What drives the growth of shadow banks? Evidence from emerging markets

Dhulika Arora [*], Smita Kashiramka

Department of Management Studies, Indian Institute of Technology (IIT) Delhi, Hauz Khas, New Delhi 110016, India

ABSTRACT

The present study analyses the factors affecting the growth of Non-Banking Financial Institutions (NBFI) and finance companies in 11 emerging market economies (EMEs) that the FSB monitors. Using data for the period 2002 to 2019 and employing the panel corrected standard errors (PCSE) method, the results indicate that the growth of banks, search for yield, demand from institutional investors, and bank regulations are the key factors affecting the growth of NBFI.

Further, the study highlights the impact of different types of bank regulations on the NBFI growth in EMEs. While the capital regulations tend to restrict their growth, activity restrictions and restrictions for financial conglomerates boost NBFI growth. Thus, stringent bank regulations create arbitrage opportunities for non-banks.

1. Introduction

Non-Banking Financial Institutions (NBFI) play an important role in catering to the financial needs of the economy. They are institutions engaged in financial intermediation but differ from banks in several aspects. These entities are neither covered by explicit government guarantees nor regulated the way banks are regulated. FSB broadly defines NBFI as "the system of credit intermediation that involves entities and activities outside the regular banking system" (FSB, 2012). Thus, NBFI include all the financial institutions facilitating credit except banks. FSB further classifies NBFI into insurance companies, pension funds and other financial institutions (OFIs). OFIs include investment funds, hedge funds, broker-dealers and finance companies. NBFI have gained relevance over the years due to increasing regulations in the banking sector and the rise in financial technologies (fintech). The rise of big data and fintech provide a competitive advantage to shadow banks in assessing the credit worthiness of their borrowers and offering innovative products (Buchak et al., 2018).

However, the global financial crisis (GFC) of 2008 highlighted the problems associated with NBFI, and thus, they were called shadow banks. Several issues, such as asset-liability mismatches, dependence on leverage, maturity transformation, and regulatory arbitrage opportunities, led to the unchecked growth of these institutions. Maturity transformation led to "runs" on the shadow banking sector, resulting in funding fragility and pro-cyclicality of leverage.[1] Also, factors such as agency conflicts, government backstops, and lack of adequate financial disclosures increased the risk-taking capacity of shadow banks (Adrian and Ashcraft, 2012).

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[1] Pro-cyclicality implies that firms rely more on leverage and less equity during boom periods while raising more equity during the bust.

NBFI were considered one of the leading causes of GFC 2008 (Pozsar, 2011).

Thus, the Financial Stability Board (FSB) was established to ensure financial stability across nations. Since 2011, FSB has monitored NBFI covering 29 jurisdictions (representing 80 percentage of the global GDP), including advanced and emerging nations, annually. As per (FSB, 2020), NBFI in EMEs were growing faster than NBFI in advanced nations; their assets constituted an 11 percentage share of global NBFI assets in 2019. The share of assets held by NBFI sector (as a percentage of their total financial assets) in Brazil, China, India, and Russia increased from 2013 to 2019. IMF (2014) reported that in the case of advanced economies, the growth of NBFI has been mainly due to the growth of sectors such as investment funds, bond funds and other entities. While in the case of EMEs, the continued growth was attributable to broker-dealer activities and finance companies.

This faster growth of NBFI in EMEs may be due to the fact that there is a huge chunk of the population not covered by the formal financial system in these economies that are catered to by entities such as NBFI (Arora and Zhang, 2018), thus contributing to the growth of these economies. Albeit, their unchecked growth may expose the financial system to several instability risks, and therefore, the factors propelling this growth need to be examined to control the possible shadow banking risks.

In light of the above, the present study thus attempts to gauge the factors affecting the growth of NBFI in the 11 EMEs that FSB monitors. These economies had a combined real GDP (constant 2010) of US$ 24.235 trillion in 2019, equivalent to approximately 28.53 percentage of the world GDP. NBFI constituted approximately 20% of the total domestic financial assets for these EMEs except in Argentina, Indonesia, Saudi Arabia and Turkey.

The study contributes to the existing literature in the following ways. Firstly, the extant literature is scarce concerning determinants of the growth of the shadow banking sector in emerging markets. Secondly, the study analyses the impact of bank regulations and institutional quality on the growth of the sector. A negative association is found between bank capital regulations and the growth of NBFI in EMEs. The results contradict the findings in the context of advanced economies (IMF, 2014; Duca, 2016; Hodula et al., 2020) but are close to Reinhardt and Sowerbutts (2015), who did not find evidence of leakage of credit from the banking sector to NBFI sector (in the presence of capital regulations) in case of EMEs.

Further, the activity restrictions index and financial conglomerate index is positively associated with the growth of NBFI. This result highlights the need to study the impact of different types of bank regulations on the growth of NBFI. Thirdly, the study further narrows down (within the NBFI sector) to analyse the factors leading to the growth of finance companies in these EMEs since they constituted more than 25 percentage of the global EF2[2] assets in the emerging markets in 2019 (FSB, 2020). The results indicate that banks, institutional investors and stock market development positively impact the growth of NBFI. While, monetary policy, money market rate, and institutional quality negatively impact the growth of NBFI.

The rest of the paper is organised as follows. Section 2 discusses the conceptual framework; Section 3 presents the literature reviewed for the study; Section 4 enumerates the data and methodology adopted; Section 5 discusses the results; Section 6 presents the findings from robustness checks; Section 7 finally presents the concluding observations.

2. Conceptual framework

The present section discusses the meaning of NBFI and their growth and relevance in EMEs.

2.1. NBFI

Non-Banking Financial Institutions (NBFI) are vital credit intermediaries, especially in developing countries. Due to the complexity and variation in the type of activities of NBFI across nations, there is no exact definition of NBFI or shadow banks (IMF, 2014). However, there are several definitions in the literature. Adrian and Ashcraft (2012) define NBFI as all credit intermediation activities that are implicitly enhanced, indirectly enhanced, or unenhanced by official guarantees established on an ex-ante basis. This definition reflects the backstops available to these entities. It implies that these institutions facilitate credit but are not covered by official guarantees like banks. FSB broadly defines NBFI as "the system of credit intermediation that involves entities and activities outside the regular banking system" (FSB, 2012). FSB further classifies NBFI into insurance companies, pension funds and other financial institutions (OFIs). OFIs include investment funds, hedge funds, broker-dealers and finance companies.

2.2. NBFI in EMEs

FSB monitors the performance of NBFI in 29 advanced and emerging nations annually. NBFI in EMEs evidenced a faster growth (including insurance companies and pension funds) compared to NBFI in advanced nations, especially from 2013–2019. Compared to advanced nations, NBFI in EMEs are lesser complex and mostly in forms such as finance companies, credit unions, investment funds and insurance companies (Ghosh et al., 2012).

OFIs that are a subset of NBFI (NBFI excluding insurance companies and pension funds) held 13 percentage of the global OFI assets in EMEs in 2019 compared to 4.9 percentage in 2012. Their assets are continuously growing over the years. Moreover, their growth in 2019 outpaced their compounded annual growth in 2013–2018 in Brazil, Indonesia, Saudi Arabia and Turkey. The share of OFIs in

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[2] EF2 refers to economic function 2 of the narrow measure of NBFI used by the FSB. It refers to entities that are dependent on short term funding. It includes finance companies, leasing or factoring companies and consumer credit companies. Global EF2 assets refers to the assets of 29 countries (sample of the FSB) consisting of the advanced and emerging nations.

total financial assets was approximately 20% in these nations except for Argentina, Indonesia, Saudi Arabia and Turkey. Also, OFIs represent a significant share of NBFI (they had a greater share in assets than insurance companies and pension funds) except in Argentina and Chile.

Further, they also constituted a significant percentage of GDP, especially in economies such as Brazil, Chile, China, India and Russia. Thus, OFIs have gained relevance over the years. However, some concerns relating to these entities may increase stability risks for a nation.

Fig. 1 shows the growth in financial assets of banks vis-à-vis non-banks (OFIs) as a percentage of GDP for the 11 EMEs. It depicts that the growth of OFIs has been more volatile than that of banks. Although the growth of NBFI outpaced the growth of banks in all these EMEs, their growth rates were severely affected in the crisis period compared to banks. Thus, they tend to assume more risk as compared to banks.

The OFIs are exposed to several risks as their interlinkage with other financial system entities may increase interconnectedness risks. They are dependent on banks for their funding requirements. OFIs use of funding from banks is more than 10% of their total financial assets in the case of Russia, India, Indonesia and Turkey. In terms of this interlinkage, finance companies constituted a significant share of OFIs in the case of India (9.7%) and Indonesia (11%). In the case of Argentina, Brazil, Chile and South Africa, OFIs exposure to banks was more than 20 percentage. This exposure was mainly with money market funds (MMFs) and other investment funds (OIFs). Further, OFIs also depend on insurance companies and pension funds for funding. Moreover, there is considerable interlinkage among OFIs in India (FSB, 2020).

In order to identify the instability risks, FSB narrows down its focus to monitoring specific types of NBFI. This narrow measure[3] is bifurcated into five economic functions (EF). EF1 refers to collective investment vehicles (CIVs) that might be exposed to risk related to runs. EF2 refers to entities that are dependent on short-term funding. It includes finance companies, leasing or factoring companies and consumer credit companies. EF3 refers to entities engaged in market intermediation dependent on short-term funding, such as broker-dealers. EF4 includes entities that facilitate credit creation, such as credit insurance companies, and EF5 includes entities engaged in securitisation activities, such as structured finance vehicles.

Fig. 2 depicts that most of the share of the narrow measure is either EF1 or EF2. As per FSB, EF2 assets have gained relevance in EMEs. Their assets in EMEs constituted more than 25 percentage of the global EF2 assets in 2019 compared to 10 percentage in 2013. EF2 constituted the major share of the narrow measure in India (76%), Russia (68%) and Turkey (48%), respectively. In contrast, it was the second most important economic function for Argentina (19%), Chile (23%), Mexico (34%), Saudi Arabia (19%) and South Africa (12%), respectively. Finance companies are the primary entities of EF2, accounting for approximately 63 percentage of total EF2 assets in EMEs. In the case of India, EF2 represented the finance companies entirely. Finance companies are considered important credit intermediaries in India and are called non-banking finance companies (NBFCs).

Regarding the interconnectedness of finance companies with other institutions, finance companies of Brazil, Chile, and Mexico depended on banks for their funding requirements. In the case of India, they were dependent on other OFIs for their requirement (Fig. 3). Further, the finance companies of Chile and Mexico were largely reliant on short-term wholesale funding.[4]

Thus, the interconnectedness between NBFI and the rest of the financial system points towards the financial stability risks if the former fails. Therefore, there is a pressing need to examine the factors leading to the growth of this sector.

3. Literature review

3.1. Shadow banking

NBFI were termed shadow banks post the GFC of 2008. The term "shadow banks" was coined by the economist Paul McCulley in a 2007 speech at the annual financial symposium hosted by the Kansas City Federal Reserve Bank in Jackson Hole, Wyoming" (Gandhi, 2014). It is also referred to as 'alternative banking' since it provides an alternative for investors apart from bank deposits and is an alternative source of funding for the financial system when the traditional sources face problems (Maede et al., 2012).

The literature on shadow banking has evolved post the GFC of 2008. It was referred to as "an international systemic risk transmitter" in times of crisis (Adrian and Ashcraft, 2012). The sector was called so because of several problems: lack of transparency, increased off-balance-sheet activities, and lack of access to formal liquidity support. Studies on shadow banking covered several aspects, such as the cross-border interconnectedness of shadow banks (Fong et al., 2021; Johnson, 2021), the impact of NBFI on economic growth (Liang and Reichert, 2012; Zhou and Tewari, 2019), the relationship between banks and shadow banks (Gornicka, 2016; Huang, 2018) and factors affecting the growth of shadow banks.

3.2. Factors affecting the growth of shadow banking

The literature on the factors leading to the growth of NBFI dates back to the 1980s. Kantas and Greenbaum (1982) pointed out that

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[3] Narrow measure of FSB refers to "those activities that may engender vulnerabilities through liquidity/maturity transformation or leverage" (FSB, 2020). NBFI who engage in such activities are included in one of the five economic functions defined by FSB.

[4] The data for the dependence of Finance companies on short term wholesale funding was available only for 7 EMEs, namely Argentina, Brazil, Chile, China, Indonesia, Mexico and Saudi Arabia. Following were their shares in short term wholesale funding (as percentage of assets) – Argentina (19.9%), Brazil (6.8%), Chile (56.7%), China (6.9%), Indonesia (1.2%), Mexico (37.4%) and Saudi Arabia (17.4%).
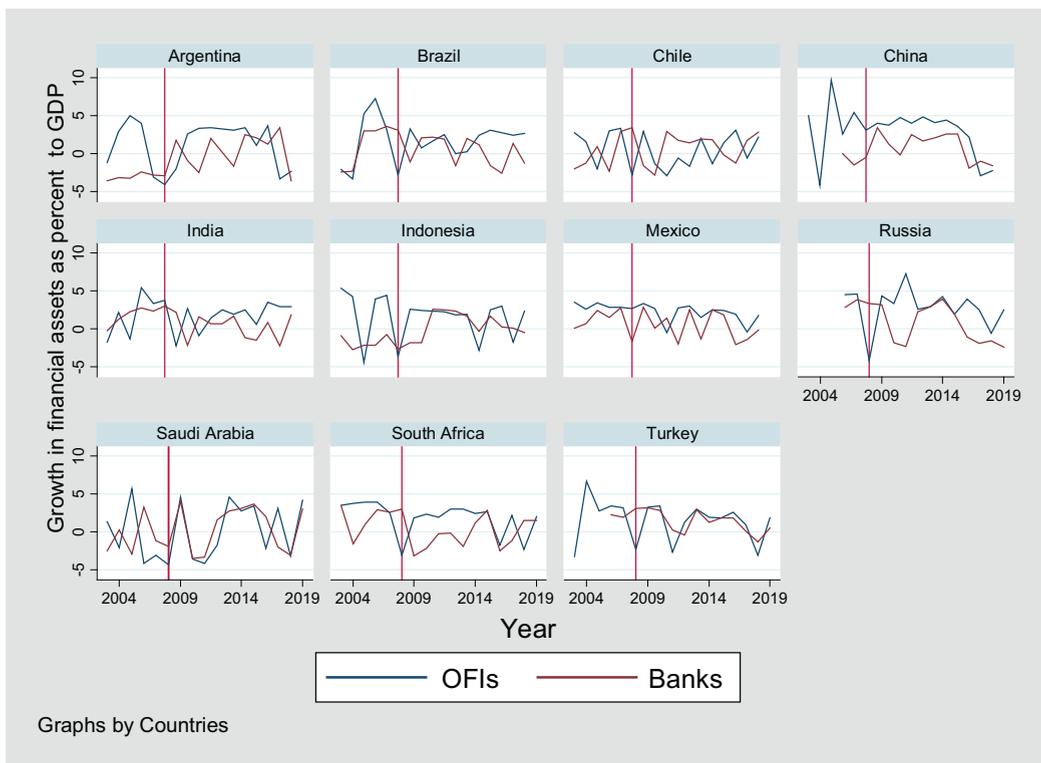
Fig. 1. Growth in financial assets of banks and OFIs as a percentage of GDP in 11 EMEs.
Source: Global Monitoring Report on NBFI 2020, FSB (FSB, 2020) and author's calculations. The vertical line represents the year 2008, marking the global financial crisis.
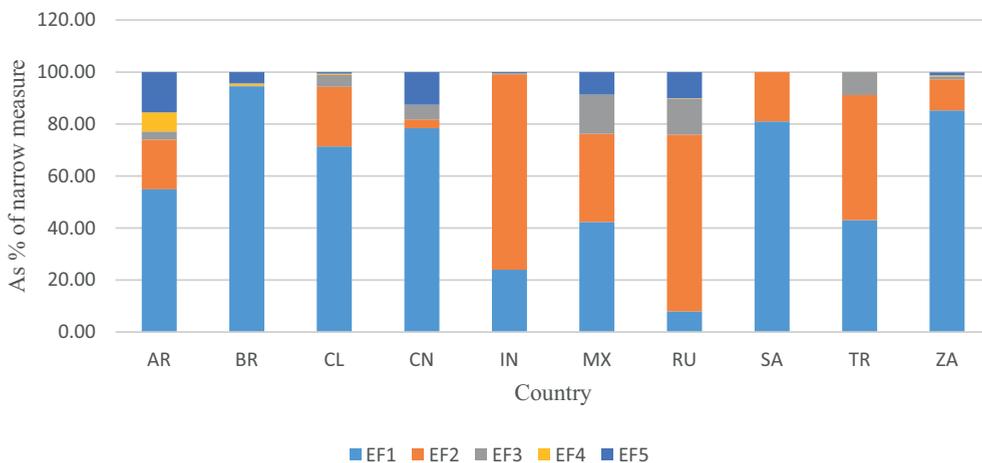
Fig. 2. Economic function classification (2019) (as a percentage of narrow measure of NBFI).
Source: Global Monitoring Report on NBFI 2020, FSB (FSB, 2020). Data for Indonesia for all economic functions were not available. AR-Argentina, BR-Brazil, CL-Chile, CN-China, IN-India, MX-Mexico, RU-Russia, SA-Saudi Arabia, TR-Turkey and ZA-South Africa.

an increase in reserve requirements of banks may create financial alternatives to bank loans. These alternatives refer to financial innovations such as repurchase agreements and money market mutual funds (MMFs). Similar factors lead to the growth of securitisation (Pennachi, 1988).

In the context of emerging nations, such as India and China, 'financial exclusion' was identified as the pertinent factor leading to the growth of the shadow banking sector (Arora and Zhang, 2018). The formal financial system fails to cover all the segments of the economy in these nations. Further, (Sherpa, 2013) highlights the role of financial liberalisation in the growth of NBFI in India and
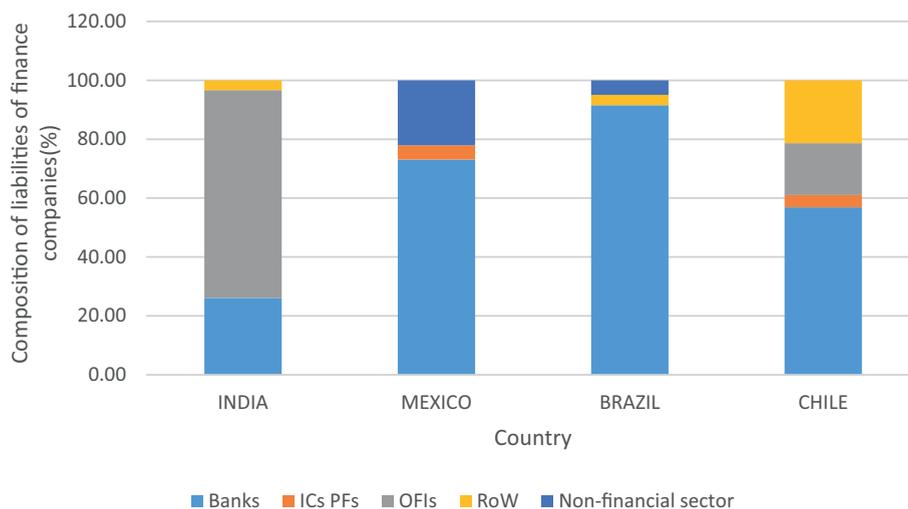
Fig. 3. Composition of liabilities of finance companies for the year 2019.
Source: Global Monitoring Report on NBFI 2020, FSB (FSB, 2020).
The non-financial sector refers to non-financial corporations, governments, and households. Data on liabilities of finance companies were available only for these four nations.

China. Also, high inflation in China post the GFC of 2008 reduced the returns on bank deposits leading to the growth of NBFI. (Ghosh et al., 2012) pointed out that shadow banking had grown over the years in EMEs (Central and Eastern Europe and East Asia) but was largely unregulated.

The literature has identified several factors affecting the growth of shadow banking. Regulatory arbitrage, the complementary role of NBFI to the rest of the financial system, the search for yield effect, and demand from institutional investors were some of the factors enhancing NBFI's growth (Duca, 2014; IMF, 2014; Kim, 2016; Fong et al., 2021; Apostoaie and Bilan, 2019; Hodula et al., 2020).

3.2.1. Regulatory arbitrage

Stricter regulations in the banking sector incentivise banks to avoid them through non-bank intermediation (Kantas and Greenbaum, 1982; Bernanke and Lown, 1991; Duca, 1992). Banks have several restrictions, such as capital requirements, disclosure requirements, and restrictions on certain activities. However, the same type of restriction is not there for NBFI. These differences in regulations for banks and NBFI are called regulatory arbitrage, also called financial repression or capital stringency (Vittas, 1992). Regulatory arbitrage may result in the growth of NBFI. IMF (2014) measured regulatory arbitrage using indicators of bank regulations from the Bank Regulation and Supervision Survey (BRSS) conducted by the World Bank and compiled by Barth et al. (2013). They found a positive relationship between bank regulations and the growth of NBFI. Fong et al. (2021) deployed bank concentration, financial freedom index and the rule of law index as measures of capital stringency. They found that capital stringency in the banking sector enhances the cross-border interconnectedness between the shadow banking systems. Irani et al. (2021) measured the impact of capital requirements on shadow banking in the United States and found that banks with low capital reallocate their loans having higher capital requirements to non-banks. Hodula et al. (2020) deployed the capital stringency index of BRSS and found a positive relationship between bank capital regulations and the growth of the shadow banking sector in 24 countries in the European Union (EU). Another strand of literature (closely related to regulatory arbitrage) is studying the impact of macro-prudential regulations on the leakages of financial activity to the non-banking sector (Reinhardt and Sowerbutts, 2015; Bruno et al., 2017; Schryder and Opitz, 2021). Macro-prudential regulations include capital requirements, exposure limits and risk weights on different activities. Schryder and Opitz (2021) found leakages of the credit disbursed to firms from banks to the non-bank sector in case of a macro-prudential shock for 13 EU nations (Reinhardt and Sowerbutts, 2015).

The empirical evidence on the relationship between bank capital regulations and the growth of the shadow banking sector is limited for emerging markets. The present study intends to analyse this relationship for emerging markets. It holds relevance since the shadow banks in emerging markets such as India (Acharya et al., 2013) and Mexico (Berrospide and Herrerias, 2015) depend on banks for their funding. Thus, it becomes imperative to study the effect of regulations (imposed on the latter) on the growth of the former.

The literature in the context of advanced nations indicates a positive relationship between regulatory arbitrage and the growth of NBFI. However, in the context of EMEs, no significant results have been obtained (Reinhardt and Sowerbutts, 2015). EMEs such as India and China regulate these entities, and the extent of arbitrage between banks and non-banks is reducing in these countries (Arora and Zhang, 2018). Thus, we formulate the following hypothesis:

H1. Regulatory arbitrage has a significant impact on the growth of NBFI.

3.2.2. Search for yield effect

As the yield on government bonds decreases, investors search for better yields that the NBFI sector may provide, as evidenced by (Caballero, 2010; Goda et al., 2013; Jackson, 2013; Goda and Lysandrou, 2014; Lysandrou and Nesvetailova, 2015). Fong et al. (2021) measured the search for yield effect using general forward earnings yield of the MSCI World Index, individual forward earnings yield, short-term interest rates and survey-based measure of consumer confidence relating to investor sentiments. Apostoaie and Bilan (2019) measured it using two proxies: the first one was the term spread rate between long-term (10 years) interest rates and money market (three months) interest rates, and the second was the money market rate per annum. The literature in US and EU context indicates a negative relationship between government yields and the growth of shadow banks. Also, assets of NBFI in EMEs, such as investment funds in Brazil, were reported to be growing due to the lower government yields (IMF, 2014). Thus, the hypothesis for the search for yield effect is specified as follows:

H2. Search for yield has a significant negative impact on the growth of NBFI.

3.2.3. Monetary policy

The monetary policy tools control banks' capacity to lend (Dang and Nguyen, 2021). The literature documents lose monetary policy (low-interest rates) before the GFC of 2008 as one of the reasons for the increase in credit growth in the financial system, thereby causing the crisis (Pozsar et al., 2010; Jimenez et al., 2014). (Hodula, 2019) posit funding costs and search for yield as two plausible reasons for the relationship between the policy rate and growth of NBFI in the euro area. They found that increasing funding costs of banks due to monetary policy tightening leads to the growth of NBFI as the former increases securitisation activity. However, continued easing of the monetary policy rate increases the growth of NBFI (especially investment funds) due to the search for yield effect. Thus, the author concluded that monetary policy has a non-linear relationship with the growth of NBFI in the euro area. However, it was found to positively affect the growth of shadow banking in countries such as the US. (Nelson et al., 2018). In the case of EMEs, Zhou and Tewari (2019) found that policy rates negatively affect shadow banking growth. Thus, the hypothesis is stated as follows:

H3. Monetary policy has a significant impact on the growth of NBFI.

3.2.4. Growth of banks

The growth of banks refers to the growth in asset size of commercial banks. Shadow banks complement commercial banks and the financial system in emerging markets. For instance, Non-Banking Financial Corporations (NBFCs) in India provide access to credit in informal sectors not covered by the banking sector (Acharya et al., 2013). In EMEs such as China, banks and shadow banks have displayed interlinkages that could affect the overall financial system (Ghosh et al., 2012). Further, studies (IMF, 2014; Apostoaie and Bilan, 2019) have also found the growth of assets of banks and non-banks to be positively related in advanced nations. Thus, we hypothesise that:

H4. The growth of banks positively affects the growth of NBFI.

3.2.5. Demand from institutional investors

Demand from institutional investors led to the growth of shadow banking in the United States (Pozsar, 2011). They invest in shadow banking assets as an alternative to safe assets. They have been proxied as insurance companies and pension funds in the literature (IMF, 2014; Kim, 2016; Barbu et al., 2016; Apostoaie and Bilan, 2019; Hodula et al., 2020; Fong et al., 2021). The literature reports a positive relationship between growth in shadow banking and institutional investors in advanced nations. Moreover, in emerging nations such as Brazil, demand from such investors has played an important role in the growth of assets of investment funds from 2002–2013 (IMF, 2014). However, no empirical evidence could be found for the direction of influence in the EME context.

H5. Demand from institutional investors positively affects the growth of NBFI.

3.2.6. Liquidity and other macro-economic factors

Shadow banks are vulnerable to liquidity shocks due to their asset-liability mismatches and dependence on leverage. Apostoaie and Bilan (2019) hypothesised global liquidity conditions as a factor affecting shadow banking growth and measured it using the growth rate of total reserves, excluding gold. They found liquidity and shadow banking growth to be positively related.

The impact of other macro-economic factors such as economic growth, inflation and stock market development on the growth of NBFI were also measured in the literature (IMF, 2014; Duca, 2016).

Thus, several factors led to the growth of NBFI. They are continuously growing over the years, especially in EMEs. The present study, therefore, aims to find out the determinants affecting the growth of the NBFI sector in EMEs. Further, the study narrows down the NBFI sector to study the factors affecting the growth of the finance companies in EMEs.

4. Data and methodology

The present study aims to gauge the aspects of the NBFI sector in emerging market economies (EMEs). It covers 11 EMEs, namely Argentina, Brazil, Chile, China, India, Indonesia, Mexico, Russia, Saudi Arabia, South Africa and Turkey, from 2002–2019. FSB periodically monitors the NBFI of these economies. Thus, the data relating to NBFI assets, bank assets, pension funds and insurance assets were sourced from FSB.

Table 1
List of variables employed in the study.

S. No.	Variable	Explanation	Expected sign	Source
A.	Dependent variable			
i.	Broad measure of NBFI	Log of growth (year-on-year) of financial assets of OFIs.		Global Monitoring Report 2020, FSB.
		Log of growth (year-on-year) of OFI financial assets to GDP		
		Log of growth (year-on-year) of NBFI assets to GDP		Global financial development database, World Bank.
ii.	Finance companies	Log of growth (year-on-year) of financial assets of economic function 2 (EF2)		Global Monitoring Report 2020, FSB.
		Log of growth (year-on-year) of economic function 2 (EF2) financial assets to GDP		
B.	**Explanatory variables**			
1.	*Search for Yield*			
i.	Term Spread	The difference between long-term interest rates (10 years maturity) and money market rates (percentage per annum).	Negative	Bloomberg, Economic intelligence unit (EIU) and World Development Indicators, World Bank.
ii.	Money market rate	Three-month interest rate on T-bills.	Negative	Bloomberg, Economic intelligence unit (EIU) and World Development Indicators, World Bank.
iii.	Forward earnings yield	Reciprocal of the forward price-earnings ratio of the MSCI EME index. The index captures large and mid-cap representation across 27 emerging nations.	Negative	Bloomberg.
2.	*Central Bank Policy Rate*	Policy rate used by Central Bank to influence the monetary policy.	Negative	International Financial Statistics, IMF.
3.	*Demand from Institutional investors*			
i.	Growth of pension funds	Annual growth rate of total financial assets of pension funds.	Positive	Global Monitoring Report 2020, FSB.
		Annual growth rate of total financial assets of pension funds to GDP.		
ii.	Growth of insurance companies	Annual growth rate of total financial assets of insurance companies.	Positive	Global Monitoring Report 2020, FSB.
		Annual growth rate of total financial assets of insurance companies to GDP.		
4.	*Regulatory arbitrage*			
i.	Banks' regulatory capital to risk-weighted assets ratio (Bank's CRAR)	Ratio of total regulatory capital to total assets held. The assets are weighted according to the risks associated with those assets.	Positive	Global financial development database, World Bank and International Financial Statistics, IMF.
ii.	Banks' Overall Capital Stringency Index	Index of questions relating to overall capital stringency of banks.	Positive	Bank regulation and Supervision Surveys of 2000,2003,2006,2010, and 2016. For compiled data of the surveys till 2010- Barth et al. (2013)
iii.	Official Supervisory Power Index	Index of questions relating to official supervisory power of banks.	Positive/ Negative	
iv.	Activity restrictions	Index of questions relating to restrictions on securities, insurance and real estate activities of banks.	Positive	
v.	Financial conglomerate	Index of questions measuring restrictions on banks relating to financial conglomerates.	Positive/ Negative	
5.	*Complementarity with the financial system*			
	Growth of banking assets	Annual growth rate of financial assets of banks.	Positive	Global Monitoring Report 2020, FSB.
6.	*Liquidity*			
i.	Liquid assets to deposits and short-term funding (%)	Ratio of liquid assets to deposits and short-term funding. Liquid assets refer to cash and due from banks, trading securities at fair value through income, loans and advances to banks, reverse repos and cash collaterals. Deposits and short-term funding include total customer deposits (current, savings and term) and short-term borrowing (money market instruments, CDs and other deposits).	Positive	World Development Indicators, World Bank
ii.	Financial system deposits to GDP	Demand, time and saving deposits in banks and other financial institutions as a share of GDP.	Positive	International Financial Statistics, IMF.
iii.	Total reserves minus gold	Total reserves minus gold include special drawing rights, reserves of IMF members held by the IMF, and foreign exchange holdings under the control of monetary authorities. Data are in current US dollars.	Positive	World Development Indicators, World Bank
7.	*Economic growth*			
i.	Real GDP growth	Log of the year-on-year real GDP growth.	Positive	Global Monitoring Report 2020, FSB.
ii.	Inflation	The annual growth rate of GDP implicit deflator.[a]	Positive	Global Monitoring Report 2020, FSB.
8.	*Financial market development indicators*			
	Stock market development		Positive	World Development Indicators, World Bank.

Table 1 (*continued*)

S. No.	Variable	Explanation	Expected sign	Source
		Annual growth of the turnover ratio of stock markets. The turnover ratio is the ratio of domestic shares traded divided by their market capitalisation.		
9.	**Governance indicators**			
i.	Regulatory quality estimate	The estimate measures the perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Estimate gives the country's score on the aggregate indicator in units of standard normal distribution, i.e. ranging from approximately −2.5 to 2.5.	Positive	World Governance Indicators, World Bank.
ii.	Rule of law estimate	It measures the perceptions of the agents' confidence in the rules of society, particularly the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	Positive	World Governance Indicators, World Bank.
iii.	Government effectiveness estimate	Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	Positive	World Governance Indicators, World Bank.
10.	**Event Risk Dummies**			
i.	Crisis	Dummy equals 1 for the period 2007–2009 for the global financial crisis of 2008.	Negative	–
ii.	Bank crisis dummy	Dummy equals 1 for the period in which banks faced a crisis.	Negative	Global Financial Development Database, World Bank.
11.	Intrumental variable Percentage of years the country has been independent since 1776	$\dfrac{\textit{Final sample year } (2019) - \textit{Year of independence}}{\textit{Final sample year} - 1776}$	–	Central Intelligence Agency Factbook, US; (Houston et al., 2011)

[a] GDP implicit deflator refers to the ratio of GDP in current local currency to GDP in constant local currency (base year was 2010).

Further, macroeconomic data such as gross domestic product (GDP), inflation, liquidity and stock market development were sourced from World Development Indicators, World Bank and the International Financial Statistics database of IMF. Also, interest rate data, such as the money market rate, was sourced from the Bloomberg database. In order to measure regulatory arbitrage, Bank Regulation and Supervision Surveys (BRSS) database available with the World Bank and compiled by Barth et al. (2013) was used.

Table 1 explains the variables used for measuring the growth of NBFI and their expected impact on economic growth and other factors.

The dependent variable is the growth of the NBFI sector. It is measured as the ratio of OFI[5] to GDP. They have been deployed in the literature such as (IMF, 2014; Fong et al., 2021). The dependent variable is alternatively narrowed to economic function 2 (EF2). EF2 is a measure employed by FSB to analyse NBFI engaged in activities like finance companies, leasing or factoring companies and consumer credit companies.

The explanatory variables include the following factors identified in literature affecting the growth of NBFI.

The search for yield effect refers to the investors' behaviour of searching for better returns elsewhere when yields on government bonds decrease. It is measured using two proxies: money market rate and term spread (spread between 10-year long-term government bond yield and the money market rate), similar to (IMF, 2014; Apostoaie and Bilan, 2019; Fong et al., 2021). The money market rate is expected to affect NBFI growth negatively. This relationship is so because low rates would encourage investors to look for alternative options, that is, the NBFI sector (IMF, 2014). Similar is the case with the term spread rate. The central bank policy rate, which is a measure of monetary policy, is expected to have a negative impact on the growth of NBFI.

As per IMF (2014), institutional investors such as insurance companies and pension funds look for alternatives to insured and safe deposits. Demand from institutional investors is measured using the growth rate of pension funds and the growth rate of total assets of insurance corporations similar to (Kim, 2016; Barbu et al., 2016; Apostoaie and Bilan, 2019; Hodula et al., 2020; Fong et al., 2021). It is expected that demand from institutional investors is positively related to growth of NBFI.

Regulatory arbitrage is regarded as one of the important factors in the literature impacting the growth of the NBFI sector. It is measured using three proxies: the capital adequacy ratio (CRAR) of banks, the overall capital stringency index and the official supervisory power index of banks similar to (IMF, 2014). Banks' CRAR measures the amount of capital banks need to maintain against the risk inherent in the loans disbursed by them. The higher the amount of risk, the higher the CRAR requirement.

NBFI complement the banking sector in catering to the needs of the financial system. The relationship between banks and NBFI was measured using the growth of bank assets (IMF, 2014). A positive sign is expected between NBFI growth and the growth of banking assets.

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[5] OFIs comprise all financial institutions except Central Banks, banks, public financial institutions, insurance companies, pension funds or financial auxiliaries.

Further, several macroeconomic variables were deployed as control variables. Economic growth was measured as the real gross domestic product (GDP) growth, similar to (IMF, 2014; Barbu et al., 2016; Kim, 2016; Apostoaie and Bilan, 2019). Liquidity is assumed to positively affect the NBFI sector's growth (IMF, 2014; Duca, 2016). Also, stock market development was used as a control variable (IMF, 2014). Besides, several event risk dummies were controlled. All the variables were converted to their natural logarithm.

4.1. Econometric specification

The growth of NBFI, the framework based on IMF (2014) and Kim (2016), is modelled as a function of economic growth and other factors:

$$NBFIG_{it} = \alpha_1 + \alpha_2 Complementarity_{it} + \alpha_3 Institutional_{it} + \alpha_4 Reg_{it} + \alpha_5 Yield_{it} + \alpha_6 Other_{it} + a_i + \lambda_t + \varepsilon_{it} \qquad (1)$$

where, $NBFIG_{it}$ represents the growth of financial assets of NBFI to GDP. The proxy for measuring the growth of NBFI is the ratio of financial assets of OFIs to GDP. Further, they are narrowed down and measured as the ratio of financial assets of finance companies to GDP (defined as EF2 by FSB).

$Complementarity_{it}$ refers to the complementary role played by banks with NBFI in credit intermediation. $Institutional_{it}$ refers to the demand from institutional investors. Reg_{it} refers to the regulatory arbitrage between banks and NBFI. $Yield_{it}$ refers to the search for yield factor. $Other_{it}$ refers to other factors and a set of control variables affecting NBFI growth, such as economic growth. a_i and λ_t measures the country and time effects, respectively and ε_{it} is the error term.

4.2. Methodology

Panel data allow us to study different cross-sections over time. Panel data estimation accounts for unobserved heterogeneity. The problem of unobserved heterogeneity makes it imperative to analyse panel data models using different techniques. There are broadly two methods of estimating panel data: fixed effects and random effects. The fixed-effects model removes the unobserved heterogeneity, while random effects allow it to be present in the model.

The present study analyses 11 EMEs from 2002–2019. Thus, the cross-sections ($N = 11$ years) are less than the time duration ($T = 17$). This type of panel data is referred to as long or macro panels (Cameron and Trivedi, 2009). In the case of macro panels, non-stationarity may occur due to large time series in each cross-section. Non-stationarity may lead to spurious regression.

Further, there may be cross-section dependence among the panel members in such panels. Thus, panel unit root tests and cross-

Table 2
Descriptive statistics.

Variable	N	Mean	SD	Min	Max	Median	Skewness	Kurtosis
LOFIFA/GDP	184	1.646	2.766	−4.467	9.731	2.493	−0.545	2.737
LEF2/GDP	115	1.017	2.602	−3.936	4.955	1.983	−0.520	1.833
LBankFA/GDP	178	0.447	2.149	−3.587	4.006	0.857	−0.199	1.653
LInsuranceFA/GDP	171	0.944	2.287	−5.236	8.158	1.745	−0.481	2.584
LPensionFA/GDP	155	1.667	2.671	−3.856	7.003	2.511	−0.489	2.206
LPolicyRate	182	1.702	0.966	−1.386	4.082	1.087	−1.152	5.303
LMMRate	170	1.761	0.746	−0.365	4.095	1.834	−0.287	3.872
LGovtBond	143	1.893	0.366	0.941	2.854	2.024	−0.543	2.900
LTermSpread	149	0.359	1.446	−3.402	2.623	0.654	−0.843	2.769
LFwdEarningYield	165	2.119	0.232	1.760	2.704	2.106	0.907	3.693
LGDP	184	1.761	1.349	−3.035	3.516	2.253	−1.731	5.475
LInflation	187	2.462	1.117	−3.522	4.618	2.612	−2.346	12.343
LStockTurnover	185	0.437	3.741	−4.718	6.467	2.053	−0.085	1.265
LLiquidAssets	187	3.198	0.569	1.695	4.153	3.087	−0.114	2.148
LFSDeposits	187	3.608	0.408	2.760	4.191	3.745	−0.60	2.163
LBankCRAR	183	2.742	0.246	0.916	3.431	2.765	−2.545	20.773
Capital stringency	181	4.068	1.948	1	8.75	4	0.023	2.141
Capital regulatory	177	6.451	2.086	2	11.72	6.444	0.080	2.349
FinancialConglomerate	174	7.374	1.984	3	12	7	0.371	3.10
Official Supervisory	181	11.438	2.527	6	16	11.85	−0.337	2.565
Regulatory Quality	187	0.024	0.488	−0.933	1.216	0.045	0.798	3.373
Rule of Law	187	−0.154	0.492	−0.860	1.157	−0.243	1.071	3.902

Table 2 report the descriptive statistics, that is, mean, standard deviation (SD), min(minimum), max(maximum), skewness and kurtosis for the variables. Variables include year on year (yoy) OFI financial assets to GDP (LOFIFA/GDP), yoy EF2 financial assets to GDP (LEF2/GDP), yoy bank financial assets to GDP (LBankFA/GDP), yoy pension fund financial assets to GDP (LPensionFA/GDP), yoy insurance companies financial assets to GDP (LInsuranceFA/GDP), Central Bank policy rate (LPolicyRate), money market rate (LMMRate), government bond (LGovtBond), term spread rate (LTermSpread), forward earning yield (LFwdEarningYield), LGDP refers to real GDP growth year on year, LInflation measured as the rate of inflation over the years, stock turnover value (LStockTurnover), LLiquidAssets refers to the ratio of liquid assets to deposits and short term funding, LFSDeposits refers to the ratio of financial system deposits to GDP, risk- weighted capital ratio (LBankCRAR). All the variables were converted to a natural log. Also, BRSS survey indices (overall capital stringency, capital regulatory index, financial conglomerate index and official supervisory power) and governance indicators (regulatory quality and rule of law) were deployed.

section dependence tests were deployed. There are several panel unit root tests. We have an unbalanced panel, and thus, Im-Pesaran-Shin (IPS) test, Philips-Perron (PP), Fisher-type augmented Dickey-Fuller (ADF) and Maddala and Wu (1999) test were applied (Cameron and Trivedi, 2009). Further, panel unit root tests accounting for cross-section dependence, Pesaran (2007) test was also applied. In order to test for cross-section dependence in data, Pesaran (2015) test of weak cross-section dependence was applied. Moreover, the tests of heteroscedasticity and autocorrelation were performed to decide the appropriate estimation method. Wooldridge test for testing autocorrelation in panel data was applied. It is based on the null hypothesis of no serial correlation in the errors (Wooldridge, 2012). In order to test for heteroscedasticity, the Modified Wald test was deployed. It tests group-wise heteroscedasticity in the residuals of a fixed effect. The errors were found to be heteroskedastic and autocorrelated. The models were estimated using Prais Winstein regression which provides panel-corrected standard errors (PCSE). PCSE estimation controls for serial correlation, heteroscedasticity and contemporaneous correlation in panel data (Cameron and Trivedi, 2009; Smaoui et al., 2017).

Further, the model may suffer from the problem of endogeneity due to omitted variable bias. The dependent variable (growth of NBFIs) might be affected by many other factors not controlled in the study. Thus, we also deployed two-stage least squares instrumental variable (2SLS-IV) regression.

5. Results

Descriptives of the variables deployed are presented in Table 2. In order to select the appropriate estimation method, variables were tested for stationarity using panel unit root tests. Further, the models were tested for cross-section dependence and were found to be

Table 3
Determinants of NBFI growth.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DV: LOFIFA/GDP				DV: LEF2FA/GDP			
LBankFA/GDP	0.162* (0.088)	0.048 (0.099)	0.0571 (0.076)	0.098 (0.091)	0.389*** (0.096)	0.434*** (0.090)	0.484*** (0.102)	0.417*** (0.111)
LInsuranceFA/GDP	0.186** (0.085)	0.183** (0.084)	0.059 (0.072)	0.0317 (0.089)	0.238*** (0.081)	0.274*** (0.077)	0.182** (0.090)	0.215** (0.102)
LPensionFA/GDP			0.391*** (0.071)	0.564*** (0.082)			−0.016 (0.117)	−0.029 (0.112)
LPolicyRate	−0.691** (0.336)	0.108 (0.290)			−0.336 (0.306)	−0.339 (0.30)		
LMMRate			−1.28*** (0.40)	−1.32*** (0.437)			−1.190** (0.593)	−0.403 (0.678)
LGDP	−0.118 (0.186)	−0.114 (0.170)		0.0472 (0.149)	0.183 (0.166)	0.071 (0.226)	−0.100 (0.245)	0.152 (0.20)
LInflation	−0.175 (0.268)	−0.330 (0.258)	−0.357 (0.323)	−0.138 (0.339)	0.081 (0.205)	0.075 (0.229)	0.198 (0.402)	0.140 (0.371)
LStockTurnover	0.147*** (0.045)	0.051 (0.050)	−0.002 (0.045)	0.075 (0.045)	−0.041 (0.045)	0.017 (0.053)	−0.036 (0.057)	0.047 (0.60)
LLiquidAssets		0.506 (0.339)				−0.880 (0.650)		
LBankCRAR	−1.430 (1.320)	−1.550** (0.725)			−5.450*** (1.460)	−4.320*** (1.50)		
Capital Stringency			−0.385** (0.169)				−0.730*** (0.215)	
Official Supervisory				0.018 (0.06)				−0.110 (0.122)
Crisis dummy	−0.935 (0.647)			−0.445 (0.514)	0.091 (0.686)			0.649 (0.740)
Constant	7.959** (4.061)	3.880** (1.790)	9.858*** (1.721)	6.021*** (1.816)	15.30*** (4.180)	15.10*** (4.630)	5.760* (3.020)	2.420 (2.550)
Number of observations	160	160	142	142	113	113	102	102
Number of countries	11	11	10	10	10	10	9	9
Country/Time Effects	None	Time	Both	Country	None	Time	Both	Country
R squared	0.249	0.371	0.558	0.423	0.365	0.471	0.509	0.362
Wald Chi-Square	171***	19549***	3866***	211***	82.9***	51188***	322004***	149***

***, **, * indicate significance at 1%, 5% and 10%, respectively. The models are estimated using Prais-Winstein regression Panel Corrected Standard Errors (PCSE) to control heteroscedasticity, contemporaneous correlation and serial correlation. Data for Pension funds were not available for Saudi Arabia. Thus, models 3, 4, 7 and 8 are estimated for ten cross-sections.

Table 3 reports the regression results for determinants of NBFI growth using yoy OFIFA to GDP (model 1–4) yoy EF2 to GDP (model 5–8) as dependent variables, respectively. The explanatory variables include the yoy bank financial assets to GDP (LBankFA/GDP), yoy insurance companies financial assets to GDP (LInsuranceFA/GDP), yoy pension fund financial assets to GDP (LPensionFA/GDP), Central Bank policy rate (LPolicyRate), money market rate (LMMRate), LGDP refers to real GDP growth year on year, LInflation measured as the rate of inflation over the years, LStockTurnover refers to the stock turnover value, LLiquidAssets refers to the ratio of liquid assets to deposits and short term funding, bank's risk-weighted capital ratio (LBankCRAR). All these variables were converted to a natural log. Also, BRSS survey indices (capital stringency and official supervisory power) and crisis dummy for the years 2007–09 were included as regressors.

cross-sectionally dependent in most cases. The results of the above tests are presented in the appendices. Thus, panel corrected standard error (PCSE) estimation was considered appropriate to estimate the models, and the results are explained in Table 3. The models allowed for country effects and time effects.

Table 3 presents models for the broad and narrow measures of NBFI. The models were significant as measured by Wald Chi-square statistics. The results obtained are explained as follows:

The regulatory arbitrage measured as the ratio of the bank's CRAR was found to have a significant negative impact on OFI assets. Also, its other proxy, the overall capital stringency variable, had a similar relationship. This result contrasts with the IMF (2014) results for advanced nations. However, they found no significant impact of bank capital regulations on the growth of NBFI when they deployed the FSB measure of shadow banking. They analysed this relationship for the overall sample of advanced and emerging nations monitored by the FSB, and no disaggregate analysis was done based on economies. The possible reason for this negative relationship may be because banks lend to NBFI, and increased restrictions on bank capital may decrease its lending to the latter, and thus the strict capital regulatory restrictions on banks may decrease the growth of NBFI. Moreover, there are restrictions on banks with respect to exposure to NBFI in emerging economies such as India.

The measure of the search for yield factor, money market rate (MM), had an expected negative relationship with both the narrow and broad measure of NBFI. Thus, a 1% increase in the MM rate leads to an approximately 1.28% decrease in the NBFI assets. It signifies that a decrease in yield in the money market induces investors to invest in NBFI.

The Central Bank policy rate had a negative impact on NBFI growth. In the case of broad measure, it was significant at 5%. It implies that a 1% increase in the policy rate (contraction of the money supply) will decrease the OFIs growth by 0.69 %. Thus, a contractionary

Table 4
Robustness tests using OFI financial assets and EF2 financial assets as the dependent variable.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DV: LOFIFA				DV: LEF2FA			
LBankFA	0.121	0.188	−0.041	−0.090	0.306*	0.290***	0.226	0.149
	(0.122)	(0.118)	(0.106)	(0.097)	(0.168)	(0.146)	(0.168)	(0.191)
LInsuranceFA	0.269**	0.155	0.115	0.153*	0.214***	0.245***	0.142*	0.195***
	(0.108)	(0.102)	(0.088)	(0.089)	(0.065)	(0.076)	(0.077)	(0.071)
LPensionFA			0.512***	0.618***			−0.259*	−0.226
			(0.104)	(0.073)			(0.138)	(0.141)
LPolicyRate	0.187	0.196			0.273	0.342		
	(0.233)	(0.228)			(0.242)	(0.199)		
LMMRate			−0.166	−0.333*			−0.109	0.237
			(0.246)	(0.202)			(0.126)	(0.490)
LGDP	−0.077	−0.040	0.0180	0.080	0.111	0.007	−0.005	0.173
	(0.083)	(0.103)	(0.080)	(0.063)	(0.128)	(0.173)	(0.171)	(0.149)
LInflation	0.171	0.182	−0.032	−0.081	−0.162	−0.205	0.087	0.028
	(0.174)	(0.184)	(0.220)	(0.212)	(0.137)	(0.172)	(0.277)	(0.243)
LStockTurnover	0.111***	0.028	0.031	0.025	0.010	0.067*	0.030	0.019
	(0.028)	(0.033)	(0.032)	(0.024)	(0.034)	(0.040)	(0.037)	(0.043)
LLiquidAssets		0.104				−0.893		
		(0.155)				(0.703)		
LBankCRAR	−1.10*	−1.19***			−3.580***	−2.730**		
	(0.625)	(0.689)			(1.040)	(1.130)		
Capital Stringency			−0.150				−0.730***	
			(0.117)				(0.213)	
Official Supervisory				0.008				−0.037
				(0.038)				(0.064)
Crisis dummy	−0.776**			0.014	0.303			0.546
	(0.331)			(0.263)	(0.419)			(0.418)
Constant	4.532***	4.730***	3.321***	1.354***	10.40***	11***	5.870	3.260
	(1.607)	(1.70)	(1.195)	(0.593)	(2.930)	(3.620)	(2.290)	(1.850)
Number of observations	160	160	142	142	113	113	102	102
Number of countries	11	11	10	10	11	11	10	10
Country/Time Effects	None	Time	Both	Country	None	Time	Both	Country
R squared	0.227	0.371	0.483	0.394	0.257	0.335	0.437	0.361
Wald Chi-Square	36.47***	5.91e+07***	2235***	670***	72.9***	19549***	378440***	273***

***, **, * indicate significance at 1%, 5% and 10%, respectively. The models are estimated using Prais-Winstein regression Panel Corrected Standard Errors (PCSE) to control heteroscedasticity, contemporaneous correlation and serial correlation. Data for Pension funds were not available for Saudi Arabia. Thus, models 3, 4, 7 and 8 are estimated for ten cross-sections.

Table 4 reports the regression results for robustness analysis using the yoy OFI financial assets (LOFIFA) and the yoy EF2 financial assets (LEF2FA) as dependent variables. The explanatory variables include yoy bank financial assets (LBankFA), yoy insurance companies financial assets (LInsuranceFA), yoy pension fund financial assets (LPensionFA), Central Bank policy rate (LPolicyRate), money market rate (LMMRate), LGDP refers to real GDP growth year on year, LInflation measured as the rate of inflation over the years, LStockTurnover refers to the stock turnover value, LLiquidAssets refers to the ratio of liquid assets to deposits and short term funding, bank's risk-weighted capital ratio (LBankCRAR). All these variables were converted to a natural log. Also, BRSS survey indices (overall capital stringency and official supervisory power) and crisis dummy for the years 2007–09 were included as regressors.

money supply will lead to a decline in NBFI assets. This result may be due to the interconnectedness between banks and NBFI (Zhou and Tewari, 2019). NBFI in EMEs depend on banks for their funding requirements, and a contractionary monetary policy will decrease banks' capacity to lend, thereby affecting NBFI. The other reason for this relationship may be the search for yield motive (in times of low-interest rates), as reported by Hodula (2019). However, in the case of narrow measure, the policy rate was not significant.

The growth of bank assets has a positive and significant impact on the growth of OFI assets (broad measure). A 1% increase in bank assets leads to a 0.16% increase in NBFI assets. While in the case of EF2 assets, a 1% increase in the growth of bank assets leads to a 0.40% increase in the growth of EF2 assets. The coefficient was positive and significant at 1%. The positive relationship between banks and NBFI signifies the complementary role played by NBFI in credit intermediation. As explained by IMF (2014), banks finance NBFI in most countries and thus, growth in the assets of the former boosts the latter's growth.

The growth of insurance assets, a measure of demand from institutional investors, also had a significant positive relationship with OFI assets. Similar results were obtained for EF2 assets. Thus, a 1% increase in insurance assets leads to a 0.18% increase in OFI assets and approximately a 0.24% increase in EF2 assets. The results are aligned with Pozsar (2011), who posits that insurance companies may invest in NBFI as an alternative to safe bank deposits in search of better returns.

The other measure of institutional investors, the growth of pension funds, had a significant positive relationship with the broad measure of NBFI. Thus, a 1% increase in pension fund assets leads to an approximately 0.40% increase in NBFI assets. The findings were similar to (IMF, 2014; Fong et al., 2021). In the case of EF2 assets, the growth of pension funds did not impact the growth of EF2 assets.

Table 5
Robustness tests (Driscoll-Kray Standard Error estimation).

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DV: LOFIFA/GDP				DV: LEF2/GDP			
LBankFA/GDP	0.109	0.084	0.070	0.100	0.367***	0.322***	0.381***	0.280***
	(0.079)	(0.083)	(0.106)	(0.111)	(0.062)	(0.063)	(0.088)	(0.077)
LInsuranceFA/GDP	0.222**	0.225**	0.036	0.032	0.281***	0.349***	0.233***	0.310***
	(0.078)	(0.080)	(0.067)	(0.061)	(0.060)	(0.086)	(0.064)	(0.062)
LPensionFA/GDP			0.558***	0.564***			−0.053	0.068
			(0.101)	(0.101)			(0.097)	(0.076)
LPolicyRate	0.149	0.035			−0.480	−0.148		
	(0.356)	(0.333)			(0.508)	(0.157)		
LMMRate			−1.380**	−1.320**			−0.625	−0.254
			(0.480)	(0.485)			(0.829)	(0.265)
LGDP	−0.035	0.058		0.047	0.056	0.142		0.271
	(0.144)	(0.126)		(0.157)	(0.157)	(0.148)		(0.148)
LInflation	−0.143	−0.213	−0.146	−0.138	−0.107 (0.123)	0.110	0.038	−0.043
	(0.168)	(0.154)	(0.265)	(0.291)		(0.192)	(0.321)	(0.263)
LStockTurnover	0.154**	0.140*	0.071	0.075	−0.019 (0.062)	−0.004	−0.041	−0.045
	(0.065)	(0.068)	(0.053)	(0.051)		(0.054)	(0.077)	(0.087)
LLiquidAssets		0.554**	−0.618			−0.569		
		(0.239)	(0.621)			(0.659)		
LBankCRAR	−1.550*	−1.810*			−6.510***	−4.810**		
	(0.857)	(0.846)			(1.93)	(1.69)		
Capital Stringency			−0.053				−0.169	
			(0.124)				(0.149)	
Official Supervisory				0.018				−0.249
				(0.042)				(0.149)
Crisis dummy	−0.825*			−0.445	−0.095			0.538
	(0.418)			(0.386)	(0.426)			(0.615)
Constant	5.88**	4.880*	5.990**	3.350**	19.10** (5.950)	15**	2.620	3.310**
	(2.580)	(2.590)	(2.510)	(1.210)		(4.970)	(1.950)	(1.340)
Number of observations	160	160	142	142	113	113	102	102
Number of countries	11	11	10	10	10	10	9	9
Pooled/Fixed Effects	Pooled	Pooled	Fixed	Fixed	Fixed	Pooled	Fixed	Pooled
R squared	0.163	0.158	0.379#	0.380#	0.30#	0.354	0.216#	0.242
Wald Chi-Square	14.760***	10.120***	15.08***	81.15***	93.270***	75.740***	39.260***	55.870***

***, **, * indicate significance at 1%, 5% and 10%, respectively. # represents the within R-squared reported in the model. Data for Pension funds were not available for Saudi Arabia. Thus, models 3, 4, 7 and 8 were estimated for ten countries.

Table 5 reports the regression results for robustness analysis using Driscoll-Kraay standard error estimation. It controls for serial correlation, heteroscedasticity and cross-section dependence. The dependent variables for models 1–4 are the yoy OFI financial assets to GDP (LOFIFA/GDP), and models 5–8 are the yoy EF2 financial assets to GDP (LEF2/GDP). The explanatory variables include yoy bank financial assets to GDP (LBankFA/GDP), yoy insurance companies financial assets to GDP (LInsuranceFA/GDP), yoy pension fund financial assets to GDP (LPensionFA/GDP), Central Bank policy rate (LPolicyRate), money market rate (LMMRate), LGDP refers to real GDP growth year on year, LInflation measured as the rate of inflation over the years, LStockTurnover refers to the stock turnover value, LLiquidAssets refers to the ratio of liquid assets to deposits and short term funding, bank's risk-weighted capital ratio (LBankCRAR). All these variables were converted to natural log. Also, BRSS survey indices (capital stringency and official supervisory power) and crisis dummy for the years 2007–09 were included as regressors.

The control variables, such as economic growth measured by real GDP growth and inflation growth, were not significant for both the dependent variables, although growth in inflation had the expected negative sign. This result may be due to fewer variations in annual data (IMF, 2014). Stock market development had a significant positive relationship in the first model. Liquidity measured as the ratio of liquid assets to deposits was positive, albeit insignificant.

The crisis dummy had a negative relationship with OFI assets, although insignificant. Similar was the case with EF2 assets.

6. Robustness checks

Several robustness checks were deployed to validate the findings.

6.1. Alternate proxies of the dependent variable

Log of OFI financial assets and log of EF2 financial assets (Table 4) were deployed as the broad and narrow measure of NBFI. Similar signs were obtained for the explanatory variables. However, bank financial assets and policy rates did not significantly correlate with OFI financial assets. Also, the money market rate was significant, only at 10 percentage. Further, the crisis dummy was negative and significant, reflecting the impact of the slowdown on NBFI growth. The rest of the variables had a similar and expected relationship.

6.2. Robustness of the estimation method

In order to check for the robustness of our estimation method, fixed effects and pooled regression were applied, and standard errors were corrected using Driscoll and Kraay (1998). This correction allows for serial correlation, heteroscedasticity and cross-sectional dependence (Table 5). Similar results and signs were obtained. However, variables such as policy rate lost significance in the case of broad measure (OFI financial assets to GDP) as the dependent variable. In contrast, both policy rate and money market rate lost significance in the case of EF2 financial assets as the dependent variable.

6.3. Alternate proxies of the explanatory variable

Thirdly, several proxies of the explanatory variables were used. Regulatory arbitrage was alternatively measured using capital regulatory, activity restrictions and financial conglomerate indices sourced from BRSS and compiled by Barth et al. (2013). The results are summarised in Table A3. The capital regulatory index negatively impacted the growth of NBFI. In contrast, the activity restrictions and financial conglomerate indices had a positive impact on the growth of NBFI. Thus, different measures of regulatory arbitrage had different results. Also, World Governance Indicators sourced from World Bank, namely, the rule of law estimate and regulatory quality estimate, were deployed as measures of institutional quality. The rule of law and government effectiveness was negatively related to the growth of NBFI, although the regulatory quality was not significant. This result implies that the better the institutional quality lower is the growth of NBFI.

Table A4 summarises the findings of the proxies of the other variables. The other measure of the search for yield effect, called forward earnings yield (supporting Fong et al. (2021) findings), had a similar sign as that of money market rate, but the other proxies called the long-term government bond, and term spread rate was insignificant.[6] Further, the event dummy called the banking crisis dummy negatively and significantly affected the growth of NBFI. This result highlights the importance of banks in emerging markets for the growth of NBFI and the interlinkage between banks and non-banks. This fact was also pointed out by RBI (2017), who found that banks' bad asset quality (non-performing assets) initially had a positive impact on non-banking finance companies (NBFCs) in India, but later on, it led to a decline in their credit.

6.4. An extended sample of 24 EMEs

Fourthly, the sample of emerging nations from 11 countries was extended to 24 countries.[7] The results are presented in Table A5. The dependent variable is the annual growth rate of NBFI assets to GDP. The growth of Insurance company assets and bank capital regulation had similar signs and significance. However, the money market rate and growth of banks were insignificant. This result may be due to limited data available for all the countries concerning these variables.

6.5. Problem of endogeneity

The results may suffer from the problem of endogeneity due to omitted variable bias. The dependent variable might be affected by

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[6] Long term government bonds data was not available for Argentina and only few observations were available for Saudi Arabia. Term spread was measured as the difference between 10-year long term government bond and the money market rate. Separate regressions excluding Argentina and Saudi Arabia yielded similar results. Further, lags of the term spread rate was also insignificant.

[7] The sample countries of 24 emerging market economies is based on IMF definition of emerging nations. The sample consists of countries namely; Albania, Argentina, Armenia, Bahrain, Bolivia, Brazil, Chile, China, Colombia, Costa Rica, El Salvador, Fiji, Honduras, India, Indonesia, Mexico, Philippines, Romania, Russia, Saudi Arabia, South Africa, Thailand, Tunisia and Turkey, respectively.

many other factors not controlled in the study. Thus, we deploy two-stage least squares instrumental variable (2SLS-IV) regression to validate the impact of bank regulation on the growth of shadow banks. In order to measure bank regulation, we deploy indices of BRSS, namely, capital regulation, activity restrictions, limitations on foreign banks, financial conglomerates and official supervisory power. Also, the bank capital adequacy ratio is used as a proxy for bank regulation. We follow the banking regulation literature; thus, the appropriate instrument for bank regulation was the percentage of years the country has been independent since 1776 (Cihak et al., 2013; Barth et al., 2013; Kladakis et al., 2022). The instrument is not expectedto affect the growth of the NBFI sector directly.

Tables 6 and 7 summarise the results of the first and second stage 2SLS-IV regression. The Wald Chi-square of the first stage regression rejects the possibility of weak instrumentation in Table 6. The results of the second stage instrumental variable regression indicate that regulation of bank capital (measured as overall capital stringency) negatively impacted the growth of NBFI. However, the coefficient of capital adequacy ratio was insignificant.[8] While activity restrictions and financial conglomerate indices positively affected NBFI growth. Further, the world governance indicators, namely, regulatory quality estimate, the rule of law estimate and government effectiveness estimate, were also found to negatively affect the NBFI growth. Thus, IV regression further validated our results obtained from other methods.

7. Discussion

The present section discusses the findings of the study.

The results point out the impact of bank regulations on NBFI. Bank regulations such as capital stringency negatively affected the growth of NBFI. Also, finance companies had a similar relationship. This finding contradicts the results reported in the context of advanced nations (Hodula et al., 2020; Schryder and Opitz, 2021). (Reinhardt and Sowerbutts, 2015) analysed the impact of macro-prudential policies, including capital regulation (for both advanced and emerging markets), on credit disbursed by the banking sector. They did not find evidence of leakages to the non-bank sector in the case of the bank's capital tightening for the emerging markets in contrast to leakages found for the advanced nations. The possible reason for the negative relationship between bank capital regulations and the growth of NBFI may be due to the dependence of NBFI on banks for their funding in EMEs. Further, there are also restrictions defined for banks with respect to their exposure to NBFI in emerging markets such as India.

Also, regulatory arbitrage measured in activity restrictions and financial conglomerate indices had a positive relationship with the growth of NBFI. This result implies that restrictions on banks with respect to engaging in certain activities or forming conglomerates lead to the growth of NBFI. Thus, different measures of regulatory arbitrage yielded different results.

We also applied 2SLS-IV regression to validate the relationship between regulatory arbitrage and the growth of NBFI in EMEs. We found similar results for the following indices.

The search for yield effect measured in terms of money market rate and forward earnings yield had an expected negative association with the growth of NBFI in EMEs. The finding is aligned with Fong et al. (2021), who report a negative relationship between the forward earning yield and the growth of NBFI. However, the same was not significant in terms of the term spread between the money market rate and long-term government bonds. The Central Bank policy rate had a negative association with the growth of NBFI. Thus, the study supports that monetary policy tightening restricts the growth of NBFI in EMEs. However, this relationship was not significant in all the cases. The growth of banks had a positive association with the growth of NBFI, reflecting the complementary role of banks and non-banks in facilitating the financial system in EMEs. This relationship was stronger for finance companies. These findings align with (IMF, 2014; Fong et al., 2021).

Demand from institutional investors plays a vital role in the growth of NBFI. Insurance companies and pension funds had a highly significant and positive association with broad and narrow measures of NBFI. However, they were not significant in the case of finance companies. Institutional investors have long-term investment avenues; thus, their investment in NBFI can ensure stability for the latter. However, finance companies did not have a significant relationship with pension funds. Further, control variables such as liquidity and stock market development positively impacted NBFI growth.

8. Conclusion

The growth of NBFI in emerging nations is faster than the advanced nations highlighting the increasing significance of these entities in EMEs. The present study, thus, investigated the determinants of growth of NBFI in EMEs. It further narrowed down the NBFI to a specific type called economic function 2 (EF2), measured by FSB. EF2 assets have grown significantly over the years in EMEs. It constitutes a significant share in India, Russia and Turkey. EF2 comprises entities such as leasing companies and finance companies. Finance companies are the primary entity of EF2, accounting for approximately 63 percentage of total EF2 assets in EMEs. While for India, EF2 comprises entirely of finance companies.

It was found that growth of bank assets, regulatory arbitrage, search for yield effect, central bank policy rate, demand from institutional investors (proxied as insurance companies and pension funds), institutional quality, liquidity and stock market development were the important factors affecting the growth of NBFI. The findings highlight that banks and NBFI play complementary roles in serving the financial system in emerging markets. Further, the results point out the impact of bank regulations on NBFI. Bank regulations such as capital stringency negatively affected NBFI growth. This result indicates the interlinkage between banks and non-

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[8] The instrumental variable was insignificant for the official supervisory power index and thus the following regression is not reported.

Table 6
First stage instrumental variable regression.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	CRAR	CS	AR	FC	RQ	ROL	GE
Percentage of years independent	−0.0012*	−0.011***	0.0249***	-0.021***	0.014***	0.014***	0.0106***
	(0.0006)	(0.003)	(0.008)	(0.006)	(0.002)	(0.001)	(0.001)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.637***	0.032 (1.386)	3.084	12.918***	0.991*	1.791***	1.098***
	(0.234)		(2.971)	(2.177)	(0.552)	(0 0.463)	(0.386)
Number of observations	161	161	161	152	161	161	161
Number of countries	11	11	11	11	11	11	11
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald Chi-Square	30***	346***	56***	101***	124***	226***	151***

***, **, * indicate significance at 1%, 5% and 10%, respectively.

Table 6 reports the regression results for first stage Instrumental variable (IV) regression using percent of years a country has been independent since 1776 for the respective bank regulation variables and governance indicators as the dependent variables. The dependent variable is log of bank capital adequacy ratio (CRAR) in model 1, overall capital stringency index (CS) in model 2, activity restrictions index (AR) in model 3, financial conglomerate index (FC) in model 4, regulatory quality (RQ) estimate in model 5, rule of law (ROL) estimate in model 6 and government effectiveness (GE) estimate in model 7, respectively. All the other independent variables have been controlled in the first stage regression.

Table 7
Second stage instrumental variable regression.

Variable	Expected sign	(1) CRAR	(2) CS	(3) AR	(4) FC	(5) RQ	(6) ROL	(7) GE
		DV: LOFIFA/GDP						
LBankCRAR	+/−		−1.70*					
			(0.90)					
Capital Stringency	+/−	15						
		(10)						
Activity Restrictions	+/−			0.73*				
				(0.42)				
Financial Conglomerate index	+/−				0.92** (0 0.39)			
Regulatory Quality estimate	−					−1.30** (0.51)		
Rule of Law estimate	−						−1.30** (0.51)	
Government effectiveness	−							−1.70** (0.70)
LInsuranceFA/GDP	+	0.42** (0.20)	0.27** (0.12)	0.35** (0.14)	0.07 (0.13)	0.23** (0.092)	0.24*** (0.09)	0.25*** (0.093)
LBankFA/GDP	+		−0.014 (0.15)	−0.027 (0.17)	0.19 (0.13)	0.11 (0.11)	0.11 (0.11)	0.09 (0.11)
LGDP	+	0.24 (0.39)	−0.49 (0.34)	0.82 (0.57)	−0.31 (0.24)	−0.17 (0.19)	−0.21 (0.19)	−0.17 (0.19)
LInflation	−	0.25 (0.52)	−0.32 (0.33)	0.12 (0.38)	0.38 (0.34)	−0.24 (0.24)	−0.20 (0.24)	−0.23 (0.24)
LLiquidity	+	−0.47 (0.77)	0.65 (0.40)	0.15 (0.42)	1.50** (0.62)	0.33 (0.28)	−0.14 (0.34)	0.069 (0.31)
LMM	+/−	−0.39 (0.68)	−1.2 (0.82)	0.32 (0.48)	−0.05 (0.46)	−0.21 (0.35)	−0.15 (0.33)	−0.16 (0.34)
Constant		−39 (28)	−0.64 (3.4)	1.70 (4.0)	−11.0 (5.60)	0.67 (2.7)	1.70 (2.80)	1.30 (2.80)
Number of observations		161	161	161	152	161	161	161
Number of countries		11	11	11	11	11	11	11
Year Effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes
R squared		0.046	0.18	0.092	0.27	0.39	0.41	0.37
Wald Chi-Square		26***	47***	40***	57***	83***	86***	80***

***, **, * indicate significance at 1%, 5% and 10%, respectively.

Table 7 reports the regression results for second stage instrumental variable (IV) regression. The dependent variable is log of YOY OFI financial assets to GDP (LOFIFA/GDP). The explanatory variables includes regulatory variables include bank capital adequacy ratio (LBankCRAR), BRSS survey indices namely, overall capital stringency index (CS), activity restrictions (AR) financial conglomerate index (FC), regulatory quality (RQ) estimate, rule of law (ROL) estimate and government effectiveness (GE) estimate. Also, governance indicators namely regulatory quality (RQ), rule of law (ROL) and government effectiveness (GE) were used as regressors. Bank financial assets to GDP (LBankFA/GDP), insurance companies financial assets to GDP (LInsuranceFA/GDP), money market rate (LMMRate), LGDP refers to yoy real GDP growth, LInflation measured as rate of inflation over the years, LLiquidAssets refers to ratio of liquid assets to deposits and short term funding. All these variables were converted to natural log.

banks in EMEs, as explained in the FSB report (FSB, 2020).

The study thus highlights the growing importance of NBFI in EMEs. The factors affecting the growth of NBFI in EMEs are similar to those identified in the literature in the US and other advanced nations' contexts (IMF, 2014; Duca, 2016; Hodula et al., 2020). However, it varies concerning the impact of bank capital regulations on NBFI growth, highlighting the interconnectedness of funding between banks and non-banks (especially finance companies) in EMEs. Further, it explains the need to reduce the arbitrage between banks and non-banks regarding activity restrictions and restrictions on financial conglomerates. Also, improvement in legal enforcement and government effectiveness (institutional quality) restricts the growth of NBFI. Thus, transparency in enforcement and governance restricts the unchecked growth of the shadow banks. The recent failures of certain NBFI in emerging markets like India highlight the need for better governance and transparency of these institutions (Das, 2019).

The present study has certain limitations. Firstly, the database for the present study was restricted to 2002–2019 (17 years). This problem restricted the use of dynamic panel methods developed in panel time-series literature. Secondly, regulatory arbitrage was measured using several bank-level regulations, such as banks' CRAR and indices from the BRSS survey. There are no uniform regulations or surveys across nations for NBFI. Availability of data relating to regulations of NBFI would help make the measurement of regulatory arbitrage between banks and non-banks more comprehensive.

CRediT authorship contribution statement

Dhulika Arora: Conceptualization, Data curation, Methodology, Software, Writing – original draft, Investigation. **Smita Kashiramka:** Conceptualization, Supervision, Writing – review & editing.

Data availability

Data will be made available on request.

Appendix 1: Panel unit root tests

There are several panel unit root tests developed in the literature. They vary depending on the balanced or unbalanced panel and the presence of cross-section dependence in the data. In the present case, we have an unbalanced panel, and thus we have applied Im-Pesaran-Shin (IPS) test, Fisher-type augmented Dickey-Fuller (ADF), Philips-Perron (PP) and Maddala and Wu (1999) tests. Further, panel unit root tests accounting for cross-section dependence, Pesaran (2007) were also applied.

The null hypothesis of the IPS test assumes that all panels have unit roots (non-stationary). In contrast, the alternative hypothesis is that some (fraction) panels are stationary. If no lag is specified, it reports t-bar, t-tilde bar and Z_t-tilde bar statistics. When lags are specified (that is, if there is serial correlation in the data), then IPS' W_t-bar statistic is reported. This statistic is asymptotically normally distributed. Fisher tests (ADF and PP tests) conduct stationarity tests for each panel separately and then compute a comprehensive test by combining *p*-values from each test. Maddala and Wu (1999) compute a chi-square statistic, allowing for heterogeneity in the autoregressive (AR) coefficient. Pesaran (2007) test allows cross-section dependence among the panel members and heterogeneity in the AR coefficient. All these tests assume the null hypothesis of the non-stationarity of the variable.

Table A1 and Table A2 report the results of panel unit root tests and cross-section dependence tests deployed in the study.

Table A1
Results of Panel unit root tests.

Variables	Number of Panels	Average number of periods	IPS(W statistic) Lags(1)	Fisher Phillips and Perron χ^2 Lag(1)	Fisher ADF regression χ^2 Lag(1)	Maddala and Wu (1999)	Pesaran (2007)
LOFIFA	11	16.73	−6.175***	149.082***	135.22***	135.219***	−3.723***
LOFIFA/GDP	11	16.73	−5.982***	176.379***	128.68***	128.682***	−2.792***
LGDP	11	16.73	−3.224***	102.229***	57.225***	57.225***	−0.289***
LInflation	11	17	−0.868	52.847***	34.836**	35.619***	0.347
LEF2	10	11.50		33.094**	34.132**		
LEF2FA/GDP	10	11.50		29.437*	73.990***		
LBankFA	11	16.45	−2.368	133.597***	50.446***	47.137***	−2.552***
LBankFA/GDP	11	16.18	−3.261***	86.609***	53.835***	49.936***	−1.387***
LInsuranceFA	11	15.50	−2.179***	114.042***	50.024***	51.560***	−1.477***
LInsuranceFA/GDP	11	15.50	−4.529***	126.889***	74.457***	61.116***	−2.969***
LPensionFA	10	15.80	−3.997***	141.768***	67.530***	72.373***	−1.655***
LPensionFA/GDP	10	15.50	−4.529***	163.818***	85.600***	68.328***	−0.157
LPolicyRate	11	16.55	−1.928***	38.064**	37.846**	32.302***	−0.838
LMMRate	11	15.45	−1.183	32.007**	38.760***	34.340***	−0.543
LGovtBond	10	14.30		43.673***	43.007***		
LTermSpread	10	14.30		67.210***	77.290***		

(continued on next page)

Table A1 (*continued*)

Variables	Number of Panels	Average number of periods	IPS(W statistic) Lags(1)	Fisher Phillips and Perron χ^2 Lag(1)	Fisher ADF regression χ^2 Lag(1)	Maddala and Wu (1999)	Pesaran (2007)
LStockTurnover	11	16.82	−4.377***	121.769***	70.750***	54.656***	−1.630***
LBankCRAR	11	16.64	−3.238***	107.620***	60.177***	78.145***	−2.693***
LLiquidAssets	11	17	−3.125***	106.262***	54.935***	63.851***	−1.625**
LFSDeposits	11	17	−2.224***	20.072	43.426***	43.439***	−0.524

Table A1 reports the results of panel unit root tests. Variables include yoy OFI financial assets (LOFIFA), yoy OFI financial assets to GDP (LOFIFA/GDP), LGDP refers to real GDP growth year on year, LInflation measured as the rate of inflation over the years, LEF2 refers to yoy EF2 financial assets (LEF2FA), yoy EF2 financial assets to GDP (LEF2FA/GDP), yoy bank financial assets (LBankFA), ratio of yoy bank financial assets to GDP (LBankFA/GDP), yoy insurance company financial assets (LInsuranceFA), yoy insurance companies financial assets to GDP (LInsuranceFA/GDP), yoy pension fund financial assets (LPensionFA), yoy pension fund financial assets to GDP (LPensionFA/GDP), Central Bank policy rate (LPolicyRate), money market rate (LMMRate), government bond (LGovtBond), term spread rate (LTermSpread), stock turnover value (LStockTurnover), LLiquidAssets refers to the ratio of liquid assets to deposits and short term funding, LFSDeposits refers to the ratio of financial system deposits to GDP, bank's risk-weighted capital ratio(LBankCRAR). All the variables were converted to a natural log.

Table A2

Pesaran (2015) Cross-section dependence (CD) tests.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
H0: errors are weakly cross-sectional dependent.								
	DV: LOFIFA/GDP				DV: LEF2/GDP			
CD statistic	3.266***	3.315***	1.286	1.463	0.404	0.534	1.074	1.383
Cross-section dependence	No	No	Yes	Yes	Yes	Yes	Yes	Yes

The table above presents the results of the cross-section dependence tests conducted for each model specified in Table 3.

Appendix 2: Robustness Analysis

Table A3

Models measuring the effect of regulatory variables on NBFI Growth.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	DV: LOFIFA/GDP					
Proxy title	Regulatory Arbitrage			Governance indicators		
Proxies	Capital Regulatory Index	Activity Restrictions	Financial Conglomerate Index	Regulatory Quality estimate	Rule of law estimate	Government effectiveness
LBankFA/GDP	0.171*	0.147	0.183*	0.170*	0.183**	0.137
	(0.097)	(0.105)	(0.108)	(0.092)	(0.093)	(0.087)
LInsuranceFA/GDP	0.141	0.154	0.178*	0.194**	0.178**	0.213***
	(0.099)	(0.105)	(0.101)	(0.085)	(0.085)	(0.083)
LMMRate	−1.350**	−1.080**	−1.320**	−0.960**	−1.040**	−0.790*
	(0.607)	(0.511)	(0.651)	(0.476)	(0.469)	(0.453)
LGDP	−0.159	−0.078	−0.063	−0.055	−0.113	−0.067
	(0.217)	(0.215)	(0.248)	(0.185)	(0.185)	(0.189)
LInflation	0.073	−0.247	0.302	−0.205	−0.231	−0.309
	(0.297)	(0.343)	(0.335)	(0.255)	(0.250)	(0.266)
LStockTurnover	0.120*	0.140**	0.160**	0.144***	0.141***	0.149***
	(0.068)	(0.055)	(0.065)	(0.046)	(0.045)	(0.045)
LLiquidAssets	−0.214	−0.560	−0.434	−0.488	−0.556	−0.879
	(0.766)	(0.747)	(0.831)	(0.759)	(0.739)	(0.744)
Capital regulatory	−0.349**					
	(0.125)					
Activity Restrictions		0.134*				
		(0.081)				
Financial Conglomerate			0.162*			
			(0.426)			
Regulatory Quality				−1.070		
				(0.801)		
Rule of Law					−2.240**	
					(1.110)	
Government effectiveness						−2.470***
						(0.851)

Table A3 (*continued*)

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	DV: LOFIFA/GDP					
Proxy title	Regulatory Arbitrage			Governance indicators		
Proxies	Capital Regulatory Index	Activity Restrictions	Financial Conglomerate Index	Regulatory Quality estimate	Rule of law estimate	Government effectiveness
Crisis dummy	−1.340	−0.356	−0.211	−0.334	−0.415	−0.338
	(0.869)	(0.626)	(0.853)	(0.573)	(0.579)	(0.561)
Constant	8.374***	7.097***	5.090***	6.546**	6.706**	8.457***
	(2.808)	(2.879)	(3.128)	(2.896)	(2.891)	(3.002)
Number of observations	153	150	150	159	159	159
Number of countries	11	11	11	11	11	11
R squared	0.297	0.250	0.239	0.254	0.261	0.271
Wald Chi-Square	1756***	75***	518***	196***	239***	223***

***, **, * indicate significance at the 1%, 5% and 10%, respectively. All the models (1–7) were estimated using Prais-Winstein regression, Panel corrected standard errors (PCSEs) and adjusted for serial correlation, heteroskedasticity and contemporaneous correlation. The above models allow for country effects and the crisis dummy.

Table A3 reports the regression results for models measuring the effect of different regulatory variables. The dependent variable is yoy OFI financial assets to GDP (LOFIFA/GDP). The explanatory variables includes yoy bank financial assets to GDP (LBankFA/GDP), yoy insurance companies financial assets to GDP (LInsuranceFA/GDP), money market rate (LMMRate), LGDP refers to real GDP growth year on year, LInflation measured as rate of inflation over the years, LStockTurnover refers to stock turnover value, LLiquidAssets refers to ratio of liquid assets to deposits and short term funding. All these variables were converted to natural log. Regulatory variables include BRSS survey indices namely, capital regulatory index, activity restrictions and financial conglomerate index. Also, governance indicators namely regulatory quality, rule of law and government effectiveness were used as regressors. Crisis dummy for the years 2007–09 was also controlled.

Table A4
Models measuring the effect of different proxies on NBFI Growth.

Variable	(1)	(2)	(3)	(4)		(6)	(7)
	DV: LOFIFA/GDP						
Proxy Title	Search for yield			Liquidity		Stock market development	Event crisis dummy
Proxies	Forward Earning Yield	Government Bonds	Term spread	Total reserves minus Gold	Financial system Deposits to GDP	Stock market capitalisation	Banking crisis dummy
LBankFA/GDP	0.132	0.203*	0.227**	0.196**	0.166*	0.247***	0.080
	(0.10)	(0.116)	(0.111)	(0.087)	(0.090)	(0.087)	(0.07)
LInsuranceFA/GDP	0.189*	0.146	0.140	0.139*	0.170**	0.107	0.173**
	(0.106)	(0.102)	(0.104)	(0.078)	(0.080)	(0.076)	(0.07)
LMMRate				−1.30***	−1.20***	−1.270***	−0.536
				(0.485)	(0.458)	(0.412)	(0.328)
LGovtBond		−1.60					
		(1.00)					
LTermSpread			0.242				
			(0.215)				
LFwdEarningYield	−2.43**						
	(1.130)						
LGDP	0.117	−0.254	−0.228	−0.109	0.082	0.006	−0.165
	(0.228)	(0.246)	(0.235)	(0.181)	(0.186)	(0.155)	(0.116)
LInflation	−0.218	0.154	0.079	−0.243	−0.166	−0.040	−0.329
	(0.277)	(0.413)	(0.401)	(0.249)	(0.264)	(0.252)	(0.248)
LStockTurnover	0.130**	0.176***	0.165***	0.124***	0.152***		0.141***
	(0.054)	(0.056)	(0.057)	(0.045)	(0.045)		(0.032)
LStockMarketCap						0.232***	
						(0.042)	
LLiquidAssets	−0.245	0.999	0.653			0.455	−0.140
	(0.990)	(1.030)	(0.901)			(0.796)	(0.804)
LTotalReservesminusGold				−0.265			
				(0.364)			
LFSDeposits					2.010		
					(1.50)		
LBankCRAR	−1.70	−1.250	−1.90	−0.947	−1.550	−1.030	0.475
	(1.570)	(1.530)	(1.57)	(1.270)	(1.290)	(1.380)	(0.881)
Crisis dummy	−1.02	−0.513	−0.614	−0.149	−0.218	−0.224	
	(0.622)	(0.604)	(0.618)	(0.529)	(0.561)	(0.378)	
BankingCrisis							-3.690**
							(1.830)

Table A4 (*continued*)

Variable	(1)		(2)	(3)	(4)	(6)	(7)
	DV: LOFIFA/GDP						
Proxy Title	Search for yield			Liquidity		Stock market development	Event crisis dummy
Proxies	Forward Earning Yield	Government Bonds	Term spread	Total reserves minus Gold	Financial system Deposits to GDP	Stock market capitalisation	Banking crisis dummy
Constant	13.1**	3.570**	4.930**	15.60**	4.420**	6.650**	4.820**
	(6.160)	(5.970)	5.960)	(10.40)	(6.770)	(4.640)	(3.590)
Number of observations	152	135	137	156	157	157	137
Number of countries	11	11	11	11	11	11	11
R squared	0.289	0.255	0.262	0.279	0.269	0.322	0.363
Wald Chi-Square	75.80***	85.80***	109***	193***	172***	197***	370***

***, **, * indicate significance at the 1%, 5% and 10%, respectively. All the models (1–7) were estimated using Prais-Winstein regression, Panel corrected standard errors (PCSEs) and adjusted for serial correlation, heteroskedasticity and contemporaneous correlation. The above models allow for country effects and the crisis dummy. Models with the above proxies were also estimated for the dependent variable YOY EF2 to GDP, but the proxies were insignificant except for Financial system deposits to GDP.

Table A4 reports the regression results for models measuring the effect of different proxies. The dependent variable is yoy OFI financial assets to GDP (LOFIFA/GDP). The explanatory variables includes yoy bank financial assets to GDP (LBankFA/GDP), yoy insurance companies financial assets to GDP (LInsuranceFA/GDP), money market rate (LMMRate), LGovtBond refers to government bond yield, LTermSpread refers to term spread rate, LFwdEarningYield refers to forward expected earning yield index of EMEs, LGDP refers to real GDP growth year on year, LInflation measured as rate of inflation over the years, LStockTurnover refers to stock turnover value, LStockMarketCap refers to year on year stock market capitalization, LLiquidAssets refers to ratio of liquid assets to deposits and short term funding, total reserve minus gold (LTotalReservesminusGold), ratio of financial system deposits to GDP (LFSDeposits) and LBankCRAR refers to bank's risk weighted capital ratio. All these variables were converted to natural log. Crisis dummy for global financial crisis of 2008 for the year 2007–09 and banking crisis dummy were also included as regressors.

Table A5
Panel corrected standard estimation (PCSE) for a sample of 24 EMEs.

Variable	Expected sign	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		DV: LNBFI/GDP							
LBankA/GDP	+	−0.043	−0.043	−0.021	0.010	−0.03	−0.04	−0.028	−0.039
		(0.09)	(0.09)	(0.076)	(0.086)	(0.075)	(0.075)	(0.075)	(0.077)
LInsuranceA/GDP	+	0.35***	0.35***	0.27***	0.31***	0.30***	0.30***	0.22***	0.27***
		(0.07)	(0.071)	(0.07)	(0.077)	(0.071)	(0.071)	(0.072)	(0.07)
LPolicyRate	−							−0.28	
								(0.37)	
LMMRate	−	0.28	0.29		0.03				
		(0.26)	(0.27)		(0.35)				
LGDP	+	0.05	0.059	−0.38	−0.37	−0.22	−0.24	−0.36	−0.35
		(0.29)	(0.29)	(0.29)	(0.31)	(0.29)	(0.28)	(0.31)	(0.30)
LInflation	−	−0.48**	−0.48**	−0.38*	−0.23	−0.25	−0.29	−0.33	−0.27
		(0.20)	(0.21)	(0.21)	(0.23)	(0.21)	(0.20)	(0.24)	(0.21)
LLiquidAssets	+								0.069
									(0.69)
LBankCRAR	+/−	−1.60**	−1.60**						
		(0.79)	(0.79)						
Capital Stringency	+/−				−0.22*				
					(0.12)				
Capital regulatory	+/−			−0.21**				−0.24*	−0.20*
				(0.10)				(0.13)	(0.10)
Activity restrictions	+/−					−0.13			
						(0.09)			
Financial conglomerate	+/−						0.06		
							(0.13)		
Crisis dummy	−		−0.13	−0.33	0.02	0.07	0.02	−0.44	−0.44
			(0.62)	(0.47)	(0.61)	(0.40)	(0.40)	(0.55)	(0.48)
Constant		5.2**	5.2**	3.80***	3.0***	3.30***	2.0*	4.30***	3.40
		(2.40)	(2.40)	(0.82)	(0.81)	(0.85)	(0.20)	(0.99)	(2.30)
Number of observations		252	252	309	258	309	309	242	301
Number of countries		21	21	24	21	24	24	21	24
Country/Time Effects		None	None	Country	Country	Country	Country	Country	Country
R squared		0.13	0.13	0.24	0.27	0.24	0.23	0.25	0.24
Wald Chi-Square		45***	45***	730	523***	188***	261***	6085	916

***, **, * indicate significance at the 1%, 5% and 10%, respectively. All the models (1–8) were estimated using Prais-Winstein regression, Panel corrected standard errors (PCSEs) and adjusted for serial correlation, heteroskedasticity and contemporaneous correlation. The above models allow for country effects and the crisis dummy.

Table A5 reports the regression results for PCSE regression for 24 EMEs. The dependent variable is yoy NBFI assets to GDP (LNBFI/GDP). The

explanatory variable include the yoy deposit money bank assets to GDP (LBankA/GDP), yoy insurance company assets to GDP (LInsuranceA/GDP), policy rate (LPolicyRate), money market rate (LMMRate), LGDP refers to real GDP growth year on year, LInflation measured as rate of inflation over the years, LLiquidAssets refers to ratio of liquid assets to deposits and short term funding, LBankCRAR refers to bank's risk weighted capital ratio. Regulatory variables include BRSS survey indices namely, overall capital stringency, capital regulatory index, activity restrictions and financial conglomerate index. All these variables were converted to a natural log. Crisis dummy for global financial crisis of 2008 (dummy for 2007–09) was also controlled.

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