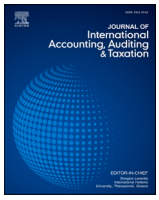
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Financial development and tax evasion: International evidence from OECD and non-OECD countries

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ABSTRACT

This study investigates the nexus between financial development and tax evasion across 156 countries from 2000 to 2017. In contrast to previous research focusing solely on banks or financial markets' development, we employ a more comprehensive financial development index introduced by the International Monetary Fund (IMF) in 2016. This index gauges the progress of financial institutions (FI) and financial markets (FM) in terms of depth, access, and efficiency. Our findings underscore a negative correlation between financial development and tax evasion. Enhanced depth, access, and efficiency in both FI and FM correspond to reduced levels of tax evasion. Nevertheless, disparities emerge between the Organization of Economic Cooperation and Development (OECD) and non-OECD countries. While non-OECD countries exhibit negative associations between FI and FM development and tax evasion, in OECD countries, the role of FI assumes greater significance in curtailing tax evasion. Notably, within OECD countries, the depth of FI and FM emerges as the sole influential factor. This contrasts starkly with non-OECD counterparts, where all dimensions – depth, access, and efficiency – negatively influence tax evasion. Our research has noteworthy implications for policymakers in both categories of countries.

1. Introduction

Financial systems play a significant role in economies through their influence on investment and saving decisions and, eventually, economic growth (Beck & Levine, 2004; Beck, Levine, & Loayza, 2000; King & Levine, 1993; Wahidin, Akimov, & Roca, 2021). Financial development refers to the improvements taking place over time in the various functions of a financial system, including savings accumulation, capital investment allocation and monitoring, and risk diversification (Levine, 2005). Continuous improvements in these functions alleviate information asymmetries and enhance risk sharing, leading to enhanced financial system stability and less economic volatility and inequality (International Monetary Fund (IMF), 2016).

The association between financial development and tax evasion has been examined in a few studies (e.g., Ahamed, 2016; Bittencourt, Gupta, & Stander, 2014; Blackburn, Bose, & Capasso, 2012; Bose, Capasso, & Andreas Wurm, 2012; Capasso & Jappelli, 2013; Guo & Hung, 2020; Hajilee, Stringer, & Metghalchi, 2017, 2021). The earliest empirical evidence by Bose et al. (2012) indicates that developments in the banking sector are negatively associated with the size of the shadow economy, a common proxy for tax evasion. In addition, Blackburn et al. (2012) propose a theoretical model that suggests a negative relationship between tax avoidance and the level of financial development. Furthermore, Bittencourt et al. (2014) report empirical evidence of a negative link between tax evasion levels and the financial sector development level.

The prevailing theme of these studies suggests that tax evasion is more prevalent in less financially developed societies. The increase in the size of shadow economies is usually a by-product of the increase in tax burden. Higher tax burdens provide an incentive for undertaking business operations in the informal economic sector and avoiding additional payments to the government (Schneider, 2000). Less

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financially developed countries suffer from a lack of loanable funds and competition, limited resources of financial institutions to manage information, and potentially high levels of financial repression (Bose et al., 2012). Accordingly, individuals and businesses in less developed countries will have less motivation to declare their income when applying for loans, for example. Declaring income may make these parties subject to tax liabilities, and in the lack of a high financial development incentive, they will opt to stay in the showdown economy (i.e., higher tax evasion). Nevertheless, these studies have limitations tied to their scope and the metrics used to assess the link between financial development and tax evasion.

The financial development proxy measures utilized in prior research are subject to criticism (IMF, 2016). A common proxy of countries' financial development is either the ratio of private credit to Gross National Product (GDP) or stock market capitalization to GDP; both are criticized for not considering the different dimensions of the financial development construct (IMF, 2016).[1] Such constructs reflect the overall level of financial development and do not, for example, differentiate between the level of financial development in financial institutions on one side and financial markets on the other (e.g., Berdiev & Saunoris, 2016; Bittencourt et al., 2014). For example, Bittencourt et al. (2014) study of financial development and tax evasion focuses only on the banking sector. This view partially reflects a country's financial development level as it does not consider the role of financial markets as an integral part of the financial system. Banks play a main role in providing financial services, but nonbanks and financial markets are affecting access and efficiency of financial services and have an impact on economic growth (Sahay, Čihák, N'Diaye, & Barajas, 2015). In addition, although some studies consider the depth (e.g., Berdiev & Saunoris, 2016; Bittencourt et al., 2014) and efficiency (e.g., Bittencourt et al., 2014) dimensions of financial development, they do not include the accessibility dimension, i.e., the ability of individuals and companies to access financial services.[2] This is probably due to the lack of a proper measure for such a dimension. Accessibility holds significant importance, as it is contended to play a pivotal role in realizing the United Nations SDG1 (Sustainable Development Goal) of eradicating extreme poverty (Kara, Zhou, & Zhou, 2021).

Recognizing these criticisms, the International Monetary Fund (IMF) (2016) introduced a multidimensional measure that is made of nine indices that show a country's level of financial development under two groups: financial institutions and financial markets, reflecting their depth, efficiency, and access. Undoubtedly, differentiating between the roles of financial institutions and financial markets becomes imperative when examining their influence on tax evasion. Specifically, financial institutions like banks can curtail tax evasion due to the enhanced traceability of transactions they facilitate. This enhanced traceability results from the rigorous regulatory frameworks and oversight mechanisms to which banks are subjected. Furthermore, the move towards digital banking and the decreasing reliance on cash transactions restrict the scope of the shadow economy, making tax evasion more difficult. On the other hand, the role of financial markets, particularly those less regulated, in influencing tax evasion is more complex. While well-regulated and transparent financial markets can similarly discourage shadow economic activities, less regulated or informal markets might provide avenues for such activities, potentially facilitating tax evasion. Hence, understanding the distinct roles of each element within the financial system becomes indispensable when examining the impact of financial development on tax evasion.

Accordingly, we argue that there is a case to revisit the relationship between financial development and tax evasion to take advantage of the new holistic approach to measuring financial development. This should provide us with better insights into how financial institutions and financial markets development (by depth, access, and efficiency) can help in the fight against tax evasion. We also extend our analysis by examining the relationships in both OECD and non-OECD countries to determine whether the same (or different) elements of financial development are significant in limiting tax evasion in each of the two groups.

After controlling for social and economic differences among the 156 countries included in the study, the results indicate a lower level of tax evasion in countries with higher levels of financial development. These results remain the same in the financial institutions and market development levels. We find that greater depth, access, and efficiency in these areas tend to lead to lower levels of tax evasion. However, the relationship between financial development and tax evasion appears to differ when comparing OECD and non-OECD countries. In non-OECD countries, both financial institutions and markets display a negative relationship with tax evasion. Conversely, in OECD countries, only the depth of financial institutions and markets emerges as a significant factor in reducing tax evasion, diverging from non-OECD countries where all dimensions of financial development (depth, access, and efficiency) negatively impact tax evasion.

This study makes several critical contributions to the literature exploring the determinants of tax evasion and the role of financial development. First, it utilizes the multidimensional Financial Development Index (FDI) introduced by the IMF (IMF, 2016) as a comprehensive tool for examining the relationship between financial development and tax evasion. This new measure reflects a country's level of financial development by considering its depth, efficiency, and accessibility. As such, it provides a more nuanced perspective than traditional indices, which have been criticized for their limited view of financial development. Our use of this more robust measure fills an important gap in the current literature. Secondly, we adopt a comprehensive perspective by examining the impact of financial development on tax evasion at two distinct levels: the overall FDI and its constituent components, namely, financial institutions and financial markets development. This nuanced approach allows us to unearth the differential impacts of these components on tax evasion, thereby offering a more detailed understanding of the mechanisms at work. Furthermore, our research extends the existing discourse by conducting a comparative analysis across both OECD and non-OECD countries. This extension allows us to explore whether the same or different aspects of financial development play significant roles in limiting tax evasion within these two distinct groups. This novel contribution highlights the different impacts of financial development across various economic and social contexts, thus underscoring the need for context-specific policy responses.

In essence, our research provides a significant step forward in understanding the intricate dynamics of financial development and tax evasion. It provides novel insights that can aid in formulating effective strategies and policies for tax evasion mitigation, catering to the unique financial development landscape of different countries. As such, our findings have vital implications for both scholars and policymakers.

The following section sets out the background of the research, highlighting the role of tax evasion in public economics and the different research directions scholars pursue to explain the tax evasion phenomenon. This is followed by hypotheses development and research design. The empirical results and implications are then discussed, leading to our concluding remarks, research limitations, and suggestions for future research.

[1] For example, Bittencourt et al. (2014) used two constructs as measures of financial development. The first included domestic credit provided by banks, domestic credit provided to the private sector, liquid liabilities, and market capitalization of listed companies, all as percentages of GDP. The second construct included the lending rate minus deposit rate in addition to the domestic credit measures of the first construct.

[2] Depth reflects the size and liquidity of the market. Financial institutions efficiency reflects their ability to provide low-cost financial services, whereas financial markets efficiency is reflected by their level of activity.

2. Research background

Tax evasion is a major issue in public economics due to its impact on the provision of public services resulting from reduced tax collections (Alm, 2012; Shi et al., 2023). It contributes toward promoting a general feeling of injustice among compliant taxpayers. The negative consequences of tax evasion are even worse in less developed, lower-income countries since tax evasion is higher in these countries. Globally, the average size of the shadow economy, a commonly used proxy of tax evasion, is 31.9 % of GDP (Medina & Schneider, 2018). The largest shadow economies are Georgia, Bolivia, and Zimbabwe (64.9 %, 62.3 %, and 60.6 %, respectively), whereas the smallest shadow economies are Switzerland, the US, and Austria (7.2 %, 8.3 %, and 8.9 %, respectively). All OECD countries are below 20 %, whereas Sub-Saharan African countries are above 36 %. In other words, low-income countries have the highest level of tax evasion, and high-income countries have the lowest.

In their attempt to explain the tax evasion phenomenon, researchers have examined numerous factors, including public governance and regulation (Benkraiem, Uyar, Kilic, & Schneider, 2021; De Simone & Stomberg, 2023; Ojala, Malo, & Penttinen, 2023; Yamen, Allam, Bani-Mustafa, & Uyar, 2018), personality traits and religiosity (Khalil & Sidani, 2020, 2022), culture (Allam, Moussa, Abdelhady, & Yamen, 2023; Bame-Aldred, Cullen, Martin, & Parboteeah, 2013; Brink & Porcano, 2016; Ermasova, Haumann, & Burke, 2021; Hutchinson, 2019; Masca & Chis, 2023; Richardson, 2008; Torgler, 2003), tax havens (Langenmayr & Zyska, 2023; Sacco, Arenas, & De Domenico, 2023), optimal tax rate (Dabla-Norris & Feltenstein, 2005), tax audit rates (Alm, 2012; Richardson, 2006), corruption (Cerqueti & Coppier, 2011), income level and wealth inequality (Fishlow & Friedman, 1994; Leenders, Lejour, Rabaté, & van 't Riet, M., 2023; Richardson, 2006), tax system complexity and fairness (Richardson, 2006), and tax morale (Alm & Torgler, 2006; Blaufus, Braune, Hundsdoerfer, & Jacob, 2015; Carsamer & Abbam, 2023; Cummings, Martinez-Vazquez, McKee, & Torgler, 2009; Kemme, Parikh, & Steigner, 2020; Lisi, 2015; Riahi-Belkaoui, 2004; Russo, 2013; Torgler & Schneider, 2009).

However, a small body of the literature examines the impact of financial development, the focus of our study, on tax evasion. Bittencourt et al. (2014) study of 150 countries covers the period 1980–2009 and shows evidence that higher levels of financial development lead to smaller shadow economies, i.e., less tax evasion. This result supports Bose et al. (2012) findings that better banking sector development is associated with smaller shadow economies and Blackburn et al. (2012) conclusion that higher wealth disclosure is associated with higher levels of financial development. Our study endeavors to contribute to and expand upon this existing body of literature.

3. Hypotheses development

The predominant thesis utilized in prior research to establish a connection between the degree of financial development and tax evasion hinges on the trade-off between the inclination to divulge financial information in exchange for improved access to credit and financial services. For example, when applying for credit/loans, individuals decide how much information they should disclose about their income and financial position. Financial institutions request such information to assess the creditworthiness of the individual. However, this information can also be used to calculate their tax obligations. Individuals will have less incentive to disclose the information in lower financially developed economies (Bose et al., 2012). This behavior is aggravated when the amount of funding available for financial institutions to lend to their clients is low, and the competition is weak, as the incentive to disclose information is lacking. Furthermore, when financial institutions cannot securely maintain information and provide better service than their counterparts in more financially developed economies, the motivation to disclose information becomes even weaker. Accordingly, put together, these factors lead to lower motivation for individuals to engage in the formal economy and, consequently, add to the shadow economy and tax evasion.

Evidence from literature supports this notion. For example, a link is reported between the ease of raising funds to finance firms' operations and the likelihood of hiding sales (Dabla-Norris, Gradstein, & Inchauste, 2008). When financing is perceived as an obstacle, firms are more likely to hide sales, accordingly, contributing to the shadow economy and tax evasion. Similarly, better access to credit and external finance is reported to be positively associated with tax compliance (Gatti & Honorati, 2008). Moreover, a strong association is reported between the size of the shadow economy and individuals' perception of the degree of credit accessibility (La Porta & Shleifer, 2008). Furthermore, firms are motivated to participate in the formal sector with enhanced accessibility to credit (Antunes & Cavalcanti, 2007) and are more likely to disclose information and be part of the formal economy if the financial markets are more developed (Blackburn et al., 2012). Better financial development that can reduce the cost of external finance can lead to less tax evasion (Capasso & Jappelli, 2013).

More recently, Hajilee et al. (2017) reported a negative association between the size of the shadow economy and financial inclusion, i.e., access to financial tools, including accessible banking and credit availability, as well as financial services. In the same vein, Ahamed (2016) shows that tax evasion at firm level is less in developing countries with more inclusive financial sectors. In addition, Hajilee, Stringer, and Hayes (2021) report a negative association between the size of the shadow economy and financial market development. Furthermore, Guo and Hung (2020) document that tax evasion is negatively associated with countries' level of financial development in developed markets, where there is optimal tax enforcement. The economy exhibits relatively lower agency costs; hence, the government increases the optimal probability of tax auditing, which triggers more tax compliance.

The above discussion indicates that prior research had a limited scope by examining the impact of financial development on tax evasion, focusing on either financial markets or financial institutions. Also, these studies examine the impact of specific factors such as ease of raising funds/credit (i.e., accessibility), cost reduction, and level of financial services. A very limited body of literature examines multiple dimensions of financial development (i.e., Bittencourt et al., 2014; Bose et al., 2012). For example, Bose et al. (2012) examine the impact of the banking sector's depth and efficiency on tax evasion. Depth is proxied by the level of liquid liabilities and total domestic credit provision through banks, both as percentages of GDP. Efficiency is estimated by the banks' level of overhead costs, rate spread, net interest margin, and the level of bank concentration. Bose et al. (2012) results suggest that the higher the development of the banking sector, the smaller the size of the shadow economy, i.e., less tax evasion. However, their study only covers the banking sector and does not include the development of the financial markets. Bittencourt et al. (2014) conclude that neither economic development level nor per capita income impacts the size of the shadow economy; rather, it is the level of financial development. Albeit including market capitalization of listed companies as a percentage of GDP in their financial development construct, they do not report separately on the impact of financial institutions and financial markets on tax evasion levels.

Accordingly, we attempt to fill this gap in the literature by examining the impact of financial development on tax evasion in both financial markets and institutions, including three dimensions: accessibility, depth, and efficiency. We hypothesize that:

H1. The higher the level of financial institutions' development (in terms of depth, accessibility, and efficiency), the lower the level of tax evasion.

H2. The higher the level of financial markets' development (in terms of depth, accessibility, and efficiency), the lower the level of tax evasion.

4. Research design

4.1. Variable measurement

4.1.1. Tax evasion

Tax evasion measures include traditional methods, such as the size of the shadow economy, tax returns audits, and surveys, in addition to modern methods, including controlled field experiments and luminosity as measured from space (Alm, 2012). It is claimed that "actual evasion is unknown and impossible to determine" (Tsakumis, Curatola, & Porcano, 2007, p. 140). Although there is no one ideal measure of tax evasion, the size of the shadow economy is commonly utilized as a proxy in the tax evasion literature (for example, Alm & Torgler, 2006; Bittencourt et al., 2014; Hutchinson, 2019; Richardson, 2008; Tsakumis et al., 2007; Yamen et al., 2018). It can be defined as: "those economic activities and income earned that circumvent government regulation, taxation or observation" (Medina & Schneider, 2018, p. 5). These activities are deliberately hidden from authorities to avoid paying taxes.

The size of the shadow economy is estimated based on data collected on both the micro and macro levels. The micro-level data are based on questionnaires and surveys in addition to other proxies, such as the demand for currency, whereas the macro-level data are based on different factors, such as the degree of regulation and employment levels in the country.

We use Medina and Schneider's MIMIC (Multiple Indicators Multiple Causes) estimation of shadow economy sizes as a proxy for tax evasion (Medina & Schneider, 2018).[3] This model is based on various factors that impact the size of the shadow economy over time and is claimed to give more precise estimates (Medina & Schneider, 2018; Yamen et al., 2018).

4.1.2. Financial development

We use the IMF's (2016) multidimensional framework to measure financial development. At its first level, the framework distinguishes between two main components: financial institutions (*FII*), including banks, insurance companies, pension funds, and mutual funds, and financial markets (*FMI*) including stock and bond markets. At the second level, each component is made of three indices: depth (*FIDI* and *FMDI*), access (*FIAI* and *FMAI*), and efficiency (*FIEI* and *FMEI*). Depth reflects the size and liquidity of the market. Access measures entities' ability to access financial services (individuals and companies). The financial institutions efficiency index (*FIEI*) measures their ability to provide low-cost financial services, whereas the financial markets efficiency index (*FMEI*) reflects their activity level. Each indicator is normalized, and data are winsorized with the 5th and 95th percentiles. Indicators are then aggregated into sub-indices and weighted based on principle component analysis, and finally, sub-indices are aggregated into the financial development index (*FDI*).

4.1.3. Control variables

Following the literature, we include country-level factors that may impact tax evasion to control for the social and economic differences between countries. We control for age (*AGE*) and gender (*FEMALE*) as evidence from prior research shows that older individuals and females are more tax-compliant (Hanno & Violette, 1996; Jackson & Milliron, 1986; Richardson, 2006; Torgler & Valev, 2010). We also control for the level of urbanization (*URBAN*) as it has been linked to increased tax evasion levels (Aizenman & Jinjarak, 2008; Safuan, Habibullah, & Sugandi, 2022). As improving economic conditions has an impact on tax morale (Martinez-Vazquez & Torgler, 2009), we control for some economic factors that have been linked to tax evasion in prior research, including imports of goods and services (*IMPORT*), rate of change in real gross domestic product (*RCGDP*) and level of unemployment (*UNEMP*) (Yamen et al., 2018). A description of all variables is shown in Table 1.

4.2. Sample and data sources

The sample for this study includes 156 countries covering the period from 2000 to 2017 (see Appendix 1). Our sample goes as far as 2017 due to the availability of the shadow economy size data. The data used in this study was obtained from various sources: tax evasion data from Medina and Schneider (2018) and the financial development index data from the IMF website (IMF, 2022). We gathered the control variables from publicly available resources such as the World Bank (World Bank, 2022). Of the initial sample, a total of 522 country-year observations were excluded due to missing financial development data. A further 145 country-year observations were excluded due to missing tax evasion data. This leaves us with 2627 country-year observations.

4.3. Model specification

To test our hypotheses on the impact of financial development on tax evasion, we run the following models using fixed effects regressions to reduce the standard error and avoid the effect of omitted variable bias. Model (1) tests the impact of the overall financial development index (*FDI*) on tax evasion (*TE*). Model (2) disentangles the overall index into its two main components: financial institutions (*FII*) and financial markets (*FMI*). Model (3) tests the hypotheses at the third level, reflecting the depth (*FIDI*), access (*FIAI*), and efficiency (*FIEI*) of financial institutions. Model (4) tests the hypotheses at the third level for financial markets reflecting depth (*FMDI*), access (*FMAI*) and efficiency (*FMEI*). $CONTROLS_{it}$ refers to a vector of country-level control variables.

$$TE_{it} = \alpha_0 + \beta_1 FDI_{it} + \sum_{i=1}^{n} \beta_i \, CONTROLS_{it} + \varepsilon_{it} \quad (1)$$

$$TE_{it} = \alpha_0 + \beta_1 FII_{it} + \beta_2 FMI_{it} + \sum_{i=1}^{n} \beta_i \, CONTROLS_{it} + \varepsilon_{it} \quad (2)$$

$$TE_{it} = \alpha_0 + \beta_1 FIDI_{it} + \beta_2 FIAI_{it} + \beta_2 FIEI_{it} + \sum_{i=1}^{n} \beta_i \, CONTROLS_{it} + \varepsilon_{it} \quad (3)$$

$$TE_{it} = \alpha_0 + \beta_1 FMDI_{it} + \beta_2 FMAI_{it} + \beta_2 FMEI_{it} + \sum_{i=1}^{n} \beta_i \, CONTROLS_{it} + \varepsilon_{it} \quad (4)$$

5. Empirical results

5.1. Descriptive statistics

Table 2 illustrates the behavior of tax evasion (*TE*) and financial development (*FDI*) over the sample period. The average *TE* for all countries is 29.31 % as a percentage of total annual GDP (SD = 12.58). Financial development (*FDI*) represents 0.33 (SD = 0.24). Breaking down our sample by OECD classification reveals remarkable differences between the two groups. The results in Panel B and C indicate lower *TE* in OECD countries with a mean of 15.07 % as a percentage of total annual GDP (SD = 6.33), compared to 33.29 % (SD = 10.89) for non-OECD countries. On the other hand, the results suggest higher financial development levels for both institutions and markets in OECD countries, with an overall *FDI* mean of 0.66 for OECD countries compared to 0.24 in non-OECD countries.

Table 3 reports an analysis of *TE* and *FDI* by country. We only report

[3] Another widely used estimation of shadow economies is provided by Elgin and Oztunali (2012); however, its most recent coverage stops at 2009. Accordingly, it was not an option for our study. Nevertheless, Bittencourt et al. (2014) report a strong correlation (0.987) between the two estimations.

Table 1
Variable definitions.

Variables	Symbols	Definitions
Tax Evasion	TE	The size of the shadow economy as a percent of total annual GDP (Medina & Schneider, 2018).
Lagged Tax Evasion	L.TE	The previous period's value of tax evasion as a percent of total annual GDP, used to account for the persistence of tax evasion behavior over time.
Financial Development Index	FDI	A relative ranking of countries' depth, access, and efficiency of their financial institutions and financial markets. It is an aggregate of the financial institutions index and the financial markets index (IMF, 2022).
Financial Institutions Index	FII	An aggregate of FIAI, FIDI and FIEI (IMF, 2022).
Financial Markets Index	FMI	An aggregate of FMAI, FMDI, and FMEI (IMF, 2022).
Financial Institutions Access Index	FIAI	Compiles data on bank branches per 100,000 adults and ATMs per 100,000 adults (IMF, 2022).
Financial Institutions Depth Index	FIDI	Compiles data on bank credit to the private sector in percent of the GDP, pension fund assets to the GDP, mutual fund assets to GDP, and insurance premiums, life, and non-life to GDP (IMF, 2022).
Financial Institutions Efficiency Index	FIEI	Compiles data on banking sector net interest margin, lending-deposits spread, non-interest income to total income, overhead costs to the total assets, return on assets and return on equity (IMF, 2022).
Financial Markets Access Index	FMAI	Compiles data on the percent of market capitalization outside of the largest companies and the total number of issues of debt (domestic and external, non-financial corporations) per 100,000 adults (IMF, 2022).
Financial Markets Depth Index	FMDI	Compiles data on stock market capitalization to GDP, stocks traded to GDP, international debt securities of government to GDP, and total debt securities of the financial and non-financial corporations to GDP (IMF, 2022).
Financial Markets Efficiency Index	FMEI	Compiles data on stock market turnover ratio (stocks traded to capitalization) (IMF, 2022).
Population ages 65 and above	AGE	Population ages 65 and above as a percentage of the total population. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship (World Bank, 2022).
Female population	FEMALE	Female population is the percentage of the population that is female. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship (World Bank, 2022).
Urban Population	URBAN	Urban population refers to people living in urban areas as defined by national statistical offices (World Bank, 2022).
Imports of goods and services	IMPORT	The value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments (World Bank, 2022).
Rate of change of real GDP	RCGDP	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 US dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for the depreciation of fabricated assets or for the depletion and degradation of natural resources (World Bank, 2022).
Unemployment rate	UNEMP	The share of the labor force that is without work but available for and seeking employment (World Bank, 2022).

Table 2
Descriptive statistics – All sample and OECD vs non-OECD countries.

Panel A: All countries					
Variable	Obs.	Mean	Std. Dev.	Min	Max
TE	2627	29.311	12.579	5.1	70.5
FDI	2627	0.328	0.242	0.029	1
AGE	2627	7.975	5.616	0.69	27.11
RCGDP	2627	3.989	4.997	−62.08	123.14
UNEMP	2627	7.463	5.475	0.14	33.29
IMPORT	2627	45.504	27.908	0.06	236.39
URBAN	2627	58.819	22.534	8.25	100
FEMALE	2627	49.998	3.262	23.29	54.56
Panel B: OECD countries					
Variable	Obs.	Mean	Std. Dev.	Min	Max
TE	574	15.067	6.331	5.1	32.9
FDI	574	0.658	0.183	0.173	1
AGE	574	15.232	3.79	5.15	27.11
RCGDP	574	2.341	2.862	−10.15	25.18
UNEMP	574	7.395	4.099	1.81	27.47
IMPORT	574	44.922	26.615	9.1	187.17
URBAN	574	77.001	10.931	52.66	97.96
FEMALE	574	50.882	0.712	49.56	54.12
Panel C: Non-OECD countries					
Variable	Obs.	Mean	Std. Dev.	Min	Max
TE	2053	33.294	10.894	9.4	70.5
FDI	2053	0.236	0.164	0.029	0.787
AGE	2053	5.946	4.183	0.69	20.76
RCGDP	2053	4.45	5.357	−62.08	123.14
UNEMP	2053	7.482	5.802	0.14	33.29
IMPORT	2053	45.667	28.262	0.06	236.39
URBAN	2053	53.735	22.319	8.25	100
FEMALE	2053	49.751	3.632	23.29	54.56

Note: All variables are fully defined in Table 1.

the highest and lowest 10 countries in terms of mean *FDI* and *TE* for parsimonious reasons. In terms of mean *TE*, nine of the lowest ten countries are OECD member countries (except Singapore). On the other hand, all the highest ten countries are non-OCED countries. With regard to *FDI*, all the highest ten countries are OECD countries, while all the lowest ten countries are non-OECD countries. Guatemala has the highest *TE* mean value of 50.33, whereas Switzerland has the lowest *TE* of 6.35. Furthermore, Germany has the highest FDI of 0.65, whereas South Sudan has the lowest *FDI* of 0.01. The difference between the minimum and maximum values for most variables suggests the observed variability in the heterogeneous countries panel.

Table 4 reports the Pearson correlation coefficients. The two dimensions of financial development and their components are negatively and significantly correlated with *TE*, in line with prior literature (Guo & Hung, 2020; Hajilee et al., 2021; IMF, 2016). This implies that higher levels of financial development are associated with lower levels of tax evasion. Correlation coefficients reveal that all the components of *FDI* dimensions (*FII* and *FMI*) are positively correlated, implying that *FDI* is a

Table 3
Descriptive analysis of countries with high-low tax evasion and high-low financial development.

Panel A: High and low tax evasion					
	Country	Low TE		Country	High TE
1	Switzerland	6.348	1	Guatemala	50.333
2	United States	7.574	2	Gabon	51.170
3	Austria	7.900	3	Azerbaijan	53.344
4	Luxembourg	9.585	4	Peru	53.511
5	Netherlands	9.933	5	Haiti	53.781
6	United Kingdom	10.544	6	Zimbabwe	53.874
7	New Zealand	11.185	7	Tanzania	55.956
8	Japan	11.274	8	Nigeria	56.778
9	Germany	11.411	9	Georgia	61.693
10	Singapore	11.663	10	Bolivia	62.893
Panel B: High and low financial development					
	Country	High FDI		Country	Low FDI
1	Switzerland	0.862	1	Kiribati	0.058
2	United States	0.737	2	Eritrea	0.055
3	United Kingdom	0.736	3	Tajikistan	0.054
4	Australia	0.710	4	French Polynesia	0.053
5	Japan	0.704	5	Timor-Leste	0.038
6	Canada	0.685	6	Comoros	0.036
7	Netherlands	0.678	7	Guinea-Bissau	0.034
8	Korea, Rep.	0.667	8	Micronesia, Fed. States	0.034
9	Luxembourg	0.664	9	Congo, Dem. Rep.	0.032
10	Germany	0.650	10	South Sudan	0.016

combination of all these components. However, this high correlation may create a multicollinearity concern in the regression analysis. We address this issue by monitoring variance inflation factor (VIF) values and using stepwise regression analysis. Un-tabulated VIF values show that multicollinearity is not a concern. Un-tabulated results reveal that the correlation coefficients of OECD and non-OECD countries align with the overall sample.

5.2. Regression results

Table 5 presents our main findings for the overall sample. As expected, Model (1) shows a negative association between *FDI* and *TE* (coef. = −31.32, p < 0.01). This finding is consistent with prior literature on the association between financial development and tax evasion (Bose et al., 2012; Capasso & Jappelli, 2013), grounded in the theory of the economics of crime (Becker, 1968). Accordingly, market participants evaluate the benefits of illegal actions against the costs associated with getting caught and punished. Hence, operating informally in shadow economies and avoiding taxes are associated with less developed financial systems with lower opportunity costs forgone to enter the formal financial sector.

Durusu-Ciftci, Ispir, and Yetkiner (2017) report a greater effect of financial institutions' development on economic growth than financial markets development. Accordingly, we perform further tests to unravel these associations with *TE*. Further analysis in Model (2) shows that the financial institutions' dimension of *FII* drives the association (coef. =

Table 5
Fixed-effects regressions for the effect of financial development on tax evasion.

Variables	TE	TE	TE	TE
(Model)	1	2	3	4
FDI	−31.32***			
	(1.073)			
FII		–22.32***		
		(1.527)		
FMI		−11.83***		
		(1.055)		
FIDI			−18.69***	
			(0.913)	
FIAI			−5.623***	
			(1.025)	
FIEI			−13.15***	
			(1.425)	
FMDI				−10.57***
				(1.191)
FMAI				−6.489***
				(0.896)
FMEI				−4.961***
				(0.786)
AGE	−0.316***	−0.268***	−0.456***	−0.557***
	(0.0477)	(0.0487)	(0.0507)	(0.0464)
RCGDP	−0.0118	−0.0204	−0.0111	0.0100
	(0.0347)	(0.0346)	(0.0351)	(0.0359)
UNEMP	−0.0208	−0.00455	0.0588*	−0.0278
	(0.0319)	(0.0320)	(0.0316)	(0.0334)
IMPORT	−0.0343***	−0.0297***	−0.0123**	−0.0401***
	(0.00592)	(0.00599)	(0.00604)	(0.00642)
URBAN	0.00287	0.00936	−0.00531	−0.0248**
	(0.0102)	(0.0103)	(0.0104)	(0.0106)
FEMALE	0.715***	0.773***	0.994***	0.657***
	(0.0626)	(0.0637)	(0.0624)	(0.0659)
Constant	7.945**	5.559*	−1.797	9.740***
	(3.219)	(3.251)	(3.391)	(3.368)
Observations	2,627	2,627	2,627	2,627
R-squared	0.553	0.556	0.551	0.521
Number of years	18	18	18	18

Notes: Table 1 outlines definitions and data sources for all variables.***p-value < 0.01, **p-value < 0.05, *p-value < 0.1. Robust t-statistics in parentheses and italic.

Table 4
Pearson's correlation matrix for all variables.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) TE	1.000									
(2) FDI	−0.709	1.000								
(3) FII	−0.691	0.925	1.000							
(4) FMI	−0.645	0.926	0.714	1.000						
(5) FIDI	−0.645	0.886	0.877	0.764	1.000					
(6) FIAI	−0.598	0.798	0.904	0.575	0.670	1.000				
(7) FIEI	−0.399	0.502	0.604	0.327	0.364	0.385	1.000			
(8) FMDI	−0.619	0.878	0.700	0.924	0.782	0.537	0.320	1.000		
(9) FMAI	−0.565	0.797	0.636	0.839	0.644	0.545	0.290	0.719	1.000	
(10) FMEI	−0.524	0.766	0.549	0.868	0.590	0.441	0.253	0.711	0.534	1.000

Notes: All correlation coefficients are significant at the 0.001 level. All variables are fully defined in Table 1.

–22.32, p < 0.01), and *FMI* is associated with *TE* with (coef. = −11.83, p < 0.01). According to Mukherjee, Roy Chowdhury, and Bhattacharya (2021), financial policies, such as liberalization, affect aspects/dimensions of financial development differently. Hence, we use Models (3) and (4) to further decompose financial development to examine the effect of specific dimensions on *TE*. Model (3) focuses on the financial institutions' dimension. Results show that access to and efficiency of financial institutions are negatively associated with *TE* (coef. = −18.69, p < 0.01; coef. = −5.623, p < 0.01; coef. = −13.15, p < 0.01). Finally, Model (4) focuses on the financial markets dimension. The results demonstrate that access to financial markets is significantly associated with *TE* (coef. = −10.57, p < 0.01; coef. = −6.489, p < 0.01; coef. = −4.961, p < 0.01) respectively.

Our findings complement the prior research theoretical finding that lower (higher) levels of financial development cause a bigger (smaller) shadow economy (Bittencourt et al., 2014; Blackburn et al., 2012; Bose et al., 2012; Capasso & Jappelli, 2013). Prior research has mainly focused on the overall association between financial development and tax evasion. Subsequent research on the association between financial development and tax evasion has generally used only the overall association without analyzing the details of financial development (i.e., Bittencourt et al., 2014). We argue that considering the three sub-indices of financial development (depth, efficiency, and access) provides extra insights that prior research was not able to deliver due to the lack of proper metrics.

According to Johannesen, Tørsløv, and Wier (2020), developing (less developed) countries are more exposed to tax avoidance practices. Moreover, financial development varies within developing countries according to different determinants (Durusu-Ciftci et al., 2017; Ezeibekwe, 2020). Therefore, we divide our sample into two subsamples to disentangle the association examined in OECD versus non-OECD countries. Table 6, Model (1), shows a negative significant association between *TE* and *FDI* (coef. = −11.56, p < 0.01) for OECD countries. Similarly, in Model (2), *FII* is negatively associated with *TE* (coef. = −13.62, p < 0.01), while *FMI* is not significantly associated with *TE*. When we decompose *FDI* dimensions to their components, Model (3) shows that the depth of financial institutions is negatively associated with tax evasion (coef. = −16.50, p < 0.01) while the access is positively associated with *TE* (coef. = 3.81, p < 0.1). However, the association between the efficiency of financial institutions and tax evasion is not significant (coef. = −0.217). Model (4) reveals that access to financial markets is negatively and significantly associated with tax evasion (coef. = −14.55, p < 0.1). The association between depth and efficiency of financial markets, on the one hand, and tax evasion, on the other hand, is positively significant (coef. = 2.308, p < 0.01; coef. = 7.010, p < 0.01).

For non-OECD countries, in Model (5), the results show a significant negative association between *TE* and *FDI* (coef. = −29.06, p < 0.01). Model (6) shows that, in non-OECD countries, both the development of financial institutions (coef. = −20.07, p < 0.01) and the development of financial markets (coef. = −11.48, p < 0.01) are negatively associated with *TE*. Model (7) reveals that access, efficiency, and depth of financial institutions are negatively associated with *TE* (coef. = −12.19, p < 0.01; coef. = −7.344, p < 0.01; coef. = −15.51, p < 0.01). Model (8) confirms the results of Model (2) as all components of financial markets development are negatively associated with *TE* (coef. = −4.421, p < 0.01; coef. = −6.456, p < 0.01; coef. = −7.739, p < 0.01). The results in all models are significant and negative, with higher coefficients in non-

Table 6
Fixed-effect regressions – OECD versus non-OECD countries.

	OECD countries				Non-OECD countries			
Variables	TE	TE	TE	TE	TE	TE	TE	TE
(Model)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FDI	−11.56***				−29.06***			
	(1.506)				(1.536)			
FII		−13.62***				−20.07***		
		(1.568)				(2.049)		
FMI		−0.508				−11.48***		
		(1.211)				(1.402)		
FIDI			−16.50***				−12.19***	
			(0.969)				(1.434)	
FIAI			3.810***				−7.344***	
			(0.911)				(1.371)	
FIEI			0.217				−15.51***	
			(2.044)				(1.650)	
FMDI				−14.55***				− 4.421**
				(1.125)				(1.725)
FMAI				2.308**				− 6.456***
				(0.919)				(1.169)
FMEI				7.010***				−7.739***
				(0.750)				(1.052)
AGE	−0.580***	−0.537***	−0.474***	−0.608***	−0.0326	0.0204	−0.0415	−0.200***
	(0.073)	(0.0718)	(0.0623)	(0.0655)	(0.0608)	(0.0635)	(0.0705)	(0.0612)
RCGDP	−0.0859	−0.0748	−0.0647	−0.139	−0.0368	−0.0448	−0.0378	−0.0174
	(0.096)	(0.0959)	(0.0844)	(0.0897)	(0.0373)	(0.0374)	(0.0379)	(0.0382)
UNEMP	0.439***	0.415***	0.302***	0.533***	−0.131***	−0.111***	−0.0432	−0.157***
	(0.056)	(0.0544)	(0.0493)	(0.0512)	(0.0361)	(0.0367)	(0.0363)	(0.0373)
IMPORT	−0.052***	−0.039***	−0.049***	−0.012	−0.039***	−0.036***	−0.034***	−0.056***
	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)	(0.007)	(0.008)	(0.008)
URBAN	0.012	0.023	0.036*	0.092***	0.009	0.013	−0.009	−0.020*
	(0.022)	(0.022)	(0.020)	(0.022)	(0.012)	(0.012)	(0.012)	(0.012)
FEMALE	1.157***	1.126***	0.0412	0.830**	0.726***	0.764***	0.900***	0.709***
	(0.386)	(0.376)	(0.329)	(0.359)	(0.068)	(0.070)	(0.069)	(0.071)
Constant	−29.030	−27.160	24.870	−25.150	6.678*	5.218	3.858	6.846*
	(20.330)	(19.79)	(17.17)	(18.81)	(3.507)	(3.539)	(3.799)	(3.619)
Observations	574	574	574	574	2,053	2,053	2,053	2,053
R-squared	0.438	0.469	0.596	0.539	0.344	0.346	0.336	0.317
Number of years	18	18	18	18	18	18	18	18

Notes: Table 1 outlines definitions and data sources for all variables. ***p-value < 0.01, **p-value < 0.05, *p-value < 0.1. Robust t-statistics in parentheses and italic.

OECD compared to OECD countries. This aligns with Johannesen et al. (2020), suggesting that non-OECD countries are more exposed to tax evasion.

One noticeable difference between the two sets of countries is related to the unemployment level (*UNEMP*), which is positive in OECD countries and negative in non-OECD countries (see Table 6). The positive coefficient of *UNEMP* in OECD countries implies that a higher unemployment rate is associated with higher tax evasion in these countries. One possible explanation for this positive relationship is that individuals and businesses may resort to informal economic activities and tax evasion to minimize their tax liability. This could be particularly true in countries with well-developed social welfare systems, where unemployment benefits might provide some support but not enough to maintain the same standard of living. The negative coefficient of *UNEMP* in non-OECD countries suggests that a higher unemployment rate is associated with lower tax evasion in these countries. One possible explanation could be that unemployed people may be more likely to rely on government benefits, which are taxable. However, these explanations require further investigations that can be the subject of future research.

5.3. Robustness tests and additional analysis

For robustness, we conduct an ordinary least squares (OLS) regression analysis. The results in Table 7 show a significant negative association between *FDI* and *TE* (coef. = −31.32, $p < 0.01$). Hence, this robustness test supports the fixed effect regression results. In addition, we test the panel data at low tax evasion (25 % quartile) and high tax evasion (75 % quartile) levels. The results for both subsamples align with our previous tests as there is a significant negative association between *FDI* and *TE* in both low and high tax evasion quartiles (coef. = −11.77, $p < 0.01$ and −8.504, $p < 0.01$, respectively). This analysis also indicates higher coefficients in the sample's upper quartile than the lower quartile, supporting our hypothesis on the direction of the relationship.

The results in Table 7 show different patterns between the overall sample and those reported for the top and lower quartiles for *AGE* and *FEMALE*. For example, the negative coefficient for *AGE* suggests that, on average, as the population ages increase, tax evasion tends to decrease. Older people may have a stronger sense of civic duty and be more aware of the consequences of tax evasion. However, the positive association between age and tax evasion in the top and bottom quartiles suggests that the relationship between age and tax evasion is not linear. In other words, the effect of age on tax evasion may be different for people in different age groups. Possibly, in countries with lower tax evasion (25 % quantile), older individuals might have accumulated more wealth and assets, making them more likely to engage in complex tax planning strategies to minimize their tax burden. Conversely, in countries with higher tax evasion levels, older individuals might face reduced economic opportunities due to age-related factors, leading them to rely on informal economic activities with limited tax reporting.

Regarding the percentage of females in a society, the results show a positive association with tax evasion in the overall sample, suggesting that women are more likely to evade taxes than men. This is likely because women are more likely to be involved in informal economic activities, such as unpaid domestic work. However, the association is negative at both the top and lower quartiles. A possible explanation could be that countries with low levels of tax evasion (25 % quartile) may have more formal economic activities. In these countries, women, having more access to education and training, may be more likely to be employed in the formal sector and accordingly pay taxes, leading to less tax evasion. In countries with high levels of tax evasion, the negative association may be because these countries may have more informal economic activities, which men often dominate, as they have more access to capital and resources, potentially leading to less tax evasion as the number of females increases. Nonetheless, these interpretations necessitate more in-depth studies that could be explored in subsequent research.

To examine the potential impact of the 2008 financial crisis on our results, we have performed a supplementary analysis by dividing our dataset into two periods: pre-crisis (2000—2008) and post-crisis (2009—2017). This allowed us to assess whether the relationships we observed in our primary analysis held true before and after the financial crisis. The results (see Table 8) are consistent with our main findings without introducing new or contrasting interpretations.

We run further tests to check the robustness of our results to accommodate the potential impact of using the size of the shadow economy as a proxy of tax evasion as it captures economic activities and income that are intentionally concealed from authorities to avoid tax obligations. The shadow economy proxy is often based on a combination of micro and macro-level data, which can help provide a more comprehensive understanding of tax evasion trends. However, several factors can skew the results when using the shadow economy as a proxy for tax evasion. For example, the unemployment rate can influence the size of the shadow economy. In economies with high unemployment rates, individuals may be more likely to engage in undeclared or informal work to earn income. This can inflate the size of the shadow economy, potentially leading to an overestimation of tax evasion. On the other hand, in economies with low unemployment rates, the incentive to participate in the shadow economy may be reduced, potentially leading to an underestimation of tax evasion. Similar observations can be made for the level of imports of goods and services (*IMPORT*) and the rate of change in GDP (*RCGDP*). Accordingly, we re-ran the regressions for Tables 5, 6, And 7 without these variables. The results, un-tabulated for brevity, are robust and remain consistent with our original findings.

Finally, to address heteroskedasticity and endogeneity, we run the generalized method of moments (GMM) (Hansen & Singleton, 1982). Our results remain negative and significant in all models. In Table 9, Model (1) results show a significant negative association between *TE* and *FDI* (coef. = –33.77, $p < 0.01$). Model (2) shows that both financial markets and institutions development are negatively associated with *TE* (coef. = −24.24, $p < 0.01$; coef. = −12.78, $p < 0.01$). Model (3) reveals that access to, efficiency and depth of financial institutions are negatively associated with *TE* (coef. = –23.52, $p < 0.01$; coef. = −2.499, $p < 0.01$; coef. = −13.25, $p < 0.01$). Model (4) shows that all components of financial markets development are also negatively associated with *TE*

Table 7
The effect of financial development index on tax evasion in low and high tax evasion levels.

	Pooled sample	(25 % Quartile)	(75 % Quartile)
Variables	TE	TE	TE
(Model)	(1)	(2)	(3)
FDI	−31.32***	−11.77***	−8.504***
	(1.073)	(0.780)	(2.596)
AGE	−0.316***	0.0608*	1.162***
	(0.048)	(0.0326)	(0.136)
RCGDP	−0.012	−0.0325	0.099*
	(0.035)	(0.0394)	(0.050)
UNEMP	−0.021	0.236***	−0.0325
	(0.032)	(0.0378)	(0.058)
IMPORT	−0.034***	0.00226	−0.0542***
	(0.006)	(0.00313)	(0.010)
URBAN	0.003	−0.00239	−0.008
	(0.010)	(0.00822)	(0.018)
FEMALE	0.715***	−0.167***	−3.488***
	(0.063)	(0.0385)	(0.379)
Constant	7.945**	26.92***	221.2***
	(3.219)	(1.912)	(19.07)
Observations	2,627	729	578
R-squared	0.553	0.442	0.193
Number of years	18	18	18

Notes: Table 1 outlines definitions and data sources for all variables. ***p-value < 0.01, **p-value < 0.05, *p- value < 0.1. Robust t-statistics in parentheses and italic.

Table 8
Comparison of results pre- and post-financial crisis.

	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Variables	TE	TE	TE	TE	TE	TE	TE	TE
(Model)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FDI	−34.94***	−26.88***						
	(1.589)	(1.433)						
FII			−28.34***	−13.76***				
			(2.118)	(2.182)				
FMI			−10.73***	−13.58***				
			(1.524)	(1.425)				
FIDI					−18.15***	−18.00***		
					(1.434)	(1.166)		
FIAI					−8.917***	−1.942		
					(1.647)	(1.304)		
FIEI					−17.07***	−8.839***		
					(2.089)	(1.908)		
FMDI							−12.78***	−8.882***
							(1.828)	(1.533)
FMAI							−6.699***	−6.128***
							(1.297)	(1.206)
FMEI							−4.547***	−4.730***
							(1.142)	(1.064)
AGE	−0.311***	−0.399***	−0.231***	−0.398***	−0.429***	−0.572***	−0.630***	−0.572***
	(0.0766)	(0.0597)	(0.0772)	(0.0619)	(0.0819)	(0.0640)	(0.0762)	(0.0566)
RCGDP	0.146**	−0.0890**	0.118**	−0.0891**	0.148**	−0.0830**	0.211***	−0.0871**
	(0.0607)	(0.0408)	(0.0603)	(0.0409)	(0.0616)	(0.0412)	(0.0638)	(0.0415)
UNEMP	−0.131***	0.0502	−0.114**	0.0506	−0.0358	0.0934**	−0.101**	0.0109
	(0.0480)	(0.0417)	(0.0476)	(0.0423)	(0.0471)	(0.0419)	(0.0509)	(0.0429)
IMPORT	−0.0262***	−0.0444***	−0.0180**	−0.0444***	−0.00464	−0.0217***	−0.0323***	−0.0493***
	(0.00877)	(0.00782)	(0.00881)	(0.00794)	(0.00889)	(0.00801)	(0.00966)	(0.00832)
URBAN	0.00290	0.0124	0.0130	0.0125	−0.00529	0.00365	−0.0287*	−0.00735
	(0.0152)	(0.0135)	(0.0151)	(0.0137)	(0.0153)	(0.0138)	(0.0161)	(0.0137)
FEMALE	0.932***	0.654***	1.036***	0.655***	1.250***	0.910***	0.905***	0.586***
	(0.110)	(0.0735)	(0.110)	(0.0754)	(0.108)	(0.0737)	(0.117)	(0.0761)
Constant	−1.003	8.644**	−5.489	8.610**	−11.30**	−1.722	−0.891	10.90***
	(5.595)	(3.817)	(5.597)	(3.869)	(5.730)	(4.128)	(5.953)	(3.915)
Observations	1,312	1,315	1,312	1,315	1,312	1,315	1,312	1,315
R-squared	0.577	0.547	0.586	0.547	0.580	0.543	0.531	0.534
Number of years	9	9	9	9	9	9	9	9

Notes: Table 1 outlines definitions and data sources for all variables.***p-value < 0.01, **p-value < 0.05, *p-value < 0.1. Robust t-statistics in parentheses and italic.

(coef. = −15.84, p < 0.01; coef. = −2.598, p < 0.01; coef. = −4.360, p < 0.01). In Model (5), we run two-stage least-squares regression (2SLS) to capture the maximum likelihood method to estimate the path coefficient; the results remain significant (coef. = −31.25, p < 0.01). The findings of the robustness analysis support our main findings on the relationship between *FDI* and *TE*.

6. Conclusion and implications

This research sheds light on the complex relationship between financial development and tax evasion across an international sample of 156 countries from 2000 to 2017. Our findings reveal a negative association between financial development and tax evasion. More developed financial institutions and markets, characterized by their depth, accessibility, and efficiency, are associated with lower tax evasion rates. These results hold when social and economic differences among countries are controlled.

However, the relationship between financial development and tax evasion demonstrates nuanced variations between OECD and non-OECD countries. In non-OECD countries, the development of financial institutions and markets is negatively associated with tax evasion. All elements of financial development, including depth, access, and efficiency, appear to play a significant role in mitigating tax evasion in these countries.

On the other hand, in OECD countries, our study reveals a different landscape. Here, only the depth of financial institutions and markets seems to have a significant negative impact on tax evasion. Unexpectedly, we observe a positive association between access to financial institutions and markets and tax evasion in these countries, contradicting previous research (i.e., Antunes & Cavalcanti, 2007; Gatti & Honorati, 2008; La Porta & Shleifer, 2008). The reasons for this contradiction can be multiple and warrant further research. For instance, greater access to banks may facilitate tax evasion by providing more avenues for individuals and businesses to conceal their financial transactions. Similarly, access to financial markets could encourage the creation of complex financial structures that can be used to hide wealth and income from tax authorities.

These findings hold significant implications for fiscal tax administrations worldwide, shedding light on the complex relationship between financial development and tax evasion. The results indicate that promoting financial institutions and markets' growth and development could be a strategic tool in reducing tax evasion, particularly in non-OECD countries. There is a demonstrable negative correlation between robust financial systems and instances of tax evasion, highlighting the potential role that financial development can play in enhancing tax compliance.

Moreover, the research uncovers varying impacts of financial development on tax evasion across OECD and non-OECD countries. In OECD countries, the advancement of financial institutions appears to have a more significant role in reducing tax evasion compared to the development of financial markets. This suggests that in these countries, tax administrations could achieve greater success in minimizing tax evasion by focusing their efforts on collaborating with and regulating financial institutions.

Our study also brings to the forefront the multifaceted dimensions of financial systems, including the depth, accessibility, and efficiency of

Table 9
GMM regression analysis.

Variables	TE	TE	TE	TE	TE
(Model)	(1)	(2)	(3)	(4)	(5)
L.TE	0.109***	0.111***	0.124***	0.110***	
	(0.0122)	(0.0120)	(0.0118)	(0.0128)	
FDI	–33.77***				−31.25***
	(1.059)				(1.083)
FII		−24.24***			
		(1.503)			
FMI		−12.78***			
		(1.015)			
FIDI			–23.52***		
			(0.865)		
FIAI			−2.499**		
			(0.978)		
FIEI			−13.25***		
			(1.371)		
FMDI				−15.84***	
				(1.180)	
FMAI				−2.598***	
				(0.909)	
FMEI				−4.360***	
				(0.772)	
AGE	−0.306***	−0.240***	−0.497***	−0.592***	−0.337***
	(0.0442)	(0.0457)	(0.0471)	(0.0429)	(0.0481)
RCGDP	0.0451	0.0257	0.0413	0.0779*	−0.00220
	(0.0387)	(0.0385)	(0.0380)	(0.0406)	(0.0337)
UNEMP	−0.208***	−0.179***	−0.132***	−0.270***	−0.0109
	(0.0299)	(0.0302)	(0.0287)	(0.0326)	(0.0322)
IMPORT	−0.0147**	−0.0126**	0.0145**	−0.0139**	−0.0387***
	(0.00598)	(0.00594)	(0.00600)	(0.00646)	(0.00597)
URBAN	0.0338***	0.0434***	0.0325***	−0.00527	0.00177
	(0.00931)	(0.00941)	(0.00920)	(0.00986)	(0.0103)
FEMALE	0.900***	0.947***	1.151***	0.865***	0.742***
	(0.0633)	(0.0634)	(0.0613)	(0.0670)	(0.0632)
Constant	−4.972	−6.931**	−14.56***	−3.884	6.908**
	(3.249)	(3.239)	(3.301)	(3.424)	(3.249)
Observations	2,071	2,071	2,071	2,071	2,627
R-squared	0.581	0.322	0.365	0.451	0.555
Number of years	18	18	18	18	

Notes: Table 1 outlines the variables definitions and data sources.***p-value < 0.01, **p-value < 0.05, *p-value < 0.1. Robust t-statistics in parentheses and italic.

financial institutions and markets. These dimensions are inversely related to tax evasion, indicating that tax administrations should consider these aspects when formulating strategies to capitalize on financial development as a deterrent against tax evasion.

Given the global scope of this study, it is evident that there are opportunities for international cooperation in promoting financial development and combating tax evasion. Collaborative efforts could include sharing best practices, aligning regulatory frameworks, and orchestrating joint enforcement actions. These international endeavors could be instrumental in fostering a global financial environment that discourages tax evasion and promotes fiscal responsibility.

For governments and policymakers, these results suggest that strategies tailored to the specific financial landscape of their respective countries are needed. In non-OECD countries, policies should promote the development of both financial institutions and markets. This could involve measures to increase access to financial services, foster financial education, and maintain a stable and well-regulated financial system. In OECD countries, more resources and expertise may need to be devoted to regulating and monitoring access to financial institutions and markets.

Moving forward, we highlight several avenues for future research to explore. Prior evidence shows that tax evasion is lower in countries with better financial outreach (Beck, Lin, & Ma, 2014). Hence, it is interesting to examine how information sharing may moderate the association between *FDI* and *TE*. Research may be extended to investigate how different institutional factors affect the association differently in developed versus developing countries. Financial inclusion has been examined in association with tax evasion. For instance, Ahamed (2016) finds that developing countries are the most affected due to tax evasion. However, countries with more financial inclusion are affected to a lower extent. Therefore, further research may investigate whether an inclusive financial development agenda moderates the association between *FDI* and *TE* through achieving sustainable and inclusive economic growth. Furthermore, Fontin and Lin (2019) show that developing and low-income countries vary in financial innovation. It seems interesting to investigate whether varying degrees of financial innovation in developing countries affect their respective level of tax evasion. Additionally, avenues for future research may focus on the mechanisms by which culture affects tax evasion behavior and whether this is different for countries with more (less) cultural diversity.

In conclusion, this research offers a nuanced understanding of the role of financial development in mitigating tax evasion, providing valuable insights that can guide the formulation of effective tax policies and strategies worldwide. By incorporating these findings into their strategic planning, tax administrations can leverage financial development as a powerful tool to combat tax evasion and foster a culture of tax compliance. Ultimately, such efforts can contribute to a fair and efficient global tax system.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used ChatGPT to enhance the readability of the manuscript. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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Appendix 1. List of OECD and Non-OECD countries

OECD		Non-OECD					
1	Australia	1	Albania	42	Estonia	83	Mozambique
2	Austria	2	Algeria	43	Ethiopia	84	Myanmar
3	Belgium	3	Angola	44	Fiji	85	Namibia
4	Canada	4	Argentina	45	Gabon	86	Nepal
5	Chile	5	Armenia	46	Gambia, The	87	Nicaragua
6	Czech Republic	6	Azerbaijan	47	Georgia	88	Niger
7	Denmark	7	Bahamas, The	48	Ghana	89	Nigeria
8	Estonia	8	Bahrain	49	Guatemala	90	Oman
9	Finland	9	Bangladesh	50	Guinea	91	Pakistan
10	France	10	Belarus	51	Guinea-Bissau	92	Papua New Guinea
11	Germany	11	Belize	52	Guyana	93	Paraguay
12	Greece	12	Benin	53	Haiti	94	Peru
13	Hungary	13	Bhutan	54	Honduras	95	Philippines
14	Iceland	14	Bolivia	55	Hong Kong SAR, China	96	Qatar
15	Ireland	15	Bosnia and Herzegovina	56	India	97	Romania
16	Israel	16	Botswana	57	Indonesia	98	Russian Federation
17	Italy	17	Brazil	58	Iran, Islamic Rep.	99	Rwanda
18	Japan	18	Brunei Darussalam	59	Israel	100	Saudi Arabia
19	Korea, Rep.	19	Bulgaria	60	Jamaica	101	Senegal
20	Latvia	20	Burkina Faso	61	Jordan	102	Sierra Leone
21	Luxembourg	21	Burundi	62	Kazakhstan	103	Singapore
22	Mexico	22	Cabo Verde	63	Kenya	104	Slovenia
23	Netherlands	23	Cambodia	64	Kuwait	105	Solomon Islands
24	New Zealand	24	Cameroon	65	Kyrgyz Republic	106	South Africa
25	Norway	25	Central African Republic	66	Lao PDR	107	Sri Lanka
26	Poland	26	Chad	67	Latvia	108	Suriname
27	Portugal	27	Chile	68	Lebanon	109	Syrian Arab Republic
28	Slovak Republic	28	China	69	Lesotho	110	Tajikistan
29	Slovenia	29	Colombia	70	Liberia	111	Tanzania
30	Spain	30	Comoros	71	Libya	112	Thailand
31	Sweden	31	Congo, Dem. Rep.	72	Lithuania	113	Togo
32	Switzerland	32	Congo, Rep.	73	Madagascar	114	Tunisia
33	Turkey	33	Costa Rica	74	Malaysia	115	Uganda
34	United Kingdom	34	Cote d'Ivoire	75	Maldives	116	Ukraine
35	United States	35	Croatia	76	Mali	117	United Arab Emirates
		36	Cyprus	77	Malta	118	Uruguay
		37	Dominican Republic	78	Mauritania	119	Venezuela, RB
		38	Ecuador	79	Mauritius	120	Vietnam
		39	Egypt, Arab Rep.	80	Moldova	121	Zambia
		40	El Salvador	81	Mongolia		
		41	Equatorial Guinea	82	Morocco		

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