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Macro-Financial Effects of Portfolio Flows: Malaysia's Experience*

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Abstract

This paper studies the causes and effects of portfolio flows in Malaysia. We use Structural Vector Autoregression (SVAR) and Autoregressive Distributed Lag (ARDL) models to analyse the interactions among portfolio flows, global and domestic macro and financial variables within a common empirical framework. Three findings emerge: First, the SVAR estimations show that global and domestic factors play transitory roles in driving Malaysia's net portfolio flows. A subsample analysis from the ARDL model highlights that domestic factors play an increasingly important role in attracting portfolio inflows as Malaysia liberalised its exchange rate regime and capital flow restrictions. Second, higher net portfolio flows lead to exchange rate appreciation, higher equity prices and credit expansion. The effects are visible in the exchange rate, followed by equity prices and credit. Third, in the transmission of higher portfolio flows to growth, the positive effects from higher equity prices and credit are partially offset by the dampening effect from the appreciating exchange rate on output. While the contribution of portfolio flow's effects on output variance is low, the impulse responses of output does change to portfolio flow shocks, suggesting that portfolio flows are tail risks to growth and that the risks magnify when the flows are large and volatile.

Keywords: International Portfolio Flows; Open Economy; Financial Economics; SVAR Model
JEL Classification: C52; E44; F41; G15

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1. Introduction

Emerging economies (EMs) with open capital accounts constantly face risks associated with large capital inflows and their corresponding reversals. In developed financial markets, capital flows are easily dispersed across assets and sectors. However, financial markets in many EMs have not reached this level of development, resulting in capital flow movements being more visible in the exchange rate, asset prices and bank credit.[4] When large enough, capital flow movements can cause the build-up of financial imbalances (e.g. over-valued asset prices and over-investment), exchange rate misalignments and the associated risks to growth. Crucially, these developments put EMs at risk of a financial crisis triggered by large capital flow reversals.[5] Understanding the determinants and effects of international capital flows on EMs can help these economies design and focus on pre-emptive measures to diffuse these risks.

This study uses Malaysia as an example to examine the macro-financial effects of portfolio flows. We estimate Structural Vector Autoregressive (SVAR) and Autoregressive Distributed Lag (ARDL) models to give insight to three issues: What drives Malaysia's portfolio flows; what is the impact of portfolio flows on domestic financial markets and the real economy; and how important are domestic financial markets in the transmission of portfolio flows to the real economy. Both SVAR and ARDL estimations focus on the portfolio (debt and equity) component of the financial account. Our interest arises from the uncertainty surrounding the effects of portfolio flows on economic growth. Portfolio inflows are associated with higher

[4] For instance, Tillmann (2013) finds that capital inflows account for approximately twice the variation in property prices in emerging Asian economies compared to OECD economies.

[5] See for example Chang and Velasco (1999), Eichengreen and Adalet (2005) and Lane and Milesi-Ferretti (2012). Sarno, Tsiakas, and Ulloa (2016) finds that the contribution of global economic variables to the variance of international portfolio flows to EMs is higher than the world average.

asset prices and credit growth, which affect growth positively. However, inflows also cause the exchange rate to appreciate, which exerts downward pressure on growth.

The SVAR model depicts Malaysia as a small emerging economy with open financial markets and accounts for key features of the global environment, such as global growth, liquidity and financial market volatility. To determine the drivers of portfolio flows over time in more detail, we then use an ADRL model to investigate the relationship between portfolio flows and the domestic and foreign macro-finance variables over a number of sub-periods.[6]

Existing studies tend to analyse the effects of capital flows on financial markets and credit and,[7] separately, the effects of financial markets and credit on the real economy.[8] There are fewer studies, especially on EMs that encompass capital flows, financial markets and the real economy within a common empirical framework. Our model uses monthly data which departs from most relevant studies using cross-country and lower frequency datasets (quarterly or annually). A country-specific model is likely more informative as the causes and transmission of portfolio flows may differ across countries due to differences in institutions, regulation and financial market structure. Meanwhile, higher frequency data is arguably better suited to study the transmission of portfolio flows, which can be volatile and short-term in nature.

The SVAR estimations reveal that global and domestic factors play transitory roles in driving Malaysia's portfolio flows, with domestic influences having a more gradual and

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[6] We estimate an ARDL model over the full period (January 2000 to September 2015) and two sub-periods, depicting Malaysia's pegged exchange rate period (January 2000 to December 2005) and post Global Financial Crisis (GFC) period (January 2009 to September 2015).

[7] See, for instance, Kim and Yang (2011), Tillmann (2013), Lane and McQuade (2014) and Rhee and Yang (2014).

[8] See, for instance, Schularick and Taylor (2012), Drehmann and Juselius (2014) and Jordà, Schularick, and Taylor (2015).

persistent effect compared to global factors.[9] A subsample analysis from the ARDL estimations show that the long-run elasticities of domestic output and equity prices to gross portfolio inflows have gained significance and are more sensitive in the post-GFC period, compared to the pegged exchange rate period. Meanwhile, the SVAR estimations show that higher net portfolio flows lead to first an appreciating exchange rate, followed by higher equity prices and increased credit. Although there are gains to growth from looser credit conditions and higher equity prices, there is also downward pressure on growth from an appreciating exchange rate. Overall, economic growth increases with higher portfolio flows, but with a time dynamic that is volatile and transitory.

The remaining sections proceed as follows. Section 2 provides a brief overview of relevant theoretical and empirical literature linking global factors, portfolio flows and growth. Section 3 sets the stage by giving a brief overview of Malaysia's portfolio flows, highlighting relevant regulatory changes and discussing how the Central Bank of Malaysia (Bank Negara Malaysia, henceforth, BNM) monitors portfolio flow developments. Section 4 details the data used for the empirical analysis and the SVAR methodology. Section 5 presents and discusses the findings while Section 6 concludes the paper.

2. Theoretical and Empirical Review on the Causes and Effects of Portfolio Flows

Since the wave of financial liberalisation in the early 1980s, EMs have experienced various episodes of large portfolio flows that brought benefits and risks to these economies. This section summarises some relevant findings from literature and the narrative of global and Malaysia's portfolio flows from the macro-finance literature.

[9] These results are in contrast to that reported in Forbes and Warnock (2012) and Sarno, Tsiakas, and Ulloa (2016) who found the global factors to be more influential than domestic forces in explaining movements in international portfolio flows.

2.1 What Drives Portfolio Flows: "Push" and "Pull" Factors

Following Calvo, Leiderman, and Reinhart (1996) and Fernandez-Arias (1996), the distinction between country-specific "pull" factors and foreign "push" factors provide a useful underlying theoretical framework to understand the drivers of portfolio flows. The push-pull dichotomy provides an intuitive classification of portfolio flows drivers, mainly to assess whether portfolio flows are mostly 'pulled' by attractive domestic conditions or 'pushed' by unfavourable external conditions.[10]

Studies have investigated how global and domestic, economic and financial conditions, classified as push- and pull-factors respectively, have influenced the flow of capital to EMs.[11] Among the common push-factors that matter for portfolio flows are global growth, global liquidity (as measured by the money supplies of US, Euro Area, Japan, and UK) and global risk aversion. Stronger global growth tends to increase portfolio flows. Higher global liquidity amplifies global leverage, causing sudden shifts in capital flows. Global risk aversion, which measures risk appetite, driven mainly by changes in financial market and economic uncertainties, can adversely affect portfolio flows.

Though classified as common shocks to EMs, the size and effects of these push factors on portfolio flows tend to vary across countries. For example, Cerutti et al. (2015) finds that Malaysia's portfolio flows is largely sensitive to push factors in comparison with other EMs.[12] According to Fratzscher (2011), this heterogeneity is due mainly to country specific pull factors. Pull factors reflect domestic economic factors and investment opportunities that attract capital

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[10] The push-pull framework is also useful for explaining the behaviour of portfolio flows during and after the financial crisis (see, for example, Koepke (2015)) and .

[11] See, for example, Milesi-Ferretti and Tille (2011), Fratzscher (2011), Forbes and Warnock (2012), Ahmed and Zlate (2014), Cerutti, Claessens, and Puy (2015), Rey (2015), Koepke (2015) and Sarno, Tsiakas, and Ulloa (2016) among many others.

[12] On other hand Sarno, Tsiakas, and Ulloa (2016) found there is little regional variation in the relative contribution of push and pull factors among countries

into a country. Some commonly identified pull factors are domestic macroeconomic conditions such as high interest rates, low inflation, growth potential, trade openness and financial sector development.

2.2 The Transmission of Portfolio Flows

The capital flows literature has also concentrated on the macroeconomic implications and policy responses to surges in portfolio flows. This includes the costs and benefits in terms of economic growth, financial stability and other risks related to portfolio flows. Unlike the broad consensus in existing literature on the positive impact of trade openness on growth, there is little agreement on the impact of financial openness and the associated portfolio flows on EMs. Obstfeld and Rogoff (1996), Obstfeld (1998), Mishkin (2009), Kose, Prasad, Rogoff, and Wei (2009) and Obstfeld (2009) argue that increased openness to capital flows is important and beneficial for growth in EMs. The premise is that access to international funds allows developing countries to supplement domestic savings and achieve higher rates of capital accumulation, thus accelerating growth through investment and/or greater consumption. Rodrik (1998) and Rodrik and Subramanian (2009), among others, argue that increasing capital flows pose risks to global financial stability, consequently leading to adverse effects on growth stability in EMs. After the financial crises in Latin American and Asian economies during the 1990s, it became apparent that capital flows to EMs came with risks. This was mainly attributable to the liquidity risks underpinned by maturity mismatches between foreign assets and liabilities, and the associated exchange rate exposures (Bosworth & Collins, 1999; Rey, 2015).

More recently, developing countries have been receiving large amounts of financial flows arising from the high global liquidity created from unconventional monetary policies in several advanced economies. The increase in global liquidity and associated inflows have led to concerns over excessive asset prices and the unsustainable build-up of leverage in EMs. In the

short-term, large capital inflows fuel credit booms and elevate asset prices, thus increasing household consumption and investment through laxer credit availability and positive wealth effects. Over the longer-term, however, higher debt and overheated asset markets led to vulnerabilities such as increased domestic and external indebtedness and the erosion of current account balances. As described in Calvo (1998) and Forbes and Warnock (2012), an exogenous sudden slowdown in capital flows can cause large unexpected changes in relative prices such as depreciation of the domestic currency and collapse of asset prices. These developments can trigger a further reversal of capital flows, leading to sharp corrections in collateral values and a credit crunch (Borio & Zhu, 2012; Meissner, 2013).

Capital flow related crises have often been attributed to misguided domestic macroeconomic policies and weak country fundamentals, with proponents often citing the reluctance of developing economies to allow free-floating exchange rates. Central to this view is the concept of the "impossible trinity". Countries with an open capital account that wish to maintain monetary autonomy have to allow their exchange rates to float freely. Attempts to control currency movements are unsustainable and will result in speculative attacks and financial instability (Bosworth & Collins, 1999; Koepke, 2015; Obstfeld, 2009; Obstfeld & Taylor, 1997; Reinhart & Reinhart, 2008).[13]

Several studies on EMs have empirically explored the macroeconomic effects of capital flows. One strand uses cross-country panel models with relatively low data frequency (mostly annual), in part due to limited data availability. Soto (2000), Kose, Prasad, and Terrones (2005), Bussière and Fratzscher (2008) and Ferreira and Laux (2009) find that portfolio equity flows

[13] A recent study by Rey (2015) argues that the global financial cycle has transformed the well-known "trilemma" into a "dilemma". Since exchange rate adjustment cannot insulate against large movements in capital flows, independent monetary policies are only possible if the capital account is managed accordingly and is supported with the right policies to curb excessive leverage and credit growth.

promote growth. On the other hand, Durham (2004), Baharumshah and Thanoon (2006) and Choong, Baharumshah, Yusop, and Habibullah (2010) find that short-term capital inflows do not increase growth. More recently, Aizenman, Jinjarak, and Park (2013) find that the association of portfolio flows with growth is smaller and less stable compared to FDI flows.

Another strand of papers focus on the impact of global liquidity and capital flows on asset prices and credit conditions in EMs using panel VAR models. Kim and Yang (2011) and Tillmann (2013) find that higher portfolio inflows boosts asset prices and the exchange rate in emerging East Asian countries. Brana, Djigbenou, and Prat (2012) find that excess global liquidity contributes significantly to higher GDP and inflation, while the effects on equity and property prices are less clear. Rhee and Yang (2014) show that a positive shock to global liquidity leads to larger portfolio inflows, exchange rate appreciation and higher GDP growth, inflation and equity prices.

It appears that the effects of capital flows on growth depend on how the flows are intermediated and channelled to productive economic activities. The evidence suggests that capital inflows can benefit growth, depending on factors such as the type of flows, state of financial market development and exchange rate regimes of the recipient country. The effects on GDP, stock prices and exchange rate are often larger and more persistent in emerging recipient economies compared to advanced economies.

Our study contributes to and extends the existing literature in several aspects. First, our SVAR model exhibits small-open economy properties, by using exogeneity restrictions for the foreign variables. Second, the methodology allows us to conduct inference with relatively little structural assumptions, which is an advantage given the apparent lack of consensus and mixed existing empirical findings. Furthermore, our study focuses on both short- and long-term dynamics in the factors that drive portfolio flows and their transmission to the real economy.

3. A Stylised Look at Portfolio Flows in Malaysia from 2000 to 2015

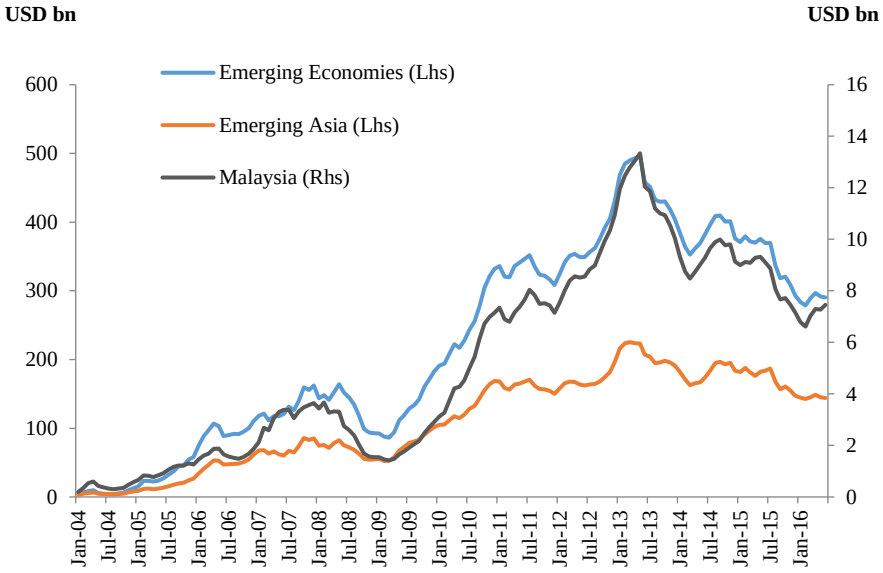
We now present a brief stylised exposition of how portfolio flows in Malaysia have evolved over time, its statistical relationship with key variables and discuss important institutional changes that took place during the sample period.

Figure 1 starts with the global context by illustrating cumulative net portfolio inflows from 2004 to present for EMs and Malaysia. The figure shows that Malaysia's portfolio flow cycles are strikingly similar to other EMs and the region. From 2005 to mid-2008, EMs, including Malaysia, were recipients of substantial inflows. These economies subsequently experienced outflows until mid-2009, during the most intense phase of the Global Financial Crisis (GFC).

Figure 2 displays a breakdown of Malaysia's overall portfolio flows by its debt and equity components. The figures show a steady increase in the magnitude and volatility of portfolio flows. This occurred as Malaysia gradually deepened its integration with global financial markets and thus increasingly exposed itself to global events. The potential for large two-way portfolio flows is particularly evident since 2008, following the financial crisis which started in the advanced economies. Not surprisingly, the largest episode of outflows occurred from 2Q-2008 to 2Q-2009. This led to mainly net inflows until 2013, as the additional liquidity created from several rounds of quantitative easing by the advanced economies flowed largely to emerging economies, including Malaysia, with favourable macroeconomic prospects.[14]

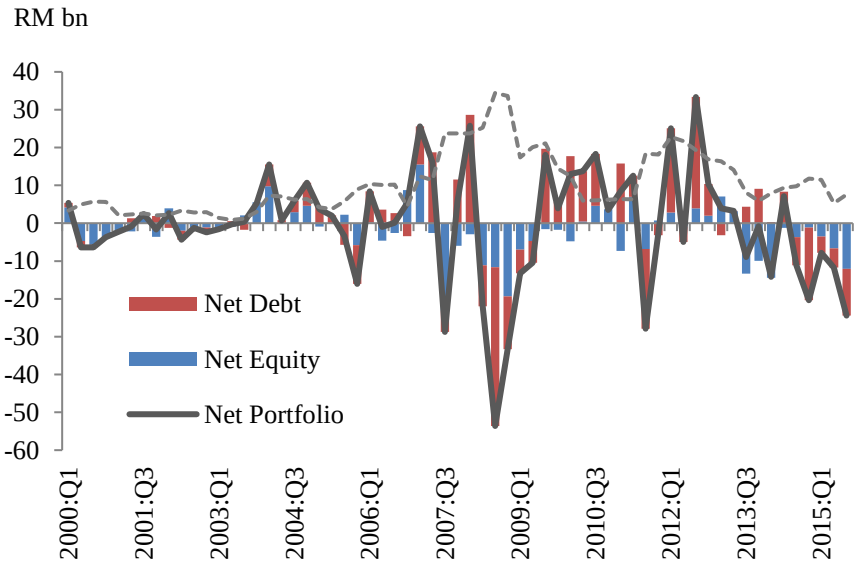
[14] See Ooi (2008), Anwar and Tan (2009), BNM (2010), Razi, Ripin, and Nozlan (2012) and Sim and Tengku Muhammad Azlan (2016) for comprehensive discussions on the trends of capital flows in Malaysia and policy efforts to liberalise the foreign exchange market.

Figure 1. Cumulative Net Portfolio Inflows in EMs and Malaysia[15]



Source: EPFR Global

Figure 2. Net Portfolio Debt and Equity Flows in Malaysia (2000-2015)



Source: Bank Negara Malaysia

[15] The economies covered are listed in the Data Appendix.

Regulatory and policy efforts since the 1998 Asian Financial Crisis (AFC) were major factors that facilitated greater two-way movements in portfolio flows. First, there were major efforts to develop Malaysia's domestic bond market as an alternative to bank credit and equities as a source of finance.[16] Second, there was a continuous liberalisation of foreign exchange administration rules as Malaysia gradually lifted policies implemented in response to the AFC in 1998. Third, the central bank adopted a managed float regime for Malaysian Ringgit on 21st July 2005. Reflecting these developments, there was a notable shift in composition of portfolio flows from predominantly equities in the early-2000s to debt currently. The share of debt and equity securities shifted from 22% and 78% of gross portfolio flows in 2001 to 60% and 40% in 2015, respectively.

In recognising the risks associated with capital flows, BNM developed several data systems for monitoring and statistical inference. The three main systems/databases used to monitor capital flows are summarised in Table 1.[17] These databases encapsulate BNM's view that no individual system perfectly captures portfolio flows (and, more generally, capital flows) with maximum timeliness, depth and breadth. The near real-time basis in which ROMs captures capital flows makes it useful for decision-making on time sensitive market operations, such as open market operations to smooth exchange rate volatility as well as management of domestic liquidity and international reserves. In contrast, IIP data is the lowest in frequency but most comprehensive in detail and gives a complete snapshot of how Malaysian residents have been re-allocating their wealth across borders by the type of assets. The IIP also captures the participation of non-residents in Malaysia's assets and the composition of these asset types.

[16] See BNM and SC (2009) for a detailed account of the initiatives taken to develop Malaysia's bond market.

[17] These systems/databases are also described in Ooi (2008).

Hence, the IIP is useful for gauging Malaysia's aggregate risk profile in terms of its external wealth position.

The timeliness and coverage of CBOP lies between ROMS and IIP, and is suitable for analyses related to business/financial cycles and the characterisation of macro-financial linkages for three reasons: First, the monthly frequency is compatible with macro-financial dynamics and information, which are typically captured at monthly or quarterly frequencies. Second, CBOP captures flows intermediated through the domestic financial system, which in turn have direct implications for the balance sheet positions of institutions responsible for extending financing to the private sector. Finally, the cross-border flows captured by CBOP includes transactions that involve conversion to the Malaysian ringgit and those left in foreign currency, making CBOP's data better suited than ROMS to study macroeconomic issues.

Table 1. Timeliness and Coverage across Databases

	Lag	Coverage	Example of Application
Ringgit Operations Monitoring System (ROMS)	Near real-time	Flows with foreign exchange transactions	Time sensitive open market operations and reserves management
Cash Balance of Payments (CBOP)	1 month	Flows intermediated through bank, inter-company & overseas accounts	Business/financial cycle and macro-financial analyses
BNM-DOSM Joint Survey on International Investment Position (IIP)	1-2 quarters	All flows	Structural analyses

4. Empirical Framework

The review and stylised facts presented in sections 2 and 3 suggest that the empirical analysis must account for the structural and policy changes in Malaysia's financial markets that facilitated greater two-way flows. Ten variables are used for econometric analysis and fall in two broad categories with some overlap: those used to identify push- and pull-factors of portfolio flows and those that capture fundamentals and market characteristics of the Malaysian

economy. Appendix 1 provides the sources and detailed data descriptions. The series are in monthly frequency spanning January 2000 to September 2015.

4.1 The Data

The world production index ($WIPI$) captures the global business cycle. GLI is a measure of global liquidity to proxy for unconventional monetary policy in the advanced economies.[18] GLI is constructed as the sum of $M2$ from the United States, Euro Area, Japan and United Kingdom.[19] The implied volatility index (VIX) captures global investors' reaction to economic and financial market uncertainties. These three variables characterise global economic and financial cycles, and also represent the foreign push-factors described under Section 2.

Seven variables characterise the domestic economy. The industrial production index (IPI) captures business cycle movements and is an important pull-factor for portfolio flows (Koepke, 2015). The consumer price index (CPI) reflects prices. The short-term interbank interest rate (IR) reflects domestic liquidity conditions and the nominal effective exchange rate (EX) represents the exchange rate.[20] Credit (CR) refers to loans outstanding from domestic banks. Lane and McQuade (2014) find a significant relationship between international capital flows and domestic credit growth. Berkelmans (2005) and Jacobs and Rayner (2012) find that the inclusion of credit is necessary to capture the balance sheet effects of portfolio flows on banks. The KLCI reflects the level of Malaysia's equity price.

The final variable is portfolio flows (CF), comprising the sum of debt and equity securities flows. This information is from Bank Negara Malaysia's Cash Balance of Payments (CBOP)

[18] In recent years, unconventional monetary policy and the associated lower interest rates in mature economies have driven much of portfolio flows to EMs (Cerutti et al., 2015).

[19] Refer to Rhee and Yang (2014) for a detailed explanation on the construction and the interpretation of this index.

[20] The IPI, CPI, IR and EX are also the standard set of variables used in the VAR literature to represent small open economy business cycle models.

reporting system, which encompasses resident and non-resident cash transactions of cross-border flow of funds through the banking system, intercompany and overseas accounts. This variable is expressed in net terms (inflows minus outflows).[21]

Except for the interest rate and portfolio flows, all variables are transformed to natural logarithm and where necessary are seasonally adjusted. Portfolio flows are in level terms as the series contains negative values. Although there is statistical evidence of non-stationarity with several of the variables, all variables enter the SVAR model in levels as the impulse response functions generated from the SVAR model allows the underlying data to reflect whether the effects of shocks are permanent or transitory. This modelling approach is commonly applied in the literature (Cushman & Zha, 1997; Kim & Roubini, 2000; Raghavan, Silvapulle, & Athanasopoulos, 2012).

4.2 The SVAR Model

With the intercept suppressed for ease of exposition, an SVAR model representation is:

$$A_0 X_t = A_1 X_{t-1} + \cdots + A_p X_{t-p} + \varepsilon_t \qquad (1)$$

where X is a (10×1) vector of variables, the $A_i (i = 0,1,2,\cdots,p)$ are (10×10) matrices of coefficients with A_0 normalised across the main diagonal and ε_t is a (10×1) multivariate white noise error process with zero mean and a diagonal covariance matrix, Σ_ε containing the variances of the structural disturbances. The SVAR in (1) is represented as:

$$A(L) X_t = \varepsilon_t \qquad (2)$$

where $A(L)$ is a matrix polynomial in lag operator L and $A(L) = A_0 - A_1 L - \cdots - A_p L^p$. Since shocks to small open economies have little impact on major foreign economies, we treat

[21] The net flows are interpreted as being driven by both foreigners and domestic investors. As a robustness check, we also carried out the analysis using the gross flows and the results are broadly similar.

the foreign variables as exogenous to domestic economic variables. The SVAR system, divided into foreign and domestic blocks and the X_t in (2), is represented as:

$$X_t = [X_{1,t} \quad X_{2,t}]'$$

where $X_{1,t} = [WIPI_t, GLI_t, VIX_t]$ and $X_{2,t} = [IPI_t, CPI_t, IR_t, CF_t, CR_t, KLCI_t, EX_t]$ represent the foreign and domestic blocks, respectively. To capture the foreign block exogeneity phenomenon, the contemporaneous and lagged values of the Malaysian variables are restricted from entering the foreign equations. Hence, the $A(L)$ in (2) is:

$$A(L) = \begin{bmatrix} A_{11}(L) & 0 \\ A_{21}(L) & A_{22}(L) \end{bmatrix} \qquad (3)$$

Apart from foreign block exogeneity restrictions, no further restrictions are imposed on the lag structure. To provide some economic structure to the model, restrictions on the contemporaneous matrix A_0, shown in (4), are drawn from theory, stylised facts and existing literature.

$$A_0 = \begin{bmatrix} 1 & 0 & 0 & \vdots & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ a_{2,1}^0 & 1 & 0 & \vdots & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ a_{3,1}^0 & a_{3,2}^0 & 1 & \vdots & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \cdots & \cdots & \cdots & \vdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ a_{4,1}^0 & 0 & a_{4,3}^0 & \vdots & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \vdots & a_{5,4}^0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & a_{6,2}^0 & 0 & \vdots & a_{6,4}^0 & a_{6,5}^0 & 1 & 0 & 0 & 0 & 0 \\ a_{7,1}^0 & a_{7,2}^0 & a_{7,3}^0 & \vdots & a_{7,4}^0 & a_{7,5}^0 & a_{7,6}^0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & \vdots & a_{8,4}^0 & a_{8,5}^0 & a_{8,6}^0 & a_{8,7}^0 & 1 & 0 & 0 \\ a_{9,1}^0 & a_{9,2}^0 & a_{9,3}^0 & \vdots & a_{9,4}^0 & a_{9,5}^0 & a_{9,6}^0 & a_{9,7}^0 & a_{9,8}^0 & 1 & 0 \\ a_{10,1}^0 & a_{10,2}^0 & a_{10,3}^0 & \vdots & a_{10,4}^0 & a_{10,5}^0 & a_{10,6}^0 & a_{10,7}^0 & a_{10,8}^0 & a_{10,9}^0 & 1 \end{bmatrix} \qquad (4)$$

World production index ($WIPI_t$) is ordered first with the expectation that it has flow-on effects on global liquidity (GLI_t) and financial market volatility (VIX_t). GLI is ordered before the VIX index, which captures the fact that the uncertainty variable responds instantaneously

to global economic and liquidity shocks (Bekaert, Hoerova, & Lo Duca, 2013). All three variables can influence one another in the lags.

Among the domestic variables, portfolio flows (CF_t), equity prices ($KLCI_t$) and the exchange rate (EX_t) respond immediately to the foreign shocks. As in Forbes and Warnock (2012), Tillmann (2013) and Koepke (2015), the portfolio flow shock is partially driven by push-factors, where global financial and macroeconomic conditions lead investors to channel funds to EMs. On the other hand, the price level (CPI_t) and bank credit (CR_t) do not contemporaneously react to foreign shocks. As in Raghavan et al. (2012) and Tng and Kwek (2015), these variables are perceived as sluggish and respond slowly through the lag structure. As a small open economy, interest rates (IR_t), reflecting liquidity and financing conditions in Malaysia's financial markets, is assumed to be contemporaneously affected by foreign monetary conditions, represented by global liquidity. Malaysia's output (IPI_t) responds immediately to world production, which is a common assumption in small open economy SVAR studies (Cushman & Zha, 1997; Dungey, Osborn, & Raghavan, 2014; Dungey & Pagan, 2009). We also allow Malaysia's output (IPIt) to respond contemporaneously to the VIX index, as export-oriented companies may interpret increases in global financial turmoil as higher uncertainty and foreshadow slower future external demand.

The contemporaneous ordering assumptions in the domestic block are largely in line with existing literature and based on the discussions under Sections 2 and 3. The production index, the most exogenous variable has immediate effects on the domestic variables. The domestic price level equation reflects a basic Phillips curve, where prices respond contemporaneously to output shocks. These two variables IPIt and CPIt are assumed to be contemporaneously unaffected by other domestic variables within a month due to inertia, adjustment costs and planning delays. However, no such restrictions are imposed in the lag structure. The short-term interest rate is modelled as contemporaneously dependent on output and prices, reflecting

money market behaviour. IPIt, CPIt and IRt affect portfolio flows contemporaneously, while portfolio flows have immediate flow-on effects on equity prices and the exchange rate.

Credit is influenced by expectations of future activity. As such, credit contemporaneously reacts to IPIt as current activity gives some indication of future conditions. It also reacts contemporaneously to CPIt and IRt, which reflects the perception that borrowers respond quickly to the real cost of credit (the difference between the interest rate and the inflation rate). Credit is restricted from having an immediate effect on IPIt because it is likely that firms and households use internal funds and savings to finance spending in the short term rather than rely on new credit. The equity price is a forward-looking variable. We therefore assume that all variables have contemporaneous effects on equity prices except the exchange rate. The exchange rate is an information market variable and is contemporaneously affected by all variables.

We also include two exogenous dummy variables. The first dummy identifies the post-GFC period from January 2009 to September 2015 and is included in the foreign block equations and the portfolio flow equation. This dummy reflects the structural break from major central banks shifting their monetary policy from controlling a short-term interest rate to quantity-based policies. This shift likely changed the monetary policy transmission in these economies and also created substantial liquidity which potentially increased gross portfolio flows globally, especially to EMs. The second dummy identifies the shift in Malaysia's exchange rate from a fixed to floating regime and corresponds with the dates January 2000 to July 2005. This dummy is included in all domestic equations.

We estimate our SVAR model with 6 lags. The Schwarz (SC) and Hannan-Quinn (HQC) tests chose an optimal lag length of one, while Akaike (AIC) and log likelihood (LR) ratio tests picked a lag length of at least twelve. One lag is likely inadequate to capture the underlying dynamics of the system, while too many lags risks over-parameterising the model.

Subsequently, we rely on the LM-test for residual autocorrelation which indicates that at least six lags are required to capture the model's dynamics.

The disturbances, ε_t, have economic meaning and therefore the effects of various shocks on domestic variables are captured effectively by the impulse response functions given in (5):

$$X_t = A(L)^{-1}\varepsilon_t \quad (5)$$

where $\varepsilon_t = \left[\varepsilon_{WIPI,t}, \varepsilon_{GLI,t}, \varepsilon_{VIX,t}, \varepsilon_{IPI,t}, \varepsilon_{CPI,t}, \varepsilon_{IR,t}, \varepsilon_{CF,t}, \varepsilon_{CR,t}, \varepsilon_{KLCI,t}, \varepsilon_{EX,t}\right]'$

In assessing the transmission of portfolio flows to domestic financial markets and the economy, the initial impact is likely on the exchange rate. The impact on asset prices should also occur with relatively low lags given the direct cross-border transactions in debt and equity securities. In contrast, the quantity effect of portfolio flows on domestic credit should occur with longer lags given the behavioural changes that need to take place - from the time banks' balance sheets are altered through movements in external assets and deposits of the non-bank sector, to changes in the supply of domestic credit to economic agents. The final transmission to the real economy through the various confidence, wealth and credit channels should also occur with longer lags.

5. Estimation Results

We first analyse how foreign (push-factors) and domestic (pull-factors) variables affect portfolio flows. Second, we assess the effects of portfolio flows on domestic output and financial markets. Finally, we characterise the role of domestic financial markets in transmitting portfolio flow shocks to the real economy.

The impulse responses generated from the SVAR model are plotted over three years and measured relative to one-standard deviation shocks. The shocks, ε_t, are one standard deviation of the orthogonal errors obtained from (1) and are presented in Table 2. The confidence bands

are computed using the bootstrap-after-bootstrap method of Kilian (1998). Although (1) does not guarantee that the residuals are orthogonal, Table 3 indicates that the values are zero or very small. This implies that the portfolio flow residual is effectively uncorrelated with other residuals.

Table 2. Magnitude of One Standard Deviation Shocks

	Size of shocks from foreign variables			Size of shocks from domestic variables						
	WIPI	GLI	VIX	IP	CPI	IR	CF	CR	KLCI	NEER
Shocks	0.0279	0.0497	0.2925	0.0942	0.0255	0.1077	0.6677	0.0095	0.1080	0.1933

Table 3. Residual Correlations

	with shocks from foreign variables			with shocks from domestic variables						
	WIPI	GLI	VIX	IP	CPI	IR	CF	CR	KLCI	NEER
Portfolio Flow Shock	0.000	0.000	0.000	0.000	0.000	0.000	1.000	-0.017	-0.038	-0.027

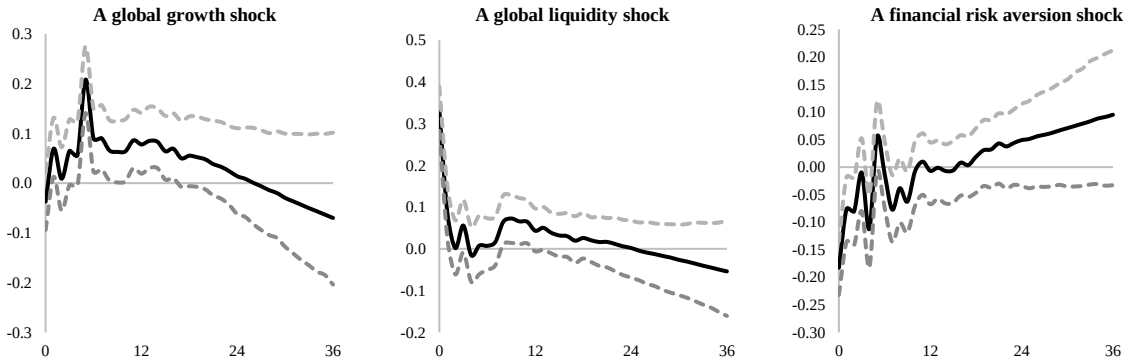
5.1 The Role of Push and Pull Factors in Driving Portfolio Flows

Figure 3 illustrates how net portfolio flows respond to changes in global conditions. An increase in global growth (WIPI) leads to higher portfolio flows to Malaysia. Portfolio flows increase after the shock, peaks after 6 months and normalise after approximately 2 years. Two possible transmission channels are at play here. Initially, higher global growth improves market expectations of Malaysia's growth prospects, which manifests as portfolio inflows with a low lag. As higher global growth leads to enhanced realised growth over time via higher exports, there is added impetus for more portfolio inflows due to the improved macroeconomic outlook.

Higher global liquidity (GLI) leads to an immediate and transitory increase in portfolio inflows. While most of the effects normalise to initial levels within 6 months, portfolio flows remain higher with the effects fully dissipating only after 2 years. This indicates that the global

liquidity created by the quantitative easing policies of major central banks have indeed led to higher portfolio inflows to Malaysia. Meanwhile, an increase in global financial risk aversion (VIX) causes an immediate and volatile net outflow of portfolio securities, which returns to normal levels after approximately 1 year.

Figure 2. Responses of Portfolio Flows to Global Shocks

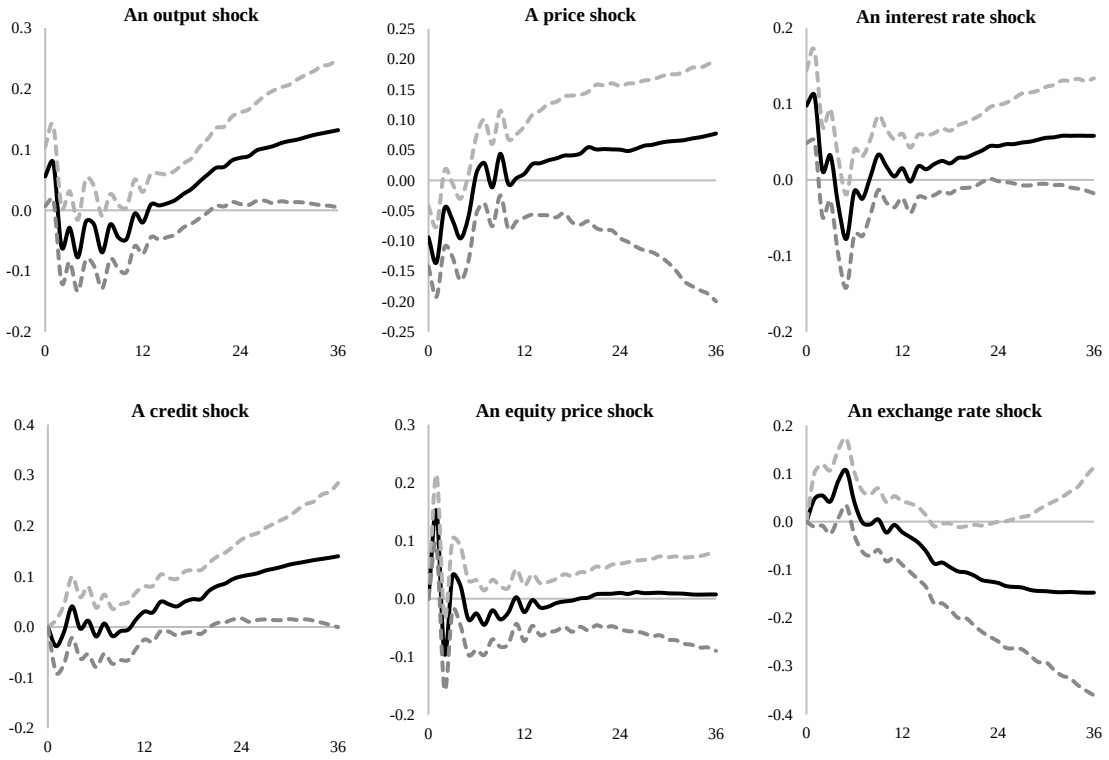


Note: Impulse responses are shown with 68% confidence bands obtained from 10000 bootstrap replications shown as dashed lines.

Figure 4 gives insight into how domestic factors attract inflows into Malaysia. Portfolio inflows increases immediately and normalises quickly in response to higher domestic interest rates, equity prices and exchange rate. The increase in portfolio inflows from higher domestic output and credit is more persistent, as the increase occurs with a lag of approximately 12 months and remains higher throughout the 36-month horizon. Meanwhile, higher prices trigger an outflow over a 12-month period.

Figures 3 and 4 show that both foreign push and domestic pull factors influence Malaysia's portfolio flows. The effects on portfolio flows from financial shocks (GLI, VIX, KLCI and IR) manifest quicker compared to the growth (WIPI and IPI) and credit shocks. The slower response of portfolio flows to these shocks likely reflects information delays vis-à-vis the lag in data releases of these variables.

Figure 3. Response of Portfolio Flows to Domestic Shocks



Note: Impulse responses are shown with 68% confidence bands obtained from 10,000 bootstrap replications shown as dashed lines.

Table 4 presents the forecast error variance decompositions (FEVD) of portfolio flows. The results suggest that both push- and pull-factors play significant roles in portfolio flow trends. At the 12-month horizon, all global variables emerge as important drivers of Malaysia's portfolio flows, with the largest shares attributable to global liquidity (14.37%), global output (9.57%) and global financial risk aversion (7.22%). At the 24- and 36-month horizons, global growth and global liquidity remain among the top three most significant drivers of the variation in portfolio flows, although the exchange rate becomes increasingly important as the horizon increases. Domestic growth also gains significance in its role over time, as its share rises from 2.89% at 12-months to 7.82% at 36-months, almost equivalent to the share of global growth (8.66%). Hence, for Malaysia's portfolio flows, the role of push-factors are initially larger, while the overall influence of pull-factors rise over time.

Table 4. Forecast Error Variance Decomposition of Portfolio Flows (%)

	Global			Domestic (Exc. Portfolio Flows)					
	WIPI	GLI	VIX	IPI	CPI	IR	CR	KLCI	NEER
12 Months	9.57	14.37	7.22	2.89	5.12	2.80	0.65	3.57	2.86
	31.16			17.89					
24 Months	10.23	12.60	6.24	4.59	5.77	2.85	2.47	2.88	10.15
	29.06			28.71					
36 Months	8.66	9.00	6.23	7.82	6.72	3.07	5.90	2.04	20.53
	23.90			46.09					

Table 5 presents the estimates of the long-run coefficients of portfolio inflows based on ARDL regressions for full and two sub-periods, 2000-2005 and 2009-215. The ARDL model, is represented in the following error correction specification:

$$\Delta y_t = \beta_0 + \Sigma \beta_{1,i} \Delta y_{t-i} + \Sigma \delta_{1,j} \Delta x_{1,t-j} + \Sigma \delta_{2,j} \Delta x_{2,t-j} + \cdots + \Sigma \delta_{n,j} \Delta x_{n,t-j} + \varphi(cointeq_{t-1}) + e_t \quad (6)$$

where

$$cointeq_{t-1} = y_{t-1} + \theta_1 x_{1,t-1} + \theta_2 x_{2,t-1} + \cdots + \theta_n x_{n,t-1}$$

The coefficients $(\theta_1, \theta_2 \ldots \theta_n)$ and the significance of the cointegration coefficient (φ) are reported in Table 5. At 95% confidence level, φ is significant, implying that a long-run relationship exist in the full period and in the two sub-periods.[22] The first sub-period corresponds to when Malaysia pegged its exchange rate from the US dollar. The second sub-period reflects the post-GFC period, when central banks from many major economies started pursuing unconventional monetary policies, which created substantial liquidity and potentially increased gross portfolio flows globally, especially to EMs such as Malaysia.

[22] The lag structure of the models for the full sample period and both sub-periods are (2, 0, 3, 2, 3, 0, 0, 0, 2, 0), (4, 0, 0, 3, 0, 0, 2, 0, 0, 0) and (2, 4, 4, 4, 1, 4, 3, 0, 2, 4), respectively, with the variables ordered similar to the SVAR model.

Table 5. Long-run Coefficients of Portfolio Inflows based on ARDL Regressions

	Full Sample 2000M01-2015M09		**Sub-sample 1 2000M01-2005M12**		**Sub-sample 2 2009M01-2015M09**	
	Coefficient (θ)	*ρ-value*	Coefficient (θ)	*ρ-value*	Coefficient (θ)	*ρ-value*
WIPI	1.27	0.73	**-7.43**	**0.00**	**-14.30**	**0.03**
GLI	**2.35**	**0.00**	**1.54**	**0.01**	-0.79	0.45
VIX	**-0.36**	**0.01**	**-0.42**	**0.04**	0.25	0.34
IPI	-2.00	0.25	0.68	0.41	**4.74**	**0.01**
CPI	-2.52	0.40	-4.30	0.37	1.62	0.80
IR	0.11	0.49	**-1.74**	**0.00**	**1.38**	**0.00**
CR	-0.05	0.96	4.43	0.12	-1.82	0.21
KLCI	**1.41**	**0.01**	**1.48**	**0.00**	**5.21**	**0.00**
NEER	2.30	0.11	-0.68	0.69	1.44	0.51
C	-39.80	0.00	-32.34	0.10	30.60	0.17
Cointeq (φ)	**-0.60**	0.00	**-1.77**	0.00	**-1.25**	0.00

The full sample results show that higher global liquidity, lower global risk aversion and higher domestic equity prices lead to more portfolio inflows. Comparing the results between the pegged exchange rate and post-GFC sub-periods, there seems to be a shift in importance from the global "push factors" to the domestic "pull factors" in driving portfolio inflows to Malaysia. When the exchange rate was pegged (2000-2005), all global variables were significant long-run determinants of portfolio inflows. For the domestic variables, only the KLIBOR (short-term inter-bank interest rate) and KLCI (equity prices) were statistically significant. Post-GFC, global demand (WIPI) was the only statistically significant global variable, while domestic demand (IPI), domestic inter-bank interest rate and domestic equity prices were statistically significant. In addition, the elasticities became larger indicating rising importance of domestic variables in influencing portfolio inflows in the post-GFC period.

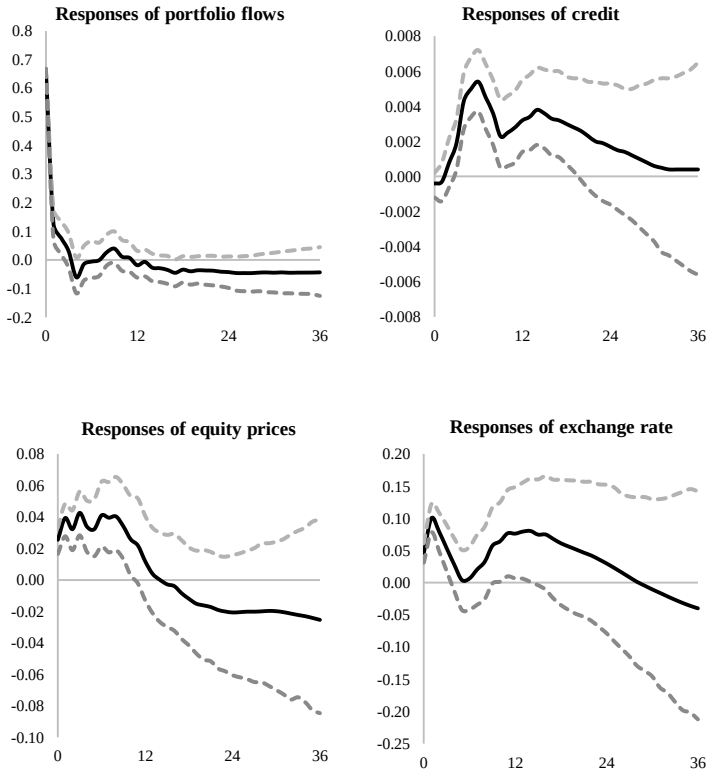
Overall, the emerging narrative seems to be that as Malaysia liberalised its exchange rate regime and capital flow restrictions, the gradual development and opening of its financial and capital markets over time facilitated a shift towards domestic factors in driving portfolio inflows into Malaysia. The post-GFC subsample results show that higher domestic growth and

equity prices both lead to higher portfolio inflows with a higher sensitivity in elasticities compared to the earlier pegged exchange rate subsample.

5.2 The Macroeconomic Effect of Portfolio Shocks

We now analyse how portfolio flows affect domestic financial markets and growth. Figure 5 illustrates the responses of financial market variables from a portfolio flow shock. Portfolio flow shocks are not persistent as they return to initial levels within 3 months of the shock.

Figure 4. Response of Domestic Financial Markets to Portfolio Flow Shocks



Note: Impulse responses are shown with 68% confidence bands obtained from 10,000 bootstrap replications shown as dashed lines.

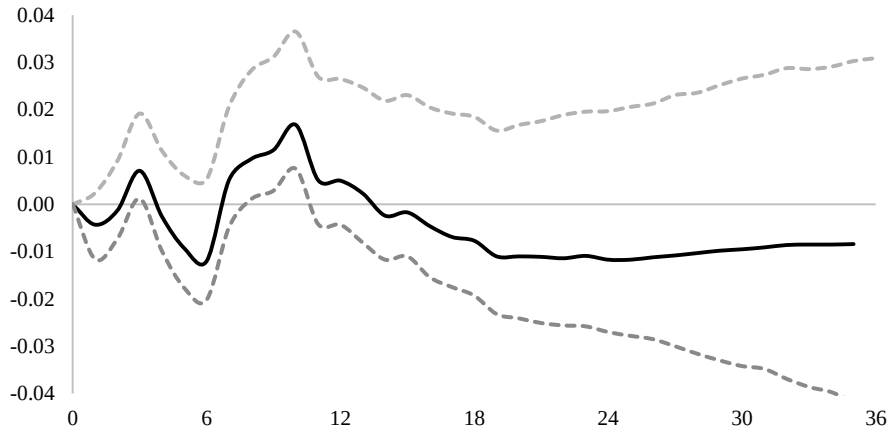
The financial market responses to portfolio flow shocks are largely transitory. The exchange rate appreciates immediately, peaks within 1 month and dissipates close to initial levels by the fourth month. Although the response indicates some persistence, the confidence bands become large especially after the first year, making inference over that horizon difficult.

Equity prices rise immediately in response to a portfolio flow shock, with the highest impact after 7 months that normalises beyond 1 year. The response of credit is the most persistent, increasing only gradually after the shock and dissipating back to initial levels after 2-3 years.

Figure 6 shows that higher portfolio inflows have a positive effect on domestic output. Output becomes volatile during the first 6 months after the shock, but displays a positive effect that peaks after 10 months before converging to initial levels just over a year after the shock. The impulse response results are qualitatively in line with those by Jansen (2000), Berument and Dincer (2004), Kim and Yang (2011), Brana et al. (2012), Tillmann (2013) and Rhee and Yang (2014), for which comparable impulse response functions are reported. Nonetheless, the speed of reaction and persistence differ considerably. Jansen (2000) finds that capital flow shocks have more persistent implications on the financial and real variables, with the positive impact on output lasting for more than 3 years. In contrast, Berument and Dincer (2004) find that a positive capital flow shock very quickly led to higher output that lasted for 2-5 months. Our results also differ from the literature in the persistence of the exchange rate appreciation, with these four studies reporting persistent effects. Nevertheless, the impulse responses are intuitive and match our expectations on the time dynamics. When portfolio flows increase, the initial effects are most visible first in the exchange rate and asset prices. Bank credit then starts increasing as the effects of portfolio flows on the balance sheets of banks and economic agents gradually translate to a higher credit quantity. Finally, the positive effect on the real economy is the slowest, temporary and marked by higher volatility.

Table 6 illustrates the importance of portfolio flows in driving Malaysia's output. Portfolio flows play a relatively small role in the overall variation of output, with shares of 1.62% and 1.59% at the 12- and 24-month horizons. This result and Figure 6 suggests that portfolio flows are "tail risks" to growth. While its contribution to output dynamics is low, the impulse responses show that output does change when there are portfolio flow shocks.

Figure 5. Response of Output to a Portfolio Flow Shock



Note: Impulse responses are shown with 68% confidence bands obtained from 10000 bootstrap replications shown as dashed lines.

Table 6. Forecast Error Variance Decomposition of Output (%)

	Global					Domestic (Exc. IPI)			
	WIPI	GLI	VIX	CPI	IR	CF	CR	KLCI	NEER
12 Months	22.48	16.54	1.35	7.72	2.07	1.62	7.81	1.54	13.23
	40.38					*34.00*			
24 Months	18.06	18.19	1.31	5.58	3.59	1.59	9.52	2.82	18.25
	37.57					*41.39*			
36 Months	10.64	10.58	3.24	4.62	3.08	1.16	14.53	2.05	30.08
	24.47					55.53			

Source: Authors' calculations

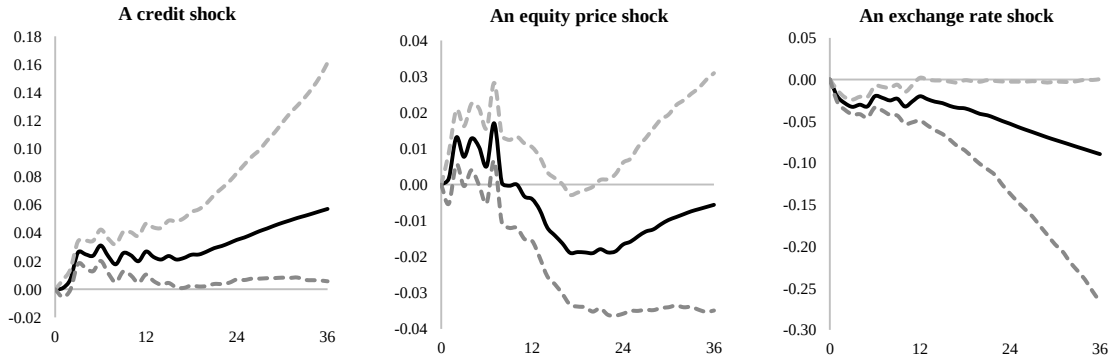
5.3 Channels of Transmission of Portfolio Flow Shocks to Output

In this section, we give insight to the contribution of the various transmission channels of portfolio flow shocks to output. Figure 5 shows the impulse responses of variables that serve as key transmission channels - the exchange rate, equity prices and credit - to portfolio flow shocks. To quantify the contribution from each channel, we first analyse the impulse responses of output to the exchange rate, equity prices and credit shocks. We then compare the impulse response of output to portfolio flow shocks from the baseline model with those from alternative models with the respective channels individually shut down. This is done by incorporating the variables exogenously, which restricts the "exogenised" variables' direct and indirect roles in

the transmission process. This approach to quantifying transmission channels follows from Morsink and Bayoumi (2001), Chow (2004), Raghavan et al. (2012) and Tng and Kwek (2015).

Figure 7 shows the impulse responses of output to exchange rate, equity prices and credit shocks. An exchange rate appreciation leads to a gradual decline in output that reaches its trough 6 months after the shock. The effects thereafter are uncertain as the error bands start to widen substantially, especially after 12 months. Meanwhile, higher equity prices and credit lead to higher output, although the output response to credit is more persistent. In a scenario, as shown in Figure 5, in which all three variables increase given positive portfolio flow shocks, an appreciating exchange rate has an offsetting effect that reduces the improvements in output from higher credit and equity prices.

Figure 6. Responses of Output to Domestic Financial Shocks

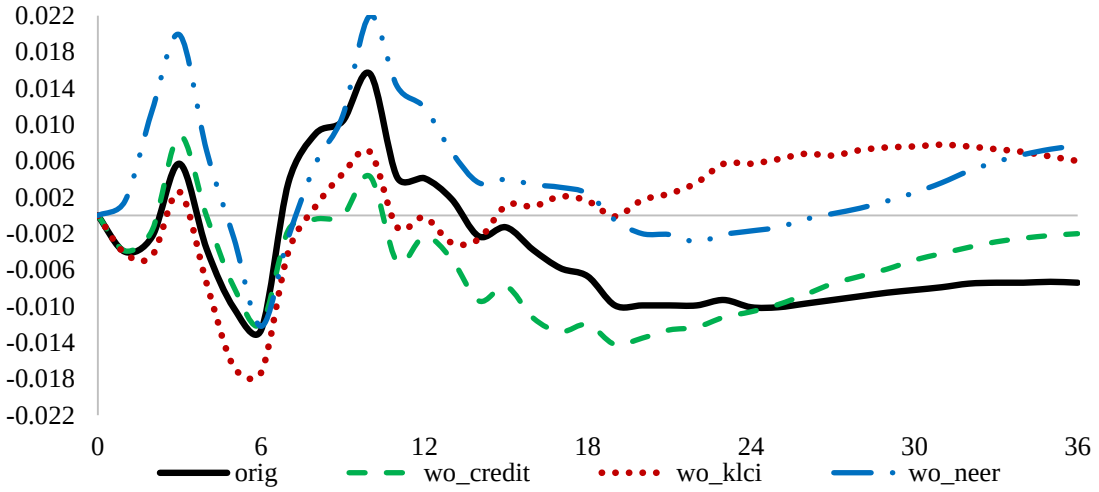


Note: Impulse responses are shown with 68% confidence bands obtained from 10000 bootstrap replications shown as dashed lines.

Figures 8 and 9 illustrate the output's unit and cumulative responses respectively to a portfolio shock, from the baseline and alternative SVAR models with the exchange rate, equity prices and credit individually exogenised. Credit and equity prices are important conduits in channelling the increase in portfolio flows to output. Compared with the baseline output response (solid black line), the response of output with the equity price channel shut down (dotted red line) is materially smaller after approximately 4-12 months. The difference with the

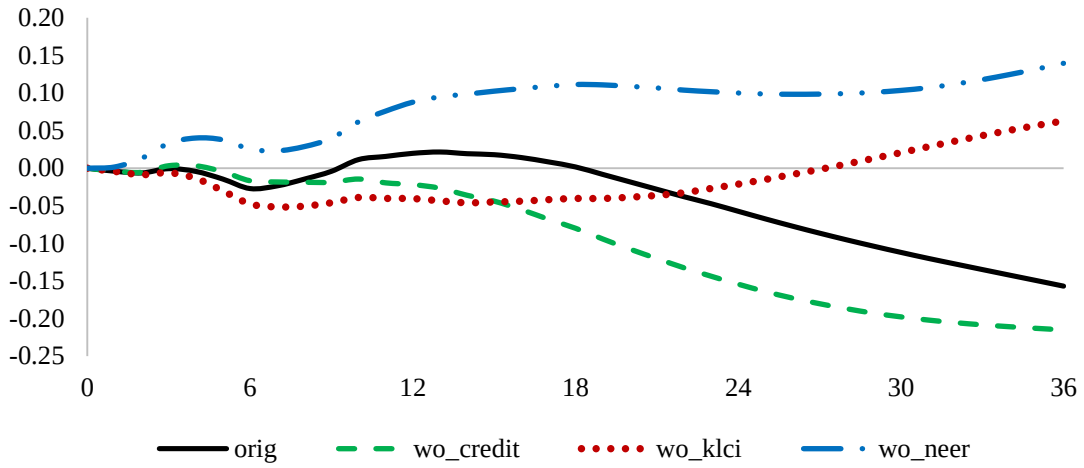
credit channel shut down (dotted grey line) is most visible between the 7- to 24-month period. This reflects that relative to credit, portfolio flows affect equity prices quicker, which in turn affects output quicker (as shown in Figure 6). Credit's role in the transmission occurs with more lag and is more persistent. The exchange rate channel plays the opposite role compared to equity prices and credit, as the exchange rate reduces the positive effect of portfolio flows on output. These effects are visible relatively quickly. These results reiterate the output dynamics highlighted in Figures 5 and 7, where the exchange rate appreciation from higher portfolio flows partially offsets the increase in output through the equity and credit channels. Figure 9 further reflects the lags in the transmission mechanism of portfolio flows and is consistent with our discussion under Section 4, in which the exchange rate channel operates the quickest, followed by asset prices and then bank credit.

Figure 7. Responses of Output to a Portfolio Flow Shock from Baseline and Restricted Models



Note: wo_neer, wo_klci and wo_credit refer to the impulse response of output to a portfolio shock in SVAR models with the neer, klci and credit included as exogenous variables.

Figure 9. Cumulative Responses of Output to a Portfolio Flow Shock from Baseline and Restricted Models



Note: wo_neer, wo_klci and wo_credit refer to the impulse response of output to a portfolio shock in SVAR models with the neer, klci and credit included as exogenous variables.

6. Conclusion

In this study, we estimate SVAR and ARDL models to examine the causes and effects of portfolio flows for Malaysia. Three key findings emerge: First, global and domestic factors play transitory roles in driving Malaysia's portfolio flows. Net portfolio inflows increase immediately with higher global liquidity, falls when global financial risk aversion increases and increases gradually when global growth improves. A subsample analysis from the ARDL estimations show that the long-run elasticities of domestic output and equity prices to gross portfolio inflows have gained significance and sensitivity in the post-GFC period. Higher domestic equity prices and output lead to higher portfolio inflows, with the response to the former occurring sooner compared to the latter. Second, higher net portfolio inflows lead to exchange rate appreciation, higher equity prices and higher credit. The impact of portfolio flows is felt most immediately by the exchange rate, followed by equity prices and, finally, credit. Portfolio inflows lead to short-term improvements in growth, but with volatile dynamics. Finally, the transmission from higher portfolio flows to higher growth occurs through improved

equity prices and credit conditions, which is partially offset by the dampening effect of the appreciating exchange rate on output.

While our results suggest that growth benefits from portfolio inflows, its contribution to variations in output is nonetheless small. This indicates that portfolio flows are "tail risks" to growth, whereby a very large episode of portfolio outflows could have a material impact on growth, but with low likelihood due to the rarity of such occurrences. The positive effect of portfolio inflows on growth could partially be due to the foreign exchange intervention operations by the central bank. While the central bank does not target a level of the exchange rate, foreign exchange operations are conducted to reduce exchange rate volatility when capital flows are sudden and volatile, both during episodes of inflow and outflow. Hence, the exchange rate does not react as strongly as it otherwise would to portfolio flow movements and thus does not exert the full pressure on growth through the trade and valuation channels.

As a whole, while the size and volatility of portfolio flows have increased significantly over the years, the impact of these flows on the Malaysian economy appear to have remained relatively contained. This likely reflects both the steady development of domestic financial markets as well as policies that have been implemented by regulatory authorities. In particular, the central bank has always recognised the importance of gradualism in the conduct of capital and financial account policies. Given that capital flows could have a significant impact on growth when the size is large, the conscious effort to pursue liberalisation in a gradual manner is appropriate such that any resultant impact to the real economy is limited and manageable. In sum, while our findings suggest that portfolio flows do increase the volatility of the Malaysian business cycle, its effects have remained manageable.

Appendix

Coverage of Economies in Figure 1

Emerging Asia refers to Bangladesh, Cambodia, China, India, Indonesia, North Korea, South Korea, Malaysia, Mongolia, Myanmar, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam. Emerging Economies refer to Emerging Asia economies plus Angola, Botswana, Egypt, Ghana, Ivory Coast, Kenya, Liberia, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Sierra Leone, South Africa, Swaziland, Tanzania, Tunisia, Uganda, Zambia, Zimbabwe, Baltic Republics, Bulgaria, Croatia, Syprus, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Tajikistan, Turkey, Turkmenistan, Ukraine, Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Mexico, Panama, Paraguay, Peru, Uruguay, Venezuela, Algeria, Bahrain, Iran, Iraq, Israel, Jordon, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, United Arab Emirates and Yemen.

Summary of Variables used in the SVAR and ARDL Models

Variable	Abbreviation	Definition	Source
World Production	WIPI	World Industrial Production Index	CPB Netherlands Bureau for Economic Policy Analysis
Global liquidity	GLI	M2 for the United States, Japan, United Kingdom and Euro area	Datastream
VIX index	VIX	Implied volatility of the S&P index from the Chicago Board of Options Exchanges	Bank for International Settlements
Output	IPI	Industrial production index	Bank Negara Malaysia
Prices	CPI	Consumer price index	Bank Negara Malaysia
Interest rate	IR	3-month interbank offered rate (KLIBOR)	Bloomberg
Portfolio flows	CF	Portfolio flows from the cash balance of payments database	Bank Negara Malaysia
Bank credit	CR	Bank credit, deflated by CPI	Bank Negara Malaysia
Equity Price	KLCI	Kuala Lumpur Composite Index, deflated by CPI	Bank Negara Malaysia
Exchange rate	EX	Nominal effective exchange rate	Bank Negara Malaysia

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