Financial Development and Post Keynesian Economic Growth: Advancing Theoretical and Empirical Grounds

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1. Introduction

Over the last couple of decades, a great deal of attention has been paid to the role of financial markets in economic growth. In recent studies the importance of financial markets has been highlighted and financial systems have been recognised via their increasing influence over real sector development. However, most of these studies fail to adequately integrate this relationship into a general macro economic model. "Since the writings of John Stuart Mill, many economists have argued either that finance is unimportant or that it matters most when it gets out of order" Caprio (1998). Generations of economists constructed models without money or a financial sector. However, with the explosion of banking crises around the globe in the last two decades, finance is back in fashion.

Recent studies, particularly those originating from Modern Growth Theory, have suggested that financial intermediation affects growth through various channels, including through its effects on rates of investment, the efficiency of capital allocation, its impact on productivity growth rates, and the level of savings. However, within the Kaleckian tradition in particular and Post Keynesian tradition in general, macroeconomic models concentrate on the real side of the economy and pay little attention to the financial side, and it seems that the importance of financial sector and financial intermediaries have been neglected in Post Keynesian works, and the impacts of financial markets have rarely been considered as relevant to the determination of equilibrium conditions in Post Keynesian macroeconomic modeling.

Even though, most insights into financial impacts have derived from Modern Growth Theory rather than from standard Neo-Classical, Keynesian or Post-Keynesian models, nevertheless the author believes that these Post Keynesian models of Economic growth can and should be expanded to include financial variables. This expansion should account for the role of the banking system and credit market in stimulating the aggregate demand.

This said, the objective of this study is to examine the role of financial market development in producing a virtuous circle of high aggregate demand (Investment, Savings, Income distribution, productivity growth, etc) in Hong Kong and UK. In this study, we develop a long run macroeconomic framework, following the work of Onaran and Stockhammer (2003), who have constructed a dynamic Kaleckian-Post Keynesian and open economy model in nature.

The methodological approach adapted in this exercise is a Structural Vector Autoregression (SVAR) Model, which is used to examine the relationship between exogenous financial development indicators and system of equations for Key macroeconomic growth indicators, using quarterly data for periods ranging from 1990 to 2006. This is done in a series of steps and pre- analysis testing; first cointegration tests are carried out to determine the existence of long-run relationships between the variables, all of which shed some light on the nature of the relationship among the variables. Second, a Structural VAR model is set up and used, in the first instance, to conduct block exogeneity tests. These tests are then complemented by an analysis of the impulse response functions.

The empirical analysis of this study provides insights into the functioning of the Hong Kong and United Kingdom macroeconomy, considering their productive but uneven financial market structure. This paper investigates the dynamic responses of the model to shocks in indicators of financial development, and determines whether the effects of such shocks on the long run relations disappear.

Particular emphasise is placed on the formal and exogenous integration of financial market development into a Kaleckian –Post Keynesian open macroeconomic model. The influence of financial markets over economic development is captured through the inclusion of financial development proxies.

We organise the remainder of the paper as follows. Section 2 presents a review of literature on financial development and economic growth, and the specification of the selected countries' financial sector in this study. Section 3 introduces the adapted proxies for financial development and deals with the measure of financial development indicators. Section 4 summarises estimation techniques the model to be estimated. Section 5 discusses data characteristics and the results of the SVAR estimation, as well as the results of impulse response. Finally section 6 derives the conclusion.

2. Literature Review

The role of finance in promoting technological development has long been a controversial issue. Hicks (1969) argued on the basis of economic history that the British industrial revolution was made possible by the availability of finance. He argued that the large-scale capital requirements of the industrial revolution could only be met by the development of capital market institutions that permitted the pooling of small individual savings into large funds for industrial development. Joan Robinson (1952), on the other hand, saw finance as responding passively to technological innovation and development, and that "where enterprise leads finance follows" (p. 123).

The role of financial development has become significantly important in recent research in different areas of the growth literature. Among others, Schumpeter (1911), Gurley and Shaw (1955), Goldsmith (1969) and McKinnon (1973) mentioned the importance of financial intermediaries to the economic growth.

Schumpeter (1911) was one of the pioneers in highlighting the significance of the financial sector in promoting economic growth. In particular, he argued that economic growth was a product of interactions between financial and real innovations. As Hein and Ochsen (2001) argue; from a Schumpeterian monetary point of view, monetary variables have impacts that extend beyond merely temporary and out-of-equilibrium effects on the real variables of the economic system: production, employment, distribution and growth .

Since Schumpeter (1911), McKinnon (1973) and Shaw (1973), and more recently King and Levine (1993a) and Levine et al. (2000), the relationship between financial development and economic growth has been extensively studied. In the beginning, like McKinnon (1973) and Shaw (1973), offer detailed arguments and evidence on the role of organised financial structure of an economy to accelerate economic growth and improve economic performance. They believe that excess funds would be channelled efficiently to deficit units to drive the economy, and differences in the quality and quantity of services provided by financial intermediations are the main reasons for different economic growth of every country.

Focusing on Keynes's (1939), distinction between finance, saving and funding, Post-Keynesians, such as Terzi (1986), Chick (1998), Davidson (1996) and Wray (1998) state that in an economy characterised by a developed financial structure, finance is issued by banks, and it is the role of the credit system to provide the liquid funds to entrepreneurs, and thus , it is banks that hold a key position in the transition from lower to higher scale of economic activity (see also, Keynes,1979 : 212). Post Keynesian, Chick (1998) argues that every credit-based financial system supports high levels of growth if other financial arrangements are created in order to overcome lack of funding in the market.

Keynes's finance-funding process of investment is based on a financial structure characterised by a developed banking system and dynamic and organised financial markets. From a Post-Keynesian point of view, Zina and Trigui (2000) argue that a financial system is efficient in the process of economic development when it increases the use of available resources.

Demetriades & Hussein (1996) find evidence that financial development causes growth in 16 developing countries, they found that in some cases the relationship is bi-directional. In 2000, the panel studies done by Khan and Senhadji show that the relationship between financial development and economic growth varies according to the level of financial development of that country. The positive relationship is reported for the middle and high level of financial development. However ambiguous effect is found in countries with low financial development.

In a recent study, Abd. Ghafar & Nur Azura (2003) reported that as income level rise, financial structure becomes more extensive, economic growth becomes more rapid and income inequality across the rich and poor widens. Zoli (2007) argues that financial development is often associated with improved economic performance, as deep, liquid, diversified, and stable financial markets allow efficient intermediation of funds, facilitate risk diversification, and tend to favour growth in the long run. Moreover, strong local markets can offer a stable source of financing for private and public sectors, helping them cope with possibly volatile external capital flows.

2.1 Financial Sector Development and Structure

According to the literature, financial sector development requires growth in the volume and sophistication of activities as well as changes in the structure of the market. Generally speaking, as the economy develops, an increase in the volume of

transactions in the financial sector is expected. According to Levine (1993, 1997) and Ellis (2004), by definition, the financial sector can be called "developed" if the efficiency, stability, and competitiveness of the sector improve, and the range of financial services and diversity of financial institution increases. The increase in the amount of money that is intermediated through the financial sector or the amount of capital that is allocated by the private sector are other signs of development in financial markets.

In terms of the market structure, traditionally, there are two major types of financial systems: bank-based and market-based systems. In countries with bank based systems, long term finance is largely provided by banks which is the case in Hong Kong in this study, while in market-based systems bonds and equity finance plays a much greater role, which is evident in UK's financial system.

The significance of banks has not been ignored by pioneer economists as well. The relationship between banking system and economic activities is not a new concept, since the topic was opened by Keynes and the Post Keynesian economists. From the "Treatise on Money", to the "General Theory", and through to the controversy with Robertson and Ohlin after the publication of the "General Theory", Keynes pointed out the key importance of the banking system in supporting investment. Alves et al (2003) argues that the Post Keynesian approach to banking and financial intermediation in business- cycle fluctuations views the banking system as a channel through which agents' perceptions of risks, and hence business-cycle fluctuations, both influence and are strongly influenced by non probabilistic uncertainty.

At the most basic level, banks serve as key intermediaries facilitating the integration of markets by shaping the norms and rules under which capital flows occur (Rohner, 2008). Bank are considered as essential connections between economic sectors in the developed and developing world and make significant decisions about the use and allocation of capital. The bank-based financial structure demonstrates a positive role of banks in development and growth, and that banks can finance development more effectively than markets in developing economies. Gerschenkron (1962) highlights that in the case of state-owned banks, market failures can be overcome and allocation of savings can be undertaken strategically. Those banks that are unhampered by regulatory restrictions, can exploit economies of scale and scope in information gathering and processing (Levine, 2002, Beck and Levine, 2002). Stiglitz (1985) and Singh (1997) believe that bank-based financial systems are in a much better position than market-based systems to address agency problems and short-termism.

According to Chowdhury and Islam (1993) there are distinct advantages that flow from the operation of a state-dominated, credit-based system based on the role of finance in development. Wade (1988), for example, identifies the following assumed advantages. First, a bank/credit-based system permits faster investment in developing country conditions than would be possible if investment depended on the growth of firm's own profits or on the inevitably slow development of securities market. More importantly, productive investment is less affected by speculative stock-market booms and busts.

In the 20th century economists started arguing that differences in the financial structure of the two countries help explain country's pace of economic growth (see Gerschenkron 1962). The argument is initiated based on the following; bank-based financial system creates strong bonds between banks and industries, which consequently reduce the costs of acquiring information about firms. This makes it easier for the financial system to identify good investments, exert corporate control, and mobilising saving than in countries with a more security and bond market oriented financial system such as England, where the ties between banks and industry are less intimate.

The market-based theory, from the other hand, highlights the advantages of well-functioning markets. Big, liquid and well functioning markets foster growth and profit incentives, enhance corporate governance and facilitate risk management (Levine, 2002, and Beck and Levine, 2002). Boyd and Smith (1998) assumes that Market-based financial systems reduce the inherent inefficiencies associated with banks and are, thus, better in enhancing economic development and growth. They demonstrate through a model that allows for financial structures to change as countries go through different stages of development, that countries become more market-based as development proceeds.

The bank-based financial system is sometimes viewed as superior to the market-based financial structure in terms of fostering economic growth. However, recent banking problems and financial crisis particularly in East Asian economies and emerging markets which are more bank-based in financial sector have led some to argue that the absence of a credible takeover threat through efficient stock markets has hampered proper corporate governance and competitiveness (King and Levine 1997).

Connecting the structure of financial markets to economic performance is not an easy task though and may not enable us to investigate that how well different financial systems function in different countries. In the bank-based financial system, banks may have closer ties with industries and investment projects, Hong Kong financial market is a strong example. Nevertheless, at the same time countries with market-based financial system may be more capable at providing liquidity and facilitating transactions, which is certainly the case in the UK.

2.2 Country Specifications in Terms of Financial Structure

The UK's large and sophisticated financial sector features fundamentally sound and highly developed financial institutions, markets and infrastructure. UK banks appear to be sufficiently profitable and well capitalised overall to be able to absorb the effects of the more likely macroeconomic shocks without systemic distress. This partly reflects profits and capital accumulation during the past decades of strong economic performance as well as banking system's activities.

The money market does a good job in distributing the liquidity supplied by the Bank of England and the unsecure interbank segment of the money market functions well. The traditional structure of UK's banking system is characterised by private financial institutions and low governance featuring a few large, direct clearing banks and a

large number of smaller, indirect clearers with the latter tending to hold most of their liquidity in the form of unsecured deposits with the largest banks. According to Sabot and Skekely (1998) this type of system is called arm's-length banking, in which different agents specialise in different monitoring functions, and no one agent is able to exercise significant control.

Hong Kong is one of the leading international financial centers in Asia. In terms of stock market capitalisation, it is the 6th largest in the world according to "World Federation exchange- statistics", and it is one of the most established stock markets in the world, being classified by the "International Finance Corporation" (IFC) as a developed market. However, in terms of financial market structure Hong Kong is more likely to be called "bank-based", since the banking sector plays a vital role in establishing Hong Kong as a major loan syndication centre in the country and surrounding regions to fund investment projects. From the other hand government ownership of banks has been a dominated form in Hong Kong. It seems that the rapid economic growth in Hong Kong is attributable in part to the efficiency and operation of banking system.

In the 1990s effort was made to develop the money market, including the improvement in the financial infrastructure (e,g. Central Money Market Unit Service, and the Real Time Gross Settlement System). The establishment of the Honk Kong Monetary Authority in 1994 and China Banking Regulatory Commission (CBRC), aimed at strengthening supervision of banks, was another step taken towards the improvement banking conduct and banking transparency.

3. Financial Development Indicators

Financial development is usually defined as a process giving rise to improvements in quantity, quality and efficiency of financial intermediary services. Levin and Zervos (1996) report evidence indicating that both stock market liquidity (as measured by stock trading relative to GDP and market capitalisation), and the level of banking development (as measured by bank credits to private firms divided by GDP) predict economic growth over subsequent decades. King and Levine (1997) claim that bank and stock market development indicators both help to predict economic growth and these two components enter the regression significantly, they also observed that there are important overlaps between the services provided by banks and stock markets.

In this study we employ three commonly used measures of financial development; the monetisation ratio, which is M_2, to GDP, the ratio of domestic credit to the private sector and GDP, and the stock market capitalisation ratio. The measurement issue is not addressed in this study through statistical testing, which might have resulted in the collection of inappropriate indicators or produced wrong conclusions about the FD-growth relationship.

3.1 Monetisation Ratio

This measure which is the ratio of Broad Money, M2, to Nominal GDP has been used as a standard measure of financial development in numerous studies (Glen 1989;

World Bank 1989; King and Levin 1993; Calderon and Liu 2003; Wood 1993; Murinde and Eng 1994; Lyons and Murinde, 1994; Berthelemy and Varoudakis 1995; Arestis and Demetriades, 1997; and Agung and Ford, 1998). The monetisation ratio reflects the relative size and depth of the financial market, (King and Levine 1993). Rohner (2008) argues that larger financial system allows the exploitation of economies of scale. More recently, the World Bank and others have found a correlation between size of financial sector of economies and their overall growth rate. An increase in this ratio indicates further expansion in the financial intermediary sector to the rest of the economy. While monetisation ratio does not accurately gauge the effectiveness of the financial sector in ameliorating information asymmetries and diversifying risk, it can be viewed as a general measure of overall financial development.

According to Demetriades and Hussein (1996), this indicator accords well with McKinnon's outside money model where the accumulation of money is necessary before self financed investment can take place. As such, an increase in the M2/GDP ratio may reflect an extensive use of currency rather than an increase in bank deposits.

3.2 Domestic Credit

This ratio equals the value of credits by financial intermediaries to the private sector divided by GDP. Unlike many of the measures used in the past (King and Levine, 1993a, b), this measure excludes credits issued by the central bank and development banks. King and Levine (1993a, b) use a measure of gross claims on the private sector divided by GDP. But, this measure includes credits issued by the monetary authority and government agencies, whereas Private Credit includes only credits issued by deposit money banks and other financial intermediaries. Furthermore, it excludes credit to the public sector and the cross claims of one group of intermediaries over another, and includes all financial institutions, not only the deposit money banks.

It is assumed that the credit provided to the private sector generates increases investment and productivity to a much larger extent than do credits to the public sector. It is also argued that loans to the private sector are given under more inflexible conditions and that the improved quality of investment emanating from financial intermediaries' evaluation of project viability is more significant for private sector credits (Mushin and Pentecost, 2000). As UK banks maintain a large exposure to domestic credit to the UK household and corporate sectors, this indicator will be efficient in terms of reflecting the UK's credit market performance.

3.3 Stock Market Capitalisation

This ratio is the total value of shares traded per year as a percentage of GDP. Demirguc-Kunt and Levine (1996, and 1999) discuss that this indicator measures the activity or liquidity of a stock market relative to its size. A small but active stock market will have a high turnover ratio whereas a large, while a less liquid stock market will have a low turnover ratio. There are significant differences in financial structure across countries, with many countries having large banking sectors relative to stock market capitalisation.

4. Methodology

The main methodological motivation behind this research is to model the dynamic relationship between financial development, accumulation, income distribution and employment in a way that considers simultaneous interaction within a system approach. For this purpose, we adopt structural VAR (SVAR) technique based on short-run restrictions, which accommodates the contemporaneous interaction, as well as lagged relationships, which is essential for the purpose of Impulse Response analysis.

To obtain credible impulse responses analysis, Sims (1986) and Bernanke (1986) advocate the use of economic theory to set the required identifying restrictions. The structural form of the model can then be conveniently summarised by the impulse response functions and the variance decomposition. Impulse responses represent the dynamic adjustment towards the steady state. As the steady state corresponds to the deterministic state of economy, the impulse response function is characterised by the number of periods away from the steady state by which economy could return to the equilibrium depending on the structure of the economy. Consistent with the aim of the paper, which is to analyse the impact of financial development on key macroeconomic variables, one of the main focuses will be on the responses of these variables to a one-time shock to the financial development indicators.

4.1 Theoretical Model

Post Keynesian Macroeconomics and Financialisation

Post Keynesian growth theory has been formed from various strands found mainly in the writings of Keynes and Kalecki that is stimulated by Harrod's approach, which places more emphasis on income distribution. The introduction of monetary variable into the post Keynesian models of distribution and growth is an ongoing process. Nevertheless, the Cambridgian models of growth and distribution drew criticism from some post Keynesian authors, from time to time, because their models left out any explicit analysis of the monetary and financial aspects. In the 1980/90s, post Keynesians have started to take Keynes's (1933) research program of a "monetary Theory of Production" seriously and have introduced monetary variables into Kaldorian and Kaleckian variants of the post Keynesian growth and distribution models. Recently, there have been many attempts to build models of growth or of business cycle that incorporate financial variables, the inspiration of which has been Kalecki's (1937) " principle of increasing risk and the work of Minsky (1975) " John Maynard Keynes".

The common Post Keynesian approach to money is to assume that the quantity of money intermediated in the economy influences final demand, through either the consumption of household or investment of firms or households. Money and credit might also influence production, since firms demand it to purchase inputs or pay wages. Therefore, following Dumenil and Levy (1993), it is presumed that this demand for money is accommodated by banks to finance production, and the

indicators of financial development are treated as exogenous inputs. However the corresponding flows and stocks are not modelled in this study.

In this study, the Kaleckian model of growth and distribution will be the starting point for our analysis. For a Kaleckian model, different regimes of accumulation can be derived, ranging from the usually expected adverse effects of interest rate variations on capital accumulation, capacity utilisation and the profit rate to positive effects throughout on the equilibrium value of the system (Lavoie (1993, 1995), Hein (1999), Hein/Ochsen (2003)).

In the Kaleckian model of growth, the long run is a sequence of short run equilibria, which in turn reflects the influence of the dynamics of money and finance on the macroeconomy. This paper presumes that long term equilibrium cannot be defined independently of money and monetary variables, because monetary mechanisms are responsible for the convergence of short term equilibria to long term equilibrium.

We will proceed through the analysis of the model of aggregate demand, which has Kaleckian features in terms of accumulation, savings, and income distribution and incorporates the labour market as well as international trade. Adding financial sector development indicators as exogenous variables allows for a more realistic structure of the economy. Finally, the new improved model is used to examine the effect of increase in the volume and complexity of the financial markets on the aggregate demand behaviour of the economic units.

4.2 The Empirical Model

The model presented here, for analysing the dynamic effect of financial development, is a Kaleckian-Post Keynesian open economy model. Based on foregoing discussions, we utilise Stockhammer and Onaran (2002, and 2005) Post- Keynesian open economy model, which is augmented by a demand driven labour market, a reserve army effect, as defined in Marxian sense, and technological change. The goods market consists of behavioural functions for accumulation, savings, and net exports, which is then complemented by a distribution function, a productivity function and an unemployment function. Financial development indicators are included in the model intending to capture the exogenous influence of financial market development on accumulation, saving and productivity growth. The equations of the model are listed below:

Accumulation	$g_t^i \equiv \frac{I_t}{K_t} = \alpha_0 + \alpha_1 z_{t-1} + \alpha_2 \pi_{t-1} + \alpha_3 r_t + \alpha_4 gx_{t-1} + \alpha_5 fd$	(1)
Savings	$g_t^s = \beta_1 z_t + \beta_2 \pi_t + \beta_3 fd$	(2)
Income Distribution	$\pi_t = \gamma_0 + \gamma_1 z_t + \gamma_2 u_t + \gamma_3 gx_t$	(3)
Productivity growth	$gx_t = \tau_0 + \tau_1 g_t^i + \tau_2 z_t + \tau_4 fd$	(4)
Net Export	$nx_t = -\delta_1 z_t + \delta_2 \pi_t$	(5)
Unemployment	$u_t = n - e_1 g_t^i - e_2 \Delta z_t - e_3 \pi_t + e_4 u_{t-1} + e_5 gx_t$	(6)

Market equilibrium $g_t^i = g_t^{stotal} = g_t^s - nx$

g_t^i : Growth of Capital stock
g_t^s : Domestic savings/ capital stock
z : Capacity utilisation (capital productivity)
π : Profit share
nx : Net export (normalised by capital Stock)
u : Unemployment rate
gx : Productivity Growth
fd : Financial development indicator

Equation (1) represents the investment decision which is a function of expected profitability. Expectations are captured by the combination of profit share and capacity utilisation rate, which is expected to have a positive effect on investment. The impact of financial sector development is captured by exogenous indicators of financial development in the investment equation since a modern financial system can identify and fund good business opportunities, facilitates the exchange of good and services, and enables trading, hedging, and diversification of risk, all of which, promote investment.

Equation (2) models private saving behaviour, such that private domestic savings normalised by the capital stock is a positive function of profit share and capacity utilisation, which is a simple Cambridge savings function. According to the theory of financial intermediation, financial development raises the proportion of saving and influences the saving rate. Also financial markets may ease liquidity constraints on consumers by providing consumer credit that further reduces saving, and may increase the rate of return on saving and consequently boosts savings. This justifies the exogenous inclusion of financial development indicator in the savings equation. However, the final impact of financial development indicators on savings is ambiguous.

According to Kaldor (1960) and Robinson (1965, 1962), income distribution is a determinant of the level of output in the long run. Inclusion of an income distribution function provides the model with the ability to achieve equilibrium in short and long term and it is thus important in the growth process. In common with the model in Marglin and Bhaduri (1990), equation (3), which represents the supply-side of the model, makes the profit share a positive function of the rate of capacity utilization and a negative function of the rate of employment.

The model adopts a Kaldorian approach to productivity growth in Equation (4), which defines it as a function of accumulation and capacity utilisation. Exogenous technical progress is captured by the constant term. The financial development indicator is also included as an exogenous variable in the equation in line with theoretical literature on finance productivity and growth, which suggest that financial development can

enhance productivity growth in many ways, by raising capital allocation efficiency, and stimulating technological progress through providing financial support to R&D and innovation.

Equation (5) incorporates international trade into the model by defining net exports as a negative function of capacity utilisation and a positive function of the profit share at the level of domestic activity.

The labour market is described by Equation (6), which defines the change in the rate of employment as a positive function of growth of capital stock and changes in capacity utilisation, which is a variation of Okun's Law. Separating out the impact of competitiveness, it can be assumed that profit share and exports will be positively related.

4.3 Data Sources and the Period of Study

The data were obtained from the various issues of the Intentional Financial Statistics (IFS-IMF), International Labour Organisation (ILO), World Bank data base and Asian development Bank (ADB) for the period of 1990Q1 to 2006 Q4 for Hong Kong and United Kingdom.

5. Pre-Analysis

Pre analysis testing includes testing for Stationarity and Cointegration tests using EViews, to evaluate the characteristics of the time series more deeply and to get the pre-requisites to set up VAR model, and before to proceed to Structural VAR modelling we perform residual tests to make sure that homoscedasticity and normality conditions are not violated.

5.1 Data Set Characteristics

For all endogenous and exogenous variables, we have quarterly data for the period ranging from 1990:1 to 2006:4. The Augmented Dickey Fuller Test Statistics calculated with EViews in Table 1 and 2 in appendix confirm that all data are integrated at first difference in both Hong Kong and United Kingdom. The conclusion from these tests is that from now on we will use the first differences of the variable series, which display a stochastic trend.

5.2 Coinetgration Analysis

The Cointegration approach developed by Johansen (1988) is applied in this study, to allow for different degrees of integration among variables as it is better designed to estimate several coinetgration vectors. The test is applied to investigate the existence of any long run relationship between the underlying variables entered in every single equation of the model.

The coinetgration results are shown in the appendix. This has been applied to each of variables of each equation separately, and the values of both eignevalue and Trace statistics indicate the null hypothesis of no cointegrating vector can be rejected in almost all the cases. Thus the results confirm the existence of long-run relationships among the variables included in the model specification.

5.3 Residual Tests

In this section we would subject our single equations to a set of diagnostic tests. The following table has summarised the result of applied tests in the residuals.

Residual tests results

INVESTMENT	**Statistics**	**Probability (Hong Kong)**	**Probability (UK)**
Normality	J-B	**0.953**	**0.059**
Serial Correlation	B&G Obs R^2	**0.279**	**0.571**
ARCH	Obs R^2	**0.198**	**0.881**
White Hetroscedasticity	Obs R^2	**0.826**	**0.949**
SAVINGS			
Normality	J-B	**0.901**	**0.588**
Serial Correlation	B&G Obs R^2	**0.853**	**0.181**
ARCH	Obs R^2	**0.211**	**0.419**
White Hetroscedasticity	Obs R^2	**0.362**	**0.306**
INCOME DIST.			
Normality	J-B	**0.605**	**0.023**
Serial Correlation	B&G Obs R^2	**0.992**	**0.490**
ARCH	Obs R^2	**0.147**	**0.374**
White Hetroscedasticity	Obs R^2	**0.435**	**0.695**
PRIDUCTIVITY			
Normality	J-B	**0.345**	**0.802**
Serial Correlation	B&G Obs R^2	**0.122**	**0.643**
ARCH	Obs R^2	**0.301**	**0.242**
White Hetroscedasticity	Obs R^2	**0.666**	**0.491**
NET EXPORT			
Normality	J-B	**0.596**	**0.931**
Serial Correlation	B&G Obs R^2	**0.645**	**0.000**
ARCH	Obs R^2	**0.552**	**0.468**
White Hetroscedasticity	Obs R^2	**0.976**	**0.647**
EMPLOYMENT			
Normality	J-B	**0.502**	**0.871**
Serial Correlation	B&G Obs R^2	**0.167**	**0.000**
ARCH	Obs R^2	**0.822**	**0.008**

White Hetroscedasticity	Obs R^2	**0.568**	**0.014**

As observed from the table, the Jarque-Bera test reveals that the residuals are normally distributed in five out of six equations in the case of UK and the Normality condition holds in all equations in the case of Hong Kong. Based on computed Breusch-Godfrey serial correlation LM test we can not reject the null of zero autocorrelation except for the equation net export and employment for the UK. Application of ARCH LM test, introduced by Engle (1982) proves that there is no evidence of homoscedastic errors in favour of ARCH residuals; the only exception is employment equation for UK. This particular specification of Heteroscedasticity was motivated by the observation that in many financial time series, the magnitude of residuals appeared to be related to the magnitude of recent residuals.

White Heteroscedasticity statistics is a general test for model misspecification, since the null hypothesis underlying the test assumes that the errors are both homoscedastic and independent of the regressors, and that the linear specification of the model is correct. Failure of any one of these conditions could lead to a significant test statistic. Conversely, a non-significant test statistic implies that none of the three conditions is violated. The result of White test in our model is satisfactory in terms of specification; again the only exception is employment equation for UK.

5.4 SVAR estimation and results

In this section we present the SVAR identification and estimation results, and then analyse the impulse response function for the period of 1990:Q1 to 2006:Q1. In order to be able to plot impulse response functions based on the orthogonal Shocks, we must find the structural form errors. The recursiveness approach gives us a lower triangular Matrix. This means that the ordering of variables plays a crucial role, and they must enter the model based on the post- Keynesian theoretical priors. A lower triangular Matrix restricts the first variable to be contemporaneously independent of all other variables, whereas the last variable is allowed to be influenced contemporaneously by all other variables.

The ordering given in the problem set and which we used throughout this paper is the vector:

$$Y_t' = (INV_t, SAV_t, DISTRIBUTION_t, NX_t, PRODUCTIVITY_t, EMP_t)$$

With this ordering, we assume that investment is the variable which can be influenced directly. Employment is put last because we consider that employment as determined endogenously depending on investment, productivity growth, and income distribution. Having defined the ordering, and since we are interested in investigating the impulse responses to financial development indicator shocks. Initially, we introduce these indicators into SVAR model endogenously and then proceed to perform Block exogeneity tests to indicate which one of these financial development indicators are actually endogenous in Hong Kong and UK's economy. If it is found that one or some of the financial variables are exogenous then they will be removed from SVAR

modelling and will be treated exogenously, and this means we will not be able to impose shocks to those exogenous indicators. Therefore our equation becomes:

$$Y_t' = (INV_t, SAV_t, DISTRIBUTION_t, NX_t, PRODUCTIVITY_t, EMP_t, DOMESTICCRD_t, MR_t, CAPITALI_t)$$

Where DOEMSTICCRD is indicator domestic credit, MR is monetisation ratio and CAPITALI is stock market capitalisation. We are able to write the system in structural VAR representation, which allows us to plot impulse response functions for shocks of structural form, as following:

$$B_0 y_t = a + bt + B_1 y_{t-1} + B_2 y_{t-2} + ... + B_9 y_{t-9} + u_t \qquad u_t \approx iin(0,1)$$

Here u_t are the structural shocks that are serially uncorrelated and have an orthonormal variance-covariance matrix. These unobservable structural shocks are related to the observable reduced form residuals by the following relation;

$e_t = B_0^{-1} u_t$,

Where B_0 is the (k× k) matrix of coefficients. Multiplication with B_0^{-1} leads to the VAR representation:

$$y_t = \alpha + \beta t + A_1 y_{t-1} + A_2 y_{t-2} + ... + A_9 y_{t-9} + B_0^{-1} u_t$$

Where $A_i = B_0^{-1} B_i$

There are several ways of specifying the restrictions to achieve identification of the structural parameters. A popular and straightforward method is to orthogonalise reduce form errors by Choleski decomposition as originally applied by Sims (1980). The restrictions can be based on long run considerations or contemporaneous effects. Following the argument of Faust and Leeper (1997) we do not impose long run restrictions in order to avoid serious misspecification problems.

SVAR Model, before testing for Block Exogeneity

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \alpha_{21} & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \alpha_{31} & \alpha_{32} & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & 1 & 0 & 0 & 0 & 0 & 0 \\ \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & 1 & 0 & 0 & 0 & 0 \\ \alpha_{61} & \alpha_{62} & \alpha_{63} & \alpha_{64} & \alpha_{65} & 1 & 0 & 0 & 0 \\ \alpha_{71} & \alpha_{72} & \alpha_{73} & \alpha_{74} & \alpha_{75} & \alpha_{76} & 1 & 0 & 0 \\ \alpha_{81} & \alpha_{82} & \alpha_{83} & \alpha_{84} & \alpha_{85} & \alpha_{86} & \alpha_{87} & 1 & 0 \\ \alpha_{91} & \alpha_{92} & \alpha_{93} & \alpha_{94} & \alpha_{95} & \alpha_{96} & \alpha_{97} & \alpha_{98} & 1 \end{bmatrix} \times \begin{bmatrix} e_{INV} \\ e_{SAV} \\ e_{\pi} \\ e_{PROD} \\ e_{NX} \\ e_{UNEMP} \\ e_{CREDIT} \\ e_{Monetisation} \\ e_{Capitalisation} \end{bmatrix} =$$

$$\begin{bmatrix} \beta_{11} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \beta_{22} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \beta_{33} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \beta_{44} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \beta_{55} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \beta_{66} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \beta_{77} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \beta_{88} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \beta_{99} \end{bmatrix} \times \begin{bmatrix} u_{INV} \\ u_{SAV} \\ u_{\pi} \\ u_{PROD} \\ u_{NX} \\ u_{UNEMP} \\ u_{CREDIT} \\ u_{Monetisation} \\ u_{capitalisation} \end{bmatrix}$$

After estimating VAR lag, and testing Blok exogeneity, it is observed that among our three Financial Development indicators, only Stock Market capitalisation seem to reject the hypothesis of exogeneity, and exogeneity assumption is violated in terms of Monetisation ratio and Domestic Credit for United Kingdom therefore according to proposition we took, only Stock Market Capitalisation will be an endogenous variable in SVAR, which later on will be shocked for further investigation. The estimated SVAR with application of Choleski decomposition to the SVAR specification is presented below for United Kingdom and Hong Kong.

United Kingdome Estimated Matrix A

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ -0.811 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0.728 & 0.189 & 1 & 0 & 0 & 0 & 0 \\ 421.76 & 16.37 & -22.20 & 1 & 0 & 0 & 0 \\ -2.49 & -0.03 & 0.016 & 0.002 & 1 & 0 & 0 \\ -0.19 & -0.285 & -0.113 & 0.0008 & 0.118 & 1 & 0 \\ 66.73 & -16.95 & -4.46 & 0.026 & 2.60 & 36.94 & 1 \end{bmatrix}$$

United Kingdome Estimated Matrix B

$$\begin{bmatrix} 0.0012 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.007 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.0065 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1.22 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.005 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.0018 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0.147 \end{bmatrix}$$

In the case of Hong Kong Block exogeneity assumption is violated in terms of Stock market Capitalisation, and therefore, this indicator of financial development will be removed from Structural VAR.

Hong Kong Estimated Matrix A

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0.02 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0.13 & -2.14 & 1 & 0 & 0 & 0 & 0 & 0 \\ 5.19 & 30.78 & -0.14 & 1 & 0 & 0 & 0 & 0 \\ 283 & -113.18 & 53.37 & 0.28 & 1 & 0 & 0 & 0 \\ -17.24 & 3.62 & -7.96 & 0.03 & -0.06 & 1 & 0 & 0 \\ -1.91 & -1.55 & 0.80 & 0.04 & 0.005 & -0.05 & 1 & 0 \\ 1.68 & -7.27 & -0.23 & 0.04 & 0.008 & 0.03 & -0.03 & 1 \end{bmatrix}$$

Hong Kong Estimated Matrix B

$$\begin{bmatrix} 0.013 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.008 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.025 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.88 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 4.41 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.89 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0.16 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0.17 \end{bmatrix}$$

The results of SVAR, presented above allow concluding that the post Keynesian model seems to perform well and in line with theoretical model. The results indicate that a higher level of investment significantly boosts the volume of export which is in line with out theoretical macroeconomic model. Investment and productivity growth are significantly interrelated as theory predicts.

The interaction between investment and unemployment is negative as expected. The positive and significant interaction between investment and income distribution implies that higher rate of accumulation is accompanied with higher share of profit, suggesting that the regime of accumulation in Hong Kong and UK is profit led.

5.5 Impulse Response Function Results

Impulse response functions enables us to analyse reactions of the whole system to shocks (structural or reduced form shocks). The result of impulse response analysis is presented in Figures 1,2 and 3. Each graph includes a point estimation of impulse response functions as well as lower and upper bounds for a 95% confidence interval. The solid line portrays the macroeconomic variables changes in response to a standard deviation of one whereas the dotted lines represent the 95% error bands.

Given the focus of this study, the impulse response functions are scaled by the initial impact of a one standard error financial development indicators' shock on the responding variables Investment, Saving and Productivity Growth according to the theory. The speed of adjustment after a structural shock is measured by the number of periods before the impulse-response functions cross the zero line. The sizes of shocks applied to SVAR system in this study measured as one-standard deviation shock of the structural error.

Since Monetisation Ratio is identified exogenous variable in Block Exogeneity Test, therefore this indicator of financial development has not entered the Structural VAR model neither for the case of Hong Kong nor United Kingdom.

Figure 1 presents the impulse responses for orthogonal shocks to Domestic Credit in Hong Kong. The size of the raw shock in Domestic Credit on Productivity Growth tends to be consistent up to 10 quarters in Hong Kong and then starts to disappear. A positive domestic credit shock increases investment significantly for 3 quarters, while at the same time decreases the savings up to 4 quarters, where the effect crosses zero

and declines again immediately for another 2 quarters . The impact of this shock on savings seems to disappear after 7 quarters. The interpretation for this negative shift in savings due to more accessibility to Domestic credit is plausible, since firms and household have more access to credit they may tend to increase their level of consumption and expenditure instead of save.

Figure 2 shows the impulse response to orthogonal shocks to the Stock market Capitalisation ratio for the period of 20 quarters ahead. A positive shock to Stock Market Capitalisation appear to have an expected and interesting positive impact on Investment, savings as well as Productivity Growth in Hong Kong , which this increase almost lasts for up to 5 quarters. The impact of stock market capitalisation shock seems to disappear after 10 quarters for Investment and savings. The impact on investment over all is positive and this could be interpreted that financial sector capitalisation is tightly involved with investment projects in the real sector in the case of Honk Kong.

Figure 3 presents the impulse response to orthogonal shocks to the Stock market capitalisation in United Kingdom, which is the only endogenous indicator of financial development according to Block Exogeneity test in this study, for the period of 20 quarters ahead. As it is easily observed a positive shock to the capitalisation of the stock market in United Kingdom, creates an immediate increase in the level of investment and productivity growth for up to 3 quarters, which accompanies with a decline in the level of savings for the first 3 quarters. This decrease in the saving level is expected since if the capitalisation of the stock market increases, that means the market turn over must have been higher comparatively with initial stage, therefore firms and households start investing into the stock market instead of saving into the banking system.

According to the results obtained from figure 2 and 3, it is interpreted that the simple average of the speed of adjustment for the responses to the structural shocks of financial development indicators on macroeconomic indicators in Hong Kong is higher than United Kingdom, and the financial sector development shock has longer-lived impact upon the macroeconomic variables in the United Kingdom and seems to be more persistent. The implication is that Hong Kong economy appears as more resilient than the United Kingdom. Figure 3 indicates that stock market capitalisation impacts hugely and positively on the productivity growth for up to 4 quarters. This is in line with the modern growth theory of financial intermediation, which argues that financial development increases productivity and therefore enhances economic growth.

An innovation to stock market capitalisation seems to have a positive impact on Investment both in Hong Kong and UK. However, the positive impact seems stronger in Hong Kong. The response of productivity growth to this innovation is strong and positive at least for the first 3 quarter in the UK, and in the case of Hong Kong the response is strong and positive after an immediate decline in productivity growth for 1 quarter only. It appears from figures 1 and 2, that financial development in Hong Kong strongly declines unemployment in the labour market.

6. Conclusion

The analysis in this paper is predicted on a view that the theory of financial development must be combined with the Post Keynesian assumptions of economic growth. This objective emerges from a belief that financial sector has been extensively neglected by post Keynesian studies. At the same time, very large numbers of empirical heterodox studies have confirmed the positive and strong relationship between financial sector development and economic growth. Therefore, this study has integrated the theory of financial intermediation, in which lies on the assumption that financial development promotes economic growth through the channels of Investment, Saving and Productivity Growth, with a Post Keynesian-Kaleckian approach to economic growth.

The particular Kaleckian- Post Keynesian dynamic macroeconomic model adopted in this study is taken from Stockhammer and Onaran (2003). The model was estimated using Structural VAR methods in order to identify dynamic responses of Hong Kong and United Kingdom's economies to financial sector development shocks. Block exogeneity test was applied in order to identify exogeneity of financial development variables before the decision is made on their inclusion in the final SVAR model. Finally, financial sector shocks were simulated and presented in the form of impulse response functions.

Structural VAR estimation results confirm the basic Keynesian theory: employment requires high aggregate demand, which needs high net investment, high investment, in turn, signifies rapid growth and expands goods market, and good's market demands determines labour market outcome. The findings also suggest that productivity growth does play an important role in promoting economic growth.

The results support the Keynesian theory of endogeneity of money, since the Monetisation Ratio, M2/GDP, has not been found to be exogenous indicator in the VAR model neither in the UK nor in Hong Kong. For many rasons, the widely used *M2/GDP is* not a trustworthy indicator of financial development, as it fluctuates enormously over time as well as across countries. Also this indicator responds excessively to any changes in monetary policy. Domestic Credit was found to be endogenous in SVAR model in the case of Hong Kong only, and following the results of block exogeneity test Stock Market Capitalisation was treated as endogenous variable in SVAR both in the UK and Hong Kong.

The study provides evidence that financial development may exercise a positive influence on economic growth in financially developed (e.g. UK) and fast developing (Hong Kong) countries, both in the short- and long- run. The results can be used to inform policy makers and economic forecasters how macroeconomic variables such as accumulation, savings and productivity growth respond over time to changes in banking system policies and regulation in terms of availability of credits, and stock market rules and regulations in terms of capitalisation of the market. According to the results, enforcing the creditors and investors' right will be recommended to create a

motivating environment, in which banking system and stock market stimulate domestic investment and promote economic growth.

Given the nature of indicators of financial development variables employed in this study, the results also suggest that financial development shocks, particularly stock market capitalisation and improvements are strongly responsible for stimulation of Investment, Saving and Productivity Growth in Hong Kong, and enhancing productivity growth strongly in the UK for up to 4 quarters. Hong Kong's financial sector is transformed during the last decades, and its international financial centre status consolidated. So long as Hong Kong bonds with the policy of no capital control and operates in free market environment, it will attract foreign capitals to its open economy and advanced financial market.

As Hong Kong financial system remains almost dominated by banks. In this respect, as a result of the Post-Keynesian conclusions that we have already put forward, institutional and banking arrangements significantly facilitate financial market development and enhance economic growth.

Although results can not be taken as definitive, as series improvement is always a possibility, and financial development indicators must not be overrated, since they certainly are differentiated across countries and their applications into the model produce different results, impulse response analysis in the paper reassessed the extensive view of "development of financial sector impacts positively upon macroeconomic variables", and tended to emphasis that Keynesian/ Post Keynesian macroeconomic models and policies should pay more attention to this view and that the subject deserves more investigation.

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Figure 1-- impulse responses for orthogonal shocks to Domestic Credit; Hong Kong

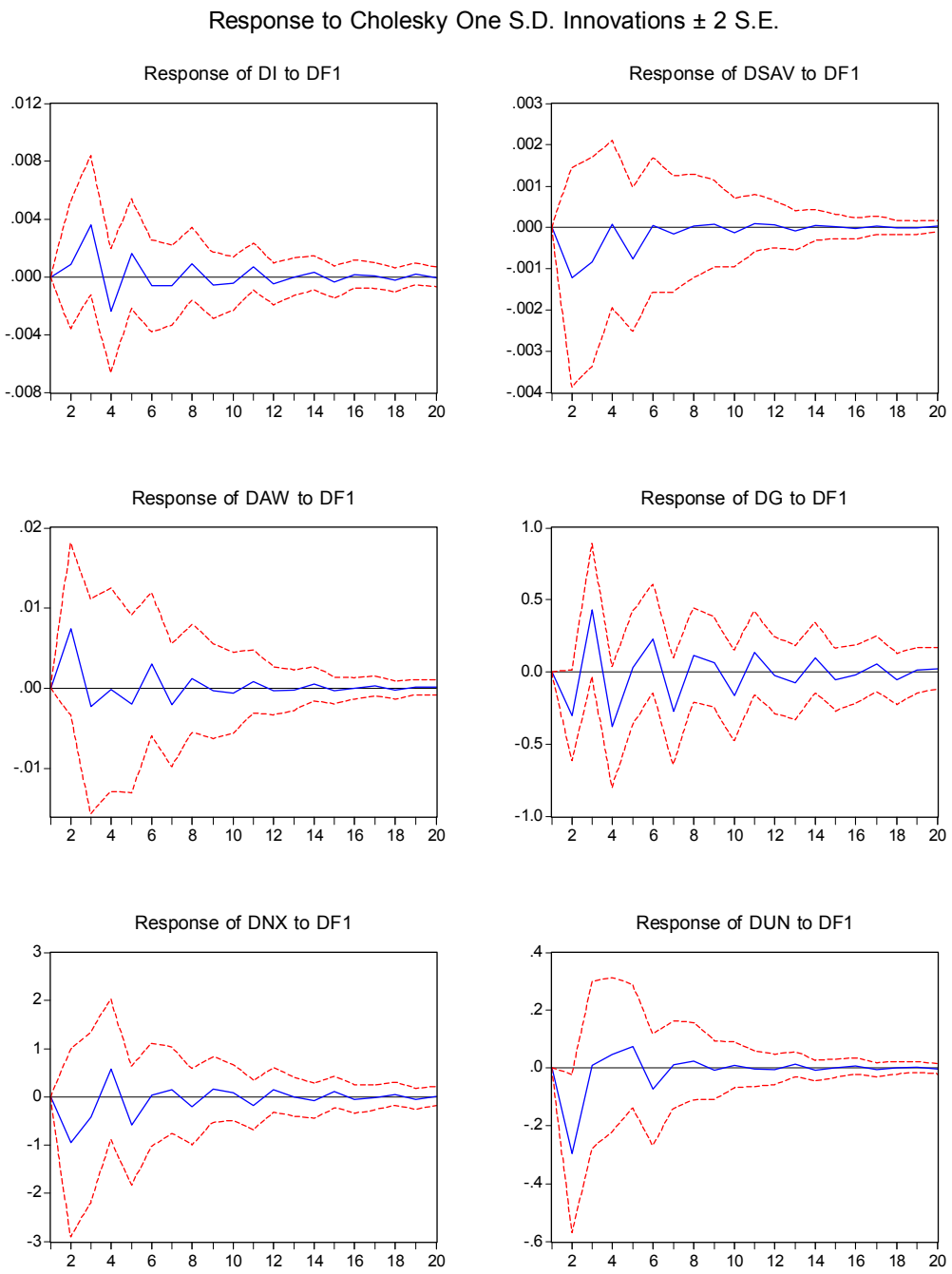


Figure 2-- response to orthogonal shocks to the Stock market Capitalisation ratio; Hong Kong

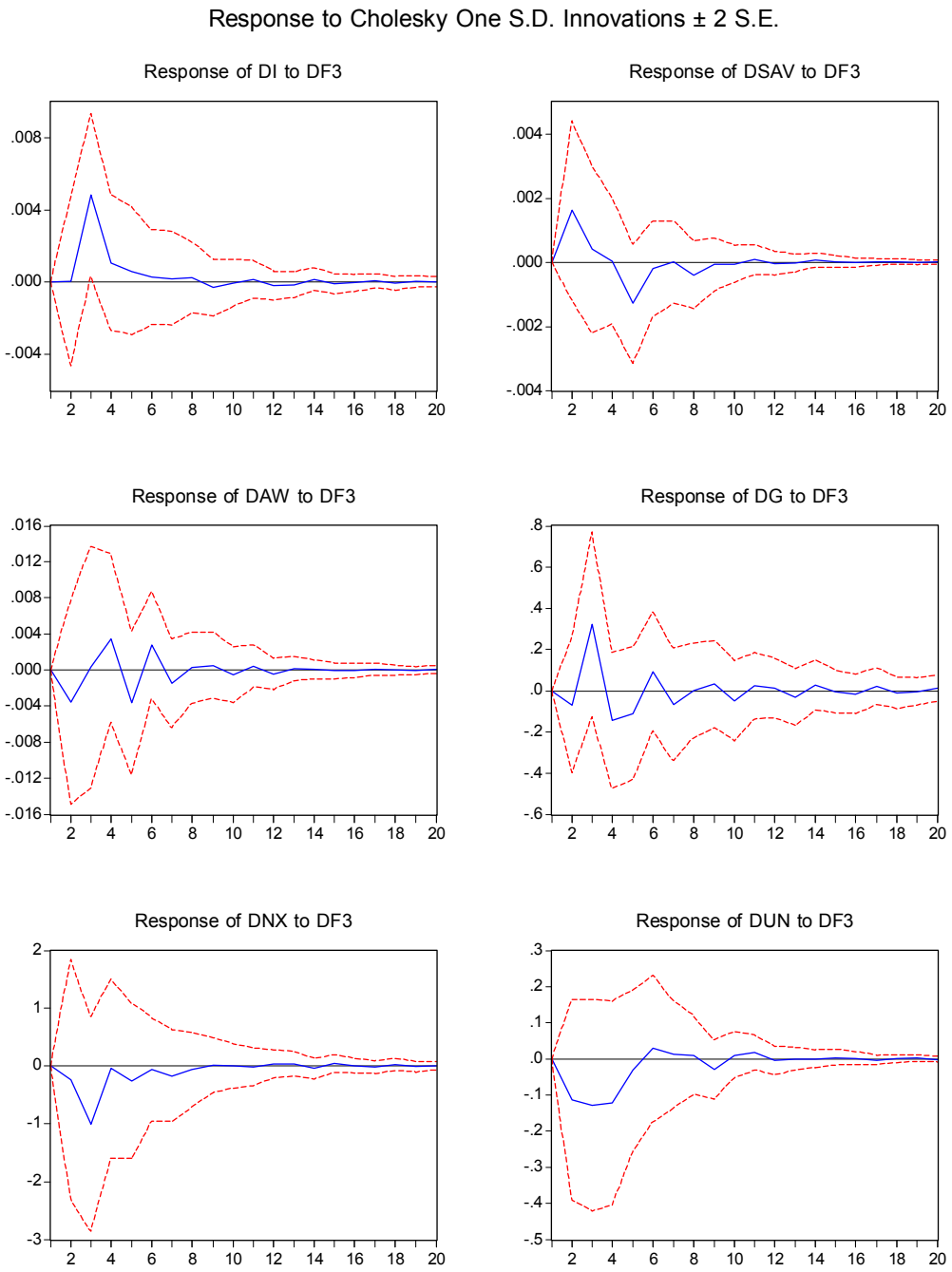
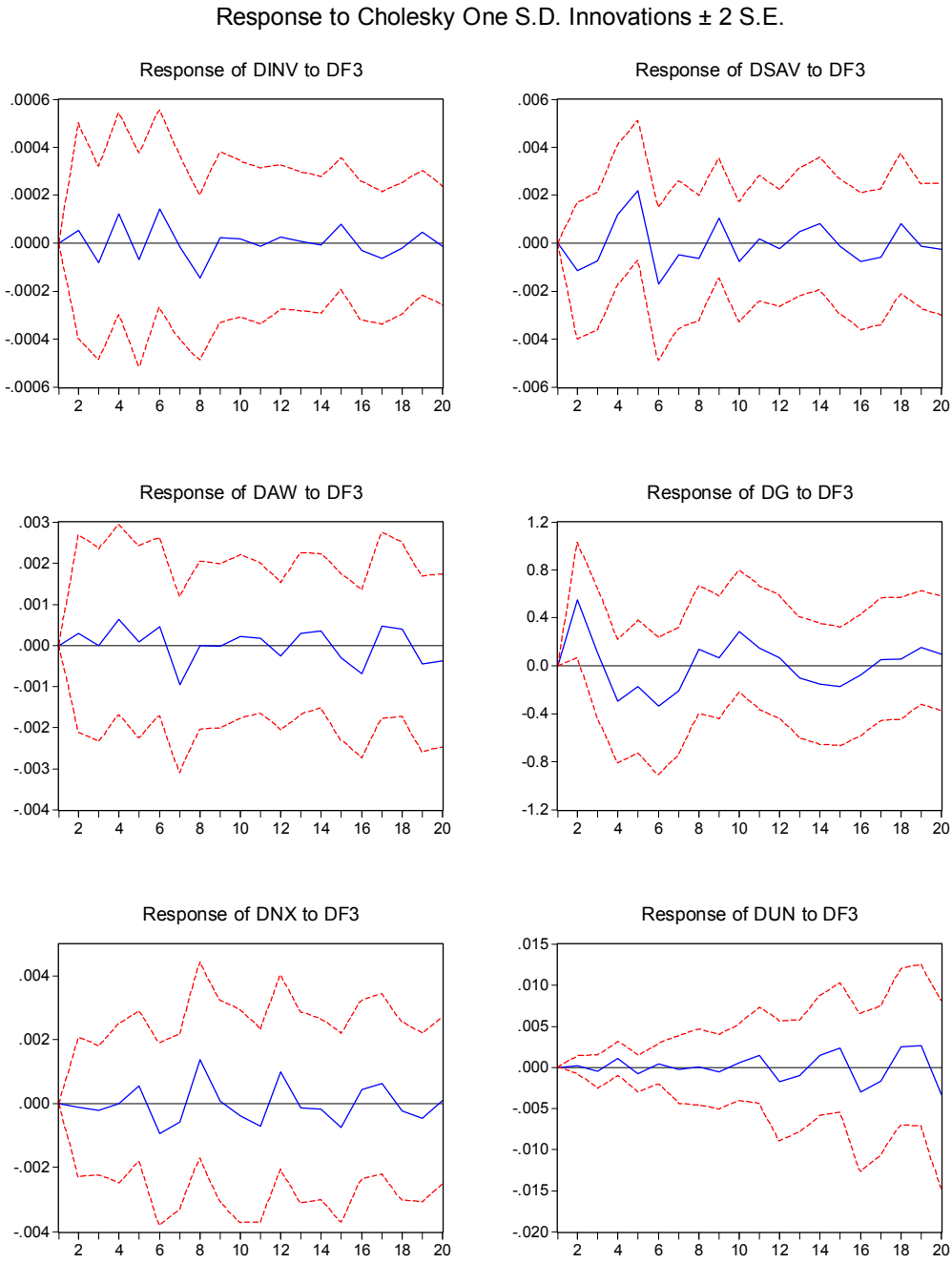


Figure 3-- response to orthogonal shocks to the Stock market Capitalisation ratio; UK



APPENDIX
Unit Root Test results

Table 1
Unit root tests results for UK's model

	ADF				PP				KPSS			
	Level		First D		Level		First D		Level		First D	
Investment	-2.993 **	-2.896	-10.42 ***	-10.42 ***	-3.016 *	-2.92	-10.14 ***	-10.15 ***	0.092*	0.094*	0.313	0.099*
Savings	-2.124	-2.083	-6.720 ***	-6.673 ***	3.124 *	3.082	-13.60 ***	-13.65 ***	0.154	0.145	0.277	0.269
Income Distribution	-1.797	-2.983	-13.397 ***	-13.294 ***	-2.37 *	4.261 **	-14.49 ***	-14.39 ***	0.681	0.131	0.149	0.146
Productivity growth	-10.871 ***	-10.82 ***	-9.96 ***	-9.902 ***	-11.03 ***	-11.0 ***	-38.08 ***	-37.60 ***	0.087 *	0.062 *	0.073 *	0.071 *
Net Export	-0.198	-3.427 *	-9.506 ***	-9.920 ***	-3.031 *	-5.39 ***	-14.63 ***	-34.06 ***	0.724	0.246	0.384	0.148
Unemployment	-4.100 **	-4.126 **	-7.370 ***	-7.278 ***	-1.61	-2.03	-13.56 ***	-13.53 ***	0.796	0.116	0.166	0.166
Capacity Utilisation	-1.359	-2.299	-8.875 ***	-8.873 ***	-1.131	-2.22	-8.85 ***	-8.87 ***	0.921	0.106	0.088 *	0.086 *
Interest Rate	-3.093 *	-3.053	-4.138 ***	-4.072 **	-9.09 ***	-10.0 ***	-43.78 ***	-43.61 ***	0.253	0.156	0.071 *	0.070 *
Monetisation Ratio	-2.172	-3.574 *	-12.85 ***	-12.99 ***	-3.66 **	-4.69 **	-13.42 ***	-14.23 ***	0.467	0.106	0.192	0.07 *
Domestic Credit	0.6507	-6.468 ***	-6.818 ***	-7.362 ***	-4.75 ***	-6.87 ***	-25.54 ***	-31.88 ***	0.807	0.246	0.083	0.071
Stock Market Capitalisation	0.760	-2.584	-17.02 ***	-16.97 ***	-0.608	-5.85 ***	-18.38 ***	-18.52 ***	1.01	0.195	0.301	0.348
Change in Capacity Utilisation	-8.863	-8.879	-8.868	-8.794	-8.86 ***	-8.88 ***	-53.23 ***	-51.39 ***	0.088	0.081	0.375	0.299

*** (**), (*) indicates that t-statistic is significant at 1% (5%), and (10%)

Table 2
Unit root tests results for Hong Kong's model

	ADF				PP				KPSS			
	Level		First D		Level		First D		Level		First D	
Investment	-1.417	-1.886	-9.612***	-9.771***	-1.177	-1.691	-9.663***	-9.818***	0.333	0.210	0.207	0.057
Savings	-2.229	-2.458	-8.685***	-8.619***	-2.137	-2.464	-8.685***	-8.619***	0.501	0.177	0.063	0.046
Income Distribution	-0.979	-1.923	-15.79***	-15.719***	-2.443	-3.387*	-15.839***	-15.802***	0.530	0.159	0.50	0.50
Productivity growth	-1.779	-1.710	-12.621***	-6.745***	-4.699***	-7.381***	-19.405***	-19.600***	0.751	0.205	0.120	0.059
Net Export	-2.064	-2.050	-8.161***	-8.116***	-2.064	-2.050	-8.161***	-8.110***	0.293	0.185	0.102	0.078
Unemployment	-1.794	-3.096	-6.252***	-6.191***	-1.689	-3.111	-9.436***	-9.371***	0.834	0.141	0.180	0.178
Capacity Utilisation	0.443	-2.309	-14.36***	-14.35***	0.731	-3.926	-15.886***	-18.818***	0.904	0.236	0.500	0.319
Interest Rate	-1.471	-2.297	-4.825**	-4.789**	-1.306	-1.863	-4.834***	-4.797***	0.709	0.121	0.092	0.079
Monetisation Ratio	0.555	-1.627	-8.374***	-8.757***	-0.106	-2.320	-8.256***	-17.084***	0.711	0.248	0.33	0.500
Domestic Credit	-1.918	-1.510	-6.830***	-6.790***	-1.721	-2.102	-6.852***	-6.813***	0.300	0.101	0.122	0.117
Stock Market Capitalisation	-2.298	-4.073**	-3.858***	-1.375	-2.554	-4.012**	-3.983**	-4.012**	0.794	0.076	0.053	0.047
Change in Capacity Utilisation	-6.577***	-6.582***	-8.522***	-8.385***	-6.545***	-6.516***	-32.83***	-31.37***	0.117	0.059	0.205	0.154

*** (**), (*) indicates that t-statistic is significant at 1% (5%), and (10%)

Johansen Coinetgration Test Results

UK:

Investment Equation Variables

Hypothesised No of CEs	Eignevalue	Trace Stat.	Critical Value at 5%	Critical Value at 1%
None **	0.627920	254.5017	182.82	196.08
At most 1 **	0.598697	190.2396	146.76	158.49
At most 2 **	0.504460	130.8921	114.90	124.75
At most 3	0.392506	85.25511	87.31	96.58
At most 4	0.256475	52.85828	62.99	70.05
At most 5	0.227395	33.59537	42.44	48.45
At most 6	0.156270	16.82622	25.32	30.45
At most 7	0.085101	5.781231	12.25	16.26

Hypothesised No of CEs	Eignevalue	Trace Stat.	Critical Value at 5%	Critical Value at 1%
None **	0.627920	64.26208	55.50	62.46
At most 1 **	0.598697	59.34752	49.42	54.71
At most 2 *	0.504460	45.63700	43.97	49.51
At most 3	0.392506	32.39683	37.52	42.36
At most 4	0.256475	19.26292	31.46	36.65
At most 5	0.227395	16.76915	25.54	30.34
At most 6	0.156270	11.04499	18.96	23.65
At most 7	0.085101	5.781231	12.25	16.26

Savings Equation Variables

Hypothesised No of CEs	Eignevalue	Trace Stat.	Critical V at 5%	Probability
None *	0.461690	121.9407	114.90	124.75
At most 1	0.392909	81.68496	87.31	96.58
At most 2	0.294210	49.24501	62.99	70.05
At most 3	0.194487	26.59659	42.44	48.45
At most 4	0.101622	12.53865	25.32	30.45
At most 5	0.082165	5.572953	12.25	16.26

Hypothesised No of CEs	Eignevalue	Max. Eignevalue	Critical V at 5%	Probability
None	0.461690	40.25579	43.97	49.51
At most 1	0.392909	32.43995	37.52	42.36
At most 2	0.294210	22.64842	31.46	36.65
At most 3	0.194487	14.05794	25.54	30.34
At most 4	0.101622	6.965694	18.96	23.65
At most 5	0.082165	5.572953	12.25	16.26

Income Distribution Equation Variables

Hypothesised No of CEs	Eignevalue	Trace Stat.	Critical V at 5%	Probability
None **	0.995024	388.0948	62.99	70.05
At most 1*	0.315224	43.38549	42.44	48.45
At most 2	0.176800	18.77234	25.32	30.45
At most 3	0.089943	6.126156	12.25	16.26

Hypothesised No of CEs	Eignevalue	Max. Eignevalue	Critical V at 5%	Probability
None **	0.995024	344.7093	31.46	36.65
At most 1	0.315224	24.61316	25.54	30.34
At most 2	0.176800	12.64618	18.96	23.65
At most 3	0.089943	6.126156	12.25	16.26

Productivity Growth Equation Variables

Hypothesised No of CEs	Eignevalue	Trace Stat.	Critical V at 5%	Probability
None **	0.490294	126.0921	114.90	124.75
At most 1	0.368169	82.28726	87.31	96.58
At most 2	0.264098	52.44355	62.99	70.05
At most 3	0.225950	32.51073	42.44	48.45
At most 4	0.157910	15.86304	25.32	30.45
At most 5	0.069635	4.691617	12.25	16.26

Hypothesised No of CEs	Eignevalue	Max.Eigen value	Critical V at 5%	Probability
None	0.490294	43.80484	43.97	49.51
At most 1	0.368169	29.84371	37.52	42.36
At most 2	0.264098	19.93282	31.46	36.65
At most 3	0.225950	16.64769	25.54	30.34
At most 4	0.157910	11.17142	18.96	23.65
At most 5	0.069635	4.691617	12.25	16.26

Net Export Equation Variables

Hypothesised No of CEs	Eignevalue	Trace Stat.	Critical V at 5%	Probability
None **	0.454306	52.55947	42.44	48.45
At most 1	0.121714	13.18913	25.32	30.45
At most 2	0.070517	4.753265	12.25	16.26

Hypothesised No of CEs	Eignevalue	Max. Eignevalue	Critical V at 5%	Probability
None **	0.454306	39.37034	25.54	30.34
At most 1	0.121714	8.435865	18.96	23.65
At most 2	0.070517	4.753265	12.25	16.26

Employment Equation Variables

Hypothesised No of CEs	Eignevalue	Trace Stat.	Critical V at 5%	Probability
None **	0.994528	412.3396	87.31	96.58
At most 1 **	0.411509	73.81347	62.99	70.05
At most 2	0.292234	39.35089	42.44	48.45
At most 3	0.139389	16.88418	25.32	30.45
At most 4	0.103847	7.126841	12.25	16.26

Hypothesised No of CEs	Eignevalue	Max. Eignevalue	Critical V at 5%	Probability
None **	0.994528	338.5261	37.52	42.36
At most 1 *	0.411509	34.46258	31.46	36.65
At most 2	0.292234	22.46671	25.54	30.34
At most 3	0.139389	9.757335	18.96	23.65
At most 4	0.103847	7.126841	12.25	16.26

Hong Kong

Investment Equation Variables

Hypothesised No of CEs	Eignevalue	Trace Stat.	Critical Value at 5%	Critical Value at 1%
None **	0.745655	266.2087	182.82	196.08
At most 1 **	0.644500	190.9102	146.76	158.49
At most 2 **	0.519244	134.0276	114.90	124.75
At most 3 *	0.429297	93.74580	87.31	96.58
At most 4	0.376823	62.89707	62.99	70.05
At most 5	0.286458	36.88618	42.44	48.45
At most 6	0.203272	18.32289	25.32	30.45
At most 7	0.100487	5.824579	12.25	16.26

Hypothesised No of CEs	Eignevalue	Max. Eignevalue	Critical Value at 5%	Critical Value at 1%
None **	0.745655	75.29852	55.50	62.46
At most 1 **	0.644500	56.88259	49.42	54.71
At most 2	0.519244	40.28179	43.97	49.51
At most 3	0.429297	30.84873	37.52	42.36
At most 4	0.376823	26.01089	31.46	36.65
At most 5	0.286458	18.56330	25.54	30.34
At most 6	0.203272	12.49831	18.96	23.65
At most 7	0.100487	5.824579	12.25	16.26

Savings Equation Variables

Hypothesised No of CEs	Eignevalue	Trace Stat.	Critical V at 5%	Probability
None *	0.449787	118.6996	114.90	124.75
At most 1	0.400375	85.83994	87.31	96.58
At most 2	0.271998	57.71015	62.99	70.05
At most 3	0.255099	40.25031	42.44	48.45
At most 4	0.220051	24.05256	25.32	30.45
At most 5	0.172042	10.38361	12.25	16.26

Hypothesised No of CEs	Eignevalue	Max. Eignevalue	Critical V at 5%	Probability
None	0.449787	32.85969	43.97	49.51
At most 1	0.400375	28.12979	37.52	42.36
At most 2	0.271998	17.45985	31.46	36.65
At most 3	0.255099	16.19775	25.54	30.34
At most 4	0.220051	13.66895	18.96	23.65
At most 5	0.172042	10.38361	12.25	16.26

Income Distribution Equation Variables

Hypothesised No of CEs	Eignevalue	Trace Stat.	Critical V at 5%	Probability
None **	0.508916	74.99985	62.99	70.05
At most 1	0.345324	35.88718	42.44	48.45
At most 2	0.128828	12.58840	25.32	30.45
At most 3	0.086949	5.003017	12.25	16.26

Hypothesised No of CEs	Eignevalue	Max. Eignevalue	Critical V at 5%	Probability
None **	0.508916	39.11267	31.46	36.65
At most 1	0.345324	23.29878	25.54	30.34
At most 2	0.128828	7.585382	18.96	23.65
At most 3	0.086949	5.003017	12.25	16.26

Productivity Growth Equation Variables

Hypothesised No of CEs	Eignevalue	Trace Stat.	Critical V at 5%	Probability
None **	0.552757	170.2295	146.76	158.49
At most 1 **	0.515207	126.7782	114.90	124.75
At most 2 *	0.454500	87.68041	87.31	96.58
At most 3	0.345611	54.95362	62.99	70.05
At most 4	0.254667	32.05471	42.44	48.45
At most 5	0.159532	16.18278	25.32	30.45

Hypothesised No of CEs	Eignevalue	Max.Eigen value	Critical V at 5%	Probability
None **	0.692081	64.78552	49.42	54.71
At most 1	0.446295	32.51175	43.97	49.51
At most 2	0.354065	24.03810	37.52	42.36
At most 3	0.328259	21.88357	31.46	36.65
At most 4	0.249155	15.76061	25.54	30.34
At most 5	0.140811	8.347168	18.96	23.65

Net Export Equation Variables

Hypothesised No of CEs	Eignevalue	Trace Stat.	Critical V at 5%	Probability
None	0.181330	26.05344	42.44	48.45
At most 1	0.170996	15.04933	25.32	30.45
At most 2	0.082492	4.735151	12.25	16.26

Hypothesised No of CEs	Eignevalue	Max. Eignevalue	Critical V at 5%	Probability
None	0.181330	11.00410	25.54	30.34
At most 1	0.170996	10.31418	18.96	23.65
At most 2	0.082492	4.735151	12.25	16.26

Employment Equation Variables

Hypothesised No of CEs	Eignevalue	Trace Stat.	Critical V at 5%	Probability
None **	0.608037	119.8505	87.31	96.58
At most 1 *	0.438821	68.33816	62.99	70.05
At most 2	0.326089	36.56385	42.44	48.45
At most 3	0.148168	14.85767	25.32	30.45
At most 4	0.103963	6.037517	12.25	16.26

Hypothesised No of CEs	Eignevalue	Max. Eignevalue	Critical V at 5%	Probability
None **	0.608037	51.51238	37.52	42.36
At most 1 *	0.438821	31.77430	31.46	36.65
At most 2	0.326089	21.70618	25.54	30.34
At most 3	0.148168	8.820156	18.96	23.65
At most 4	0.103963	6.037517	12.25	16.26