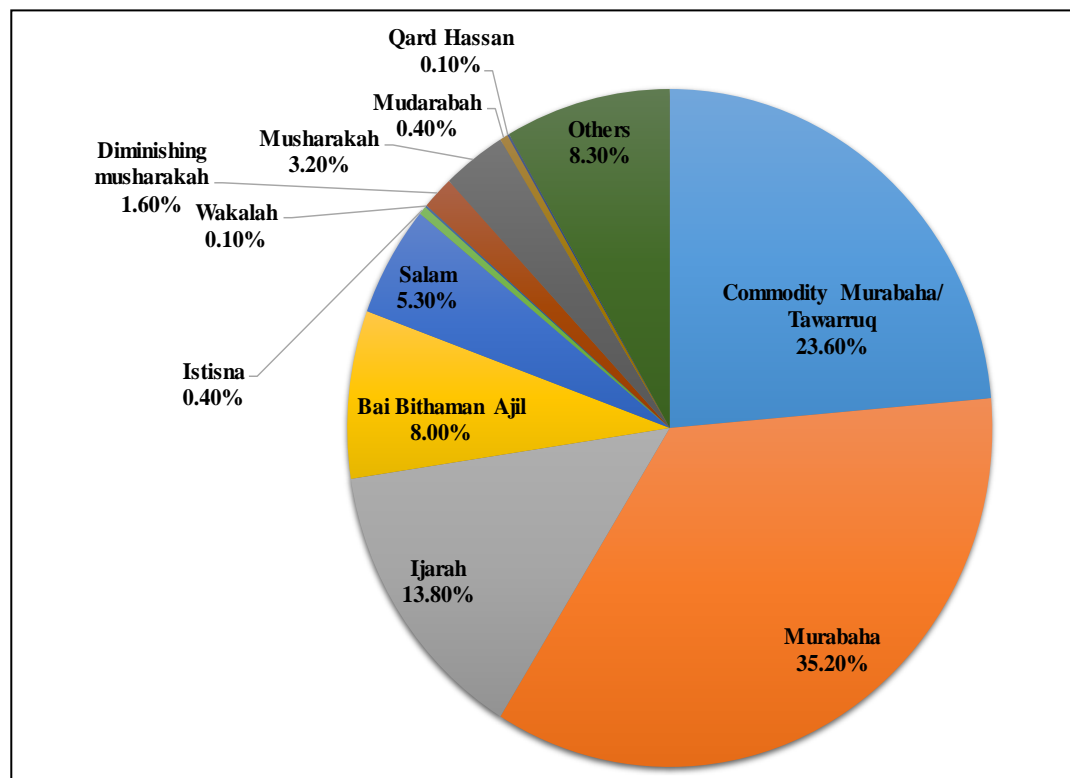


Figure 1.2 Total Financing in Islamic Banks: IFSB Member Countries

The low level of PLS-based financing in current practice indicates that the practice of Islamic banking institutions is far from ideal. Therefore, the superiority of Islamic banking as a means of wealth distribution is questionable. Moreover, many

empirical studies show that the current practice of conventional bank lending is also able to reduce the gap in wealth distribution (see subchapter 2.3.). At this point, it seems that both Islamic and conventional banking systems may promote wealth distribution.

In response to this problem, and to explain whether Islamic bank financing promotes wealth distribution, there is a need to examine the relationship between Islamic and interest-based financial systems with wealth distribution. Nevertheless, data on PLS-based financing is very limited and is not sufficient for long-term analysis, especially econometric analysis. The lack of data suggests the need for a model to simulate an ideal Islamic financial system for comparison with the interest-based system. Furthermore, the growing complexity and interconnectedness of banking systems suggest that the model constructed should include collective intelligence and exhibit the emergent behavior of the agents at the macro level (El-Masri, 2015). Therefore, it is necessary to conduct research from different angles, involving transactions between households, firms and banks. One such class of model that could achieve this objective is the agent-based computational model (ABM).

Tesfatsion (2005) defines ABM in economics as a computational study to build an economy, modelled as evolving systems of autonomous interacting agents. The economy evolves over time as its constituent agents repeatedly interact with each other and learn from their interactions. Many studies (see subchapter 4.8) suggest that ABM should cover complex interactions amongst economic agents (Arthur 1994, 1999; Arthur, Durlauf, & Lane 1997; Oh 2015). The economic system is one example of a complex system (Al-suwailem, 2011). In this regard, an economic system is created from heterogeneous interacting agents who have goals within an environment, a continuously developing set of institutions, and arrangements and technological

innovation. For example, firms change their prices depending on previous demand. Therefore, the output decision of an individual is a result of an interaction.

Considering the nature of an economic system as a complex system, this study will apply ABM as the research methodology. Furthermore, there are two other fundamental reasons for employing ABM in this research.

The first reason is the need to have a simulation. A simulation is employed in research when a new concept is to be applied and there is a need to understand the possible impacts that may emerge after the implementation of the new concept. A simulation is also applied when data is not freely available (Oh, 2015). As a pure Islamic financial system does not exist, and data on PLS-based financing is not sufficient for long term analysis, this research employs ABM as a simulation tool. In this regard, one of the scenarios is that PLS becomes the only financing scheme in the economy. The simulation will be run at least 2000 times, with each time equal to 1 month, or a total of around 140 years. Therefore, the role of a pure Islamic financial system in the economy can be examined and the unavailability of long term data on Islamic banks can be solved.

The second reason is that the nature of the banking system is complex, thus it is necessary to build a complex system model. This study will build a model of a complex system which captures interactions between households, firms and banks. A simulation using the ABM framework is able to observe the interaction of each economic agent in the economy, as well as investigate the emergence at the macro level. In this research, the term ‘emergence’ is basically the pattern which emerges due to the interaction of each agent. It is expected that the results will show the movement in and adjustment of wealth distribution.

Considering this background, this research examines the role of Islamic bank financing in wealth distribution by applying ABM as a tool of analysis. In addition, the impact of Islamic bank financing on wealth distribution will be compared with conventional bank lending.

1.2 PROBLEM STATEMENT

Previous studies argue that one of the causes of inequality is limited access to the financial sector, especially for low income households (Akimov, Wijeweera, & Dollery, 2006; Kenourgios & Samitas 2007; Levine, 2003; Park & Shin, 2015). This implies that one of the purposes of providing financing is to promote wealth distribution in society. Currently, the financial system comprises two types of banking, i.e., conventional and Islamic banks. Both types provide credit or financing for customers.

The main feature, which makes Islamic-based financing contracts different from those of conventional banks, is that financing schemes must follow *sharia* rulings. As an ideal contract of financing in Islamic banks, PLS is expected to play a major role in Islamic banking system practices. In theory, the application of the PLS-based system would be inherently less volatile and lead to a more desirable distribution of wealth. The PLS mechanism is further argued to produce an economic system that is more stable than the conventional interest-based one (Askari, Krichene, and Mirakhor 2014; Iqbal and Mirakhor 2013; Khan and Mirakhor 1989).

Nevertheless, currently Islamic banks prefer to apply markup-based financing- which is argued to be economically similar to simple interest-based lending- rather than PLS-based (see Figure 1.1.). Therefore, the current practice of Islamic bank financing differs from its ideal condition. On the other hand, previous studies on the

impact of financing based on conventional bank lending also show a positive impact on wealth distribution (Agnello & Sousa, 2011; Akimov, Wijeweera, & Dollery, 2006; Ayyagari, Beck, & Hoseini 2013; Baligh & Pirae 2013; Batuo, Guidi, & Mlambo 2010; and many others). This situation leads to the question of whether PLS is able to promote better wealth distribution compared to markup-based and interest-based systems, or whether both markup-based and interest-based system actually perform better than PLS. In this regards, the urgency of wealth equality as Christine Lagarde (2015) explains that the leading condition for more inclusive and sustainable economic development is to maintain economic stability by addressing the problem of inequality in wealth distribution (Icenhower 2015).

Since data on PLS is very limited, it is necessary to conduct a simulation to predict and compare its impact. The model constructed will provide access to economic agents in the credit market and differentiate the market according to financing method; i.e., interest-based, markup-based or PLS-based. Therefore, this study will provide information on which types of financing have a better impact on wealth distribution.

1.3 RESEARCH OBJECTIVES

The primary objective of the study is to examine the role of Islamic bank financing in wealth distribution by applying ABM as an analysis tool. The results will be compared with the model of conventional bank lending (interest-based). To reach the primary objective, three specific research objectives (RO) can be defined as follows:

RO₁. To build a model to assess the contribution of PLS-based financing, markup financing and interest-based lending to wealth distribution using ABM.

RO₂. To compare the impact of PLS-based financing, markup-based financing and interest-based lending on wealth distribution.

RO₃. To explain the mechanism that leads to the differences in impact on wealth distribution due to the three types of financing.

Data from the simulation results will be analyzed to compare and explain the impact of the different financing models on wealth distribution. Specifically, it is expected that the outcome of the model simulation will be able to be used to examine the effects of PLS, markup-based financing and conventional bank lending on wealth distribution. Therefore, the differences in wealth distribution under the two banking systems will be explained and compared.

1.4 RESEARCH QUESTIONS

With regard to the objectives, this study focuses on the following research questions (RQs):

RQ_{1a}. What are the important elements required to build an ABM for different modes of financing (PLS-based, markup-based and interest-based financing)?

RQ_{1b}. How do the elements (in point RQ_{1a}) interact with each other in the economy?

RQ_{2a}. What is the impact of different modes of financing on wealth distribution?

RQ_{2b}. Why do the impacts of different modes of financing on wealth distribution differ or are similar?

RQ₃. How do different modes of financing effect wealth distribution in the economy?