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Sin-Yu Ho and Nicholas M. Odhiambo

Abstract

This paper examines the macroeconomic drivers of stock market development in Hong Kong during the period 1992Q4 to 2016Q3. Specifically, it investigates the impact of banking sector development, economic growth, the inflation rate, the exchange rate, trade openness and stock market liquidity on stock market development. By employing autoregressive distributed lag (ARDL) bounds testing procedure, we find that banking sector development and economic growth have positive impacts on stock market development, whereas the inflation rate and the exchange rate have negative impacts on stock market development both in the long and short run. In addition, the results show that trade openness has a positive long-run impact but a negative short-run impact on stock market development. Policy recommendations are provided based on these findings.

Keywords: macroeconomic drivers, determinants, stock market development, Hong Kong, ARDL bounds testing

JEL codes*:* C22; E44; G23

Introduction

Theories advanced by Jensen and Murphy (1990), Levine (1991 & 2005), Obstfeld (1994), Bencivenga et al. (1996), and Greenwood and Smith (1997), among others, have demonstrated the importance of the stock market in promoting economic growth in various ways, for instance by promoting market liquidity, reducing the cost of mobilising savings, improving corporate governance, and enhancing international risk-sharing. Owing to the important role played by the stock market, there is a growing volume of studies seeking to examine the factors leading to the development of the stock market. Although there are a number of studies that have explored the factors driving the development of stock markets, the literature has produced diverse views on the

relationship between these factors and stock market development. For instance, with regard to the association between banking sector development and stock market development, some studies show that they are negatively related, whereas others show that they are positively related (see Stiglitz, 1985; Levine, 1997 & 2005). As far as the relationship between the inflation rate and stock market development is concerned, some studies argue that a higher inflation rate has a negative impact on stock market development. Conversely, others argue that the inflation rate is positively associated with stock returns in a high inflationary environment (see Huybens & Smith, 1999; Boyd et al., 2001). With regard to the relationship between exchange rate movements and stock market performance, studies also show mixed results (see Gavin, 1989; Phylaktis & Ravazzolo, 2005). Regarding the relationship between foreign direct investment and stock market development, studies also reveal diverse views (see Hausmann & Fernández-Arias, 2000a & 2000b; Rhee & Wang, 2009). Against this background, this paper seeks to contribute to the existing debate by investigating the key macroeconomic drivers of stock market development in Hong Kong.

In recent decades, the stock market in Hong Kong has experienced phenomenal growth. The size of the stock market, as measured by stock market capitalisation, increased significantly from USD122 billion in 1991 to USD3 185 billion in 2015 [World Development Indicators (WDI), 2016]. In 2015, it was ranked the fifth-largest stock market in the world, and the third-largest in Asia (WDI, 2016). In addition, Hong Kong had the largest stock market in the world during the period 1999 to 2015 in terms of market capitalisation ratio (WDI, 2016). Despite its phenomenal growth, there are, to the best of our knowledge, no relevant studies on the macroeconomic drivers of stock market development in Hong Kong. Therefore, this paper endeavours to enrich the literature by examining the macroeconomic drivers of stock market development in Hong Kong during the period 1992Q4 to 2016Q3. In addition, the study employs the ARDL bounds testing approach to estimate both the long- and short-run impacts of macroeconomics factors on stock market development. While the long-run impacts of macroeconomic variables on stock market development are important, the short-run impacts cannot be overlooked, because the stock market is highly sensitive to the short-term development of the macroeconomic environment. Therefore, by using the ARDL bounds testing technique, the study unveils both the long- and short-run impacts of macroeconomic variables on the growth of the stock market in Hong Kong.

The rest of the paper is organised as follows: Section 2 provides an overview of stock market development in Hong Kong; Section 3 reviews the theoretical and empirical literature on the determinants of stock market development; Section 4 presents the data and the empirical methodology; Section 5 discusses the empirical results; and Section 6 concludes the paper.

2. Stock market development in Hong Kong

Hong Kong has experienced more than a hundred years of stock market development. The first formal stock exchange, known as the Association of Stockbrokers in Hong Kong, was established early in 1891. However, the activities of the stock exchange were largely regarded as insignificant until the 1970s. During the 1950s and 1960s, only 50 to 70 companies were listed and less than 25 per cent of them were actively traded (Uddin & Wong, 1998). Indeed, the industrialisation of Hong Kong during that period was not financed mainly through the stock exchange. Later, during the 1970s, it witnessed an era of confidence and growth. Hong Kong was regarded as the Eurodollar market in a different time zone, and the flows of international capital into Asia boosted financial activities in Hong Kong (Jao, 2003). In addition, the influx of foreign banking institutions and non-bank financial institutions promoted the rapid development of the Hong Kong stock market. As a result, three other stock exchanges were established in 1969, 1971 and 1972 (Tsang, 2004).

Since the late 1980s, a number of reforms have been introduced to strengthen the stock market in Hong Kong (see Ho & Odhiambo, 2015). One of the major reforms was the unification in 1986 of the four stock exchanges to form the Hong Kong Stock Exchange, a reform designed to prevent destructive competition among the four stock exchanges [Hong Kong Exchanges and Clearing Limited (HKEx), 2011]. Another reform was the establishment of the Securities and Futures Commission (SFC) with the enactment of the Securities and Futures Commission Ordinance in 1989. Under the ordinance, the SFC became the sole statutory securities market regulator regulating the securities and futures markets in Hong Kong (Arner et al., 2010). In addition, a fundamental reform of the market structure was carried out in 1999. As a result, the stock exchange, the futures exchange and its associated clearing houses were merged to form Hong Kong Exchanges and Clearing Limited (HKEx) with the aim of reducing operating costs. In the same year, a second board known as the

Growth Enterprise Market was launched to provide start-up companies with a capital-formation platform and an alternative market to the Main Board (HKEx, 1999). Later, in 2000, the HKEx was demutualised and became one of the first stock exchanges in the world to go public (HKEx, 2011).

The Hong Kong stock market responded positively to all these reforms. As a result, it has become one of the most highly developed stock markets by international standards in recent decades. There has been continuous growth in the size of the stock market, as measured by market capitalisation and the market capitalisation ratio. For instance, the market capitalisation increased significantly from USD122 billion in 1991 to USD3 185 billion in 2015 (WDI, 2016). In 2015, it was ranked as the fifth-largest stock market in the world, and the third largest in Asia (WDI, 2016). The major reason for the phenomenal growth in market capitalisation is that Hong Kong has established itself internationally as a preferred centre for initial public offerings (IPOs). In particular, the growth of Hong Kong as an IPO centre has been largely driven by the listing of Mainland Chinese companies (Ho & Odhiambo, 2015). When the stock market development is gauged in terms of the market capitalisation ratio, such development becomes even more impressive. According to the World Development Indicators (2016), Hong Kong had the largest stock market in the world during the period 1999 to 2015 in terms of market capitalisation ratio. In view of this impressive performance, it is worthwhile analysing the drivers thereof. Figure 1 shows that the market capitalisation ratio of the HKEx surged from 137 in 1991 to 1 028 in 2015 (WDI, 2016).

Figure 1: The market capitalisation ratio of the HKEx, 1991–2015

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

3. Review of the determinants of stock market development in the literature

Owing to the importance of the stock market in fostering economic growth, there are a number of studies investigating the factors leading to the development of the stock market. These factors are broadly classified into factors falling under the micro-based asset pricing models and macroeconomic factors. Under the micro-based asset pricing theories, two categories of factors are identified that can influence stock prices. The first one comprises market-related factors such as interest rates, market risk, returns on investment, economic growth, the exchange rate, inflation, industrial production, oil prices, liquidity of the stock market, and the risk factors that influence the states of current and future consumption (see Sharpe, 1964; Lintner, 1965; Merton, 1973; Breeden, 1979; Stulz, 1981a & 1981b; Cochrane, 1991). The second is made up of the portfolio-related factors, which include dividends or earnings, book-market relations, the size of the company, the rate of return, and the variance of asset returns (see Fama, 1965; Malkiel & Fama, 1970; Ross, 1976).

Apart from the micro-based asset pricing models that mainly focus on stock prices, there is a huge volume of theoretical studies linking stock market development to various macroeconomic factors. The macroeconomic factors encompass banking sector development, the inflation rate, the exchange rate, foreign direct investment, trade openness, economic development and stock market liquidity. Generally, the theoretical findings of these studies are largely inconclusive (see Ho & Iyke, 2017). For example, on the relationship between the development of the banking sector and the stock market, some studies argue that the banking sector and the stock market are negatively related. In particular, they show that the banking sector performs better than the stock market in providing financial functions for the economy. These functions include information provision concerning firms (see Stiglitz, 1985), corporate governance (see Jensen, 1993), and intertemporal risk-sharing (see Allen & Gale, 1997). In contrast, other studies argue that attention should be paid to the importance of the overall financial market rather than the importance of the banking sector in relation to the stock market (see Merton & Bodie, 2004; Levine, 1997). Furthermore, Levine (2005) argues that the banking sector and the stock market are positively related in terms of providing financial services for the economy. As far as the exchange rate is concerned, theories suggest a strong association between

exchange rate movement and stock market performance. It is argued that currency appreciation can have a negative impact on stock prices, and vice versa (see Dornbusch & Fisher, 1980; Adler & Dumas, 1983; Jorion, 1991). On the other hand, Gavin (1989) argues that the relationship between the exchange rate and stock prices can be positive or negative under different conditions. In terms of the inflation rate, existing studies argue that a higher inflation rate has a negative impact on stock market development (see Huybens & Smith, 1998 & 1999; Boyd et al., 1996 & 2001). Other studies, however, argue that the inflation rate can have a positive impact on the stock market through stock returns in a high inflationary environment (see Barnes et al., 1999; Boyd et al., 2001). Regarding the relationship between foreign direct investment (FDI) and stock market development, economic theories suggest opposing views. Some studies argue that FDI inhibits domestic stock market development, whereas other show that FDI promotes the development of stock markets (see Hausmann & Fernández-Arias, 2000a & 2000b; Claessens et al., 2001). The only consensus found in the existing literature relates to the impacts of economic development on the development of stock markets. Theories suggest that both the level and growth of real income 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 Greenwood & Jovanovic, 1990; Greenwood & Smith, 1997; Boyd & Smith, 1998).

The theoretical literature on the macroeconomic factors discussed above reveals highly inconclusive results regarding the impact of these factors on stock market development. Consequently, empirical studies are increasingly investigating the determinants of stock market development. The bulk of the existing literature has examined the relationship between individual macroeconomic variables and stock market development. Such studies include those by Atje and Jovanovic (1993), Boyd et al. (1996), Levine and Zervos (1996 & 1998), Barnes et al. (1999), Minier (2003), Kutan and Aksoy (2003), Jeffus (2004), Adjasi and Biekpe (2006), Adam and Tweneboah (2009), Rhee and Wang (2009), Agbloyor et al. (2013), Malik and Amjad (2013), and Raza et al. (2015), among others. In contrast, there is a fairly limited number of studies which have directly examined the key determinants of stock market development. These studies include those of Garcia and Liu (1999), El-Wassal (2005), Ben Naceur et al. (2007), Billmeier and Massa (2009), Cherif and Gazdar (2010), Kurach

(2010), Law and Habibullah (2009), Yartey (2007 & 2010), El-Nader and Alraimony (2013), Şükrüoğlu and Nalin (2014), Bayar (2016), and Ho (forthcoming). Table 1 summarises the empirical studies which have directly examined the key determinants of stock market development.

Table 1: Summary of empirical studies on the key determinants of stock market development

Author(s)	Region / country	Independent variables	Method(s)	Findings
Garcia & Liu (1999)	15 industrial and developing countries	• Last-year income • Last-year saving rate • Last-year investment rate • Credit to private sector / gross domestic product (GDP) • Liquid liability / GDP • Last-year turnover ratio • Inflation change • Dummy variable for structural change • Income growth rate	Fixed effects of panel data analysis	Real income level, the saving rate, financial intermediary development, and stock market liquidity have positive impacts on stock market development.
El-Wassal (2005)	40 emerging economies	• FDI / GDP • (Export + import) / GDP • Portfolio investment liabilities / GDP • Composite political, financial and economic risk rating from International Country Risk Guide (ICRG)	Fixed effects of panel data analysis	Economic growth, financial liberalisation policies, and foreign portfolio investment have positive impacts on stock market development.
Ben Naceur et al. (2007)	12 Middle Eastern and North African (MENA) countries	• Last-year income • Last-year saving rate • Last-year investment rate • Credit to private sector / GDP • M3 • Last-year turnover ratio • Inflation change	Fixed and random effects of panel data analysis	The saving rate, stock market liquidity, and financial intermediary development have positive impacts, whereas macroeconomic instability has a negative impact on stock market growth.
Billmeier & Massa (2009)	17 emerging markets	• Heritage Foundation's Index of Economic Freedom • Net amount of workers' remittances / GDP • Lagged real GDP • Lagged investment • Second difference of the Consumer Price Index (CPI) level	Fixed and random effects of panel data analysis	Both institutions and remittances have positive and significant impacts on stock market capitalisation.

		• Domestic credit to the private sector / GDP • Value trade ratio • Oil price index • US Federal Fund rate		
Law & Habibullah (2009)	27 economies	• Real GDP per capita • Institutional quality • Trade openness • Domestic financial sector liberalisation • Stock market liberalisation • Capital account liberalisation	Generalised method of moments Pooled mean group estimation	Trade openness, institutional quality, and financial liberalisation have positive impacts on stock market development.
Cherif & Gazdar (2010)	14 MENA economies	• Real GDP • Gross saving / GDP • Gross fixed capital / GDP • Domestic credit to private sector • M3 / GDP • Turnover ratio • Value trade ratio • Real interest rate • Inflation • Institutional factor	Panel data analysis	The saving rate, banking sector development, stock market liquidity, and income have positive impacts, while the interest rate has a negative impact on stock market development.
Kurach (2010)	13 Central and Eastern European economies	• GDP per capita • Monetisation ratio (M3) • Liquidity ratio • Turnover ratio • CPI • Budget balance • Saving rate • EU accession	Panel data analysis	Economic growth, banking sector development, market liquidity, fiscal balance, and European Union (EU) membership have positive impacts on stock market development.
Yartey (2007)	13 African countries	• Last-year GDP per capita • Last-year saving rate • Last-year investment rate • Credit to private sector / GDP • Last-year turnover ratio • Real interest rate • Last-year inflation • Current inflation • Political Risk Index from ICRG	Fixed and random effects of panel data analysis	Income level, domestic savings and investment, financial intermediary development, stock market liquidity, and institutional quality have positive impacts on stock market development.
Yartey (2010)	42 emerging economies	• Lagged stock market capitalisation ratio • Log GDP per capita • Credit to private sector / GDP • Square to credit to private sector / GDP • Value trade ratio • Gross domestic investment / GDP • Gross domestic savings / GDP	Generalised method of moments	Income level, gross domestic investment, banking sector development, private capital flows, and stock market liquidity have positive impacts on stock market development.

		• Real interest rate • Inflation • FDI / GDP • Net private capital flows / GDP • Political Risk Index from ICRG		
El-Nader & Alraimony (2013)	Jordan	• GDP • M2 / GDP • Value trade ratio • Gross capital formation / GDP • Net remittances • CPI • Domestic credit to private sector / GDP	Multivariate cointegration and variance decomposition analysis	Banking sector development, stock market liquidity, investment, and inflation have positive impacts on stock market development, while GDP and net remittances have negative impacts.
Şükrüoğlu & Nalin (2014)	19 European countries	• GDP per capita • Turnover ratio • Monetisation ratio • Saving rate • Inflation rate	Dynamic panel data analysis	Income, stock market liquidity, and the saving rate have positive impacts on stock market development, whereas the monetisation ratio and the inflation rate have negative impacts.
Bayar (2016)	Turkey	• Growth rate of real GDP • Inflation rate • (Export + import) / GDP • Domestic credits to private sector / GDP • Turnover ratio	ARDL bounds test	Economic growth and stock market liquidity have positive impacts on stock market development, while inflation has a negative impact.
Ho (forthcoming)	Malaysia	• Domestic credit / GDP • Net inflows of FDI / GDP • Real GDP per capita • Inflation rate • (Export + import) / GDP	ARDL bounds test	Economic performance and trade openness have positive long-run impacts, whereas banking sector development has a negative long-run on stock market development.

Source: Authors' own compilation

4. Data and methodology

4.1 Data

4.1.1 Data sources

This study utilises quarterly time-series data covering the period 1992Q4 to 2016Q3. The period covered is mainly the result of data availability. The data have been obtained from various reliable sources such as the Census and Statistics Department of Hong Kong (2017), Hong Kong Exchanges

and Clearing Limited (HKEx, 2015), the Hong Kong Monetary Authority (HKMA, 2017), International Financial Statistics (IFS, 2017) and the World Federation of Exchanges (WFE, 2017).

4.1.2 Definitions of variables

Stock market development (*SMD*)

The study uses the size of the stock market, as measured by the market capitalisation ratio, to indicate the level of stock market development. Such ratio is defined as the value of listed domestic shares on the domestic exchange as a percentage of GDP. This proxy has been widely used as a measure of stock market development in other empirical studies such as those by Levine and Zervos (1996 & 1998), Arestis and Demetriades (1997), Garcia and Liu (1999), Ben Naceur et al. (2007), Yartey (2007 & 2010), and Şükrüoğlu and Nalin (2014), among others. In addition, despite the fact that there are various indicators of stock market development, such as the size of stock markets, the volatility of stock markets, and the degree of international integration, Demirgüç-Kunt and Levine (1996) argue that all of these stock market indicators are significantly correlated.

Banking sector development (*BNK*)

The study employs domestic credit to GDP to measure banking sector development. Such ratio is defined as private credit by deposit money banks and other financial institutions to GDP. This proxy has been used in other studies such as those of Levine et al. (2000), Beck et al. (2007), and Sehrawat and Giri (2016).

Inflation rate (*INF*)

The inflation rate is proxied by the Consumer Price Index, which measures the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or change at yearly intervals. This proxy has also been used in studies such as those of Shan et al. (2001), Boyd et al. (2001), and Marques et al. (2013).

Exchange rate (*REERI*)

The exchange rate is measured by the real effective exchange rate index (REERI), which is defined as the nominal effective exchange rate (a measure of the value of a currency against a weighted

average of several foreign currencies) divided by a price deflator. This measure has been used in other studies such as those of Calvo et al. (1993), Abdalla and Murinde (1997), and Chou (2000).

Economic growth (*RGDPG*)

Real GDP growth (RGDPG) is used to measure economic growth. RGDPG is the annual percentage change in real GDP. This indicator has also been used in other studies by researchers such as Levine and Zervos (1998), Deb and Mukherjee (2008), and Carp (2012) to measure the development of the economy.

Trade openness (*OPEN*)

The study uses the sum of exports and imports of goods and services as a share of GDP to measure trade openness. Studies using this proxy to measure trade openness include the studies by Rajan and Zingales (2003), El-Wassal (2005), and Niroomand et al. (2014).

Liquidity of the stock market (*TOR*)

The study uses turnover ratio (TOR) to measure stock market liquidity. TOR is defined as the value of the trades in domestic shares on the domestic exchange divided by the value of listed domestic shares. This proxy has been widely used in the literature to measure stock market liquidity, for instance by Levine and Zervos (1996), Minier (2003), Ben Naceur et al. (2007), and Billmeier and Massa (2009), among others.

4.2 ARDL bounds testing procedure for cointegration

To investigate the long-run relationships between the development of the stock market and various macroeconomic determinants, the study uses the ARDL bounds testing procedure proposed by Pesaran et al. (1996), Pesaran and Shin (1999), and Pesaran et al. (2001). This procedure is chosen on account of its favourable properties. Firstly, it does not impose the restrictive assumption that all the variables 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. Secondly, unlike other cointegration tests which are sensitive to the sample size, the ARDL bounds test is suitable even when the sample size

is small (see Pesaran et al., 1996; Pesaran & Shin, 1999; Pesaran et al., 2001). In this paper, the ARDL bounds testing procedure employs the following equation

$$\begin{aligned}\Delta lnSMD_t = \gamma_0 &+ \sum_{i=1}^{n} \gamma_{1i}\, \Delta lnSMD_{t-i} + \sum_{i=0}^{n} \gamma_{2i}\, \Delta lnBNK_{t-i} + \sum_{i=0}^{n} \gamma_{3i}\, \Delta INF_{t-i} + \sum_{i=0}^{n} \gamma_{4i}\, \Delta lnREERI_{t-i} \\ &+ \sum_{i=0}^{n} \gamma_{5i}\, \Delta RGDPG_{t-i} + \sum_{i=0}^{n} \gamma_{6i}\, \Delta lnOPEN_{t-i} + \sum_{i=0}^{n} \gamma_{7i}\, \Delta lnTOR_{t-i} + \delta_1 lnSMD_{t-1} \\ &+ \delta_2 lnBNK_{t-1} + \delta_3 INF_{t-1} + \delta_4 lnREERI_{t-1} + \delta_5 RGDPG_{t-1} + \delta_6 lnOPEN_{t-1} \\ &+ \delta_7 lnTOR_{t-1} + \varepsilon_t \qquad (1)\end{aligned}$$

where ε, γ, and δ are the white-noise error term, the short-run coefficients, and the long-run coefficients of the model, respectively. In addition, Δ is the first-difference operator; *t* denotes time period; and *n* is the maximum number of lags in the model. The variables, namely $lnSMD$, $lnBNK$, $lnREERI$, $lnOPEN$ and $lnTOR$ are the natural logarithms of the market capitalisation ratio, domestic credit to GDP, the real effective exchange rate index, the value of exports and imports to GDP, and stock market liquidity, respectively. The study does not take the natural logarithm of the inflation rate (*INF*) and real GDP growth (*RGDPG*), because there are a number of negative observations during the study period. The maximum number of lags in the model is chosen based on the Schwarz criterion (SC).

In the first stage, the null hypothesis of no cointegration, $H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = 0$, is tested against the alternative hypothesis of the existence of cointegration, $H_1 : \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \delta_7 \neq 0$. From Equation (1), if at least one of the δs is significantly different from zero, there are cointegrating relationships between the series. In the second stage, we consider the F-statistic. There are two sets of critical values constructed by Pesaran et al. (2001) under this null hypothesis. When the calculated F-statistic falls below the lower-bound values, we do not reject the null hypothesis of no cointegration. When the calculated F-statistic is greater than the upper-bound values, we reject the null hypothesis of no cointegration. However, when the calculated F-statistic falls between the lower and upper bounds, the test becomes inconclusive.

If the variables are found to be cointegrated, we proceed to estimate the short-run behaviour of the variables using the following error-correction model

$$\Delta lnSMD_t = \gamma_0 + \sum_{i=1}^{n} \gamma_{1i}\, \Delta lnSMD_{t-i} + \sum_{i=0}^{n} \gamma_{2i}\, \Delta lnBNK_{t-i} + \sum_{i=0}^{n} \gamma_{3i}\, \Delta INF_{t-i} + \sum_{i=0}^{n} \gamma_{4i}\, \Delta lnREERI_{t-i} + \sum_{i=0}^{n} \gamma_{5i}\, \Delta RGDPG_{t-i} + \sum_{i=0}^{n} \gamma_{6i}\, \Delta lnOPEN_{t-i} + \sum_{i=0}^{n} \gamma_{7i}\, \Delta lnTOR_{t-i} + \delta ECM_{t-1} + \varepsilon_t \quad (2)$$

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

5. Empirical results

5.1 Results of stationarity tests

Before we examine the nature of the relationship between the development of the stock market and various macroeconomic variables, the stationary properties are examined. The variables include: $lnSMD$, $lnBNK$, INF, $lnREERI$, $RGDPG$ $lnOPEN$, and $lnTOR$. To examine their stationary properties, the study uses two unit roots tests: (i) the Dickey–Fuller Generalised Least Squares (DF-GLS) test; and (ii) the Perron (PPURoot) test. Table 2 shows the results of unit roots tests of the variables in levels and at the first differences.

Table 2: Stationarity tests of all variables

Dickey–Fuller Generalised Least Squares (DF-GLS) test				
Variable	**Stationarity of all variables in levels**		**Stationarity of all variables at first differences**	
	Without trend	**With trend**	**Without trend**	**With trend**
InSMD	−0.088	−3.140**	−8.311***	−10.062***
lnBNK	−1.603	−1.943	−4.140***	−6.737***
INF	−0.904	−1.592	−6.130***	−6.919***
lnREERI	−0.569	−1.224	−5.822***	−5.771***
RGDPG	−3.006***	−3.558**	-	-

lnOPEN	1.143	−0.875	−4.167***	−7.541***
lnTOR	−3.538***	−4.514***	-	-
Perron (PPURoot) test				
Variable	**Stationarity of all variables in levels**		**Stationarity of all variables at first differences**	
	Without trend	**With trend**	**Without trend**	**With trend**
lnSMD	−4.240	−3.807	−11.775***	−11.016***
lnBNK	−4.209	−4.102	−15.732***	−15.732***
INF	−4.108	−3.100	−6.736***	−5.943***
lnREERI	−3.514	−2.508	−7.617***	−6.858***
RGDPG	−5.539**	−5.388***	-	-
lnOPEN	−3.973	−3.925	−13.253***	−13.253***
lnTOR	−5.165*	−4.833**	-	-

Source: Authors' own compilation
Notes: (1) *, ** and *** denote significance at 10%, 5% and 1%, respectively; (2) - Denotes "Not applicable".

In Table 2, the results of the Dickey-Fuller Generalised Least Squares test and the Perron test show that variables such as *RGDPG* and *lnTOR* are stationary in levels. Other variables such as *lnSMD, lnBNK, INF, lnREERI* and *lnOPEN* are stationary at first differences. Having established that the variables are integrated of order zero or one, the study can proceed to test the long-run relationships between stock market development and its macroeconomic factors using the ARDL bounds testing procedure.

5.2 Empirical analysis using ARDL bounds testing procedure

The results of the ARDL bound test for cointegration show that the calculated F-statistic is 4.770, 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 cointegrated. Table 3 shows the results of ARDL bounds testing for cointegration and the critical values of the ARDL bounds test. Having established that *lnSMD, lnBNK, INF, lnREERI, RGDPG, lnOPEN* and *lnTOR* are cointegrated, 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 the SC is ARDL(2, 0, 0, 0, 1, 3, 0). The long-run and short-run results of the selected model are reported in Table 4.

Table 3: Bounds test F-test for cointegration

Dependent variable	**Function**	**F-statistic**	**Cointegration status**
lnSMD	F(*lnSMD* | *lnBNK, INF, lnREERI, RGDPG, lnOPEN, lnTOR*)	4.770***	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 1%.

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

Long-run results **Dependent variable is *lnSMD***				
Regressor	**Coefficient**	**Standard error**	**T-ratio**	**Probability**
lnBNK	0.776**	0.307	2.527	0.013
INF	−0.214**	0.080	−2.657	0.010
lnREERI	−1.874***	0.700	−2.677	0.009
RGDPG	0.051***	0.018	2.888	0.005
lnOPEN	2.513***	0.300	8.388	0.000
lnTOR	0.164	0.210	0.780	0.438
Short-run results **Dependent variable is Δ*lnSMD***				
Regressor	**Coefficient**	**Standard error**	**T-ratio**	**Probability**
Δ*lnSMD(−1)*	−0.255***	0.089	−2.867	0.005
Δ*lnBNK*	0.546**	0.216	2.524	0.014
Δ*INF*	−0.050*	0.029	−1.706	0.092
Δ*lnREERI*	−0.861*	0.451	−1.910	0.060
Δ*RGDPG*	0.027***	0.005	5.053	0.000
Δ*lnOPEN*	−0.275	0.289	−0.950	0.345
Δ*lnOPEN(−1)*	−1.104***	0.311	−3.555	0.001
Δ*lnOPEN(−2)*	−0.927***	0.282	−3.290	0.002
Δ*lnTOR*	−0.019	0.040	−0.464	0.644
C	−0.783***	0.152	−5.162	0.000
ECM	−0.243***	0.045	−5.405	0.000

Source: Authors' own compilation

Notes: (1) *, ** and *** denotes 10%, 5% and 1% significant levels, respectively; (2) Δ = first-difference operator.

The long-run regression results show that the key macroeconomic drivers of stock market development in Hong Kong are banking sector development, the inflation rate, the exchange rate, economic growth and trade openness. In particular, the study finds that banking sector development, economic growth and trade openness have a positive influence on stock market development, whereas the inflation rate and the exchange rate have a negative impact on stock market development. As regards banking sector development, the results show that a percentage increase in banking sector development leads to an increase in stock market development of 0.776 per cent. Such positive relationship between the banking sector and the stock market is well documented both theoretically (see Merton & Bodie, 2004; Levine, 1997 & 2005) and empirically (see Garcia & Liu, 1999; Kurach, 2010; El-Nader & Alraimony, 2013). Regarding the impact of the inflation rate on stock market development, the results show that, in the long run, a one-unit increase in the inflation rate leads to a decline in stock market development of approximately 21.4 per cent. The negative relationship between the inflation rate and stock market development found in this study is supported by other studies, both theoretically (see Choi et al., 1996; Huybens & Smith, 1998 & 1999; Boyd et al., 2001) and empirically (see Ben Naceur et al., 2007; Şükrüoğlu & Nalin, 2014; Bayer, 2016).

As far as the exchange rate is concerned, the results show that a percentage increase in the real effective exchange rate index leads to a decline in stock market development of approximately 1.874 per cent. Such negative relationship between the exchange rate and stock market performance found in the study is consistent with the literature, both theoretically (see Dornbusch & Fisher, 1980; Adler & Dumas, 1983; Jorion, 1991) and empirically (see Ma & Kao, 1990; Wu, 2000). With regard to economic growth, the results show that a unit increase in economic growth promotes stock market development by 5.1 per cent in the long run. This finding is consistent with most of the studies which document a positive association between stock market development and economic growth (see Atje & Jovanovic, 1993; Levine & Zervos, 1996 & 1998; Cherif & Gazdar, 2010; Şükrüoğlu & Nalin, 2014; Raza et at., 2015; Bayar, 2016; Ho, forthcoming). In terms of trade openness, the results show that a percentage increase in trade openness promotes stock market development by approximately 2.513 per cent. This positive influence of trade openness on financial market development, including

stock market development, is well documented in the literature (see Newbery & Stiglitz, 1984; Rajan & Zingales, 2003; Law & Habibullah, 2009; Niroomand et al., 2014; Ho, forthcoming).

The short-run regression results show that the key macroeconomic drivers of stock market development are banking sector development, the inflation rate, the exchange rate, economic growth and trade openness. Similar to the long-run results, the short-run results show that banking sector development and economic growth have positive impacts on stock market development, whereas the inflation rate and the exchange rate have negative impacts on stock market development. However, trade openness has a negative impact on stock market development in the short run, while it has a positive impact in the long run. The co-existence of positive long-run relationship and negative short-run relationship between trade openness and financial development are found in other studies such as those of Kim et al. (2010a) and (2010b). One plausible reason of negative relationship between trade openness and financial development is that, in the short run, an increase in trade openness leads to higher exposure to foreign competition and technology, as well as the changes in factor prices and product prices. Such changes will increase uncertainty and reduce investment, thereby inhibiting stock market growth in the short run. Despite the negative short-run effects, the long-term benefits of trade openness eventually promote stock market growth (see Blankenau et al., 2001; Arora and Vamvakidis, 2004; Kim et al. 2010a).

Furthermore, the short-run regression results show that the coefficient of the error-correction term is negative and statistically significant. Specifically, when the variables drift apart from the equilibrium level by 1 per cent in the short run, they correct by 0.243 per cent towards the equilibrium level. With respect to the diagnostic tests, the result displayed in Table 5 show that the model passes all the diagnostic tests performed for serial correlation, functional form, normality and heteroscedasticity.

Table 5: Results of diagnostic tests

Test	**Statistic**	**P-value**
Serial correlation: CHSQ(2)	1.105	0.576
Functional form: F(1,82)	0.208	0.650
Normality: CHSQ(2)	0.428	0.807

Heteroscedasticity: CHSQ(3)	5.466	0.141

Source: Authors' own compilation

Figure A.1(a) and (b) in the Appendix shows the plot of cumulative sum of recursive residual (CUSUM) and cumulative sum of squares of recursive residual (CUSUMSQ) of the model, respectively. It shows that the CUSUM passes the stability test. Although the CUSUMSQ slightly deviates from the upper bound, later on it returns completely inside the critical bounds.

6. Conclusion

This paper has shed some light on the following question: What are the key macroeconomic drivers of the sustainable and phenomenal growth of the Hong Kong stock market in recent decades? The stock market in Hong Kong is now considered one of the most highly developed stock markets by international standards. In 2015, it was ranked the fifth-largest stock market in the world, and the third-largest in Asia measured by market capitalisation. In addition, Hong Kong had the largest-size stock market in the world during the period 1999 to 2015 in terms of market capitalisation ratio. Given the remarkable growth of the stock market in Hong Kong, this paper investigated the macroeconomic drivers of stock market development in Hong Kong during the period 1992Q4 to 2016Q3 using the ARDL bounds testing procedure. The empirical results showed that the key macroeconomic drivers of the Hong Kong stock market development are banking sector development, the inflation rate, the exchange rate, economic growth and trade openness. Based on these findings, five main policy recommendations can be advanced. First of all, the positive impact of banking sector development on stock market development found both in the long and short run indicates the complementary nature of these two sectors in the financial system. Hong Kong has become known as a financial centre in the Asian region during the past few decades. In particular, it has a long-established track record as a leading international banking centre in Asia (see Reed, 1981). The continuous growth in both international and domestic banking activities in Hong Kong not only further strengthens the country's role as an international financial centre, but also benefits the growth of the stock market. Therefore, policymakers should pursue policies that promote the growth of the banking sector in order to further enhance stock market development. Secondly, the study found that the inflation rate has had a negative impact on Hong Kong stock market development both in the long run and the short run. During the study period, the monetary authority was effective in bringing down

the inflation rate of over 4 per cent in 1992Q1 to 1.33 per cent in 2016Q3. Therefore, monetary authority should persist with its policy in order to stabilise inflation at low levels and so continue to promote stock market development. Thirdly, the study found that the exchange rate exerted a negative impact on stock market development both in the long and short run. This indicates that policies for stabilising the exchange rate fluctuations are conducive to the development of the stock market in Hong Kong. It would appear that the monetary authority in Hong Kong correctly resolved to adopt the linked exchange rate system in 1983 (HKMA, 2016). Policymakers may also consider linking the Hong Kong dollar to the Chinese renminbi in the future owing to the increasing economic and financial ties between these two economies. Fourthly, economic growth is found to have had a positive and significant impact on Hong Kong stock market development in the long and short run. During the study period, the real GDP growth rate was moderate (i.e. an average of 3.72 per cent). Therefore, policymakers should strive to pursue growth-enhancing policies, which will, in turn, benefit the development of the stock market in the country. Fifthly, the study found that trade openness has had a positive long-run impact on stock market growth in Hong Kong. Hong Kong is known as a small and open economy. Its average trade openness was maintained at a high level of 336.91 per cent during the study period. Therefore, policymakers in the country should continue to pursue policies that enhance trade openness so as to further promote the long term growth of stock market.

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APPENDIX

Figure A.1(a): The plot of cumulative sum of recursive residuals

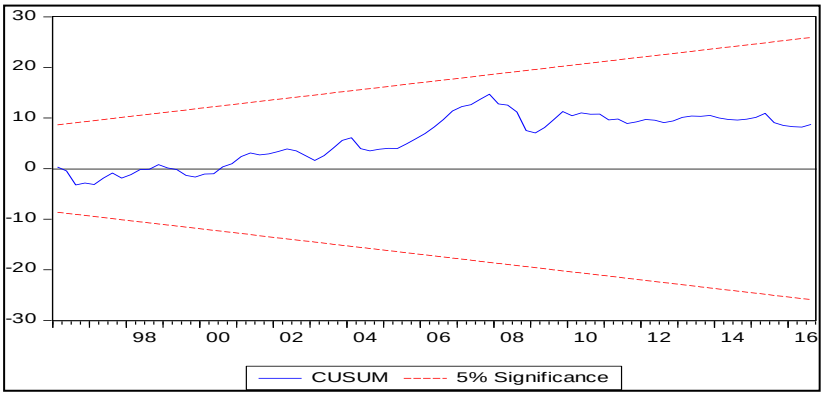
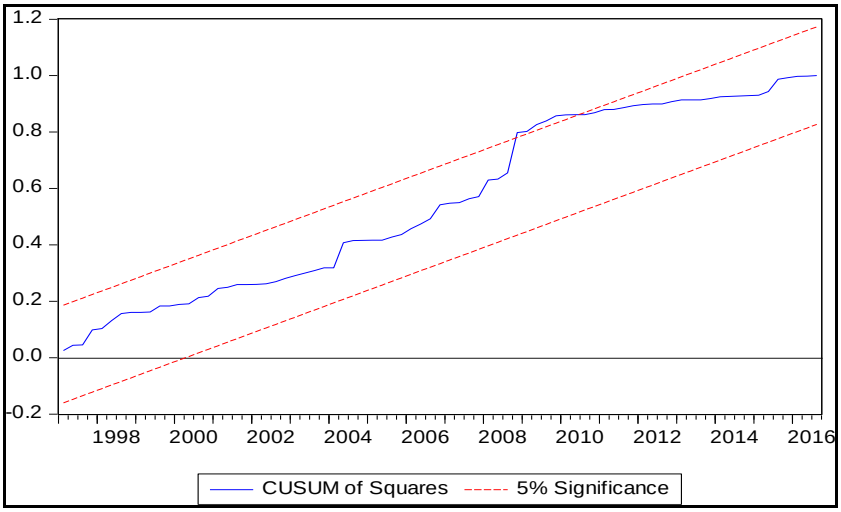


Figure A.1(b): The plot of cumulative sum of squares of recursive residuals



Source: Authors' own compilation

Note: The straight lines represent critical bounds at 5% significant level.