Int. Journal of Economics and Management 9 (S): 1 - 20 (2015)

PERTANIKA JOURNALS

IJEM
International Journal of Economics and Management
Journal homepage: http://www.econ.upm.edu.my/ijem

Impact of External and Domestic Shocks on Malaysia's Electronic and Electrical (E&E) Export Demand

NORASHIDA OTHMAN[a]*, MOHD AZLAN SHAH ZAIDI[b], ZULKEFLY ABDUL KARIM[c] AND ZULKORNAIN YUSOP[d]

[a,d]*Faculty of Economics and Management, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor*
[b,c]*Faculty of Economics and Management, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor*

ABSRACT

This paper analyses the impact of foreign shocks as well as domestic shocks on Malaysia's total E&E export demand. The foreign factors consist of world oil prices index, income and the policy rate for three main trading partner countries of Malaysia namely United States, Japan and Singapore. The domestic factors consist of national income, inflation, interest rates and the real effective exchange rate. The study utilizes monthly data spanning from January 2000 until December 2013. Using the Structural Vector Autoregressive (SVAR) model with non-recursive identification structure, the results indicate that foreign factors are important and dominant variables in explaining the variability of the aggregate exports of E&E in medium term horizon. Impulse Response Function (IRF) and Variance Decomposition (VDC) show that the contribution of the foreign shocks dominates, accounting for around 40% to 50% of the forecast error variance at one year onwards. The results also indicate that Singapore is an important foreign factor compared to US and Japan.

Keywords: Foreign shocks, domestic shocks, E&E export demand, SVAR

* Corresponding Author: E-mail: shida_hr87@yahoo.com
Any remaining errors or omissions rest solely with the author(s) of this paper.

INTRODUCTION

Exported goods from the manufacturing sector in Malaysia had covered more than 80% of the country's total exports by the end of 1990, and as to date it still remains the largest component of the country's exports. The electrical and electronic (E&E) industry covers most of the exports of manufactured goods and is the largest contributor to economic growth since the 1980s. Nevertheless, electrical and electronic (E&E) shares in Malaysia's export had declined from 61.7% in 2000 to 32.4% in 2012[1].

To address the issue of the slump in E&E performance, an effort to strengthen the E&E sector has been one of the National Key Economic Areas (NKEAs) in the Malaysia's Economic Transformation Programme (ETP). However, to what extent do the steps taken have helped the E&E sector achieves the targeted goal has raised a question. This is due to the fact that the E&E sector is highly dependent on global economic circumstances and there is also an uncertainty in the global trade market.

Most of the previous studies conducted on the E&E industry in Malaysia mainly focused on the issues of performance and competitiveness of the E&E exports. Some examples are studies done by Arshad and Radam (1997), Wen Chan (2000) and Muhammad and Yaacob (2008). Although they are important aspects to be investigated, the studies are not really capable of examining factors that directly affect the performance and competitiveness of the E&E exports. Shocks coming from domestic and foreign sources can also be important factors that affect the industry's performance. Nevertheless, studies in this area are still lacking. Recent related studies by Wong and Tang (2007, 2008) look on the causation between FDI and electronic exports and the effects of exchange rate variability on disaggregated electrical exports respectively. Nonetheless, both studies focus only the foreign factors that could contribute to the performance of the export industry.

This study investigates the role of external as well as domestic shocks in affecting the performance of the E&E industry in Malaysia. Firstly, the study examines the effect of output and monetary policy shocks of foreign countries on Malaysia's E&E exports. Secondly, the study examines the relative importance of domestic shocks as compared to foreign ones in influencing E&E exports. Thirdly, this study compares between three foreign countries under study as to who contributes significantly to the E&E export performance.

This study contributes to existing literatures in three important aspects. First, unlike previous studies, it examines the relevance of external as well as internal shocks in influencing the E&E export demand performance of Malaysia. This is

[1] Department of Statistics, Malaysia (2014)

done by imposing block exogeniety assumptions where relevant foreign countries affect the domestic economies but not vice versa. Thus the model would reflect the real situation as closely as possible. Second, the study takes into account the relative importance of Malaysia's trading partners in explaining the change in the E&E export demand performance. For these reasons, the United States (US), Japan and Singapore are selected to represent foreign countries in the model as they are Malaysia's most important trading partners. Knowing which foreign countries have the most effect on Malaysia's E&E exports will help policy makers formulate appropriate policies to mitigate any adverse effects coming from that particular country. Third, the study employs SVAR methodology as to theoretically structure the relationship between the domestic variables and the foreign counterparts. Both block exogeniety assumption and short run restrictions as suggested by Cuhsman and Zha (1997) and Dungey and Pagan(2000) are imposed.

The rest of the paper is structured as follows. The next section briefly reviews previous literature that considers the E&E export performance. Section 3 explains the data and estimation procedures, which include a small-open economy SVAR model. Section 4 presents the main empirical results and finally, section 5 summarizes and concludes the findings of this study.

LITERATURE REVIEW

Studies on the E&E industry in Malaysia have largely focused on its performance and competitive issues. Arshad and Radam (1997) for example had evaluated the export competitiveness of five selected E&E products. Their shift-share analysis results show that market opportunities for Malaysian E&E products are high in the United States, United Kingdom, Germany, Japan and Korea. Muhammad and Yaacob (2008) had also studied the export competitiveness of five E&E products selected by the Standard International Trade Classification (SITC) in Malaysia as compared to China, Indonesia and Thailand. Using the Constant Market Share (CMS) and Revealed Comparative Advantage (RCA) framework, the study discovered that Malaysian E&E products dominate the United States market for almost all SITC studied.

Another related study by Chen (2001) investigates the exports competition between Thailand, Malaysia and China in the US market for electrical and electronic (E&E) products between 1995 to 1999. The finding reveals that China enjoys competitive advantage for the E&E products in the US market compared to the other economies studied. In addition, the study also finds that China has an unfavorable export structure as compare to Malaysia and Thailand, although these two nations suffer from competitive disadvantage.

Studies which look specifically at the electrical and electronic export of Malaysia have been done by Wong and Tang (2007, 2008). Wong and Tang (2007) examine causal relationship between FDI and electronic exports. Using Granger causality test, they find bi-directional causality between the two variables. Wong and Tang (2008) further investigate the effects of exchange rate variability on disaggregated electrical exports. They uncover that exchange rate variability has an adverse impact on the five electrical exports. In the meantime, they also find that foreign income and prices are important determinants of the electrical export demand.

There are quite number of studies which use the SVAR model to examine the effects of domestic or foreign shocks or both on export in general: see Zhiqiang (2013) for China; Castro and Garrote (2012) for Euro Area; Shioji and Uchino (2012) for Japan; Dias and Dias (2013) for Brazil; and Ozcelebi and Yildirim (2011) for Turkey. Zhiqiang (2013) analysed the importance of domestic supply and foreign demand on China's export and the dynamic effects of various shocks on export. Their findings show that foreign income shocks cause lasting effects on exports while exchange rate shock has negative impact on export. Dias and Dias (2013), investigated the effects of US shocks on Brazil's economy. They found that an increase in the US fiscal expenditure causes increases in global aggregate demand and as a result, prices of imported goods rose for Brazilian residents, increasing the level of domestic prices and inducing domestic demand for consumption. This creates an incentive for more exports.

Meanwhile, Shioji and Uchino (2012) looked at the impact of external shocks on the automobile industry in Japan by analysing the response of exports of automobiles, automobile manufacturing and industrial production to four types of external shocks which are oil prices, exchange rates, total imports of the United States, and total imports of Union Europe. Variance decomposition results show that external shocks are important for Japan. Ozcelebi and Yildirim (2011) investigated the effects of variations in the nominal exchange rate on output difference, bilateral real exchange rate and nominal exchange rate for both Turkey against Germany and Turkey against Russia. Their finding shows that nominal exchange rates shocks have temporary effects on industrial production differences. Positive shocks in the nominal bilateral exchange rate indicate the appreciation of Turkey's exchange rate against German and Russia. Accordingly, it implies that Turkey's exports to Germany and Russia are promoted.

Most empirical studies on Malaysia that use the SVAR model of a small open economy are done to test the effects of domestic and external shocks on output and inflation. For example, Zaidi and Fisher (2010), Zaidi, Karim and Azman –Saini

(2013) and Zaidi and Karim (2014) found that foreign variables are more important than domestic variables in explaining the variability of output and inflation in Malaysia. Ibrahim and Amin (2005) used a closed economy SVAR model to test the dynamics of the exchange rate shocks and monetary policy on manufacturing output in Malaysia. The study revealed that shocks in the policy rate and exchange rate have significant effects on the output of the manufacturing sector in a greater magnitude compare to the output from other sectors. Nevertheless all these studies do not include export variables in their models.

This study follows the approach used by Zaidi and Karim (2014). Their analysis is primarily based on the relative importance of foreign shocks from the three most important major trading partners' countries (United States, Japan and Singapore) on domestic macroeconomic variables. Unlike previous studies, this study includes export variables in the SVAR model and contributes to the existing literature by analysing the responses of Malaysia's E&E exports to foreign shocks.

METHODOLOGY

SVAR Models

This study employs the SVAR model with non-recursive identification structure to investigate the relative importance of domestic and external shocks on Malaysia's E&E exports. In essence, the study estimates four SVAR models. The first model takes into account the trade weighted (TW) variables of Singapore, US and Japan as representing the foreign sector. The other three models take the foreign variables (Singapore, US or Japanese output and interest rate) by themselves as representing the foreign sector.

It is assumed that a small-open economy like Malaysia is described by a structural form representation. Equation (1) shows the dynamic relationship of the system equation in the structural model.

$$BY_t = \Gamma_0 D_0 + (\Gamma_1 L + \Gamma_2 L^2 + \ldots\ldots + \Gamma_k L^k)\, Y_t + \varepsilon_t \qquad (1)$$

where, B is a matrix of coefficients describing the structural contemporaneous interaction between the variables in the system. Y_t is a vector of system variables. $\Gamma_0 D_0$ is a vector of deterministic variables (constant and dummy variable) while $\Gamma_1 L$ is a k'th order matrix polynomial in the lag operator. The structural innovation, ε_t satisfies the conditions where $E(\varepsilon_t) = 0$, $E(\varepsilon_t, \varepsilon_s) = \sum\varepsilon = I$ for all $t = s$ and $E(\varepsilon_t \varepsilon'_s)$ for the rest.

Pre-multiplying equation [1] with B^{-1} yields a reduced form VAR equation shown as equation (2).

$$Y_t = B^{-1}\,\Gamma_0 D_0 + B^{-1}\,(\Gamma_1 L + \Gamma_2 L^2 + \ldots\ldots + \Gamma_k L^k)\; Y_t + B^{-1}\varepsilon_t \qquad (2)$$

where $e^t = B^{-1}\varepsilon_t$ is a reduced form VAR residual which satisfies the conditions $E(et) = 0$. $E(\varepsilon_t \varepsilon'_s) = \Sigma_e$ for all $t = s$ and $E(\varepsilon_t \varepsilon'_s)$ otherwise. Σ_e is a (nxn) symmetric, positive definite matrix which can be estimated from the model. The variance-covariance matrix of the estimated residuals, Σ_e and the variance-covariance matrix of the structural innovations, Σ_e are related such that

$$\begin{aligned} \Sigma_e &= E(\varepsilon_t \varepsilon'_t) \\ &= E(Be_t e_t' B') = BE(Be_t e_t')B' \\ &= B\Sigma_e B' \qquad (3) \end{aligned}$$

Sufficient restrictions must be imposed to recover all structural innovations from the reduced form VAR residuals, e_t. Thus, for (nxn) symmetric matrix Σ_e, there are $\frac{n^2+n}{2}$ unknowns. To exactly identify the system, $\frac{n^2-n}{2}$ additional restrictions need to be imposed. $Be_t = \varepsilon_t$ shows the relationship between the structural innovations ε_t and the reduced-form residuals e_t. The elements above the diagonal of the matrix B are all set equal to zero in a purely recursive SVAR model.

This study, however, imposes alternative restrictions on the contemporaneous parameters of the SVAR model as indicated in equation [4]. The coefficient indicates the contemporaneous effect (monthly in this case) of variable j on variable i. The coefficients on the diagonal are normalised to unity. There are 36 zero restrictions on the coefficients, so the model is over identified.

$$BY_t = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ b_{21} & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ b_{31} & b_{32} & 1 & 0 & 0 & 0 & 0 & 0 \\ b_{41} & 0 & 0 & 1 & 0 & 0 & b_{47} & 0 \\ b_{51} & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ b_{61} & 0 & b_{63} & 0 & b_{65} & 1 & 0 & b_{68} \\ b_{71} & b_{72} & 0 & 0 & b_{75} & 0 & 1 & b_{78} \\ b_{81} & b_{82} & b_{83} & b_{84} & b_{85} & b_{86} & b_{87} & 1 \end{bmatrix} \begin{bmatrix} LOIL_t \\ LYF_t \\ IRF_t \\ LYMY_t \\ INF_t \\ IRD_t \\ LTE_t \\ LREER_t \end{bmatrix} \qquad (4)$$

There are basically two blocks in the SVAR model; a foreign block and a domestic block. The foreign block comprises the first three variables while domestic block takes the rest. At the top of the order is the world oil price index which is the most exogenous variable. It is allowed to affect all other variables contemporaneously. Foreign income is contemporaneously affected by the world oil price while the foreign interest rate is contemporaneously affected by both the foreign income and the world oil prices.

The rest of the five variables represents domestic factors which are considered important in affecting E&E industry. Domestic income is contemporaneously affected by the world oil prices as well as the E&E export demand. In the meantime, domestic interest rate is assumed to react contemporaneously to world oil prices, foreign interest rate, domestic inflation, and exchange rates. Since the main objective for monetary authority is to achieve low and stable inflation, shocks in inflation will require policy makers to respond and adjust policies rate immediately.

E&E export demand is assumed to respond contemporaneously to world oil prices, foreign income and inflation. This is in line with international trade theory where foreign income plays an important role to effect the domestic export demand. An increase in economic activities in foreign counterparts tends to increase the quantity of Malaysia's export demand. Thus, there is positive relationship between foreign income and the E&E export demand (Wong and Tang, 2008).

Finally, the exchange rate reacts immediately with all foreign and domestic variables as the exchange rate is fast moving variable. Exchange rates and interest rates interdependence was also assumed by Kim and Roubini (2000) and Brichetto and Voss (1999) to solve the exchange rate puzzle.

Since Malaysia is a small open economy, the foreign block is assumed to be block-exogenous to each of the domestic macroeconomic variables; see Cushman and Zha (1997), Zha (1999) and Dungey and Pagan (2000). In other words, there are no contemporaneous or lag effects from the domestic variables to the international variables. The assumption of no lag effects from the domestic variables is not applied to the Singapore model as the country is also a small open economy as well as being Malaysia's closest neighbor.

Equation (5) shows the block-exogenous constraints on the lag coefficients metric to be applied for the trade weighted variables for the United States and Japan models, while equation (6) is specifically for the Singapore model. The zero restrictions on the lag coefficients matrix in equation (5) show that domestic variables will not affect foreign variables with lags. This is reasonable because Malaysia is a small open economy where shocks in the domestic variables may give little or no impact on world oil prices as well as on both the United States and Japan's economic performances. Equation (6) indicates that domestic variables do not affect the oil price with lags in the Singapore model. As a small economy, Singapore may be affected by Malaysia's variables.[2]

$$\Gamma(L)=\begin{bmatrix} 1 & \gamma_{12} & \gamma_{13} & 0 & 0 & 0 & 0 & 0 \\ \gamma_{21} & 1 & \gamma_{23} & 0 & 0 & 0 & 0 & 0 \\ \gamma_{31} & \gamma_{32} & 1 & 0 & 0 & 0 & 0 & 0 \\ \gamma_{41} & \gamma_{42} & \gamma_{43} & 1 & \gamma_{45} & \gamma_{46} & \gamma_{47} & \gamma_{48} \\ \gamma_{51} & \gamma_{52} & \gamma_{53} & \gamma_{54} & 1 & \gamma_{56} & \gamma_{57} & \gamma_{58} \\ \gamma_{61} & \gamma_{62} & \gamma_{63} & \gamma_{64} & \gamma_{65} & 1 & \gamma_{67} & \gamma_{68} \\ \gamma_{71} & \gamma_{72} & \gamma_{73} & \gamma_{74} & \gamma_{75} & \gamma_{76} & 1 & \gamma_{78} \\ \gamma_{81} & \gamma_{82} & \gamma_{83} & \gamma_{84} & \gamma_{85} & \gamma_{86} & \gamma_{87} & 1 \end{bmatrix}\begin{bmatrix} LOIL_t \\ LYTW_t@LYUS_t@LYJPN_t \\ ITW_t@IRUS_t@IRJPN_t \\ LYMY_t \\ INF_t \\ IRD_t \\ LTE_t \\ LREER_t \end{bmatrix} \quad (5)$$

$$\Gamma(L)=\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \delta_{21} & 1 & \delta_{23} & \delta_{24} & \delta_{25} & \delta_{26} & \delta_{27} & \delta_{28} \\ \delta_{31} & \delta_{32} & 1 & \delta_{34} & \delta_{35} & \delta_{36} & \delta_{37} & \delta_{38} \\ \delta_{41} & \delta_{42} & \delta_{43} & 1 & \delta_{45} & \delta_{46} & \delta_{47} & \delta_{48} \\ \delta_{51} & \delta_{52} & \delta_{53} & \delta_{54} & 1 & \delta_{56} & \delta_{57} & \delta_{58} \\ \delta_{61} & \delta_{62} & \delta_{63} & \delta_{64} & \delta_{65} & 1 & \delta_{67} & \delta_{68} \\ \delta_{71} & \delta_{72} & \delta_{73} & \delta_{74} & \delta_{75} & \delta_{76} & 1 & \delta_{78} \\ \delta_{81} & \delta_{82} & \delta_{83} & \delta_{84} & \delta_{85} & \delta_{86} & \delta_{87} & 1 \end{bmatrix}\begin{bmatrix} LOIL_t \\ LYSING_t \\ IRSING_t \\ LYMY_t \\ INF_t \\ IRD_t \\ LTE_t \\ LREER_t \end{bmatrix} \quad (6)$$

Since not all equations in the reduced-form VAR have identical right-hand side variables, thus a seemingly unrelated regression (SUR) is used to estimate equation [1] and Σ_e. Using SUR in this situation will increase the estimation efficiency (Enders, 2003). Maximum likelihood estimation is used to estimate the structural parameters in B. The log likelihood function is

$$-\frac{T}{2}\ln\left| B^{-1}\Sigma_\varepsilon B'^{-1}\right| - \frac{1}{2}\sum_{t=1}^{T}\left(\hat{e}_t' B' \Sigma_\varepsilon^{-1} B\hat{e}_t\right) \quad (7)$$

Since there are 35 restrictions which are more than the additional restrictions required to exactly identify the system, the system is over-identified. test statistic as in equation (8) is used to test the restricted system.

$$X^2 = \left|\Sigma_e^R\right|\left|\Sigma_e\right| \quad (8)$$

[2] As robustness test, the study also makes use of equation 5 for the Singapore model.

where R is the degrees of freedom (number of restrictions exceeding $(n^2–n)/2$)) while Σ_e^R is the restricted variance-covariance matrix and Σ_e is the unrestricted variance-covariance matrix.

Sims, Stock and Watson (1990) recommend estimating the VAR in levels. They argue that differencing discards information about the inter-relationships among the variables. Moreover, the parameter estimates are not commonly focused on VARs since they are usually over-parameterized. Ramaswamy and Slok (1998) discussed the trade-offs between estimating VAR in levels (loss of efficiency) and estimating VAR in first-differences (loss of information). They recommend not imposing co-integration restrictions on the VAR model in cases where there is no prior economic theory that can suggest either the number of long-run relationships or how they should be interpreted. We follow their recommendation by specifying the SVAR model in levels.

The study provides analysis of impulse response function (IRF) and variance decomposition. Impulse response function (IRF) generated from the SVAR model is obtained to identify the response of variables of interest to one standard deviation shock on structural innovation. In other words, IRF reflects the response direction of the intended variable (Malaysia's total E&E exports for this case) to other variable shocks (external shocks, i.e. world oil price index). Confidence bands for the impulse response are obtained using a bootstrapping technique[3] on the draw of IRF reduced form that has been formed. In addition, variance decomposition explains the percentage of variability in one variable that is caused by the other variables in the system. It provides information on the importance of one variable on another variable in the system.

Data

The data used in this study is a monthly time series data spanning from January 2000 to December 2013 (168 observations). The data is gathered from various series of monthly bulletins from Bank Negara Malaysia (BNM), external trade monthly reports, and reports from the Malaysian Department of Statistics. A dummy is included to take into account the global financial crisis (sub-prime crisis) which represents the value of one for the time period from 2007:09 to 2008:09 and zero otherwise.

As mentioned earlier, the variables are divided into two blocks; the foreign and domestic blocks. The foreign block includes the world oil price (LOIL), foreign income (LYF), and a foreign interest policy rate (IRF). The domestic block includes

[3] Bootstrapping is a re-sampling technique which is used to obtain the summaries of estimated statistics.

domestic income (LYD), interest rates (IRD), inflation (INF), the real effective exchange rate (REER) and finally the targeted variable which is the total E&E export (LTE). All data uses 2005 as the base year (2005 = 100). All variables are transformed into natural logs except for domestic inflation and both foreign and domestic policy interest rates.

The real foreign aggregate output (YF) is a trade-weighted industrial production index for Singapore, the US and Japan. For foreign interest rates, a similar trade-weighted approach is employed. Similar approaches had been done by Zaidi *et al*. (2013) and Zaidi and Karim (2014). The formula for calculating the trade-weighted variables is as follows:

$$W_i = \frac{M_i + X_i}{\sum_{i=1}^{n} X_i + \sum_{i=1}^{n} M_i} \tag{9}$$

where is a weightage of a foreign country from the overall trade volume of Malaysia with the three main trading partners (US, Japan, Singapore), thus ($\sum_{i=1}^{n} W_i = 1$; M_i is the import of Malaysia from country i; X_i is the export of Malaysia to country i; $\sum_{i=1}^{n} X_i$ is the total exports from Malaysia to the three main trading partners and $\sum_{i=1}^{n} M_i$ is the total imports of Malaysia from the three main trading partners. Consequently, the average weighted of foreign output (YF) and foreign interest rates (IRF) of the three major trading partners in this study are calculated in the following way:

$$YF = (Y_{US} \times W_{US}) + (Y_{Jpn} \times W_{Jpn}) + (Y_{Sing} + W_{Sing}) \tag{10}$$

Foreign interest rates (IRF) are measured by the three month interbank rate for Singapore, the Federal Funds rate for the US and the call money rate for Japan[4]. Meanwhile, for the domestic block, the variables are Malaysia's monthly industrial production index to represent Malaysia's income (LYD), month-on-month percentage change in CPI for inflation (INF), the interbank overnight money rate for interest rate (IRD), and the real effective exchange rate variable (REER).[5]

[4] Singapore uses the exchange rate as its monetary policy variable. The use of the interest rate as monetary policy variable for Singapore is for comparison purpose.

[5] This study has calculated the real effective exchange rate based on Malaysia main trading partner for E&E industry which are Singapore, US and Japan. An increase in REER means the domestic currency, Ringgit Malaysia appreciates.

RESULTS

This section discusses key findings from the SVAR model especially the variance decompositions and impulse response functions. Diagnostic test results indicate that the optimal lag length is two when using the Akaike Information Criterian (AIC) and one when using the Schwarz Bayesian Criterion (SBC) for the basic model. However, two lags are too short for monthly data. A Portmenteau test is performed to test the serial correlation. The test results show that only two variables indicate serial correlation at lags four and seven at the 95% confidence level, while other lag lengths show more than two variables with serial correlations. Therefore, lag four is chosen for the model and it is enough to describe the dynamics of the model. Furthermore, the study used monthly data and the selection of four lags does not involve too many losses of degrees of freedom.[6]

A unit root test is also performed (Table A1 in Appendix) and at 1% significance level, the inflation variable is the only variable stationary in levels, while the other variables contain unit roots in levels and are stationary in first differences. Variables in levels will be used in this analysis because the study is more interested in dynamics responses rather than parameter estimations.

There are seven over identifying restrictions on the structural model. The test statistic of the over identifying restrictions is distributed as a chi-square with eight degrees of freedom. The value of the test statistic is 6.4142 with the p-value of 0.4923. Thus the over identifying restrictions cannot be rejected even at the 10% significance level. Furthermore, the stability tests indicate that the model with four lags is stable where all the eigenvalues are less than one (in absolute value).

Table 1 shows estimated coefficients of the B matrix for trade weighted model. There are nine coefficients that are significant at the 5 percent level. Most of the signs of the estimated coefficients are as expected. Interestingly, all the three coefficients above the diagonal elements of the B matrix are significant. The significance of these variables provides some supports for the application of non-recursive structure in the SVAR model.

Figure A1 and A2 (in Appendix) show the results of the impulse response functions for the first model which is with the foreign trade weighted variables. The study does not report all impulse response functions from the other models. Only some are extracted and these are depicted in Figure 3 and 4. As in figure 1 and 2, the solid line in the middle represents the estimated response while the two dashed lines represent the confidence bands. These bands were calculated by taking the estimated coefficients in the structural model to form the data generating process

6 Robustness tests were carried out using different lag lengths and the results do not show any significant changes as the results in the model with lags four.

Table 1 Estimated coefficients of the SVAR model

LOIL	LYF	IRF	LYMY	INF	IRD	LTE	LREER
1	0	0	0	0	0	0	0
0.0196 (0.7237)	1	0	0	0	0	0	0
0.0474 (0.2341)	0.3859 (0.7280)	1	0	0	0	0	0
-0.0376 (-0.5750)	0	0	1	0	0	**0.9945** **(2.4436)**	0
1.1250 **(2.8090)**	0	0	0	1	0	0	0
-0.0133 (-0.2337)	0	**-0.0378** **(-1.7801)**	0	-0.0084 (-0.6786)	1	0	**0.6018** **(1.7260)**
0.5910 (1.6610)	**2.9633** **(1.9016)**	0	0	**-0.2299** **(-1.8857)**	0	1	**-30.3508** **(-2.1450)**
-0.0164 (-0.3446)	**-0.6279** **(-2.1320)**	-0.0192 (-1.3178)	**1.8034** **(2.5615)**	-0.0017 (-0.2178)	-0.1290 (-1.4285)	-0.1871 (-1.0770)	1

Note: the number in parentheses is t-value

which was then bootstrapped 2500 times. Responses of each variable in a period of 36 months (using four lags) are shown with 95% confidence intervals.

Figure A1 shows the responses of the domestic variables to a positive shock in foreign variables. The E&E export demand responds positively to the shock to world oil price and foreign income. The positive response to foreign income can be explained by income effect that states when income for trading partner increases, their purchasing power will increase. Consequently the demand for imports increases. This in turn contributes to an increase in domestic exports.

Furthermore, the IRF table shows that E&E export demand responds positively and significantly when there is an unexpected expansionary in foreign interest rate. When world interest rates rise (in flexible exchange rate regime), the domestic policy rate would be relatively low due to capital outflows and thus the value of the domestic currency would fall (depreciates). This might cause the price of goods in the domestic country to be relatively lower and the domestic country would become more competitive. As a result, E&E export demand increases.

Figure A2 depicts responses of E&E export demand to positive shocks in domestic variables. In responding to a shock in the domestic output, E&E export demand responds negatively at the initial stage before becoming positive at later period. Moreover, responses of E&E export demand to positive shocks in the domestic inflation and domestic interest rate are too small or close to zero and the response are also not significant. Finally, E&E export demand falls when there is an unexpected appreciation of the domestic currency. This phenomenon is in line with Mundell Fleming model indicating that an appreciation (depreciation) in the local currency will lower (boost) net export.

Figure A2 also shows that inflation responds negatively to a positive shock in the domestic interest rate. Therefore, no price puzzle appears in the model. This finding is in line with the results of Zaidi and Fisher (2010). Meanwhile, responses of real effective exchange rate (LREER) to positive shocks in the domestic interest rate are too small or close to zero. The response is also not significant and therefore, exchange rate puzzle is negligible.

Table 2 presents the relative contributions of the foreign and domestic variables to the forecast error variance in the E&E export demand variable over short and medium term horizons. The second last column of the table which is denoted as FC shows the sum of contributions from the foreign variables (LOIL, LFY, and IRF) to the forecast error variance in the E&E export demand variable. Meanwhile, DC corresponds to domestic contributions which are the sum of the three domestic variables (LYD, INF and IRD) to the forecast error variance in E&E export demand variable. LREER is excluded in the calculation as it can be regarded as either foreign or domestic variable.

The contribution from the domestic shocks to the forecast error variance is around 80% at the one monthly horizon whereas the contribution of the foreign shocks is only 3%. Among the domestic variables, the domestic income is the most important variable, accounting for around 40% to 80% along the horizons. However, the contribution of the foreign shocks dominates at longer horizons.

Table 2 Forecast error variance decomposition for E&E export

Step	LOIL	LYF	IRF	LYMY	INF	IRD	LTE	LREER	FC	DC
1	0.44	2.61	0.05	81.06	0.05	0.31	1.08	14.41	3.10	81.41
6	15.78	5.65	14.90	50.29	0.39	0.65	0.73	11.61	36.33	51.33
12	17.03	6.93	18.10	43.35	0.45	0.82	0.73	12.58	42.07	44.62
18	16.63	6.86	19.02	41.66	0.44	1.18	0.78	13.42	42.52	43.28
24	16.72	6.89	19.06	41.05	0.44	1.39	0.81	13.65	42.66	42.88
30	16.86	7.17	18.90	40.64	0.45	1.50	0.84	13.65	42.93	42.59
36	17.07	7.77	18.66	40.15	0.44	1.54	0.85	13.52	43.49	42.13

However, as a small open economy with a managed floating rate regime, the real effective exchange rate can also be considered as a foreign variable. If LREER is taken into account as one of the foreign variables (FC), the foreign factors will become more dominant at a faster phase. As shown in Table 1, foreign factors in the E&E export demand variability accounts for around 50% of the forecast error variance starting from horizon twelve onwards if real effective exchange rate is included as foreign variable.

This study also compares the responses of E&E export demand to foreign output and foreign monetary policy between three foreign countries following the trade-weighted (TW) as to identify which foreign country contributes more to E&E export demand variability. Figure 1 shows the responses of E&E export demand variables to foreign output shocks while Figure 2 depicts the responses to foreign monetary policy shocks. A shock to foreign output, as in Figure 1, results in relatively high response of E&E export demand when the Singapore effect is considered. Similar patterns can also be observed in the responses of Malaysia's E&E export demand to positive shocks in the foreign monetary policy rate (Figure 2). The US factor can be considered as the second most influential factor while the Japanese factor is the least influential.

CONCLUSION

The main objectives of this study are to investigate the effect of output and monetary policy shocks of foreign countries on Malaysia's E&E export demand, to identify the relative importance of domestic and foreign shocks on the total E&E export demand and finally to determine which one of the trading partner countries is more dominant than the others in affecting the E&E export demand. The external sector in this study is divided into the world oil price index and the combination of income and interest policy rate for Malaysia's trading partners (US, Japan and Singapore) which are calculated using the trade-weighted formula.

The results ratify the importance of foreign output and foreign interest rate as an indicator of E&E export demand expectations and explaining the variability of the aggregate E&E export demand in Malaysia. Besides, relative contributions of the foreign variables are greater than domestic variables if real effective exchange rate is taken into account as one of the foreign variables. Foreign factors in the E&E export demand variability accounts for around 50% of the forecast error variance starting from horizon twelve onwards if real effective exchange rate is included as foreign variable.

Finally, the results also indicate that Singapore is more dominant in affecting E&E exports compared to the US and Japan. Thus, the Singapore factor should

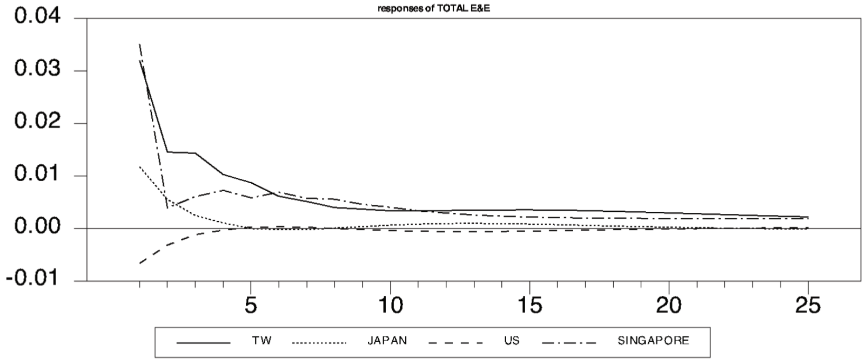

Figure 1 Responses of Malaysia E&E exports to foreign output shocks

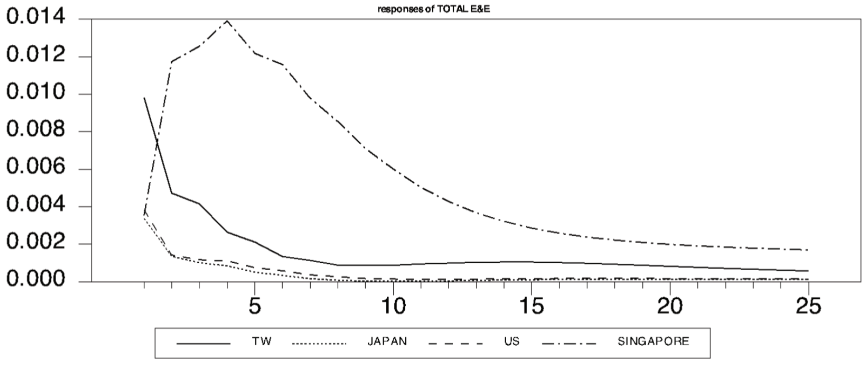

Figure 2 Responses of Malaysia E&E exports to foreign monetary policy shocks

be taken into account in modelling the effect of foreign factors on the Malaysian economy. This is imperative as Singapore is not only one of Malaysia's major trading partners, but it is also Malaysia's closest neighbor.

As an economy becomes more open, policy makers face more difficult tasks to mitigate any adverse effects coming from external sectors. To achieve the government's aim in increasing value-added activities in the E&E sector, Malaysia needs to shift its competitiveness from providing cheap goods to the provision of high value added items. In addition, efforts to expand trade for E&E products to new markets is also a good move to reduce Malaysia's exposure to negative shocks from the existing foreign economies.

ACKNOWLEDGEMENTS

The authors thankfully acknowledge the financial support received from the UKM research grant: UKM-GGPM-PLW-016-2011.

REFERENCES

Arshad, F. M. and Radam, A. (1997), "Export performance of selected electrical and electronic products", in *Towards Management Excellence in 21st Century Asia*, Proceedings of the Second Asian Academy of Management Conference in Langkawi, Malaysia,12-13 December. pp.1-22

Bank Negara Malaysia. (various issues). *Monthly Statistical Bulletin*, Bank Negara Malaysia, available at: Kuala Lumpur. http://www.bnm.gov.my/index. (accessed 1 January 2012).

Castro, F. D. and Garrote D. (2012), "The effects of fiscal shocks on the exchange rate in the EMU and differences with the US", Banco de Espana Working Papers No.1224, 2 July.

Chen, W. (2001), "Export Competition between Thailand, Malaysia and China in the US Market: A Survey on Electrical and Electronics Products. *Asia Fellow Program mimeo, available a*t: http://www.asianscholarship.org/publications/ papers. (accessed 15 July 2014)

Cushman, D. O. and Zha, T. (1997), "Identifying monetary policy in a small open economy under flexible exchange rates", *Journal of Monetary Economics*, Vol. 39 No.3, pp. 433-448.

Department of Statistics Malaysia. (Various Issues). *Monthly External Trade Statistics,* Department of Statistics Malaysia. Available at: https://www.statistics.gov.my/ (accessed 1 January 2012).

Dias, M. H. A. and Dias, J. (2013), "Macroeconomic policy transmission and international interdependence: A SVAR application to Brazil and US", *EconomiA*, Vol. 14 No. 2, pp. 27–45.

Dungey, M. and Pagan, A. (2000), "A structural VAR model of the Australian economy", *The Economic Record*, Vol.76 No.235, pp. 321-343.

Enders, W. (2003), "Applied Econometric Time Series", John Wiley and Sons, New York, NY.

Ibrahim, M. H. and Amin, R. M. (2005), "Exchange rate, monetary policy and manufacturing output in Malaysia", *Journal of Economic Cooperation,* Vol.26 No.3, pp. 103-130.

Karim Z.A. and Mokhtar, A. (2005), "Hubungan antara hasil dengan perbelanjaan: Bukti empirikal kerajaan persekutuan dan kerajaan negeri di Malaysia"*, International Journal of Management Studies*, Vol. 12 No. 2, pp. 145-170.

Khan, M.A. and Ahmed, A. (2011), "Macroeconomic effects of global food and oil price shocks to the Pakistan economy: A Structural Vector Autoregressive (SVAR) Analysis", *The Pakistan Development Review*, Vol. 50 No. 4, pp. 491-511.

Muhammad, N.M.N. and Yaacob, H. C. (2008), "Export competitiveness of Malaysian electrical and electronic (E&E) product: Comparative study of China, Indonesia and Thailand", *International Journal of Business and Management*, Vol. 3 No. 7, pp. 65-75.

Ozcelebi, O. and Yildirim, N. (2011), "Revisiting the relationshıp between exchange rates and output within SVAR Blanchard-Quah framework: Empirical evidence from Turkey", *Economy and Business Review*, Vol. 13 No.3, pp. 179-198.

Ramaswamy, R. and Slok, T. (1998), "The real effects of monetary policy in the European Union: What are the difference?," *IMF staff papers*, Vol. 45 No. 2 pp. 374-396.

Shioji, E and Uchino, T. (2012), "External shocks and Japanese business cycles: Impact of the "Great Trade Collapse" on the automobile industry", Working Papers, Center on Japanese Economy and Business, 10 February.

Sims, C. (1980), "Macroeconomics and reality", *Econometrics*, Vol. 48 No.1, pp.1-49.

Sims, C., Stock, J. and Watson M. W. (1990), "Inference in linear time series models with some unit roots", *Econometrica*, Vol. 58 No.1, pp. 113-144.

Wong, Koi Nyen and Tuck Cheong Tang, (2007) "Foreign direct investment and electronics exports: Exploratory empirical evidence from Malaysia's top five electronics exports." *Economics Bulletin,* Vol. 6 No. 14, pp. 1-8.

Wong, Koi Nyen and Tuck Cheong Tang, (2008) "The effects of exchange rate variability on Malaysia's disaggregated electrical exports", *Journal of Economic Studies,* Vol. 35, No. 2, pp.154-169.

Zaidi, M.A.S. and Fisher, L. A. (2010), "Monetary policy and foreign shock: A SVAR analysis for Malaysia", *Korea and the world economy*, Vol.11, No. 3, pp. 527-550.

Zaidi, M.A.S. and Karim, Z. A., & Azman-Saini, W.N.W. (2013), "Foreign and domestic shocks: Macroeconomic responses of ASEAN-3 countries", *Global Economic Review: Perspectives on East Asian Economies and Industries*, Vol 42, No. 3, pp. 215-237.

Zaidi, M.A.S. and Karim, Z. A. (2014), "Impact of Singapore, US and Japanese macroeconomic shocks on Malaysian economy: A sign-restricted SVAR analysis" *Jurnal Pengurusan,* Vol. 41 No.1, pp. 113-122.

Zha, T. (1999). "Block recursion and structural autoregressions". *Journal of Econometrics*, Vol.90 No.2, pp. 291-316.

Zhiqiang, L. (2013), "Domestic supply, foreign demand and dynamic change of China's export: Empirical research based on SVAR model", *Finance & Trade Economics*, Vol. 34, No. 5, pp. 76-84.

APPENDIX

Table A1 Augmented Dickey Fuller (ADF) for unit root test

Variables	Level			First different		
	none	constant	Trend & constant	none	constant	Trend & constant
LOIL	0.77	–1.24	–3.16***	–9.47*	–9.51*	–9.48*
LYF	1.02	–1.27	–2.86	–7.16*	–12.56*	–12.53*
IRF	–1.33	–1.24	–1.53	–14.60*	–14.66*	–14.61*
LYMY	1.49	–1.05	–1.66	–3.26*	–3.61*	–3.61**
INF	–7.48*	–8.45*	–8.43*	–9.24*	–9.20*	–9.18*
IRD	–0.07	–2.28	–2.26	–7.12*	–13.86*	–13.85*
LTE	0.18	–1.49	–1.43	–4.12*	–4.11*	–4.13*
LREER	–0.32	–1.44	–2.92	–10.71*	–10.68*	–10.64*

Note: The optimal number of lags is determined based on Schwarz information criteria (Maxlag = 13). * ,** and *** represent rejection of the null hypothesis at significance level of 1% ,5% and 10% respectively. The critical values for the respective significance level are -4.023, -3.441 and -3.14 for model with a constant and trend, -3.476,-2.881 and -2.577 for model with constant only, and -2.581,-1.943 and -1.615 for model without constant and trend.

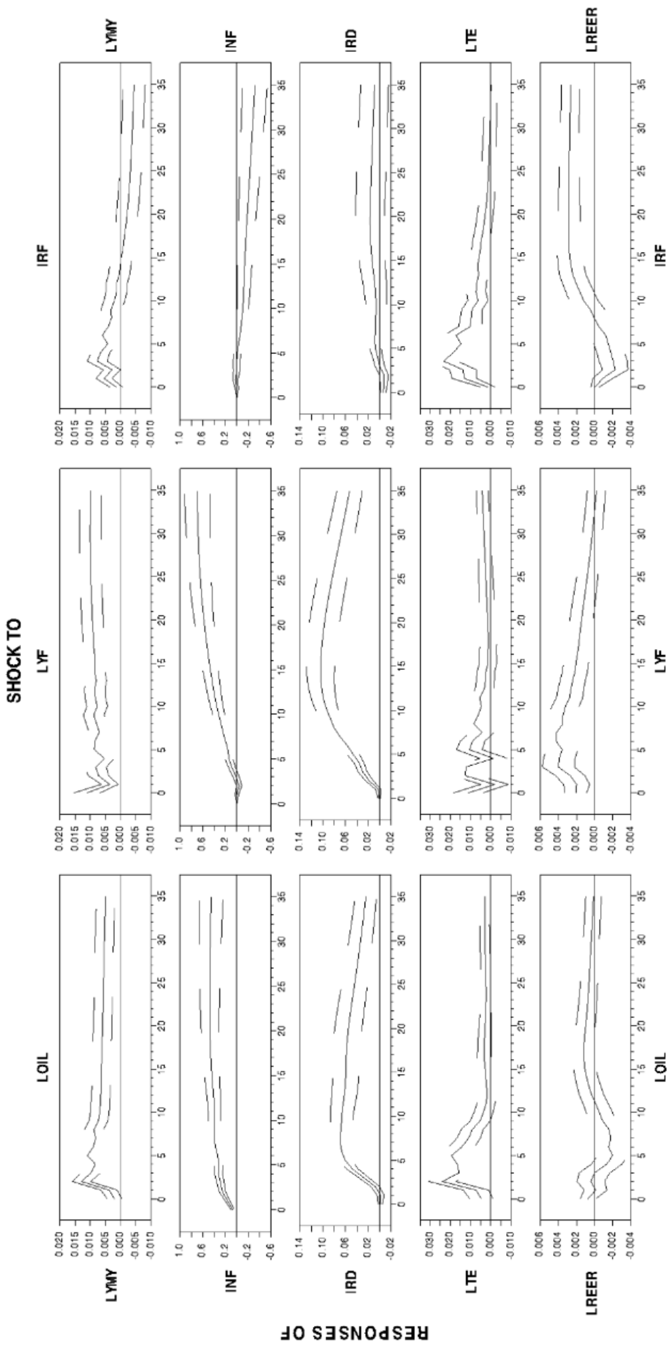

Figure A1 Responses of domestic variables to foreign shocks

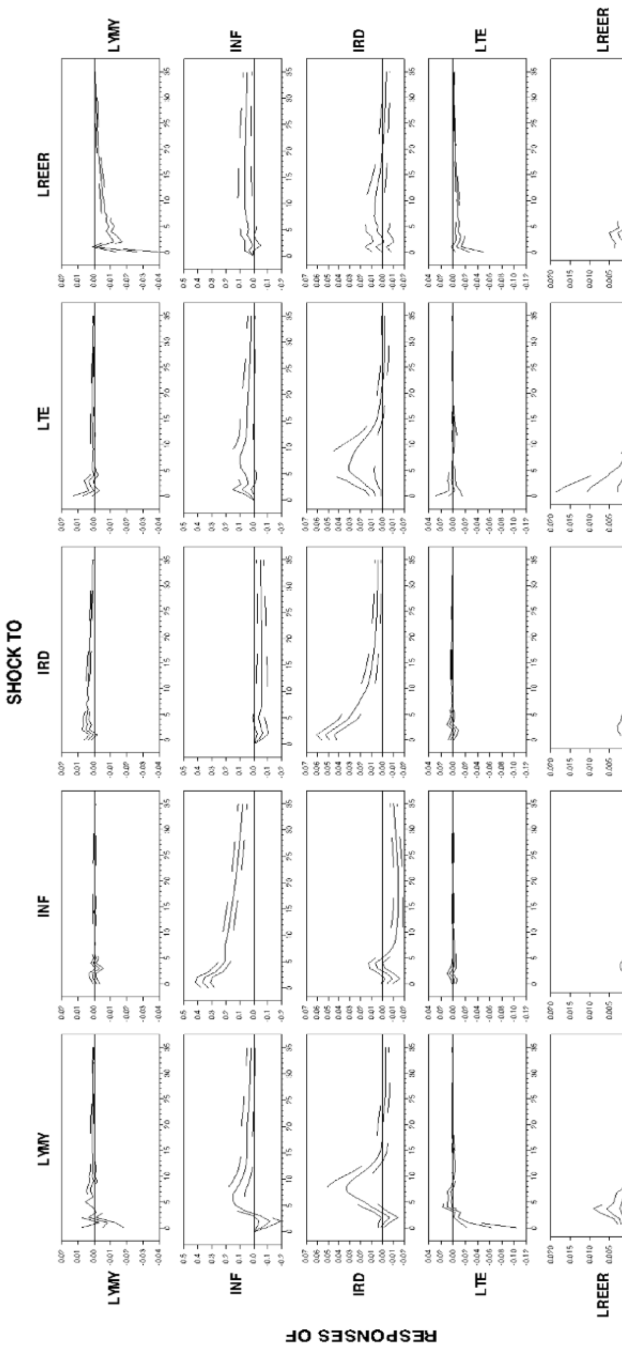

Figure A2 Responses of domestic variables to domestic shocks