Asian Development Policy Review
ISSN(e): 2313-8343
ISSN(p): 2518-2544
DOI: 10.18488/journal.107.2019.71.23.30
Vol. 7, No. 1, 23-30

URL: www.aessweb.com

BANK LOAN, INFLATION, AND FARMERS WELFARE: DATA ANALYSIS BY PROVINCE IN INDONESIA

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Article History
Received: 16 October 2018
Revised: 23 November 2018
Accepted: 31 December 2018
Published: 21 January 2019

Keywords
Bank loan
Farmers' welfare
Inflation
Productivity
Rural
Agriculture

JEL:
Q14.

ABSTRACT

The effects of bank loans and access to formal financial institutions on rural economic growth and farmers' welfare in all provinces in Indonesia have not been previously comprehensively documented with accurate, scientific methodology. This study examines the relationship of bank loans to the Farmers' Terms of Trade and also provides a comprehensive analysis on some control variables such as inflation and agricultural sector productivity. The results show that bank loans do not significantly affect the welfare of farmers. Inflation and farmers' welfare have an inverted U shape pattern and relationship which indicates that while low inflation rates are positively related to farmer's welfare; higher inflation rates will drastically decrease the level of welfare. The productivity of the agricultural sector affects the welfare of farmers but must be carefully interpreted in the context of the Indonesian economy's condition which is currently undergoing an economic transformation

Contribution/ Originality: This study is one of the very few studies which have investigated the linkage of farmers' access to formal financial institutions; inflation; productivity; and, the Farmers' Terms of Trade taking into consideration the differences in economic conditions between provinces in Indonesia. The paper's primary contribution finds that the inflation rate to farmers' welfare relationship has an inverted U shape.

1. INTRODUCTION

The literature on agricultural economics broadly acknowledges the significant impact of limited financing access on agribusiness and the welfare of farmers (Briggeman *et al.*, 2009; Birthal *et al.*, 2017). Limited financial access makes rural agribusiness activities still operate in mostly subsistence modes, merely meeting minimum living needs, low profitability, and on small production scales (Mishra *et al.*, 2008; Braun *et al.*, 2018). On the other hand, financial institutions are still avoiding lending to the agricultural sector due to the high risk nature of agricultural business and the insufficient capacity of agribusiness entities in managing a business and its financial risks (Cornaggia, 2013). Although the impact of agricultural finance is recognized as a crucial factor of businesses in rural areas, empirical scientific research documenting it in the Indonesian context is still rare and difficult to obtain.

Several previous studies have shown a strong relationship between the development of the financial industry, particularly the development of the banking industry, and rural economic growth. Beck *et al.* (2010); Briggeman *et*

al. (2009) and Mishra *et al.* (2008) who specifically studied US data, show that financial institutions play a significant role in encouraging economic growth in rural areas. Financial institutions drive higher economic growth in rural areas, more efficient capital allocation among the economic sector, and more equitable distribution of wealth. Fowowe (2017) proves that banking access improves the average performance of small farmers in Africa. Bidisha *et al.* (2018) with Bangladeshi data, found that attempts to obtain banking credit have boosted the efficiency of farmers' production in rural areas.

There are several theories which explain the relationship between the financial sector and the agricultural sector as described by Ang (2008). The financial structuralist theory states that the development of a financial system is crucial in promoting the economic growth and welfare of farmers in rural areas. The development of the real sector, including the agricultural sector, begins with the development of more evenly distributed financial institutions so that rural residents can access various types of financial products and services which encourage greater welfare effects from the saving-investment process (Herwartz and Walle, 2014).

The Keynesian proposes the financial repression theory that emphasizes monetary policy, such as low-interest rates, statutory reserve requirements, and credit programs aimed at specific banking segments, as the primary economic tool to push increased growth of a rural economy. Keynesian theorists believe that all these monetary policies will automatically create more investment and production in the rural agricultural sector.

Neo-structuralists differ in opinion with this Keynesian view. Neo-structuralists base their arguments on the typical characteristics of agricultural sector, especially in developing countries, such as the so-called 'efficiency curb' faced by most farmers who have low production efficiency due to limited land, weak business skills, and nonstandard financial management. This limitation makes most farmers classified as an unbankable segment and means that they must finance their business out of their own funds or an informal financial institution (Madestam, 2014). This seems to be the case in Indonesia where bank loans to the agriculture sector was less than 1% (see Table 1).

Table-1. Farming finance sources in Indonesia

Financing Source	Paddy Farmer Household	Percentage (%)	Horticultural Farmer Household	Percentage (%)
Owner's Equity	13.104.575	95.17	10.346.070	89.68
Bank Loan	111.404	0.81	25.576	0.24
Non Bank Loan	165.992	1.21	112.38	1.04
Others	388.129	2.82	974.282	9.04

Source: Bappenas (2014)

The impact of bank loan allocations on the agriculture sector and farmers' welfare is often strongly influenced by the level of non-performing loans in each region. Bad loans reflect the failure of bank-financed business and bank loan effectiveness in increasing the purchasing power of rural farmers.

Farmers's Term Trade, which is calculated based on the ratio of the farmers' buying price to the farmers' selling price, is greatly influenced by inflationary movements in rural areas. The relationship between inflation rates and the Farmers' Term of Trade should have an inverted U shape that indicates a change in the relationship when inflation is relatively low compared to when inflation is high. Low and controlled inflation is a reflection of reasonable economic growth, with aggregate prices increasing due to demand growth and farmers' increased purchasing power. But after a certain point, a high inflation rate erodes welfare and purchasing power. Modern manufactured goods and services consumed by farmers have a high price elasticity and are so inflationary sensitive that the purchasing power of farmers decreases drastically (Lowder *et al.*, 2016).

The impact of inflation on the purchasing power of farmers can be reduced if the productivity of farmers increases so that the farmer's total income can increase and stabilize their purchasing power (Dorfleitner *et al.*, 2017). Farmer productivity is measured using the ratio of agricultural sector GDP to the amount of labor in the

agricultural sector (Bappenas, 2014). The stability of purchasing power is highly dependent on the geographical position which affects access to the logistics of transporting agricultural products to consumers. The agricultural product type also greatly affects the stability of these purchasing power because some agricultural products can be stored for a relatively long time before consumption, but some products must be consumed immediately so transportation and logistics become crucial factors. Without adequate logistical and marketing support, farmers' productivity does not have a significant impact on welfare.

This study examines the relationship between bank loan allocations in the agricultural sector and farmers' welfare level as measured by the Farmers' Terms of Trade using panel data from all Indonesian provinces from 2008 to 2014. To get a robust empirical test result on the relationship of bank loans and farmers' welfare several control variables were also included in the model, such as the banks' non-performing loans (NPL), the inflation rate per province, and the productivity level of the agricultural sector.

2. METHOD

Farmers' Terms of Trade (FTT) is the ratio between the farmer's selling price (HT) and farmer's buying price (HB) and is measured in the index form:

$$FTT = \frac{IHT}{IHB} \quad (1)$$

where: FTT = Farmers' Term of Trade Index, IHT= Farmers' Revenue Price Index, and IHB=Farmers' Purchasing Price Index.

The index in the above equation is the weighted value of the price in a given year compared to the price in a base year using the Laspeyres Index (Badan Pusat Statistik, 2013):

$$I = \frac{\sum Q_0 * P_i}{\sum Q_0 * P_0} \quad (2)$$

where: I = Laspeyres Index, Q_0= Quantity in a given base year (year 0), P_0= Price in the base year (year 0), and P_i=Price in the year i.

If NTP> 100, the farmer gets a surplus. The price of the products produced by the farmer increases more than the total price of all products that they consume, or in other words, the income of the farmer is higher than their expenditure. Thus the farmer's welfare level is better compared to their welfare level in the previous period. Conversely, if NTP <100, it means farmers will have a deficit and that their welfare level decreases.

The research used the monthly Farmer's Term of Trade Index and the Inflation and Productivity Index of the agriculture sector data reported by BPS for all 33 Indonesian over seven years from January 2008 to December 2014. The monthly data of the bank loan disbursements and the number of non performing loans (NPL) were obtained from Bank Indonesia.

To empirically test the relationship between bank loans and the welfare of rural farmers, this study employed the following empirical model:

$$FTTI_{it} = \beta_0 + \beta_1 Loan_{it-1} + \beta_2 NPL_{it} + \beta_3 Inflation_{it} + \beta_4 (Inflation_{it})^2 + \beta_5 Productivity_{it} + \alpha_i + \varepsilon_{it} \quad (3)$$

where, FTTI is the Farmer's Terms of Trade Index, i indicates the province, t is the monthly data per province, credit is the amount of bank credit channeled to the agricultural sector, NPL is the number of non-performing loans

to the agricultural sector in each province, inflation is the monthly inflation rate per province, productivity is the agricultural sector productivity that is ratio between the GDP of the agriculture sector and the amount of labour or manpower in the agricultural sector, α_i is a fixed effect constant for each province, and ε_{it} is the error term.

The relationship between the inflation rate and the FTTI should be in the form of an inverted U-shape which can be tested by looking at the significance of the coefficient of the squared inflation variable (β_4). If $\beta_4 < 0$ then we may conclude that that there is an inverted U-shaped pattern between the inflation rate and the Farmer's Terms of Trade where low inflation rates lead to improved farmers' welfare level but excessive inflation rates push welfare levels down.

Model (1) is a fixed panel model which is used to eliminate the bias of other variables that have not been included in the model (the omitted variable bias). The variables are omitted because they are unobservable and are therefore not available. The fixed effect panel model is used to overcome the problem of correlating the explanatory variables present in the model with the omitted variables (Wooldridge, 2010).

3. RESULT AND DISCUSSION

In the case of Indonesia, based on the Central Bureau of Statistics (BPS) survey, a capital problem is still the main problem faced by horticultural farmers in developing their businesses (Table 2). The majority of plantation capital is still dependent on the owner's capital (89%), while paddy farming business is almost all dependent on the farmers' capital (95%). Banking credit for paddy and smallholder farming enterprises is less than 1% (Table 1).

Table-2. Key Issues Facing Plantation & Farming Households

Key Issue	Percentage (%)
Lack of capital	51.64
Lack of cultivation knowledge	14.44
Low quality of production	14.89
Others	19.03

Source: BPS (2013)

The problems faced by farmers in rural areas are the major obstacles for poverty alleviation programs in Indonesia where the majority of the poor reside in rural areas. The percentage of poor rural households varied greatly from 1980 to 2012, in contrast to the percentage of urban poor households which consistently declined over the same period (Table 3). The data indicates that the welfare of the rural population, which is dominated by farmers, did not increase in a consistent manner.

Table-3. Poverty Figures in Indonesia from 1980 - 2012

	1980	1990	2000	2012
Rural				
Number of poor people (millions)	32.8	17.8	26.4	18.48
Percentage of total rural population	28.4	14.3	22.38	15.12
Urban				
Number of poor people (millions)	9.5	9.4	12.3	10.65
Percentage of total rural pPopulation	29.0	16.8	14.6	8.78

Source: BPS (2013)

However, rural economic growth often does not reflect farmer welfare because the price elasticity of agricultural commodities is much lower than the price elasticity of the manufactured products and modern services that are consumed by farmers (Mellor and Malik, 2017). Additionally, the transformation of the Indonesian economy makes the role of the agricultural sector considered as less important compared to the modern

manufacture and service sectors which have become more dominant. The GDP growth rate and the agriculture labor sector growth are the lowest compared to other economic sectors although the productivity of agriculture sector is quite high (Table 4). Researchers therefore developed a more accurate measure of a farmer's welfare level, called the Farmers' Terms of Trade, which reflects the exchange rate of agricultural commodities produced by farmers on products purchased by farmers for consumption and the cost of production (Bappenas, 2014).

Table-4. Transformation of Indonesia's Economy

	Growth rate (%/year)		
Sector	GDP	Number of workers	Productivity
Agriculture, Forestry, Fisheries	3.41	0.04	3.37
Manufacture Industry	4.50	1.79	2.72
Building & Civil Works	6.99	4.75	2,24
Trading, Restaurant, & Hotel	6.15	2.70	3,45
Services	5.43	4.72	0,72
Total	5.28	1.93	3,35

Source: BPS (2013)

Based on the estimation result of Table 5's empirical model, we can conclude that the allocation of bank loans to the agricultural sector has no significant impact on farmer welfare. This result is different from results found by previous researchers such as Beck *et al.* (2010) and Mellor and Malik (2017) that indicate a significant positive relationship between loan allocation and rural economic growth and farmers' welfare. The main factor causing this result is that the agriculture sector in Indonesia still rarely uses banks as a source of capital (see Table 2Since Indonesian farmers largely use non-banking finance, non-performing loans (NPLs) distributed to the agricultural sector also have no significant effect on the welfare of farmers.

Table-5. Estimation Result of Empirical Model

Variable	Coefficient	t-statistics	Prob-value
Loan (t-1)	0,245	1,076	0,259
NPL	2,568	1,083	0,461
Inflation	1,728***	2,392	0,000
Inflation ^{2}	0.987**	3,765	0,035
Productivity	3,267*	3,036	0,055
R^2	0,857		

The role of informal finance as a source of financing for the agricultural sector is still dominant in rural areas. Access to the formal financial sector for those who are out of reach of the services of financial institutions remains a problem in Indonesia. According to the World Bank, the number of adult males in Indonesia who have a bank accounts is below 25%, much lower than in neighboring countries such as Malaysia, Thailand, Philippines and even India (World Bank, 2018). Cultural factors, educational levels, and government regulations are suspected to be the cause of the low interest of rural communities, especially farmers, in using the services of formal financial institutions (Madestam, 2014).

The inflationary relationship with farmer's welfare as measured by the Farmer's Term of Trade Index has a reversed U-shaped pattern due to the negative significance of the coefficient of the squared inflation variable (β_4). So we may conclude that the relationship of inflation rates and farmers' welfare will vary between high inflationary regimes and low ones. Increasing the inflation rate in a low inflationary regime is positively related to farmer's welfare because increasing the aggregate price indicates rural economic growth and an increase in farmers' purchasing power. On the other hand, in a high inflationary regime, increasing the inflation rate will push down the welfare of farmers because the farmers' purchasing power on modern manufacturing and service products will start declining. Modern manufacturing and service products generally have a high price elasticity and are sensitive to

inflation while agricultural products produced by farmers have a low-income elasticity so that when inflation rises rapidly, the price of agricultural products is relatively stable while modern manufacturing and service products experience substantial price increases.

The inverted U-shape relationship is also caused by the relatively low value-added agricultural product: the farmers sell the product as a raw material which means its price deteriorates when there is an oversupply. The dependence of farmers on informal financing is also a possible cause of the inverted U-shape relationship. Non-formal financing sources typically have limited financing capacity and are sensitive to inflationary conditions by setting very high borrowing rates at times of high inflation and high market interest rates which erode farmers' purchasing power.

The Farmers' Terms of Trade Index will be further depressed in the harvest period due to the abundance of supply of agricultural products in the market. These price fluctuations affects the farmers who produce agricultural products which cannot be stored for long periods of time such as vegetables and fruits and the farmers who lack access to warehousing and adequate logistics of transport (Fowowe, 2017).

The productivity of the agricultural sector also significantly affects the welfare of farmers. This finding is similar to the findings of other researchers such as Rehman *et al.* (2017). However, we should carefully analyze this significant relationship between farmers' productivity and the Farmers' Term of Trade Index considering that Indonesia's economy is in the process of transforming from a predominantly agricultural sector into a dominantly modern manufacturing industry sector and services (Bappenas, 2014). This transformation will naturally lead to the shift of labor from the rural agricultural sector to other rapidly growing economic sectors in urban areas. Farmer productivity as measured by the ratio of agricultural sector GDP to the labor force in the agricultural sector can lead to erroneous conclusions when the number of workers has decreased significantly while the GDP of the agricultural sector is stagnant or growing at a relatively low growth rate.

Table-6. Individual Effect per Province

No	Province	Coefficient	t-Stat	No	Province	Coefficient	t Stat
1	Nanggroe Aceh Darussalam	0,24	2,34	18	Nusa Tenggara Barat	1,92	2,94
2	Sumatera Utara	0,35	2,12	19	Nusa Tenggara Timur	0,23	3,11
3	Sumatera Barat	0,11	2,93	20	Kalimantan Barat	1,28	2,54
4	Riau	1,23	3,10	21	Kalimantan Tengah	0,35	2,51
5	Jambi	1,17	2,54	22	Kalimantan Selatan	1,03	2,95
6	Sumatera Selatan	1,04	2,51	23	Kalimantan Timur	0,85	3,12
7	Bengkulu	0,83	2,09	24	Sulawesi Utara	1,02	2,48
8	Lampung	1,94	2,94	25	Sulawesi Tengah	2,34	2,45
9	Kepulauan Bangka Belitung	0,14	3,11	26	Sulawesi Selatan	2,54	2,96
10	Kepulauan Riau	0,67	2,54	27	Sulawesi Tenggara	2,12	3,13
11	DKI Jakarta	0,09	1,01	28	Gorontalo	2,15	2,42
12	Jawa Barat	1,98	2,03	29	Sulawesi Barat	2,02	2,39
13	Jawa Tengah	1,99	2,95	30	Maluku	1,06	2,97
14	D I Yogyakarta	0,93	3,52	31	Maluku Utara	1,03	3,14
15	Jawa Timur	2,19	2,58	32	Papua Barat	0,02	1,02
16	Banten	2,01	2,51	33	Papua	0,45	1,33
17	Bali	0,08	1,02				

Some researchers doubt that the growth of the agricultural sector's GDP is caused by the use of more sophisticated and efficient technology and production processes or increasing the capacity and skills of the agricultural labor force but more due to the declining number of agricultural sector workers. Compared to the growth rate of GDP among economic sectors, the trade, restaurants, hotels sector grew the highest at 6.15 percent

per year in the period 2000-2012, the agricultural sector scored the lowest GDP growth rate, reaching only 3.41 percent per year. The construction sector has the highest employment growth rate of 4.75 percent per year, the agricultural sector has the lowest labor growth rate of 0.04 percent per year (BPS, 2013).

The constants in the model (α_i) are dummy variables showing the individual effects of each province in this research model and their statistical t test results can be seen in Table 6. From the observed 33 provinces, 28 provinces have significant positive α_i. Five provinces that have insignificant individual effect constants in the data panel model have undeveloped agricultural sectors such as Papua and West Papua or provinces dominated by services and modern industries such as DKI Jakarta.

4. CONCLUSION

The impacts of bank loan allocations in the agricultural sector do not significantly affect the Farmer's Terms of Trade Index. Relatively small bank loan allocations to the agricultural sector and limited usage of bank loans as a source of financing in rural areas is suspected to be the cause of this insignificant relationship between bank loans and the welfare of farmers.

Farmers' welfare is more influenced by macroeconomic conditions, i.e inflation rates. The inflation rate's relationship with farmer welfare is a quadratic functional form, resembling an inverted U-letter, i.e. at low inflation regime, rising inflation rates are positively related to a farmer's welfare level due to increased aggregate demand in rural areas and increasing farmers' purchasing power. However, an increase in inflation rates past a certain point will only suppress the Farmers' Terms of Trade Index because of the rise in prices of manufactured goods and modern services consumed by farmers.

The productivity of the agricultural sector is significantly related to the Farmers' Terms of Trade Index but needs to be studied further to determine to what extent the productivity of the agricultural sector is influenced by the transforming of the Indonesian economy from diminishing the role of the agricultural sector and shifting employment and the labor force into non-agriculture sectors.

All the results of the study imply that the government should focus on alleviating rural poverty by increasing the Farmers' Terms of Trade instead of stabilizing farm product market prices or only increasing subsidies without ensuring the effects of subsidies are targeted to poor rural farming households who are the largest portion living in poverty in Indonesia.

Macroeconomics stability, such as the inflation rate plays the most important role in increasing farmer welfare. To energize the agricultural and fishery sector, the government should drive more loan allocations and access to formal financing sources to agribusiness by providing incentives and policies that ensure that financial inclusions in rural farming areas are an achievable target.

Funding: This study received no specific financial support.
Competing Interests: The author declares that there are no conflicts of interests regarding the publication of this paper.

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