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# Financial development, legal systems and SME finance: Cross-country evidence

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## ABSTRACT

This paper provides a comprehensive investigation into the selection of different sources of finance for both short-term and long-term projects by SMEs, utilizing cross-country data from the World Bank. The results highlight the crucial roles played by financial development and legal system in the countries where SMEs operate. Specifically, with better developed financial systems, SMEs are more likely to use formal sources of external finance from formal sources (e.g., bank and non-bank institutions) to meet their short term and long term financing needs, highlighting the importance of financial development in accessing external finance for SMEs. Furthermore, this paper provides evidence on the moderating effects of legal systems on the favourable impacts of financial development on SME finance. In particular, the effects of financial development on SMEs' access to external finance are more pronounced in countries with stronger investor protection, such as common law countries, than in those civil law countries, highlighting the importance of legal systems in facilitating SME financing and suggests that policymakers should consider strengthening investor protection on promote SME growth and development.

## 1. Introduction

It has been widely acknowledged that access to capital is crucial for small and medium-sized enterprises (SMEs) to attain a strategic advantage over competitors (Beck et al., 2013), but SMEs are more likely to be financially constrained than large firms (Beck & Demirguc-Kunt, 2006; Rostamkalaei & Freel, 2016) due to their information opacity, relative scarcity of collateralisable assets, and the disproportionately high monitoring costs for creditors (Berger & Udell, 1998). Not only is equity market such as initial public offerings (IPOs) largely inaccessible to SMEs, but formal debt finance such as bank and nonbank financial institutions are also not viable options for those companies. An increasing number of studies are exploring the implications of financial market and institutional environment in the SMEs development and growth (Durusu-Cifyci et al., 2017; Galli et al., 2017; Wellalage & Thrikawala, 2021; Wellalage, Locke, & Samujh, 2020). However, the impact of financial development on SME to access formal sources remains gap, hence, this paper aims to fill the gap in the extant literature by providing a better understanding of financial development and institutional environment on SMEs financing decisions.

Existing studies have attempted to investigate how financial development contribute to SME finance in terms of availability, price,

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financial services and products. For example, empirical studies on banking market development have shown that improved banking market competition is able to increase credit supply and improve SME's access to bank finance, in both developed markets, such as U.S (Rice & Strahan, 2010) and emerging economies, such as China (Chong et al., 2013). In addition, the quality of institutional environment can have significantly effect on the development of credit market (La Porta et al., 1997; Morck et al., 2000) by producing more authentic information, gathering and distributing information and capital, and facilitating transactions (Khanna & Palepu, 2010). For example, the enforcement of legal rights plays a role in the credit market, thus affecting SMEs' access to external finance (Galli et al., 2017; Wellalage, Locke, & Samujh, 2020).

The literature has yet to fully explore how the financial and legal environment at country level would contribute to SMEs' access to external finance from bank and non-bank institutions in terms of both short-term and long-term finance, from a cross-country perspective. To address this research gap, this paper aims to provide empirical and cross-country evidence on the determining roles played by the degree of financial development and the origin of legal system in the country where SMEs operate.

In this paper, we investigate the impacts of financial development and legal system on SMEs' access to external finance from bank and non-bank institutions, in terms of both short term and long term finance. By collecting data from World Bank on SME finance from 154 countries between 2006 and 2022, we show primary results supporting the important roles played by financial development and legal system in the country where SMEs operate. Specifically, we find that with a greater degree of financial development, SMEs are more likely to use formal sources of external finance (e.g. from both bank and non-bank institutions) than use informal sources (e.g. private) to finance their short term (e.g. working capital) and long term (e.g. fixed assets investment) demand for finance.

This result suggests that non-bank financial institutions are more sensitive of the degree of financial development in providing finance to SMEs. Economically, with one standard deviation increase in financial development, overall, SMEs would use more non-bank finance by 2.52% and 5.61% to finance working capital and fixed assets investment. Although non-bank financial institutions, such as microfinance institutions and credit unions, rely on relationship and reputation lending, they monitor and enforce repayment from a class of firms more efficiently than commercial banks (Arnott & Stiglitz, 1991). However, non-bank financial institutions would not substitute banks and serve the needs of higher end of the market as their monitoring and enforcement mechanisms are insufficiently developed (Ayyagari et al., 2010). With a lower level of financial development, financial system does not work well to accomplish the functions. In contrast, with financial market development, government and regulators should attempt to provide support to supervise and standardise non-bank financial institutions.

This paper also provides novel evidence on the moderating effects of legal systems on the favourable impacts of financial development on SME finance. In particular, it shows that the favourable effects of financial development on the access to external finance for SMEs are stronger for countries with a common law system than for those with a civil law system. The results are consistent with existing studies on law and finance, such as Qian and Strahan (2007), Graff (2008) and Haselmann et al. (2010).

The results are robust to various empirical specifications, such as alternative variable measurements. First, we group sample firms by firm size. Second, we construct two alternative proxies for financial development in addition to liquid liabilities to GDP used in the baseline analysis, such as the ratio of private credit to GDP and stock trade total value to GDP. Final, we introduce one-year and two-year lagged value of liquid liabilities to GDP as alternative specification to evaluate the lagged effects of financial development on the access to finance by SMEs.

This paper expands the different aspects of prior research. Growing evidence in research on financial market highlights the significant impact of financial development in SME finance (Beck & Demirguc-Kunt, 2006; Rahaman, 2011; Rostamkalaei & Freel, 2016). However, the financing sources in those studies rarely distinguish between types of bank and nonbank institutions and between types of finances of SMEs. In other words, insight into the specific effects of financial development on SME using formal sources remains limited in the literature. In this paper, we explore the formal sources (bank and nonbank institutions) for short term and long term financing by SMEs, providing a fresh perspective on SMEs finance in cross-countries and highlighting the importance of financial development in SMEs development.

This paper also adds to the literature focusing on the impact of institutional environment on credit market. An effective institutional framework is also expected to facilitate the information transmission in an economy or society amongst individuals and organisations so as to reduce asymmetric information (Casson, 1997). From a theoretical perspective, this study provides supporting evidence on the role played by legal system in moderating the effects of financial development on SMEs' access to external formal finance. It shows that strong creditor rights improve formal credit availability where in countries with better legal protection during bankruptcy and registration, lenders are more likely to provide credit on favourable terms *ex ante*.

The remainder of this paper is organized in sections. Section 2 critically reviews prior research and develops hypotheses. Section 3 outlines the data and methods. Sections 4 reports the results analysis and Section 5 concludes by summarising the paper and offering implications and limitations.

## 2. Literature review and development of hypotheses

### 2.1. An overview of SME finance

Funding options can be categorised in several ways, but most can be described as either short-term or long-term finance, depending on the period of time involved. Short-term finance is used briefly, perhaps as working capital or to purchase small items of equipment, whereas long-term finance is generally used when more costly and strategically activities must be funded, such as investments or larger, more enduring items of equipment (Esperanca & Matias, 2006). In both cases, the financial behaviours of SMEs, and investors' lending decisions, may be heavily influenced by asymmetric information (Han & Zhang, 2012), which may in turn lead to adverse

choices and moral issues. Information asymmetries exist wherever one party knows more than the other; for example, small business owner managers generally know more about their businesses and investment projects than external stakeholders, including lenders, do.

With regard to the role of information asymmetries in SME financing, the pecking order theory, developed by Myers (1984) and Myers and Majluf (1984), considers how businesses make financing decisions in terms of the priority of sources of external finance. The pecking order theory proposes that 1) firms favour internal funding sources to external finance, since this avoids issue costs; and 2) if external financing is unavoidable, firms should rank their funding options in a hierarchical order from low-risk to high-risk, and issue debt rather than equity security to the greatest extent possible.

Recent literature provides empirical evidence that supports application of the pecking order theory in small business decision making. For example, Sanchez-vidal and Martin-ugedo (2005) studied data from 1566 Spanish firms over the period 1994–2000, and concluded that their financing decisions were consistent with the predictions of pecking order theory. Aktas et al. (2011), who analysed the behaviours of 56,605 French micro firms between 1998 and 2006, found that these firms preferred to use internal funding sources, with debt as a complementary source, which also supports pecking order theory.

Several factors may influence the dominance of pecking order theory in explanations of SME financing decisions based on asymmetric information. Firstly, compared with large firms, SMEs are disadvantaged in accessing external finance due to their unique characteristics, such as less diversification (Ang, 1991), higher bankruptcy risk (Morck et al., 2000) and information opacity (Beck & Demircug-Kunt, 2006). Consequently, small firms pay more to borrow capital (Liu et al., 2011), generate disproportionately higher monitoring costs for lenders (Aktas et al., 2011; Berger & Udell, 1998) and increase the levels of moral hazard and problems of adverse selection (Berndt & Gupta, 2009). Empirical evidence shows that the pecking order effect becomes more pronounced where there is a higher degree of information asymmetry, and that the cost of capital varies with financing sources (Cassar & Holmes, 2003). Secondly, it is widely accepted that SMEs rely heavily on internal sources, such as the personal wealth of business owners and retained earnings, and have limited access to equity markets (Daskalakis et al., 2013). Therefore debt finance, especially bank finance, is the primary source of external financing for small firms (Robb & Robinson, 2014). Carpentier et al. (2012) noted that the existence of information asymmetries and high costs for both SMEs and external equity investors causes SMEs to face strong financial constraints in accessing equity markets, which supports the pecking order theory. Additionally, most SMEs strongly prefer financing in forms that have minimal impact on their business functioning – for example, they tend to avoid solutions that hand over decision-making power to investors – consequently, they do not prioritise the achievement of a perfect balance between wealth and capital costs (Lopez-Gracia & Aybar-Arias, 2000). Thus, most SMEs prefer internal and debt funding, despite associated disadvantages; for example, internal funding is often costly and debt funding frequently inadequate.

For external funding, SMEs are more likely than large firms to experience restricted access to financial resources. This arises from multiple factors, including deficits in the SME's accounting, regulation and financial systems (Beck & Demircug-Kunt, 2006); competition (Anzoategui, Martinez Peria, & Rocha, 2010); interest rates and other finance-related policies and practice (Foltz, 2004); and a general lack of awareness of the funding sources available, and how to access them. All of these factors – and others – can drive up the costs and risks involved in securing external credit, and make it more likely that SMEs turn to informal funding sources instead. This effect is often particularly strong for SMEs operating in developing nations.

It may be helpful at this point to clarify the differences between formal and informal finance. According to Elston et al. (2016), formal finance comprises capital from formal financial service providers, including banks; in contrast, informal finance is capital sourced from outside the formal financial services sector, such as loans from friends, family, relatives or private lenders. When lending is formal, it is carried out on an arms-length basis, and decisions are made on the grounds of tangible or 'hard' evidence. Informal lending, however, is generally made on the basis of private (sometimes called 'soft') information, and on the principles of an existing or relatively informal relationship. Studies indicate that because SMEs are often restricted in their ability to access formal finance streams – such formal funding being associated with multiple advantages – they may turn to informal finance as a last resort. In these cases, SMEs may be locked out of formal sources because lenders in the formal sector must operate on limited information, and rely on collaterals to minimise the inherent risks of lending; risks that include moral hazards and potential adverse choice (Guirkingier, 2008). Consequently, while informal borrowing may cost SMEs considerably more than formal transactions would (Nguyen & Canh, 2021), SMEs may use informal debt regardless, often for its speedy, accessible nature.

## 2.2. Hypotheses development

According to institutional theory, the behaviours of an organisation are both driven and constrained by the political, social and financial systems that apply in the context within which they operate (Scott, 2001). Studies of financing around the world have highlighted the impacts of institutional differences on capital structure (Beck et al., 2008; Demircug-Kunt & Maksimovic, 1998; Fan et al., 2017; Wellalage, Locke, & Samujh, 2020). Recent theories on economic development have also shed light upon the importance of financial development in promoting entrepreneurship, firms' innovation and economic growth (Ayyagari et al., 2012; Becker, Chen, & Greenberg, 2013), specifically by improving the allocation of resources and investment opportunities (Bekaert et al., 2005).

As Levine (2005) concluded, financial development is the degree to which financial instruments, markets and institutions alleviate the impacts of information and transaction costs through the provision of financial services to an economy. It is widely accepted that financial systems perform five key functions, namely providing information, monitoring investment, diversifying risks, mobilising savings and facilitating the exchange of services (Levine, 2005; Merton, 1992). A well-developed financial market can produce more information and thereby affect capital allocation, as the institutional framework in developed financial market is held to function more effectively in its disciplinary and enforcing roles than is the case in weaker financial markets (Bloom & Van Reenen, 2010).

Additionally, formal institutions in developed financial market tend to be efficient (Young et al., 2008). There are very substantial fixed costs involved in evaluating firms and projects before investment decisions are made, and individual investors have a limited ability to collect, process and produce information regarding possible investment projects. As noted by Boyd and Prescott (1986), financial institutions may reduce the costs involved in collecting and processing information, and thereby fund more promising firms and induce a more efficient allocation of capital.

Financial development reduces the information asymmetries between formal financial institutions and SMEs, and lower transaction costs would make it easier for SMEs to select more formal sources of finance. Thus, we formulate our first hypothesis as follows:

**H1.** Financial development has a positive impact on SMEs' use of formal sources of external finance (e.g., from bank or non-bank institutions) for both short-term and long-term financing needs.

The literature on law and finance acknowledges the role of legal systems in finance and economic growth; this began with two widely-cited papers by La Porta, Lopez-de Silanes, Shleifer and Vishny (La Porta et al., 1997; 1998; henceforth LLSV). Levine (1999), in a study of financial development and economic growth, suggested that a country's legal system and political institutions are factors that drive both financial and economic development at critical moments. The characteristics of, and differences between, legal systems may help to explain why firms' access to capital varies so much between countries.

La Porta et al. (1998) indicated that law and the quality of its enforcement are potentially key determinants of the rights allocated to security holders, and how these rights are protected. Watson (1993) pointed out that law, while it varies between countries, is developed from and shaped by principles arising from a few families and traditions. Generally, commercial laws are derived from two broad traditions: common law, which is English in origin, and civil law, which has been derived from Roman law (La Porta et al., 1998). Prior studies have acknowledged that civil law (common law) provides weaker (stronger) legal protections for both shareholders and creditors (Djankov et al., 2003; La Porta et al., 1998, 2000). Common law countries also seem to have better institutions, with less legal formalism, and thereby more efficient courts (Djankov et al., 2003), with less corrupt governments (La Porta et al., 1999), and more informative accounting standards (La Porta et al., 1998).

Empirical studies of law and investment provide evidence to explain how investor protection affects micro investment activities. First, investor protection stimulates more arbitrage (Morck et al., 2000) and more accurate financial reporting (Leuz et al., 2003), which leads to stock prices more accurately reflecting fundamental values (McLean et al., 2012). Second, strong protection for investors helps firms to access external finance for value-enhancing projects (La Porta et al., 1998, 2000). Third, business managers and controlling shareholders are more likely to invest in projects that will benefit shareholders and which are unlikely to waste or fritter away company resources (Bekaert et al., 2011; Shleifer & Wolfenzon, 2002; Wurgler, 2000).

Qian and Strahan (2007), in a study of the legal and institutional variations that shape ownership and the terms of bank loans, suggest that, in countries with strong investor protection, bank loans have more concentrated ownership, longer maturities and lower interest rates. They explain that, in such contexts, lenders can control credit risk, since they know that in the event of default, they will still obtain assets under the country's strong investor protection law. In other words, greater protection of investors helps to make finance available to firms, with lower costs and longer maturities.

In addition, appropriate bankruptcy law is increasingly accepted as essential for the good health of credit markets and entrepreneurship (Ayotte & Yun, 2009). Empirical studies have shown that inefficiencies in judicial and bankruptcy processes reduce access to credit, which suggests that the efficiency of the bankruptcy system is important in determining the availability of credit (Berger & Udell, 2006). Institutions that regulate insolvency commonly perform insufficiently, especially in developing countries (Djankov et al., 2008). Where this happens, it is often because bankruptcy procedures are hugely inefficient; processes may take a long time to conclude and cost a great deal, and creditor protection may be weak. Moreover, it has also been accepted that countries with greater formalism in legal procedures, which are typically civil law countries, take longer to implement some types of financial contract (Djankov et al., 2003).

Despite studies by LLSV and others on the relationships between legal origins, institutions and financial outcomes, there is still a lack of research and understanding of the relationships between those elements and sources of finance. Specifically, does the legal environment play a moderating role in the effects of financial development on SME finance? This paper aims to fill that gap in the literature, by offering direct empirical and cross-country evidence of the determinant roles played by the degree of financial development and legal system in the country where a given SME operates. Thus, we formulate our second hypothesis as follows:

**H2.** Legal systems moderate the effect of financial development on access to external finance for SMEs.

### 3. Data and methodology

#### 3.1. Data collection

A big challenge to research on SMEs finance is the lack of reliable data to make cross-country comparisons, which is compounded by the lack of conformity in defining SMEs across countries. In this study, the empirical analysis uses data from two main sources. Firm-level data are collected from World Bank Enterprise Survey (WBES) and country-level data are collected from World Development Indicator (WDI).

WBES is a firm-level survey of a representative sample of an economy's private sector. It provides detailed information on enterprises between 2002 and 2022 from both emerging and developed markets in the following perspectives: firm level characteristics, access to finance, informality, corruption, crime, gender, infrastructure, performance, trade, workforce, regulations and taxes, and

innovation and technology. In addition, WBES database has excellent coverage of firms of small and medium sizes, accounting for 80% of all sample firms in WBES SMEs observations; whereas, other single country studies use data that focus heavily on large firms. There has been a lack of universal definition on SMEs because of the big variation across countries and industries. We follow WBES and define samples as being of small (5–19 employees), medium (20–99 employees) and large (100 + employees). Because countries are surveyed by WBES in every 3–4 years but not synchronously,<sup>1</sup> in order to ensure the consistency of data, this research analyses the standardised dataset from 2006 to 2022, which contains 154,154 SMEs cross 154 countries. Furthermore, this paper analyses SMEs financing decision between bank and non-bank institutions and hence the samples used in the following analysis exclude SMEs who never use bank or non-bank institutions as financing sources for working capital or fixed assets investment. In the regression analysis, we match firms' financing patterns with other firm and country level characteristics.

### 3.2. Measuring financing sources

To investigate the access to external finance by SMEs, the main dependent variables are the percentage of external finance by firm  $y$  in country  $k$  in year  $t$ , referring to the sources from either bank or non-bank institutions, in terms of both short term (working capital) and long term (fixed assets investment) finance, respectively. In constructing dependent variables, we use two survey questions, first, the percentage of this establishment's working capital borrowed from each of the following sources: 1) internal funds or retained earnings, 2) banks including private and state-owned, 3) non-bank financial institutions which include microfinance institutions, credit cooperative, credit unions, or finance companies, 4) purchases on credit from suppliers and advances from customers, and 5) other, moneylenders, friends, relatives, etc. The second question is the percentage of this establishment's total purchase of fixed assets that was financed from each of above sources. According to the survey question, banks are private and state-owned banks, and non-bank institutions include microfinance institutions, credit cooperative, credit unions and finance companies. Informal sources consist of trade credit and others, such as moneylenders, friends, relatives, etc. In total, there are four dependent variables in this paper, including 1) the percentage of working capital financed by banks ( $W.Cap_B$ ), 2) the percentage of working capital financed by non-bank institutions ( $W.Cap_{NB}$ ), 3) the percentage of fixed assets investment financed by banks ( $F.Ass_B$ ), and 4) the percentage of fixed assets investment financed by non-bank institutions ( $F.Ass_{NB}$ ).

### 3.3. Measuring financial development

The key explanatory variable is the level of financial development. In last three decades, many scholars have developed several measures to investigate the degree of financial development based on the characteristics of financial institutions and markets (Bekaert et al., 2005; Levine & Zervos, 1998; Loayze et al., 2018). There are three points to explain how the indicators have been selected to measure the degree of financial development in this study. First, existing literature investigating the impacts of financial development on the allocation of capital has widely used the size of the financial systems as a measure of financial development and such measures are usually liquid liabilities to GDP or private credit to GDP. For example, King and Levine (1993b) in their pioneering article on finance and growth use liquid liabilities to GDP as indicator of financial development, and provide cross-country evidence between financial development and economic growth. Second, this study aims to explain how financial development affects the access to external sources from both bank and non-bank institutions and hence, the indicators which only measure the banking system, such as net interest margin and deposit money banks assets to GDP, are not appropriate options in this study in order to avoid bias. Third, although SMEs have very limited access to equity market (Mateev et al., 2013), existing evidence has shown that stock market development takes place in tandem with other aspects of financial development (Demirgüç-Kunt & Maksimovic, 1996). Hence, in addition to the key indicator used in the main analysis, we also select an indicator of capital market development to measure financial development in robustness test.

Following existing studies, such as King and Levine (1993a) and Hermes et al. (2009), the level of financial development in this study is primarily measured by *liquid liabilities to GDP*, the traditional indicator of financial development to measure financial depth. Liquid liabilities (measured as M3) include currency held outside the banking systems plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries (King & Levine, 1993b). Liquid liabilities to GDP is the broadest available indicator of financial intermediation, including all banks and bank-like and nonbank financial institutions (Beck et al., 2010). A higher ratio of liquid liabilities to GDP means a higher intensity in the financial system and a greater degree of financial development. According to King and Levine (1993a), the assumption of this indicator is that the size of financial sector is positively related to financial services. For instance, Hermes et al. (2009) suggest that there is a positive relationship between the efficiency of microfinance institutions and financial development, where financial development is measured by liquid liabilities to GDP.

In robustness tests, we employ alternative measures of financial development which serve as substitutes to liquid liabilities to GDP, such as *domestic credit to private sector to GDP* and *stock market total value trade to GDP*. Domestic credit to private sector to GDP, as a traditional indicator of financial development, is commonly used to measure the depth of country's financial sector (Hassan et al., 2011; Li et al., 2018; Love, 2003). Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporations where data are available, e.g. finance and leasing companies, money lenders and insurance corporations. The high ratio of

<sup>1</sup> This is the reason to explain the data used in this paper is cross-section data rather than panel data.

domestic credit to private sector to GDP means a high level of domestic investment and a high level of financial system development (Hassan et al., 2011). Love (2003) reports that financial institution relations with private sector are more indicative of the provision of efficient financial services than financial institution relations with the public sector; hence, a higher ratio of domestic credit to private sector to GDP indicates a greater degree of financial development.

As shown by Levine (1991), stock market impacts on the economic activity through the creation of liquidity. Hence, we use one indicator of stock market as an alternative measure of financial development, stock market total value trade to GDP, by following recent papers exploring financial development and the allocation of external finance, e.g. Bena and Ondko (2012). Stock market total value to GDP, which is defined in Levine (1999), equals total number of shares traded on the stock market exchange divided by GDP. It indicates the trading volume of the stock market activity as share of national output and catches the liquidity of the stock market (Beck & Demirguc-Kunt, 2009).

### 3.4. Measuring legal system

Existing literature on law and finance has attempted to identify the legal factors which matter most for finance (Djankov et al., 2008; La Porta et al., 1998) and the legal origin is a universal variable to measure the legal environment. Some national legal systems are sufficiently similar in certain crucial aspects; thereby allow classification of national legal systems into major families of law. Two broad legal traditions to be relevant in matters of investor protection are common law and civil law. According to La Porta et al. (1998), the civil law family as the oldest, the most influential, and the most widely distributed around the world, includes three currently civil families of laws - French, German, and Scandinavian, and the common law family consists of the law of England and those law modelled on English law. Literature has indicated that common law countries have stronger investor protection laws and a greater private enforcement than civil law countries (Djankov et al., 2008; La Porta et al., 1998).

One of the objectives of this paper is to investigate whether the legal system moderates the effects of financial development on SMEs' access to external finance. By following La Porta et al. (1998), we use legal origin to measure legal environment. The sample countries are categorised according to their legal system into common law (21.43%), civil law (46.75%) and other (31.82%) legal system. In the empirical part, we set up two dummy variables, CommonLaw (1 = country is from common families of laws, 0 = others) and CivilLaw (1 = country is from civil families of laws, 0 = others).

### 3.5. Control variables

Prior literature has also indicated that, how the access to external finance is affected by a variety of firm characteristics, such as *firm age* (Beck et al., 2013), *ownership* (Beck et al., 2006), and *financing constraint* (Beck et al., 2008). It is acknowledged that younger and smaller firms are more likely to be financially constrained in accessing external finance (Rostamkalaei & Freel, 2016). Accordingly, all of the corresponding variables describing the above characteristics are considered in the baseline and subsequent analyses. Besides, following Beck et al. (2013) who study financial structure, size and access to finance, we also control for two dummy variables to gauge the access to and the use of financial services: *account* that equals to one if the establishment has a checking or saving account and zero otherwise, and *loan* that equals to one if the establishment has a line of credit or a loan from a financial institution and zero otherwise. Asymmetric information is central to understanding the financing behaviour, and informationally opaque small business borrowers are more likely to face credit rationing (Stiglitz & Weiss, 1981; Vos et al., 2007). Scholars indicate having an external auditor review company's financial statements can help to reduce information asymmetry between the company and its investors (Palazuelos Cobo, Herrero Crespo, & Montoya del Corte, 2017), moreover, various studies suggest that improved quantity and quality of financial statements for SMEs increases the likelihood of accessing credit (Ennew & Binks, 1999) raises the volume of credit available (Moro et al., 2015), reduces the need for collateral or security (Zecchini & Ventura, 2009), and lowers the interest rates charged. Hence, we add a dummy variable to control for asymmetric information, *financial statement* that equals to one if annual financial statements checked and certified by an external auditor and zero otherwise, where the degree of information opacity can be mitigated by the checked and certified financial statements. Following Leon (2015), we also control for the top *manager's year of experience* and whether the sample firm is a *subsidiary*.

To avoid the omitted variable issue, following Demirguc-Kunt and Maksimovic (1998), Beck et al. (2008) and Leon (2015), macroeconomic characteristics correlated with external finance availability are included as control variables, including GDP per capita and the rate of inflation. GDP per capita is a proxy for institutional determinant of the access to external finance. According to Demirguc-Kunt and Maksimovic (1998), the rate of inflation indicates a government's management of its economy and whether the local currency provides a stable measure of value to be used in long-term contracting. Hence, we consider the rate of inflation in each country over the sample period to control for the possibility that the level of inflation may influence on firm's ability to access long-term debt finance. Besides, we control for country-level governance by 'Worldwide Governance Indicators' which consist of six indicators, including control of corruption, government effectiveness, political stability and absence of violence, regulator quality, rule of law and vice and accountability. All indicators have a value ranging from -2.5 and +2.5 and by following Cole et al. (2008), we use the average value of six indicators to control for the governance at country level. In addition, we also control for year, industry and country fixed effects.

### 3.6. Descriptive statistics

Table 1 reports the descriptive statistics of the variables used in this analysis, the description of the variable definition is shown in

**Appendix 1.** In order to avoid the influence of extreme values of continuous variables, the continuity variables were treated with 1% bilateral tail reduction. Panel A presents summaries of the variables used to measure the external finance for both short term working capital finance and long term fixed asset investment. Variables regarding the characteristics of the country and firm level have been reported and summarised in Panel B. Averagely, SME samples use 39.58% and 27.73% of working capital borrowed from banks and non-bank institutions, respectively. This percentage, however, varies significantly across countries. In addition, 65% of SMEs in the samples are facing financing constraint, and the variable of financial statements indicates that over 50% of samples are informationally opaque firms. Indicators to measure financial development also have been reported in Panel B. In specific, liquid liabilities to GDP ranges from 0.14 to 1.81 with an average of 0.56 and a standard deviation of 0.37 respectively.

**Table 2** provides the detail of sample selection. This study investigates SMEs which have borrowed from bank and non-bank institutions, but not those SMEs never using bank or non-bank finance. Hence, samples do not include observation without working capital and fixed asset investment borrowed from bank or non-bank institutions. Additionally, due to missing value of other variavles, smaple size varies significantly from model to model. **Table 3** shows the correlation matrix of dependent and independent variables and in general, it suggests that there is little evidence on the multicollinearity problem because most correlation coefficients are not higher than 0.2.

### 3.7. Empirical method

In order to examine the determinant role played by financial development in SMEs’ access to short-term and long-term finance from three major sources, banks, non-bank institutions and other informal sources. First, we adopt the Logit model to explore how financial development affects SMEs’ sources selection between formal sources and informal sources:

$$\begin{aligned}
 W.Cap.Ex = & \partial + \beta_1 \text{Financial development}_{j,t} + \beta_2 \text{Loan}_{i,j,t} + \beta_3 \text{Account}_{i,j,t} + \beta_4 \text{Subsidiary}_{i,j,t} + \beta_5 \text{Firm Age}_{i,j,t} + \beta_6 \text{Foreign}_{i,j,t} \\
 & + \beta_7 \text{Government}_{i,j,t} + \beta_8 \text{Exp}_{i,j,t} + \beta_9 \text{Finance Constraint}_{i,j,t} + \beta_{10} \text{Small}_{i,j,t} + \beta_{11} \text{Financial Statements}_{i,j,t} + \beta_{12} \text{GDP per capita}_{j,t} \\
 & + \beta_{13} \text{Inflation}_{j,t} + \beta_{14} \text{GovIndex}_{j,t} + \text{Year}_t + \text{Industry}_k + \text{Country}_j + \varepsilon_{i,j}
 \end{aligned} \tag{1}$$

$$\begin{aligned}
 F.Ass.Ex = & \partial + \beta_1 \text{Financial development}_{j,t} + \beta_2 \text{Loan}_{i,j,t} + \beta_3 \text{Account}_{i,j,t} + \beta_4 \text{Subsidiary}_{i,j,t} + \beta_5 \text{Firm Age}_{i,j,t} + \beta_6 \text{Foreign}_{i,j,t} \\
 & + \beta_7 \text{Government}_{i,j,t} + \beta_8 \text{Exp}_{i,j,t} + \beta_9 \text{Finance Constraint}_{i,j,t} + \beta_{10} \text{Small}_{i,j,t} + \beta_{11} \text{Financial Statements}_{i,j,t} + \beta_{12} \text{GDP per capita}_{j,t} \\
 & + \beta_{13} \text{Inflation}_{j,t} + \beta_{14} \text{GovIndex}_{j,t} + \text{Year}_t + \text{Industry}_k + \text{Country}_j + \varepsilon_{i,j}
 \end{aligned} \tag{2}$$

where the *W.Cap.Ex* is dummy variable that takes on the value 1 if SMEs choose formal sources (bank or non-bank) as working capital

**Table 1**

Descriptive statistics This table reports the summary statistics of all variables used in the following empirical analysis, including those used in robustness tests. The sample collected is from 2006 to 2022 and 154 countries. Panel A reports the four dependent variables to measure choices of financing between bank and nonbank institutions, in terms of working capital finance and fixed asset investment, respectively. Panel B presents the variables that may affect firm’s financing sources from both country-level and firm-level.

Variable	Obs.	Mean	Std.dev.	Min	Max
<b>Panel A: Dependent Variables</b>					
W.Cap.Ex	50,029	0.86	0.35	0	1
F.Ass.Ex	18,454	0.90	0.30	0	1
W.Cap.B	40,050	39.58	26.06	5	100
W.Cap.N.B	6119	27.73	22.78	3	100
F.Ass.B	15,208	61.81	31.65	5	100
F.Ass.N.B	2023	49.04	34.16	5	100
<b>Panel B: Independent Variables</b>					
<i>Firm level characteristics</i>					
Loan	149,855	0.32	0.47	0	1
Account	150,701	0.86	0.35	0	1
Subsidiary	151,544	0.14	0.35	0	1
Age (log)	152,143	3.13	0.52	1.61	4.54
Foreign	151,744	0.08	0.26	0	1
Government	151,794	0.01	0.09	0	1
Exp (log)	150,471	2.63	0.78	0	3.91
Finance Constraint	149,080	0.65	0.48	0	1
Small size	154,154	0.58	0.49	0	1
Financial Statements	150,414	0.46	0.50	0	1
<i>Country level characteristics</i>					
FD <sub>LL</sub> /GDP	115,071	0.56	0.37	0.14	1.81
FD <sub>PC</sub> /GDP	104,585	0.44	0.32	0.05	1.46
FD <sub>ST</sub> /GDP	59,069	0.14	0.18	0.002	0.79
GDP per capita (log)	117,318	8.28	1.25	5.85	11.02
Inflation (log)	110,309	1.44	0.99	-2.63	3.53
GovIndex	118,108	-0.19	0.73	-1.49	1.71
Law	121,114	0.33	0.47	0	1

**Table 2**  
Sample selection.

	W.Cap-B	W.Cap-NB	F.Ass-B	F.Ass-NB
Total SMEs	154,154	154,154	154,154	154,154
<b>Excluded</b>				
Don't know	4958	5148	2281	2173
Refused to answer	135	146	1971	2526
Do not use (0)	99,895	134,297	41,121	50,222
Missing value	9116	8444	93,573	97,210
Sample size	40,050	6119	15,208	2023

finance, and 0 means using informal sources (e.g. private) as financing sources. *F.Ass.Ex* is dummy variable that takes on the value 1 if SMEs choose formal sources (bank or non-bank) as fixed asset investment, and 0 means using informal sources (e.g. private) as financing sources.

Then, we establish the following baseline specifications by OLS model to indicate the effect of financial development on the access formal external sources:

$$\begin{aligned}
 \text{Working capital financing}_{i,j,t,s} = & \delta + \beta_1 \text{Financial development}_{j,t} + \beta_2 \text{Loan}_{i,j,t} + \beta_3 \text{Account}_{i,j,t} + \beta_4 \text{Subsidiary}_{i,j,t} + \beta_5 \text{Firm Age}_{i,j,t} \\
 & + \beta_6 \text{Foreign}_{i,j,t} + \beta_7 \text{Government}_{i,j,t} + \beta_8 \text{Exp}_{i,j,t} + \beta_9 \text{Finance Constraint}_{i,j,t} + \beta_{10} \text{Small}_{i,j,t} + \beta_{11} \text{Financial Statements}_{i,j,t} \\
 & + \beta_{12} \text{GDP per capita}_{j,t} + \beta_{13} \text{Inflation}_{j,t} + \beta_{14} \text{GovIndex}_{j,t} + \text{Year}_t + \text{Industry}_k + \text{Country}_j + \varepsilon_{ij}
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 \text{Fixed assets investment financing}_{i,j,t,s} = & \delta + \beta_1 \text{Financial development}_{j,t} + \beta_2 \text{Loan}_{i,j,t} + \beta_3 \text{Account}_{i,j,t} + \beta_4 \text{Subsidiary}_{i,j,t} + \beta_5 \text{Firm Age}_{i,j,t} \\
 & + \beta_6 \text{Foreign}_{i,j,t} + \beta_7 \text{Government}_{i,j,t} + \beta_8 \text{Exp}_{i,j,t} + \beta_9 \text{Finance Constraint}_{i,j,t} + \beta_{10} \text{Small}_{i,j,t} + \beta_{11} \text{Financial Statements}_{i,j,t} \\
 & + \beta_{12} \text{GDP per capita}_{j,t} + \beta_{13} \text{Inflation}_{j,t} + \beta_{14} \text{GovIndex}_{j,t} + \text{Year}_t + \text{Industry}_k + \text{Country}_j + \varepsilon_{ij}
 \end{aligned} \tag{4}$$

where *i, j, t, s* and *k* index firm, country, year, sources and industry respectively. *Working capital financing*<sub>*i,j,t,s*</sub> is the dependent variable to measure the proportion of working capital referring to the sources *s* from either bank or non-bank institutions by firm *i* in country *j* in year *t*. Similarly, *Fixed assets investment financing*<sub>*i,j,t,s*</sub> is the dependent variable measuring the proportion of fixed assets investment referring to the sources *s* from either bank or nonbank institutions by firm *i* in country *y* in year *t*. *Financial development*<sub>*j,t*</sub> is country *j*'s degree of financial development in year *t*, measured by liquid liabilities to GDP (*FD<sub>LL/GDP</sub>*) in baseline estimations and by domestic credit to private sector to GDP (*FD<sub>PC/GDP</sub>*) and stock market total value trade to GDP (*FD<sub>ST/GDP</sub>*) in robustness tests. Control variables are the characteristics at both firm and country-level. *Year<sub>t</sub>*, *Industry<sub>k</sub>*, and *Country<sub>j</sub>* capture year, industry and country fixed effects respectively to control for time and industry-specific trends. we followed existing literature, e.g. D'Souza et al. (2017) which used the same dataset, and controlled for heteroskedasticity-robust standard errors, after including a rich set of country-level variables.

#### 4. Empirical results

##### 4.1. Financial development and SME financing decision: baseline results

We first test the effect of financial development on SMEs' choose between various finance sources by Logit models (Eq. (1) and Eq. (2)), as shown in Table 4. The positive and significant coefficients of *FD<sub>LL/GDP</sub>* indicate financial development contributes to SMEs choose formal sources (bank and non-bank) to assess short-term and long-term finance rather than choose informal sources (private) to finance short term and long term finance demand.

Table 5 presents the baseline OLS results for Eq. (3) and Eq. (4) to examine the role played by financial development in determining the access to external sources of both short term (working capital finance, *W.Cap*, Models 1 and 2) and long term finance (fixed asset investment, *F.Ass*, Models 3 and 4) by SMEs, where the dependent variables are the percentage of either short term or long term finance obtained from either bank or non-bank institutions, respectively. The regressions are run with OLS with heteroskedasticity-robust standard errors. Variance inflation factor (VIF) has been checked where the VIFs of *FD<sub>LL/GDP</sub>* in Models 1–4 are 1.93, 1.95, 1.86 and 1.73. Given other variables, the VIFs are below 5, indicating that the results are not affected by a multicollinearity issue. At the bottom of models, we report the results of testing the statistical significance for the differences in the coefficients for using finance from bank versus non-bank institutions, which is statistically significant at 1% level.

As reported in Table 5, the estimated coefficients of *FD<sub>LL/GDP</sub>* are positive and statistically significant in all regression specifications. In specific, the results show clear evidence that with a greater degree of financial development, SMEs are more likely to obtain more formal sources of external finance (e.g. from both bank and non-bank institutions) to finance the short term (e.g. working capital) and long term (e.g. fixed asset investment) demand. Because SMEs are more vulnerable to asymmetric information problems than large firms (Vermoesen et al., 2013), for financial institutions, the fixed costs of collecting private information from small firms are higher than from large firms (Han & Zhang, 2012). With financial development, financial intermediaries may reduce the cost of collecting and processing information and thereby alleviate asymmetric information and improve resource allocation. This finding is consistent with Beck et al. (2011), who show banks in developing countries provide a lower share of investment loans and charge higher interest rates

**Table 3**  
Correlation matrix of dependent and independent variables.

Variable	1	2	3	4	5	6	7	8	9	10
1 W.Cap <sub>B</sub>	1									
2 W.Cap <sub>NB</sub>	0.0313*	1								
3 F.Ass <sub>B</sub>	0.4534***	0.2612***	1							
4 F.Ass <sub>NB</sub>	0.2484***	0.4408***	0.1550**	1						
5 Loan	0.0555***	-0.0020	0.0936***	0.1227***	1					
6 Account	-0.0080	-0.0253**	0.0025	0.0040	0.1520***	1				
7 Subsidiary	0.0095*	-0.0180	-0.0140*	-0.0323	0.0195***	0.0327***	1			
8 Age (log)	0.0149**	0.0049	0.0650***	0.0673**	0.1012***	0.0568***	0.0383***	1		
9 Foreign	-0.0272***	-0.0231	-0.0260**	-0.1147***	-0.0180***	0.0327***	0.1256***	-0.0077**	1	
10 Government	-0.0334***	-0.0515***	-0.0836***	-0.1866***	-0.0136***	0.0007*	0.0428**	0.0241***	0.1040***	1
11 Exp (log)	-0.0022	-0.0173	0.0551***	0.1389***	0.1199***	0.0712**	-0.0017	0.3779***	-0.0441***	-0.0262***
12 Finance Constraint	-0.0111**	-0.0211*	-0.0583***	-0.0383*	0.0732***	-0.0272***	-0.0246***	-0.0010	-0.0248***	-0.0004
13 Small size	0.0006	0.0723***	-0.0011	0.0312	-0.1508***	-0.1231***	-0.0998***	-0.1439***	-0.0868***	-0.0353***
14 Financial Statements	0.0793***	-0.0171	0.0474**	0.0345	0.1049***	0.1548***	0.1321***	0.1064***	0.0978***	0.0151***
15 FD <sub>LL</sub> /GDP	0.0839***	0.0049	0.0551***	0.1275***	0.1121***	0.0871***	0.0701***	-0.0055*	-0.0357***	-0.0263***
16 FD <sub>PC</sub> /GDP	0.0756***	0.0035	0.0332***	0.1869***	0.1346***	0.0550***	0.0547***	0.0063**	-0.0211***	-0.0206***
17 FD <sub>ST</sub> /GDP	0.1769***	0.1715***	0.0254**	-0.0092	-0.0493***	0.0498**	-0.0384***	0.0352***	-0.0774***	-0.0175***
18 GDP per capita (log)	-0.0638***	-0.0689***	0.0761***	0.1809***	0.2078***	0.1024***	0.0296***	0.0502***	-0.0128***	-0.0160***
19 Inflation (log)	-0.0124**	0.0508***	0.0272**	-0.0167	-0.0751***	-0.0167***	-0.0204***	0.0340***	-0.0048	0.0179***
20 GovIndex	0.0071***	0.0140	0.1046***	0.2570***	0.2236***	0.1286***	0.0208***	0.0703***	0.0245**	-0.0631***
11 Exp (log)	1	12	13	14	15	16	17	18	19	20
12 Finance Constraint	-0.0319***	1								
13 Small size	-0.0866***	0.0235***	1							
14 Financial Statements	0.0769***	-0.0251***	-0.1873***	1						
15 FD <sub>LL</sub> /GDP	0.1440**	-0.1460***	-0.0776***	0.1698***	1					
16 FD <sub>PC</sub> /GDP	0.1326***	-0.1399***	-0.0931***	0.1413***	0.7540***	1				
17 FD <sub>ST</sub> /GDP	-0.0297***	-0.0514***	-0.0975***	0.1212***	0.5245***	0.5361***	1			
18 GDP per capita (log)	0.2594***	-0.1830***	-0.0354***	0.0547***	0.4450***	0.5209***	-0.1864***	1		
19 Inflation (log)	-0.0761***	0.1005***	0.0203***	-0.0648***	-0.4256***	-0.4398***	-0.2073***	-0.2928***	1	
20 GovIndex	0.2285***	-0.1735***	-0.06327***	0.1166***	0.4562***	0.5446**	-0.0066***	0.7922***	-0.3303***	1

**Table 4**

Financial development and financing source selection This table reports Logit model results on how financial development affects the selection of external finance sources by SMEs. Models 1 and 2 show results of the effects of financial development on sources selection of working capital and fixed asset investment obtained from either formal or informal sources. Specifically, the dependent variable is dummy variable that takes on the value one if SMEs choose formal sources (bank or non-bank financial institutions) as working capital finance (*W.Cap.Ex* in Model 1) or fixed asset investment (*F.Ass.Ex* in Model 2), and zero means using informal sources (family, friends, and others) as financing sources. Financial development is measured by liquid liabilities to GDP ( $FD_{LL/GDP}$ ). \*\*\*, \*\* and \*denote statistically significant levels of 1%, 5% and 10% respectively.

VARIABLES	(1)	(2)
	<i>W.Cap.Ex</i>	<i>F.Ass.Ex</i>
$FD_{LL/GDP}$	1.0219*** (0.1247)	0.3957** (0.1799)
Loan	2.7120*** (0.0519)	2.1749*** (0.0753)
Account	0.2275*** (0.0585)	0.0602 (0.1142)
Subsidiary	0.0685 (0.0594)	-0.0146 (0.0967)
Age (log)	0.1431*** (0.0467)	0.0184 (0.0820)
Foreign	-0.2189*** (0.0753)	0.0244 (0.1300)
Government	0.7875*** (0.1578)	0.5160** (0.2355)
Exp (log)	0.0644** (0.0295)	0.0332 (0.0520)
Finance Constraint	-0.1980*** (0.0469)	-0.2573*** (0.0823)
Small size	-0.4796*** (0.0429)	-0.2323*** (0.0734)
Financial Statements	0.4011*** (0.0444)	0.3109*** (0.0755)
GDP per capita (log)	-0.1218*** (0.0407)	-0.0308 (0.0702)
Inflation (log)	-0.0286 (0.0359)	0.1217** (0.0549)
GovIndex	0.1826** (0.0743)	0.4335*** (0.1219)
Year Fixed Effect	Yes	Yes
Industry Fixed Effect	Yes	Yes
Country Fixed Effect	Yes	Yes
Constant	5.8362*** (0.6964)	0.3970 (0.7884)
Observations	33,720	11,761
Pseudo R <sup>2</sup>	0.3063	0.2469

to SMEs than those in developed countries.

Table 5 also provides clear evidence that the access to external sources of long term finance from non-bank institutions by SMEs are more sensitive to the degree of financial development at country level than the use of finance from banks. To be more concrete, the estimated coefficient indicates an increase of  $FD_{LL/GDP}$  by one standard deviation (0.36)<sup>2</sup> would contribute to SMEs obtaining more non-bank finance by 2.52% on working capital (Model 2) and by 5.61% on fixed asset investment (Model 4), where the means (standard deviations) of using non-bank finance are 28.37% (22.90%) and 62.59% (31.58%) for working capital and fixed assets finance, respectively. Focusing on access to bank finance, the marginal effects suggest that the proportion of working capital and fixed assets investment from banks increases by 3.14% and 3.35%, respectively, with  $FD_{LL/GDP}$  increased by one standard deviation (0.36). From few papers focusing on competition between banks and non-banks, one seemingly contradictory result is Vanroose and D'Espallier (2013) who suggest that microfinance financial institutions (MFIs) display less outreach in countries with better developed formal banking systems; whereas Hermes et al. (2009) indicate that MFIs would operate more efficiently with better developed formal financial systems. The results in this study suggest that, with a greater degree of financial development, non-bank financial institutions are more likely to supply finance to their SMEs customers in accessing external finance of fixed assets investment. Overall, the evidence shows a favourable effect of financial development on the access to external finance by SMEs from both banks and non-bank institutions.

<sup>2</sup> The descriptive statistics for different models show the standard deviations of  $FD_{LL/GDP}$  is 0.36 in each model.

**Table 5**  
Financial development and SME finance.

VARIABLES	(1)	(2)	(3)	(4)
	<i>W.Cap.B</i>	<i>W.Cap.NB</i>	<i>F.Ass.B</i>	<i>F.Ass.NB</i>
FD <sub>LL/GDP</sub>	8.7308*** (0.8532)	6.9972*** (2.5557)	9.3010*** (1.5699)	15.5751** (7.5892)
Loan	5.0506*** (0.3766)	−3.6418** (0.7849)	5.9469*** (0.8035)	2.7919 (1.9291)
Account	−2.8502*** (0.6473)	−1.7057 (1.0686)	−1.1373 (1.3418)	−2.9679 (2.7571)
Subsidiary	−0.4464 (0.4400)	0.9862 (1.0120)	−0.5864 (0.8288)	0.2162 (2.2127)
Age (log)	−2.0482*** (0.3433)	−2.6373*** (0.8397)	−1.4033** (0.6467)	−4.8156*** (1.8341)
Foreign	−1.7926*** (0.6257)	0.1007 (1.2700)	−0.0320 (1.1455)	0.0106 (2.9418)
Government	−4.9539*** (1.6397)	−1.9924 (2.0336)	−15.0136*** (3.0016)	−7.7906 (4.8289)
Exp (log)	0.6656*** (0.2334)	0.4301 (0.5240)	0.4172 (0.4388)	2.5489*** (1.2801)
Finance Constraint	−0.1968 (0.3451)	−1.1433 (0.8673)	−2.6105*** (0.6482)	−2.5093 (1.9306)
Small size	0.5335* (0.3159)	1.6342*** (0.7509)	0.9286 (0.6114)	1.6372 (1.7400)
Financial Statements	2.5393*** (0.3423)	0.0669 (0.7683)	1.4754*** (0.6362)	−3.0790* (1.8312)
GDP per capita (log)	−2.3613*** (0.3775)	−2.2287*** (0.8101)	−3.0091*** (0.7179)	4.0179 (2.5390)
Inflation (log)	0.8989*** (0.2847)	2.1591*** (0.5853)	3.6023*** (0.5166)	0.8411 (1.5115)
GovIndex	3.4928*** (0.6498)	1.2686 (1.3786)	7.6722*** (1.2220)	0.8961 (4.0469)
Year Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes
Constant	60.6284*** (3.4455)	55.0607*** (7.5726)	80.7100*** (6.6327)	34.5015 (21.0719)
Observations	27,875	4058	11,199	1476
R-squared <sup>a</sup>	0.0938	0.0912	0.1084	0.2385
Adj R-squared	0.0913	0.0741	0.1021	0.1861
F-statistic	36.89***	5.33***	17.12***	4.55***
P-value	0.000		0.000	

This table reports OLS results on how financial development affects the access to external finance by SMEs. Models 1 and 2 show results of the effects of financial development on sources of working capital obtained from either bank or non-bank institutions. Models 3 and 4 report results of the effect of financial development on sources of fixed asset investment obtained from either bank or non-bank institutions. Specifically, the dependent variables measuring SMEs financing sources are the percentage of working capital financed by bank (*W.Cap.B*), the percentage of working capital investment financed by non-bank institutions (*W.Cap.NB*), the percentage of fixed asset investment by bank (*F.Ass.B*) and the percentage of fixed assets investment by non-bank financial institutions (*F.Ass.NB*). Financial development is measured by liquid liabilities to GDP (*FD<sub>LL/GDP</sub>*). T test for differences in the coefficients for using finance from bank versus non-banks is at the bottom of models. The regressions are run with OLS with heteroskedasticity-robust standard errors. \*\*\*, \*\* and \* denote statistically significant levels of 1%, 5% and 10% respectively.

<sup>a</sup> The R-squared are relatively low but at an acceptable level. For the research on small business finance, due to the large variation of the data in small business finance sector, the R-squares are lower than those of empirical studies on large firms. For example, to investigate the relation between financial structure and firms' access to financial services by the dataset of WBES, the R-squares of the models' testes by Beck et al. (2013) range from 0.033 to 0.043 in general.

#### 4.1.1. Additional test for baseline results

Existing studies have indicated that national culture is a factor which influences the contracting environment (Zheng et al., 2012). Therefore, at country level, we also consider the national culture to measure country characteristic as control variables in Eq. (3) and Eq. (4). Following Hofstede and Hofstede (2001), we use uncertainty avoidance (UA) to measure national culture. As shown in Table 6, the effects of financial development on SME using formal sources are significant in the baseline models, consisting with literature and the earlier baseline results still hold after adding the additional national culture control, UA.

However, due to the data limitation, in this study, UA is just available for 29 countries, where the total sample countries are 154; hence, the number of observations is decreased. More specifically, compared with the original observation in baseline results (Table 5), the new number of observations, where considering the UA as control variables (Table 6), in each model reduces by 46% (*W.Cap.B*), 47% (*W.Cap.NB*), 50% (*F.Ass.B*) and 51% (*F.Ass.NB*), respectively. Consequently, we just consider national culture (UA) as control variable in the baseline models only to best use the available observations.

**Table 6**

Financial development and SME finance This table reports OLS results on how financial development affects the access to external finance by SMEs. Models 1 and 2 show results of the effects of financial development on sources of working capital obtained from either bank or non-bank institutions. Models 3 and 4 report results of the effect of financial development on sources of fixed asset investment obtained from either bank or non-bank institutions. Specifically, the dependent variables measuring SMEs financing sources are the percentage of working capital financed by bank ( $W.Cap_B$ ), the percentage of working capital investment financed by non-bank institutions ( $W.Cap_{NB}$ ), the percentage of fixed asset investment by bank ( $F.Ass_B$ ) and the percentage of fixed assets investment by non-bank financial institutions ( $F.Ass_{NB}$ ). Financial development is measured by liquid liabilities to GDP ( $FD_{LL/GDP}$ ). The regressions are run with OLS with heteroskedasticity-robust standard errors. \*\*\*, \*\*and \* denote statistically significant levels of 1%, 5% and 10% respectively.

VARIABLES	(1) $W.Cap_B$	(2) $W.Cap_{NB}$	(3) $F.Ass_B$	(4) $F.Ass_{NB}$
$FD_{LL/GDP}$	16.7707*** (1.2753)	6.8004*** (2.7551)	12.9412*** (2.8028)	-18.8114 (7.6089)
Loan	5.1697*** (0.4944)	-2.4474** (1.0201)	8.6849*** (1.1184)	5.3595*** (2.6767)
Account	-0.2140 (0.8294)	-0.4252 (1.2499)	2.5003 (1.8467)	1.0374 (3.4881)
Subsidiary	0.0268 (0.5815)	0.7416 (1.3313)	-0.5014 (1.1200)	-9.1253*** (3.0572)
Age(log)	-2.2093*** (0.5085)	-1.2588 (1.1923)	-3.1228*** (1.0228)	-1.0350 (2.9230)
Foreign	-1.4014 (0.9249)	-2.0303 (1.6764)	-2.6797 (1.7176)	-1.7424 (4.1099)
Government	-8.6688*** (2.0677)	-2.9277 (2.2509)	-17.8071*** (3.7787)	-10.4976* (5.4889)
Exp (log)	0.8919*** (0.3203)	0.3275 (0.6836)	1.6273*** (0.6565)	2.7975 (1.8007)
Finance Constraint	-1.0487*** (0.4269)	2.4416*** (0.9668)	-3.4086*** (0.9167)	-1.5825 (2.7641)
Small size	1.0047*** (0.4269)	2.4416*** (0.9668)	0.3405** (0.8614)	-0.9905 (2.4474)
Financial Statements	1.8676*** (0.4652)	0.9110 (0.9827)	1.1800 (0.8948)	-1.5548 (2.4731)
GDP per capita (log)	-4.6252*** (0.4996)	-2.6660*** (0.9859)	-3.8129*** (0.9707)	-2.0643 (2.6461)
Inflation (log)	-0.1626 (0.3454)	0.8336 (0.8176)	0.1066 (0.7121)	-4.7600*** (1.8314)
GovIndex	5.2850*** (0.6589)	3.0174** (1.3756)	6.3437*** (1.1967)	9.6202*** (3.6150)
UA	0.0365* (0.0213)	-0.0217 (0.0560)	-0.0809*** (0.0411)	0.0647 (0.1305)
Year Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes
Constant	72.2944*** (4.3498)	56.1550*** (8.5946)	104.1700*** (8.5699)	82.2479*** (23.6428)
Observations	14,969	2160	5615	722
R-squared	0.1311	0.0698	0.1105	0.2471
Adj R-squared	0.1293	0.566	0.1057	0.2144
F-statistic	75.11***	5.32***	23.13***	7.56***

#### 4.2. Analysis of legal environment on the relationship between financial development and SME finance

The results so far have shown primary evidence supporting the important role played by financial development in improving SMEs' access to finance from both bank and non-bank institutions. In addition, relevant literature on law, finance and economic growth has provided both theoretical and empirical evidence on the effects of legal and institutions environment on the nature of financial contracts and thereby corporate financial activities (La Porta et al., 1998; Rajan & Zingales, 2001). Besides, the access to external finance by SMEs are also affected by economic shocks, such as financial crisis (Fernández et al., 2018). In this section, we continue to investigate the possible factors which may moderate the effects of financial development on SME's access to finance.

Previous studies have identified the importance of legal origin of country in explaining the obstacles that firms face in accessing external finance (Demirguc-Kunt & Levine, 2005). We further explore how the financial and legal environment at country level would affect the access to external finance from bank and non-bank institutions by SMEs, in terms of both short term and long term finance. The sample countries are classified by legal systems into two groups, common law countries (21.43% sample countries) and civil law countries (46.75% sample countries). Table 7 provides the mean value of each indicator of financial development between common law countries and civil law countries, showing small difference of financial development in two groups. Table 8 reports results for estimations of Eq. (3) and Eq. (4) in common law and civil law countries, respectively. In addition, *t*-test results for the differences in the coefficients for using external finance in common law versus in civil law countries are reported at the bottom of table.

The results as shown in Table 8, indicate that the favourable effect of financial development on the access to external finance for SMEs are stronger in countries with a common law system (stronger investor protection) than for those in a civil law system (weaker investor protection). First, the coefficients of  $FD_{LL}/GDP$  in all regression specifications are economically greater as well as statistically significant at the 0.01 level in common law countries (Models 1, 3, 5 and 7). In civil law countries (Models 2, 4, 6 and 8), the coefficients of  $FD_{LL}/GDP$  are positive in all models but just statistically significant in Models 2, 4 and 6. More specifically, the magnitude of the coefficients of  $FD_{LL}/GDP$  in common law countries is multiples higher than that in a civil law country. For example, the coefficient of  $FD_{LL}/GDP$  on using bank finance as source of fixed assets investment (Model 5) is 51.72, comparing with 29.30 in all sample countries (Model 3, Table 5) and 3.27 in civil law countries (Model 6, Table 8). The results suggest that financial development plays a much more important role in accessing to external finance by SME in a common law country than that in a civil law country. Second, the result provides evidence that, in a common law country, SMEs' access to external finance as the sources of fixed asset investment is more sensitive to the degree of financial development than that as the sources of working capital finance. More specifically, the marginal effect suggests with  $FD_{LL}/GDP$  increased by one standard deviation (0.37), SMEs use 19.14% more obtained from bank and 29.95% more obtained from non-bank institutions for fixed assets investment in common law country. Previous research has suggested that collateral plays an important role in accessing external finance by SMEs (Voordeckers & Steijvers, 2006), especially long term finance. Therefore, this is a possible reason to explain why the effect of financial development on fixed asset investment is economically greater than that on working capital finance in countries with strong investor protection.

In order to further explain the moderating role of legal system, in Table 9, we include an interaction of a country's legal system with  $FD_{LL}/GDP$  in Eq. (3) and Eq. (4), respectively. The model is showing as follow:

$$\begin{aligned}
 \text{Working capital financing}_{i,j,t,s} = & \partial + \beta_1 \text{Financial development}_{j,t} + \beta_2 \text{Law}_{i,j} * \text{Financial development}_{j,t} + \beta_3 \text{Law}_{i,j} + \beta_4 \text{Loan}_{i,j,t} \\
 & + \beta_5 \text{Account}_{i,j,t} + \beta_6 \text{Subsidiary}_{i,j,t} + \beta_7 \text{Firm Age}_{i,j,t} + \beta_8 \text{Foreign}_{i,j,t} + \beta_9 \text{Government}_{i,j,t} + \beta_{10} \text{Exp}_{i,j,t} + \beta_{11} \text{Finance Constraint}_{i,j,t} \\
 & + \beta_{12} \text{Small}_{i,j,t} + \beta_{13} \text{Financial Statements}_{i,j,t} + \beta_{14} \text{GDP per capita}_{j,t} + \beta_{15} \text{Inflation}_{j,t} + \beta_{16} \text{GovIndex}_{j,t} + \text{Year}_t + \text{Industry}_k + \text{Country}_j \\
 & + \varepsilon_{ij}
 \end{aligned}$$

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$$\begin{aligned}
 \text{Fixed assets investment financing}_{i,j,t,s} = & \partial + \beta_1 \text{Financial development}_{j,t} + \beta_2 \text{Law}_{i,j} * \text{Financial development}_{j,t} + \beta_3 \text{Law}_{i,j} + \beta_4 \text{Loan}_{i,j,t} \\
 & + \beta_5 \text{Account}_{i,j,t} + \beta_6 \text{Subsidiary}_{i,j,t} + \beta_7 \text{Firm Age}_{i,j,t} + \beta_8 \text{Foreign}_{i,j,t} + \beta_9 \text{Government}_{i,j,t} + \beta_{10} \text{Exp}_{i,j,t} + \beta_{11} \text{Finance Constraint}_{i,j,t} \\
 & + \beta_{12} \text{Small}_{i,j,t} + \beta_{13} \text{Financial Statements}_{i,j,t} + \beta_{14} \text{GDP per capita}_{j,t} + \beta_{15} \text{Inflation}_{j,t} + \beta_{16} \text{GovIndex}_{j,t} + \text{Year}_t + \text{Industry}_k + \text{Country}_j \\
 & + \varepsilon_{ij}
 \end{aligned}$$

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We add the new variables,  $Law_{i,j}$ , and the interaction term between  $Financial\ development_{j,t}$  and  $Law_{i,j}$ . Specifically,  $Law_{i,j}$  is a dummy variable, which equals one for common law country and zero for civil law country. According to the coefficients of the interaction term, the marginal effects of  $FD_{LL}/GDP$  increased by one standard deviation (0.37) in common law are 8.36% on SME accessing bank source as working capital source and 10.12% on SME accessing bank source as fixed asset investment. The evidence consistently suggests legal systems plays an important role in moderating the effects of financial development on SME finance.

Taken together, the results shown in Tables 8 and 9 demonstrate that financial development is more effective on the access to external finance from both bank and non-bank institutions by SMEs in common law countries than that in civil law countries. Consistent with Qian and Strahan (2007), the strong creditor rights improve the finance availability for SMEs as in the presence of better legal protection during bankruptcy and reorganisation, financial institutions are more likely to provide credit on favourable terms.

### 4.3. Robustness checks

#### 4.3.1. Alternative sampling

The literature has verified a positive effect of financial development on the allocation of external finance (Beck et al., 2008; Bena & Ondko, 2012). It is also accepted that smaller firms are more informationally opaque and face greater financing constraints than large firms (Berger & Udell, 1998). The question is, therefore, whether financial development plays different roles in accessing external finance by firms of different sizes. To ease this concern, we re-estimate Eq. (3) and Eq. (4) by grouping the sample into different firm

**Table 7**  
 Distribution of indicators for financial development varies legal systems This table reports the mean values of indicators to measure financial development varies legal systems. T tests on group mean differences and \*\*\* denotes statistical significance at 1% level.

Variables	Legal origin	
	Common Law countries	Civil Law countries
$FD_{LL}/GDP$	0.52	0.53***
$FD_{PC}/GDP$	0.39	0.47***
$FD_{ST}/GDP$	0.22	0.10***

**Table 8**  
Additional Tests: Financial development and SME finance varies legal systems.

VARIABLES	<i>W.Cap.B</i>		<i>W.Cap.NB</i>		<i>F.Ass.B</i>		<i>F.Ass.NB</i>	
	Common	Civil	Common	Civil	Common	Civil	Common	Civil
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$FD_{LL}/GDP$	23.0039*** (3.5166)	2.8239*** (0.9875)	27.5770*** (8.7534)	11.1486*** (3.2780)	51.7214*** (7.1636)	3.2684** (1.8296)	80.9556*** (24.4167)	10.1364 (8.8524)
Other Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	47.7497*** (7.7009)	81.0670*** (4.4074)	28.1455* (15.3697)	64.4852*** (11.6037)	57.3783*** (14.3546)	72.3227*** (8.0202)	−68.5095 (42.5095)	3.2760 (26.6722)
Observations	6504	15,601	1198	2027	1800	6740	296	835
R-squared	0.1847	0.0427	0.1296	0.0736	0.2349	0.0691	0.3366	0.1141
Adj R-squared	0.1811	0.0408	0.1087	0.0592	0.2228	0.0646	0.2670	0.0799
F-statistic	52.37***	22.43***	6.22***	5.11***	19.42***	15.55***	4.84***	3.34***
<i>P-value</i>	0.000		0.000		0.000		0.000	

This table reports the results of how financial development impacts on SME financing decisions in different legal environments. The sample countries are divided into common law and civil law countries. Common law countries have a greater investor protection than civil law countries. Models 1,3 and Models 5,7 report the effect of financial development on working capital finance and fixed asset investment in common law countries respectively. Models 2, 4 and Models 6, 8 report the effect of financial development on working capital finance and fixed assets investment in civil law countries respectively. All estimations control for industry and year fixed effects and include a full set of control variables. T test on the difference in the coefficients for common law versus civil law countries is at the bottom of models. The regressions are run with OLS with heteroskedasticity-robust standard errors. \*, \*\* and \*\*\* denote statistical significance at 10%, 5% and 1% level respectively.

**Table 9**  
Additional Tests: Financial development and SME finance varies legal systems.

VARIABLES	(1)	(2)	(3)	(4)
	<i>W.Cap.B</i>	<i>W.Cap.NB</i>	<i>F.Ass.B</i>	<i>F.Ass.NB</i>
$FD_{LL}/GDP$	3.1410** (1.0560)	−3.9942 (3.8376)	3.1911* (1.9277)	33.2054** (11.3645)
$FD_{LL}/GDP * Law$	23.9898*** (2.3716)	38.5120*** (6.8431)	29.8036*** (4.2634)	−67.4652 (41.5826)
Law	−15.8378*** (1.4775)	−11.8119*** (3.2297)	−13.3152*** (2.5150)	13.7259 (14.5036)
Other Control Variables	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes
Constant	74.5158** (4.7844)	44.6491*** (9.4556)	100.7225** (8.1612)	−22.0861 (35.5056)
Observations	22,105	3225	8540	1131
R-squared	0.1151	0.1064	0.1055	0.2569
Adj R-squared	0.1124	0.0083	0.0986	0.0233
F-statistic	42.79***	5.88***	15.38***	4.79***
<i>P-value</i>	0.000		0.000	

This table shows regression coefficients and standard errors (in parentheses) explaining the effect of financial development on the accessing to external finance by examining the legal systems. The dependent variables are the proportion of using external financing sources. Models 1 and 2 report the effect of financial development on working capital finance. Models 3 and 4 report the effect of financial development on fixed assets investment. All estimations control for industry and year fixed effects and include a full set of control variables. T test on the difference in the coefficients for common law versus civil law countries is at the bottom of models. The regressions are run with OLS with heteroskedasticity-robust standard errors. \*, \*\* and \*\*\* denote statistical significance at 10%, 5% and 1% level respectively.

sizes: small, medium, and large firms. Following the standard WBES definition, firm sizes are defined based on number of employees (small for less than 20; medium for 20–99 and large for more than 100). In addition, in order to ensure the difference of coefficients are statistically significant over firm sizes, we report the results at the bottom of models.

Table 10 presents the estimation results by grouping firm sizes and Models 1–3 in Panel A and Models 7–9 in Panel B are for bank finance for working capital finance and fixed asset investment respectively. Models 4–6 in Panel A and Models 10–12 in Panel B show results of SMEs on using non-bank institutions as the source of working capital finance and fixed asset investment respectively. Firstly, in Panel A, the coefficients of  $FD_{LL}/GDP$  are positive and significantly significant in Models 1–5, and in Model 6 the coefficient of  $FD_{LL}/GDP$  is negative and statistically insignificant. The results show clear evidence on the variation of earlier identified financial

development effects across firm sizes. Secondly, the positive and significant coefficients of  $FD_{LL/GDP}$  (Models 7–9, Panel B) indicate financial development plays a significant role in using bank finance as the source of fixed asset investment for each firm size. Models 10–12 display a positive and statistically significant coefficient of  $FD_{LL/GDP}$  on using non-bank finance for small firm (Model 10) but not significant for medium (Model 11) and large firm (Model 12), indicating the coefficients of  $FD_{LL/GDP}$  on the sources of fixed asset investment for small firm (Models 7 and 10) have a greater magnitude and greater significant level than that for medium firm (Models 8 and 11) and large firm (Models 9 and 12). Given the significant coefficients in Models 7 and 10, empirically, small firms use more external finance from bank finance and non-bank finance to finance fixed asset investment by 2.65% and 8.52%, respectively, with a standard deviation (0.37) increase in  $FD_{LL/GDP}$ . Besides, *t*-test results for the differences in the coefficients for small firms versus medium-sized firm and medium-sized firm versus large firm are all statistical significance at the 1% level, suggesting that the variation of the effect is statistically meaningful. To a certain extent, the results indicate a beneficial effect of financial development on small firms obtaining external finance from both bank and non-bank institutions as the sources of both working capital and fixed asset investment, and there is little evidence that large firms benefit from financial development to obtain finance from non-bank institutions. The results imply that financial development contributes to small business finance by processing information and thereby reduce information asymmetrically between small firms and financial institutions. In addition, the aim of non-bank institutions, e.g. microbanks, is to provide financial services to low-income communities and small business customers who face financial constraints in accessing bank finance. As indicated by Cull et al. (2014), the microbanks are micro not due to their institutional scale but because of the scale of typical transactions with customers. This is probably why there is an insignificant relation between financial development and the use of non-bank finance by large firms.

**Table 10**  
Robustness Tests: Alternative sampling.

	Small size	Medium size	Large size	Small size	Medium size	Large size
<b>Panel A: Financial development and sources of working capital finance</b>						
VARIABLES	<i>W.CAP.B</i>			<i>W.Cap.NB</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
$FD_{LL/GDP}$	12.5035*** (1.6232)	10.5476*** (1.1771)	10.7873*** (1.5505)	4.4921* (2.6321)	13.0189*** (3.6428)	-0.6453 (4.6370)
Other control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Constant	75.1885*** (5.2207)	51.4488*** (4.8370)	58.5418*** (6.2068)	64.8050*** (28.8554)	36.8128** (10.9197)	19.0202 (13.5294)
Observations	12,951	14,924	10,071	2240	1818	1113
R-squared	0.0908	0.1110	0.1228	0.0086	0.1103	0.1245
Adj R-squared	0.0848	0.1064	0.1161	0.0639	0.0752	0.0675
F-statistic	15.12***	24.07***	18.17***	3.59***	3.14***	2.18***
<i>P</i> -value	0.000	0.000		0.000	0.000	
<b>Panel B: Financial development and sources of fixed asset investment</b>						
VARIABLES	<i>F.Ass.B</i>			<i>F.Ass.NB</i>		
	(7)	(8)	(9)	(10)	(11)	(12)
$FD_{LL/GDP}$	7.1536*** (2.5368)	10.8132*** (2.0083)	5.6482** (2.3370)	23.0232** (10.5324)	8.1608 (11.2664)	17.05757 (13.3887)
Other control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Constant	98.2885*** (10.0985)	84.7413*** (8.8016)	65.5212*** (9.7789)	52.4635* (29.0800)	0.6502 (31.6084)	70.1513 (45.4187)
Observations	4638	6561	5403	723	753	504
R-squared	0.1310	0.1108	0.1291	0.3319	0.2553	0.2649
Adj R-squared	0.1163	0.1001	0.1170	0.2428	0.1591	0.1421
F-statistic	8.92***	10.35***	10.67***	3.72***	2.65***	2.16***
<i>P</i> -value	0.000	0.000		0.000	0.000	

This table reports the results for robustness test of Eq. (3) (Models 1–6) and Eq. (4) (Models 7–12) by grouping samples into different sizes. Firm size is based on the number of employees and defined as small (<20), medium (20–99) and large (100 and over). Dependent variables are the proportion of working capital (Panel A) and fixed assets investment (Panel B) obtained by sample firms. All estimations control for industry and year fixed effects and include a full set of control variables. T tests for differences in the coefficients for small versus medium-sized firms and medium versus large firms are at the bottom of models. The regressions are run with OLS with heteroskedasticity-robust standard errors. \*, \*\* and \*\*\* denote statistical significance at 10%, 5% and 1% level, respectively.

#### 4.3.2. Alternative measures of financial development

Next, we check the robustness of baseline results by using alternative financial development measures to make sure the earlier results are not subject to how financial development is measured. We construct two alternative proxies to evaluate the degree of financial development in addition to *liquid liabilities to GDP* ( $FD_{LL/GDP}$ ) used in the baseline analysis. First, following Li et al. (2018), we use the ratio of domestic credit to private sector to GDP ( $FD_{PC/GDP}$ ) to evaluate the degree of financial market development. Second, following Bena and Ondko (2012), we introduce one indicator of stock market, stock market total value traded to GDP ( $FD_{ST/GDP}$ ), to measure financial development. Existing evidence has shown that stock market development taking place in tandem with other aspects of financial development. For example, Demirgüç-Kunt and Maksimovic (1996) find that countries with well-developed stock markets also have well-developed banks and non-bank financial intermediaries, while countries with weak stock markets tend to have weak development of banks and other financial intermediaries.

With each alternative measure of financial development, we re-estimate the baseline specification (Eq. (3) and Eq. (4)) and report the results in Table 11. The baseline regression results (Table 4) are fully retained. It shows that the coefficients of  $FD_{PC/GDP}$  (Models 1, 2, 5 and 6) are all positive and statistically significant. This result verifies the significant and important role played by financial development in the country where SMEs operate. Quantitatively, for example, an increase of  $FD_{PC/GDP}$  by one standard deviation (0.32) would increase the proportion of working capital (fixed asset investment) by SMEs from banks and non-bank institutions by 2.68% (1.27%) and 2.58% (7.66%), respectively. Focusing on stock market development, the coefficients of  $FD_{ST/GDP}$  on both working capital finance (Models 3 and 4) and fixed asset investment (Model 7) from banks are positive and statistically significant. However, the result (Model 8) suggests that there is an insignificant relation between stock market development and SMEs using non-bank finance as the source of fixed assets investment. There are two possible reasons to explain such a result. First, existing studies have provided evidence that, in developing economies, large firms become more levered with the stock market development, whereas stock market development does not significantly affect small firms (Demirgüç-Kunt & Maksimovic, 1996). In this paper, most of sample SMEs in WBES database are from emerging or under-developed countries. Second, due to the unreliable information disclosure and high transaction costs (Mateev et al., 2013), SMEs have very limited access to equity market; hence, SMEs are less sensitive to the degree of stock market development than large firms. In addition, it should be noted that, due to missing value of variables, the number of observations in Model 8 is relatively smaller than that in other models.

Overall, consistent with baseline results, Table 11 shows clear evidence on the favourable effects of financial development measured by both the ratio of domestic credit to private sector to GDP ( $FD_{PC/GDP}$ ) and the ratio of stock market total value traded to GDP ( $FD_{ST/GDP}$ ) on SMEs' access to external finance.

#### 4.3.3. Alternative specification of financial development

As a robustness test, we explore whether the financial development has a lagged effect on SME financing behaviour. More specifically, we introduce one-year and two-year lagged values of liquid liabilities to GDP as an alternative specification to examine the effects of financial development on the access to finance by SMEs.

Results are reported in Table 12 where Models 1, 2, 5 and 6 use one-year lagged value of liquid liabilities to GDP ( $FD_{LL/GDP_{t-1}}$ ) to measure financial development, and Models 3, 4, 7 and 8 employ two-year lagged value of liquid liabilities to GDP ( $FD_{LL/GDP_{t-2}}$ ). As shown, the coefficients of both lagged values are positive and statistically significant in all models. Consistent with baseline findings,

**Table 11**  
Robustness Test: Alternative measures of financial development.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	W.Cap <sub>B</sub>	W.Cap <sub>NB</sub>	W.Cap <sub>B</sub>	W.Cap <sub>NB</sub>	F.Ass <sub>B</sub>	F.Ass <sub>NB</sub>	F.Ass <sub>B</sub>	F.Ass <sub>NB</sub>
$FD_{PC/GDP}$	8.3870*** (1.0898)	8.0763*** (2.4654)			4.0213*** (2.2303)	23.9276*** (6.2691)		
$FD_{ST/GDP}$			4.2568* (2.2184)	23.7577** (10.7899)			9.1378** (3.6217)	-42.1725 (60.0220)
Other control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	52.2725*** (3.6065)	54.5403*** (7.8186)	39.7185*** (4.6520)	41.7720*** (13.0687)	69.3893*** (7.2796)	54.3980** (23.3587)	115.3859*** (12.2165)	-32.6703 (39.4493)
Observations	25,537	3850	15,691	2160	9815	1396	5615	726
R-squared	0.1044	0.0871	0.1119	0.1048	0.1059	0.2497	0.1247	0.3072
Adj R-squared	0.1018	0.0694	0.1100	0.0866	0.0990	0.1974	0.1180	0.2581
F-statistic	40.12***	4.93***	59.76***	5.76***	15.37***	4.77***	18.46***	6.26***
P-value	0.000		0.000		0.000		0.000	

The table presents regression coefficients and standard errors (in parentheses) for robustness tests of alternative measures of financial development, where in Models 1, 2, 5 and 6, financial development is measured by the ratio of domestic credit to private sector to GDP ( $FD_{PC/GDP}$ ). In Models 3, 4, 7 and 8, financial development is measured by stock market total value trade to GDP ( $FD_{ST/GDP}$ ). All estimations control for industry and year fixed effects and include a full set of control variables. T test for differences in the coefficients for using finance from bank versus non-banks is at the bottom of models. The regressions are run with OLS with heteroskedasticity-robust standard errors. \*, \*\* and \*\*\* denote statistical significance at 10%, 5% and 1% level respectively.

the results provide clear evidence supporting the important role played by financial development in accessing external finance by SMEs. Quantitatively, for example, with an increase of one-year lagged value of liquid liabilities to GDP ( $FD_{LL}/GDP_{t-1}$ ) by one standard deviation (0.36), SMEs would obtain additional bank finance by 3.18% and 3.43% for working capital and fixed asset investment (Models 1 and 5), respectively, and obtain additional non-bank finance by 2.76% and 5.62% for working capital and fixed asset investment (Models 2 and 6), respectively. T test results for differences in the coefficients for bank versus non-bank financial institutions are all statistical significance at the 1% level, as shown at the bottom of models.

#### 4.3.4. Placebo test

We follow He et al. (2022) to perform a placebo test to identify the causal effect of the financial development on SME finance. Specifically, we randomly picked independent variable 500 times and re-estimate the regressions with Eq. (3) and Eq. (4) and plot the kernel density of the newly estimated coefficients in Figs. 1–4. It is observed that the kernel density of coefficients concentrates at approximately 0, indicating the randomly generated sample could not obtain the same effect as our baseline estimates. The results suggest that the causal effect of the financial development on SME finance is less likely to be confounded by unobservable factors.

#### 4.4. Additional tests: the moderating effects of financial crisis

Prior studies support the view that SMEs rely more on bank finance and are more likely to be financially constrained than large firms (Beck et al., 2008; Stiglitz & Weiss, 1981), especially in a financial crisis (Ryan et al., 2014). Recently, empirical studies have provided empirical evidence on the access to finance by small firms since 2008 financial crisis (Lee et al., 2015; McGuinness et al., 2018). Following this route, we also explore whether the effects of financial development on the access to external finance by SMEs differ in financial crisis and after financial crisis period. We define financial crisis period as that between 2007 and 2009, and after crisis period is from 2010 to 2016.

Table 13 reports the results in financial crisis period (Models 1, 3, 5 and 7) and after financial crisis period (Models 2, 4, 6 and 8). During financial crisis, the coefficients of  $FD_{LL}/GDP$  are positive in all regression specifications, and statistically significant, except in Model 5. Specifically, the coefficients of  $FD_{LL}/GDP$  on sources of working capital during financial crisis (Models 1 and 3) are greater than those after financial crisis (Models 2 and 4). This result provides clear evidence that financial development plays a much more important role in supporting the access to external finance as sources of working capital by SMEs in financial crisis than that after financial crisis. Focusing on fixed assets investment during financial crisis (Models 5 and 7), the coefficient of  $FD_{LL}/GDP$  is positive and significant on using non-bank finance at 0.1 level (Model 7) but insignificant for bank finance (Model 5). The results suggest that, in financial crisis period, financial development improves SMEs access to non-bank finance and provides evidence that the long term credit of bank to SMEs has decreased in financial crisis.

## 5. Conclusion

This paper investigates the effects of financial development and legal system on SMEs' access to external finance from bank and non-bank institutions, in terms of both short term (working capital) and long term (fixed assets investment) finance, from a cross-

**Table 12**

Robustness Tests: Alternative specification of financial development.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	W.Cap_B	W.Cap_NB	W.Cap_B	W.Cap_NB	F.Ass_B	F.Ass_NB	F.Ass_B	F.Ass_NB
$FD_{LL}/GDP_{t-1}$	8.8426*** (0.8635)	7.6667** (2.5642)			9.5257*** (1.6092)	15.6010** (7.6386)		
$FD_{LL}/GDP_{t-2}$			9.3533*** (0.6991)	9.1474*** (2.7474)			8.9489*** (1.3851)	13.4244* (7.5819)
Other control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	61.8444*** (3.46618)	55.6588*** (7.5973)	59.5695*** (3.4466)	55.7459*** (7.6019)	89.9570*** (6.6499)	34.6049* (21.1412)	88.6093*** (6.6175)	33.7810 (21.1358)
Observations	27,863	4053	28,006	4052	11,208	1476	11,200	1475
R-squared	0.0939	0.0918	0.0935	0.0923	0.1093	0.2385	0.1097	0.2368
Adj R-squared	0.0913	0.0747	0.0909	0.0752	0.1029	0.1855	0.1033	0.1842
F-statistic	36.45***	5.36***	36.44***	5.39***	17.06***	4.50***	17.12***	4.50***
P-value	0.000		0.000		0.000		0.000	

This table shows the results for robustness tests of Eq. (3) (Models 1–4) and Eq. (4) (Models 5–8) by using alternative specification of financial development. Models 1, 2, 5 and 6 use one-year lagged value of liquid liabilities to GDP ( $FD_{LL}/GDP_{t-1}$ ) to measure financial development, and Models 3, 4, 7 and 8 employ two-year lagged value of liquid liabilities to GDP ( $FD_{LL}/GDP_{t-1}$ ). All estimations control for industry and year fixed effect and include full set of control variables. T test for differences in the coefficients for using finance from bank versus non-banks is at the bottom of models. The regressions are run with OLS with heteroskedasticity-robust standard errors. \*, \*\* and \*\*\* denote statistical significance at 10%, 5% and 1% level respectively.

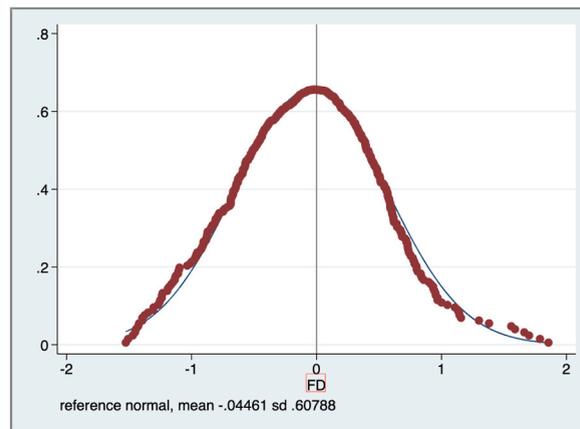


Fig. 1. Placebo test of financial development in using bank source as working capital finance.

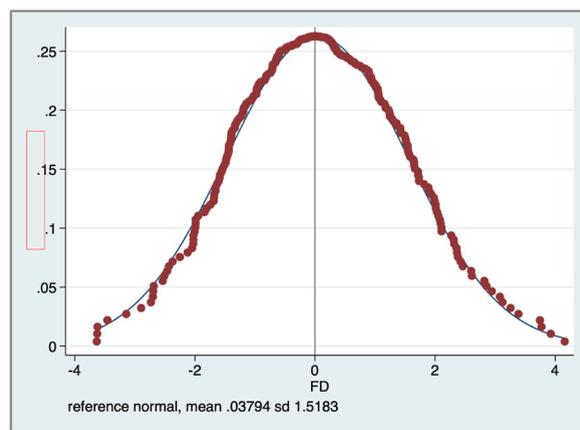


Fig. 2. Placebo test of financial development in using non-bank source as working capital finance.

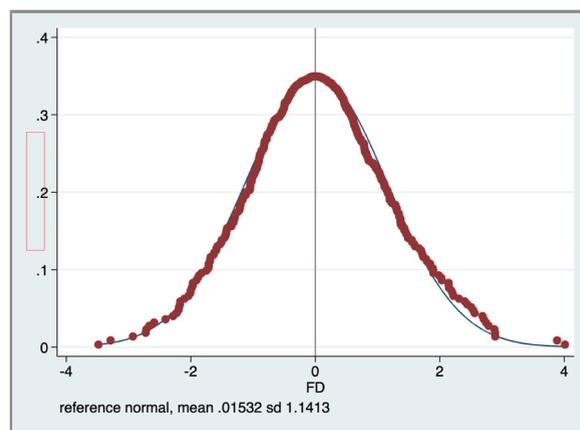


Fig. 3. Placebo test of financial development in using bank source as fixed asset investment.

country perspective. Covering 154 countries from 2006 to 2022, our study finds that SMEs are more likely to use external finance from formal institutions (bank and non-bank institutions) when financial development is greater. The development of financial market and institutions reduces information asymmetry between financial institutions and SMEs, lowering transactions costs and promoting allocation of capital to SMEs. In addition to examining the benefits of financial development, this paper documents SMEs' use of

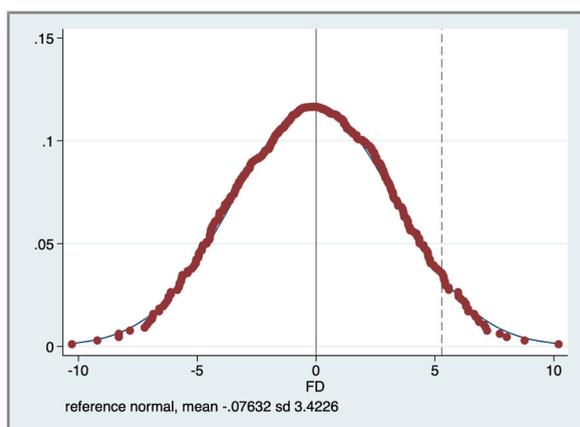


Fig. 4. Placebo test of financial development in using non-bank source as fixed asset investment.

Table 13

Additional Tests: Financial development and SME finance varies financial period.

VARIABLES	W.Cap.B		W.Cap.NB		F.Ass.B		F.Ass.NB	
	F_crisis	After F_crisis	F_crisis	After F_crisis	F_crisis	After-F_crisis	F_crisis	After F_crisis
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FD <sub>LL</sub> /GDP	16.3275*** (3.1549)	7.8417*** (0.8140)	13.8611* (8.0449)	4.7479*** (1.7129)	-1.7069 (4.2109)	10.9509** (1.8763)	34.6769** (16.9269)	22.3694** (8.2275)
Other control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	45.2205* (23.7127)	58.6578*** (3.7234)	63.3756** (25.1143)	57.4649*** (6.7353)	74.2293*** (17.3393)	73.1564*** (9.1010)	142.4747 (89.38378)	17.8258 (26.1989)
Observations	2932	21,823	408	3280	2118	7712	145	1171
R-squared	0.0562	0.1019	0.1273	0.0649	0.0801	0.1410	0.2976	0.2655
Adj R-squared	0.0471	0.0094	0.0774	0.0504	0.0656	0.1330	0.1050	0.2116
F-statistic	6.18***	40.47***	2.55***	4.48***	5.50***	17.66***	1.54*	4.93***
P-value	0.000		0.000		0.000		0.000	

This table reports the results of Eq. (3) and Eq. (4) over different period. Models 1, 3, 5 and 7 and Models 2, 4, 6 and 8 report the results in financial crisis (between 2007 and 2009) and after financial crisis (between 2010 and 2021), respectively. Models 1–4 present the regressions for the access to external finance as sources of working capital. Models 5–8 present the regressions for the sources of fixed asset investment. All estimations control for industry and year fixed effects and include a full set of control variables. T test for differences in the coefficients for financial crisis versus after financial crisis is at the bottom. The regressions are run with OLS with heteroskedasticity-robust standard errors. \*, \*\* and \*\*\* denote statistical significance at 10%, 5% and 1% level respectively.

finance from non-bank institutions is more sensitive to financial development at country level. Our research further explores the moderating effect of legal systems on the favourable role of financial development in improving the access to external finance by SMEs, supporting the view that the beneficial effect of financial development on access to external finance for SMEs are stronger in countries with common law system than for those in civil law countries. The empirical results are robust to a wide range of model specifications and econometric concerns.

The findings provide implications for policy makers, financial institutions and SMEs. First, policy makers, especially those in emerging and under-developed countries, should further improve the effectiveness of institutional frameworks by which SMEs could reduce the transaction costs in their operation. An efficient formal institutional framework would help SMEs standardise their operating activities, such as accounting information disclosure. Another implication of this study is policies should develop and support the nonbank financial institutions, which quickly diffuse across countries as the new alternative financing sources for small firms, hence, policy makers should pay greater attention to supervising and developing non-bank institutions. In addition, with the increased role of non-bank institutions in providing finance to SMEs, banks should develop innovative financial services to stabilise and extend SME clients in a competitive financial market. The important implication for SMEs is that the development of financial markets provides more convenient financial services, to reduce information asymmetry between firms and financial institutions, it is crucial for SMEs to enhance their information infrastructure, leverage financial services offered by institutions and proactively furnish high-quality financial information.

Nevertheless, our study has limitations, and we call for future research when such information becomes available. One key concern when studying the effect of financial development is endogeneity. In this paper, although the Placebo test suggested the causal effect of

the financial development on SME finance is less likely to be confounded by unobservable factors. The ideal effect is to use an instrumental variable to retest the endogeneity problem. However, due to data limitations, we are unable to find the suitable instrumental variables to address potential endogeneity problem. Therefore, future studies can consider controlling for the possible country-level endogeneity. Finally, this paper indicates with a greater degree of financial development, SMEs are more likely to obtain external finance from bank and non-bank institutions. What little known is, however, how a specific financial institution could improve the availability and reduce the costs of external finance for a particular SME customer. This is probably because such “one-to-one” matched bank-firm information is rarely available publicly; thereby, the thesis does not provide a whole picture to show if SMEs switch banks or other financial service providers with the development of financial markets. Therefore, upon the availability of such data, future research could examine how a SME selects a bank or non-bank institutions as its primary supplier of financial services and how such a match affects the decision makings of financial institutions when lending SMEs.

## Appendix 1. Variable definition

Variables	Definition	Original source
<b>Firm Level</b>		
W.Cap.Ex	Dummy variables that takes on the value one if a firm uses formal sources as working capital finance, and zero if a firm uses informal sources as working capital finance	WBES
F.Ass-Ex	Dummy variables that takes on the value one if a firm uses formal sources as fixed assets investment, and zero if a firm uses informal sources as fixed assets investment	WBES
W.Cap.B	% working capital is financed from banks: private and state-owned	WBES
W.Cap.NB	% working capital is financed from non-bank financial institutions which include microfinance institutions, credit cooperatives, credit unions or finance companies	WBES
F.Ass-B	% of total purchase of fixed assets was borrowed from banks: private and state-owned	WBES
F.Ass.NB	% of total purchase of fixed assets was borrowed from non-bank Financial institutions which include microfinance institutions, credit cooperatives, credit unions or finance companies	WBES
Account	Dummy variables that takes on the value one if a firm has a checking or saving account, and zero otherwise	WBES
Loan	Dummy variables that takes on the value one if a firm has a line of credit or a loan from a financial institution and zero otherwise	WBES
Age (log)	Log value of total years that this firm has formally operations	WBES
Government	Dummy variables that takes on the value one if any government agency of state body has a financial stake in the ownership of the firm, and zero otherwise	WBES
Foreign	Dummy variables that takes on the value one if any foreign Company or individual has a financial stake in the ownership of the firm, and zero otherwise	WBES
Financing constraint	Dummy variable that takes on the value one if a firm considers there is financing obstacle, and zero otherwise	WBES
Financial statements	Dummy variable that takes on the value one if a firm has its annual financial statements checked and certified by an external auditor, and zero otherwise	WBES
Experience (Log)	Log value of year of experience in this sector that the top manager has	WBES
Subsidiary	Dummy variables that takes on the value one if the firm is part of larger firm and zero otherwise	WBES
Small size	A firm is defined as small if it has between 5 and 19 employees.	WBES
<b>Country Level</b>		
FD <sub>LL</sub> /GDP	Liquid liabilities to GDP where liquid liabilities are also known as broad money, or M3. They are the sum of currency and deposits in the central bank (M0), plus transferable deposits and electronic currency (M1), plus time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2), plus travellers checks, foreign currency time deposits, commercial paper, and shares of mutual funds or market funds held by residents.	WDI
FD <sub>PC</sub> /GDP	Domestic credit to private sector to GDP and domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment.	WDI
FD <sub>ST</sub> /GDP	The value of shares traded to GDP and the value is the total number of shares traded, both domestic and foreign, multiplied by their respective matching prices.	WDI
GDP per capital (log)	Log value of real per capital GDP	WDI
Inflation rate (log)	Log value of inflation rate and inflation is measured by the annual growth rate of the GDP implicit deflate	WDI
GovIndex	Governance Indicators which are produced by Worldwide Governance Indicators, including six dimensions of governance: control of corruption, government effectiveness, political stability and absence of violence, regulatory quality, rule of law and voice and accountability.	WGI
Law	Dummy variables that takes on the value one for common law country and zero for civil law country	

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