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Introducing a multi-dimensional financial development index for the Philippines

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Abstract

The literature on financial development and economic growth nexus is replete with empirical studies that approximate financial development with private sector credit-to-GDP as the conventional measure. However, this indicator only captures the depth aspect of financial development. The main contribution of this paper is to extend the index constructed by the International Monetary Fund in 2016 by including the stability dimension of financial development and thus, construct a multi-dimensional index for the Philippines.

Using principal components analysis (PCA) to derive weights for 38 variables, we construct indices that quantify the extent of development in financial institutions and markets with respect to access, depth, efficiency, and stability. Our findings provide evidence that access, depth, efficiency, and stability are distinct dimensions of financial development and thus, necessary analytical tools to facilitate the analysis of pinning down likely sources of fragilities in the Philippine financial system. We also find that both financial institutions and markets have progressed and developed through time even amid the global pandemic. We note that the BSP's timely policy responses to ensure ample liquidity in the system have mitigated the potential adverse impacts of the health crisis on the financial sector.

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for the Philippines**

Jean Christine A. Armas and Nerissa D. De Guzman[1]

1.   Introduction

In the finance-growth theory, economic growth can be achieved with financial development through the efficiency of the saving-investment channel, marginal productivity of capital, and technological innovation (Levine, 1999). The impact of these growth-supporting channels on the economy highlights the importance of having a well-developed financial system. There exists a plethora of empirical evidence, arguing that countries with well-developed financial systems exhibit prolonged growth (Demirguc-Kunt and Levine, 2008). The question, however, is – *how well do economists measure financial development?* Most of these empirical studies approximate financial development with two traditional measures – private sector credit to GDP and, to some extent, stock market capitalization to GDP. These indicators, though useful, only capture the depth aspect of financial development and thus, do not provide a holistic analysis of the extent of development in the financial system. The aftermath of the 2007-2009 Global Financial Crisis (GFC) highlighted the complex and multi-dimensional features of the financial system.

The Philippine financial system, while it is largely dominated by banks, is also composed of non-banking financial institutions (non-banks) and the financial markets. Monitoring the developments in the non-banks became more pronounced following the GFC when the unregulated shadow banking system[2] was identified as one of the culprits of the collapse of the financial system (Bhatia and Bayoumi, 2012). Thus, addressing the information gaps in the non-bank sector is also important in shaping the financial development landscape of the Philippines. Similarly, the capital markets have become an alternative source of funding for the private non-financial corporates since 2007 (Guinigundo, 2015). The diversity of the Philippine financial system implies that measuring financial development requires looking at multiple indicators. An important motivation of this study is to improve the existing single proxy variable for financial development and to capitalize on the available data sources by putting together these indicators for a more extensive and comprehensive analysis of the degree of development of the Philippine financial system.

The key contribution of this paper lies in the construction of a multi-dimensional index that measures the level of development in both financial institutions and markets in terms of their access, depth, efficiency, and stability. It is also an improvement of and extension to the index constructed by International Monetary Fund (IMF) in 2016 by including the stability dimension of financial development. This study, however, goes beyond constructing indices. It also aims to address key questions such as *(i) how can we empirically characterize the multi-*

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[1] The authors are Bank Officers at the Monetary Policy Research Group (MPRG) of the Department of Economic Research (DER). The authors are thankful to Director Dennis D. Lapid (MPRG) and Managing Director Zeno Ronald R. Abenoja (DER) for their insightful comments and suggestions in improving the research paper. The usual institutional disclaimer applies.

[2] Shadow banking system refers mainly to a network of non-bank financial intermediaries that acts like banks but are not supervised as banks (Kodres, 2013).

dimensional aspects of the Philippine financial system? and (ii) what are the key trends in the financial system following the GFC?

The remainder of this paper is structured as follows: The concept of financial development and its importance are explained in Section 2. The structure of the Philippine financial system is discussed in Section 3. Meanwhile, the data and the methodology are presented in Section 4. The results of the paper are analyzed in Section 5. Finally, the conclusions and directions for future research initiatives are summarized in Section 6.

2.   The Concept and Importance of Financial Development

Market imperfections such as high transaction costs, taxes, unavailability of complete and useful information in a timely manner, and information asymmetry support the existence of financial intermediaries as sources of financing. They connect a deficit unit needing an additional source of funding (borrower) with a surplus unit with positive net income (lender) in a more efficient way than if the two parties had to deal with each other directly through their asset transformation function alongside prudent risk management. Through this process, they facilitate increased economic efficiency. Since the 1970s, literature suggests that there is a strong positive correlation between the extent of financial intermediation or financial development and growth, which varies across regions and over time (De Gregorio and Guidotti, 1995).

These studies, however, largely approximate financial development with the usual measures of financial depth – private credit to GDP and stock market capitalization to GDP. Both measures emphasize how financial intermediaries (both institutions and markets) affect not just transitional but also long-run growth. The financial sector plays an important role in promoting economic development by reducing the cost of mobilizing savings and channelling investments to productive technologies or long-term projects with long-term payoffs (Greenwood and Smith, 1997; Bencivenga et al. 1996; King and Levine, 1993).

Goldsmith (1969) was the first to point out that the main channel of transmission from financial development to growth is the effect on the efficiency of investment rather than its level. Using data for 100 countries covering the period 1960 – 1985, he finds a strong positive effect of more efficient use of capital stock to real GDP per capita for middle- and low-income countries. However, the inverse was observed for high-income countries where the large extent of financial development in these economies was attributed to factors and developments outside the banking system. Meanwhile, McKinnon (1973) and Shaw (1973) extend the analysis and consider the role of financial liberalization in increasing savings rate and, ultimately, higher volume of investment.

Rajan and Zingales (1998) examine the financial development and growth nexus through the idea that financial development could reduce the costs of external finance to firms and, thus, these firms could be 'better off' in economies with well-developed financial markets. Using data of listed US firms for the period 1980 – 1990, they compute for a specific industry's external finance needs. They use this information as a proxy for the desired amount that foreign firms in the same industry would have liked to raise had financial markets been more

developed.[3,4] They find that financial markets and institutions indeed reduce the cost of external finance and support the link between financial development and growth.

At the same time, several cross-country studies re-examined the relationship between financial development and growth and find that finance fosters growth but only up to a certain point. Rajan (2006) attributes this non-linearity to the increase in risk-bearing capacity and actual risk taking of economies. While positive on net, as developments in the financial sector have created wider access to finance for both firms and households, the emergence of new financial intermediaries with different sizes and appetites for risk (compared to their traditional asset transformation function) may make economies more exposed to the possibility of a 'financial-sector-induced turmoil.' This is also echoed by Arcand et al. (2012) where they use private sector credit to GDP to establish a threshold above which financial development no longer has a positive effect on economic growth. They find that for economies with small and intermediate financial sectors, the positive and robust correlation between financial depth and economic growth holds but when the share of private sector credit to GDP reaches around 80 – 100 percent, financial development starts to have a negative effect on economic growth.

Turner (2010) and Beck et al. (2013) argue that the shift of financial intermediaries' business models to those based on non-interest income generating activities and proprietary trading have an overall smaller effect on economic growth. Meanwhile, Beck et al. (2012) notes the increasing share of loans extended to households for consumption purposes instead of firms in advanced economies, resulting in reduced allocation of funds for investment activities. These findings suggest that policies aimed at addressing the trade-offs between growth and stability that may emerge through requiring banks to refocus their business models on credit provision by limiting excessive risk-taking and leverage, can contribute to a more positive effect of financial deepening on economic growth.

The foregoing findings highlight the complex and multidimensional nature of financial development. While these studies usually approximate financial development with the two measures of financial depth we cited earlier, Svirydzenka (2016) points out that the evolution of financial sectors to multifaceted and diverse financial systems across countries underscores the importance of understanding financial development through the lens of both financial institutions and financial markets. Financial markets have progressed in ways where economic agents can further diversify their savings and risks as well as raise funds through non-bank sources such as the capital markets. We note that apart from depth and access, efficiency and stability are important factors that shape the financial development process of a nation. In this

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[3] External finance is defined as the ratio of capital expenditures minus cash flow from operations divided by capital expenditures. Cash flow from operations is the aggregate of cash flow from operations, decreases in inventories, decreases in receivables, and increases in payables.

[4] Rajan and Zingales (1998) assume that financial dependence of US firms is a good proxy for the demand for external funds in other countries with the following considerations: (1) in a steady-state equilibrium, there is not much need for external finance and should the need arise it will be likely because of technological shocks that raise an industry's investment opportunities beyond what internal funding can cover; (2) amount of cash flow produced by existing firms in a certain industry is likely to be similar across countries; (3) the stage of the product life cycle of US firms in the 1980s may be comparable to the product life cycle of developing countries; and (4) the noisy measure of the need for funds creates a bias against finding any effect of financial development on growth.

regard, the Global Financial Development Database (GFDD) developed by Čihák et al (2012), covering an extensive dataset of financial system characteristics for over 205 economies for the period 1960s onwards, is an invaluable input. Sahay et al (2015) used the GFDD in the creation of a broad-based measure of financial development which captures both financial institutions and markets in terms of their depth (size and liquidity), access (ease of accessing financial services for households and firms), and efficiency (cost of provision of financial services vis-à-vis sustainable revenues for financial institutions).

An important and breakthrough contribution of our paper is the construction and introduction of a multi-dimensional index to overcome the shortcoming of using single indicators as proxy variables for measuring the extent of financial development. This multi-dimensional index summarizes the complex nature of financial development and monitors the continuous evolution of the Philippine financial system.

3. The Philippine Financial System

The Philippine financial system (PFS) is composed of financial institutions and financial markets. In this study, the financial institutions include both banks and non-bank financial institutions while the financial markets cover the stock and bond market.

3.1 The Philippine Financial Institutions

While the financial institutions are largely dominated by banks, accounting for an average of about 75 percent, the share of non-banks to total financial institutions' assets is steadily increasing over time (Figure 1). Hence, non-banks were taken into account in the construction of the financial development index. However, only the private insurance corporations were included in the dataset due to the unavailability of longer time series data for consolidated non-banks in the country.[5]

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[5] The compilation of Other Financial Corporations Survey (OFCS), which is an analytical survey of the assets and liabilities of all the non-banks or other financial corporations in the Philippines, started only in Q1 2017.

Figure 1: Asset share of banks and non-banks (in percent)
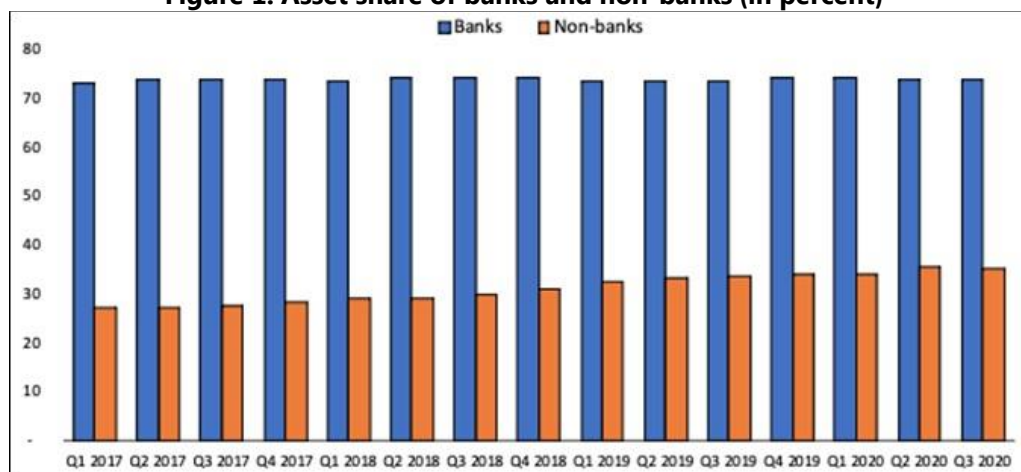
Source: Department of Supervisory Analytics, Department of Economic Statistics

Notes: Banks include universal/commercial, thrift and rural banks. Non-banks consist of trust entities; private and public insurance corporations; holding companies; government financial institutions, specifically government owned or controlled corporations engaged in financial intermediation; non-money market funds covering unit investment trust funds and investment companies; and other financial intermediaries and auxiliaries consisting of offshore banking units and non-banks without quasi-banking functions.

The banking system in this paper covers the universal/commercial, thrift, and rural/cooperative banks. These types of banks are distinguished according to the size of capitalization and the kind of activities they engaged in (Table 1).

Table 1: Key Features of the Philippine Banking System

| Particulars	Universal Banks (UBs)	Commercial Banks (KBs)	Thrift Banks (TBs)	Rural Banks (RBs)
Capitalization	₱4.9 billion	₱2.4 billion	₱325 million	₱2.6-20 million
Capital adequacy ratio (BASEL III standards)	8 percent	8 percent	8 percent	8 percent
Capital adequacy ratio (BSP standards)	10 percent	10 percent	10 percent	10 percent
Activities	Accept drafts and issue letters of credit as well as other evidences of indebtedness; engage in investment activities such as investing in equity of business-related companies, among others.		Accumulate depositors' savings and invest these deposits into retail loans and other financing-related activities.	Extend credit to rural areas, which are mainly intended for meeting the loan demands of the farmers, fishermen, cooperatives, and merchants.

Source: Espenilla (2007). "Financial Stability and Financial Sector Supervision: Lessons from the Past Decade and Way Forward."

In terms of size, the universal/commercial banks constitute the bulk of the banking system's total assets (Figure 2). However, in terms of physical network, the rural banks hold the biggest share of operating banks at 82.6 percent with a total of 447 head offices as of end-

June 2020. Considering the geographical profile of the Philippines, the sizable share of the rural banks in the physical structure of the banking system demonstrates the BSP's effort to reach out and provide financial services to the people in rural areas.

Figure 2: Asset Share, by Philippine Banking System Classification (as of end-December 2020)
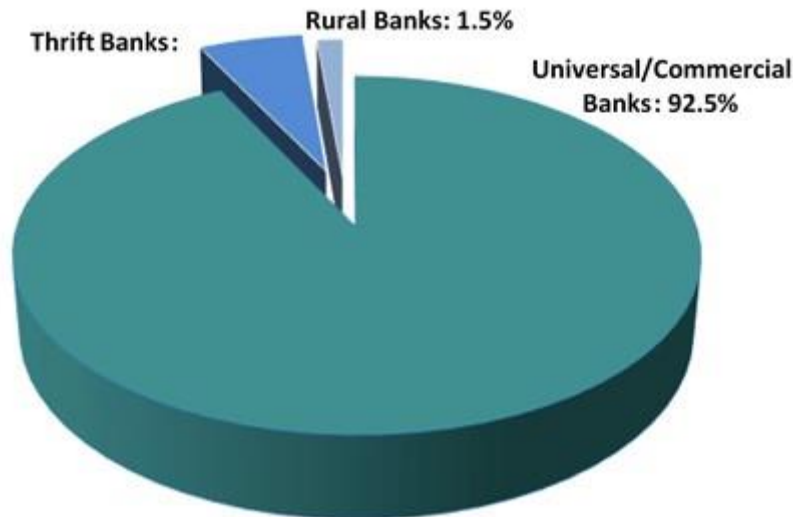
Source: Department of Supervisory Analytics

Meanwhile, the insurance industry covers both the private life and non-life insurance companies. The private insurance corporations represent over a quarter of the non-banks' total assets as of Q3 2020. Notwithstanding the relatively modest share of the insurance industry, its role in managing, transferring, and diversifying various kinds of risks is crucial in shaping the country's financial development landscape.

3.2 The Philippine Financial Markets

This paper focuses on the long-term funding prospects for the Philippines as part of financial development and, thus, includes the bond and stock markets in the index construction. The Philippine Stock Exchange (PSE) has been an increasingly important component of capital market development in the country. It has been the sole stock exchange operating in the country since 1994. Looking at the share price index as a measure of stock market activity (Figure 3), the PSEi showed generally upward trends with three troughs during 2000 – 2020. There was a drag on PSEi growth from 2000-2001 as markets were affected by the political protests against then-President Joseph Estrada which led to his impeachment as well as the 9/11 World Trade Twin Tower terrorist attacks in the US (Visda et al., 2013). The GFC likewise affected investor sentiment in 2008 which resulted in the PSEi plunging from 3,622 points in 2007 to 1,873 points in 2008. Meanwhile, the brewing trade war between the United States and China as well as the domestic inflation concerns and worries over interest rate hikes by the US Federal Reserve and the BSP have resulted in subdued investor sentiment for 2018 with the PSEi decreasing to 7,466 points from 8,558 points in 2017.

The number of listed firms also provided insight on how broadly accessible the stock market is for capital-seeking firms. The PSE has remained relatively small with 253 listed companies in 2010 with total market capitalization of ₱8.87 trillion. This figure has increased to 271 listed companies with total market capitalization amounting to ₱15.89 trillion as of end-2020. Another measure of the accessibility of the stock market to firms is the concentration ratio which include: (1) the proportion of stock market capitalization accounted for by the top 10 listed companies, and (2) the proportion of trading accounted for by the top 10 listed companies in the exchange. The PSE shows a high concentration ratio with the top 10 companies on average accounting for 51.3 percent of its total capitalization while their value of stocks traded comprise 47.0 percent of the total value of stocks traded for 2020.

Market capitalization shows the absolute size of the stock market and is an indicator of how effective it is, as an intermediary, in allocating savings and investments. Generally, larger stock markets are more likely to be more liquid and deeper than smaller markets. For the Philippines, market capitalization has accelerated from ₱2.58 trillion in 2000 to ₱15.89 trillion in 2020. At the same time, in terms of the market capitalization ratio or share of market capitalization to GDP, the Philippines shows an increasing trend, with the ratio rising from 70.4 percent in 2011 to 73.0 percent in 2019. However, when compared with other ASEAN-5 stock exchanges, PSE ranks the second lowest (Figure 4).

Figure 3: Year-on-Year Growth Rate of the PSEi (in percent)

Source: PSE Annual Reports, various issues

Figure 4: Market Capitalization as Share of GDP in ASEAN-5 economies (in percent)
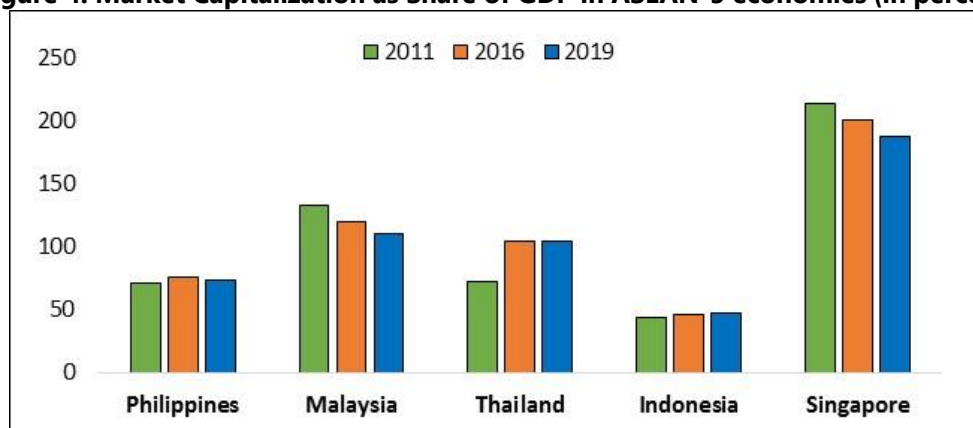
Source: World Bank

The domestic bond market is the largest part of the capital market in the Philippines with the government securities (i.e., Treasury notes and bonds) market being much larger and more highly developed compared to the corporate bond market (Ho and Odhiambo, 2014). The Bureau of the Treasury (BTr) handles the issuance of government securities in the Philippines. The outstanding amount and share of GS in the market is presented in Table 2 and Figure 5, respectively, with Treasury bonds making up more than half of the issuances.

As of December 2020, a total of ₱1,612 billion of outstanding corporate securities issued by 53 corporations were listed and traded on the Philippine Dealing and Exchange System (PDEx), with the issuer community diversified across the bank, food and beverages, realty, telecommunications, utilities and other sectors. The outstanding bonds of the top 30 corporate issuers totaled ₱1,439 billion, which comprised 89.2 percent of the entire corporate bond market. While an acceleration in the growth of trading volume for debt securities was observed in 2019 at 169 percent, this moderated in 2020 at 16 percent amid the COVID-19 pandemic and its subsequent impact on the economy (Table 3).

Table 2: Total Outstanding Amount (₱ billion)

Year	Treasury Bills	Treasury Bonds	Benchmark Bonds	Retail Treasury Bonds	Zero Coupon Bonds	Total
2010	527.4	940.8	872.1	314.0	54.7	2,709.1
2011	295.1	1,112.5	990.9	457.7	8.1	2,864.3
2012	274.9	1,514.0	910.6	766.4	-	3,465.9
2013	320.9	1,711.3	834.1	866.5	-	3,732.8
2014	281.7	1,871.4	850.0	811.2	-	3,814.3
2015	264.4	1,834.8	1,031.3	753.2	-	3,883.8
2016	287.9	1,927.4	909.3	802.0	-	3,926.6
2017	314.4	2,002.9	909.3	1,213.8	-	4,440.3
2018	494.3	2,036.8	909.3	1,335.5	-	4,775.9
2019	486.2	2,159.7	909.3	1,571.5	-	5,126.7
2020	949.5	2,567.1	977.7	2,199.5	-	6,693.7

Source: Bureau of the Treasury (BTr)

Figure 5: Percent Share of Government Securities to Total Issuances
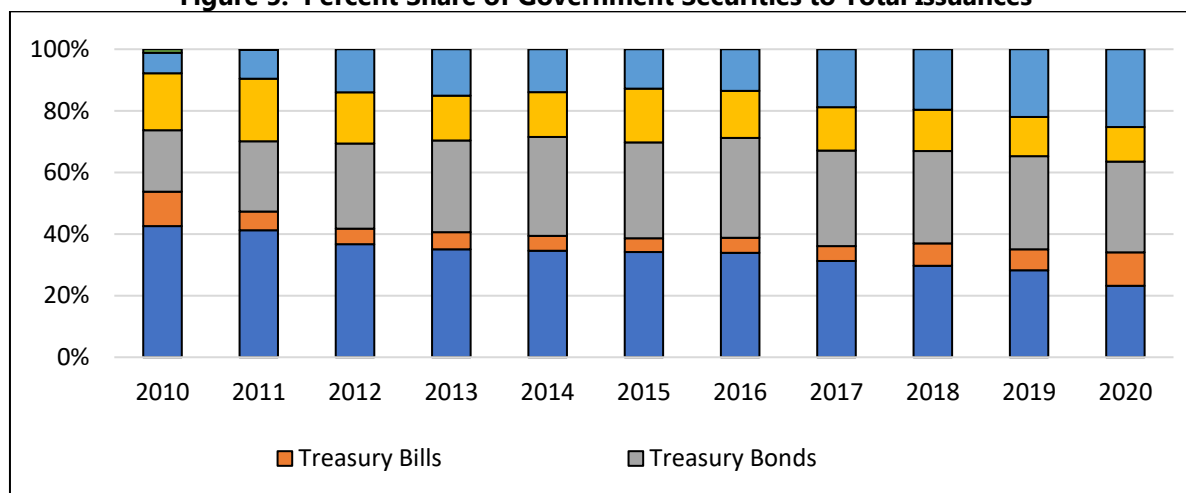
Source: Bureau of the Treasury (BTr)

Table 3: Trading Volume in Government Securities and Corporate Bonds (₱ Billion)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Volume	5,396	4,163	5,057	5,732	4,449	3,423	2,930	2,677	1,972	5,295	6,135
Growth (%)	109	(23)	21	13	(22)	(23)	(14)	(9)	(26)	169	16
Ave. Daily Volume	21.4	16.5	20.1	22.7	17.7	13.6	11.6	10.6	7.8	21.0	24.3

Source: Philippine Dealing and Exchange System

4.   Data and Methodology

4.1.   Variables and Data Characteristics

The dataset used in this study is built upon a number of existing data sources – both domestic and international. The set of indicators are summarized in Table 4. These indicators are proxy variables to measure the (a) access, the degree in which households can use financial services, (b) depth, the size of financial intermediaries and markets, (c) efficiency of financial institutions and markets in intermediating resources and facilitating transactions, and (d) stability of the financial system.

The variables included in this research to capture the different dimensions of financial development are more exhaustive than those of the indicators used in the construction of the financial development index database of the IMF (Svirydzenka, 2016). The index that will be constructed for the Philippines includes 38 indicators while the IMF-based index covers 21 variables (Appendix 1). Meanwhile, the summary statistics for the underlying data are presented in Appendix 2.

Table 4: Variables and Data Characteristics

Variables	Description	Source
1.A. Financial Institutions: Access Indicators		
ATMs per 100,000 adults	Number of Automated Teller Machines (ATMs) per 100,000 adults at time t. The indicator is calculated as: 100,000*number of ATMs per capita.	BSP-Department of Supervisory Analytics (DSA)
Depositors with banks per 1,000 adults	Number of deposit account holders at the universal/commercial, thrift and rural banks per 1,000 adults at time t.[6] This is computed as: 1,000*depositors with banks per capita.	BSP-DSA
Financial institutions offices per 100,000 adults	Number of offices of BSP supervised or regulated financial institutions per 100,000 adults at time t.[7] This is measured as 100,000*reported number of financial institutions' offices per capita.	BSP-DSA

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[6] A depositor who has several types of deposit accounts (e.g., savings, current, time) is counted as one.
[7] BSP supervised or regulated financial institutions include the Philippine banking system, non-bank financial institutions with and without quasi-banking functions, and offshore banking units.

Variables	Description	Source
Insurance density[8]	Ratio of total insurance premiums written by life and non-life insurance companies to whole population at time t.	Insurance Commission (IC)
1.B. Financial Institutions: Depth Indicators		
Life insurance premiums to GDP (%)	Ratio of premiums earned on variable and traditional life insurance to GDP at time t.	IC[9]
Non-life insurance premiums to GDP (%)	Ratio of premiums earned by the non-life insurance companies to GDP at time t.	IC
Insurance industry's total assets to GDP (%)	Ratio of total assets of insurance industry to annualized GDP at time t.[10] Insurance industry includes life and non-life insurance companies and mutual benefit associations.[11]	IC
Private sector credit to GDP (%)	Domestic credit provided to the private sector by the depository corporations in the Philippines at time t. This is calculated as the ratio of domestic credit to annualized GDP. Private sector includes both the non-financial corporations and household sectors.	BSP-Department of Economic Statistics (DES)
M3 to GDP (%)	Ratio of M3 or broad money to annualized GDP at time t. M3 includes currency in circulation, transferable, savings and time deposits, and securities other than shares included in broad money.	BSP-DES
1.C. Financial Institutions: Efficiency Indicators		
Bank net interest margin (%)	Net interest income of the Philippine banking system as a share of its average interest-bearing assets at time t.	BSP-DSA
Bank non-interest income to total income (%)	Philippine banking system's income generated through non-interest-bearing related activities as a percentage of its total operating income at time t.	BSP-DSA
Return on assets (%)	Computed as annualized net profit of the Philippine banking system divided by its average total assets from last and current year at time t.	BSP-DSA
Return on equity (%)	Computed as annualized net profit of the Philippine banking system divided by its average total capital from last and current year at time t.	BSP-DSA
Bank cost to income (%)	Computed as annualized non-interest expenses to annualized total operating income at time t.	BSP-DSA

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[8] Insurance density gives an indication of how much each of the people in a country spends on insurance premium.

[9] The earliest quarterly available periods for life/nonlife insurance premiums and insurance industry's total assets are 2017 and 2012, respectively. We used the Insurance Commission's annual key data from 2007-2016 to construct a longer quarterly data series using the built-in high frequency conversion tool in Eviews.

[10] Annualized GDP is used in the calculation of quarterly ratios where the numerator is a stock variable.

[11] The inclusion of mutual benefit associations (MBAs) in the report started only in Q2 2016 pursuant to Circular Letter (CL) 2016-35.

	1.D. Financial Institutions: Stability Indicators	
Bank's Z-score	It explicitly compares buffers (capitalization and returns) with risk (volatility of returns) to measure a bank's solvency risk. The z-score is computed as: $\frac{(ROA)+\frac{equity}{assets}}{sd\,(ROA)}$, where $sd\,(ROA)$ is the standard deviation of bank's return on assets (ROA).	BSP-DSA; authors' calculations
Non-performing loans to total loans (%)	Ratio of defaulting loans (payments of interest and principal past due by 90 days or more) to total gross loans (total value of loan portfolio).	BSP-DSA
Bank equity to total assets (%)	Ratio of bank's total capital accounts to total assets. Total assets include both financial and nonfinancial assets.	BSP-DSA
Capital adequacy ratio	Ratio of total qualifying capital to risk weighted assets computed in accordance with the risk-based capital adequacy framework effective 01 July 2001 under BSP Circular No. 280 dated 29 March 2001, as amended.	BSP-DSA
Liquid assets to total deposits (%)	Ratio of the value of liquid assets (easily converted to cash) to total deposits. Liquid assets include cash and due from banks and financial assets (excluding equity investments).	BSP-DSA
Loans to deposits (%)	Ratio of bank's total loan portfolio to total deposits.	BSP-DSA
	2.A. Financial Markets: Access Indicators	
Nonfinancial corporate bonds to total debt securities issuances (%)	Total amount outstanding of debt securities issued by the nonfinancial corporates to total debt securities issued in domestic and international markets at time t.[12]	Bank for International Settlements' (BIS) Debt Securities database
Market capitalization excluding top 10 companies to total market capitalization (%)	Ratio of the value of stock market capitalization outside of the largest ten largest companies to total market capitalization at time t.	Philippine Stock Exchange (PSE)
Value traded excluding top 10 companies to total value traded (%)	Value of all traded shares outside of the largest ten companies as a share of total value of all traded shares in stock market exchange.[13]	PSE

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[12] Total debt securities (TDS), which is the sum of domestic debt securities (DDS) and international debt securities (IDS), are issued by residents in all markets. The DDS are issued in the local market of the country where the borrower resides, regardless of the currency in which the security is denominated while the IDS are securities issued outside the local market of the country where the borrower resides. The TDS and DDS are reported by national authorities, while IDS are defined and compiled by the BIS from commercial data sources.

[13] The top 10 companies by value of traded shares pertain to the value of shares traded in the regular market only where block sales and odd lot trades are excluded. For more information on odd lot market, please refer to the Revised Trading Rules and Implementing Guidelines of the Revised Trading Rules from this link:
https://pse.com.ph/stockMarket/tradingParticipantRules.html?tab=0

	2.B. Financial Markets: Depth Indicators	
Stock market capitalization[14] to GDP (%)	Total market capitalization as percentage of annualized GDP at time t.	PSE
International debt securities issuances of government to GDP (%)	Amount of general government international debt securities (amounts outstanding) as a share of annualized GDP at time t. It covers long-term bonds and notes and money market instruments placed on international markets.	BIS
International debt securities issuances of private sectors[15] to GDP (%)	Amount of private international debt securities (amounts outstanding) as a share of annualized GDP at time t. It covers long-term bonds and notes and money market instruments placed on international markets.	BIS
Total international debt securities issuances to GDP (%)	Ratio of the amount outstanding of private and general government debt securities to annualized GDP at time t. It covers long-term bonds and notes and money market instruments placed on international markets.	BIS
Gross portfolio equity liabilities to GDP (%)	Ratio of gross portfolio investment on equity and investment fund shares (liability side) to annualized GDP at time t.	International Investment Position (IIP) BSP-DES[16]
Gross portfolio debt securities liabilities to GDP (%)	Ratio of gross portfolio investment on debt securities (liability side) to annualized GDP at time t.	IIP BSP-DES
Gross portfolio equity assets to GDP (%)	Ratio of gross portfolio investment on equity and investment fund shares (asset side) to annualized GDP at time t.	IIP BSP-DES
Gross portfolio debt securities assets to GDP (%)	Ratio of gross portfolio investment on debt securities (asset side) to annualized GDP at time t.	IIP BSP-DES

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[14] Market capitalization is the total market value of all of a company's outstanding shares. It is an indicator used by the investment community when determining a company's size.

[15] Private sectors, in the BIS debt securities statistics database, include financial (i.e., banks and other financial corporations) and private non-financial corporations.

[16] The earliest available quarterly data for the portfolio investments on equity and debt securities is Q1 2013. The Q1 2013 to the latest available report is based on the Balance of Payments and International Investment Position Manual 6th edition (BPM6) concept. To construct a longer data series, we used the 2000-2005 annual IIP data based on BPM5 methodology and convert the series into quarterly data using the built-in quarterly conversion tool in Eviews.

	2.C. Financial Markets: Efficiency Indicator	
Stock market turnover ratio (%)[17]	Ratio of the value of stocks traded to real stock market capitalization for the period. The denominator is deflated using this formula: $\dfrac{T_t/P_{at}}{\frac{1}{2}*[\frac{M_t}{P_{et}}+\frac{M_{t-1}}{P_{et-1}}]}$ where T is total value traded, P_{at} is the average CPI for the period, M is stock market capitalization, and P_{et} is the end-of period CPI.	PSE; authors' calculations
Bond market turnover ratio (%)[18]	The ratio shows the extent of trading in the secondary market relative to the amount of bonds outstanding. It is computed as the ratio of value of bonds traded to average amount of outstanding government securities issuances.	Asian Bonds Online
Trading volume in stock market	Trading volume, which is an indicator of market activity, refers to the volume of trades transacted in the stock market and secondary market for government securities. A higher trade volume indicates a greater overall market interest for stocks or bonds. In cases where the outstanding volume of trades grew rapidly, the turnover ratio would be a better measure of trading activity and market liquidity.	PSE
Trading volume in bond market		Philippine Dealing Exchange (PDEx)
	2.D. Financial Markets: Stability Indicators	
Stock price volatility	Refers to the degree of variation or standard deviation of the return on the national stock market price index over time. The volatility is calculated as $\sigma_T = \sigma\sqrt{T}$, where σ_T is the volatility over a time horizon, σ is the standard deviation of returns and T is the number of periods in a time horizon.[19]	PSE; authors' calculations
Price/Earnings ratio (%)	Price-to-earnings ratio is used to evaluate a stock's worth. It is calculated by dividing the stock's price by an earnings-per-share figure.	PSE
Short-term debt securities to total debt securities issuances (%)	Ratio of short-term debt securities issuances to total debt securities issued onshore and offshore.	BIS

4.2   Construction of the Financial Development Index

The construction of a quarterly multi-dimensional financial development index for the Philippines builds upon the 4x2 matrix of financial system characteristics. This analytical framework, which is largely based on the financial development concept of the IMF and the World Bank, is represented in Figure 6 (Čihák et al, 2012).

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[17] A higher turnover should indicate higher liquidity and greater efficiency in the market (Svirydzenka, 2016).

[18] The higher the turnover ratio, the more active the secondary market is.

[19] There are approximately 252, 63 and 21 trading days in a given year, quarter and month, respectively.

The diversity and multi-dimensional feature of the financial system require measuring financial development using multiple indicators. However, an indicator (when taken on its own) may not offer a comprehensive assessment of the extent and level of financial development in a country. Hence, constructing an overall index and sub-indices that pull together these various indicators is important to allow for a holistic assessment of the overall level of financial development in the country. These indices will also facilitate the analysis of pinning down the likely source of fragilities in the financial system or identifying which aspects of financial development influence a country's macroeconomic performance.

Figure 6: Analytical Framework of a Multi-dimensional Financial Development Index
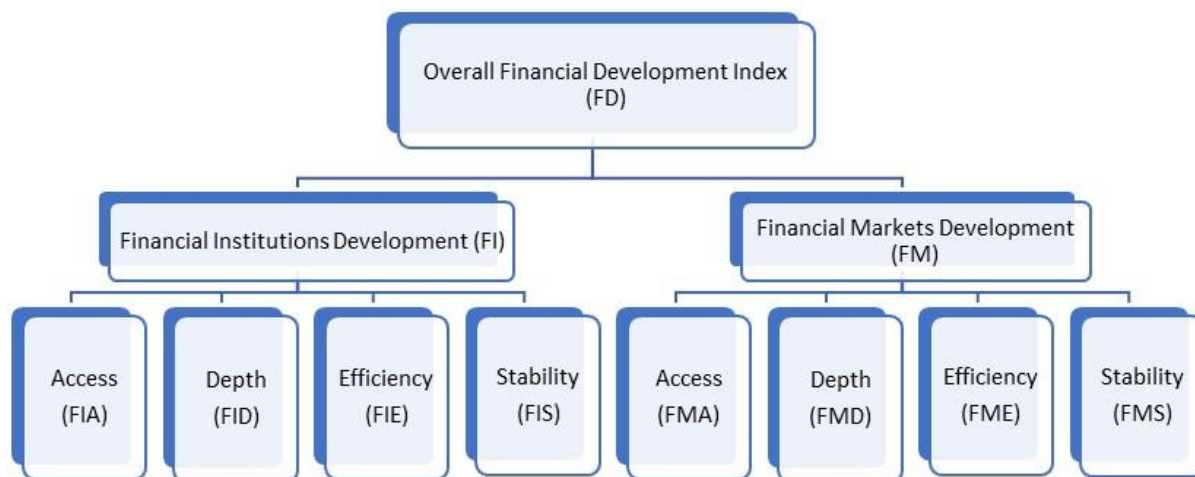
The construction of the multi-dimensional financial development index follows the four-step methodological suggestions of the Organisation for Economic Co-operation and Development (OECD) in constructing composite indicators (OECD, 2008). These four (4) steps include: (i) winsorization and normalization of all the variables; (ii) derivation of weights using Principal Components Analysis (PCA); (iii) aggregation of normalized variables into sub-indices that represent the four (4) dimensions of financial system; and (iv) aggregation of these sub-indices into a final index.

4.2.1 Winsorization and normalization of variables

We winsorized each data series first to prevent extreme values from distorting the continuous 0-1 indicators when we normalized all the variables later. During periods of financial crisis or unprecedented economic events, it is highly probable that the distribution of statistics would be greatly affected by outliers. To reduce the effect of possible spurious outliers, transformation of data series through winsorization is the usual statistical approach. Winsorization is the process of replacing extreme values by setting all the outliers to certain percentiles (Čihák et al, 2012). In this paper, we preserve the data range by replacing the bottom and top 5 percent with the 5th and 95th percentiles, respectively.

Winsorized indicators are then normalized between 0 and 1 to render all variables comparable and to facilitate the aggregation of variables that are expressed in different

measurement units. More formally, all the indicators are normalized using the min-max equations below[20]:

$$V_x = \frac{x - x_{min}}{x_{max} - x_{min}} \tag{1}$$

$$V_{x,rescaled} = 1 - \frac{x - x_{min}}{x_{max} - x_{min}} \tag{2}$$

where V_x is the normalized continuous 0-1 variable, x_{min} and x_{max} are the minimum and maximum values of indicator, x, respectively. The normalized indicators would facilitate interpretation of results such that the highest (lowest) value of a certain variable across time is equal to one (zero). All other values are then measured relative to the minimum (maximum) values. The use of min-max normalization procedure in transforming variables is not constant especially when data for a new time point becomes available. Since it takes into account the evolution of indicators through time, the composite indicator must be re-calculated to ensure the comparability between the existing and new data points (OECD, 2008).

We use equation (2) to re-scale variables such as net interest margin (NIM), non-interest income to total income, bank cost to income, non-performing loans ratio (NPL) and stock price volatility. Higher values for these data series indicate worse performance in terms of financial institutions' efficiency and stability. To avoid confusion and ensure consistency in interpreting the results, these variables were re-scaled using equation (2) so that a higher value indicates greater level of financial development.

4.2.2 Derivation of weights from Principal Component Analysis (PCA)

Most composite indicators rely on equal weighting where all variables are "worth" the same in the composite. However, this kind of weighting method does not reflect the statistical quality of the data. With equal weights, there is a possibility of double counting especially when two collinear indicators are included in the index (OECD, 2008).

Weights have significant effects when one takes into consideration the relative importance of the indicators. To generate a good composite index for the Philippines, we use the statistical method—Principal Component Analysis (PCA)—to capture as much information that is available from all the indicators so as not to prejudge the importance of particular variables in measuring the different dimensions of financial development. Moreover, the use of PCA as an indexing strategy is robust to redundant information from the indicators (Cámara and Tuesta, 2017). Hence, the number of variables included in the index construction will not be an issue.

The first step of the PCA is to check for correlation among the indicators. On the one hand, if no correlation exists between variables, then weights cannot be estimated using the PCA method because this weighting approach is used only to correct for overlapping information between two or more correlated variables. On the other hand, once correlation is

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[20] The Human Development Index (HDI) is one example of an index that made use of the min-max normalization technique.

established among indicators, we identify and extract those factors or principal components that account for the largest amount of the variance. Eigenvalues represent the total amount of variance that can be explained by a given principal component. In practice, eigenvalues should be greater than zero since variance cannot be negative. In this study, we retained those factors with eigenvalue greater than 0.5. The third step involves the rotation of factors, usually the *varimax* rotation. This type of rotation produces orthogonal factors so that variables or indicators without inter-related factors or components are obtained. The last step is the construction of weights from the matrix of factor loadings after the varimax rotation. Weights are squared factor loadings that represent the proportion of the total unit variance of the indicator which is explained by the factor (OECD, 2008).

4.2.3 Aggregation of normalized variables into sub-indices

Normalized indicators are aggregated according to the three (3) levels of aggregation, starting from the bottom of Figure 6. More precisely, a total of eight (8) sub-indices will be constructed to assess how developed financial institutions and financial markets are with respect to access, depth, efficiency and stability using Equations 3 and 4 below:

$$FI_j = \sum_{i=1}^{n} w_i V_i \tag{3}$$

$$FM_j = \sum_{i=1}^{n} w_i V_i \tag{4}$$

where FI and FM stands for financial Institutions and financial markets, respectively. The PCA-based weight of variable i is denoted as w_i and the subscript j pertains to the four aspects of financial development. The eight (8) sub-indices in Level 3 are tagged as FIA, FID, FIE, FIS, FMA, FMD, FME and FMS where I and M stand for institutions and markets, respectively while the letters, $A, D, E,$ and S, denote access, depth, efficiency and stability. All of these sub-indices are re-normalized using Equation (1) so that the range is between 0 to 1, with 0 and 1 signifying the lowest and highest levels, respectively, of financial development.

The purpose of aggregating the normalized variables into sub-indices is twofold. On the one hand, the additional disaggregated information that these sub-indices provide will be useful both for policy making and analysis. On the other hand, generating the sub-indices first prior to estimating the overall index is a preferred approach from a statistical standpoint because it shuns weight biases towards indicators that show the highest correlation within the dataset (OECD, 2008).

4.2.4 Aggregation of sub-indices into an overall index

The eight (8) sub-indices generated will then be aggregated into second-level indices to generate the FI and FM development indices (Equations 5 and 6). There are 20 and 18 indicators that feed into the construction of FI and FM development indices, respectively.

$$FI = \sum_{j=1}^{4} w_j FI_j \tag{5}$$

$$FM = \sum_{i=1}^{4} w_j FM_J \tag{6}$$

$$FD = w_{FI} FI + w_{FM} FM \tag{7}$$

Using the PCA-based weights for each dimension, the most aggregated level that will be generated would be the financial development (FD) index (Equation 7). The FI, FM, and FD indices are again re-normalized using Equation (1) so that the lowest and highest levels of financial development at time *t* will take the value of 0 and 1, respectively.

The aggregation method is a weighted linear average of the underlying indicators where the weights obtained from the PCA reflect the contribution of each data series and dimension *j* to the variation in specific sub-index and overall index, respectively. The use of linear aggregation approach facilitates the implementation as well as the interpretation of the indices such that the contribution of changes in each indicator to the changes in FD index is attributed to its weight. Simply put, the method allows for the assessment of the marginal contribution of each variable independently.

5. Presentation and Analysis of Results

5.1 Financial Institutions Development

Measuring financial development has always been focused on financial institutions, particularly banks, and private sector credit scaled against economic output. While we note that credit is an important type of financial service provided by banking institutions, it does not provide information about other components of financial institutions. The results in Table 5 show that the contributions of access, depth, efficiency, and stability are distinct, reflecting the equal importance of each dimension in explaining FI development.

Table 5: PCA-based weight contribution of each sub-index to FI Development

Dimension	PCA-based weights
FI Access	0.289
FI Depth	0.294
FI Efficiency	0.194
FI Stability	0.224

Source: Authors' estimates

Furthermore, Figure 7 demonstrates that focusing only on financial depth would mean overlooking other important aspects of FI development. For instance, financial institutions can become deep without necessarily being efficient. The correlation between the FI sub-indices

is not one-for-one, with correlation coefficients (ρ) ranging from a low of 0.17 (depth vs. efficiency) to a high of 0.98 (access vs. depth).

Figure 7: Correlation between FI sub-indices
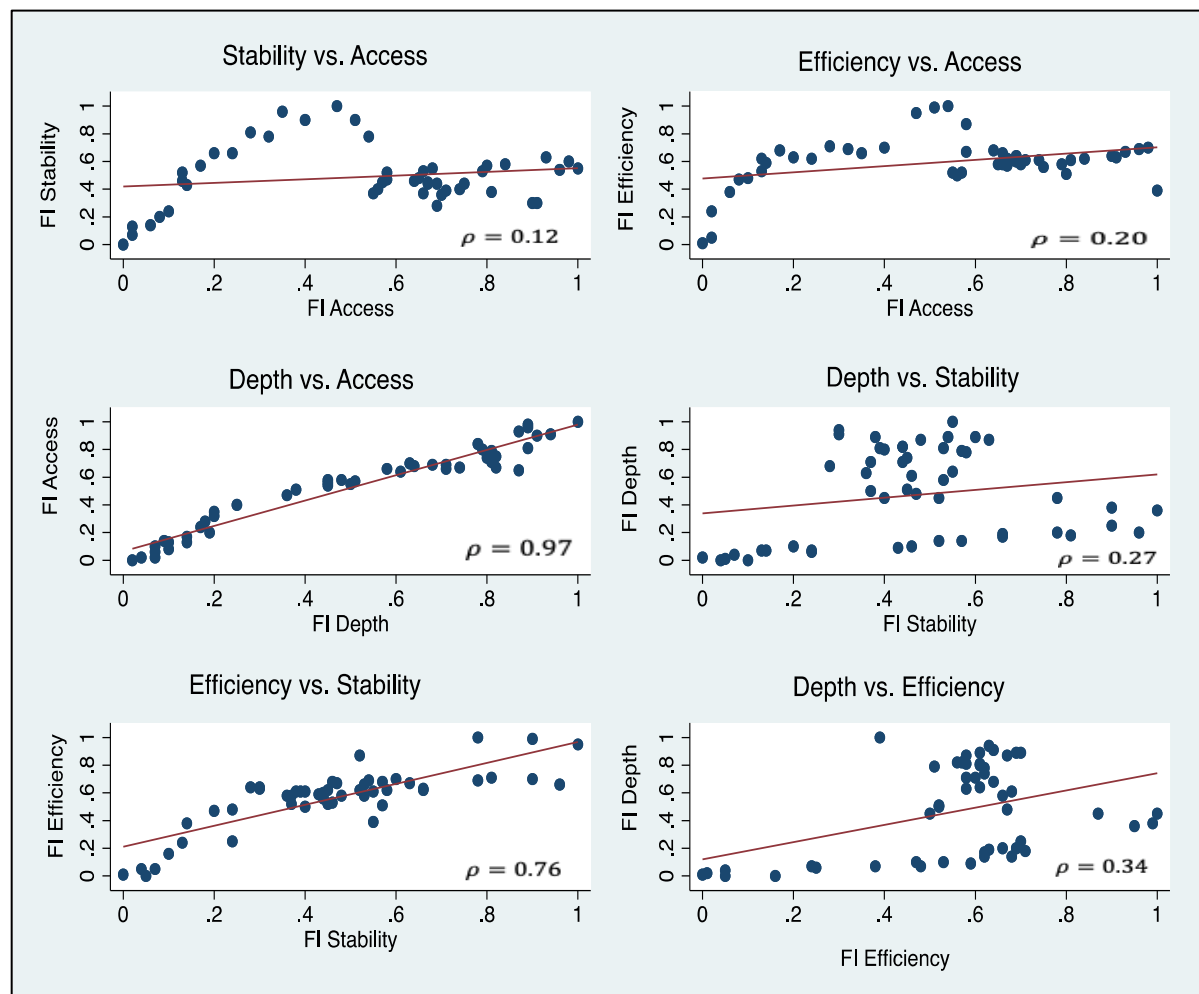
Source: Authors' estimates

For further analysis, we also look at the relative importance of indicators contained in each sub-index. In terms of measuring the accessibility of financial institutions, the density indicators include both the banks and non-banks. This is an improvement of and an extension to the FI access sub-index constructed by the IMF (2016), which only focused on banks. The results also illustrate that insurance density, which indicates how much each Filipino spends on insurance coverage, plays a significant role in determining the extent of reach of financial institutions.

Table 6: PCA-based weight contribution of each indicator to FI Sub-Indices

Indicators in each sub-index	PCA-based weights
FI Access	
ATMs per 100,000 adults	0.337
Depositors with banks per 1,000 adults	0.159
Financial institutions offices per 100,000 adults	0.155
Insurance density	0.349
FI Depth	
Life insurance premiums to GDP	0.145
Non-life insurance premiums to GDP	0.153
Insurance industry's total assets to GDP	0.237
Private sector credit to GDP	0.234
M3 to GDP	0.231
FI Efficiency	
Bank net interest margin	0.146
Bank non-interest income to total income	0.117
Return on assets	0.314
Return on equity	0.312
Bank cost to income ratio	0.111
FI Stability	
Bank's Z-score	0.151
Non-performing loans to total loans	0.088
Bank equity to total assets	0.172
Capital adequacy ratio	0.191
Liquid assets to total deposits	0.193
Loans to deposits	0.206

Source: Authors' estimates

The results in Table 6 provide evidence that the traditional indicator for financial development – private sector credit to GDP – is not the only driver or relevant component of depth sub-index. It is also noteworthy to highlight that the inclusion of the indicator, insurance total assets-to-GDP, in the FI depth sub-index contributes the greatest weight at 23.7 percent. Capturing the insurance industry, which is part of the other financial corporations' or the non-bank sub-sector, enhances the scope of FI depth indicators being disseminated to the public. Thus, addressing the information gaps in the non-bank sector with the inclusion of insurance industry indicators is also important in shaping the financial development landscape of the Philippines.

Measures for FI development in terms of efficiency are more bank-specific and cover these three (3) aspects: (i) efficiency in intermediating savings to investment; (ii) operational efficiency; and (iii) profitability. Among the efficiency indicators, the variables that measure profitability, such as ROA and ROE, account for the largest weight contribution at 31.4 percent and 31.2 percent, respectively, in explaining the variation in financial institutions' efficiency.

Meanwhile, the inclusion of stability in the construction of the sub-index represents the importance of financial stability as part of the broader FI development process. In the Philippines, the stability of its financial system is primarily attributed to BSP's prudent banking regulations and cautious lending standards to pre-empt potential financial crises. The z-score,

which captures the probability of default of a country's banking system, explains about 15.1 percent of the FI stability sub-index. Loans-to-deposits and capital adequacy ratios represent higher weights, accounting for 20.6 percent and 19.1 percent, respectively, of the variation in the FI stability sub-index.

Overall, the evolution of FI development sub-index by dimension shows a pattern that generally slopes upward with some noticeable periods of peaks and troughs over the sample period (Figure 8).

Figure 8: FI Development Overtime, by Dimension
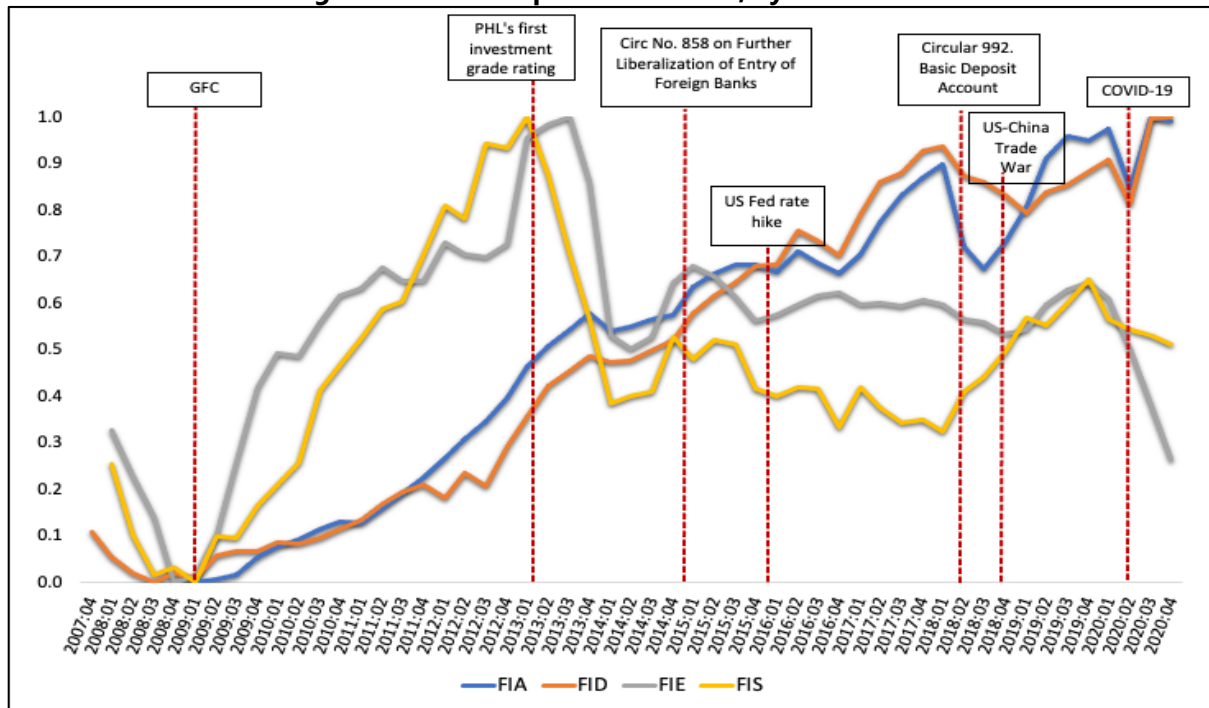
Source: Authors' estimates

The varying levels of FI development sub-indices across different periods depict important economic events both in the domestic and external fronts.

- **GFC (2007-2009)**: The GFC resulted in both financial instability as well as inefficiency and also made access to financial services increasingly difficult, as seen from Figure 8 where all the sub-indices posted the lowest level of FI development. Nonetheless, following the GFC, there have been increases in the levels of all sub-indices, with efficiency and stability sub-components showing marked increase implying that measures adopted to safeguard the financial system have positive impacts. The prudent regulatory standards and risk management measures implemented by the BSP have fortified banks' resiliency against liquidity and financial stress.

- **Investment rating upgrade (2013)**: The first ever investment rating upgrade of the Philippines to "BBB-" from "BB+" in Q1 2013 contributed to the peak in FI stability sub-index.

- **Adoption of policies on financial access and inclusion (2014, 2018)**: The sustained increase in the level of FI development sub-indices following the GFC can also be attributed to the further liberalization of entry of foreign banks under Circular No. 858 in 2014 as well as the streamlining of the banking system amid continued consolidation efforts of the industry. These developments allowed the Philippine banks to compete with bigger banks in the region by scaling up their size (Guinigundo, 2015). Meanwhile, the issuance of Circular No. 992 or the Basic Deposit Accounts (BDA) framework has broadened banks' reach and provision of financial services. This, in turn, was reflected in greater levels of FI depth and access sub-indices.

- **Monetary policy normalization (2014):** The start of the monetary policy normalization in advanced economies (AEs) at the start of 2014 has triggered considerable sell down of financial assets amid falling prices that consequently resulted to reduced profits. The easing of profitability of the Philippine banking system due to lower non-interest income generation[21] led to a decline in the FI efficiency and stability sub-indices in 2014.

- **External developments (2015, 2018)**: The impact of the US Fed rate hike in 2015 as well as the trade tensions between China and the US in 2018 resulted in noticeable dips in sub-indices.

- **COVID-19 pandemic (2020):** The global pandemic in 2020 that spared no economic territory and grounded the economy to a virtual standstill, caused FI efficiency and stability sub-indices to trend downward. The operating ratios, ROA and ROE, that are often used to assess banks' profitability, are the largest contributors in the drop of FI efficiency sub-index as provisions in credit or loan losses increased substantially by 303.5 percent in 2nd semester of 2020 amid the health crisis.[22] In terms of FI stability sub-index, despite the dip in the sub-index from Q1 2020 onwards, the decline was relatively modest than that of FI efficiency sub-index. Likewise, while the non-performing loans (NPL) ratio posted an uptick amid the pandemic, the Philippine banking system remains well-capitalized with capital adequacy ratio (CAR) exceeding the Bank for International Settlements' (BIS) BASEL III prescribed threshold of 8 percent and BSP's capital ratio requirement of 10 percent.[23]

It is interesting to note that within the periods under study, the lowest levels of FI development sub-indices were recorded during the GFC periods. This is attributed to the distinct nature of the shocks during the GFC in comparison with the shocks under COVID-19. The former was primarily a crisis emanating from the financial sector, while the latter as a public health crisis is mostly a shock arising from the real sector. Moreover, the timely policy responses of the BSP to ensure ample liquidity in the system amid the pandemic has averted the health crisis from spilling over to the financial sector.

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[21] Non-interest income includes fees and commissions from trading and selling of financial instruments.
[22] Status Report of the Philippine Financial System (2nd Semester of 2020).
[23] Basel III is a comprehensive set of reform measures, developed by the Basel Committee on Banking Supervision, to strengthen the regulation, supervision, and risk management of the banking sector.

5.2   Financial Markets Development

Financial markets are integral in shaping the financial development landscape of the Philippines because of their complementary role in financial intermediation, offering alternative sources of financing and wider array of financial instruments available for both savers and investors.

Unlike financial institutions, financial markets in emerging economies like the Philippines have rarely been included in gauging financial development. In addition, if the extent of development is to be assessed in financial markets, the conventional indicator often used is the stock market capitalization to GDP - a common measure of financial depth. Attributing FM development solely to financial depth might lead to an imprecise analysis of the degree and extent of development in Philippine financial markets.

The PCA-based weight results from Table 7 show that the depth dimension explains a marginal 0.2 percent of FM development. The access and stability factors explain the largest amount of variance in FM development. In the Philippines, accessing or tapping the domestic capital markets as alternative source of funding for the private non-financial corporates aside from bank financing has gained traction in these corporates' business operations since 2007 (Guinigundo, 2015). Also, due to the inherent volatility in financial market transactions, factoring in the stability dimension in measuring FM development is an important condition.

Table 7: PCA-based weight contribution of sub-index to FM Development

Dimension	PCA-based weights
FM Access	0.506
FM Depth	0.002
FM Efficiency	0.023
FM Stability	0.469

Source: Authors' estimates

Meanwhile, the relative importance of each indicator used in constructing FM sub-indices is presented in Table 8. The stock market capitalization to GDP, which is the usual proxy variable for measuring financial market development, explains 13.4 percent of the depth sub-index. The result suggests that the other indicators that capture the size of both the stock and bond markets are all relevant drivers or measures of depth sub-component (Table 8).

**Table 8: PCA-based weight contribution of each indicator to FM Sub-Indices**

Indicators in each sub-index	PCA-based weights
FM Access	
Nonfinancial corporate bonds to total debt securities issuances	0.384
Market capitalization excluding top 10 companies to total market capitalization	0.353
Value traded excluding top 10 companies to total value traded	0.263
FM Depth	
Stock market capitalization to GDP	0.134
International debt securities issuances of government to GDP	0.147

International debt securities issuances of private sectors to GDP	0.117
Total international debt securities issuances to GDP	0.151
Gross portfolio equity liabilities to GDP	0.062
Gross portfolio debt securities liabilities to GDP	0.139
Gross portfolio equity assets to GDP	0.118
Gross portfolio debt securities assets to GDP	0.131
FM Efficiency	
Stock market turnover ratio	0.024
Bond market turnover ratio	0.479
Stock market trading volume	0.076
Bond market trading volume	0.422
FM Stability	
Stock price volatility	0.351
Price earnings ratio	0.563
Short-term debt securities to total debt securities issuances	0.086

Source: Authors' estimates

With regard to the efficiency sub-index, the result shows that bond market indicators account for the bulk of the variance in FM efficiency. The proxy variable for bond market efficiency indicator pertains to the trading of government securities in the secondary market. This might explain, in part, the weight contribution of bond market efficiency indicators because government securities are generally the safest investment instrument in the market and are, by default, risk-free because this type of instrument is supported by the full taxing power of the government. Moreover, government securities are marketable and can be traded easily in the secondary market.

On the stability dimension, the inclusion of short-term debt securities indicator became increasingly important in the run-up to and during the wake of GFC because debt securities with maturity of less than a year became a significant source of liquidity in the system. Meanwhile, price earnings ratio as proxy indicator to approximate the volatility in the stock market explains more the half of the variation in the FM stability sub-index. The addition of this indicator in constructing the sub-index is based on the empirical findings that market prices are influenced by expectations of future cash flows and growth; thus, stock prices tend to be more volatile (Čihák et al, 2012).

Figure 9: FM Development Overtime, by Dimension
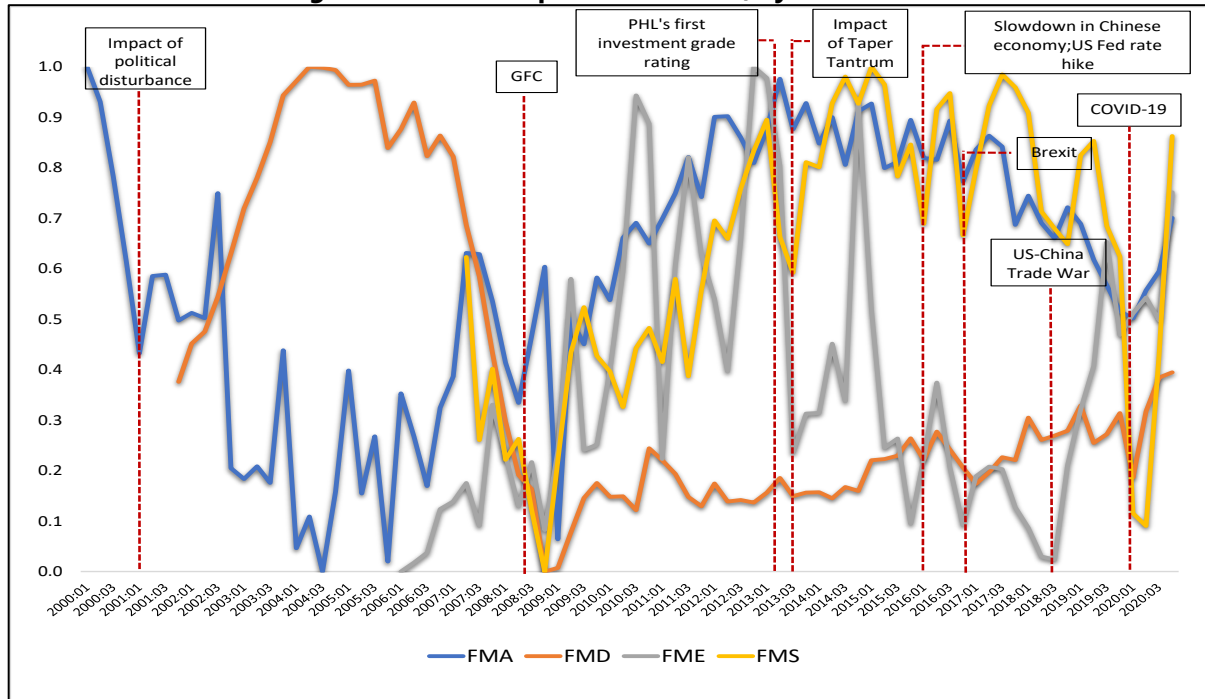
Source: Authors' estimates

Contrary to FI development where the sub-indices exhibit a generally more stable path, the FM sub-components show a rather fluctuating trend, reflecting the inherent volatility in the financial markets. We note that among the dimensions of FM, only the depth sub-index has not returned to its pre-GFC levels as international debt securities issuances of private and government sectors, which account for 26.4 percent of the variation in the FM depth sub-index (Table 8), recorded a downward trend post-GFC as corporate sector's bond issuances in the country are mostly denominated in local currency to insulate firms from possible depreciation pressures associated with a potential rise in interest rates post-GFC periods.[24]

- **Impeachment of President Joseph Estrada (2000)**: The impeachment trial of then President Estrada, which triggered minor bank runs and dampened investor confidence, affected the financial markets' performance (Pascual and Lim, 2001). The full-swing effect of this development occurred during the first half of 2001, as depicted in the dip of financial market access (FMA) sub-index in Q12001.

- **GFC (2007 – 2009)**: Similar to financial institutions, financial markets experienced the lowest levels of development across all dimensions during the GFC periods, showing the brunt of the crisis' impact in Q4 2008 to Q1 2009 as depicted in Figure 9. This was likewise mirrored in the Philippine Composite Index of Financial Stress (PCIFS) as depicted in Figure 10, when almost all variables were at very high levels indicating greater financial stress.[25] Moreover, the financial market depth sub-index recorded

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[24] In the construction of FM depth sub-index, domestic debt securities issuances were not included. The authors intend to include these indicators in the updating/upgrading of the construction of the indices in the future.

[25] A financial stress index produced by the BSP, which gauges the overall stress in the Philippine financial markets as well as its four sub-markets, namely: money, bond, equities, and foreign exchange markets.

levels that are relatively modest post-GFC to trend within the range of 10 percent to 40 percent. This development can be attributed to the decline in long-term foreign holdings of debt securities amid the shift or preference over shorter tenors post GFC in a bid to shore up liquidity in the system. At the same time, this resulted from the National Government's shift to domestic borrowings in a bid to minimize foreign exchange rate risks as well as promote capital market development.[26]

- **Investment rating upgrade and US Taper Tantrum (2013)**: The Philippine stock market was among the ASEAN economies' stock markets (along with that of Thailand) that performed the best from the start of Q1 2013 during the Philippines' first-ever investment grade score until talks of impending Fed's taper tantrum in Q2 2013 (Estrada et al, 2015).[27] This external development was reflected in evident drops in all FM sub-indices until Q3 2013. The taper tantrum also resulted in a stress episode in the PCIFS when it breached the lower distress threshold.

- **External developments (2015, 2016, 2017, 2018)**: In addition, the slowdown in the Chinese economy in tandem with the US Fed's rates hike as well as the Brexit in Q3 2015 and Q3 2016, respectively, contributed to decline in the levels of FM sub-indices. At the same time, the downturn in emerging markets (Brazil, China, and Russia) as well as the Greek's bailout referendum resulted in a dip in FM depth sub-index in 2016. The FM depth sub-index improved in 2017 on the back of higher net investments in foreign equity securities by local corporates and debt securities by local banks[28] amid recovering global economic growth and solid Philippine economy.

  Meanwhile, the brewing trade tensions between China and the United States in 2018 alongside domestic price pressures, which led the BSP to raise policy rate by 175 basis points, contributed to the bearish stance of the financial markets, with companies postponing their expansion activities.

- **COVID-19 pandemic (2020)**: The global health crisis in 2020 also manifested a steep decline in the FM sub-indices. Investor sentiment continued to be dampened by developments related to the pandemic while business operations adjusted to stringency measures implemented by the National Government in a bid to stop the spread of the virus. The latter manifested in the drop of the market capitalization of listed firms which contributed to the decline in the access, depth, and stability sub-indices. Investors reacted quite fast to these events where the after-effects to the

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The upper distress threshold is currently set to 0.75 and is based on the benchmark period 18 March 2008 when global credit conditions started to deteriorate. Hence, this is also the benchmark measure for extreme stress levels that could potentially lead to a financial crisis. Meanwhile, the lower distress threshold is set as three consecutive weeks when the index is at least one standard deviation above the previous quarter's average PCIFS. The distress threshold must be breached in at least three of the four sub-markets before a warning is raised.

[26] Pre-GFC, the financing mix averaged 73:27, in favor of the domestic debt market. In 2013, this has shifted to 94:6, a significant increase in the share of the domestic creditors.

[27] The US Federal Reserve announced in May 2013 that it will taper its monthly bond-buying program starting in January 2014.

[28] Balance of Payments and International Investment Position Reports.

Philippine financial markets are observed either contemporaneously or subsequently. Nonetheless, these markets bounced back relatively quick as observed in the movements of FM access, depth and stability sub-indices in Q3 2020. This is also mirrored in the PCIFS where financial market stress increased on concerns over the pandemic around Q2 2020 before declining on improved investor sentiment following favorable external sector indicators as well as government measures that contributed to resumption of economic activities (i.e., easing of lockdown measures, vaccination roll-out).

Figure 10: Philippine Composite Index of Financial Stress (PCIFS)
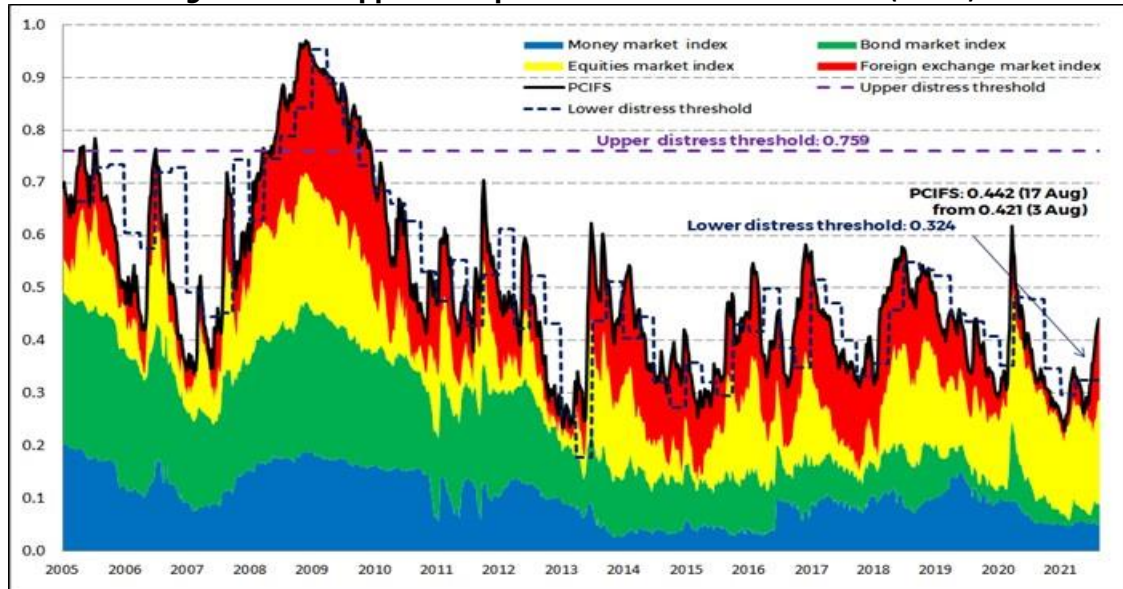
Source: Department of Economic Research (DER)

5.3   Overall Financial Development Landscape of the Philippines

The overall financial development landscape of the Philippines is influenced by the extent and level of development in both financial institutions and markets as evidenced in their PCA-based equal weight contribution. With the ever-evolving structural changes in the Philippine financial system, associated with the increased financial liberalization, attributing financial development to select indicators in banking institutions only offers weak and partial analysis of financial development.

The existing proxy variable used in the assessment of the extent of financial development in the Philippines is the private sector credit to GDP, which is a measure to capture financial depth. However, as visualized in Figure 11, we note that there is no perfect correlation between financial development and private sector credit to GDP ($\rho = 0.56$). This implies that large amounts of credit provision do not necessarily correspond to broad access to and efficient delivery of financial services. Indeed, financial development is a multi-dimensional process and needs to be examined in a more comprehensive way, considering access, depth, efficiency, and stability. The FD index incorporates a broader range of information that transcends beyond just one dimension of financial development or financial institutions alone.

Figure 11: Correlation of FD Index with Private Sector Credit-to-GDP
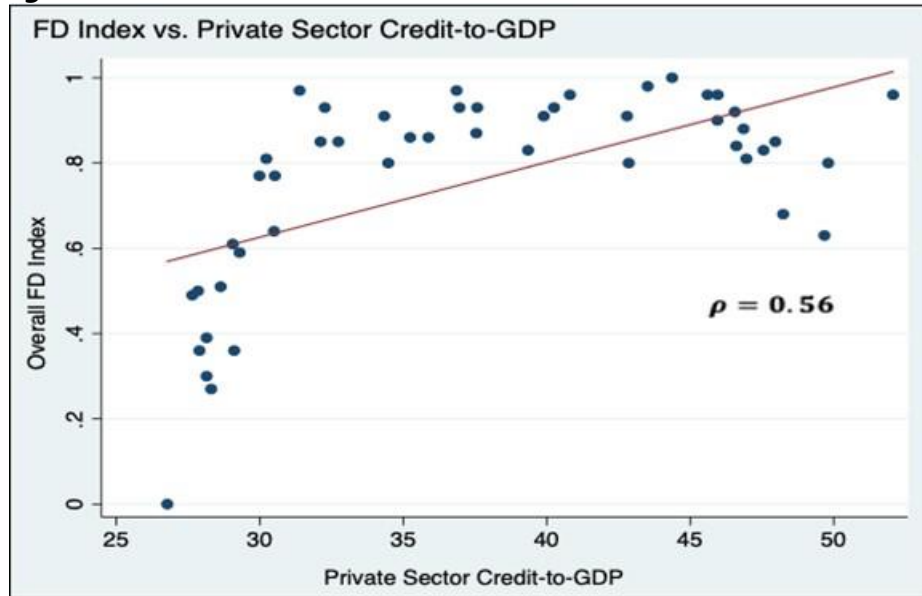
Source: Authors' estimates

Meanwhile, the evolution of the Philippine FD index throughout the sample period illustrates a pattern that generally slopes upward. Taken as a whole, the Philippine financial system has progressed and developed quite remarkably (Figure 11).

Figure 12: Overall Financial Development Through Time
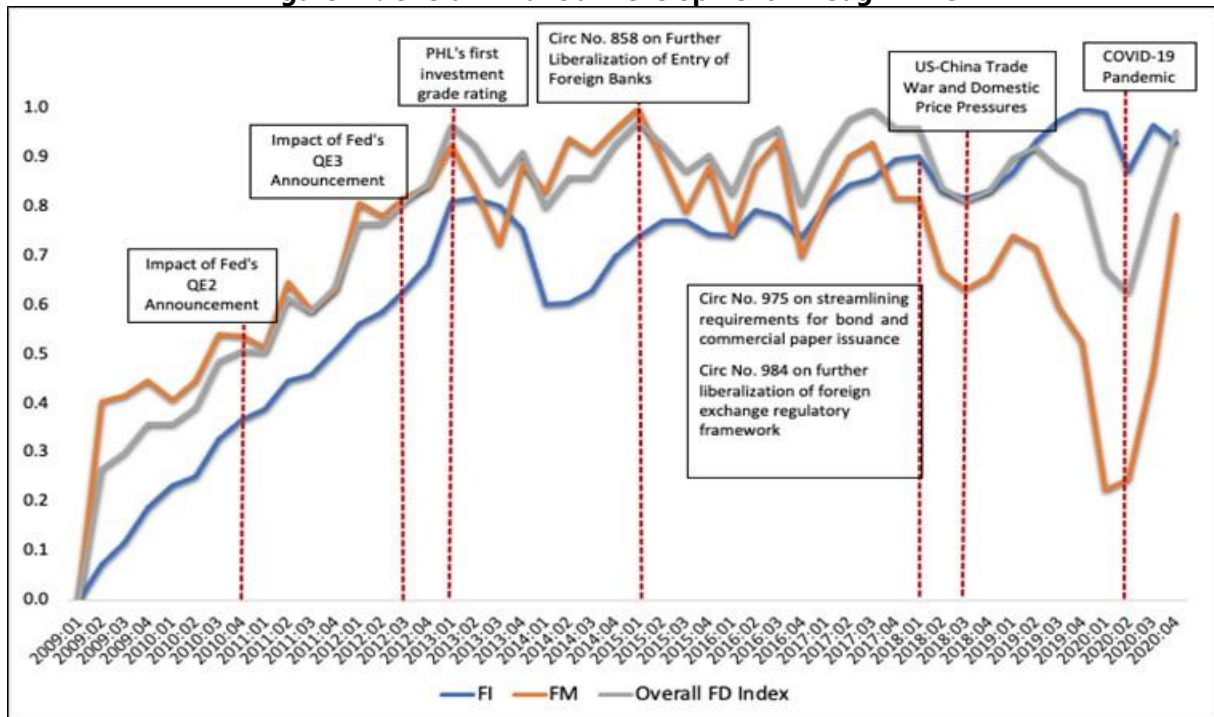
Source: Authors' estimates

Notable developments in the financial system can be attributed to external economic events as well as the developments in the regulatory environment for both financial markets and institutions.

- **Quantitative easing by the Federal Reserve (2010, 2012)**: The Fed's announcement of its second and third rounds of quantitative easing (QE2 and QE3) resulted in an increase in the FM index in Q4 2010 and Q3 2012 (Gertler and Karadi, 2012). The Philippine financial markets benefitted from periods of low interest rates in the US, which consequently led to substantial capital inflows.

- **US-China trade tensions (2018)**: Investors were alarmed by the trade tensions between China and the US as well as domestic inflation concerns stemming from supply-side issues such as the rising global oil prices and the higher excise taxes (i.e., TRAIN Law). Companies who were considering holding their initial public offering in 2018 postponed their activity as the risk of not generating enough interest from investors came to a head (PSE, 2019).

- **COVID-19 pandemic (2020)**: Conversely, the recent global pandemic that spared no economic territory caused stock markets worldwide to crater following the declaration of World Health Organization (WHO) on 30 January 2020 that the coronavirus is a global public health emergency (Zhang et al, 2020).

- **Adoption of policies on financial access and inclusion (2014, 2018)**: The issuance of Circular No. 858 on further liberalization of entry of foreign banks built a more competitive banking industry and, at the same time, attracted more foreign direct investments.[29] Moreover, the BSP's further liberalization of its foreign exchange rules to facilitate flows of foreign portfolio investments fuelled the development not only in financial institutions but also in capital markets. Hence, these developments contributed to higher levels of financial development in the Philippine financial system.

- **Monetary policy normalization (2014):** The dip in the FI index in 2014 is attributed to the relatively low levels of efficiency and stability sub-indices of FI (see Figure 8), which is primarily due to the significant sell down of financial assets amid falling prices during the start of monetary policy normalization in AEs in 2014. This development consequently led to reduced bank profitability amid lower earnings from non-interest-based banking activities.

6.   Conclusion and Directions for Future Research Initiatives

6.1   Conclusion

It has long been recognized that financial development is a complex and multi-dimensional concept. Yet, the usual measures of financial development – private sector credit and stock market capitalization as percent of GDP – are poor proxy variables of what the financial system actually does. In this study, we created a multi-dimensional financial development index for the Philippines that captures the: (i) access, the degree in which individuals can and do use financial services; (ii) depth, the size of financial intermediaries and

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[29] https://www.bsp.gov.ph/Regulations/FAQ/FAQ_C858.pdf

markets; (iii) efficiency of financial institutions and markets in intermediating resources and facilitating transactions; and (iv) stability of the financial system.

The four (4) dimensions of financial system are measured both for financial institutions (banks and insurance companies) and financial markets (bond and stock markets). This results in a total of eleven (11) indices – eight (8) sub-indices to quantify access, depth, efficiency and stability in financial institutions and markets; two (2) higher-level indices to gauge the extent of development in financial institutions and markets; and one (1) overall index to measure financial development in the Philippines.

Our study provides evidence that focusing only on financial institutions or on one feature of the financial system would mean ignoring other important aspects of financial development. We also illustrate that financial access, depth, efficiency and stability are four (4) distinct dimensions of financial development. It is, therefore, important to examine and understand financial development through the lens of these four (4) dimensions to pin down the likely sources of fragilities in the Philippine financial system or to identify which aspects of financial development influence a country's macroeconomic performance. The study likewise shows that, overall, the Philippine financial system has developed and progressed following the aftermath of GFC, with both the financial institutions and markets trekking a generally upward trend.

6.2   Directions for Future Research Initiatives

The authors recognize that the financial system is a set of institutions, markets, instruments, alongside the regulatory and legal framework in which these operate. While the index characterizes the Philippine financial system in terms of depth, access, efficiency, and stability, it does not directly include underlying drivers such as the supervisory, regulatory, and legal frameworks. Moreover, as the Philippine financial landscape continues to develop, there will be more room to expand the data coverage that can further explain the intricate process of financial development.

One example is the inclusion of foreign exchange (forex) markets in the index. Emerging market economies, including the Philippines, benefitted from the surge of forex inflows through the significant build-up of international reserves that help cushion the economy from external shocks. A flexible exchange rate is beneficial in smoothing output volatility and reducing currency mismatch vulnerabilities, which, in turn, can help deepen domestic financial markets. A possible extension of the study would be the inclusion of variables related to exchange rate flexibility and the impact to the local currency government bond market to assess its potential implications on financial development. Another area of future research is the inclusion of the derivatives market, which is important in understanding and analyzing the risk management or hedging strategy of financial and non-financial institutions. While currently small, this market is also important in the development of markets for the country.

Another avenue for future research would be the inclusion of other types of non-banks or other financial corporations (OFCs) apart from the private insurance industry. Due to the

limited sample size, a shorter period was evaluated for the construction of the multi-dimensional financial development index for the Philippines. Given these challenges, the authors will continue to improve the index over time as data coverage widens and more advanced methodology for index aggregation develops. Finally, a possible aspect to be covered for future research studies is the establishment of an index for ASEAN economies.

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Appendix

Appendix 1: IMF-based Financial Development Index Variables

Dimension	Financial Institutions	Financial Markets
Access	Bank branches per 100,000 adults	Percent of market capitalization outside of top 10 largest companies
	ATMs per 100,000 adults	Total number of debt issuers (domestic and external, nonfinancial and financial corporations)
Depth	Private sector credit-to-GDP	Stock market capitalization to GDP
	Pension fund assets to GDP	Stocks traded to GDP
	Mutual fund assets to GDP	International debt securities of government to GDP
	Life insurance premiums to GDP	Total debt securities of financial corporations to GDP
	Nonlife insurance premiums to GDP	Total debt securities of nonfinancial corporations to GDP
Efficiency	Net interest margin	Stock market turnover ratio
	Lending-deposits spread	
	Non-interest income to total income	
	Overhead costs to total assets	
	Return on assets	
	Return on equity	

Appendix 2: Summary Statistics of the Underlying Data

Variables		Obs	Mean	Std. Deviation	Min	Max
Code	Name					
Financial Institutions Access						
FIA1	ATMs per 100,000 adults	83	11.41	5.48	4.69	20.67
FIA2	Depositors with banks per 1,000 adults	63	414.37	81.65	325.96	669.06
FIA3	Financial institutions offices per 100,000 adults	47	26.61	1.76	19.77	28.46
FIA4	Insurance density	55	506.36	194.25	237.17	831.49
Financial Institutions Depth						
FID1	Life insurance premiums to GDP	55	1.10	0.27	0.60	1.55
FID2	Non-life insurance premiums to GDP	55	0.44	0.05	0.32	0.58
FID3	Insurance industry's total assets to GDP	52	7.61	1.26	5.73	9.77
FID4	Private sector credit to GDP	76	34.51	7.20	24.82	49.72
FID5	M3 to GDP	76	50.48	9.47	38.16	73.66
Financial Institutions Efficiency						
FIE1	Bank net interest margin	51	3.66	0.31	3.23	4.23
FIE2	Bank non-interest income to total income	51	31.20	6.08	22.42	43.81
FIE3	Return on assets	51	1.29	0.25	0.77	1.98
FIE4	Return on equity	51	10.63	1.79	6.85	15.35
FIE5	Bank cost to income ratio	51	64.01	3.61	55.25	73.97
Financial Institutions Stability						
FIS1	Bank's Z-score	51	5.55	1.02	3.44	8.36
FIS2	Non-performing loans to total loans	51	2.85	0.87	1.73	5.02
FIS3	Bank equity to total assets	51	12.11	0.73	10.55	14.40
FIS4	Capital adequacy ratio	59	15.89	1.05	14.32	18.03
FIS5	Liquid assets to total deposits	51	53.46	4.09	45.68	60.22
FIS6	Loans to deposits	51	71.26	4.60	64.36	80.49
Financial Markets Access						
FMA1	Nonfinancial corporate bonds to total debt securities issuances	83	38.68	15.48	13.16	57.84
FMA2	Market capitalization excluding top 10 companies to total market capitalization	82	17.95	6.79	9.13	32.10
FMA3	Financial institutions offices per 100,000 adults	83	54.18	11.38	22.62	72.88
Financial Markets Depth						
FMD1	Stock market capitalization to GDP	79	87.14	19.52	47.88	121.35
FMD2	International debt securities issuances of government to GDP	78	12.99	3.37	8.83	19.89
FMD3	International debt securities issuances of private sectors to GDP	78	14.13	3.84	10.01	23.11
FMD4	Total international debt securities issuances to GDP	78	27.12	6.64	19.26	41.58
FMD5	Gross portfolio equity liabilities to GDP	76	11.32	4.84	2.42	18.38

Variables		Obs	Mean	Std. Deviation	Min	Max
Code	**Name**					
FMD6	Gross portfolio debt securities liabilities to GDP	76	12.96	4.00	7.86	21.39
FMD7	Gross portfolio equity assets to GDP	76	0.22	0.24	0.02	1.04
FMD8	Gross portfolio debt securities assets to GDP	76	4.33	0.94	2.84	7.15
Financial Markets Efficiency						
FME1	Stock market turnover ratio	79	25.61	1.66	19.31	29.47
FME2	Bond market turnover ratio	59	26.49	16.25	3	85
FME3	Stock market trading volume	63	147.83	94.15	34.68	431.85
FME4	Bond market trading volume	59	890.42	548.68	70.17	2893.42
Financial Markets Stability						
FMS1	Stock price volatility	83	9.62	3.79	4.75	26.36
FMS2	Price earnings ratio	83	16.57	3.03	9.47	22.19
FMS3	Short-term debt securities to total debt securities issuances	53	4.66	3.03	0.30	14.05

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