A VAR ANALYSIS OF US AND JAPANESE EFFECTS ON MALAYSIAN AGGREGATE AND SECTORAL OUTPUT

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Abstract

The paper analyzes the relative influences of US, Japanese and domestic disturbances on domestic fluctuations for the case of Malaysia. Utilizing VAR framework and quarterly data from 1978 to 1999, we focus on their influences on aggregate fluctuations as well as on sectoral cycles. Our results suggest that aggregate and sectoral output fluctuations originate principally from domestic sources. However, the importance of the US and Japanese business cycles can not be ignored as they exert quite substantial influences on domestic output variability. Comparatively, the Japanese influences seem to be larger. However, from sectoral perspectives, there are disparities in the responses of sectoral output to US and Japanese disturbances. While some sectors are affected more by disturbances in Japan, other sectors seem to be more vulnerable to the US shocks. From a policy point of view, policy designs that ensure predictable domestic macroeconomic environment are most important and they need to be aligned more to those of Japan for curbing output variability. Which sectors should be given focus, however, depends crucially on the sources of disturbances.

JEL classification: C5, C51, O53, O56
Keywords: International Business Cycle Transmissions, Malaysia, Sectoral Output, VAR Analysis

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1. Introduction

The transmission of aggregate demand disturbances across countries is a subject that has received considerable attention in both academic and policy circles. The early theoretical studies have emphasized exchange rate regimes as being important in accounting for international business cycle transmissions. Namely, while interdependence among national economies is the main characteristic of the fixed exchange rate regime, it is argued that a domestic economy is insulated from foreign disturbances under the flexible exchange rate regime. However, the adoption of the flexible exchange rate system since the breakdown of the Bretton Woods system in early 1970s has not resulted in domestic economies being completely insulated from international shocks. Indeed, various empirical studies document evidence for business cycle transmissions across countries regardless of the exchange rate regimes (see Lastrapes and Koray, 1990 and references therein). As Lastrapes and Koray (1990) note, there seem to be substantial differences in the degree of insulation and interdependence across countries.

Essentially, there are two channels that transmit aggregate demand disturbances across countries – trade and finance channels. Normally, expansion or recession abroad is translated into corresponding changes in demand for domestic output, making an economy that is open to international trade vulnerable to aggregate shocks of its major trading partners. In addition, changes in international real activities may impact on domestic economy through financial linkages. For instance, with increasing liberalization of financial markets in many countries, domestic interest rate is influenced more by interest rate of major economies as envisaged by interest rate parity condition. Accordingly, any changes in dominant economies' output will affect their interest rates and, through interest rate parity condition, the domestic interest rate.

This, in turns, may affect domestic output. Furthermore, in search of optimal portfolio investment returns in environment of increasing capital mobility, national stock markets become more integrated. This provides another possible avenue for business cycle transmissions. It is well acknowledged that at least in the long run, the equity market reflects fundamental variables. Subsequently, with integrated world financial markets, foreign share price movements can be quickly transmitted to domestic share market which, in turns, may affect domestic real activity through its influences on Tobin's q, costs of funds and expectations (De Roos and Russel, 2000).

These channels of transmission mechanisms posit that economies contributing substantial shares to a nation's exports and capital flows provide potential sources of domestic aggregate disturbances. In the case of East Asian and Southeast Asian countries, attention has been given to influences and relative dominance of their two major trading partners, the United States and Japan. The focuses of existing studies range from evaluating interest rate linkages to real output dynamic interactions and to stock market linkages.

The existing results, however, are at best mixed. Looking at real interest rate linkages, Phylaktis (1997) notes strengthening influence of the Japanese economy. Chua et al. (1999) document similar results from their analysis of real output and monetary linkages for the case of Korea and Malaysia. Meanwhile, Ahmed and Tongzon (1998) document evidence for substantial contribution of the US output shocks on ASEAN real activities. However, Selover (1999) finds weak evidence of international transmissions of aggregate disturbances to ASEAN economies. In the case of stock market linkages, it is generally found that the US market is more dominant and remains dominant even during the recent Asian financial crisis (Cha and Oh, 2000 and Sheng and Tu, 2000). The purpose of this paper is to enrich this empirical literature by evaluating business cycle transmissions for the case of Malaysia.

We focus specifically on the relative importance of domestic versus foreign shocks and of US versus Japanese shocks in accounting for Malaysian aggregate disturbances. This focus is highly relevant for the country's policy direction to stem large output fluctuations. Namely, as noted by Cheung (2002), the dominance of domestic shocks requires a policy towards achieving stable and predictable domestic economic environment. By contrast, policy makers need to concentrate on designing insulation devices, such as reducing over-dependence of exports and imports on few countries, if domestic fluctuations are sourced principally from international shocks. We may add that, in the case of Malaysia, verifying the relative importance of its major trading partners, the US and Japan, provides additional insight as to policies of which nation Malaysia needs to align to as a way to reduce output variability. We contribute further to the literature by also assessing the US and Japanese effects on sectoral activities.

While existing studies add to our understanding of business cycle transmissions, they mask sector-specific responses to international disturbances. Arguably, since different sectors have different trade intensities or may receive disproportionate shares of capital inflows, they may react differently to external disturbances. Our analysis can enhance our understanding of the issue and the output dynamics of various sectors, which should prove useful for policy purposes.

The structure of the paper is as follows. The next section sets up the empirical approach and section 3 has preliminary look at the data. Section 4 assesses the influences of the US and Japan on Malaysian production. Lastly, section 5 concludes with the main findings and some policy implications.

2. Empirical Approach

In line with existing studies, we adopt a vector autoregression (VAR) approach to examine the influences of the US, Japanese and domestic disturbances. To begin, A VAR model is specified as follows:

$$X_t = A_0 + \sum_{k=1}^{p} A_k X_{t-k} + e_t \qquad (1)$$

where X_t is a vector of n variables to be specified later, A_0 is an $n \times 1$ vector of constant terms, A_k is an $n \times n$ matrix of coefficients, e_t is an $n \times 1$ vector of error terms, and p is the order of autoregression. The lag order of the VAR (i.e. p), is set such that the error terms are serially uncorrelated.

The interpretation of model (1) is normally based on its moving average representation. By inverting or successive substitution, VAR model (1) has a moving average representation as follows:

$$X_t = B + \sum_{k=0}^{\infty} B_k e_{t-k}. \qquad (2)$$

Thus, X_t is expressed as a linear combination of current and past innovations. Based on (2), we generate variance decompositions and impulse response functions as bases for our inferences. Basically, variance decompositions partition the variations in a variable of interest to shocks in other variables in the system including its own innovations. Thus, they provide natural measures of relative importance of various shocks in explaining the concerned variable. Meanwhile, the impulse-response functions, as the name implies, trace the responses of the variables in the system to one standard deviation shocks in other variables. They capture the directions, magnitudes and persistence of a variable's responses to impulses in the system.

One important aspect that needs to be pointed out, which pertains to the generation of variance decompositions and impulse-response functions, is that innovations in (2) may be contemporaneously correlated. This means that a shock in one variable may work through the contemporaneous correlation with innovations in other variables. Since isolated shocks to individual variables can not be identified due to contemporaneous correlation, the responses of a variable to innovations in another variable of interest can not be adequately represented (Lutkepohl, 1991). To solve this identification problem, Sims' (1980) suggest an empirical strategy that orthogonalizes the innovations using the so-called Cholesky factorization.

Note that, given the nature of the Cholesky factorization, results from impulse response functions may be sensitive to the ordering of the variables in the decomposition. A general guideline in ordering the variables is that the most exogenous variables are placed first and the most responsive to shocks are placed last. In our context, the ordering issue is of no problem since it should be expected that the advanced economies of the US and Japan should be treated as most exogenous. Meanwhile, the Malaysian economy, being a small open economy, tends to be responsive to shocks in the global economies. Accordingly, our empirical strategy is to adopt the Cholesky factorization.

In the analysis, we consider the influences of the US and Japan on both Malaysian aggregate and sectoral productions. Eight sectors are examined. Accordingly, nine different VAR systems are estimated – one for the aggregate system and eight for sectoral systems. For the aggregate system, X is a 3×1 vector consisting of measures of aggregate output for the US, Japan and Malaysia. To form the sectoral systems, we partition aggregate production of Malaysia into the sector under consideration and the aggregate production of the remaining sectors. Thus, in the sectoral cases, X is a 4×1 vector consisting of US output, Japanese output, Malaysian output less the production of the sector under consideration, and output from the sector under consideration. In simulating variance decompositions and impulse-response functions, we order the variables according to the sequence as mentioned above.

3. Data Preliminaries

The data used in these studies are quarterly spanning from 1978:Q1 to 1999:4. As we outlined in the previous section, our models consist of measures of real output for the US, Japan and Malaysia. We use real gross domestic products (respectively denoted as GDPUS, GDPJP, and GDPMY) to capture real production in these economies. We consider eight different sectors in the analysis of the US and Japanese influences on sectoral output. These sectors are Agriculture, Forestry and Fishing (S1); Mining and Quarrying (S2); Manufacturing (S3); Construction (S4); Electricity, Gas and Water (S5); Transport, Storage, and Communication (S6); Wholesale and Retail Trade, Hotels and Restaurant (S7); and Finance, Insurance, Real Estates and Business Services (S8). We expect that these sectors respond differently to international disturbances as they have different exposure to international trade. Data on Malaysian real activities are obtained from various issues of the *Statistical Bulletin* published by Bank Negara (Malaysia's Central Bank). Meanwhile, real GDP of the US and Japan are taken from the *International Financial Statistics* (CD Rom version).

Table 1 provides descriptive statistics of these output measures – the means and standard deviations of their year-to-year growth rates – as well as results of the ADF unit test for each output measure. The growth experience of Malaysia is very impressive, recording an average annual growth rate of 6.3% over the period 1978-1999. This performance is more than double the growth performance experienced by the US (3.0%) and Japan (2.8%) over the same period. However, the growth rate of Malaysia is more volatile, which arises mainly from the early period and during the Asian crisis.

Among the Malaysian sectors, Finance, Insurance, Real Estates and Business Services sector (S8) experienced the highest growth rate, followed by Electricity, Gas and Water (S5), Manufacturing (S3), and Transport, Storage and Communication (S6) sectors. The Construction sector (S4) is the most volatile followed by Transport, Storage and Communication sector (S6).

Before we proceed to VAR analysis, we first subject each time series to unit root and cointegration tests. The results from the ADF unit root test indicate that the GDPs of the three countries (US, Japan, and Malaysia) require first differencing to achieve stationarity. In other words, they are integrated of order 1, or I(1). However, the results for sectoral output are not uniform across sectors. Namely, we find evidence for non-stationarity (i.e. I(1)) in the output series for S2, S3, S7, and S8. However, the ADF unit root test suggests the presence of unit root even for the first differenced series for S1, S4 and S5. Meanwhile, S6 is found to be stationary in level. Accordingly, we perform the PP unit root test for further evidence. We find that S4 and S5 are also an I(1) process. The results for other series, however, remain the same.

We then proceed to testing the presence of long run co-movement or cointegration among the three GDP series using the Johansen-Juselius cointegration test (Johansen, 1988 and Johansen and Juselius, 1990). We do not test for cointegration for the sectoral systems. We believe that testing for the aggregate system is sufficient since, in the sectoral system, the Malaysian GDP is simply partitioned into the output from the sector under consideration and output from the rest. Moreover, for certain sectors, the unit root properties of the data series are not certain. In some cases, such as S1 and S6, the unit root results do not justify cointegration test.

The results from the Johansen-Juselius cointegration test are given in Table 2. Note that they suggest the absence of cointegration among the variables. These results are not unexpected since economic theory does not provide clear indication on whether output from related countries should move together. While convergence of outputs is predicted by the neoclassical growth theory, divergence is allowed under the new growth theory. Thus, output from various economies may not move together. Our evidence suggests that the US, Japanese and Malaysian GDPs do not share a long run equilibrium and they can drift away from each other arbitrarily. However, these results do not preclude short run dynamic interactions among them, the issue that we turn to next.

4. VAR Results

This section estimates VAR models and simulates variance decompositions and impulse response functions as bases for assessing relative influences of the US, Japanese, and domestic output innovations. We first focus on the aggregate system. Then, we examine whether their influences vary across sectors. Given non-cointegration results, the variables in (1) are in year-to-year growth form. The use of year-to-year growth rate of the variables instead of the first-differenced variables (i.e. quarter-to-quarter growth) seems more sensible as it can capture the interactions of the growth cycle, which is normally measured on a year-to-year basis. Moreover, the use of quarter-to-quarter growth rate (first-differenced form) unnecessarily adds noise to the data generating process, which may confound the estimation results. Note that, the use of year-to-year growth rate induces autocorrelation in the models. However, this problem is solved by introducing enough lag in the VAR system. Namely, as we have noted, the lag length is chosen such that the error terms in the VAR equations are serially uncorrelated.

4.1 Aggregate System

Table 3 presents variance decompositions of the Malaysian real output for horizons up to 5 years or 20 quarters. Overall, they suggest that innovations in the GDPs of Malaysia, Japan and the US all play a significant role in accounting for variations in the GDP of

Malaysia. To be more specific, most of the domestic GDP variations are accounted mostly by domestic innovations, explained by more than 75% after the first year and more than 60% at two year horizon onwards. Comparatively, the disturbances in the Japanese output have more explanatory power in accounting for variations in Malaysian output than those in the US real activity. Namely, more than 20% of the forecast error variance of Malaysian GDP is attributed to shocks in Japanese GDP at 1-year to 5-year horizons. Meanwhile, the US innovations explain only 10% at 2-year horizon and roughly 13% at 5-year horizon. Note that the influences of the Japanese GDP are more immediate.

These results, at least qualitatively, are further reflected in the impulse-response functions plotted in Figure 1. The response functions are plotted together with two standard deviation bands. Generally stated, if the bands do not encompass zero, then the responses are said to be significantly different from zero. The results show that variations in output are mainly domestically generated, which is true not only for Malaysia but also for the case of the US and Japan.

Indeed, for the two advanced economies under consideration, domestic disturbances seem to be the only source of their output fluctuations. In the case of Malaysia, we may note that the response of its real GDP to one standard deviation shock in the US GDP is not significant. Meanwhile, it reacts positively and significantly to innovations in the Japanese GDP up to quarter 5. Thus, in line with the variance decomposition results, the Japanese effect is relatively more important than the US effect in accounting for fluctuation in Malaysian GDP. These conform well to the results documented by Chua et al. (1999).

From a policy point of view, the dominance of domestic shocks in accounting for domestic aggregate fluctuations calls for concentration of domestic policies for attaining stable and predictable domestic economic environment. While Malaysia has been known for the government's active involvement in stabilization policies and accordingly is subject to possible destabilizing outcome, building credibility in policy initiatives and implementation can make the economic environment more predictable[1]. However, for a small open economy like Malaysia, disturbances from abroad can not be totally ignored. Some insulation devices to improve resiliency of the Malaysian economy in the face of international disturbances are needed. Perhaps, promoting export diversification and reducing reliance on foreign financial flows are relevant measures to be taken. Lastly, alignment of policies with those of Japan may help alleviating output variability. The current call to turn to the Japanese yen for trade settlements, for example, is something worth for the government to look into. In all, being a small open economy, designing appropriate economic policies may not be an easy task as the economy is subject to fluctuations from all sources, domestic and international.

4.2 Sectoral Results

Having noted the importance of domestic versus international and US versus Japanese disturbances in accounting for domestic aggregate fluctuations, we proceed to sectoral systems. The sectoral analysis may add further insight to our understanding of the international influences on Malaysian fluctuations as it allows sector-specific responses to international disturbances. The results of our sectoral systems are summarized in Table 4 and Figure 2. They generally highlight disparities in the reactions of various sectors to domestic and international disturbances.

In line with the aggregate results, variations in sectoral output are attributed mostly to domestic fluctuations. Among the sectors,

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1 This arises from the monetarist proposition that active stabilization policies can be destabilizing due to ignorance on the part of policy makers in understanding fully the working of the economy.

output in Agriculture, Forestry and Fishing (S1) seems to be most exogenous responding to mainly its own disturbances. Note that even fluctuations in other domestic output do not contribute substantially to the forecast error variance of S1. Similarly, Mining and Quarrying (S2), Electricity, Gas and Water (S5), and Transport, Storage and Communication (S6) are also affected mostly by their own disturbances. Indeed, for S6, the influences of international disturbances do not seem to be important. These results are interesting. Both S1 and S2 are traditional sectors that have witnessed reduced importance over the years, especially in the international trade context. Meanwhile, S5 and S6 are mainly related to public utilities. Accordingly, their relative insensitivities to other fluctuations should be expected. As expected, the Construction sector (S4) is most vulnerable to other disturbances followed by the Finance, Insurance, Real Estates and Business (S8), Manufacturing sector (S3), and Wholesale and Retail Trade, Hotels and Restaurants (S7). This means that, in the face of domestic or international disturbances, these sectors deserve more policy attention. Note that the main source of fluctuations in S3 and S7 is domestic while that of S4 and S8 is international

In most cases, the Japanese influences seem to be relatively more important than the US influences. Comparatively, the Japanese influence is higher for Agriculture, Forestry and Fishing (S1), Manufacturing (S3), Electricity, Gas and Water (S5), and Finance, Insurance, Real Estates and Business Services (S8). Meanwhile, the US impact is larger for Mining and Quarrying (S2), Construction (S4), and Wholesale and Retail Trade, Hotels and Restaurants (S7). The impact of Japan is largest for Finance, Insurance, Real Estates and Business Services (S8) while the impact of US is largest for Construction (S4). These results, thus, suggest the importance of looking not only at specific sectors but also at the sources of disturbances whether they are generated domestically or internationally or from the west or the east. Some sectors need to be given attention if the disturbances are from Japan while the other sectors deserve attention if they originate from the west.

The impulse-response functions, plotted in Figure 2, are not so clear about the significance of international disturbances. Still, two results from the foregoing discussions remain. First, domestic disturbances seem to solicit significant reactions from sectoral output. Indeed, fluctuations in domestic output of other sectors exert significant reaction from the Manufacturing (S3), Construction (S4), Wholesale and Retail Trade, Hotels and Restaurants (S7), and Finance, Insurance, Real Estates and Business Services (S8). These results echo our previous conclusion that stable domestic macroeconomic environment for stability in output of these sectors. And second, the Japanese influences are again more important especially for the Manufacturing (S3) and Finance, Insurance, Real Estates and Business Services (S8). Since these sectors are core sectors of the Malaysian economy, alignment of policies to those of Japan seem to be important for curbing output variability.

5. Conclusion

Understanding business cycle transmissions across national economies especially from advanced economies to a developing economy in the environment of increasing economic and financial integration is critically important for the designs of domestic macroeconomic policies. In this paper, we assess the issue for the case of Malaysia. In specific, we analyze the relative importance of two advanced economies and Malaysia's main trading partners – the US and Japan – and domestic disturbances in accounting for domestic aggregate and sectoral fluctuations. The analysis relies on vector autoregression framework. From the estimated VAR, we simulate variance decompositions and impulse response functions as a basis for making inferences on relative importance of domestic and international disturbance.

From the VAR, we document various interesting results. To summarize, they are stated as follows:

(a) While the US and Japanese influences are important, Malaysian aggregate and sectoral fluctuations originate principally from domestic sources.
(b) Comparatively, the Japanese influences are more important than the US influences.
(c) There seem to be sector-specific responses to international disturbances. While fluctuations in some sectors are attributed more to US disturbances, fluctuations in other sectors are explained more by Japanese disturbances.
(d) The traditional sectors, which witnessed reduced importance to the Malaysian economy, are most exogenous to international fluctuations. Meanwhile, the construction sector is most vulnerable followed by Finance, Insurance, Real Estates and Business sector, Manufacturing sector, and Wholesale and Retail Trade, Hotels and Restaurants sector.

These results have bearings on domestic macroeconomic policies. Namely, the dominance of domestic shocks in accounting for domestic aggregate fluctuations highlights the importance of stable and predictable domestic economic environment, which should be the main objective of policy makers. However, for a small open economy like Malaysia, disturbances from abroad can not be totally ignored. Some insulation devices such as export and international financial diversification are needed to improve resiliency of the Malaysian economy in the face of international disturbances.

The results also suggest that alignment of policies with those of Japan may help alleviating output variability. Lastly, which sectors deserve policy attention depend crucially on the sources of disturbances, whether they are sourced domestically or internationally and are originated from US or Japan. In all, being a small open economy, designing appropriate economic policies may not be an easy task as the economy is subject to fluctuations from all sources, domestic and international.

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Table 1: Data Summary and Preliminaries

	Year-to-Year Growth		ADF Tests	
Variables	Mean	Std. Dev.	X	ΔX
GDPUS	0.0296	0.0211	-2.588	-3.387***
GDPJP	0.0280	0.0218	1.207	-3.398***
GDPMY	0.0629	0.0424	-2.041	-3.895**
S1	0.0250	0.0486	0.581	-2.902
S2	0.0434	0.0680	-2.656	-10.07*
S3	0.0906	0.0763	-2.021	-4.229*
S4	0.0579	0.1334	-2.693	-1.646
S5	0.0937	0.0352	-2.365	-2.441
S6	0.0867	0.1326	-7.881*	-6.328*
S7	0.0671	0.0733	-2.145	-3.354***
S8	0.1027	0.0554	-1.511	-9.618*

Note: *, **, and *** denote significance at 1%, 5%, and 10% levels respectively.

Table 2: Cointegration Tests

	Null Hypothesis		
	r = 0	r ≤ 1	r ≤ 2
Test Statistics			
Trace	19.746	4.156	0.335
Max	6.590	3.822	0.335
95% CV			
Trace	29.68	15.41	3.76
Max	20.97	14.07	3.76

Table 3: Variance Decompositions of GDPMY- Aggregate System

	Explained by Innovations in		
Periods	GDPUS	GDPJP	GDPMY
1	1.019	3.407	95.574
4	1.643	21.049	77.308
8	10.529	24.011	65.460
12	13.540	23.531	62.929
20	13.778	23.564	62.657

Table 4: Variance Decompositions of Malaysian Sectoral Output
(a) Agriculture, Forestry and Fishing (S1)

	Explained by Innovations in			
Periods	GDPUS	GDPJP	GDPMY-S1	S1
1	0.006	2.633	0.076	97.285
4	2.628	14.837	1.964	80.571
8	3.510	15.235	3.266	77.989
12	4.498	16.411	4.087	75.004
20	5.374	16.932	4.739	72.955

(b) Mining and Quarrying (S2)

	Explained by Innovations in			
Periods	GDPUS	GDPJP	GDPMY-S2	S2
1	3.237	2.271	0.996	93.495
4	8.552	2.875	3.689	84.884
8	14.246	5.006	4.276	76.472
12	18.393	5.779	6.688	69.140
20	18.948	6.151	8.319	66.582

(c) Manufacturing (S3)

	Explained by Innovations in			
Periods	GDPUS	GDPJP	GDPMY-S3	S3
1	0.880	0.894	58.002	40.225
4	3.621	13.867	56.777	25.734
8	10.290	15.482	45.540	28.688
12	9.383	15.712	45.692	29.213
20	8.783	16.420	46.149	28.648

(d) Construction (S4)

	Explained by Innovations in			
Periods	GDPUS	GDPJP	GDPMY-S4	S4
1	0.299	0.622	20.357	78.722
4	1.158	8.715	51.311	38.816
8	23.472	13.168	39.195	24.164
12	35.085	12.215	34.348	18.353
20	34.701	13.432	33.684	18.182

(e) Electricity, Gas and Water (S5)

	Explained by Innovations in			
Periods	GDPUS	GDPJP	GDPMY-S5	S5
1	6.762	0.077	0.222	92.939
4	8.261	7.769	7.276	76.693
8	8.051	16.631	7.889	67.428
12	7.235	16.748	14.805	61.211
20	7.990	17.598	14.255	60.157

(f) Transport, Storage and Communication (S6)

	Explained by Innovations in			
Periods	GDPUS	GDPJP	GDPMY-S6	S6
1	0.636	0.783	23.967	74.614
4	2.131	1.608	24.400	71.860
8	3.319	5.626	25.681	65.374
12	3.866	6.176	26.322	63.635
20	3.982	6.540	26.961	62.516

(g) Wholesale and Retail Trade, Hotels and Restaurants (S7)

	Explained by Innovations in			
Periods	GDPUS	GDPJP	GDPMY-S7	S7
1	1.016	0.982	3.398	94.604
4	3.812	2.662	40.810	52.716
8	8.696	7.021	42.619	41.664
12	14.7860	6.491	40.381	38.342
20	15.499	6.714	40.447	37.339

(h) Finance, Insurance, Real Estates and Business Services (S8)

	Explained by Innovations in			
Periods	GDPUS	GDPJP	GDPMY-S8	S8
1	0.943	18.987	6.441	73.629
4	0.511	38.457	29.594	31.437
8	7.103	37.566	32.854	22.477
12	8.353	36.057	32.337	23.252
20	8.761	35.328	32.887	23.024

Figure 1: Impulse Response Functions: Aggregate Systems

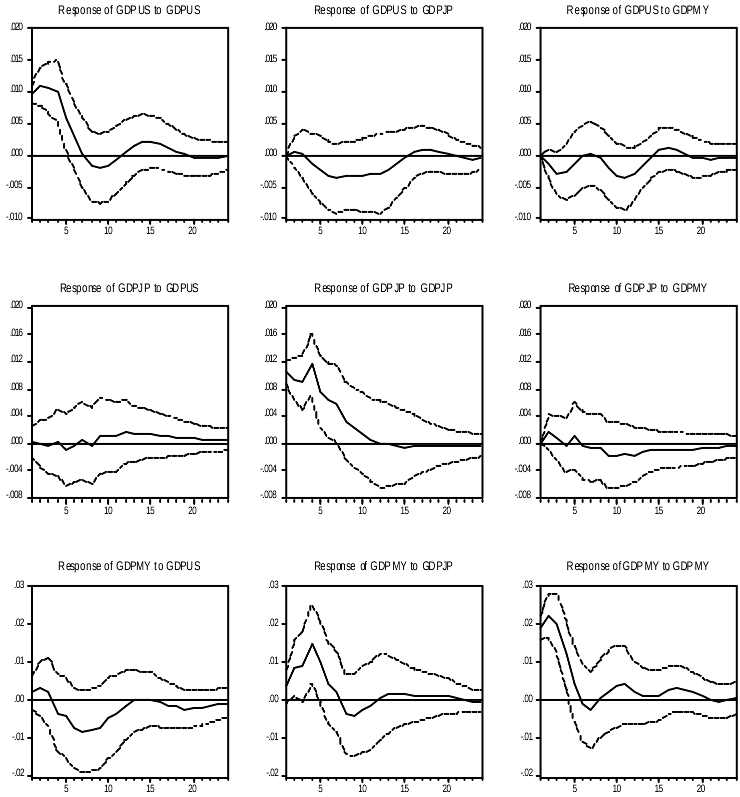
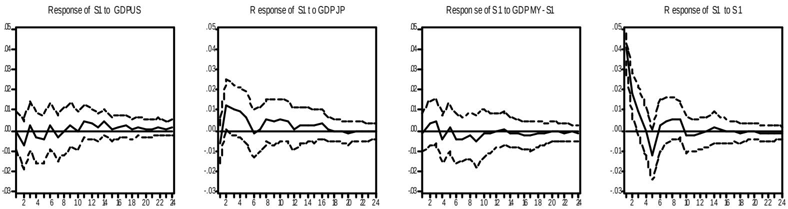
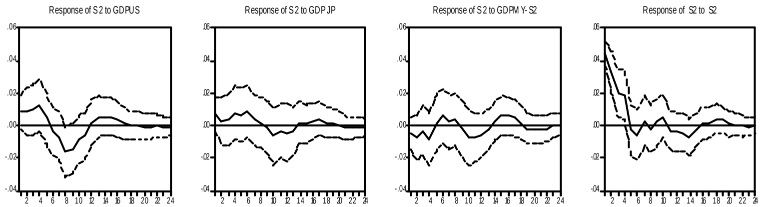


Figure 2: Impulse Response Functions – Sectoral Systems

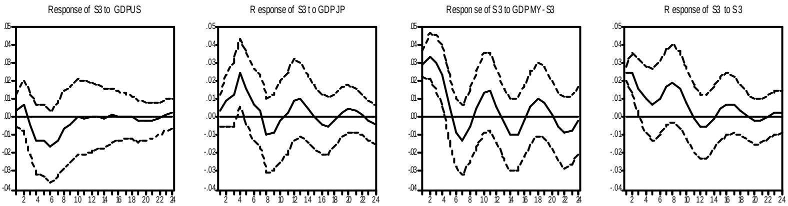
(a) Agriculture, Forestry and Fishing (S1)



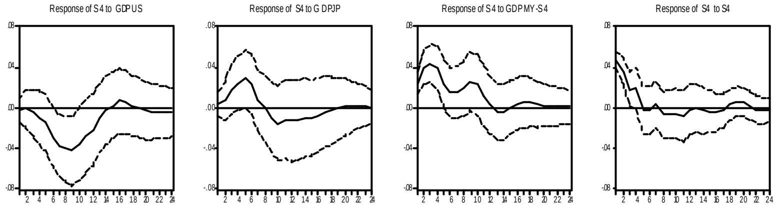
(b) Mining and Quarrying (S2)



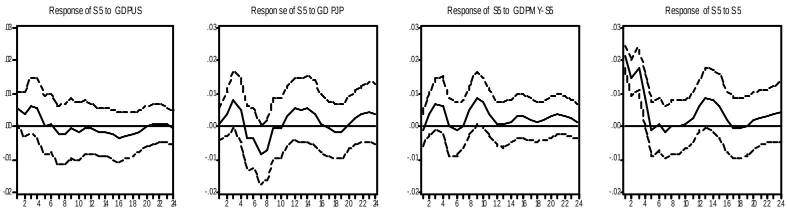
(c) Manufacturing (S3)



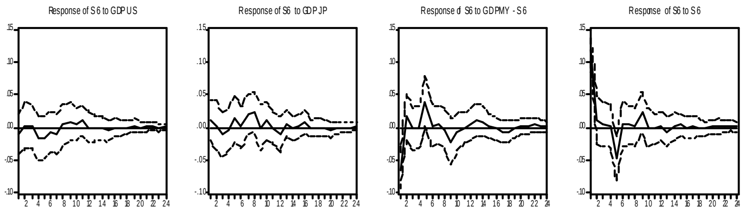
(d) Construction (S4)



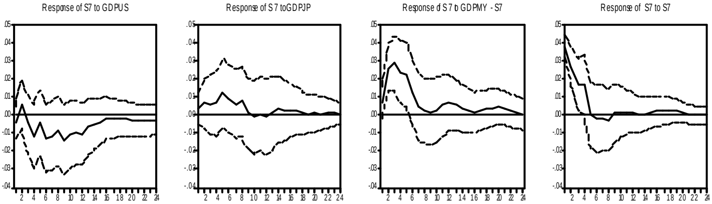
(e) Electricity, Gas and Water (S5)



(f) Transport, Storage and Communication (S6)



(g) Wholesale and Retail Trade, Hotels and Restaurants (S7)



_ (h) Finance, Insurance, Real Estates and Business Services (S8)