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Financial Inclusion in Indonesia's Fishery Sector: Factors Determining Credit Participation

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Abstract: *Geographically, Indonesia contains massive potential in terms of the fishery sector. Indonesia has the third-longest coastline in the world with a length of 54.716 km². However, in 2015, the marine and fishery sector contribution to the Indonesia Gross Domestic Product was very low at only 2.5%. From January 2011 to August 2016, banks' credit disbursement to the sector was also extremely low at only 0.3% from total credit disbursement. Therefore, this study aims to ascertain whether the fishery sector in Indonesia is financially inclusive by investigating determinants of credit participation in for the fishery sector in Malang Regency of East Java and Cirebon Regency of West Java. Using logistics regression to analyse primary data obtained from 184 respondents, the study found that the ratio of income over expenses (a proxy of bankability level), asset ownership value, years of doing business, and a number of family members have a significant and positive effect on credit participation. Moreover, different types of jobs have significantly different probability in obtaining credit from banks. Fishermen have the lowest probability to obtain bank credit, whereas the highest probability belongs to aquaculture farmers. Interestingly, the level of education does not have a significant effect on credit participation as the average level of education in the fishery sector is considerably low. This study also provides specific policy recommendations to improve credit access and participation in the fishery sector to support its growth.*

Keywords: Credit participation; financial inclusion; Indonesia fishery sector; commercial banks; rural banks
JEL Classification: G21; Q22

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1. Introduction

Having more than 17,000 islands, Indonesia is an archipelago. Two-thirds of its territory is covered by ocean according to The World Factbook of Central Intelligence Agency (2018) making Indonesia the third-longest coastline in the world reaching a length of 54,716 km. Having this vast geographical potential, Indonesia's marine and fishery sector should be the backbone of the Indonesian economy. Dijk, Mheen, and Martin (2015) estimated that the

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marine and fishery sector in Indonesia has a potential of US$ 1.2 billion or about ten times Indonesia's national budget.

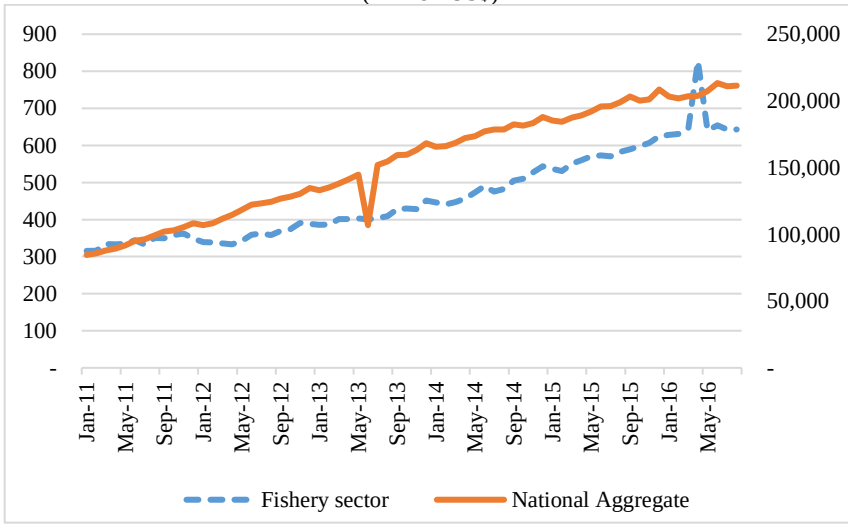
Although the nation contains massive ocean resources, in 2015, the marine and fishery sector only contributed US$ 20.7 billion or approximately 2.5% of the nation's Gross Domestic Product. Indonesia Banking Statistics showed that within the period from January 2011 to August 2016, on average, 0.3% from total credit of commercial banks were channelled to the marine and fishery sector (Financial Service Authority of Indonesia, 2016). According to the statement of some banking actors, they tend to avoid to fund businesses or actors (such as fisherman) in the fishery sector as they labelled them as high risk and high uncertainty clients. According to statements obtained from banks through focus group discussions and in-depth interviews, the reasons behind that is because the banking industry assess that fishing heavily depends on the weather, fishermen have a low repayment capability history, inadequate collateral, and are reluctant to save money when they get a considerable catch.

Not only does it have low credit disbursement, but the growth rate of commercial banks' credit disbursement to the fishery sector's credit was also well below the growth rate of commercial banks' national average credit disbursement (Figure 1). Given such conditions, it is a significant challenge for the fishery sector to catch-up with credit disbursement of other sectors. It is worsened by the fact that its ratio of non-performing loan (NPL) was also higher (3.98%) than the average NPL. As such, in the focus group discussions and in-depth interviews with banks, instead of providing funds to the fishery sector, they prefer to fund other sectors. Moreover, similar to commercial banks, rural banks' (*Bank Perkreditan Rakyat*) credit disbursement to the fishery sector is also very low. The figure for the fishery sector is only 0.24% of the total rural banks' credit disbursement. However, in terms of disbursement growth rate, the acceleration of rural banks' credit disbursement is better than commercial banks.

While commercial banks' credit disbursement to the fishery sector only grew 103.5% from US$ 316 million in January 2011 to US$ 643 million in August 2016, within the same period, the growth rate of rural banks reached more than 541% from US$ 2.9 million in January 2011 to US$ 18.6 million in August 2016 (Figure 2). The increasing trend of rural banks' credit disbursement to the fishery sector is because the government has been actively promoting credit linkage programmes, wherein credit funds from commercial banks are channelled to micro and small enterprises through rural banks (Bank Indonesia, 2006). Several studies found that credit from rural banks affected the development of micro and small enterprises positively (Maesaroh, 2012; Widyastuti and Yuliandari, 2016). Likewise, a study by Bank Indonesia (2016) concluded that services from rural banks are able to improve the accessibility of unbankable fisherman and other fishery

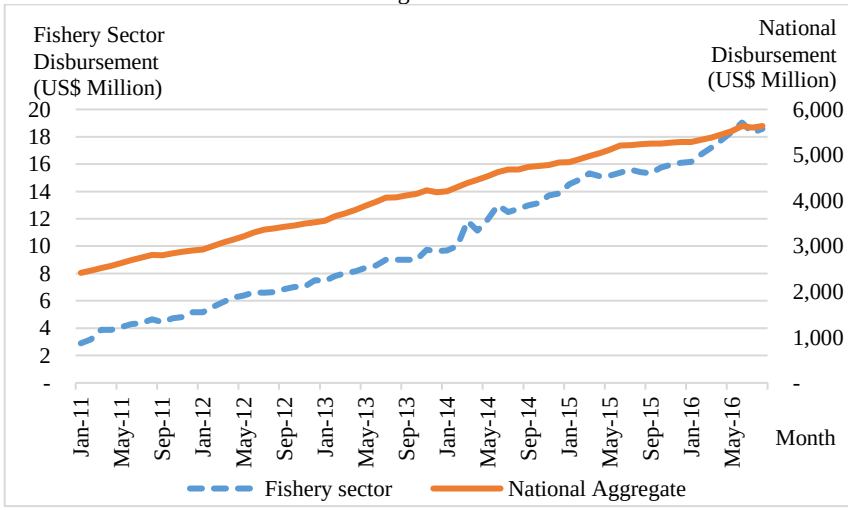
sector actors to formal credit services considering that rural banks are closer to them, both physically and culturally.

Figure 1: Commercial Banks' Credit Disbursement, January 2011 - August 2016 (Million US$)



Source: Financial Service Authority of Indonesia (2016)

Figure 2: Rural Banks' Credit Disbursement to the Fishery Sector, January 2011 - August 2016



Source: Financial Service Authority of Indonesia (2016)

Furthermore, regarding West Java, credit disbursement to the fishery sector in August 2016 was only US$ 34.5 million or 0.26% of the province's total credit disbursement with an NPL of 4.49%. At the same time, credit disbursement in East Java was US$ 53.4 million or 0.27% from total province credit disbursement with an NPL of 3.15%.

In relation to such extremely low credit disbursement to the fishery sector, the primary objective of this study is to empirically investigate factors influencing the probability of fishermen and other business actors in the fishery sector to obtain credit from banks. It also aims to identify the reasons behind the absence of bank credit to fishermen and related jobs. Studies conducted on this issue in Indonesia are limited. As such, this study will contribute to the literature on factors determining credit participation in Indonesia's fishery sector as well as provide additional perspectives on the issue.

The result of the study is expected to identify major causes of extremely low credit disbursement in the fishery sector as well as provide specific policy recommendations for decision-makers on how to provide better financial access, particularly bank credit, to fisherman and related jobs in Indonesia. It will also inform commercial and rural banks on how fishermen and related jobs could access their credit services easily. It will assist related communities understand their position toward their access to credit and how they could enhance their bankability. In the long term, specific policy recommendations provided in this study are expected to be beneficial for policy makers resulting in the improvement of credit disbursement in the fishery sector to support Indonesia's economic growth.

2. Literature Review

The financial services provided by financial institutions cannot be excluded from its role as an engine of economic growth. Schumpeter (1934) stated the importance of financial institutions in economic development, and scholars (Gurley & Shaw, 1962; King & Levine, 1993; Mishkin, 2007) specified that financial services, including bank credit, can boost the national economy through efficient resource allocation and capital accumulation that helps industry and business to expand.

In the last few years, effective and efficient financial institutions, have become the focus of policymakers, which includes the equality and depth of financial services outreach, also known as financial inclusion. Financial inclusion, according to the World Bank (2017) is when an individual and business unit has access to the products and services of financial institutions which are affordable and meet their needs. Those services are in the form of financial transactions, payments, credits, and insurances, which are distributed responsibly and sustainably.

To that extent, credit access and participation is a way to accumulate capital requirements to expand businesses and fuel economic growth. To be more specific, access and credit participation that are equally and equitably distributed is a key requirement that should be fulfilled to eradicate poverty and embody financial inclusion. Moreover, an entity, including a person, is said to participate in credit when that entity has decided to borrow money and obtained credit from a financial institution (Doan, Gibson, and Holmes 2010). Credit participation is different from access to credit, where an entity that has access to credit is defined as when an entity can obtain credit from financial institutions regardless of whether or not they want to borrow. Therefore, one who has access to credit (bankable) does not always participate in credit. Based on that definition, Diagne et al. (1999) concluded that credit participation is focussing more on demand-side regarding the choice of whether to borrow or not to borrow (demand for credit), whereas access to credit is focused on the supply side which is the preference of the money lenders.

Several studies have been conducted to identify factors determining access and participation to credit from financial institutions. The results are varied because, generally, they involve respondents from different sectors and characteristics. The majority of studies investigating determinants of credit participation originated from developing countries, mainly from the African continent. For instance, in Ghana, Sekyi (2017) analysed determinants of rural household credit access and loan amounts in Wa Municipality based on survey data of 120 rural households of which 44% had access to credit. He defined a household as having access to credit if in the last 12 months the household received credit. By applying the probit model and Ordinary Least Square Regression (OLS), he observed that the probability of rural households to access credit is significantly driven by gender, age, farming and trading occupations, credit history, and household income. Regarding gender, he concluded that female-headed households have a higher probability of accessing credit. Furthermore, Asante-Addo, Mockshell, Zeller, Siddig, and Egyir (2017) estimated factors influencing farm households' participation in credit programmes in Malawi. By applying probit regression, they found that more educated farmers and those who have larger farm size and become a member of organisations are more likely to get credit.

Moreover, Mpuga (2010) investigated determinants of access to credit in Uganda by analysing household data obtained from Uganda household surveys in 1992/93, and 1999/2000 conducted by the Uganda Bureau of Statistics (UBOS). By utilising logistic regression through probit, tobit, and multinomial logit, he found that age has a negative effect on credit participation, meaning that cohort with younger age has a higher probability in obtaining credit. He also found that more educated individuals have

greater potential to get credit. In addition, the study found that asset ownership is positively and significantly affects credit participation. Another significant indicator is job type, where each job type has a different probability of getting credit.

Furthermore, Mbiakop and Oyekale (2017) identified socio-economic factors influencing farmers' participation in village banks. The study is based on a survey conducted in Ngaka Modiri Molema District Municipality, South Africa. The survey involved 200 small farmers comprising 100 farmers who are members of village banks and 100 farmers who are not members of village banks as a control group. By implementing logit regression, the result showed that the level of education and land size positively affected the probability to participate in village banks, whereas farming experience decreases the probability of participating in village banks.

In South-East Asia, several studies investigated the determinants of credit participation or credit access. Nguyen (2007) applied probit and tobit regression on household data obtained from the Vietnam Living Standard Survey (VLSS) in 1992/1993 and 1997/1998 in order to identify factors driving credit participation. Contrary to the majority of studies, the study concluded that education is not significant in determining credit participation in Vietnam. Instead of education, she found that that the greater the number of family members and participants who work in the agriculture sector, the higher the probability of obtaining credit.

Fongthong and Suriya (2014) analysed household-level data obtained from the Thailand Socioeconomic Survey in 2009 to estimate determinants of household credit participation in the village and urban community fund. By implementing a logit model, they found that significant determinants of credit participation are age, gender, education, marital status, household size, rural dummy, asset ownership, difficulty in getting an emergency loan, and access to other credit sources. They also stated that for near-poor households, the most likely villagers becoming borrowers are farmers in rural areas with an income slightly above the poverty line. In the Philippines, Zapata (2006) investigated factors determining micro-entrepreneurs borrowing from informal lenders by using survey data of 108 micro-entrepreneurs in the Philippines. In doing so, he implemented the probit model and concluded that those who are less educated, married, and have larger household size are more likely to borrow from the informal lenders.

Regarding Indonesia, studies investigating determinant of credit participation, particularly in the fishery sector, are very limited. As such, this study will add to the literature on the determinants of credit participation in Indonesia, especially in the fishery sector. Tsukada et al. (2010) conducted a study in Gresik, Indonesia, by analysing 894 households obtained from a field survey. By utilising a mixed logit model, the study found that the level of income and household size have significant and positive effects on credit

participation. The study also pointed out that poorer households have a lower probability of obtaining formal credit and might not be able to access credit compared to richer households. The study also observed that households in self-employed businesses prefer to attain credit from formal institutions, but the access is often impeded for those who reside in rural areas because of high transaction costs.

Furthermore, Mulyasari (2015) surveyed 100 female respondents in Bengkulu, Indonesia, to analyse determinants of female participation in saving and borrowing activity using funds from a government programme fund called *PNPM Mandiri.* In order to achieve the goal, the study applied the ordinal scale and Spearmen's correlation rank method. The author concluded that age, number of family members, household income, and perception have a significant and positive effect in determining credit participation of borrow and lend female programme using fund from *PNPM Mandiri* programme.

Gitaharie et al. (2014) also analysed household data from the Indonesia Socio-Economic Survey 2008 and 2012, aiming to investigate factors affecting households' loan participation in Indonesia. The study applied a multinomial logit model over several demographic characteristics and socioeconomic variables including age, gender, education, marital status, business sector, distance, location, household size, poverty status, employment status, and several assets ownership. The study found that credit participation is affected by the demographic characteristic of respondents (age, sex, location, and level of education) and socio-economic factor (business sector, job status, and level of income).

To sum up, the majority of studies investigating determinants of credit participation are age, education, gender, marital status, household size, income, occupation, asset ownership value, distance to a nearest financial institution, and location. In terms of method, most of them applied a logistic model in the form of a probit, logit, tobit, or a combination of models.

Table 1: Summary of Previous Related Studies

Author	Sample	Method	Independent variables										Findings
			Ag	Ed	Gn	Ms	Hs	In	Oc	As	Ds	Rr	Other(s)	
Sekyi (2017)	The study surveyed 120 rural households which 44% of them had access to credit	Probit and Ordinary Least Square (OLS) regression	v	v	v	v	v	v	v	v	v	-	Religion and credit history	Rural households' access to credit is significantly influenced by gender, age, farming and trading occupations, credit history, and household income.
Assante-Addo et al. (2017)	Data collection was based on a multi-stage random sampling survey of 22 districts in Ghana	Probit	v	v	v	-	v	v	-	v	v	-	Membership in association and leverage ratio	Farm households' participation in credit programme is significantly influenced by household head gender, formal education level, farm size, and membership in associations.
Mpuga (2010)	The study utilised Uganda household surveys in 1992/93, and 1999/2000 conducted by the Uganda Bureau of Statistics (UBOS)	Probit, tobit, and multinomial logit	v	v	v	v	v	-	v	v	v	v	Dwelling characteristics	Demand for credit is significantly affected by location, age, occupation, education level, other dwelling characteristics, and household assets.
Mbiakop and Oyekale (2017)	The study is based on a survey conducted in Ngaka Modiri Molema District Municipality, South Africa, South Africa involving 200 small farmers	Logit	v	v	v	v	v	v	v	v	v	-	Diversification of enterprise hired labour, and experience	The probability of farmers participated in village banks are affected by gender, education, and experience.
Nguyen (2007)	The study utilises household data obtained from the Vietnam Living Standard Survey (VLSS) in 1992/1993 and 1997/1998	Probit and tobit	v	v	v	-	-	-	v	v	v	-	-	Factors affecting credit participation are age, household size, agricultural work dummy, and land size.

Table 1: (Continue)

Author	Sample	Method	Independent variables										Findings
			Ag	Ed	Gn	Ms	Hs	In	Oc	As	Ds	Rr	Other(s)	
Nguyen (2007)	The study utilises household data obtained from the Vietnam Living Standard Survey (VLSS) in 1992/1993 and 1997/1998	Probit and tobit	v	v	v	-	-	-	v	v	v	-	-	Factors affecting credit participation are age, household size, agricultural work dummy, and land size.
Fongthong and Suriya (2014)	The study is based on household-level data obtained from Thailand Socioeconomic Survey in 2009	Logit	v	v	v	v	v	v	v	v	-	v	Difficulty in getting an emergency loan, and access to other credit sources dummy	Probability of households' participating in the village and community fund is significantly driven by age, gender, education, marital status, household size, rural dummy, asset ownership, difficulty in getting an emergency loan, and access to other credit sources.
Zapata (2006)	The study surveyed 108 micro-entrepreneurs in the Philippines	Probit	v	v	v	v	v	v	-	-	-	-	Civil status	The probability of borrowing from informal lenders are higher for those who are married, less educated and have larger household size.
Tsukada et al. (2010)	Data source obtained from field survey consisted of 894 households in Gresik, East Java, Indonesia	Logit	v	-	-	-	-	v	v	-	-	v	-	Credit participation is strongly driven by income per capita, income per capita (squared), and household size.

Table 1: (Continue)

Author	Sample	Method	Independent variables											Findings
			Ag	**Ed**	**Gn**	**Ms**	**Hs**	**In**	**Oc**	**As**	**Ds**	**Rr**	**Other(s)**	
Mulyasari (2015)	Data was collected through a field survey covering 53 female respondents in Bengkulu, Indonesia	Ordinal scale and Spearmen's correlation rank	v	v	-	-	v	v	-	-	v	-	Working experience and perception toward saving and credit	Factors driving saving and credit participation are age, education, working experience, and a number of dependent families.
Gitaharie et al. (2014)	The study utilised household data from Indonesia Socio-Economic Survey 2008 and 2012	Multinomial logit	v	v	v	v	v	-	-	v	v	v	Poverty status	The probabilities for the household to attain credit is affected by the demographic characteristics (age, sex, marital status, location, education) and social-economic factors (employment sector, employment status, the status of poverty).

Note: Ag = Age, Ed = Education, Gn = Gender, Ms = Marital status, Hs = Household size, In = Income, Oc = Occupation, As = Asset ownership, Ds = Distance to nearest financial institution, and Rr = Rural area dummy

3. Data and Methodology

3.1 Research Location

This research was conducted in two Malang Regency of East Java Province and Cirebon Regency of West Java Province. Malang Regency is a regency in East Java Province inhabited by 2,544,315 people in 2015. Malang has an area of 2.977 km^2 with a coastline length of 102.5 km^2. Malang's ocean is part of the Java South Sea beach line. In 2015, the fishery sector contributed US$ 99.2 million or 1.9% of the total Gross Domestic Regional Product of Malang. Although the contribution of the fishery sector to Gross Domestic Regional Product is relatively low, however, its nominal value and contribution ratio is increasing.

During the period for 2007 to 2015, the contribution of the fishery sector has more than doubled from US$ 50.4 million in 2007 to US$ 99.2 million in 2015 (Malang Regency Statistics 2018). The main fish commodity in Malang Regency is tuna, which is also a competitive export commodity. The centre of tuna production in Malang is located in the Sendang Biru sub-district, which is also the research location.

Furthermore, Cirebon Regency is a regency in West Java which is part of the North Beach Line of Java. It is home to 2,309,807 people in 2015, covering an area of 990 km^2. The Cirebon Regency has a coastline of 54 km^2 with the main commodity of the fishery sector being aquaculture products such as shrimp and milkfish. In 2015, the production of sea fishing activity reached 27,545.6 tonnes, whereas fish production from aquaculture reached 21,220.99 tonnes (Cirebon Regency Statistics, 2018).

3.2 Data Collection

The population of this study are individuals in Malang Regency and Cirebon Regency working in the fishery sector including fisherman (using own boat), boat crew, boat owner, aquaculture farmer, fish product processor, fish retailer, and other fishery sector-related jobs. The sample was selected from individuals who have and have not obtained credit fromthe bank, whose works are related to the fishery sector and reside in a fishing village. In Malang Regency, we choose Sendang Biru district as it is the largest tuna producer and exporter in East Java Province, whereas in Cirebon Regency we choose the Gebang district as it is a fisherman concentrated village.

Purposeful stratified sampling is used as the data collection technique to get a balanced variation of job type. The sample is divided into credit participant and non-credit participant. Credit participants are those who have obtained, at least once, credit from banks, and non-credit participants are those who have never obtained any credit from banks. For credit participant

respondents, for effectiveness reasons, we looked for bank debtors based on references from bank account officers. Meanwhile, for the non-credit participant, to find the respondents, we visited places that are concentrated with people who work in the fishery sector such as in the fish market and beaches.

3.3 Instrument and Measurement

Two sets of questionnaires were prepared in Bahasa Indonesia to collect data. One set was meant for credit participant, whereas the other set is for the non-credit participant. Besides questions regarding respondent characteristics that are asked in both questionnaires, the first questionnaire also contains questions about credit and repayment history, perception on loan term and interest rate, credit impact on their businesses, and issues related to credit. Moreover, additional questions for non-credit participant's questionnaire concern the reasons behind the fact that they have never obtained credit, credit application history, source of alternative fund, and their suggestion for banks. Those additional questions are used to elaborate on and justify empirical findings. Also, a pre-field data collection as a pilot study was conducted in a fishing village in Cilincing, Jakarta, in order to evaluate the questionnaire design and ensure the questions are feasible before it was distributed to Malang Regency and Cirebon Regency. The pre-field collection involved 20 respondents whose jobs are related to the fishery sector.

Regarding the variable measurement, this study adopts items sourced from previous studies that select respondent credit status as dependent variable (Nguyen 2007; Kangogo, Lagat, and Ithinji 2013; Doan, Gibson, and Holmes 2010; Asante-Addo et al. 2017; Diagne and others 1999; Shah et al. 2008). In addition, the independent variable used in the study as factors influencing credit participation are synthesised from studies summarised in Table 1 and include ex, age, education, marital status, occupation, income, working experience, and household size (Gitaharie et al. 2014; Mpuga 2010; Tsukada, Higashikata, and Takahashi 2010; Mulyasari 2015; Nguyen 2007; Asante-Addo et al. 2017; Mbiakop and Oyekale 2017; Sekyi 2017; Fongthong and Suriya 2014; Zapata 2006). Furthermore, instead of using only income which was used by previous studies as a proxy of repayment capability, this study will measure it using the ratio of income over expenses as most banks use this ratio as a proxy for repayment capability.

3.4 Research Model and Technique of Analysis

Considering that the study aims to determine factors affecting credit participation, the dependent variable will be in the form of binary data having

a value of "1" if the respondent has obtained credit from banks, and "0" if the respondent has never secured credit from banks. For that reason, an appropriate econometric methodology is logistics regression using logit as Hosmer et al. (1989) inferred that logit regression has an advantage in terms of its flexibility, is meaningful and easier to interpret. Logit regression was also used by several other studies that investigated the determinants of credit participation (Mpuga 2010; Tsukada, Higashikata, and Takahashi 2010; Gitaharie et al. 2014; Mbiakop and Oyekale 2017; Fongthong and Suriya 2014). The model specification is as follows:

$$CreditParticipation_i = \beta_0 + \beta_1 Sex_i + \beta_2 Age_i + \beta_3 MaritalStatus_i + \beta_4 EducationLevel_i + \beta_5 RIoE_i + \beta_6 JobType_i + \beta_7 YearsofDoingBusiness_i + \beta_8 NumberofFamilyDependent_i + \mu_i \quad (1)$$

The description of each variable used in the model is presented in Table 2.

Table 2: Variable Description and Measurements

Variable	Data Type	Description
Credit participation	Binary (Dummy)	1 = Respondent **has ever** received, at least once, credit from bank 0 = Respondent **has never** obtained any credit from bank
Sex	Binary (Dummy)	1 = Male 0 = Female
Age	Categorical	Consists of four categories: 1 = Less than 30 years old 2 = 30-39 years old 3 = 40-49 years old 4 = More than 50 years old
Marital status	Categorical	Consists of three categories: 0 = Single 1 = Married 2 = Widowed/divorced
Education level	Categorical	The last education level, consist of five categories: 1 = Never been to school 2 = Elementary school 3 = Junior high school 4 = High school 5 = College
Ratio of Income over Expenses (RIoE)	Continues	A ratio of total income divided by total expenses, the larger the RIoE the higher the incomes over the expenses. The sample of interpretation is as follows: • RIoE = 1 indicates that total income is the same as total expenses;

Table 2: (Continue)

Variable	Data Type	Description
		• RIoE = 2 indicates that total income generated is twice larger compared to the total expenses
Job Type	Categorical	Type of jobs related to the fishery sector, consist of: 1 = Fisherman (using own boat) 2 = Fisherman (Boat crew or *anak buah kapal* or ABK) 3 = Boat owner or *Juragan* (does not go fishing by himself) 4 = Aquaculture farmer 5 = Fish product processor (shredded producer, shrimp chips producer, etc.) 6 = Fish retailer 7 = Others
Years of doing business	Continues	Age of doing business (in year)
Number of family dependent	Continues	Number of family members deducted by number of children who have already worked or married

3.5 Research Limitation

Salas-Eljatib, Fuentes-Ramirez, Gregoire, Altamirano, and Yaitul (2018) stated that it is better for analysis using logistics regression to have a more balanced sample as it reduces the variability of estimated parameters. In this case, it means that it is more favourable to have a more balanced sample between credit participants and non-credit participants. However, in this, the quantity sample of credit participants outnumbers the non-credit participants in which the sample comprises of 73% credit participants and 27% non-credit participants. Nevertheless, other studies concluded that it is not necessary to have a balanced sample in logistics regression; instead it is more important to have sample distribution that represents the population and captures rare events even if it means that the sample distribution is not well-balanced (Oommen, Baise, and Vogel 2011; King and Zeng 2012).

4. Results and Discussion

4.1 Descriptive Statistics

Total respondents involved in this study is 184 respondents comprising 134 respondents (credit participant) who have obtained credit from banks and 50 respondents who have never obtained credit from banks (non-credit participant). Sixty-six respondents obtained credit from commercial banks and 68 from rural banks. In terms of respondent origins, each city contributed

the same number of respondents, 92. While Malang comprises 60 credit participants and 32 non-credit participants, in Cirebon, there are 74 credit participants and 18 non-credit participants.

Regarding sex composition, 82% are male, and 18% female. Moreover, the majority of respondents are aged 40-49 years. In terms of marital status, 97% of credit participants and 88% of the non-credit participant are married, whereas the rest are single or widowed/divorced. As for the education level, the majority of respondents have low education. Most of them only graduated from elementary school. This also indicates that financial literacy in the fishery sector is low (Potrich, Vieira, and Kirch 2015; Lusardi and Mitchell 2011; Chen and Volpe 1998).

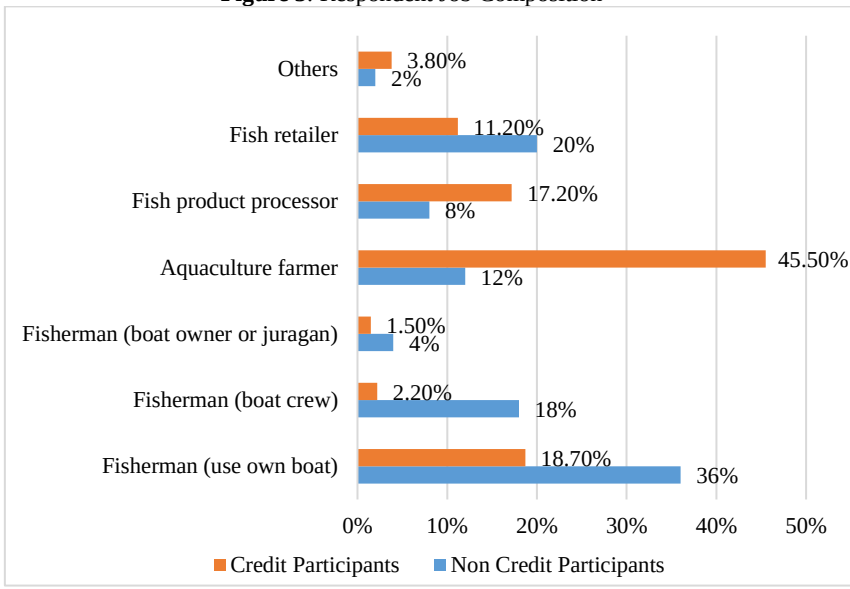
Table 3: Respondents' Demographic Profile

Description	Credit participant		Non-credit participant	
	Frequency	**Percent**	**Frequency**	**Percent**
Credit participation status	134	73%	50	27%
City origin				
Malang	60	65%	32	35%
Cirebon	74	80%	18	20%
Bank				
Commercial bank	66	49%	-	-
Rural bank	68	51%	-	-
Sex				
Female	25	19%	9	18%
Male	109	81%	41	82%
Age				
< 30 y.o.	13	10%	8	16%
30 - 39 y.o	39	29%	15	30%
40-49 y.o.	46	34%	21	42%
>= 50 y.o.	36	27%	6	12%
Marital status				
Married	3	2%	5	10%
Single	130	97%	44	88%
Widowed/divorced	1	1%	1	2%
Education				
Never been to school	7	5%	4	8%
Elementary school	65	49%	23	46%
Junior high school	22	16%	10	20%
Senior high school	29	22%	11	22%
College	11	8%	2	4%

Moreover, regarding job type, as can be seen from Figure 3, the majority of credit participant respondents are working as aquaculture farmers (45.5%) followed by fishermen who use their boats (18.7%), fish product processor (17.2%), fish retailer (11.2%), other type of jobs (3.8%), boat crew (2.2%), and boat owners who do not go fishing by themselves (1.5%). Meanwhile, job type composition of non-credit participant comprises fishermen who use

their boat (36%), followed by fish retailer (20%), boat crew (18%), aquaculture farmer (12%), fish product processor (8%), *juragan* (4%), and other types of jobs (2%).

Figure 3: Respondent Job Composition



Source: Author's calculation based on survey data

4.2 Empirical Results

Table 4 shows that variables that significantly affect credit participation in the fishery sector are RIoE, job type, years of doing business, and number of family dependents. Interestingly, unlike the majority of other studies that concluded that education level is significant (Mbiakop and Oyekale 2017; Asante-Addo et al. 2017; Gitaharie et al. 2014; Mulyasari 2015; Fongthong and Suriya 2014; Zapata 2006), in this study, the level of education is not a significant determinant of credit participation. The finding is reasonable considering that fishermen in Indonesia have low education regardless of their social status (income). As can be seen from Table 3, more than 50% of respondents have never been to school, or their last education is elementary school (both credit participants and non-credit participant).

Regarding the significance of RIoE, where the value of RIoE indicates repayment capability level (bankability level) of a participant, the higher the RIoE, the more money he/she can save to pay for credit instalment. It also meanes that the higher the RIoE, the more bankable the participant. The significance of RIoE is also supported by the data showing that the average

value of RIoE of credit participant is 4.87, whereas average RIoE of the non-credit participant is half that with 2.08. The RIoE value of 4.87 means that a participant is able to generate income 4.87 times larger than his/her expenses so that he/she has more money that can be used to repay credit instalment and save.

Table 4: Result of Logit Regression

Independent Variables	Logit Coefficient	Marginal Effect
Sex	0.519	0.080
	(0.528)	(0.087)
	-0.107	-0.165
Age	(0.228)	(0.035)
	0.851	0.131
Marital Status	(0.861)	(0.131)
	0.309	0.048
Education Level	(0.214)	(0.032)
RIoE	0.155*	0.024
	(0.085)	(0.013)
Job Type	0.416***	0.064
	(0.122)	(0.165)
Years of Doing Business	0.067***	0.103
	(0.024)	(0.025)
Number of Family Dependent	0.476***	0.073
	(0.177)	(0.003)
Constant	-5.471**	
	(2.171)	
Prob > chi^2= 0.000		
LR $chi^2(8)$ = 42.38		
Pseudo R^2 = 0.2087		
Standard errors are written in parentheses, *** p<0.01, ** p<0.05, * p<0.1		

In order to interpret the impact of RIoE on credit participation, marginal effect coefficient is used. A marginal effect value of 0.024 indicates that every one-point increase of RIoE is expected to increase the probability of getting credit from the bank by 2.4%. In terms of years of doing business, this variable is significant with a marginal effect value of 0.103. The positive value of years of doing business infers that the longer a participant does business, the larger her/his probability in obtaining credit. That is because an older business is relatively better established with more knowledge, experience, and financial capability (Swain 2001). Empirically speaking, data from the survey shows that age of doing business is positively correlated with income level (correlation = 0.098) and total asset ownership (correlation = 0.091).

Another significant variable is the number of family dependents. This variable has a positive coefficient with marginal effect value of 0.073 indicating that a larger number of family dependents has a larger probability of attaining credit from banks than one who has a smaller number of family

dependents. This finding is in line with other research results (Nguyen 2007; Ho 2004; Shah et al. 2008; Simtowe, Zeller, and Phiri 2006) based on the argument that a larger number of family dependents requires more money for necessities (child school, health, clothes, etc.). Whereas a smaller number of family dependents tend to have the lower motivation to get more money and expand the business.

Another significant variable is job type, which means that each job type has a different probability of obtaining credit from banks. This confirms the findings of Mpuga (2010), Nguyen (2007) and Sekyi (2017). Considering that job type is a categorical variable, STATA logistic command is used to get more meaningful interpretation and obtain information about the different probability of credit participation among job types.

As can be seen in Table 5, aquaculture farmers have the highest probability of obtaining credit compared to the other five job types in the fishery sector. Aquaculture farmers have an odds value of 18.3 inferring that the probability of them obtaining credit from banks is 18.3 times higher than the probability of them not obtaining credit. On top of the odds value, the level of probability to get credit is also seen from the odds ratio value used to capture different probability levels among job types in the fishery sector. The value of the odds ratio is compared to the boat crew as the baseline in the model. For instance, the odds ratio value of aquaculture farmers is 72.66 meaning that the probability of aquaculture farmers getting credit from banks is 72.66 higher than the probability of boat crews which is used as a base value. Based on field observations, aquaculture farmers have more viable collateral than fishermen. At least, they own the land of their fishpond while boat crews have limited collateral capacity and a higher risk of failure. Moreover, aquaculture farmers have a more certain business cycle than fishermen.

Table 5: Coefficient of Odds and Odds Ratio

Job Type	Odds	Odds ratio
Fisherman (boat crew)	0.296	Base value
Fisherman (using own boat)	2.667	3.655
		(3.256)
Boat owner (does not go fishing by himself)	2.031	11.790
		(18.490)
Aquaculture farmer	18.311	72.660
		(71.45)
Fish product processor	5.798	19.990
		(19.660)
Fish retailer	1.662	7.920
		(7.483)
Prob > chi^2= 0.000		
LR $chi^2(8)$ = 67.01		
Pseudo R^2 = 0.3356		
Standard errors are written in parentheses, *** p<0.01, ** p<0.05, * p<0.1		

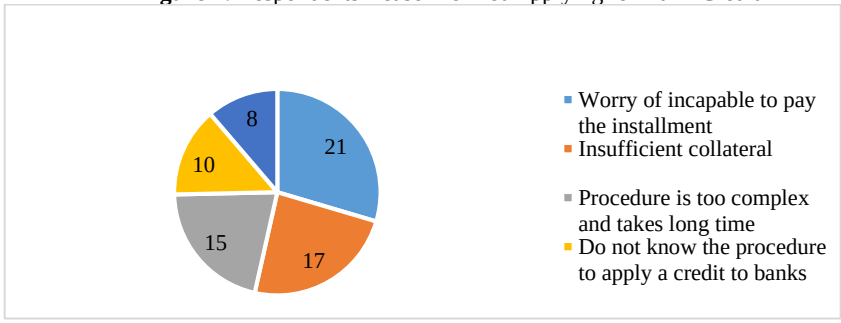
Note: Job type of "Others" is automatically deleted from observation for the reason that the observation value of "Others" are all participated in credit so that there is no variation value of the dependent variable. Therefore, STATA automatically excludes six rows of observation with the value of job type classified as "Others".

The same condition also applies to other fishermen (both who go fishing on their own or own the boat) as they have a smaller probability compared to aquaculture farmers and fish retailers. This is because, according to the statement of fishermen obtained from in-depth interviews, if they have more money as a result of a big catch, they tend to buy more boat equipment instead of buying fixed assets such as land, properties, or automobiles which are more viable as bank collateral. Proof of boat ownership cannot currently be used as bank collateral even though some government regulations allow proof of boot ownership to be used as bank collateral. The banks' reason for that is it will violate their prudence principle considering that ownership transfer of boats, the security of the boat, and control to the boat is not well developed.

Also, there is a significant gap of collateral capacity between the participant of bank credit and non-participant of bank credit. The average value of asset ownership of credit participant is US$ 30,388, which is almost twice the average value of asset ownership of non-credit participant, which is US$ 16,079. This gap indicates that from the collateral capacity aspect, the credit participant is more bankable than a non-credit participant.

Based on the data processed from the survey results, respondents who have never obtained credit from banks did so not because they got rejected by the bank, but because they have never applied for credit (92% of non-credit participant respondent). This is due to concerns about their capacity to pay the instalment (chosen by 21 respondents), insufficient collateral (17), procedure is too complex and takes a long time, (15) do not know the procedure to apply for credit (10), and do not need additional funds from banks (8).

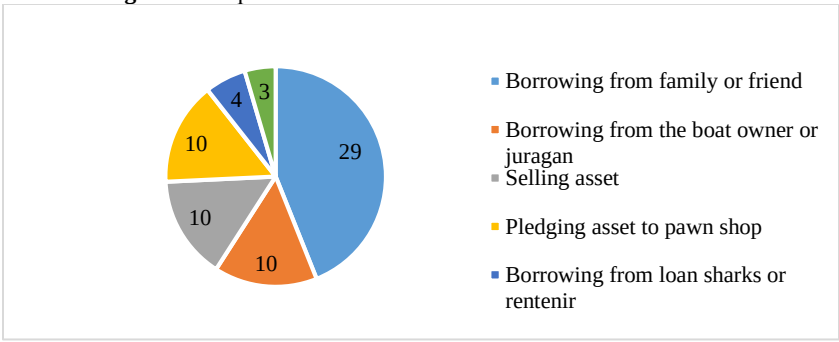
Figure 4: Respondents Reason for not Applying for Bank Credit



Source: Author's calculation based on survey data

In terms of source of alternative funds other than banks, the majority of non-credit participant respondents rely on borrowing from family or friends (29 person), borrowing from the boat owner (10), selling assets (10), pledging assets to the pawn shop (10), borrowing from loan sharks, and borrowing from cooperatives.

Figure 5: Respondent's Alternative Source of Funds Other Than Banks



Source: Author's calculation based on survey data

Besides credit, in terms of savings, the condition of non-credit participant credit to support saving is not favourable. Almost half of them (44%) do not have a bank account. This is also correlated with low financial literacy and low RIoE of non-credit participant respondents. It is also related to the financial culture of fishermen who treat saving as a non-important activity in the case of an emergency, which requires additional funds.

4.3 Results Validity

To determine that the model and the empirical results meet internal and external validity of this study, we evaluate the results using the pseudo R^2 and by comparing the tobit regression result with the logit regression result. For the first method, both models presented in Table 4 (pseudo $R^2 = 0.21$) and Table 5 (pseudo $R^2 = 0.34$) meet the standard of internal and external validity. Louviere et al. (2000) stated that a good logistic regression model has a pseudo R^2 in a range of 0.2 to 0.4.

Furthermore, by running a tobit regression on the same equation as the logit model (equation 1), the result of the tobit estimation is similar to logit estimation. The tobit estimation also shows that there are four significant variables with a positive effect on determining credit participation which are (RIoE), job type, years of doing business, and number of family dependents. Therefore, it can be concluded that the model and the estimation results meet the standard of internal and external validity.

Table 6: Result of logit regression

Independent Variables	Logit Coefficient	Tobit Coefficient
Sex	0.519	0.089
	(0.528)	(0.117)
	-0.107	-0.033
Age	(0.228)	(0.505)
	0.851	0.208
Marital Status	(0.861)	(0.205)
	0.309	0.069
Education Level	(0.214)	(0.044)
RIoE	0.155*	0.006**
	(0.085)	(0.003)
Job Type	0.416***	0.089***
	(0.122)	(0.025)
Years of Doing Business	0.067***	0.017***
	(0.024)	(0.005)
Number of Family Dependent	0.476***	0.079
	(0.177)	(0.030)
Constant	-5.471**	-0.744
	(2.171)	

Standard errors are written in parentheses, *** p<0.01, ** p<0.05, * p<0.1

5. Conclusion and Policy Recommendations

Based on the empirical results, it can be concluded that factors affecting credit participation the are ratio of income over expenses (RIoE), years of doing business, job type, and number of family dependents. Regarding job type, fishermen particularly boat crews have the lowest probability compared to other jobs in obtaining credit from banks. This is because fishing is higher risk compared to other sectors and other job types, with low repayment capability as indicates by the low value of RIoE, and low financial literacy.

Furthermore, financial services in the fishing sector are not as inclusive as the probability of business actors in the fishery sector to obtain credit from banks is low. From the demand side, such non-inclusive circumstance is shown by the large number of respondents who discourage credit application and a large number of respondents who do not have bank accounts. This indicates that the outreach of financial services to the fishery sector still has problems and is not equally distributed. From the supply side, banks do not see the fishery sector as a favourable sector to fund and have not fully implemented government regulations to support the sector as they do not allow proof of boat ownership to be as used as collateral even though it is stated in several regulations that they should accept it as a collateral.

Based on the above findings, we offer several recommendations that can be implemented by the government to improve credit disbursement in the fishery sector. First, considering the major reason that respondents have never obtained credit from banks is because they have never applied for it in

addition to the low ownership of bank accounts, the government needs an intensive and tailored financial literacy improvement programme related to accessing financial services such as credit and saving (about the importance of having emergency funds to tackle hard situations such as in rainy or windy seasons).

Second, regarding the result showing that fishermen have a lower probability of obtaining credit from banks compared to other job types in the fishery sector, one reason is their low collateral capacity. For fishermen, their main assets are their boats. Therefore, a boat is supposed to be able to be used as collateral. However, according to the statement of fishermen who own boat(s), not every boat has a proof document of ownership. They also stated that having proof of ownership is a major hurdle which takes a long and complex process.

The government has issued several regulations allowing the proof of boat ownership to be used as collateral which are: (1) Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number 26/PERMEN-KP/2013 about Capture Fisheries in the State Fishery Management Areas of the Republic of Indonesia, (2) Government Regulation No. 51/2002 concerning Vessels, and (3) the Republic of Indonesia Law No. 45 Year 2009 regarding fisheries. However, even though those regulations allow proof of boat ownership to be used as collateral, the majority of banks do not accept it as collateral because they said it is not safe enough to be collateral.

For instance, there is no guarantee that the boat cannot be sold to others without the proof of ownership, while banks hold the proof of ownership as collateral. It is unlike the proof of motorised vehicle ownership, which is taken as collateral as a person cannot sell his or her automotive without ownership documents. It is also hard for banks to monitor the boats and mitigate the risk of boats when they are sailing in the ocean. Unlike automobiles that must have third party insurance, currently, there is no scheme involving third party insurance of boats in case of there is *force majeure* condition.

Therefore, it is better for the government and relevant authorities to improve information systems regarding boats in Indonesia particularly in order to make proof of boat ownership as credit for collateral such as: (1) Accelerating the process of boat data collection and issuance of boat ownership proof as robust legal documentation, (2) Creating a system of boat ownership which meet the banks' prudence principle value similar to the system of motorised vehicle ownership, (3) Implementing a guarantee scheme for boats involving insurance companies as the third party, and (4) Strengthening the control and monitor by the Indonesia Financial Service Authority (OJK) and Bank Indonesia of banks to ensure that banks comply with regulations allowing proof of boat ownership as collateral.

For boat crews with low income and insufficient assets, the government should provide special credit programmes for them with flexible collateral requirement and subsidised interest rate. If the government does not loosen up requirements, it will be very difficult for them to access bank credit, making it hard to be financially inclusive.

Finally, considering that the growth rate of credit disbursement of rural banks in the fishery sector is better than commercial banks. It should be better for governments to optimise the role of rural banks related to certain credit programmes from the government such as the People Credit Programme or *Kredit Usaha Rakyat* and *Jaring* programme which is meant to improve financial access in the fishery sector, considering rural banks have the advantage which is close to business actors in the fishery sector (both physically and psychologically) compared to commercial banks. All in all, if the government is able to improve access and participation to credit in the fishery sector, it may be possible for this sector to become one of the main sources of economic growth in Indonesia.

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