Jurnal Perencanaan Pembangunan:
The Indonesian Journal of Development Planning
Volume VII No. 1 - April 2023/Page: 1 - 24
https://doi.org/10.36574/jpp.v7i1.308
Article

Financial Inclusion and Local Tax Revenue in Indonesia

Mifta Muzdalifah[1] and Riatu Mariatul Qibthiyyah[2]

Corresponding author. Email: ummukiya.ita@gmail.com

Submitted: 2022-06-16| Accepted: 2023-04-28 | Published: 30th April 2023

Abstract

This study calculates the financial inclusion index, which includes three dimensions: 1) banking penetration, 2) availability of financial services, and 3) usage of financial services in 33 provinces in Indonesia from 2011-2019. The study aims to find empirical evidence on whether financial inclusion affects local tax revenue using the Fixed Effects Panel Data Model. The results show that Indonesia's average regional financial inclusion index is still in a low category. The financial inclusion index has a positive and significant effect on local tax revenue. The results are robust for taxes from different sources, such as provincial tax revenue, regencies/cities tax revenue, or local tax revenue.

Keywords: Financial Inclusion; Tax Revenue; Panel Data.

[1] University of Indonesia, Depok, Indonesia.

[2] University of Indonesia, Depok, Indonesia.

1. Introduction

1.1. Background Analysis

The implementation of regional development is integral to national development efforts to realize community welfare. Regional development is carried out through a decentralized mechanism, the delegation of authority from the central government to local governments, including financial management.

Local government efforts in financial management are said to be successful if the role of locally-generated revenue in regional development is getting bigger, so that dependence on central government assistance is getting smaller. Based on data from the Directorate General of Fiscal Balance of the Ministry of Finance, the share of locally-generated revenue in regional income is still relatively small, at the provincial government by 30-40%. In comparison, in the regencies/city's government, the average is only 13%.

One of the causes of the low locally-generated revenue is the performance of local tax revenues, which is still lacking. Even if viewed in nominal terms, the contribution of local tax revenues to locally-generated revenue in 34 provinces in Indonesia from 2010 to 2019 is enormous, almost 70%. Since there are still many potential tax revenues that have not been explored optimally, and many regions do not have tax regulations according to best practices, do not have a good database, and have optimized the use of information technology in the tax administration process. Therefore, local governments need to make efforts to increase local tax revenues and to increase their locally-generated revenue at the same time.

To increase local tax revenue, it is necessary to know the factors influencing it. The determinants of local tax revenue that have been widely studied in previous studies include Gross Regional Domestic Product (GRDP), GRDP per capita, population, number of workers, inflation, and so on. One other factor is considered to influence tax revenue, but it is still rarely studied domestically and abroad. It is financial inclusion.

The term financial inclusion became a post-crisis trend in 2008, especially related to the impact of the crisis on low-income groups of people and marginalized people who live in remote areas, and workers who do not have legal identity documents, who generally do not have access to formal financial institutions (unbanked). There are several definitions of financial inclusion mentioned in previous studies. The World Bank defines financial inclusion as public access to affordable and valuable financial products and services to meet business needs, such as savings, payment transactions, insurance, and credit sustainably and responsibly. Meanwhile, the Global Financial Index defines that financial inclusion focuses more on the ownership and use of financial accounts at formal financial institutions (Demirgüç-Kunt & Klapper, 2013). In particular, financial inclusion can be defined as the ownership of financial accounts and the community's active and formal use of financial services.

To determine the level of financial inclusion, a measuring instrument is needed. Several previous researchers assessed the level of financial inclusion through the measurement of one of the financial inclusion indicators or the formulation of financial inclusion indicators into a financial inclusion index.

Sarma (2012) developed a formula for preparing a financial inclusion index from three dimensions: the dimensions of banking penetration (account ownership), availability of access to financial services (ATM, bank branch offices, mobile banking, internet banking,

and others), and use of financial services (savings account, deposits, and credit). A specific definition of financial inclusion relates to ownership and use of active and formal financial access.

The relationship between the level of financial inclusion and the performance of tax revenue can be seen in Figure 1. In general, the distribution of points is gathered around the line area. This means a correlation exists between the level of financial inclusion and the performance of local tax revenues. Most distribution points are clustered on the low financial inclusion index value, and some issues are seen far apart. This indicates that there is a reasonably significant disparity in financial inclusion among the provinces in Indonesia.

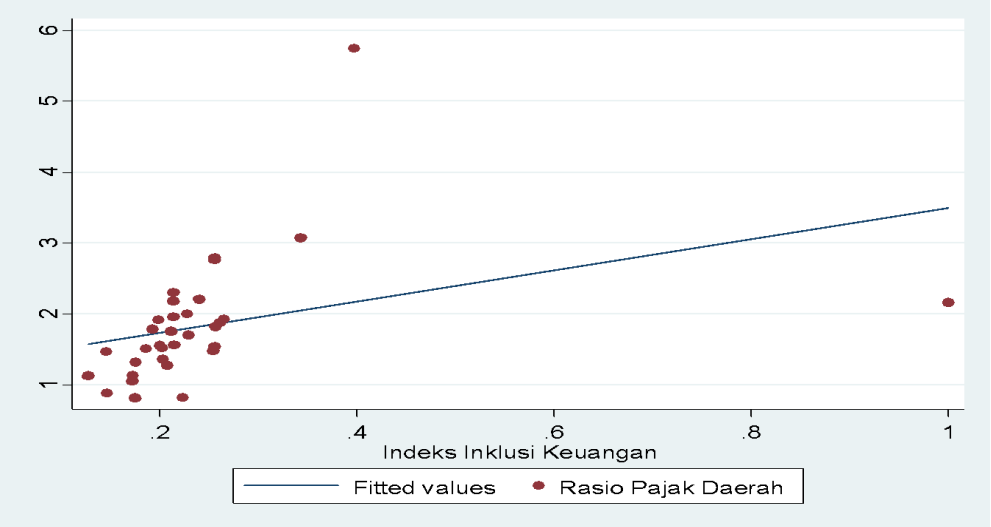

Figure 1. Financial Inclusion Index and Regional Tax Ratio in 2018

Source: Directorate General of Fiscal Balance, Ministry of Finance (2018); Fauzan et al. (2020)

Previous empirical studies show mixed results regarding the relationship between financial inclusion and tax revenue performance (tax ratio). Oz-Yalaman (2019) proves that financial inclusion in 137 countries worldwide (including Indonesia) is significantly related to a positive direction on tax revenue. Nnyanzi et al. (2018) also find that financial inclusion in East African countries - where the government seeks to reduce foreign aid and increase the distribution of non-concessional credit to the public - has a significant relationship with a positive direction on tax revenues. Banking credit has been shown to have the most significant impact on tax revenue compared to the availability of access to financial institutions.

On the other hand, financial inclusivity efforts in 20 developing countries (besides Indonesia) have not impacted reducing the shadow economy, so they have been unable to encourage an increase in tax revenues. This is due to limited access to finance, especially for the poor and vulnerable (Elsherif, 2018). In Nigeria, financial inclusion has also not been able to significantly improve economic growth and other development indicators such as the Gini ratio, poverty level, and the number of unemployment (Akyuwen & Mangowal, 2016; Nkwede, 2015).

Based on the description above and considering the theoretical and empirical studies that have been carried out previously, financial inclusion can encourage an increase in tax revenue. To fill the research gap and obtain scientific evidence as a basis for policy-making for the government, this study will examine the relationship between financial inclusion and local tax revenues in Indonesia.

1.2. Theories

1.2.1. Financial Inclusion

Financial inclusion is one of the challenges for Indonesia. Based on data from the World Bank, account ownership of people aged 15 years and over in 2011 in Indonesia only reached 19%. This percentage is still smaller than the percentage of account ownership among people in other Southeast Asian countries. In the context of developing financial inclusion, the Central Government, through Presidential Regulation Number 86 of 2016 as amended to Presidential Regulation Number 114 of 2020, issued the National Strategy for Financial Inclusion. National Strategy for Financial Inclusion is comprehensive and involves many parties, including the Bank of Indonesia, the Financial Services Authority, related Ministries/Institutions, including Local Governments. Local governments are asked to formulate and adjust regional policies following the National Strategy for Financial Inclusion document so that the procedures carried out align with national targets.

1.2.1.a. Financial Inclusion Indicators

According to the Financial Services Authority, several elements play a role in financial inclusion: access, availability of financial services, availability of financial products, quality, and use of financial services. Therefore, financial inclusion can be proxied by one or several indicators compiled into a financial inclusion index.

The following are financial inclusion indicators:

a) Bank Account

A bank account is an account used for recording financial transactions. Types of account:

1) A current account is used to manage deposits of individuals or business entities in rupiah and foreign currencies. Withdrawals can be made using billet giro and giro certificates without terms of time.
2) A savings account is an account used to manage customer deposits. Withdrawals can be made anytime via ATM, teller, or check.
3) A deposit account manages fund deposits for a certain period.
4) A credit account is an account to manage loan funds.

In addition to functioning for saving, the public can also use the account to carry out other banking transactions such as payments, one of which is the payment of local taxes. Taxpayers with an account can deposit their tax obligations online via ATM, mobile banking, or internet banking. With the existence of the tax payment service channel, the administration of tax payments becomes more accessible, more efficient, and effective so that people are expected to be more obedient, and the tax collection process will be faster and improved.

b) Bank Branch

A bank branch is a bank office directly responsible to the head office of the bank concerned, with an exact address of the place of business where the branch office conducts its business. The availability of branch offices in an area can provide convenience for the public in making tax payments, especially for the public or taxpayers who do not understand how to make online payments through ATM, mobile banking, or internet banking.

c) Automatic Teller Machine (ATM)

ATM is an electronic machine for banking services owned/managed by a bank or owned/operated by another bank but based on cooperation with a bank. Customers can use it for cash withdrawals, balance inquiries, and other transactions such as bill payments. ATMs can facilitate access to public finances, including online tax payments.

d) Deposits

Deposits are funds entrusted by the public to banks based on agreements for depositing funds in the form of demand deposits, deposits, certificates of deposit, savings, and other equivalent documents. The larger the deposits owned, the greater the community's ability to consume and invest, and the more subjects and objects that can be subject to local taxes, especially taxes related to land and building taxes, land and building rights acquisition fees, vehicle taxes, recreational taxes, hotel taxes, restaurant taxes, and other related taxes.

e) Bank Credit

Credit is the provision of money or equivalent claims based on an agreement or loan agreement between a bank and another party that requires the borrower to repay the debt after a certain period with interest. Like a deposit, bank credit can also increase the community's ability to demand goods and services, improving the tax base and local tax revenues.

1.2.1.b. Financial Inclusion Index (FII) Formula

The formula of the financial inclusion index by Sarma (2012) is carried out in the following stages:

a) Calculating the value of each dimension

$$d_i = w_i \frac{D_i - m_i}{M_i - m_1}$$

Where:

d_i: dimension value of i

D_i: dimension actual value of i,

w_i: weight attached for dimensions of i;

m_i: the lowest limit of the dimension value of i

Mi: the highest limit of the dimension value of i

Sarma (2012) assumes that the priority of all dimensions is the same, so the weight value of w for each dimension is 1.

b) Determine X1 and X2 using the formula:

$$X_1 = \frac{\sqrt{d_1^2 + d_2^2 + d_3^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2}}$$

$$X_2 = \frac{\sqrt{(w_1 - d_1)^2 + (w_2 - d_2)^2 + (w_3 - d_3)^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2}}$$

c) Calculate the FII value with the following formula:

$$\text{FII} = \frac{1}{2}[X_1 + X_2]$$

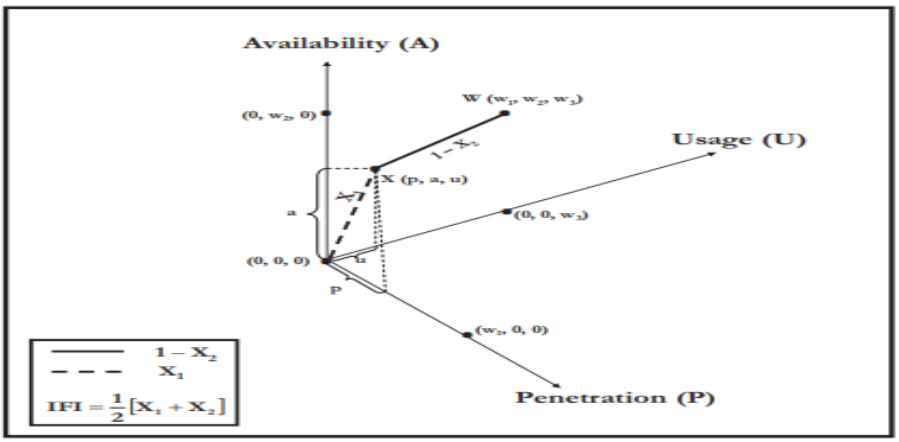

Figure 2. Vector Schematic of Financial Inclusion Dimensions

Source: Sarma (2012)

The point O = (0, 0, 0) is the worst state, while the point W = (w1, w2, w3) is the ideal state for all dimensions (Sarma, 2012). All dimensions have the same weight, the point W = (1,1,1), the final formula of FII becomes:

$$\text{FII} = \frac{1}{2}\left[\left(\frac{\sqrt{d_1^2 + d_2^2 + \cdots + d_n^2}}{\sqrt{n}}\right) + \left(1 - \frac{\sqrt{(1-d_1)^2 + (1-d_2)^2 + \cdots + (1-d_n)^2}}{\sqrt{n}}\right)\right]$$

where:

FII: Financial Inclusion Index

di: dimension value of i

n: number of dimensions

FII is in the range of values between 0 (zero) to one (1), with the following classifications: low category (0 – 0.3); medium category (0.3 – 0.6); high category (> 0.6) (Sarma, 2012).

1.3. Local Tax

1.3.1. Local Tax Definition

Local taxes are mandatory contributions to regions owed by individuals or entities that are coercive based on the law, with no direct compensation. They are used for regional purposes for the greatest prosperity of the people (Law Number 28 of 2009 concerning Regional Tax and Retribution). The measurement of the performance of local tax revenues is carried out through the ratio of local taxes, the comparison or percentage of realized tax revenues to GRDP.

1.3.2. Types of Local Tax

There are two types of taxes managed by local governments:

a) Provincial taxes, including Cigarette Tax, Surface Water Tax, and Vehicle Tax.

b) Regency/city taxes, including Rural and Urban Land and Building Taxes; and Fees for the Acquisition of Land and Building Rights; Hotel Tax; Restaurant tax; Entertainment Tax; Advertisement tax; Street Lighting Tax; Non-Metal Mineral Tax and Assistance; Parking Tax; Groundwater Tax; and Swallow's Nest Tax.

1.3.3. Local Tax Determinant

1.3.3.a. GRDP per capita

GRDP per capita is obtained by dividing the total value of final goods and services produced by the total population in the area. GRDP per capita is a proxy for the level of development. The higher the value of GRDP per capita in an area, the higher the ability and standard of living of the population in that area. This can further encourage an increase in community economic activity and demand for goods/services, impacting tax revenues (Putra & Anis, 2020; Victory & Hayati, 2020).

1.3.3.b. Population Density

The population is all people who are domiciled in the geographical area of the Republic of Indonesia for six months or more and those who are domiciled for less than six months but aim to settle down. Population density is the number of people per unit area (km2). Local tax revenues can be affected by population density, both in terms of an increase in the tax base, such as increased land use for buildings and water consumption, as well as in terms of efficiency and effectiveness of tax collection.

Collecting taxes in areas with low population density is undoubtedly more difficult than in areas with high population density. The collection fee can also be higher than the potential tax revenue received.

1.3.3.c. Level of Education

According to the Indonesian Dictionary, education is the process of changing the attitudes and behavior of a person or group of people to mature humans through teaching and training efforts. According to the Central Bureau of Statistics (2021), the relevant indicator to describe the level of education and the changes that occur is the average length of schooling. The average size of education is the average number of years spent by the population aged 15 years and over in formal education. The average length of schooling can measure the quality of society, both in terms of thought and action.

1.3.3.d. Trade Sector

The trade sector has excellent potential to contribute income or added value to the GRDP of a region. The larger the scale of a region's trading business, the more significant its contribution to the economy, including tax revenue, and vice versa. The trade sector consists of the trade sub-sector of cars, motorcycles, and their repairs and the wholesale and retail trade sub-sector of non-cars and motorcycles. The trade sector is closely related to local tax revenues, especially provincial taxes, where there is tax revenue related to vehicles and cigarettes.

1.3.3.e. Agriculture Sector

The agricultural sector is one of the most significant contributors to GRDP and can accommodate many workers from the lower levels of society. The imposition of taxes on farming is challenging because most of the production business scales are small, the activities are spatially dispersed, and the limited ability of the community, especially rural communities, to carry out financial records and bookkeeping as well as the use of formal financial institutions (banks), especially in terms of difficulty in obtaining access to capital. Lack of money affects agricultural productivity, which in turn has an impact on decreasing farmers' income and ability to pay taxes, especially regency/city taxes, land and building taxes, and land and building rights acquisition fees on rice fields.

1.4. Relationship between Financial Inclusion and Local Tax Revenue

Specifically, financial inclusion is related to local tax revenues in terms of convenience in tax administration, especially for people who have accounts through expanding banking service channels for local tax payments. For example, land and building tax or vehicle tax payments, originally paid through the sub-district or Samsat office, can now be paid online through ATMs, internet banking, or mobile banking.

Online local tax payments can reduce administrative and taxpayer compliance costs because the tax deposit process can be done quickly, efficiently, and effectively anywhere and anytime through bank payment channels, so taxpayers are encouraged to fulfill their tax obligations appropriately.

On the other hand, financial inclusion opens opportunities for people with accounts to improve their financial capabilities using banks' savings and credit facilities. Increasing income and capital encourage people to be more productive and consumptive, such as buying land, houses, vehicles, recreation, etc. These economic activities have implications for increasing the tax base, especially Land and Building Tax, Land and Building Rights Acquisition Fees, Vehicle Tax, Recreation Tax, Hotel Tax, Restaurant Tax, and other related taxes.

Based on previous research, no research has been found that explicitly observes the relationship between financial inclusion and local tax revenues. However, several previous studies examine the relationship between financial inclusion and central tax revenue, such as Oz-Yalaman (2019) examining the relationship between financial inclusion and the ratio of individual income tax and corporate income tax in 137 countries in the world, including Indonesia. The study found that financial inclusion was significantly related to a positive direction on tax revenue. Financial inclusion can be one of the determinants of tax revenue. Individuals who have accounts or credit cards have a higher ability to increase their income. The higher the individual's income, the greater the tax can be levied. The impact of financial

inclusion on tax revenues can also occur indirectly, where financial inclusion plays a role in reducing the shadow economy to encourage increased economic growth and other development indicators (Baklouti & Boujelbene, 2020; Din, 2016; Din et al., 2019).

Different results were found by Elsherif (2018) in research on financial inclusion, shadow economy, and financial stability in developing countries using the 2SLS fixed effect panel data method. The empirical study found that financial inclusion did not significantly impact the decline in the shadow economy, so it had not been able to increase tax revenues. Although most of the existing empirical studies find that financial inclusion and tax revenue are significantly related in a positive direction, either directly or indirectly, this does not necessarily make the results of these studies valid over time. Since the development of the financial sector, there have been many challenges, such as a weak financial system, inappropriate policies, and limited financial instruments (Bakar & Sulong, 2018).

Naceur & Ghazouani (2005) found that the relationship between banking development and bank credit on economic growth in Middle Eastern and North African countries was not significant in a negative direction. Another example is the financial crisis that co-occurred in Germany, France, and the UK in 2008 caused by over-financing problems, which resulted in severe fluctuations in macroeconomic indicators that disrupted economic stability and growth (Bhattarai, 2015).

Table 1. List of Variable

Variable	Data Source	References
Dependent Variable		
1. Provincial Tax Ratio 2. Regencies/cities Tax Ratio 3. Local Tax Ratio	• Directorate General of Fiscal Balance, Ministry of Finance • Central Bureau of Statistics	Akram, 2016; Oz-Yalaman, 2019; Mitchell & Scott, 2019
Interest Variable		
Financial Inclusion Index	Author's Calculation	Park & Mercado, 2015; Ningrum, 2018; Sethi & Sethy, 2019;
Control Variable		
GRDP per capita	Central Bureau of Statistics	Addison & Levin, 2011; Yuniar, 2018; Nnyanzi et al., 2018; Oz-Yalaman, 2019; Putra & Anis, 2020; Victory & Hayati, 2020
Share of Agricultural Sector GRDP to Total GRDP (Other than Model 1)	Central Bureau of Statistics	Addison & Levin, 2011; Oz-Yalaman, 2019
Share of Trade Sector GRDP to Total GRDP (Other than Model 2)	Central Bureau of Statistics	Oz-Yalaman, 2019
Population Density	Central Bureau of Statistics	Addison & Levin, 2011; Yuniar, 2018; Nnyanzi et al., 2018
Average Length of School	Central Bureau of Statistics	Lotto, 2018; Namira, 2019

Source: Directorate General of Fiscal Balance, Ministry of Finance; Central Bureau of Statistics; Author's Calculation

2. Methods

2.1. Type and Source of Data

The data used in this research is secondary data sourced from:

a) Directorate General of Fiscal Balance, Ministry of Finance;

b) Financial Services Authority;

c) Central Bureau of Statistics.

The observation period is nine years, 2011-2019.

The FII measurement adopted the formula compiled by Sarma (2012). This measurement was chosen because it can be compared between provinces, is robust, and comprehensive.

Table 2. Dimensions and Indicators of Financial Inclusion Index

No.	Dimensi	Deskripsi	Indikator
1.	Bank Penetration (D_1)	Measuring financial penetration	The ratio of the number of accounts per 1,000 adult population: $D_1 = \frac{Number\ of\ Bank\ Account\ (year\ t)}{Number\ of\ Adult\ Population\ (year\ t)}$ x 1.000
2.	Availability (D_2)	Measuring the availability of formal financial services	• The ratio of the number of bank branches per 100,000 adult population: $D_{2a} = \frac{Number\ of\ bank\ branches\ (year\ t)}{Number\ of\ Adult\ Population\ (year\ t)}$ x 100.000 • The ratio of the number of ATMs per 100,000 adult population $D_{2b} = \frac{Number\ of\ ATMs\ (year\ t)}{Number\ of\ Adult\ Population\ (year\ t)}$ x 100.000 The weighting of the index of the number of branch offices and ATMs is carried out based on the average ATM to bank branch offices per 100,000 adult population (Sarma, 2012). Based on the calculation, the average ratio of ATM to bank branch offices is 12.5. That is, one bank branch office is equivalent to 12 ATMs. Therefore, the index weight of bank branches is 12/13, and the ATM index weight is 1/13.
3.	Usage (D_3)	Measuring the use of banking services, such as deposits and loans	The ratio of the volume of Deposits and credit to GRDP: $D_3 = \frac{Volume\ of\ Deposits\ and\ Credits\ \ (year\ t)}{GRDP\ (year\ t)}$ x 100%

Source: Sarma (2012)

2.2. Analysis Method

Research on the relationship between financial inclusion and local tax revenue requires observations between periods in 33 provinces in Indonesia. Thus, the study combines time-series and cross-section data, known as panel data. Some of the benefits of using panel data analysis include 1) more accurate model parameters, 2) being able to analyze more complex data, and 3) simplifying data processing and statistical testing (Hsiao, 2005).

This study was conducted using the Fixed Effect Panel Data Model method. The way these method works is as follows.

The model's equation with one explanatory variable for each i is

$y_{it} = \beta_1 X_{it} + a_i + U_{it}, \qquad t = 1, 2, \ldots\ldots, T.$

For each i, the equation for the average over time becomes:

$$\bar{y}_i = \beta_1 \bar{x}_i + a_i + \bar{u}_i,$$

Where a_i stays all the time. If the two equations above are subtracted, the resulting equation is as follows:

$$y_{it} - \bar{y}_i = \beta_1 (x_{it} - \bar{x}_i) + u_{it} - \bar{u}_i, \quad t = 1, 2, \ldots, T,$$

or

$$\ddot{y}_{it} = \beta_1 \ddot{x}_{it} + \ddot{u}_{it}, \quad t = 1, 2, \ldots, T,$$

Thus, the fixed-effect model can eliminate the impact of unobserved variables (a_i) so that the estimation results are free from bias (Woldridge, 2012).

The econometric models developed in this study are

1) Provincial Tax Ratio

   $PTR_{it} = \alpha_0 + \beta_1 FII_{it} + \beta_2 GRDPC_{it} + \beta_3 TRADE_{it} + \beta_4 POP_{it} + \beta_5 EDUC_{it} + \mu_{it}$

   Where:

   PT_{it} = Provincial Tax Ratio, the ratio of realized provincial tax revenues to GRDP (%)

   FII_{it} = provincial level financial inclusion index (points)

   $GRDPC_{it}$ = Gross Regional Domestic Product per Capita (rupiah)

   $TRADE_{it}$ = share of Trade Sector GRDP to total GRDP (%)

   POP_{it} = population density (person/km^2)

   $EDUC_{it}$ = average length of school (year)

2) Regencies/cities Tax Ratio

   $RCTR_{it} = \alpha_0 + \beta_1 FII_{it} + \beta_2 GRDPC_{it} + \beta_3 AGRI_{it} + \beta_4 POP_{it} + \beta_5 EDUC_{it} + \mu_{it}$

   Where:

   $RCTR_{it}$ = Regencies/cities Tax Ratio, the ratio of realized regencies/cities tax revenues to GRDP (%)

   FII_{it} = provincial level financial inclusion index (points)

$GRDPC_{it}$ = Gross Regional Domestic Product per Capita (rupiah)

$AGRI_{it}$ = share of Agriculture Sector GRDP to total GRDP (%)

POP_{it} = population density (person/km²)

$EDUC_{it}$ = average length of school (year)

3) Local Tax ratio (Combined)

$$LTR_{it} = \alpha_0 + \alpha_1 FII_{it} + \beta_2 GRDPC_{it} + \beta_3 AGRI_{it} + \beta_4 TRADE_{it} + \beta_5 POP_{it} + \beta_6 EDUC_{it} + \mu_{it}$$

Where:

LTR_{it} = Local tax ratio, the ratio of realized local tax revenues to GRDP (%)

FII_{it} = provincial level financial inclusion index (points)

$GRDPC_{it}$ = Gross Regional Domestic Product per Capita (rupiah)

$AGRI_{it}$ = share of Agriculture Sector GRDP to total GRDP (%)

$TRADE_{it}$ = share of Trade Sector GRDP to total GRDP (%)

POP_{it} = population density (person/km²)

$EDUC_{it}$ = average length of school (year)

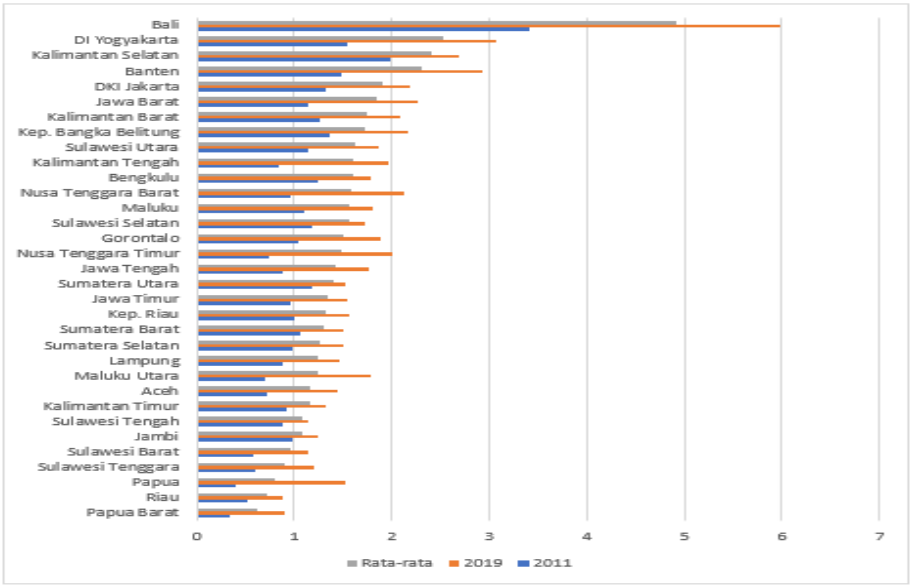

Figure 2. Development of Regional Tax Ratio in 2011 and 2019 (in percentage)

Source: Directorate General of Fiscal Balance, Ministry of Finance; Central Bureau of Statistics; Author's Calculation

3. Result and Discussion

3.1. Descriptive Analysis

3.1.1. Tax Ratio

There were increased local tax revenues in Indonesia from 2011 to 2019. The proportion of realized provincial and regency/city tax revenues was 61.51% and 38.49%, respectively. Based on the data on the average realization of local tax revenues, the highest realization of local tax revenues was obtained by DKI Jakarta Province, and West Sulawesi Province got the lowest. Suppose the realization of tax revenues is compared with the GRDP value of each province. The Province of Bali obtained the resulting tax ratio with the highest average value, and the lowest is occupied by the Province of West Papua, as shown in Figure 2.

Table 3 Descriptive Statistics of Value Dimensions of Financial Inclusion

Dimensi Penetrasi Perbankan (Rasio Jumlah Rekening per 1.000 penduduk dewasa)										
Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Ave**
Min	394.85	469.64	608.40	619.67	667.37	733.73	1007.14	1109.37	1211.18	757.93
Max	5530.12	5430.83	5367.40	5504.55	5734.27	6259.09	6866.34	7800.78	8223.26	6301.85
Ave	828.95	904.40	1077.66	1111.85	1174.61	1285.52	1606.39	1791.28	1827.60	1289.81
Stdev	867.51	838.89	802.64	816.07	851.85	925.97	998.96	1203.82	1176.79	942.50
Dimensi Availabilitas (Rasio Jumlah Kantor Cabang Bank per 100.000 penduduk dewasa)										
Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Ave**
Min	1.38	1.61	1.66	1.65	1.68	1.81	1.85	1.72	1.75	1.68
Max	6.71	7.20	7.93	8.11	8.37	8.69	8.56	8.40	7.88	7.98
Ave	3.02	3.40	3.57	3.60	3.70	4.03	4.01	3.91	3.75	3.67
Stdev	1.36	1.55	1.67	1.70	1.78	1.88	1.87	1.84	1.70	1.71
Dimensi Availabilitas (Rasio Jumlah ATM Bank per 100.000 penduduk dewasa)										
Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Ave**
Min	3.90	9.81	13.04	16.58	18.23	19.49	21.02	21.60	21.66	16.15
Max	149.79	187.58	212.67	239.41	249.30	251.94	255.98	245.81	239.93	225.83
Ave	23.41	33.09	39.86	47.20	52.45	54.11	55.48	54.10	53.14	45.87
Stdev	25.20	31.09	35.01	39.45	41.42	41.46	41.99	40.17	39.19	37.22
Dimensi Penggunaan (Rasio Volume DPK dan Kredit terhadap PDRB)										
Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Ave**
Min	0.20	0.23	0.24	0.26	0.27	0.28	0.29	0.30	0.31	0.26
Max	2.18	2.41	2.67	2.83	2.89	2.98	3.03	3.15	3.15	2.81
Ave	0.49	0.55	0.60	0.63	0.66	0.68	0.71	0.72	0.75	0.64
Stdev	0.33	0.37	0.41	0.43	0.44	0.46	0.46	0.48	0.48	0.43

Source: Author's Calculation

3.1.2. Financial Inclusion

Table 3 shows descriptive statistics of minimum (Min), maximum (Max), average (Ave), and standard deviation (Stdev) values of the three dimensions of financial inclusion. An inclusive financial system is characterized by banking penetration capabilities that can reach as many users as possible. The measure of banking penetration is the proportion of the

population with a bank account. An indicator that can reflect this size is the number of banking accounts per 1,000 adult population (Sarma, 2012). This study uses the ratio of the number of accounts consisting of checking accounts, savings accounts, time deposit accounts, and credit accounts at banking to 1,000 adults.

Based on Figure 3, it can be seen that most of the people in the provinces of DKI Jakarta, West Java, East Java, and Central Java are opening bank accounts. This means that most of the banking penetration has only been carried out by people on the island of Java.

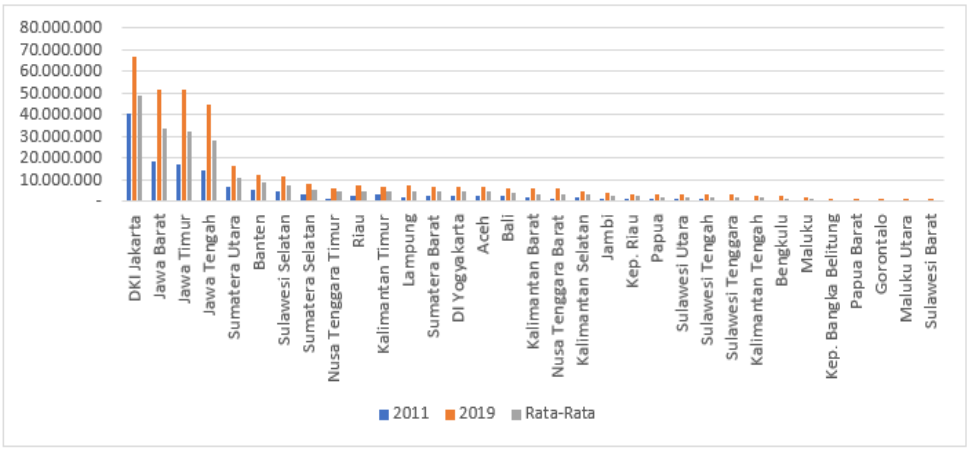

Figure 3. Development of Number of Accounts per Province in 2011 and 2019
Source: Financial Service Authority

The average number of accounts held by 1,000 adults in Indonesia is 1,289. This means that each adult resident has at least one bank account. Compared to the average for all provinces, DKI Jakarta Province has the most significant ratio with an average number of accounts of 6,301 accounts per 1,000 adult population. This means that every adult resident has at least six bank accounts.

Another dimension of the financial inclusion system is the availability of banking services, which can make it easier for the public to access financial services. Indicators of this dimension can be the number of branch offices, ATMs, bank employees per customer, and so on (Sarma, 2012). In this study, the availability of banking services is measured by the ratio of the number of bank branches and the number of ATMs per 100,000 adult population.

Most banking branches are available in Java, with a central government and many economic activities. The provinces of West Java, East Java, and Central Java are the provinces that have the most bank branch offices; where in these three provinces, many branch offices and cash service offices of Rural Banks have been established. Meanwhile, the highest number of ATMs is in DKI Jakarta Province, as shown in Figure 4.

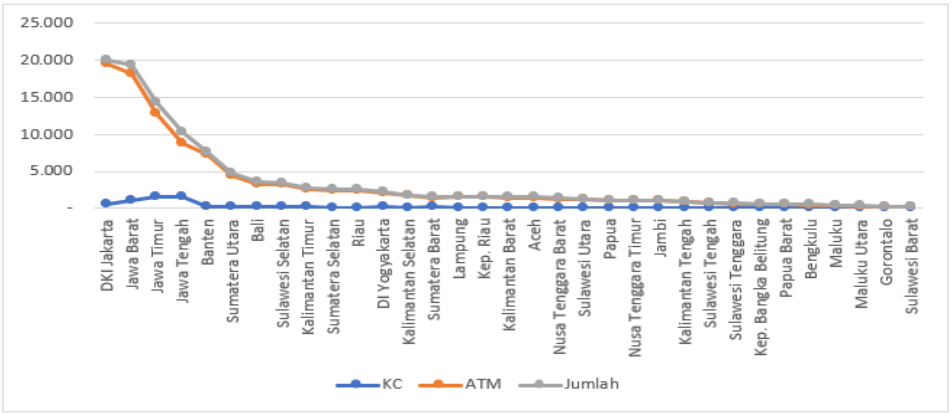

Figure 4. Number of Bank Branch Offices and ATMs per Province in 2019

Source: Financial Service Authority

From 2011 to 2019, Indonesia's average number of banking branches and ATMs per 100,000 adult population was 3.67 and 45.87 units, respectively. DI Yogyakarta Province, Bali, and DKI Jakarta are the provinces with the three highest positions in the availability of branch offices compared to other regions, with an average of 7 units per 100,000 adult population. For the most part, the availability of ATMs is in DKI Jakarta Province, where the average availability of ATMs per 100,000 adult population is 225 units.

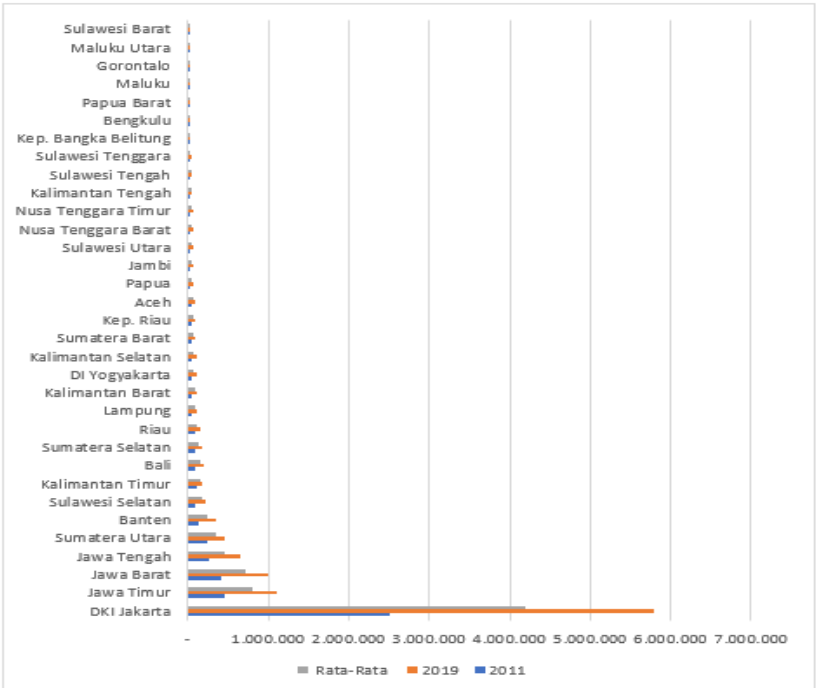

Figure 5. Development of Volume of Deposits and Loans by Province in 2011 and 2019

Source: Financial Service Authority

Another indicator of financial inclusion is using banking facilities, such as savings, deposits, and credit. Usage indicators can be seen from the proportion of deposits and credit volumes to GRDP (Sarma, 2012). There was an increase in the total value of deposits and credit over nine years. This increase occurred because of the increasing number of people with accounts and the growing volume of public deposits and credits. The volume of deposits and credit indicates that public confidence in saving and borrowing funds from formal financial institutions is increasing.

Like the number of accounts and the total number of banking branch offices and ATMs, DKI Jakarta Province ranks at the top regarding the most significant volume of deposits and loans managed. While the last rank is occupied by West Sulawesi, as shown in Figure 5.

The average ratio of the use of banking facilities in the study period was 0.64. DKI Jakarta Province is ranked first in the use of banking services by the public, with an average ratio of TPF and credit to GRDP of 2.81.

The measurement of financial inclusion indicators above produces values representing three dimensions in preparing the financial inclusion index. The availability dimension index obtained the highest average value for 2011-2019, followed by the usage dimension index and then the banking penetration dimension index, as shown in Table 4. This indicates that financial inclusion in Indonesia is heavily influenced by the availability of banking services, bank branch offices, and ATMs. The usage dimension index shows a relatively better value than the accessibility dimension value. This means that the role of banking intermediation in providing storage and financing facilities to the public is better than banking penetration.

Table 4. Dimensional Index and Regional Financial Inclusion Index 2011 - 2019

Dimension of Bank Penetration									
Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Max	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Ave	0.085	0.088	0.099	0.101	0.100	0.100	0.102	0.102	0.088
Stdev	0.169	0.169	0.169	0.167	0.168	0.168	0.170	0.180	0.168
Dimension of Availability									
Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Min	0.001	0.002	0.002	0.002	0.002	0.002	0.000	0.002	0.000
Max	0.939	0.998	0.939	0.939	0.949	0.949	0.950	0.949	0.949
Ave	0.294	0.307	0.291	0.289	0.291	0.310	0.308	0.314	0.313
Stdev	0.245	0.265	0.255	0.251	0.255	0.260	0.266	0.262	0.264
Dimension of Usage									
Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Max	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Ave	0.144	0.147	0.147	0.144	0.148	0.147	0.153	0.149	0.153
Stdev	0.168	0.169	0.168	0.169	0.169	0.169	0.168	0.168	0.167
Regional Financial Inclusion Index									
Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Min	0.013	0.020	0.018	0.012	0.015	0.014	0.016	0.018	0.017
Max	0.942	0.999	0.953	0.935	0.960	0.929	0.921	0.909	0.886
Ave	0.184	0.191	0.187	0.186	0.188	0.195	0.198	0.199	0.195
Stdev	0.168	0.179	0.173	0.170	0.173	0.170	0.169	0.166	0.165

Source: Author's Calculation

Some of the causes of the low banking penetration in the provinces in Indonesia include the lack of maximum utilizatio of banking services, especially in savings and financing facilities, and the limitations of the public in reaching banking service offices and ATMs. The number of bank branch offices and ATMs and the volume of deposits and loans are still not evenly distributed throughout Indonesia; provinces outside Java are relatively lower than those in Java.

In the analysis of the Provincial Financial Inclusion Index in Table 5, only DKI Jakarta Province obtained an average financial inclusion index in the high category. This indicates a significant disparity in the development of the financial sector between DKI Jakarta Province and other provinces. There are three provinces with a medium financial inclusion index, the Province of Bali, the Special Region of Yogyakarta, and the Riau Archipelago. The other 29 provinces are included in the low category.

Table 5. Regional Financial Inclusion Index Year 2011-2019

No	Province	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
1	DKI Jakarta	0.942	0.999	0.953	0.935	0.960	0.929	0.921	0.909	0.886	0.937
2	Bali	0.390	0.442	0.452	0.459	0.471	0.473	0.469	0.464	0.465	0.454
3	DI Yogyakarta	0.444	0.450	0.456	0.457	0.449	0.440	0.457	0.455	0.448	0.451
4	Kep. Riau	0.358	0.383	0.386	0.367	0.345	0.326	0.325	0.304	0.348	0.349
5	Sulawesi Utara	0.284	0.282	0.271	0.268	0.274	0.294	0.298	0.299	0.277	0.283
6	Jawa Tengah	0.243	0.238	0.238	0.248	0.253	0.289	0.296	0.307	0.313	0.269
7	Kalimantan Timur	0.244	0.256	0.243	0.240	0.277	0.294	0.285	0.281	0.291	0.268
8	Papua Barat	0.255	0.266	0.265	0.230	0.203	0.230	0.244	0.220	0.232	0.238
9	Sumatera Barat	0.212	0.205	0.182	0.179	0.193	0.283	0.265	0.266	0.266	0.228
10	Jawa Timur	0.191	0.196	0.200	0.205	0.211	0.251	0.261	0.265	0.246	0.225
11	Maluku	0.209	0.202	0.190	0.193	0.195	0.196	0.223	0.215	0.224	0.205
12	Sumatera Utara	0.157	0.158	0.154	0.157	0.158	0.159	0.157	0.145	0.138	0.154
13	Nusa Tenggara Barat	0.126	0.119	0.120	0.141	0.132	0.166	0.168	0.190	0.185	0.150
14	Kep. Bangka Belitung	0.134	0.146	0.138	0.143	0.133	0.165	0.161	0.164	0.149	0.148
15	Kalimantan Selatan	0.149	0.161	0.157	0.142	0.143	0.139	0.130	0.132	0.138	0.143
16	Bengkulu	0.130	0.137	0.136	0.141	0.150	0.139	0.131	0.126	0.128	0.135
17	Sulawesi Tengah	0.120	0.122	0.119	0.121	0.121	0.150	0.148	0.154	0.150	0.134
18	Papua	0.143	0.131	0.122	0.121	0.129	0.123	0.113	0.120	0.135	0.126
19	Maluku Utara	0.106	0.114	0.119	0.133	0.144	0.127	0.122	0.118	0.129	0.124
20	Jawa Barat	0.109	0.116	0.114	0.116	0.114	0.138	0.135	0.137	0.129	0.123

No	Province	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
21	Kalimantan Barat	0.126	0.126	0.128	0.123	0.122	0.120	0.118	0.113	0.121	0.122
22	Aceh	0.115	0.115	0.113	0.112	0.116	0.128	0.133	0.124	0.128	0.120
23	Sulawesi Selatan	0.131	0.129	0.121	0.121	0.122	0.116	0.113	0.108	0.103	0.118
24	Nusa Tenggara Timur	0.081	0.079	0.081	0.084	0.093	0.086	0.168	0.242	0.104	0.113
25	Gorontalo	0.110	0.114	0.118	0.114	0.110	0.115	0.105	0.106	0.120	0.112
26	Kalimantan Tengah	0.114	0.120	0.103	0.088	0.092	0.082	0.094	0.112	0.107	0.101
27	Jambi	0.092	0.100	0.107	0.104	0.103	0.102	0.098	0.097	0.095	0.100
28	Sulawesi Tenggara	0.087	0.079	0.092	0.105	0.109	0.107	0.106	0.100	0.106	0.099
29	Banten	0.080	0.096	0.091	0.093	0.095	0.099	0.102	0.110	0.100	0.096
30	Riau	0.095	0.092	0.088	0.093	0.081	0.076	0.067	0.077	0.063	0.081
31	Sumatera Selatan	0.070	0.071	0.072	0.066	0.066	0.061	0.061	0.063	0.061	0.066
32	Lampung	0.025	0.026	0.027	0.026	0.028	0.028	0.029	0.030	0.027	0.027
33	Sulawesi Barat	0.013	0.020	0.018	0.012	0.015	0.014	0.016	0.018	0.017	0.016
Rata-Rata		**0.184**	**0.191**	**0.187**	**0.186**	**0.188**	**0.195**	**0.198**	**0.199**	**0.195**	**0.191**

Source: Author's Calculation

There are exciting results, the Provinces of West Java, East Java, and Central Java have a large number of banking branches, ATMs, and large volumes of deposits and loans. Still, they have a low category of financial inclusion index. It can be concluded that a small part of the population has only carried out the utilization and affordability of banking services in three provinces.

Table 6. Statistics Description of Variables

VARIABLES	(1) N	(2) mean	(3) Sd	(4) Min	(5) Max
idprovince	297	17	9.538	1	33
tahun	297	2,015	2.586	2,011	2,019
ptr	297	1.030	0.371	0.260	2.270
rctr	297	0.513	0.526	0.0600	3.860
ltr	297	1.543	0.800	0.340	5.990
fii	297	0.191	0.168	0.0125	0.999
grdpc	297	3.699e+13	2.924e+13	9.676e+12	1.741e+14
pop	297	732.31	2,611.12	8	15,900
agri	297	14.63	7.938	0.0437	32.87
trade	297	12.09	3.462	4.574	18.66
educ	297	8.658	0.889	6.055	11.11

Source: Author's Calculation

3.1.3. Descriptive Statistics of Research Variables

Table 6 shows descriptive statistics on the variables used. The ratio of local taxes to GRDP has a mean value of 1.543%. The contribution of the average share of GRDP in the agricultural sector is 14.63%, higher than the average GRDP in the trade sector of 12.09%.

3.2. Estimation Result

3.2.1. Analysis of Local Tax Ratio Estimation Results

As previously described, this study uses a fixed effect panel data model to analyze the effect of financial inclusion on the ratio of provincial taxes, regency/city taxes, and local taxes. It has tested the classical assumptions of the three models. The test results show multicollinearity and heteroscedasticity problems in the estimation results of the three models. Therefore, robustness is carried out to fix these two problems.

Based on the empirical test results, financial inclusion is positively and significantly related to the tax ratio for provincial, regency/city, and local taxes. The findings of this study support the previous empirical studies conducted by Ajide & Bankefa (n/d); Akçay et al. (2016); Akram (2016); Nnyanzi et al. (2018); Oz-Yalaman (2019).

There are several reasons regarding the direction of the positive relationship between financial inclusion and local tax ratios. Financial inclusion through account ownership and the use of financial access can (1) increase the ease of transactions, primarily related to paying tax bills through tax payment channels provided by banks anytime and anywhere, so it can increase taxpayer compliance in paying taxes on time, (2) improve the financial capacity of the community through the use of banking facilities such as savings, deposits, and credit. The existence of additional capital from banks can be used to increase productivity and income as well as to increase consumption and investment, such as buying land, houses, vehicles, establishing a business, and others, so that it will give implications for improving the performance of local tax revenues, especially land and building tax and land and building rights acquisition fees, vehicle tax, Recreation Tax, Hotel Tax, Restaurant Tax, and other related taxes.

The robustness check in this study was carried out through regression of three research models with different data sources of the dependent variable, provincial taxes, regency/city taxes, and local taxes. Regression results show robust results for the three models; FII has a positive and significant relationship with the tax ratio. Thus, it can be said that the empirical results of this study are valid.

Financial inclusion has a significant positive effect on the ratio of provincial taxes, regency/city taxes, and local taxes. The increase in financial inclusion by 1 point increased the local tax ratio by 3.039%. Compared to the average value of the local tax ratio, the relationship between FII and the local tax ratio is elastic. An increase in FII by 1% or 0.01 can increase the local tax ratio by 1.97%.

No similar research has been found in Indonesia that directly observes the relationship between financial inclusion and tax revenue, especially local taxes, so it is challenging to compare. However, several studies abroad have been found; although the type of tax followed is not local taxes but central taxes such as individual income taxes, corporate taxes, Value Added Taxes, and other kinds of taxes.

Table 7. FEM Regression Results for Dependent Variables Provincial Tax Ratio, Regencies/cities Tax Ratio, and Local Tax Ratio with Control Variables (Robust)

VARIABLES	(1) dependent: ptr	(2) dependent: rctr	(3) dependen: ltr
fii	1.709***	1.813**	3.039**
	(0.519)	(0.867)	(1.171)
grdpc	0**	0***	0*
	(0)	(0)	(0)
trade	0.0776***		0.171***
	(0.0266)		(0.0423)
pop	-0.000216	-1.86e-05	0.000448
	(0.000274)	(0.000340)	(0.000584)
educ	0.307***	0.276***	0.476***
	(0.0662)	(0.0522)	(0.100)
agri		-0.00550	-0.0560*
		(0.0181)	(0.0299)
Constant	-3.117***	-2.899***	-5.409***
	(0.608)	(0.544)	(0.992)
Observations	297	297	297
R-squared	0.477	0.539	0.612
Number of idprovinsi	33	33	33

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's Calculation

Mitchell & Scott (2019) examined the relationship between financial inclusion (account ownership and credit card ownership) and the VAT receipt ratio in Argentina. They found that a 1% increase in account ownership was associated with a 0.033% increase in VAT receipts ratio, while an increase in credit card ownership of 0.033%. 1% corresponds to an increase in the VAT revenue ratio of 1.035%. Credit card ownership increases the percentage of VAT receipts more than account ownership because using credit cards will encourage more significant expenditures and impacts VAT receipts. In addition, using credit cards shifts expenses that were initially informal and difficult to tax into formal ones, making them easier to tax.

Compared with the results of this study, the relationship between financial inclusion and local tax revenues in Indonesia is greater than the relationship between financial inclusion and VAT receipts in Argentina. This could be because local taxes consist of a more extensive tax base at the provincial and regency/city levels. In addition, the rates for each type of local tax in Indonesia are more varied than the flat VAT rates in Argentina during the study period.

3.2.2. Analysis of the Estimation Results of the Dimensions of Financial Inclusion on the Regional Tax Ratio

Based on the empirical test results of the dimensions of financial inclusion on the tax ratio, as shown in Table 5, it is known that the three dimensions of financial inclusion are positively related to the tax ratio for provincial, regency/city taxes, or a combination of both. Provincial tax revenues are heavily influenced by account ownership and financial services. In contrast, regency/city tax revenues and local taxes are only affected by the financial services (savings, deposits, and credits).

Nofi Zumaidah & Soelistyo (2018) proves that the relationship between the volume of deposits and bank loans with the economic growth of the provinces in Indonesia from 2013 to 2016 is significant and positive. Regional economic growth can affect local tax revenues through increased economic activity and demand for goods and services. This is also in line with the empirical results of Akçay et al. (2016) that the volume of credit is significantly related to the positive direction of tax revenue.

Table 8. FEM Regression Result of Financial Inclusion Dimension to Tax Ratio (Robust)

VARIABLES	(1) dependent: ptr	(2) dependent: rctr	(3) dependent: ltr
Index of bank penetration	0.540**	0.0153	0.564
	(0.255)	(0.426)	(0.643)
Index of availability	0.442*	0.818	1.262
	(0.254)	(0.721)	(0.911)
Index of usage	6.502***	4.925**	11.46***
	(1.280)	(1.897)	(2.989)
Constant	-0.119	-0.465	-0.590
	(0.193)	(0.372)	(0.532)
Observations	297	297	297
R-squared	0.245	0.128	0.209
Number of idprovinsi	33	33	33

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's Calculation

4. Conclusion and Recommendation

4.1. Conclusion

The average FII score for provinces in Indonesia from 2011 to 2019 is in the low category of 0.191. Only DKI Jakarta Province obtained an average FII score in the high class of 0.937. Three provinces with average financial inclusion index scores are in the medium category, the Province of Bali, the Special Region of Yogyakarta, and the Riau Archipelago.

The other 29 provinces are included in the low sort. This indicates a significant disparity in the development of the financial sector, especially between DKI Jakarta and other regions.

This research contributes to measuring the effect of financial inclusion on local tax ratios, which has never been done in Indonesia. The analysis uses the fixed effect panel data model regression method. This method was chosen because it can eliminate the impact of unobserved variables so that the estimation results avoid bias. The test results are robust for different tax realization data sources. Based on analysis results, financial inclusion is positively and significantly related to the tax ratio, both for the provincial tax ratio, the regency/city tax ratio, and the regional tax ratio. The results of this study are in line with and support previous empirical studies by Ajide & Bankefa, Akçay et al. (2016), Akram (2016), Nyyanzi et al. (2018), and Oz-Yalaman (2019).

From the measurement of three dimensions of financial inclusion, it is known that financial inclusion in Indonesia is heavily influenced by the availability of access to banking services (bank branch offices and ATMs), followed by the use of banking facilities such as savings, time deposits, and credit, and then account ownership. However, based on the empirical test results between the dimensions of financial inclusion and the tax ratio, it was found that the local tax ratio is more influenced by the use of banking facilities/services. Knowing the effect of each dimension of financial inclusion on financial sector development and tax ratios can assist policymakers in understanding.

4.2. Recommendations

Financial inclusion can potentially increase tax revenue but it has not been implemented optimally. For this reason, several strategies are needed to increase the role of financial inclusion in influencing tax revenue, including:

1. Increasing banking penetration by expanding the reach of financial services and increasing programs that can attract the public to use formal financial services.
2. Improving financial literacy, especially for marginalized communities such as rural communities.
3. Equitable development of the financial sector in all regions in Indonesia, especially in areas outside Java.

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