Financial Inclusion and Tax Revenue: Evidence From Europe

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Abstract

This paper aimed to investigate the relationship between financial inclusion and tax revenue using measures from the Global Findex database for a sample of 28 European countries between 2011- 2017. The data were analysed using panel data methodology. The number of people who are financially included in this observed period might increase over time, which would create more income and in turn lead to higher tax contributions to the government. We found strong evidence to suggest that financial inclusion represents one of the determinants of tax revenue in European countries. Results of the analysis show positive and significant impact of financial inclusion as measured by Bank account (% of age +15) and credit card ownership (% age 15+) on tax revenues measures. The results are robust using several sources of taxation. The findings suggest that higher financial inclusion is associated with more tax revenue. These results should be of great interest to regulators and policymakers to take advantage of the developments on financial inclusion.

Keywords: financial inclusion, tax revenue, bank account, credit card, policymakers, financial system, panel data, taxation

JEL Classification: G20, E62, H20

1. Introduction

Over the last decade, the topic of financial inclusion has generated a great deal of interest with academics and policy makers and recently has recognised as a primary and strategic pillar that enhance development in many countries (Sarma and Pais, 2011).

According to the World Bank report (2010), almost half of the people around the world live financially excluded. Between 2011 and 2017, a dramatic global rise on financial inclusion occurred. The 2017 Global Findex database reports that since 2011, more than one billion adults have become financially included by obtaining formal account in a financial institution or through a mobile money service.

Financial inclusion is classified as a central objective among financial regulatory and researchers for several reasons. For example, financial inclusion is taken as primary instrument used to achieve higher economic development and to encourage innovations (Yawe and Prabhu, 2015; Demirguc-Kunt, Klapper and Singer, 2017). Further, financial inclusion can help the government to obtain additional financial resources, increase investment opportunities, and reduce budget deficit (Zachosova, Babina, and Zanora, 2018). Financial inclusion can also help governments in its strategy for poverty alleviation (Chibba, 2009). Moreover, financial inclusion contribute to higher macroeconomic and bank stability after the recent global financial crisis (Cull, Demirguc-Kunt, and Lyman, 2012; Ozili, 2020). For these reasons, financial inclusion and access to financial services has become a popular topic with academics and policy makers alike.

Expanding access to finance to poor individuals and informal business owners could positively influence economic activity (Bruhn and Love, 2014). The mechanism of financial inclusion leads to more income earning opportunities and reduce poverty (Zhang and Posso, 2019). Accordingly, when the accessibility to financial institutions increases and when peoples' income increases, it is expected that their tax payments to the government will also increase (Nnyanzi, Bbale, and Sendi, 2018; Oz-Yalaman, 2019). This provides an opportunity for the government and policymakers to benefit from increased income by raising annual tax revenues.

Generally, the aim of financial inclusion policies is to reduce financial exclusion and encourage people to access and use formal financial services to promote economic growth and financial development (Sharma, 2016; Allen, Demirguc-Kunt, Klapper, and Peria, 2016).

On one hand, encouraging people to use formal financial services allows them to make financial transactions more efficiently and safely (Demirguc-Kunt et al., 2017). Moreover, greater inclusion to the formal financial system increases the chance to facilitate investments and increase business opportunities, which lead to more tax revenue to support economic growth. On the other hand, inactive individuals create challenges for regulators and policymakers because this can negatively affect the size of financial transactions in the financial system, thereby reducing the revenue to financial sector and the tax revenue, ultimately affecting economic growth (Ozili, 2020). Thus, increasing financial inclusion level can be translated to more financial activity which increase the revenue to financial sector, and eventually can raise the tax revenue to the government (Xu, 2019; Ozili, 2020). Policymakers and regulators should be concerned about taking advantage of the increase in financial inclusion activities and the possible associated increase in income by increasing tax revenues.

The objective of this paper is to examine financial inclusion in European countries by investigating the linkage between financial inclusion and tax revenues using the World Bank Global Findex Database between 2011 and 2017. The rest of the paper is structured as follows. In Section 2, existing literature will be reviewed. Section 3 details the research methodology, data, and sample. The empirical results and future recommendation are all presented in Section 4. Finally, Section 5 provides the research conclusion.

2. Literature Review

The study of financial inclusion is important for society as it represents one of the essential government policy tools (Ozili, 2020). Financial inclusion play evident role in improving living standard of the poor, increasing income equality, and enhancing the of the financial markets (Morgan and Pontines, 2014; Musau, Muathe, and Mwangi, 2018; Park and Mercado, 2015; Kim, 2016; Neaime and Gaysset, 2018). Prior studies have highlighted that financial inclusion has positive impact on economic growth and play key role in bridging the gap between poor and rich individuals (e.g. Kim, 2016; Iqbal and Sami, 2017*)*.

According to Sarma and Pais, (2011), "financial inclusion refers to a process that ensures the ease of access, availability and usage of the formal financial system for all members of an economy". It also can be introduced as the situation where individuals or firms have the ability to access to useful and affordable financial sector's products and services that meet their needs (World Bank, 2017).

In empirical literature, different themes relevant to financial inclusion have been investigated, and it has been shown that financial inclusion has the potential to improve economic growth and financial stability. For example, at the regional level, Kim (2016) investigated the impact of financial inclusion on economic growth using cross-sectional data for 40 countries between 2004 and 2011. The results revealed that a decrease in income inequality through financial inclusion induces higher economic growth. Furthermore, Kim, Yu, and Hassan (2018) also provide empirical evidence of positive impact of financial inclusion on economic growth using a sample form Organisation of Islamic Cooperation (OIC) countries.

At the country level, Mohan (2006) showed in India financial inclusion activities strengthen financial deepening by providing more resources to meet the increased demand for financial services. In addition, Sharma (2016) also documents evidences of positive relationship between economic growth in India and financial inclusion measures. In contrast, according to Okoye, Erin, and Modebe (2017), financial inclusion (measured using credit delivery to private sector) in Nigeria has positive impact on poverty reduction; however, it has not largely improved economic growth.

Empirical studies have also explored the how financial inclusion strategies influence financial stability. For instance, Neaime and Gaysset (2018) rely on a sample from MENA region to assess the effect of financial inclusion on financial stability for the period 2002–2015. They conclude that although financial inclusion has not related to poverty, it enhances financial stability. In contrast , Li (2018) show that poor people choice to access financial resources enhances their wealth and is not derived by 'keeping up with the Joneses' incentive (Note 1). Taking an international sample of that consist of 2600 banks in 86 countries between 2004 and 2012, Ahamed and Mallick (2019) provided evidence that more financial inclusion contributes to higher banking stability increases.

While literature emphasises the importance of globally initiatives and governments' efforts to enhance financial inclusion, and presents empirical evidences on the positive effect of financial inclusion in enhancing economic growth, increasing financial stability, and bringing additional income into the financial markets, very little attention has been devoted to investigating whether such policy tools have become a channel of taxation for governments.

Prior empirical studies on the impact of financial inclusion on tax revenue are scarce (Maherali, 2017; Oz-Yalaman, 2019). One of the few empirical attempts to examine this impact on tax revenue is by Oz-Yalaman (2019). She relied on a sample comprising 137 countries over the period 2011-2017 to investigate whether financial inclusion determines tax revenues. The results displayed significant positive association between different tax revenue measures and financial inclusion. Thus, according to Oz-Yalaman's data, as people become more financially included, their income is expected to increase, leading to higher tax gains for governments.

In addition, Maherali (2017) used various global databases to examine the impact of financial inclusion and digital payments on government tax revenues for countries around the world. The results indicate that both financial inclusion and digital payment have positive impact on tax revenue. Furthermore, Mitchell and Scott (2019) demonstrated that financial inclusion in Argentina, Brazil and Chile led to higher value-added tax (VAT) collection from 2002 to 2015.

This paper adds to the existing literature on this topic by bridging a significant gap on empirical studies that analyse the impact of financial inclusion on taxation. While prior studies have used samples from countries around the world, there is no research conducted at either country level or regional level. This paper attempts to fill this gap and empirically present evidence at the regional level on how financial inclusion influences tax revenue using a sample from European countries.

The insights gained through this paper can also assist governments and regulators in gaining more explanations of the association between financial inclusion activities and tax revenue to help them in assessing the outcome of financial inclusion.

3. Method

This study will examine the impact of financial inclusion on tax revenue in European countries. The data used in this paper have been collected using the World Bank's Global Financial Inclusion (Global Findex) Database and International Monetary Funds' (IMF) Financial Access Survey Database. These databases provide consistent data and well-known international sources (Sarma and Pais, 2011). One of the main advantages of using these databases is that the standardised survey and questions used to collect the data from countries around the world make it easier to compare or pool the data across countries (Asuming, Osei-Agyei, and Mohammed, 2018). The Global Findex database has been published every three years since 2011, and the latest survey was conducted in 2017(Note 2). This research uses data for 28 European countries from 2011 to 2017. The sample period was selected due to the availability of data.

Data specific to the financial inclusion variables include: Bank account (% of age +15) and credit card ownership (% age 15+). For the dependent variable, which is tax revenue, the following four measures were used: tax revenue (% of GDP), taxes on income (% of revenue), and individual income tax revenue (% of GDP), and corporate income tax revenue (% of GDP). Table 1 provides further details about the variables used in the empirical model, including the definition of each variable and the source of the data used to measure the variable. The European countries under investigation are: UK, Italy, Germany, France, Spain, Netherlands, Sweden, Finland, Ireland, Denmark, Belgium, Poland, Estonia, Bulgaria, Cyprus, Malta, Austria, Latvia, Croatia, Lithuania, Czech Republic, Hungary, Greece, Romania, Portugal, Luxembourg, Slovenia, and Slovak Republic.

Table 1. Variables definition and sources

Type	Variable name	Code	Definition	Source
Dependent variable	Tax revenue (TR)	TR	Tax revenue (% of GDP)	World Bank Database IMF Database
	Tax on income (TOI)	TOI	Tax on income, profit and capital gains (% of revenue)	World Bank Database IMF Database
	Individual income tax	ITI	Individual Income Tax Revenue (% of GDP)	IMF Fund Database
	Corporate income tax	CTI	Corporate Income Tax Revenue (% of GDP)	IMF Database
Independent	Financial inclusion :Bank account	FIB	The percentage of respondent who are reports having bank account or	Global Financial inclusion Database

variable	(% age 15+)		report personally using a mobile money service in last year.	(world bank)
	Financial inclusion :Credit card ownership (% age 15+)	FIC	The percentage of respondents who report having a credit card	Global Financial inclusion Database (world bank)
Control variables	Trade openness	Trade	Trade is the sum of exports and imports of goods and services (% of GDP)	World Bank national accounts data OECD National Accounts data files.
	GDP	GDP	Gross domestic product divided by midyear population	World Bank national accounts data OECD National Accounts data files.
	Political stability	PS	Political stability and the absence of violence	World Bank Database
	Tariff	TRFF	Simple mean applied tariff rate is the unweighted average of effectively applied rates for all products subject to tariffs (% of all products)	World Bank Database
	Government debt	GOVD	Central government debt which i s the entire stock of direct government fixed-term contractual obligations to others outstanding on a particular date (% of GDP).	World bank Database IMF Database
	Inflation	INF	Inflation, consumer prices (annual %)	IMF Database
	Income tax rate	ITR	Income Tax Rate (%)	IMF Database, Heritage Foundation, Index of economic freedom
	Corporate tax rate	CTR	Corporate Tax Rate (%)	IMF Database

To the best of our knowledge, this is the first empirical study to test the link between financial inclusion and tax revenues in Europe using the Global Findex database. This research focuses on European countries because prior empirical studies test the association between financial inclusion and tax revenues using international samples (e.g. Maherali, 2007; Oz-Yalaman, 2019). However, financial inclusion can vary from region to region, which may affect the overall association between financial inclusion and tax revenues. Thus, analysing the connection between financial inclusion and tax revenue in a regional context can shed more light on this area. In this study, the sample countries share many characteristics and have few differences in the structure and regulation of their financial system. Relying on specific sub-samples of the World Bank Global Financial inclusion survey can lead to additional insights (Botrić and Broz, 2017).

3.1 Model

Following existing financial inclusion literature, the Ordinary Least Square (OLS) estimation technique is applied to investigate the effect of financial inclusion tax revenue (e.g. Sarma and Pais, 2011; Zhang and Posso, 2019; Oz-Yalaman, 2019). This study uses four different dependent variables for tax revenue. Our estimating equations are:

$$TR_{it} = \beta 0 + \beta 1\, FI_{it} + \beta 2\, Trade_{it} + \beta 3\, GDP_{it} + \beta 4\, PS_{it} + \beta 5\, TRFF_{it} + \beta 6\, GOVD_{it} + \beta 7\, INF_{it} + \beta 8\, ITR_{it} + \beta 9\, CTR_{it} + \mu_t + \acute{\varepsilon}_{i,t} \quad (1)$$

$$TOI_{it} = \beta 0 + \beta 1\ FI_{it} + \beta 2\ Trade_{it} + \beta 3\ GDP_{it} + \beta 4\ PS_{it} + \beta 5\ TRFF_{it} + \beta 6\ GOVD_{it} + \beta 7\ INF_{it} + \beta 8\ ITR_{it} + \beta 9\ CTR_{it} + \mu_t + \acute{\varepsilon}_{i,t} \quad (2)$$

$$ITI_{it} = \beta 0 + \beta 1\ FI_{it} + \beta 2\ Trade_{it} + \beta 3\ GDP_{it} + \beta 4\ PS_{it} + \beta 5\ TRFF_{it} + \beta 6\ GOVD_{it} + \beta 7\ INF_{it} + \beta 8\ ITR_{it} + \beta 9\ CTR_{it} + \mu_t + \acute{\varepsilon}_{i,t} \quad (3)$$

$$CTI_{it} = \beta 0 + \beta 1\ FI_{it} + \beta 2\ Trade_{it} + \beta 3\ GDP_{it} + \beta 4\ PS_{it} + \beta 5\ TRFF_{it} + \beta 6\ GOVD_{it} + \beta 7\ INF_{it} + \beta 8\ ITR_{it} + \beta 9\ CTR_{it} + \mu_t + \acute{\varepsilon}_{i,t} \quad (4)$$

Where *i* refers to the country and *t* to the year, β0 constant intercept ; *TR* is tax revenue (% of GDP); *TOI* is taxes on income (% of revenue); *ITI* is individual income tax revenue (% of GDP); *CTI* and corporate income tax revenue (% of GDP); *FI* is financial inclusion; *Trade* is trade openness; *GDP* is GDP per capita; *PS* is political stability; *TRFF* is tariff rate; GOVD is central government debt; *INF* is inflation rate; *ITR* is income tax rate; *CTR* is corporate tax rate.

In the regressions, the dependent variable is a ratio such as tax revenues/GDP; this research follows prior studies and uses logistic transformation of dependent variables to fit a model (e.g., Oz-Yalaman, 2019). Financial inclusion is initially considered through indicators that calculate the percentage of population using specified financial service.

3.2 Measures of Financial Inclusion

In line with prior literature, financial inclusion is investigated using two different measures. The first is the bank account (% of age +15), which is the percentage of respondents who report having an account at a bank or another type of financial institution or report personally using a mobile money service (Sarma and Pais, 2011; Musau et al, 2018; Zachosova et al., 2018).

Literature suggests that one of the key issues of measuring financial inclusion depending on the percentage of bank account is the problem of inactive users. Ozili (2020) argue that after investing substantial effort and resources to include individuals into the formal financial system, there is a chance that these individuals intend to become inactive users after a period of time. This can happen when the account exists on paper but is not used for a while or when an individual chooses to open formal accounts but refuses to own credit or debit cards (Shankar, 2013; Ozili, 2020). Therefore, a second proxy for financial inclusion is used; this measure focuses on credit card ownership (% age 15+), which is defined as the percentage of respondents who report having a credit card (Zachosova et al., 2018; Zhang and Posso, 2019).

3.3 Measures of Tax Revenue

Previous studies employ various proxies for direct tax revenue (Karran, 1985; Bohn, 1990; Hsieh and Parker, 2007; Taha, Colombage, Maslyuk, and Nanthakumar, 2013; Castro and Camarillo, 2014; Alena, Lucia, and Slavomira, 2017; Oz-Yalaman, 2019). In this research, four measures are used for tax revenues: tax revenue (% of GDP), taxes on income (% of revenue), and individual income tax revenue (% of GDP), and corporate income tax revenue (% of GDP). All the necessary data for the tax revenue (% of GDP) and taxes on income (% of revenue) variables have been gathered from World Banks' World Database. The data for individual income tax revenue (% of GDP), and corporate income tax revenue (% of GDP) variables are collected using the International Monetary Fund database.

According to existing research, there is an expected positive association between tax revenues and financial inclusion (e.g., Maherali, 2017; Oz-Yalaman, 2019). Financial inclusion is expected to make individuals and businesses healthier as their incomes increase. In addition, previous empirical evidences document a negative association between financial inclusion and poverty, leading to higher income equality (Chibba, 2009; Allen et al., 2016; Mohammed, Mensah, and Gyeke-Dako, 2017).

In theoretical and empirical literature, several variables are identified as determinant factors of tax revenue. To explain the association between financial inclusion and tax revenues, standard control variables are widely used in the literature. Thus, the following explanatory variables are included as control variables: GDP per capita, Openness degree, degree of political stability, inflation, tariff rate, income tax rate, and corporate tax rate (Agbeyegbe, Stotsky, and WoldeMariam, 2006; Gupta, 2007; Oz-Yalaman, 2019).

GDP per capita is consider the most common determinant of tax revenues that capture level of development, and it is expected to affect tax revenue positively (Agbeyegbe et al., 2006; Gupta, 2007; Castro and Camarillo, 2014). Previous tax effort studies have also showed that openness degree may also affect tax revenues. The degree of political stability represents an institutional factor that may influence tax revenues. Increasing the political stability of the country can improve the efficiency of tax policy, which raises tax revenues (Karagöz, 2013). Furthermore, the inflation rate is included as a control variable; introduced by literature as macroeconomic variable that determines tax revenue. Agbeyegbe et al. (2006) and Tanzi (1989) found that the inflation rate is indeed a significant

determinant of tax revenue. These studies documented a negative association between inflation rate and tax revenue. A higher inflation rate can alter the value income components that depress tax revenue. In addition, to control for the effect of countries' tax policies, tariff rate, income tax rate, and corporate tax rate are also added (Ebrill, Stotsky, and Gropp, 1999; Agbeyegbe et al., 2006; Oz-Yalaman, 2019).

4. Results and Discussion

In this section, the descriptive statistics, correlation coefficients of all dependent variables, and the results of the OLS regressions are presented. The results of this study complement the finding of previous research, identifying financial inclusion as a key determinant of tax revenue and showing that more financial inclusion results in higher tax revenue (Maherali, 2007; Oz-Yalaman, 2019). Table 2 details the descriptive statistics for all tax revenue variables and financial inclusion variables. The descriptive statistics for the control variables are presented in Table 3.

Table 2. Descriptive statistics for tax variables and financial inclusion

Variable	Obs	Mean	Std. Dev.	Min	Max
TR	84	3.086495	0.1880857	2.527807	3.59732
TOI	84	3.011142	0.4578531	1.803876	3.872233
ITI	84	1.869091	0.5292872	0.9799968	3.27143
CTI	84	0.8750441	0.414045	-0.2119563	1.865206
FIB	84	88.98503	12.06657	44.59163	100
FIC	84	35.5456	16.67353	10.04441	72.40598

Table 3. Descriptive statistics for control variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Trade	84	128.9588	71.15662	55.14552	400.0795
GDP	84	42873.85	23609.4	7813.807	107361.3
PS	84	0.8690476	0.3393744	0	1
TRFF	84	2.875	0.3723468	2.23	3.29
GOVD	84	10.93479	11.39607	-9.586033	50.63219
INF	84	1.751933	1.524095	-1.418184	5.789253
ITR	84	31.91548	3.063642	27.7	39.8
CTR	84	27.48214	0.8982125	25.8	30.5

In Table 4, the matrix correlation coefficients are listed. The pair-wise correlation matrix test is used to investigate the existence of a perfect linear relationship among the explanatory variables. As the data shows, the coefficients of the explanatory variables are below 0.7. Multicollinearity only becomes a concern if the correlation coefficient is above 0.70 (Anderson, Sweeney, and Williams, 1990; Baltagi, 2008; Hsiao, 2014).

Table 4. Correlation matrix of the dependent variables

	FIB	FIC	Trade	GDP	PS	TRFF	GOVD	INF	ITR	CTR
FIB	1									
FIC	0.6361	1								
Trade	0.1148	0.2269	1							
GDP	0.0033	-0.0051	-0.1352	1						
PS	-0.1714	0.0704	-0.0311	0.1348	1					

TRFF	0.1448	0.002	0.0483	0.1299	0.2741	1				
GOVD	0.0367	0.161	-0.1617	-0.0141	0.332	0.1591	1			
INF	-0.1862	-0.0181	-0.0186	-0.0142	-0.2297	-0.679	-0.1245	1		
ITR	0.0877	0.0659	-0.0105	-0.0928	-0.1151	0.0288	-0.0473	-0.1585	1	
CTR	-0.0665	0.0467	0.0765	-0.0988	-0.0117	0.0383	-0.1299	-0.0752	0.1921	1

The possible presence of multicollinearity problem is also tested using the variance inflation factor (VIF) test. Following the test, the results confirm that there are no multicollinearity problems with the independent and control variables. None of the VIFs exceed 2. According to prior studies, the value of the VIF should not exceed 10, and all the values reported for the VIF test are below the commonly accepted VIF cut-off threshold of 10 (Field, 2000; Hassan, 2009). Results of VIF test are reported in Appendix Table A1.

In Tables 5 to 8, the OLS estimation results are listed. Table 5 presents the results of Model 1, which investigates the effect of financial inclusion as measured by bank account (% age 15+) and credit card ownership (% age 15+) on tax revenue as measured by *TR*. The regression results reveal that both financial inclusion proxies have significant and positive effect on *TR* at the 1% level. These results suggest that financial inclusion is a channel for tax revenue where higher financial inclusion leads to an increase in tax revenue. Thus, as more individuals become financially included in the formal financial sector, their income and wealth will increase, which in turn raises their tax contributions. These results are consistent and conform to the findings of prior studies (Maherali, 2007; Oz-Yalaman, 2019; Mitchell and Scott, 2019).

Table 5. Regression results of Model 1: dependent variable tax revenue

	Bank account (% age 15+)		**Credit card ownership (% age 15+)**	
	Coefficient	T-statistics	Coefficient	T-statistics
FI	0.0065692	4.02	0.0033152	2.72
	(0.0000) ***		(0.008)***	
Trade	0.0001913	0.72	0.0001251	0.43
	(0.4760)		(0.667)	
GDP	0.0001240	1.4	0.0001160	1.24
	(0.051) *		(0.062)*	
PS	0.0872227	1.4	0.0184924	0.29
	(0.1640)		(0.77)	
TRFF	-0.6175735	-2.39	-0.623734	-2.29
	(0.0190)**		(0.025)**	
GOVD	-0.0021048	-1.17	-0.0025196	-1.31
	(0.2470)		(0.195)	
INF	0.0189024	0.81	0.0031542	0.13
	(0.4210)		(0.896)	
ITR	0.0037833	0.6	0.0042225	0.64
	(0.5500)		(0.527)	
CTR	0.0105861	0.5	0.000104	0.3
	(0.6170)		(0.996)	
dum2011	-0.5243967	-2.44	-0.5489064	-2.43
	(0.0170)**		(0.018)**	

dum2014	0.0016891	0.03	-0.029657	-0.49
	(0.9770)		(0.628)	
Cons	3.982687	4.12	4.856564	4.85
	(0.0000)***		(0.0000)***	
R2	0.3273		0.2527	
Prob(F-statistics)	0.0015		0.0226	

P-values are reported in parentheses, ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively.

In Tables 6 and 7, the regression results for Models 2 and 3 are presented, respectively. These models investigate the effect of financial inclusion variables on tax revenue. In Table 6, the dependent variable is tax revenue, which is measured using taxes on income, profits and capital gains as percentage of total revenues. While in Table 7, tax revenue is measured by individual income tax revenue in percent of GDP.

These analyses demonstrate that the impact of financial inclusion on these measures of tax revenue is positive and statistically strong. These results indicate that as financial inclusion increases, the government will receive more tax revenues. These results reported in Table 6 and Table 7 are consistent using different proxies for financial inclusion and when tax revenue is measured as tax on income as a percentage of revenue or when measured as individual income tax revenue as a percentage of GDP. Thus, the results reported in Tables 6 and 7 maintain the significance and sign of the results in Table 5 regarding the impact of financial inclusion in tax revenue.

Table 6. Regression results of Model 2: dependent variable tax on income

	Bank account (% age 15+)		**Credit card ownership (% age 15+)**	
	Coefficient	T-statistics	Coefficient	T-statistics
FI	0.0117237	2.89	0.0104331	3.76
	(0.0050)***		(0.0000)***	
Trade	0.00110	1.66	0.0007007	1.07
	(0.1020)		(0.29)	
GDP	0.0000027	1.23	0.00026800	1.26
	(0.0210) **		(0.024) **	
PS	0.0518708	0.34	-0.0746947	-0.52
	(0.7370)		(0.605)	
TRFF	-0.0480697	-0.08	-0.0871965	-0.14
	(0.9400)		(0.888)	
GOVD	0.0145739	3.26	0.01254	2.86
	(0.0020)***		(0.006) ***	
INF	0.0446748	0.77	0.0225901	0.41
	(0.4430)		(0.681)	
ITR	0.0193097	1.23	0.0180284	1.19
	(0.2210)		(0.237)	
CTR	0.0693963	1.33	0.0468844	0.93
	(0.1890)		(0.355)	
dum2011	-0.0547405	-0.1	-0.1362952	-0.26

	(0.9180)		(0.792)	
dum2014	0.0378717	0.26	-0.0017769	-0.01
	(0.7950)		(0.99)	
Cons	-0.7192239	-0.3	0.9859884	0.43
	(0.7660)		(0.666)	
R2	0.3002		0.3471	
Prob(F-statistics)	0.0042		0.0006	

P-values are reported in parentheses, ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively.

Table 7. Regression results of Model 3: dependent variable individual income tax revenue

	Bank account (% age 15+)		**Credit card ownership (% age 15+)**	
	Coefficient	T-statistics	Coefficient	T-statistics
FI	0.0330044	8.45	0.0239601	8.87
	(0.0000)***		(0.0000)***	
Trade	0.00155	2.42	0.00233	3.64
	(0.0180)**		(0.001)***	
GDP	0.000261	1.23	0.00237	1.14
	(0.022)**		(0.025)**	
PS	0.2353386	1.58	-0.1162873	-0.83
	(0.1170)		(0.408)	
TRFF	0.282127	0.46	0.2056807	0.34
	(0.6490)		(0.734)	
GOVD	0.004957	1.15	0.0091332	2.14
	(0.2540)		(0.036)**	
INF	0.0809694	1.45	0.0115847	0.22
	(0.1510)		(0.829)	
ITR	0.0001839	0.01	-0.0009492	-0.06
	(0.9900)		(0.949)	
CTR	0.0658181	1.31	0.0070014	0.14
	(0.1960)		(0.887)	
dum2011	0.1862721	0.36	0.0019812	0.11
	(0.7180)		(0.997)	
dum2014	0.1542393	1.1	0.0231019	0.17
	(0.2750)		(0.864)	
Cons	-3.787834	-1.64	0.8381663	0.38
	(0.1060)		(0.706)	
R2	0.5139		0.5376	
Prob(F-statistics)	0.0000		0.0000	

P-values are reported in parentheses, ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively.

Some of the results obtained for Model 4 are slightly different to those for Model 1 to Model 3. The results reported in Table 8 still exhibit positive and significant correlation between financial inclusion and tax revenue when corporate income tax revenue is used as a proxy for tax revenue. However, when using bank account (% age 15+) as a measure for financial inclusion, the results have a weak positive association with tax revenue (at 10% level of significant). Nevertheless, the second measure for financial inclusion (credit card ownership % age 15+) is still showing highly significant positive correlation with corporate income tax revenue at 1% level.

Table 8. Regression results of Model 4: dependent variable corporate income tax revenue

	Bank account (% age 15+)		**Credit card ownership (% age 15+)**	
	Coefficient	T-statistics	Coefficient	T-statistics
FI	0.0062484	1.85	0.0067382	2.91
	(0.0680)*		(0.0050)***	
Trade	0.0026526	4.81	0.0023681	4.32
	(0.0000)***		(0.0000)***	
GDP	0.000137000	0.070	0.000000130	0.07
	(0.941)		(0.9420)	
PS	0.3313648	2.58	0.2628906	2.19
	(0.0120)***		(0.0310)**	
TRFF	-0.4242336	-0.8	-0.4524219	-0.88
	(0.4290)		(0.3840)	
GOVD	0.0085184	2.29	0.0070971	1.94
	(0.0250)**		(0.0560)*	
INF	0.0559219	1.16	0.0661228	1.45
	(0.2500)		(0.1520)	
ITR	0.0119659	0.92	0.0107445	0.85
	(0.3610)		(0.3970)	
CTR	0.0048195	0.11	-0.0081707	-0.19
	(0.9120)		(0.8460)	
dum2011	-0.2309534	-0.52	-0.2842788	-0.66
	(0.6040)		(0.5100)	
dum2014	-0.1736573	-1.43	-0.1905408	-1.65
	(0.1560)		(0.1040)	
Cons	0.5281408	0.26	1.474944	0.78
	(0.7920)		(0.4400)	
R2	0.4075		0.4446	
Prob(F-statistics)	0.0000		0.0000	

P-values are reported in parentheses, ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively.

Overall, all regressions models confirm that financial inclusion has significant positive association with tax revenue collection in European countries. This positive impact is consistent when using different proxies of tax revenues and financial inclusion.

Regarding the control variables, the obtained results confirmed the findings of prior theoretical and empirical research; namely, the positive impact of GDP per capita and trade openness (Agbeyegbe et al., 2006; Arif and Rawat, 2018; Gupta, 2007). GDP per capita, which captures the level of development, is found to be positively associated with tax revenues. This shows that European countries, as developed economies tend to have more efficient tax administration; this can explain the positive association between GDP per capita and tax revenue proxies (Pessino and Fenochietto, 2010).

The positive association between trade openness and tax revenue is significant when using individual tax revenue and corporate tax revenue to measure tax, as reported in Tables 7 and 8. This is consistent with the finding of Agbeyegbe et al. (2006) who found that trade openness is not strongly linked to the total tax revenue, but has positive effect on income tax revenue. Moreover, a higher level of trade openness can lead to more profit and hence generate higher tax revenues. Thus, greater trade openness is associated with an increase in individual and corporate income tax revenues.

Government debt also has a positive and significant association with taxes on income, individual income tax revenue, and corporate income tax revenue. In this case, a higher level of government debt can influence tax revenue positively because this debt needs to be financed (Chaudhry and Munir, 2010; Oz-Yalaman, 2019). Furthermore, inflation, which is used as a proxy for macroeconomic stability, is found to be positive but insignificant with the tax revenue of the European countries. Prior tax empirical literature documents positive and insignificant relationship between tax and inflation (e.g., Arif and Rawat, 2018). For instance, Shin (1969) shows that for 16 high income countries inflation and other control variables were not significant with tax ratio. Other studies have documented a negative relationship between tax revenue and inflation (Pessino and Fenochietto, 2010). Nevertheless, Arin and Koray (2006) provide empirical evidence that different taxes will have different effects, which is a key factor behind the variation in the mixed signs for macroeconomic variables in the literature.

As an institutional variable, political stability is positively correlated with corporate income tax revenue in Table 8. Thus, by achieving a higher level of political stability, the government can generate more tax revenue (Chaudhry and Munir, 2010). In the study by Gupta (2007), political stability is noted to be an effective factor in tax revenue, but only across certain specifications of the analysis. Similarly, Arif and Rawat (2018) indicate that political stability is a variable included in governance indicators leading to efficient tax administration that consequently increases the performance of the tax revenues. In other words, people can have better perception of their governments, making them more compliant with tax regulation and less likely to engage in tax evasion (Castro and Camarillo, 2014).

Policy variables such as corporate tax rate, income tax rate, and tariff rate are insignificant in most specifications. These results are consistent with prior studies that document insignificant and inconsistent signs in some regressions for the relation between tax revenues and policy variables (e.g., Oz-Yalaman, 2019). This study shows that financial inclusion has the potential to improve the government's tax revenue, especially when a large share of the population is included in the formal financial system. Furthermore, the results presented in this paper indicate that financial inclusion can improve individual and business income.

4.1 Additional Analyses

Several proxies are used for tax revenue and for financial inclusion to check the robustness of the results. Furthermore, in this section, the association between financial inclusion and tax revenue is tested by using random effect model.

Table 9. Regression results of Model 1-4: dependent variable tax revenue

	Model 1		**Model 2**		**Model 3**		**Model 4**	
	FIB	**FIC**	**FIB**	**FIC**	**FIB**	**FIC**	**FIB**	**FIC**
FI	0.00323**	0.00602	0.00435*	0.00407*	0.00700**	0.00778***	-0.00600	0.00574*
	(0.0470)	(0.6430)	(0.0810)	(0.0520)	(0.0110)	(0.0000)	(0.8840)	(0.0650)
Trade	0.00023	0.00028	0.00041	0.00033	-0.00058	-0.00042	0.00172**	0.00153*
	(0.5430)	(0.4890)	(0.5640)	(0.6360)	(0.4490)	(0.5650)	(0.0460)	(0.0670)
GDP	-0.00709*	-0.00645*	-0.00561	-0.00420	`-0.00362	-0.00192	-0.00189*	-0.00184*

	(0.0570)	(0.0860)	(0.2970)	(0.4210)	(0.5270)	(0.7230)	(0.0700)	(0.0760)
PS	0.03474	0.03087	0.09657	0.10292***	0.07626*	0.08707**	0.18374**	0.19794***
	(0.1950)	(0.2550)	(0.0130)	(0.0070)	(0.0630)	(0.0260)	(0.0150)	(0.0080)
TRFF	-0.69003*	-0.70558	0.06233	0.01833	0.08355	-0.00084	-0.00500	-0.05650
	(0.0960)	(0.1090)	(0.1200)	(0.9850)	(0.9370)	(0.9990)	(0.9950)	(0.9440)
GOVD	-0.00055	-0.00052	-0.00184	-0.00336*	-0.00355*	-0.00598***	0.00204	0.00012
	(0.6530)	(0.6980)	(0.3130)	(0.0830)	(0.0670)	(0.0030)	(0.5350)	(0.9720)
INF	0.01140	0.00717	0.01531*	-0.00875	0.01003	-0.00204	-0.01971	-0.02207
	(0.2010)	(0.4150)	(0.0870)	(0.4730)	(0.4630)	(0.8720)	(0.4320)	(0.3650)
ITR	-0.00007	0.00020	0.00247	0.00287	0.00173	0.00099	0.00227	0.00076
	(0.9730)	(0.9270)	(0.4100)	(0.3310)	(0.5900)	(0.7470)	(0.7050)	(0.8990)
CTR	0.00718	0.00444	0.00411	0.00085	0.01768	0.01058	-0.04324**	-0.04380**
	(0.3390)	(0.5520)	(0.7040)	(0.9340)	(0.1210)	(0.3190)	(0.0430)	(0.0360)
dum2011	-0.58523*	-0.60515*	-0.05930***	-0.03008	0.01108	-0.07005	-0.05555	-0.09332
	(0.0740)	(0.0810)	(0.0040)	(0.9680)	(0.9890)	(0.9320)	(0.9340)	(0.8840)
dum2014	-0.00947	-0.01970	-0.05033***	-0.06351	0.00320	-0.01577	-0.11700*	-0.11297*
	(0.7360)	(0.4920)	(0.0050)	(0.2430)	(0.9580)	(0.7870)	(0.0880)	(0.0850)
Cons	4.74209***	5.13126***	2.13352***	0.38100	0.50540	1.35694	1.82827	1.82902
	(0.0000)	(0.0000)	(0.0000)	(2.6681)	(0.8810)	(0.6800)	(0.5100)	(0.4820)
R2	0.2957	0.2830	0.3004	0.3879	0.4874	0.3879	0.3566	0.3923

The dependent variable is measured as Tax revenue in model 1, Taxes on income in model 2, Individual Income Tax Revenue in model 3, and Corporate Income Tax Revenue in model 4. P-values are reported in brackets, ***, **, and * indicate statistical significance at 1%, 5% and 10% levels respectively.

To choose between the fixed effect model and the random effect model, the Hausman (1978) test is applied. The results from the Hausman test indicate the random effect model would be more appropriate.

In Table 9, the results of the random effect model are presented. In this, two variables are used to measure financial inclusion: bank account and credit card ownership. The results are consistent with the results in the previous section in sign, magnitude, and significance. In general, both measures of financial inclusion are still positively and statistically significant to tax revenue in European countries.

To extend this research further, it can be extended by considering separate measures for direct and indirect tax revenues. Moreover, this paper has focused on the regional level by using a sample from European countries; future researches may use different regional classification to examine the effect of financial inclusion on taxation; for example, Latin America and Caribbean, East Asia and the Pacific, Middle Sub-Saharan Africa, East and North Africa, and South Asia. In doing so, this enables comparability between analysed regions in term of the impact of financial inclusion on tax revenue and provides a deeper insight of the issue.

5. Conclusions

The role of financial inclusion in enhancing economic development and in alleviating poverty level has become a topic of interest among academics and policymakers. Over the last decade, financial inclusion has evolved to be a key policy tool for governments to achieve economic stability. Thus, given the increased attention financial inclusion has received in the last few years, this paper investigate the impact of financial inclusion on tax revenue in a sample of European countries over the 2011 – 2017 period.

Few previous studies have tested the association between financial inclusion and tax revenue. However, these studies rely on international samples, while this paper represents the first attempt to discuss this topic in the context of

European nations. Additionally, this study further expands prior financial inclusion literature by using different proxies for financial inclusion and tax revenues.

The research results confirm the significant positive impact of financial inclusion on four different tax revenue measures: tax revenue (% of GDP), tax on income (% of revenue), and individual income tax revenue (% of GDP), and corporate income tax revenue (% of GDP). This positive association is consistent using two proxies for financial inclusion: bank account (% age 15+) and credit card ownership (% age 15+). Hence, the study observed that when more people are financially included in the formal financial system, their tax contribution to the government will increase. Thus, the results indicate that financial inclusion can be considered as a determinant of tax revenue, and therefore, regulators and policymakers can take advantage of the benefits behind financial inclusion. This can be achieved by investing more attention in this subject and by prioritising financial inclusion in their policy design. Moreover, future researches can shed more lights on the impact of financial inclusion on tax revenue by using different regional classification.

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Notes

Note 1. This is the situation when poor people financing behavior is driven by jealousy to emulate the consumption style of richer household (Guven and Sorenson, 2012).

Note 2. The Global Findex dataset represent "the world's most comprehensive dataset on how adults save, borrow, make payments and manage risk" (The World Bank, 2018, https://globalfindex.worldbank.org).

Appendix

Table: A1

Results of multicollinearity test

Variable	VIF	1/VIF
FI	1.13	0.88174
Trade	1.08	0.92519
GDP	1.09	0.91914
PS	1.32	0.76033
TRFF	1.99	0.50321
GOVD	1.21	0.82801
INF	2	0.50039
ITR	1.1	0.9071
CTR	1.08	0.92459
Mean VIF	1.33	