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**Article**

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## FINANCIAL ECONOMICS | RESEARCH ARTICLE

# Analysing the macroeconomic drivers of stock market development in the Philippines

Sin-Yu Ho<sup>1\*</sup> and N.M. Odhiambo<sup>1</sup>

**Abstract:** This paper analyses the macroeconomic drivers of stock market development in the Philippines during the period 2001Q4–2016Q4. In particular, the paper examines the impact of banking sector development, inflation rate, exchange rate, economic growth, trade openness and stock market liquidity on the development of the Philippine stock market. Theoretical and empirical literature reveals diverse views on the relationship between each determinant and stock market development. In addition, the Philippine stock market has experienced remarkable growth in recent decades. However, there is no similar study on this country in the literature. The paper, therefore, enriches the literature by investigating the macroeconomic drivers of stock market development in the Philippines using the ARDL bounds testing procedure. The results show that trade openness has had a negative impact on Philippine stock market development in the long run, whereas banking sector development and the exchange rate have had positive impacts on the development of the Philippine stock market in the short run. These findings are robust to alternative specifications of the model.

**Subjects:** Economics; Econometrics; Finance

**Keywords:** macroeconomic drivers; stock market development; the Philippines; ARDL bounds testing

**JEL codes:** C22; E44; G23

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### PUBLIC INTEREST STATEMENT

The Philippine stock market has experienced phenomenal growth in recent decades. The global ranking of the stock exchange improved from 55th in 2005 to 12th in 2014 as measured by the market capitalisation ratio. In view of this remarkable growth, this paper analyses the macroeconomic drivers of stock market development in the Philippines during the period 2001Q4–2016Q4. The study shows that trade openness has had a negative impact on Philippine stock market development in the long run, whereas banking sector development and the exchange rate have had positive impacts on the development of the Philippine stock market in the short run. Based on these findings, policymakers should promote the use of equity financing in the production of main exports, enhance banking sector development, and maintain the stability of its domestic currency to foster stock market development.

## 1. Introduction

What are the key macroeconomic drivers of stock market development? A number of studies show the importance of stock markets in promoting economic growth through various channels. These channels encompass reducing the cost of mobilising savings, providing market liquidity, improving corporate governance and promoting international risk-sharing (see Bencivenga, Smith, & Starr, 1996; Greenwood & Smith, 1997; Jensen & Murphy, 1990; Levine, 1991; Obstfeld, 1994). Owing to its importance, an increasing number of studies have tried to answer the question by investigating the factors leading to the growth of stock markets. The macroeconomic factors being identified include economic development, banking sector development, inflation rate, exchange rate, foreign direct investment, trade openness and stock market liquidity.

While there is a number of studies examining the factors leading to the stock market development, the existing literature shows that the relationship between each of the macroeconomic factors and stock market development is highly debatable. For example, on the relationship between the banking sector and the stock market, some studies show that they are negatively related, while others show that they are positively related (see, for example, El-Nader & Alraimony, 2013; Levine, 1997, 2005). For the inflation rate, existing studies also show inconclusive results. Some argue that a higher inflation rate has a negative impact on stock market development, whereas others argue that the inflation rate can be positively associated with stock market returns in a high inflationary environment (see Ben Naceur, Ghazouani, & Omran, 2007; Boyd, Levine, & Smith, 1996, 2001). With regard to the exchange rate, studies also show mixed results concerning the relationship between exchange rate behaviour and stock market performance (see Gavin, 1989; Phylaktis & Ravazzolo, 2005). On the relationship between foreign direct investment (FDI) and stock market development, studies also reveal opposing views (see Hausmann & Fernández-Arias, 2000a, 2000b; Malik & Amjad, 2013). On the relationship between trade openness and stock market development, some studies show that trade openness exerts a positive impact on stock market development, whereas others find that it hurts stock market development (see Kim, Lin, & Suen, 2011; Niroomand, Hajilee, & Al Nasser, 2014; Rajan & Zingales, 2003). To sum up, the literature reveals diverse views on the impact of macroeconomic factors on stock market development. Against this background, this paper contributes to the existing debate by investigating the impact of various macroeconomic factors on stock market development in the Philippines.

In recent decades, the Philippine stock market has experienced phenomenal growth. Measured in terms of the share price index, namely PSEi, it increased from 1,869 points in 1997 to 7,230 points in 2014 (PSE, 2000–2014; World Federation of Exchanges [WFE], 2015). The growth momentum was shown by the consecutive growth of PSEi during the period 2009–2014, with a cumulative growth of 286 per cent in these six consecutive years (WFE, 2015). In addition, the extraordinary growth of the stock market in the country can be indicated by the size of the stock market as measured by the market capitalisation ratio. The global ranking of the PSE improved from 55th in 2005 to 12th in 2014 (World Development Indicators [WDI], 2016). Despite its remarkable growth, there is, to the best of our knowledge, no similar study on the drivers of stock market development in the Philippines. Therefore, this paper enriches the literature by investigating the macroeconomic drivers of stock market development in the country using autoregressive distributed lag (ARDL) bounds testing technique.

The rest of the paper is organised as follows: Section 2 provides an overview of stock market development in the Philippines. Section 3 discusses the theoretical and empirical underpinning of the determinants of stock market development. Section 4 outlines the empirical methodology and the data. Section 5 presents the empirical results. Finally, Section 6 concludes the paper.

## 2. Stock market development in the Philippines

The Philippine Stock Exchange (PSE), namely the Manila Stock Exchange established in 1927, is one of the oldest stock exchanges in Asia (PSE, 2015; Visda, Crisostomo, & Padilla, 2013). Over time, the number of listed securities increased as public interest grew. In 1963, a second stock exchange, namely the Makati Stock Exchange, was established and started to operate in 1965 in Makati (PSE, 2012; World Bank, 1992). During the 1970s, stock market activities were insignificant both in absolute and relative terms compared with other financial sectors. The trading volume was small and many listed companies were inactive for a significant period of time. Companies listing on the exchanges mainly consisted of those in the mining and oil sectors, where purely speculative movements took place (World Bank, 1992).

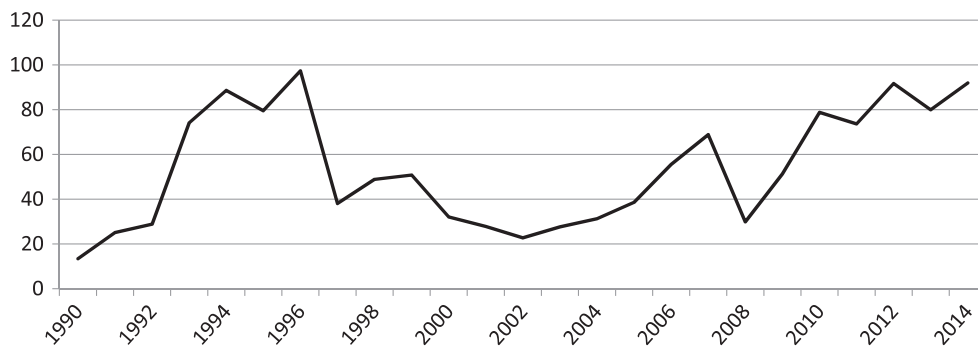
In order to revitalise the stock market, the country has undergone a series of reforms since the 1990s. These reforms include the unification of the two stock exchanges, the demutualisation of the stock exchange, and the enactment of the Securities Regulation Code (see Ho & Odhiambo, 2015). The aim of the stock exchanges unification was to reduce confusion among investors. Such confusion stemmed from the different policies, different members, and, most importantly, different prices for the same listed stocks on the two stock exchanges (PSE, 2015). Another reason for the unification of the exchanges was to achieve economies of scale through reducing operating costs. Therefore, in 1992, the government introduced a policy of consolidating the operations of the two exchanges, and a unified stock exchange named the Philippine Stock Exchange (PSE) was incorporated (PSE, 2015). This measure encouraged the development of a more efficient capital market by ensuring a level playing field for all investors, by consolidating logistics, and, as stated, by reducing operating costs (see De los Angeles, 1995).

Another fundamental change was the demutualisation of the stock exchange in 2001 (Akhtar, 2002). During the process of demutualisation, the PSE was transformed from a members' association into a for-profit stock corporation, in the process evolving into a new corporate, legal and business model. In the course of its transformation, the PSE underwent a series of structural changes in terms of ownership structure, the business of the stock exchange, trading rights, corporate governance, and its statutory regulatory role (Alinsunurin, 2002). Later, in 2003, the PSE was listed by way of introduction, which significantly reduced broker ownership (Akhtar, 2002). Alongside the structural reforms undertaken by the PSE, reforms were carried out to improve the regulatory capacity of the Securities and Exchange Commission (SEC). The SEC was established by the government early in 1936 as a primary regulatory authority in respect of the capital markets (World Bank, 1992). However, the effectiveness of the SEC was hindered by the resource-intensive tasks such as company registration and monitoring, and quasi-judicial functions (International Monetary Fund [IMF], 2004; SEC, 2015). To allow the SEC to function effectively, the Securities Regulation Code (SRC) was enacted in 2000, which led to organisational change and capital-building (IMF, 2004). The major achievements brought about by the SRC were confirmed by the assessment of security-regulation principles conducted by the IMF. The report noted that the country had performed very well against the principles of the International Organisation of Securities Commissions (IMF, 2004).

As a result of all the reforms, the Philippine stock market has experienced phenomenal growth over the years. Measured by the share price index, the PSEi generally trended upward during the period 1997–2014. It increased from 1,869 points in 1997 to 7,230 points in 2014 (PSE annual reports, 2000–2014; WFE, 2015). The growth momentum was shown by the consecutive growth of the PSEi during the period 2009–2014, with a cumulative growth of 286 per cent in these six consecutive years (WFE, 2015). In addition, the extraordinary growth of the stock market in the country was shown by the market capitalisation ratio. As indicated above, the global ranking of the PSE improved from 55th in 2005 to 29th in 2010, and leaped to 12th in 2014 (WDI, 2016). As shown in Figure 1, the market capitalisation ratio experienced an upward trend, with volatile movements from 1990–2014. The ratio increased remarkably from 13 per cent in 1990 to 92 per cent in 2014, with an average of 8 per cent annual growth (WDI, 2016). However, the liquidity of the Philippine stock market as measured in terms of turnover ratio has been low over the past two decades. In particular, the Philippines

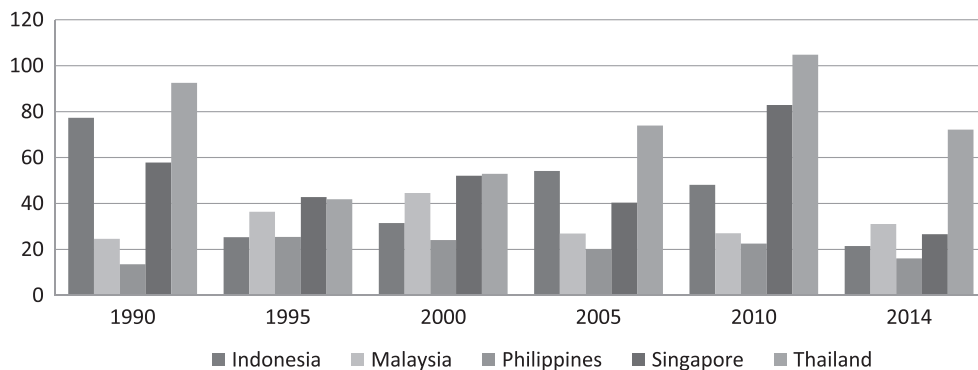
**Figure 1. The market capitalisation ratio of the PSE, 1990–2014.**

Source: Authors' own compilation based on WDI (2016).



**Figure 2. Turnover ratios of the ASEAN-5 stock exchanges, 1990–2014.**

Source: Authors' own compilation based on WDI (2016).



had the least liquid stock market in terms of turnover ratio among the ASEAN-5 countries<sup>1</sup> during the past two decades. Figure 1 shows the market capitalisation ratio of the PSE during the period 1990–2014. Figure 2 shows the turnover ratios of the ASEAN-5 stock exchanges during the period 1990–2014.

### 3. Literature review

Owing to the importance of stock markets in promoting economic growth, there are an increasing number of studies investigating the factors leading to the growth of stock markets. In the asset pricing models,<sup>2</sup> there are two broad categories of factors influencing stock prices. The first category is the macroeconomic factors, including economic growth, foreign exchange, inflation, industrial production, interest rates, oil prices, stock market volatility, liquidity of stock market, returns on investment and the risk factors that influenced the states of the current and future consumption. The second category is the portfolio characteristics. These characteristics include book-market relations, dividends or earnings, the size of company, the rate of return and the variance of asset returns (see Breeden, 1979; Cochrane, 1991; Fama, 1965; Lintner, 1965; Merton, 1973; Ross, 1976; Sharpe, 1964; Stulz, 1981a, 1981b).

Apart from the asset pricing models, there are a huge volume of studies linking stock market development to various macroeconomic factors. The macroeconomic factors encompass: economic development, banking sector development, inflation rate, exchange rate, foreign direct investment, trade openness and stock market liquidity. However, the relationship between these factors and the development of stock market are highly debatable in the literature (see Ho & Iyke, 2017). Regarding the relationship between the development of the banking sector and the stock market, the results of studies are inconclusive. Some studies argue that the banking sector and stock market are negatively related, while others suggest they are positively related. As far as negative relationship is concerned, various studies show that the banking sector performs better than the stock market in providing financial functions for the economy (see Bhide, 1993; DeAngelo & Rice, 1983; Stiglitz, 1985). However, other studies argue that the focus should be on the importance of the overall

financial market rather than the relative importance of the banking sector compared with the stock market (see Levine, 1997; Merton & Bodie, 1995, 2004). Furthermore, Levine (2005) argues that the banking sector and stock market are positively related when they provide financial services for the economy. On the empirical front, however, many studies show that the banking sector and stock market are positively related. These studies include those of Garcia and Liu (1999), Ben Naceur et al. (2007), Kurach (2010), Yartey (2007, 2010), El-Nader and Alraimony (2013), and Ho (2017).

As far as the inflation rate is concerned, existing studies show inclusive results on the relationship between inflation rate and stock market development. On the one hand, some argue that a higher inflation rate has negative impact on stock market development. For example, theoretical studies such as Azariadas and Smith (1996), Choi, Smith, and Boyd (1996), Huybens and Smith (1998, 1999) and Boyd et al. (2001) argue that higher inflation rates are associated with less liquid and smaller stock markets. In addition, they demonstrate that there exists a non-linear relationship between the inflation rate and financial market development, including stock market development. The empirical studies also support the argument that there is a negative and non-linear relationship between the inflation rate and stock market development (see Bayar, 2016; Ben Naceur et al., 2007; Boyd et al., 1996, 2001; Ho, 2017; Şükrüoğlu & Nalin, 2014). On the other hand, other studies reveal that inflation rate can have positive impact on the stock market through stock returns in a high inflationary environment (see Barnes, Boyd, & Smith, 1999; Boyd et al., 1996, 2001).

In terms of the exchange rate, economic theories demonstrate a strong association between exchange rate behaviour and stock market performance. They argue that currency appreciation (or depreciation) can have a negative (or positive) impact on stock prices (see Dornbusch & Fisher, 1980; Jorion, 1991). On the other hand, Gavin (1989) indicates that the relationship between exchange rate and stock prices can be positive or negative under different conditions. Such inconclusive results are also found in the empirical studies. For example, Ma and Kao (1990) find that currency appreciation adversely affects the stock market in an export-oriented economy, while it positively affects the stock market in an import-oriented economy. In contrast, Phylaktis and Ravazzolo (2005) show that stock prices and exchange rates are positively related.

On the relationship between FDI and stock market development, existing theoretical studies reveal opposing views. Some studies argue that FDI is simply a substitute for domestic stock market development, whereas others show that FDI promotes the growth of stock markets (see Claessens, Klingebiel, & Schmukler, 2001; Hausmann & Fernández-Arias, 2000a, 2000b). These opposing views are also found in the empirical studies. For example, Jeffus (2004) examines the nature of the association between FDI and stock markets in four Latin American countries and finds that FDI and stock market development are positively correlated. In the same vein, the findings of Malik and Amjad (2013) also show a positive relationship between FDI and aggregate market capitalisation in Pakistan. In contrast, Rhee and Wang (2009) show a negative association between FDI and stock market liquidity in Indonesia.

On the relationship between the trade openness and stock market development, some studies show that trade openness exerts a positive impact on stock market development, whereas others find that it hurts stock market development. In terms of positive relationship, theories suggest that trade openness benefits financial market development, including stock market, in two different ways, which can be described as “supply-side” and “demand-side” roles (Niroomand et al., 2014). The former one states that trade openness is conducive to the development of financial market through the supply side of financial market (see Braun & Raddatz, 2005; Rajan & Zingales, 2003). The latter one argues that trade openness foster development of financial market by raising the demand on financial services and products (see Newbery & Stiglitz, 1984; Svaleryd & Vlachos, 2002). In terms



of negative relationship, some empirical studies such as those of Jin (2006), Baltagi, Demetriades, and Law (2009), Kim et al. (2011), and Ho (2017) find that trade openness indeed inhibits the development of stock market.

The only consensus that has been reached is the impacts of economic development and the stock market liquidity on the stock market development. With respect to the relationship between economic development and stock market development, the theoretical literature in general suggests that real income level and real income growth have positive impacts on stock market development. These models show that there is a significant fixed cost associated with the formation of financial markets, including the stock market. When the economy develops, the relative importance of this fixed cost reduces. Therefore, more people can participate in the financial market (see Boyd & Smith, 1998; Greenwood & Jovanovic, 1990; Greenwood & Smith, 1997). On the empirical front, the positive relationship between economic growth and stock market development is well documented in the existing literature – see, for instance, Atje and Jovanovic (1993), Levine and Zervos (1998), Garcia and Liu (1999), El-Wassal (2005), Adjasi and Biekpe (2006), Kurach (2010), Yartey (2007, 2010), Raza, Jawaid, Afshan, and Karim (2015), Bayar (2016), Ho (2017, in press). In addition, concerning the relationship between stock market liquidity and stock market development, there is a concerted view that the liquidity of stock market is conducive to the development of stock market. These studies include those of Garcia and Liu (1999), Ben Naceur et al. (2007), Yartey (2007, 2010), Cherif and Gazdar (2010), Kurach (2010), El-Nader and Alraimony (2013), Şüküröğlü and Nalin (2014), and Bayar (2016).

#### 4. Methodology and data

##### 4.1. ARDL bounds testing procedure for co-integration

The present study uses the autoregressive distributed lag (ARDL) bounds testing procedure suggested by Pesaran, Shin, and Smith (1996), Pesaran and Shin (1999), and Pesaran, Shin, and Smith (2001) to investigate the long-run relationships between the development of a stock market and its sets of macroeconomic factors. This procedure is preferred to other procedures because it does not impose the restrictive assumption that all the variables being studied must be integrated of the same order. Instead, it can be applied to the time series which are integrated of order zero, one, or a mixture of both. In addition, while other co-integration tests are sensitive to the sample size, the ARDL bounds test is suitable even when the sample size is small (see Pesaran & Shin, 1999; Pesaran et al., 1996, 2001). In this paper, the ARDL bounds testing procedure employs the equation

$$\begin{aligned} \Delta \ln MCR_t = & \gamma_0 + \sum_{i=1}^n \gamma_{1i} \Delta \ln MCR_{t-i} + \sum_{i=0}^n \gamma_{2i} \Delta \ln BNK_{t-i} + \sum_{i=0}^n \gamma_{3i} \Delta \ln INF_{t-i} + \sum_{i=0}^n \gamma_{4i} \Delta \ln REERI_{t-i} \\ & + \sum_{i=0}^n \gamma_{5i} \Delta \ln RGDP_{t-i} + \sum_{i=0}^n \gamma_{6i} \Delta \ln OPEN_{t-i} + \sum_{i=0}^n \gamma_{7i} \Delta \ln TOR_{t-i} + \delta_1 \ln MCR_{t-1} \\ & + \delta_2 \ln BNK_{t-1} + \delta_3 \ln INF_{t-1} + \delta_4 \ln REERI_{t-1} + \delta_5 \ln RGDP_{t-1} + \delta_6 \ln OPEN_{t-1} + \delta_7 \ln TOR_{t-1} + \varepsilon_t \end{aligned} \quad (1)$$

where  $\varepsilon$ ,  $\gamma$  and  $\delta$  are the white-noise error term, the short-run coefficients, and the long-run coefficients of the model, respectively, and  $\Delta$  is the first difference operator. In addition,  $t$  denotes time period and  $n$  is the maximum number of lags in the model. The variables, namely  $\ln MCR$ ,  $\ln BNK$ ,  $\ln INF$ ,  $\ln REERI$ ,  $\ln OPEN$  and  $\ln TOR$ , are the natural logarithms of the market capitalisation ratio, domestic credit to gross domestic product (GDP), inflation rate, real effective exchange rate index, trade as a percentage of GDP and turnover ratio, respectively. Furthermore, the maximum number of lags in the model is chosen based on the Schwarz criterion (SC).

In the first stage, the null hypothesis of the no co-integration relationship

$$H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = 0$$

is tested against the alternative hypothesis of the existence of a co-integration relationship

$$H_1: \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \delta_7 \neq 0$$

From Equation (1), there are co-integrating relationships between the series if at least one of the  $\delta$ s is significantly different from zero. The second stage is to consider the  $F$ -statistic. There are two sets of critical values that have been constructed by Pesaran et al. (2001) under this null hypothesis. We do not reject the null hypothesis of no co-integration when the  $F$ -statistic falls below the lower-bound values. Similarly, we reject the null hypothesis of no co-integration when the calculated  $F$ -statistic is greater than the upper-bound values. However, when the  $F$ -statistic falls between the lower and upper bounds, the test is inconclusive.

If the variables are found to be co-integrated, then the study proceeds to estimate the short-run behaviour of the variables using an error-correction model formulated as

$$\begin{aligned} \Delta \ln MCR_t = & \gamma_0 + \sum_{i=1}^n \gamma_{1i} \Delta \ln MCR_{t-i} + \sum_{i=0}^n \gamma_{2i} \Delta \ln BNK_{t-i} + \sum_{i=0}^n \gamma_{3i} \Delta \ln INF_{t-i} + \sum_{i=0}^n \gamma_{4i} \Delta \ln REERI_{t-i} \\ & + \sum_{i=0}^n \gamma_{5i} \Delta \ln GDPG_{t-i} + \sum_{i=0}^n \gamma_{6i} \Delta \ln OPEN_{t-i} + \sum_{i=0}^n \gamma_{7i} \Delta \ln TOR_{t-i} + \delta ECM_{t-1} + \varepsilon_t \end{aligned} \quad (2)$$

where  $\delta$  is the coefficient of the error-correction term,  $ECM_{t-1}$ .  $\delta$  is expected to have a negative sign. This implies that, when the variables drift apart from the equilibrium level in the short run, they can quickly adjust back to their equilibrium levels.

#### 4.2. Data and identification of variables

This study utilises quarterly time-series data covering the period 2001Q4–2016Q4. The covering period in the study is solely dictated by the data availability. The data have been obtained from different sources, including the International Financial Statistics of the International Monetary Fund (International Financial Statistics [IFS, 2017]; and the World Federation of Exchanges [WFE], 2014, 2017). To assess the macroeconomic drivers of stock market development, the study needs: a measure of stock market development and measures of macroeconomic variables. In terms of stock market development, the study uses the market capitalisation ratio to measure the development of the stock market. This is the value of listed domestic shares on the domestic exchange divided by GDP. This indicator is used based on the following considerations. First, the level of market capitalisation is a desirable indicator which reflects the ability of the stock market in mobilising capital and diversifying risk (Demirgüç-Kunt & Levine, 1996). Second, this proxy has also been widely used to measure stock market development in other empirical studies (see, for example, Boyd et al., 2001; Garcia & Liu, 1999; Şüküröğlu & Nalin, 2014; Yartey, 2007, 2010). Third, despite the fact that stock market is a multifaceted concept that can be measured by various indicators, Demirgüç-Kunt and Levine (1996) argue that all of these stock market indicators are significantly correlated. Therefore, the market capitalisation ratio is used to measure stock market development in this study. Table 1 show the proxies, sources and justifications of all the variables used in this study.



**Table 1. Proxies, sources and justifications of the variables used in this study**

Variable	Proxy	Source	Justification
Stock market development (MCR)	Market capitalisation to GDP	Authors' calculation based on WFE (2014) and IFS (2017)	Garcia and Liu (1999), Boyd et al. (2001), Yartey (2010), Şükrüoğlu and Nalin (2014)
Banking sector development (BNK)	Domestic credit to GDP	Authors' calculation based on IFS (2017)	Levine, Loayza, and Beck (2000), Beck, Demirgüç-Kunt, and Levine (2007), Sehwat and Giri (2016)
Inflation rate (INF)	Annual percentage change of consumer price index	Authors' calculation based on IFS (2017)	Shan, Morris, and Sun (2001), Boyd et al. (2001), Marques, Fuinhas, and Marques (2013)
Exchange rate (REERI)	Real effective exchange rate index	IFS (2017)	Calvo, Leiderman, and Reinhart (1993), Abdalla and Murinde (1997), Chou (2000)
Economic growth (RGDPG)	Annual percentage change in real GDP	Authors' calculation based on IFS (2017)	Levine and Zervos (1998), Deb and Mukherjee (2008), Carp (2012)
Trade openness (OPEN)	Sum of exports and imports of goods and services as a share of GDP	Authors' calculation based on IFS (2017)	Rajan and Zingales (2003), El-Wassal (2005), Niroomand et al. (2014)
Stock market liquidity (TOR)	Turnover ratio	Authors' calculation based on WFE (2014)	Garcia and Liu (1999), Yartey (2007), Billmeier and Massa (2009)

Source: Authors' own compilation.

## 5. Empirical results

### 5.1. Results of stationarity tests

As a preliminary analysis, and prior to examining the nature of the relationship between stock market development and its sets of macroeconomic drivers, the stationary properties are examined. The variables include the market capitalisation ratio, domestic credit to GDP, the inflation rate, real effective exchange rate index, real GDP growth, value of exports and imports to GDP, and turnover ratio. To examine their stationary properties, the study uses two unit roots tests. They are the Dickey-Fuller generalised least squares (DF-GLS) test developed by Elliot, Rothenberg, and Stock (1996), and the Perron (PPURoot) test developed by Perron (1997). Table 2 shows the results of unit roots tests of the variables in levels and at the first differences.

In Table 2, the results show that variables such as  $\ln TOR$  are stationary in levels, while  $\ln MCR$ ,  $\ln BNK$ ,  $\ln REERI$  and  $\ln OPEN$  are stationary at the first differences. For the variables, such as  $\ln INF$ , and  $\ln RGDPG$ , the Dickey-Fuller Generalised Least Squares test shows that they are stationary in levels, while the Perron test suggests that they are stationary at first differences. Having established that the variables are integrated of order zero  $I(0)$  or one  $I(1)$ , the study can proceed to test the long-run relationships between the stock market development and its drivers using the ARDL bounds testing procedure.

### 5.2. Empirical analysis using the ARDL bounds testing procedure

The results of the ARDL bounds test for co-integration show that the calculated  $F$ -statistic is 3.586, which is higher than the critical value reported by Pesaran et al. (2001) in Table CI (iii) Case III. Therefore, the results show that the variables used are co-integrated. See Table 3 for the result of ARDL bounds testing for co-integration, and the critical values of the ARDL bounds test. Having found that  $\ln MCR$ ,  $\ln BNK$ ,  $\ln INF$ ,  $\ln REERI$ ,  $\ln RGDPG$ ,  $\ln OPEN$  and  $\ln TOR$  are co-integrated, the study estimates the model using the ARDL bounds test approach. The first step is to determine the optimal lag length for the model using the Schwarz criterion (SC). The optimal lag length selected based on SC is ARDL (2, 1, 0, 3, 0, 1, 0). The long-run and short-run results of the model are reported in Table 4.

**Table 2. Results of unit roots tests of the variables in levels and at the first differences**

Variable	Stationarity of all variables in levels		Stationarity of all variables at first differences	
<b>Dickey–Fuller generalised least squares (DF-GLS) test</b>				
	Without trend	With trend	Without trend	With trend
<i>lnMCR</i>	-0.346	-3.647**	-5.133***	-2.914*
<i>lnBNK</i>	-0.751	-0.893	-3.050***	-3.750***
<i>lnINF</i>	-2.856***	-3.233**	–	–
<i>lnREERI</i>	-0.332	-1.665	-4.762***	-5.409***
<i>lnRGDPG</i>	-3.037***	-3.371**	–	–
<i>lnOPEN</i>	-1.288	-1.771	-2.537**	-3.591**
<i>lnTOR</i>	-2.038**	-3.303**	–	–
<b>Perron (PPURoot) test</b>				
<i>lnMCR</i>	-4.017	-4.357	-5.645**	-6.458***
<i>lnBNK</i>	-3.097	-4.055	-21.313***	-20.614***
<i>lnINF</i>	-4.252	-4.263	-5.607**	-5.434**
<i>lnREERI</i>	-4.446	-3.624	-7.308***	-7.214***
<i>lnRGDPG</i>	-5.171*	-3.713	-8.251***	-5.456***
<i>lnOPEN</i>	-3.253	-3.151	-14.213***	-12.911***
<i>lnTOR</i>	-5.012*	-5.705**	–	–

Source: Authors’ own compilation.  
 Note: “–” Denotes “not applicable”.  
 \*Denote significance at 10%.  
 \*\*Denote significance at 5%.  
 \*\*\*Denote significance at 1%.

The long-run regression results show that the key macroeconomic driver of stock market development is trade openness. The results show that coefficient of trade openness is negative and statistically significant. In particular, a percentage increase in the trade openness hurts stock market development by approximately 2.336 per cent in the long run. Such negative relationship can be explained by the comparative advantage in trade of the Philippines. According to Do and Levchenko (2007), the level of financial development, including stock market development, can be affected by the comparative advantage in trade of a country. They demonstrate that the comparative advantage in trade will affect the production pattern of a country, and hence the demand for external finance. In particular, countries that mainly export goods which do not heavily rely on external finance will experience a slower pace of financial development. In the case of the Philippines, the main exports have been the electrical components and equipment since the 1970s. In 2014, these sectors

**Table 3. Bounds test F-test for co-integration**

Dependent variable	Function		F-statistic		Cointegration status	
<i>lnMCR</i>	$F(\ln MCR   \ln BNK, \ln INF, \ln REERI, \ln RGDPG, \ln OPEN, \ln TOR)$		3.586*		Cointegrated	
Asymptotic critical value ( $k = 6$ )						
Pesaran et al. (2001), p. 300, Table CI(iii) Case III	1%		5%		10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	3.15	4.43	2.45	3.61	2.12	3.23

Note: \*denotes significance at 10%.

**Table 4. The long-run and short-run results of the selected model**

Regressor	Coefficient	Standard error	T-ratio	Probability
<b>Long-run results</b>				
<b>Dependent variable is lnMCR</b>				
LnBNK	0.311	0.582	0.534	0.596
LnINF	-0.205	0.176	-1.164	0.251
LnREERI	-2.001	1.912	-1.047	0.301
LnRGDPG	0.105	0.086	1.219	0.229
LnOPEN	-2.336**	1.142	-2.045	0.047
LnTOR	0.059	0.233	0.252	0.802
<b>Short-run results</b>				
<b>Dependent variable is <math>\Delta</math>lnMCR</b>				
$\Delta$ lnMCR(-1)	0.335***	0.095	3.538	0.001
$\Delta$ lnBNK	1.104***	0.349	3.161	0.003
$\Delta$ lnINF	-0.030	0.033	-0.909	0.368
$\Delta$ lnREERI	1.440***	0.416	3.462	0.001
$\Delta$ lnREERI(-1)	-0.082	0.464	-0.177	0.860
$\Delta$ lnREERI(-2)	1.303**	0.505	2.582	0.013
$\Delta$ lnRGDPG	0.001	0.025	0.032	0.975
$\Delta$ lnOPEN	0.078	0.206	0.381	0.705
$\Delta$ lnTOR	0.045	0.032	1.385	0.173
C	4.239***	0.969	4.376	0.000
ECM	-0.176***	0.040	-4.362	0.000

Note:  $\Delta$  = first difference operator.

Source: Authors' own compilation.

\*\*Denote 5% significant level.

\*\*\*Denote 1% significant level.

accounted for 47 per cent of the total exports of the country (see Frederick & Gereffi, 2016). However, these sectors only accounted for 0.3 per cent of the total market capitalisation in the PSE in 2014 (PSE, 2014). It is evident that these sectors have not heavily relied on external finance through the stock market. On the empirical front, the negative relationship between trade openness and stock market development is also found in other studies such as Jin (2006), Baltagi et al. (2009), Kim et al. (2011), and Ho (2017).

In addition, the short-run regression results show that the key macroeconomic drivers of stock market development are the banking sector development and the exchange rate. Regarding the impact of banking sector development, a percentage increase in banking sector development promotes stock market development by 1.104 per cent in the short run. Despite the coefficients of banking sector development in the long-run results is not statistically significant, the coefficients of both long and short-run results are positive, showing positive impact of banking sector development on stock market growth. In fact, the argument of positive association between the banking sector and stock market is well documented both theoretically (see, for example, Levine, 1997, 2005; Merton & Bodie, 1995, 2004) and empirically (see El-Nader & Alraimony, 2013; Garcia & Liu, 1999; Yartey, 2007, 2010). Concerning the impact of exchange rate, the short-run results shows that it exhibits positive and significant impacts on stock market development at different lags. In particular, a percentage increase in the current level of exchange rate benefits stock market development by approximately 1.440 per cent in the short run. In addition, the results show that a percentage increase in the second lag of exchange rate also benefits stock market development by approximately 1.303 per cent in the short run. The positive relationship between the exchange rate and stock market

**Table 5. Results of diagnostic tests**

Test	Statistic	p-value
Serial Correlation: CHSQ(2)	1.178	0.555
Functional Form: F(1,43)	1.555	0.219
Normality: CHSQ (2)	0.735	0.693
Heteroscedasticity: CHSQ (1)	0.360	0.549

Source: Authors' own compilation.

performance is also found in the studies such as Ma and Kao (1990) and Phylaktis and Ravazzolo (2005).

Furthermore, the results show that the coefficient of the error correction term is negative and statistically significant. This implies that, when the variables drift apart from the equilibrium level by 1 per cent in the short run, they correct by 0.176 per cent towards the equilibrium level. Overall, the regression for the underlying ARDL model fits well, as indicated by the adjusted R-squared of 75 per cent. On the diagnostic tests, the result displayed in Table 5 shows that the model passes all the diagnostic tests performed for serial correlation, functional form, normality and heteroscedasticity.

Figures A1(a) and A1(b) in the Appendix 1 shows the plot of the cumulative sum of recursive residual (CUSUM) and the cumulative sum of squares of recursive residual (CUSUMSQ) of the model, respectively. The reported CUSUM and CUSUMSQ show that the model is stable and confirm the stability of the long-run coefficients of regressors in the study.

### 5.3. Robustness check

To check for the robustness of the main model, this study also estimates another model that only includes the variables with significant results. They are *lnMCR*, *lnBNK*, *lnREERI* and *lnOPEN*. The long-run model is specified as

$$\Delta \ln MCR_t = \gamma_0 + \sum_{i=1}^n \gamma_{1i} \Delta \ln MCR_{t-i} + \sum_{i=0}^n \gamma_{2i} \Delta \ln BNK_{t-i} + \sum_{i=0}^n \gamma_{3i} \Delta \ln REERI_{t-i} + \sum_{i=0}^n \gamma_{4i} \Delta \ln OPEN_{t-i} + \delta_1 \ln MCR_{t-1} + \delta_2 \ln BNK_{t-1} + \delta_3 \ln REERI_{t-1} + \delta_4 \ln OPEN_{t-1} + \varepsilon_t \quad (3)$$

where  $\gamma$ ,  $\delta$  and  $\varepsilon$  are the short-run coefficients, the long-run coefficients of the model and the white-noise error term, respectively, and  $\Delta$  is the first difference operator. Also,  $t$  denotes time period, and  $n$  is the maximum number of lags in the model.

The short-run error-correction model is formulated as

$$\Delta \ln MCR_t = \gamma_0 + \sum_{i=1}^n \gamma_{1i} \Delta \ln MCR_{t-i} + \sum_{i=0}^n \gamma_{2i} \Delta \ln BNK_{t-i} + \sum_{i=0}^n \gamma_{3i} \Delta \ln REERI_{t-i} + \sum_{i=0}^n \gamma_{4i} \Delta \ln OPEN_{t-i} + \delta ECM_{t-1} + \varepsilon_t \quad (4)$$

where  $\delta$  is the coefficient of the error-correction term,  $ECM_{t-1}$ .

The optimal lag length selected based on SC is ARDL (2, 1, 3, 1), which is the same as the main model. The results of the ARDL bounds test for co-integration show that the calculated  $F$ -statistic is 5.071, which is higher than the critical value reported by Pesaran et al. (2001) as shown in Table CI (iii) Case III. The results show that the variables in the second model are co-integrated at the level of 5 per cent significance. The long-run and short-run results of the second model are reported in Table 6.

**Table 6. The long-run and short-run results of the second model**

Regressor	Coefficient	Standard error	T-ratio	Probability
<b>Long-run results</b>				
<b>Dependent variable is lnMCR</b>				
LnBNK	0.666	0.680	0.980	0.332
LnREERI	-1.170	1.565	-0.747	0.459
LnOPEN	-1.920**	0.907	-2.118	0.040
<b>Short-run results</b>				
<b>Dependent variable is ΔlnMCR</b>				
ΔlnMCR(-1)	0.386***	0.095	4.065	0.000
ΔlnBNK	1.233***	0.317	3.888	0.000
ΔlnREERI	1.439***	0.404	3.561	0.001
ΔlnREERI(-1)	-0.102	0.447	-0.228	0.820
ΔlnREERI(-2)	1.366***	0.465	2.936	0.005
ΔlnOPEN	0.087	0.179	0.489	0.627
C	3.024***	0.649	4.660	0.000
ECM	-0.179***	0.039	-4.645	0.000

Note: Δ = first difference operator.

Source: Authors' own compilation.

\*\*Denote 5% significant level.

\*\*\*Denote 1% significant level.

As indicated in Table 6, both the long-run and short-run results in the second model are similar to the findings of the main results. In the long run, the results show that the key macroeconomic driver of stock market development is trade openness. The results further indicate that trade openness inhibits the long-term development of the stock market. In the short run, the results show that the key macroeconomic drivers of stock market development are banking sector development and the exchange rate. Similar to the main results, the results of the second model indicate that both the banking sector and the exchange rate promote stock market development in the short run. Furthermore, the results show that the coefficient of the error correction term is negative and statistically significant.

The regression for the second model passes all the diagnostic tests performed for serial correlation, functional form, normality and heteroscedasticity, as shown in Table 7. In addition, the reported CUSUM and CUSUMSQ indicated in Figures A2(a) and A2(b) in the Appendix 1 show that the second model is stable.

**Table 7. Results of diagnostic tests of the second model**

Test	Statistic	p-value
Serial correlation: CHSQ(2)	2.205	0.332
Functional form: F(1, 46)	0.361	0.551
Normality: CHSQ (2)	1.165	0.559
Heteroscedasticity: CHSQ (1)	0.382	0.537

Source: Authors' own compilation.

## 6. Conclusion

This paper examined the macroeconomic drivers of stock market development in the Philippines. It shed some light on the following question: What are the key macroeconomic drivers of the sustainable and rapid growth of the Philippine stock market in recent decades? The Philippine stock market has experienced phenomenal growth over the years. Measured by the share price index, the PSEI increased from 1,869 points in 1997 to 7,230 points in 2014. The growth momentum was shown by the consecutive growth of the PSEI during the period 2009 to 2014, with a cumulative growth of 286 per cent in these six consecutive years. In addition, measured by the market capitalisation ratio, the global ranking of the PSE improved from 55th in 2005 to 12th in 2014. Despite the remarkable growth of the Philippines stock market, there is no similar study examining the drivers of these impressive performance. Therefore, this paper enriched the existing literature by investigating the macroeconomic drivers of stock market development in the Philippines during the period 2001Q4–2016Q4 using the ARDL bounds testing procedure. The results showed that trade openness had a negative impact on the development of the stock market in the long run, whereas banking sector development and the exchange rate had positive impacts in the short run. To check for the robustness of the main model, this study estimated another model that only includes the variables with significant results in the main model. The regression for the second model found similar long-run and short-run results as those found in the main model. Based on these findings, it is imperative for policy-makers of the country to promote the use of equity financing in the production of main exports. Such policy will benefit the long-term development of the stock market by increasing the demand of equity financing from those exporting industries. In addition, it is important for policy-makers to pursue policy that promotes banking sector development, so as to foster the short-term development of the stock market. Finally, policy-makers of the country should strive to maintain the stability of its domestic currency in order to promote the growth of stock market development in the short run.

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### Notes

1. The Association of Southeast Asian Nations (ASEAN) was established in 1967 with the signing of the ASEAN Declaration by Indonesia, Malaysia, the Philippines, Singapore and Thailand. Later on, five other countries (Brunei Darussalam, Cambodia, Lao PDR, Myanmar and Vietnam) also joined this association. ASEAN is a regional economic integration which aims at sharing resources among members in the region and also increasing its bargaining potential in the world (ASEAN, 2015).
2. The asset pricing models include: Efficient Market Hypothesis (Fama, 1965), Capital Asset Pricing Model (CAPM) (Lintner, 1965; Sharpe, 1964), Arbitrage Pricing Theory (Ross, 1976), Intertemporal CAPM (Merton, 1973), Consumption-based CAPM (Breedon, 1979), International CAPM (Stulz, 1981a; 1981b), and Production-based Asset Pricing Model (Cochrane, 1991).

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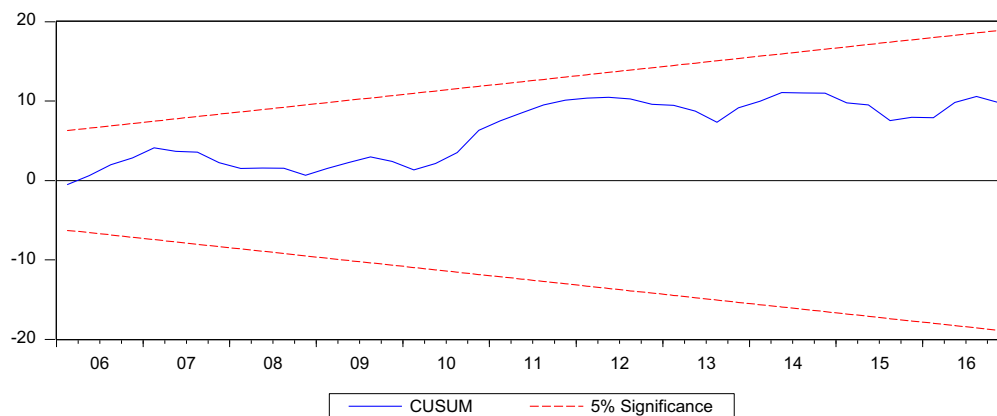
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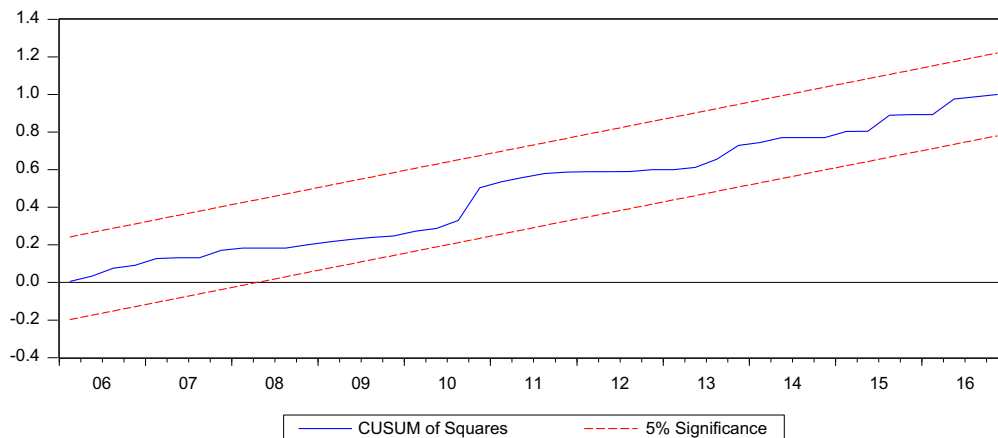
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## Appendix 1

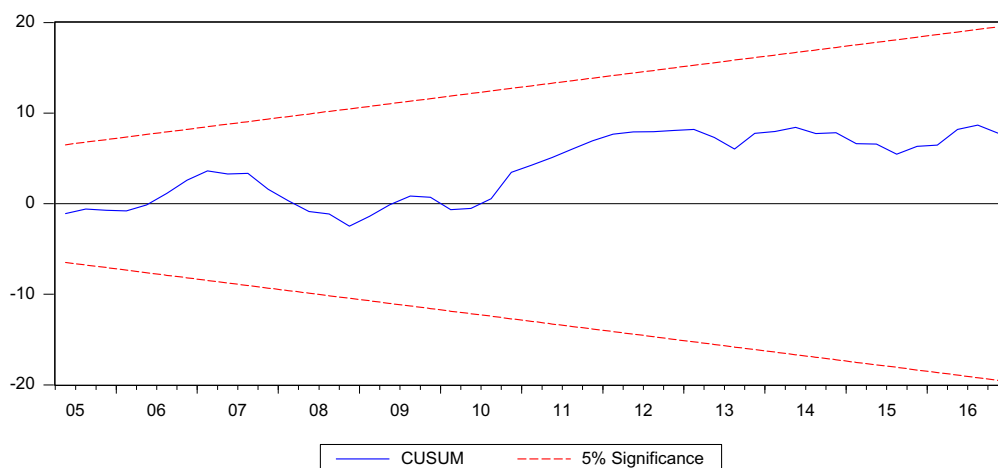
Figure A1(a). The plot of the cumulative sum of recursive residuals of the main model.



**Figure A1(b).** The plot of the cumulative sum of squares of recursive residuals of the main model.

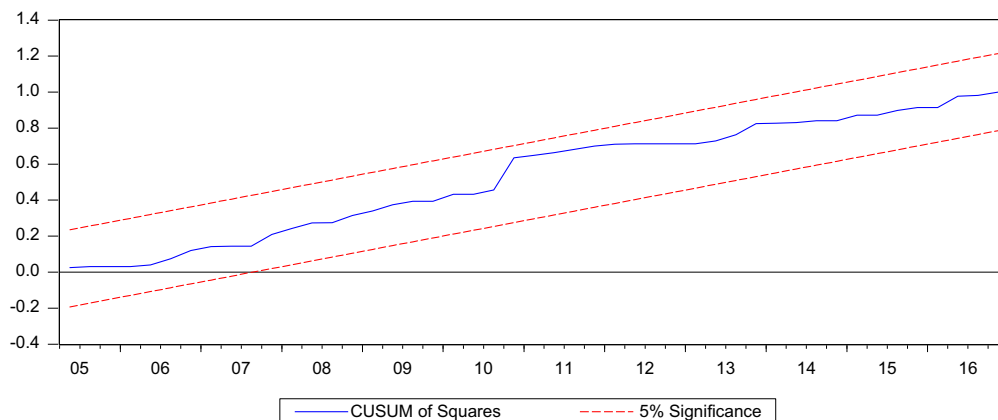


**Figure A2(a).** The plot of the cumulative sum of recursive residuals of the second model.



**Figure A2(b).** The plot of the cumulative sum of squares of recursive residuals of the second model.

Source: Authors' own compilation.  
Note: The straight lines represent critical bounds at 5% significant level.





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