

Macroeconomic Policies and Economic Growth of Cambodia during the COVID-19 Era

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ABSTRACT

The purpose of this research paper is to observe the most impacted sector among the three major contributors, including agricultural, manufacturing and service sectors on Cambodia economic growth. Additionally, the scenario analysis was employed to indicate the negative impact of the global widespread pandemic of Covid-19 on Cambodia economic growth. Responding to the research question, the VAR model which consists of the four endogenous variables, such as the real GDP growth rate, the growth rate of agricultural, the manufacturing and service sectors was run using the quarterly data from 2001:Q1 until 2019:Q4. The empirical result from the VAR model indicated that the industrial or manufacturing sector is the major contributor to Cambodia economic growth while agriculture and service respectively rank number two and three as the sectors influencing Cambodia economic growth. Furthermore, the scenario analysis indicated that in the case that all of the three sectors decrease by 5 percent quarterly for four quarters, Cambodia economic growth is expected to drop around 3.62 percent quarterly. Therefore, to minimize the impact of Covid-19 on Cambodia economic growth, the Royal Government of Cambodia is recommended to form the policy to support domestic manufacturing, especially the SMEs through increasing the regulation on the imported products that Cambodia can produce. The government should provide tax exemption and support to domestic manufacturers. Moreover, the government should provide financial and technical supports to the domestic manufacturers. Finally, the government should facilitate the improvement of the ability of domestic labor by providing vocational trainings..

Keywords: GDP, Covid-19, VAR Model, Scenario Analysis.

1. INTRODUCTION

In the last few years, the economic growth of Cambodia has been increasing at a remarkable speed, especially when compared with the regional countries in ASEAN. The gradual increase in economic growth has contributed to the enhancing of the Cambodian living standard. Given the increase in the job market in every sector, Cambodian people can easily find their jobs. Most importantly, the gradual increase in economic growth creates a favorable business environment that serves as a good opportunity for the local business to conduct their business.

Cambodia Gross Domestic Product (GDP) is divided into three major sectors, such as agricultural, industrial and service sectors. In the last four years, the annual real economic growth rate of Cambodia has been about 7 percent. Agriculture, industrial and service sectors contributed 25.7

percent, 32 percent and 42.2 percent respectively. The Cambodian economy relies approximately 74 percent on the industrial and service sector, all of which are respectively related to the garment, textile and tourism. Among the three major sectors contributed to Cambodia economy, the industrial sector is the faster-growing sector of approximate 11 percent per year. While the service sector ranks the second place, the third place is the agricultural sector with the growth rate of about 6.9 percent and 1.1 percent respectively. Thereof, the increase in the GDP of the industrial sector is from clothes, footwear, sports equipment, and bicycles. Such an increase in those industrial products is due to the increase of the demand of the international markets from the US and EU. Notwithstanding, the increase of the GDP of the service sector depends heavily on the tourism as a number of tourists who have visited the ancient-built temples in Siem Reap province and

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the coastal beaches of Kep City and Sihanoukville are the tourists from China, Vietnam, Thailand, Laos, Malaysia, US and Europe, etc. There is appreciation for the development of those sectors contributing to the Cambodia development of improving Cambodian living standard and reducing poverty. However, the gradual development of Cambodia economy cannot reach smooth and sustainable achievement without the stable development of global economic growth. Since the global purchasing power of Cambodia goods, services will be decreased in the case of a rough time and unstable growth.

The global widespread pandemic of Covid-19, for example, causes a great negative impact on the global economy and affects many countries, including the US, China, and EU that are the major trade partners and the biggest purchasers of Cambodia. The exported products such as clothes, footwear, and sports equipment, etc. are mostly sold in the US and EU markets. Furthermore, it is the major absorbing factor attracting Chinese investors to come to Cambodia. In addition, the Covid-19 will surely cause an unavoidable negative impact on Cambodia economic growth without discriminating any sector. The agricultural, industrial and service sectors are alike. Therefore, the purpose of this study is to predict any factor among the three sectors, namely agricultural, industrial and service sector that has contributed to the change of Cambodia economic growth.

Furthermore, the scenario analysis was conducted to find out, to what extent, whether Cambodia economic growth has the change or not when all of the three sectors— the agricultural, industrial and service sectors decrease all at once by 5 percent per quarter for four quarters. Finally, this study provided the insightful strategic plans to the Royal Government of Cambodia for the sake of reducing the negative impact of Covid-19 on Cambodia economic growth to the minimum level.

2. LITERATURE REVIEW

In Cambodia, there has been the scarcity of research undertaken to understand the influence of the macroeconomic policies on the development. Most of which are even restricted and can explain the effect of the macroeconomic policies in either the short run or long run only but not simultaneously explain both concepts. Ung and Chea (2011), for instance, implemented the reduced-form vector autoregressive (VAR) model on the quarterly

data from 1998:1 to 2008:4 which five variables, including gross domestic product (GDP), government expenditure (G), consumer price index (CPI), real effective exchange rate (REER) and money supply (M2) were employed. The co-integrated of order one; I (1) are found in all of the variables. The model is, then, classified as the short-run model, and the empirical result backs the hypothesis which claims that the fiscal policy performs better than the monetary policy in stimulating the economic growth in Cambodia. As predicted, the fiscal policy has a positive impact on the inflation which implies that the increase in the government expenditure will result in a higher inflation rate. Price level, in contrast, does not virtually respond to the monetary policy shock. Thus, it indicates that the money supply may not be an effective measure in managing the volatility of inflation. With the fact that Cambodia is experiencing currency substitution and depending heavily on the imported goods, which prices are sensitive to external shocks only, due to this an increase in the demand arising from the fiscal expansion leads to higher demand for imported goods. The real effective rate, moreover, affirmatively reacts to the change in government spending and broad money, yet the effects appear at the moderate level.

Lim (2011), however, evaluated the effectiveness of the monetary policy in Cambodia by applying the structural VAR (SVAR) on the quarterly data from 1998:1 to 2010:4. Four main variables taken into account are the money supply (M2), the nominal exchange rate (NEX), the consumer price index (CPI) and the gross domestic products (GDP). The SVAR, similarly, is considered as the short-run model. All of the variables are required to undergo the first differential to get rid of the spurious problem. The results indicated that the broad money growth has a strong positive impact on the inflation in the short-run while in the long run the result also exhibits a cyclical pattern of the impact of the broad money growth on the exchange rate. Changing the price in the amount of money supply, therefore, would effectively impact the price level in the market. The respond of the inflation to the exchange rate shock, in addition, has a similar shape to the response of the inflation to the broad money growth. The forecast error variance decomposition of inflation indicated that in the first four quarters, the variation of the inflation can be explained correspondingly by the three variables, including the broad money, exchange rate and GDP. In the fifth quarter, however, the variable of inflation is mainly explained by the variation of the exchange

rate (about 22 percent for every quarter).

Basically, the reduce-form VAR was also adopted by Lim (2010) to evaluate the interrelationship of the exchange rate, narrow money and price level in Cambodia. The result predominantly explained that both the variation of the exchange rate and money supply have a significant impact on the price level. Money supply growth, interestingly, has a significant impact on the exchange rate confirming with the prior prediction. Ginting (2009), on the other hand, found that Cambodia inflation rate-core and headline inflations were affected by the trading partners, namely Thailand and Vietnam according to the estimated result of the VECM applying on the monthly data from 2002:12 to 2008:7. Kahn (1987) employed five indicators, such as GNP, unemployment rate, money supply, energy price and change in the value of the dollar in the VAR model with quarterly data from the first quarter of 1960 to the first quarter of 1987 to investigate the impact of exchange rate depreciation on the price level. The estimated result has shown that as predicted the dollar depreciation led inflation in the U.S. Deravi (1995) similarly employed the VAR model. The study, however, included the money supply in addition to the exchange rate and inflation rate. The empirical result conformed to other prior research studies, such as Whitt, Koch, and Rosensweig (1986) and Kanh (1987) suggested that money supply growth affected not only the exchange rate but also inflation.

The same VAR model was adopted by Manning (1993) to determine the interrelationship between the exchange rate and the U.S. price level. Five indicators, including CPI, exchange rate, M2, personal income and interest rate are considered. The conclusion produced the same result as Kanh (1987). Kim (1998) conducted another study with the same objective of Kanh and Manning. Instead of the VAR model, the VECM was implemented, and the variables, such as exchange rate, producer price index, broad money, interest rate and personal income were included. Even with the new model, the empirical result suggested the same result as the former studies that illustrated that the variation of the exchange rate affects the price level in the U.S.

Using the ECM model on the annual data from 1980 to 2010, Simon (2012) conducted a recent study determining the effectiveness of the fiscal policy on economic growth in Zimbabwe. The empirical result explained the existing of the long-run relationship among the variables. The result concluded that the

government consumption expenditure has a positive impact on the economic growth while the capital expenditure by the government has a negative effect on the economic growth.

Similarly, Shittu, Yemitan and Yaya (2012) used both ARDL and ECM models to investigate the relationship of the five variables, such as inflation, real GDP, investment, exchange rate and interest rate in Nigeria. The study applied quarterly data from 1960:1 to 2009:4. The result of the two models indicated that the exchange rate was highly influential in determining the GDP. The short-term dynamics of the ECM model was observed to be equilibrium with the result from the ARDL model. However, the ECM for annual data indicated the long-run relationship between the five variables. A study in Croatia conducted by Erjavec and Cota (2003) applied the VECM on the monthly data from October 1994 to October 2004. The five variables, including real output, money supply, interest rate, prices and exchange price are included. The empirical result reflected that the interest rate and the exchange rate are economically exogenous in the short run, and they are the leading variables in the model. Khasravi and Karima (2010) included the five variables, such as GDP, CPI, M1, G and E to the ARDL model which was applied on the annual data from 1960 to 2006 in Iran. The result indicated that the impact of exchange rate and inflation rate on the economic growth is negative. In addition, the finding has shown that the government expenditure had a significant positive impact on economic growth.

3. METHODOLOGY

This study employed the reduced-form VAR to study the inter-relationship between real gross domestic product and its three main sectors which are the gross domestic product for the agricultural sector, gross domestic product for the industrial sector and gross domestic product for the service sector. In this model, there are four main variables which would generate a system of equation consist of four equation while the number of parameters or coefficients depends on the optimal lag length of the VAR model itself. The general form the reduced-form VAR model is presented below,

$$Y_t = a + A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + \varepsilon_t \quad (1)$$

Where,

$Y_t = (RGDP_t, GDPA_t, GDPI_t, GDPS_t)$: an (4×1) vector of time series variables,

a : a 4 x 1 vector of intercepts,

A_i ($i=1,2,\dots,p$) : n x n coefficient matrices,

ε_t : a 4 x 1 vector of unobserved variable,

RGDP : Real gross domestic product, billions of Khmer Riel (KHR), based year = 2000,

GDPA : Real gross domestic product for the agricultural sector, billions of KHR

GDPI : Real gross domestic product for the industry sector, billions of KHR

GDPS : Real gross domestic product for the service sector, billions of KHR

In this research, the VAR model that applied quarterly time series from the first quarter of 2001 to the fourth quarter of 2019 was used. The annual gross domestic products, from 2001 to 2019, were collected from the Ministry of Planning and the cubic interpolation method was conducted on that annual data to make quarterly time series, 2001Q1-2019Q4. Each data series is in natural logarithm, so the first different represent growth rate.

To avoid spurious result, before running the VAR model, the unit root test had been performed on each data series. In this research, two-unit root tests had been employed to check the stationarity of the data series, the Augmented Dickey-Fuller and Phillips-Perron tests. In addition, to determine the optimal lags length of the model, the information criteria (IC) was applied. The lower the IC is, the better the model is. To guarantee the stability of the VAR model upon getting estimated parameters, the stability test was conducted. The variation of real economic growth as well as the response of the shock due to the variation and the shock of the agricultural, industrial and service sector could be described by the forecast error variance decomposition (FEVD) and the impulse response function (IRF), respectively.

To check the effect of the pandemic of Covid-19 on the real economic growth in Cambodia, this research also performed the scenario analysis. The sample size of this study is 2001Q1-2019Q4, but to conduct the scenario analysis, the estimated parameters of the VAR model were derived from the sample size between 2001Q1 and 2017Q4. Upon receiving the estimated parameters of the VAR model, the prediction of the baseline of the real growth rate of gross domestic product between 2018Q1 and 2019Q4 was conducted. Thereafter, a simultaneous reduction of 5 percent growth rate per quarter

consistency between 2018Q1 and 2018Q4 was imposed to all sectors, including the agriculture, industry and service to see how the real economic growth rate between 2018Q1 and 2019Q4 react to these negative shocks. The predicted real economic growth rate from this scenario is denoted as scenario 1. The scenario 1 was compared with the baseline scenario, and the expected quarterly real economic growth rate was forecasted.

4. EMPIRICAL RESULTS

There are three main parts in this section. The first part is about descriptive statistics of the four endogenous variables. The estimated of the VAR model is presented in the second part. Finally, to check how the real gross domestic product responds to the simultaneous negative shock of the three sectors, such as agriculture, industry and service is presented in the third part of the section.

Table 1. Descriptive Statistics

	DLOGRGDP	DLOGGDPA	DLOGGDPI	DLOGGDPS
Mean	0.018164	0.019089	0.033955	0.028897
Median	0.022320	0.017659	0.035145	0.030907
Maximum	0.040347	0.093199	0.083542	0.073655
Minimum	-0.017166	-0.100167	-0.027306	-0.039855
Std. Dev.	0.014325	0.030052	0.023936	0.022062
Skewness	-0.552858	-0.508299	-0.114549	-0.282457
Kurtosis	2.255526	5.672882	2.745238	3.209389
Jarque-Bera	5.552651	25.55553	0.366844	1.134288
Probability	0.062267	0.000003	0.832417	0.567143
Sum	1.362294	1.431694	2.546607	2.167272
Sum Sq. Dev.	0.015185	0.066831	0.042398	0.036019
Observations	75	75	75	75

During the period of the study, 2001Q1-2019Q4, the average quarterly growth rates are approximately 1.90 percent, 3.39 percent and 2.88 percent for the gross domestic product of agricultural sector, the gross domestic product of industrial sector, and the gross domestic product of service sector, respectively. Among the three sectors of domestic output, the growth rate of the industrial sector is ranked as the highest growth followed by the service sector and then the agricultural sector. At the same time, the average growth rate real domestic output is about 1.81 percent per quarter. The highest growth is 4.03 percent, and the lowest growth rate is -1.71 percent per quarter.

Regarding the probability of the calculated Jarque-Bera value, among the four variables, only one

variable, the growth rate of agricultural sector series, is not distributed as normal distribution since the null hypothesis that the series are distributed as normal distribution is highly rejected with 1 percent significant level.

Level				
Variable	ADF test		PP test	
	t-statistic	P-value	t-statistic	P-value
LOGRGDP	-1.3669	0.5933	-1.0026	0.7486
LOGGDPA	-2.4087	0.1433	-0.7961	0.8143
LOGGDPI	-0.7256	0.8326	-0.2169	0.9308
LOGGDPS	-2.2396	0.1946	-1.2063	0.6679
First-different				
Variable	ADF test		PP test	
	t-statistic	P-value	t-statistic	P-value
DLOGRGDP	-1.6075	0.4732	-7.6137	0.0000
DLOGGDPA	-1.3656	0.5938	-5.1169	0.0001
DLOGGDPI	-1.4468	0.5538	-4.2027	0.0013
DLOGGDPS	-2.7142	0.0770	-4.5369	0.0004

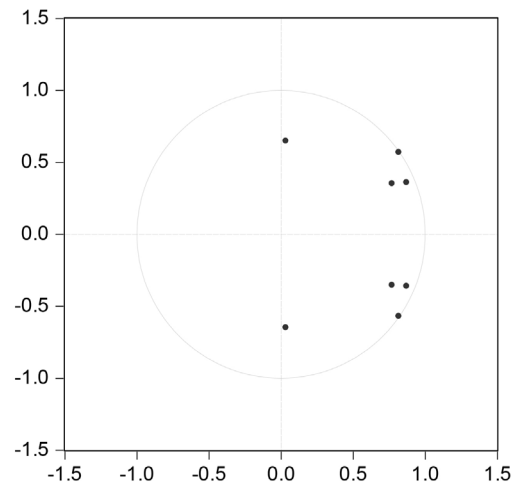
To avoid the spurious result of the estimated VAR model, the unit root tests, the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test were applied to each data series. As to the result of the unit root test, the ADF and PP tests, in Table 2, all data series in level are non-stationary due to the null hypothesis that each series has unit root is fail to reject at 5 percent significant level. Despite each data series is transformed to be first different regarding the ADF test, the null hypothesis of unit root still fails to reject at 5 percent significant level, but the null hypothesis of each data series is highly rejected at 1 percent level for all data series. Thus, each series is integrated of order one or I (1). Thus, each variable is transformed to be first different before running the VAR model.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	758.0774	NA	9.85e-16	-23.20238	-23.06857	-23.14958
1	893.5321	250.0702	2.50e-17	-26.87791	-26.20887	-26.61393
2	1089.730	338.0633*	9.82e-20*	-32.42245*	-31.21817*	-31.94728*

* indicates lag order selected by the criterion

The optimal lag length of the model estimated in this research is two lags since the information criterion, including Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quinn Information Criterion (HQ), generate the lowest criterion value as compared to zero lag and one lag, respectively.

Figure 1. Inverse Roots of AR Characteristic Polynomial



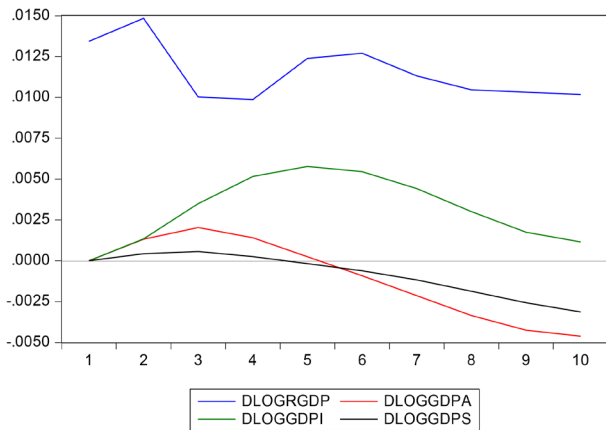
As can be seen in Figure 1, the estimated VAR model is stable which could be used for future prediction since all characteristic roots lie inside the unit circle. The forecast error variance decomposition (FEVD) (see Table 4) and the impulse response function (IRF) (see Figure 2) of DLOGRGDP are generated.

Period	S.E.	DLOGRGDP	DLOGGDPA	DLOGGDPI	DLOGGDPS
1	0.013435	100.0000	0.000000	0.000000	0.000000
2	0.013645	98.01540	0.934281	0.953572	0.096744
3	0.014648	95.85853	1.048644	2.999935	0.092894
4	0.014760	94.41862	1.216120	4.229322	0.135943
5	0.015037	93.77420	1.769470	4.243848	0.212487
6	0.015095	93.09994	2.348698	4.257226	0.294137
7	0.015253	92.00562	2.940459	4.631940	0.421986
8	0.015405	90.49858	3.501795	5.381521	0.618104
9	0.015499	89.41640	3.792037	5.974416	0.817142
10	0.015526	89.11487	3.835863	6.100816	0.948452

The variation of real economic growth rate is mostly explained by the variation of the industrial sector between 0.95 percent and 4.22 percent in the short run, between 4.24 and 4.63 percent in the medium term, and in the long term the variations are between 5.38 percent and 6.10 percent per quarter. The second indicator which explains the variation of the real growth rate of GDP is the agricultural sector. The variation is between 0.93 percent and 1.21 percent, 1.76 percent and 2.94 percent, and between 3.50 percent and 3.83 percent per quarter in the short, medium and long term, respectively. Last, but not least, in the short-run, the variation of the real growth rate of GDP is explained between 0.09 percent and 0.13 percent by the variation of the service sector. In addition, in the medium term, the variation is between 0.21 percent and 0.42 percent, and in the long term the variation is between 0.61 percent and

0.94 percent per quarter.

Figure 2. Accumulated Response of DLOGRGDP to Cholesky One S.D. Innovations



Among the three sectors, such as the agriculture, industry and service, the accumulated response of real economic growth rate to one standard deviation innovations shock (see Figure 2), firstly is given to the growth rate of industry sector, but the accumulated response to the shocks remain positive in the short, medium and long run. In the short term, the accumulated response of the real GDP growth rate is positively explained by the shock of both the growth rate of agriculture and service sector, respectively, while in the medium and long-term the accumulated response becomes negative from the fifth quarter onward. The estimated result of IRF is similar to the result of FEVD that the movement of the growth rate of real GDP is explained in order by the growth rate of GDP of agricultural, industry, and service sector.

During the pandemic of Covid-19, of course, this event would negatively affect the three main sectors, including agricultural, industrial and service of Cambodia's gross domestic product. To fulfill the main purpose of this research, a scenario analysis was performed. As indicated earlier, the estimated result of the VAR model relied on the sample size between 2001Q1 and 2017Q4. The actual historical data from 2018Q1 to 2019Q4 was used to perform the scenario analysis. This study has assumed that the growth rate of the three sectors has been simultaneously reduced by 5 percent per quarter from 2018Q1 to 2018Q4. Regarding the imposed shock, the real growth rate of GDP from 2018Q1 to 2019Q4 is predicted denoted as Scenario 1. The predicted result of the real GDP growth rate from the Scenario 1 will be compared with the baseline scenario which also forecasted from the VAR model at the same time without imposing any restriction of the growth rate of domestic output

of the three sectors

Figure 3. The Real Growth Rate of GDP, Baseline Mean, 2018Q1-2019Q4

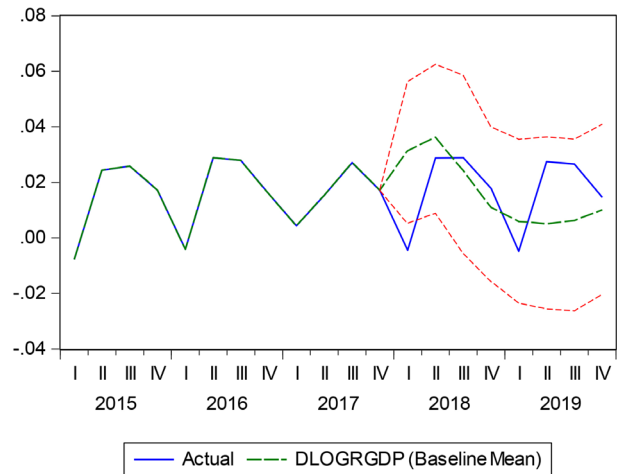
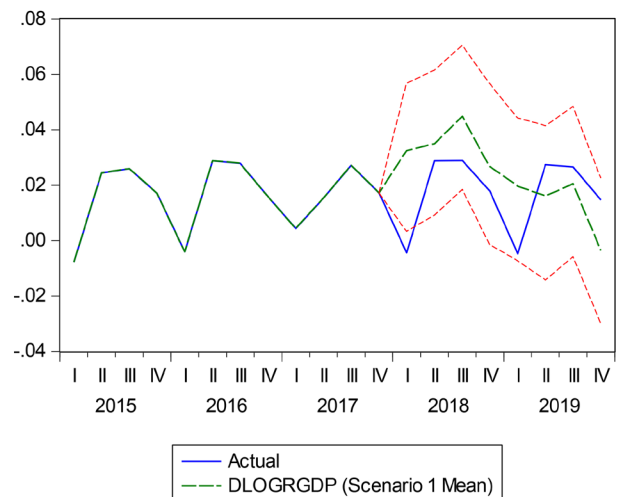


Figure 3 represents the prediction of the mean or average of the real GDP growth rate (see green dash line) from the estimated VAR model that covers from 2018Q1 to 2019Q4. Moreover, the lower and upper bounds of the confident interval which indicated as the red dash line, are also constructed in this study. The confident intervals, lower and upper bounds are employed to evaluate the estimated VAR model. Since the actual real GDP growth rate which indicated in the blue solid line, during the period of forecasting, lies inside the confident interval; therefore, the estimated result of the model is good for making the future prediction of Cambodia's economy.

Figure 4. Real Growth Rate of GDP, Scenario 1 Mean, 2018Q1-2019Q4



The predicted result of the real GDP growth rate after restricting on the growth rate of the three sectors is presented in Figure 4. The model is also good since the actual real GDP growth rate mostly lies inside the

lower and upper confident interval.

Figure 4. Actual and Expected Real GDP Growth Rate, 2018Q1-2019Q4

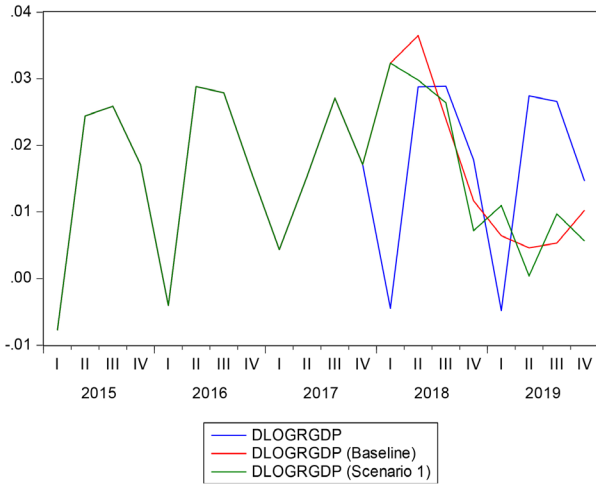


Table 5. Expected Real GDP Growth Rate, Baseline and Scenario 1, Period 1 to Period 10

Period	Baseline	Scenario 1	% Change
1	3.23%	3.23%	0.00%
2	3.65%	2.98%	-18.30%
3	2.39%	2.64%	10.29%
4	1.17%	0.72%	-38.50%
5	0.64%	1.10%	70.88%
6	0.46%	0.04%	-91.41%
7	0.53%	0.97%	82.90%
8	1.02%	0.57%	-44.81%
Expected Quarterly Growth Rate of RGDP =			-3.62%

A simultaneous decline of the growth rate of the gross domestic product of the three sectors, such as agricultural, industrial and service sectors of 5 percent per quarter for continuous four quarters would cause the real GDP growth rate to decrease on average of 3.62 percent per quarter from the baseline scenario. Thus, from this scenario analysis, Cambodia’s economy will be hit hard from the pandemic of Covid-19, if the Royal Government of Cambodia (RGC) should not take any action to stimulate the economic growth in short, medium and long term.

5. CONCLUSION AND POLICY IMPLICATION

The main purpose of this study is to investigate the inter-relationship between the real GDP growth rate and the three sectors of the GDP accounting for the agricultural, industrial and service sectors. The most important objective of this research is to conduct a scenario analysis by imposing a simultaneous decline

of 5 percent per quarter to all the three sectors of domestic output for continuous four quarters in order to check how many percentage of the real GDP growth rate would deviate from the baseline scenario. The objectives of this research are fulfilled by the estimate and analysis of the VAR model of the four endogenous variables, including the real GDP growth rate, the growth rate of agricultural, industrial and service sectors. The empirical result of this research has indicated that the variation and the response of the real growth rate of GDP are explained mostly by the movement of the industrial sector while the agricultural and service sectors come the second and third caused the variation and response of the real growth rate of GDP in Cambodia. More interestingly, in case that the growth rate of the three sectors of GDP, including agricultural, industrial and service sectors simultaneously decline by 5 percent per quarter for four quarters continuously during the present of Covid-19, without government intervention, Cambodia’s real growth rate of domestic output would decrease on average about 3.62 percent per quarter.

According to the result of the empirical analysis above, the research suggests that the manufacture plays an important role in generating income during the Covid-19 era. The government should support more on domestic manufactures, so-called, SMEs (Small and Medium Enterprises). To support SMEs, there are three-fold solutions by using fiscal policy. First, the government should limit the imported products that Cambodia, herself, can produce with tax exemption or support. Second, the government should financially supported infrastructure to local production. Third, the government should provide vocational trainings to workers and import technology to the country.

Moreover, local production is a key generation for the agricultural product that makes processed products for food and factories. However, this kind of production needs more capital to invest, good policy to support, high technology to employ, and market protectionism. The data reveals that the growth of the agricultural sector is 1.9% which can be interpreted that the sector is not strong enough to push the economy during the Covid-19 crisis. In addition to the agriculture, the service sector is slightly better because the growth rate of service will be 2.88% as the estimation from the empirical result. To support these two sectors, the Royal Government of Cambodia should change the quality of agricultural production,

especially for food production since Cambodia cannot enlarge and modernize the production. As a result, organic food production is needed to support the tourism sector. This idea is to protect the imported foods from neighboring countries, such as Vietnam and Thailand. Under food quality improvement, the government should encourage domestic tourism and develop strong community-based management in the tourism sector, concerning food, services and environment. Finally, law implementation and enforcement shall be enhanced to attract more foreign direct investments and portfolio investments to Cambodia.

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