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Shifting the State Burden in Infrastructure Financing through the Issuance of Government *Sukuk*

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A B S T R A C T

This research is intended to introduce and elaborate on the role of government sukuk as one of the macroeconomic policy instruments to cover the government budget deficit and infrastructure financing in Indonesia. This study developed an analysis model during the 2008.Q2-2020.Q4 period to show that the policy of developing Islamic financial instruments is closely related to macroeconomic variables. This study uses a dynamic linear ECM in developing government sukuk both in the short and long term. This study finds that sukuk budget deficit and infrastructure financing positively influence government sukuk issuance in the short term. While in the long term, infrastructure financing negatively influences government sukuk issuance. This study may suggest that the role of government sukuk as a substitute for foreign debt in building infrastructure must be further enhanced. The government should promote trust regarding government sukuk as a reliable investment instrument so that the government sukuk market expands and becomes an important source of financing for economic development, particularly infrastructure development.

A B S T R A K

Penelitian ini dimaksudkan untuk mengenalkan dan mengelaborasi peran sukuk negara sebagai salah satu instrumen kebijakan ekonomi makro untuk menutup defisit APBN dan pembiayaan infrastruktur di Indonesia. Studi ini mengembangkan model analisis selama periode 2008.Q2-2020.Q4 dengan tujuan untuk menunjukkan bahwa kebijakan pengembangan instrumen keuangan syariah terkait erat dengan variabel makroekonomi. Penelitian ini menggunakan ECM linier dinamis dalam pengembangan sukuk negara baik dalam jangka pendek maupun jangka panjang. Studi ini menemukan bahwa dalam jangka pendek, defisit anggaran dan pembiayaan infrastruktur berpengaruh positif terhadap penerbitan sukuk pemerintah. Sedangkan dalam jangka panjang, pembiayaan infrastruktur berpengaruh negatif terhadap penerbitan sukuk pemerintah. Kajian ini dapat menyarankan agar peran sukuk negara sebagai pengganti utang luar negeri dalam membangun infrastruktur harus lebih ditingkatkan. Pemerintah harus meningkatkan kepercayaan terhadap sukuk negara sebagai instrumen investasi yang handal, sehingga pasar sukuk negara semakin berkembang dan menjadi sumber pembiayaan yang penting bagi pembangunan ekonomi, khususnya pembangunan infrastruktur.

1. INTRODUCTION

Infrastructure has a very strategic role in economic development. With good infrastructure, the mobility of resources across regional borders will be faster, and logistics costs will be more competitive so that the competitiveness of products will be better. However, infrastructure development requires no small cost and is a significant burden on the government budget. The proportion of Indonesia's government budget for infrastructure financing is still at 10-11 percent annually because funding sources from the government budget are limited. From data from the Ministry of Finance in 2021, the proportion of the deficit to GDP is 4.65 percent. The highest deficit condition compared to previous years. Therefore, finding funding sources for low-

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risk infrastructure not affected by exchange and interest rate fluctuations is necessary. Amaliah & Aspiranti (2017) suggested that government *sukuk* is a potential source of financing to overcome the budget deficit.

The development of Islamic securities becomes an alternative funding source for the government to close the infrastructure gap and growth between regions. For developing countries, *sukuk* provides tools to finance infrastructure, naturally guaranteed by long-term assets (Yıldırım et al., 2020). Kengdo et al. (2020) concluded that infrastructure financing in Africa uses external debt and has negative impacts. It appears that infrastructure financing is good in Africa. Both developed and developing countries still rely on the government budget, external debt, and the private sector. The development of Islamic capital market instruments is an alternative to shifting infrastructure financing from external debt to Islamic bonds *(sukuk)*. Ledhem (2020) found a link between *sukuk* financing and economic growth in Southeast Asia.

According to Lahsasna et al. (2018) and Al-Ali (2019), *sukuk* is currently the main Islamic finance instrument that boosts economic growth. Previous studies on *sukuk* have mostly analyzed investor behavior regarding the preferences of *sukuk* as an investment instrument, comparing *sukuk* with conventional investment instruments with return as a factor to consider in investment decisions (Duqi & Al-Tamimi, 2019; Fathurahman & Fitriati, 2013) or the *sukuk* market development (Rahman et al., 2020). Research on *sukuk* as an instrument for macroeconomic variables is still limited, and, if any, it is more concerned with its use to support general economic development (Smaoui, & Nechi, 2017; Yıldırım et al., 2020). In Indonesia, Amaliah & Aspiranti (2017) examines the role of *sukuk* in overcoming the government budget deficit. Therefore, the novelty of the current research is to specifically explore the role of government *sukuk* as alternative financing for infrastructure development, which is currently one of the main concerns of the Indonesian government.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

The issuance of government sukuk is intended as an alternative source of financing in the government budget. The government should stop foreign debts as the main source of financing (Bhuiyan et al., 2019). sukuk can be an attractive and safe investment alternative for the community because it is free of default risk since the law guarantees payment of compensation and nominal value (Mohamed et al., 2015).

The issuance of government sukuk is very important because it serves as a government fiscal instrument and source of financing for the budget deficit. The government directs sukuk usage as an alternative to non-debt financing to reduce the burden on the government budget in the infrastructure development of the energy, telecommunications, transportation, agriculture, manufacturing industry, and public housing sectors. Government sukuk also encourages the development of the Islamic financial market (Hariyanto, 2017; Hariyanto, 2021; Nisak, 2022).

Recently, the issuance of sukuk has become the main financing instrument besides government bonds and direct loans (Ayturk et al., 2017; Ismail et al., 2014). Although it is a new one, the existence of sukuk does not overlap with other financing instruments. sukuk further strengthens the government's ability to finance its budget deficit (Diaw et al., 2014). An important part of government expenditure is the finance and maintenance of infrastructure capital as one of the productive sectors in any economy (Farhadi, 2015).

Government sukuk can also be a potential source of financing infrastructure development (Biancone & Radwan, 2018). Government sukuk has many advantages to supporting government expenditure on infrastructure financing by creating potential demand from national savings in developing countries (Diaw et al., 2014). Sukuk can attract Islamic investors (Ammar & Eling, 2015). The greater the need for infrastructure financing, the greater the need for sukuk issuance (Biancone & Radwan, 2018).

Apart from the budget deficit and infrastructure financing, the issuance of government sukuk is closely related to world oil prices. According to Arshad et al. (2017), the exchange rate and oil prices do not negatively correlate with the issuance of bonds and sukuk in the short term. However, there is a significant correlation between the exchange rate and oil prices with the issuance of bonds and sukuk in the long term. They explain that a temporary increase in world oil prices does not directly affect the issuance of securities in the short term. However, if the increase in world oil prices lasts long, it will affect government policies in the long run. The rising world oil prices will increase the burden of government spending (especially for the world's oil-importing countries). In effect, in the long run, the deficit in government spending will be greater,

which must be closed by issuing more securities (bonds or government sukuk). In Indonesia, although fluctuations in oil prices affect the increasing deficit in government spending, the government has not made government sukuk one of the financial sources to close the deficit. To reduce the government's burden on oil spending by gradually reducing fuel subsidies. Until now, the issuance of government sukuk has been allocated more for constructing and developing physical infrastructures such as roads, bridges, airports, railways, schools or colleges, and others. Further, Chkili (2022) found a positive and significant relationship between oil and the Islamic stock market during an unstable period caused by crude oil market financing.

Based on the discussion above, the hypotheses of this study are:

H_1: Budget deficit has a positive influence on government sukuk issuance

H_2: Infrastructure development has a positive influence on government sukuk issuance

H_3: Oil price fluctuation has a positive influence on government sukuk issuance

3. RESEARCH METHOD

This study uses secondary data: the outstanding value of government *sukuk* and the allocation value of government *sukuk* for infrastructure financing published by the Directorate General of Financing and Risk Management (DJPPR), Ministry of Finance of the Republic of Indonesia (https://www.djppr.kemenkeu.go.id). World oil price data is the annual average price of OPEC oil (dollars per barrel) published by Statista (https://www.statista.com/statitics/262858/ change -in-opec-crude-oil-prices). Data on the deficit value of government expenditure, namely the difference between government revenue and government expenditure, obtained from the government Budget Data Portal of the Ministry of Finance of the Republic of Indonesia (Portal government budget - Ministry of Finance - Republic of Indonesia-kemenkeu.go.id). This study used quarterly data from 2008.Q4 to 2020.Q4. The year 2008 was determined as the beginning period because, in that year, the Indonesian government began issuing the government *sukuk* as an instrument of the Islamic capital market in Indonesia.

The estimation model uses the Error Correction Model approach to see the behavior of government *sukuk* in the short and long term. There are several reasons why this research uses the Error Correction Model. Firstly, in general, time-series data are not stationary. Secondly, it is very rare for economic theory to talk about short-term equilibrium (Gujarati, 2021), whereas the gap between theory and reality often occurs in the short term. Thirdly, many variables are partially insignificant to minimize spurious regression problems where R^2 is very high (Gujarati, 2021). The Error Correction Model for government *sukuk* is described as follows:

$$\Delta GS_r = \alpha 0 + \alpha_1 \Delta BDr_t + \alpha_2 \Delta INFr_t + \alpha_3 \Delta WOPr_t + \alpha_4 BDr_{t-1} + \alpha_5 INFr_{t-1} + \alpha_6 WOPr_{t-1} + \alpha_7 EC_t + €_t \quad (1)$$

ΔGSr_t : $GSr_t - GSr_{t-1}$

ΔBDr_t : $BDr_t - BDr_{t-1}$

$\Delta INFr_t$: $INFr_t - INF_{t-1}$

$\Delta WOPr_t$: $WOPr_t - WOPr_{t-1}$

ECT : BDr(-1) + INFr(-1) + WOPr(-1) - GSr(-1)

GS : Government *sukuk*

BD : Budget Deficit

INF : Infrastructure Financing

WOP : World Oil Prices

The ECM includes the ECT (Error Correction Term) coefficient. If the ECT coefficient is significant and has a positive value, the model specifications used in the study are reliable and valid. The ECT value is located between $0 < \alpha_7 < 1$. The ECT shows an imbalance correction coefficient as an absolute value that explains how fast time is needed to get the balance value. After the short-term model is obtained, a further estimate can be made to acquire the long-term estimation model (cointegration equation).

4. DATA ANALYSIS AND DISCUSSION

Model Selection

Table 1 presents the trend of the Government Sukuk (GS), growth of Budget Deficit (BDr), Infrastructure Financing (INFr), and World Oil Price (WOPr) in Indonesia during 2008.Q4-2020.Q4. The table shows that the issuance of government sukuk continues to increase in line with the increasing government budget deficit for financing development. For 13 years, the issuance of government sukuk has increased by an average of more than 200 percent annually. A significant increase to support government expenditure funding originating from within the country.

On the other hand, the amount of the government deficit also continues to increase from year to year due to internal and external factors. In addition, the need for financing for physical infrastructure is large every year to connect

development between regions and reduce expensive logistics costs. Meanwhile, world oil prices showed a downward trend from time to time. In 2008, the world oil price per barrel was 101.84 US, but in 2020, it was recorded at 48.52 US per barrel. This condition slightly warns of the burden on the government budget, considering that the government still provides subsidies for this fuel.

Table 1. Growth of government *sukuk*, budget deficit, infrastructure financing, and oil price in Indonesia, 2008-2020

Year	Government *Sukuk* (billions IDR)	Budget Deficit (billions IDR)	Oil Price (USD/barrel)	Infrastructure Financing (billions IDR)
2008	4,700	-94,503.25	101. 84	6.91
2009	16,550	-129,844.93	79.36	7.80
2010	26,970	-133,747.67	91.38	7.94
2011	33,310	-150,836.68	98.83	9.91
2012	57,090	-190,105.30	91.82	12.98
2013	53,180	-224,186.27	98.42	12.83
2014	75,540	-241,494.27	53.27	22.18
2015	119,510	-222,506.90	37.04	23.60
2016	178,900	-296,723.88	53.72	24.74
2017	192,490	-397,235.67	60.42	25.15
2018	213,930	-325,936.64	45.41	31.41
2019	258,280	-296,000.24	61.06	39.41
2020	138,350	-307,225.90	48.52	27.35

Source: Processed data from DJPPR Ministry of Finance

Before applying the ECM model, the first step is to perform a unit roots test and integration degree test for all variables used in this study. Table 2 shows the Unit Root test using the Dickey & Fuller (DF) test.

Table 2. Unit Root with DF test

Variable	DF Count	DF Critical
GSr	-4.586	-3.190*
BDr	-7.999	-3.190*
INFr	-5.713	-3.190*
WOPr	-4.503	-3.190*

Sources: Processed data, 2022
Notes: * significance at 5%; GS: government *sukuk*; BD: Budget Deficit; INF: Infrastructure Financing; WOP: World Oil Price

Table 2 shows that the DF values count greater than critical DF values (5%). It shows all the stationer research data at the level. To further convince the stationary level of the data, testing was carried out on the first derivative using the Augmented Dickey-Fuller Test (ADF). The results of test are presented in Table 3.

Table 3 shows that all variables have an ADF value greater than the ADF alpha value (5%). This indicates that all variables are significant both at the level and the first derivative.

Table 3. Unit Root with ADF Test

Variable	Statistical ADF	Alpha ADF
GSr	-6.732	-3.519*
BDr	-6.257	-3.521*
INFr	-5.679	-3.518*
WOPr	-4.532	-3.518*

Sources: Processed data, 2022
Notes: * significance at 5%

The next step is to do cointegration tests to see the possibility of a long-term relationship between the observed variables. This study performs Johansen cointegration tests to determine whether there are stable relationships between the measure of macroeconomic indicators and the government *sukuk* issuance. The existence of stationary variables to the same degree can indicate a long-term relationship between variables. Johansen Cointegration is based on the VAR model framework by incorporating an error correction component to prove the existence of cointegration called Vector Error Correction (Gujarati, 2021). The results of the cointegration rank test are presented in Table 4 and Table 5.

Table 4. Unrestricted cointegration rank test (Trace)

Null Hypothesis	Trace Statistic	Critical Value (0.05)	Critical Value (0.1)	Prob.
None *	90.9965	69.8189	65.8197	0.0004
At most 1 *	50.3566	47.8561	44.4936	0.0286
At most 2	21.4718	29.7971	27.0670	0.3289
At most 3	3.2028	3.8415	2.7055	0.0735

Sources: Processed data, 2022

Notes: Trace test indicates 2 cointegrating eqn(s) at the 0.05 level & 3 cointegrating equation(s) at the 0.1 level; * denotes rejection of the hypothesis at the 0.05 & 0.1 level

Table 5. Unrestricted cointegration rank test (Maximum Eigenvalue)

Null Hypothesis	Max-Eigen	Critical Value (0.05)	Critical Value (0.1)	Prob.
None *	40.63998	33.87687	31.23922	0.0067
At most 1 *	28.88476	27.58434	25.12408	0.0339
At most 2	10.61860	21.13162	18.89282	0.6852
At most 3	3.202844	3.841466	2.705545	0.0735

Sources: Processed data, 2022

Notes: Trace test indicates 2 cointegrating equation(s) at the 0.05 level & 3 cointegrating equation(s) at the 0.1 level; * denotes rejection of the hypothesis at the 0.05 & 0.1 level

This finding is in line with Max-Eigen, where there are two variables at a 95% confidence level, and at a 90% confidence level, there are two significant variables. At 95% and 90% confidence levels, three variables are cointegrated or have a long-term relationship. After passing various data stationarity tests, it can be concluded that data is stationary in degree one I (1), and three variables have a tendency to achieve equilibrium in the long term.

The next step is to test the classic assumptions to ensure that the model fits for analysis. The result is presented in Table 6. It can be concluded that the estimation model of government *sukuk* is free from classical assumption problems. There are no issues in autocorrelation, heteroscedasticity, multicollinearity, and the normality of the data (BLUE model). It also means that the government *sukuk* Error Correction Model estimation can be used in further analysis.

Table 6. The summary of classical assumptions test of government *sukuk* dynamic model

Test Types	Prob. Value	Critical Value
Heteroscedastic Test	0.1554	0.05
Autocorrelation Test	0.1066	0.05
Multicollinearity Test	VIF<0.1	VIF<0.1

Sources: Processed data, 2022

To ensure that the ECM model can be used in the analysis, the next step is to test the validity of the ECM model, and the results can be seen in Table 7. The estimation results show that the residual value has a probability value of 0.00 or a t-stat of -6.7162 greater than a probability of 0.05. From these results, it can be concluded that the ECM is applicable.

Table 7. Validity test for error correction model

Variable	t-Statistics	Prob.
C	0.5086	0.6140
DBD	0.9123	0.3675
DINFRA	-1.7164	0.0944
DWOP	-1.272	0.2112
Resid01(01)	-6.7162	0.000

Source: Processed data, 2022

Government *Sukuk* model

Table 8 and Table 9 present the short-term and long-term models of government *sukuk*. Table 8 shows that the Error Correction Term (ECT) value is significant with a positive coefficient value of 0.9810 or between 0 and 1. That is, the ECM model is valid and can be used for further analysis

Table 8. Short-term estimation government *sukuk* model in Indonesia

Variable	Coefficient	t- value
Constanta	3.47E+20	3.2763
DBD	0.8938	3.2958
DINFRA	0.9325	2.4689
DWOP	0.811	1.6387
BD	- 0.6719	-1.7492
INFR	-1.3644	-3.3791
WOP	-1.3679	-2.4837
ECt	0.9810	6.2295

Sources: Processed data, 2022

Table 9. Long-term estimation government *sukuk* model in Indonesia

Variable	Coefficient	t-value
C	2.60E+20	2.5752
BD	0.2351	1.2032
INFR	-04283	-2.1374
WOP	0.0411	0.1093

Sources: Processed data, 2022

In the short term, infrastructure financing changes positively affect the issuance of government *sukuk* with a coefficient of 0.9325. It means that in the short term, any change in the increase in physical infrastructure financing will encourage the government to increase the issuance of government *sukuk*. The results of this estimate signal the government to optimize the issuance of government *sukuk* to meet the immediate need for funds. The positive nature attached to the government *sukuk* as a relatively safe government bond, not affected by fluctuations in interest rates or exchange rates, makes the government *sukuk* an alternative source of funds for infrastructure development in the economy. Similarly to the findings of short-term estimates, Table 9 reveals that infrastructure financing statistically significantly affects the issuance of government *sukuk* in the long term but in the opposite direction (negative coefficient value).

The influence of government budget deficit on government *sukuk* issuance

In the short term, the budget deficit (BD) affects the increase in the issuance of government *sukuk*. This finding is in line with Benbekhti et al. (2019) and Hendratni et al. (2021), where Islamic bonds are a very useful tool in financing deficit making Malaysia a pioneering experience in the field of Islamic engineering. When a country experiences a budget deficit, the country can create the foreign debt or issue bonds, spending mainly on goods needed in production activities (capital goods). In general, the foreign exchange reserves owned by Indonesia are, on average, only enough to meet the needs of three months of import spending. Therefore, the government can use *sukuk* to cover short-term spending deficits because the risk is lower and not affected by exchange rate fluctuations.

In some of the most recent studies, the development of the Islamic capital market is an important alternative to cover the budget deficit faced by almost all Muslim countries (Iqbal & Khan, 2004). They show that 208 OIC countries experienced a government budget deficit, and only 28 countries had a surplus in their government budget (especially those with oil resources). From the estimation results of the government *sukuk* model, the change in the government budget deficit is partially significant in the short term. It has a positive effect on the issuance of government *sukuk* in Indonesia. It is in line with Boumediene (2015), which states that countries with budget deficits solve their problems by issuing securities or fixed interest-based assets. This research's findings show a positive relationship between the budget deficit and the issuance of government *sukuk*. It indicates that the government can shift dependence from external debt and replace it with the issuance of government *sukuk*, which has a lower risk than external debt, which is vulnerable to exchange rate fluctuations.

Meanwhile, in the long term, the budget deficit (BD) will not affect the issuance of government *sukuk*. In the long term, the government has not directly used government *sukuk* to close the budget deficit. The government is slowly lowering the government spending burden by allocating government *sukuk* to finance physical infrastructure by involving many ministries. This policy synergy is so that the allocation of *sukuk* financing does not overlap, and there is a diversification of government *sukuk* products for investment media for the Muslim community. Government *sukuk* issuance is an important pillar in low-risk economic development (Smaoui & Nechi, 2017).

The influence of infrastructure financing on government *sukuk* issuance

The short-term estimation results show that, partially, infrastructure financing has a significant positive effect on the issuance of government *sukuk*. It means that every time there is an increase in infrastructure spending, the government must issue government *sukuk* in the short term. It is because the government has limited funds for physical infrastructure spending. Therefore, when infrastructure damage due to natural disasters (post-major) must be handled immediately, one of the efforts the government can make is to issue government *sukuk*.

Domestic *sukuk* market development contributes to the country's economic growth in many ways: mobilizing savings, making financing available to long-term debtors, thereby contributing to the efficient functioning of capital markets; and deepening the financial market of an economy; stimulating economic growth through technological innovations and enhanced labor productivity in the private sector (Smaoui & Nechi, 2017). Thus, *sukuk* can help the Indonesian government resolve short-term liquidity constraints and satisfy the huge demand for infrastructure funding (Uluyol, 2021). The government has increased the use of *sukuk* to diversify funding

sources (Kusuma & Silva 2014). Zulkhibri (2015) states that initially, the issuance of *sukuk* was in response to the demands of issuers and investors in Muslim countries as an alternative mode for their financing and investment needs that complies with the sharia requirements. Due to renewal and extension, the need for infrastructure investment is continuously growing, and public finance alone does not provide sufficient funds for such investments (Farhadi, 2015).

In the long run, infrastructure financing is significant and negatively affects the issuance of government *sukuk*. It is possible in the long term. The government will have the availability of adequate physical infrastructure to accelerate the mobility of resources across regions. Until now, the Indonesian government has allocated a large amount of government *sukuk* issuance to develop physical infrastructure in various regions of Indonesia. When infrastructure needs have been met, there is no additional investment in infrastructure in the long term. The government will continue to issue interest rates to meet other development needs, such as the health sector. Therefore, the government must start to consider *sukuk* for diversifying the allocation of government *sukuk* for developing other key economic sectors that still rely on high-risk external sources of funding.

The influence of world oil prices on government *sukuk* issuance

In the short term, world oil prices have a negative effect on the issuance of government *sukuk*. It means that increasing world oil prices will reduce the issuance of government *sukuk*. Until now, in the short term, the government has not placed government *sukuk* as an instrument to cover the increase in spending due to changes in world oil prices. The policy carried out by the government to reduce the deficit in government spending due to the increase in world oil prices is to reduce fuel subsidies gradually. The effect is that the price of fuel oil (pertamax and pertalite) is higher than the price of fuel before the repeal of subsidies.

In the long term, however, world oil prices have not affected government *sukuk*'s issuance. This finding contradicts Al-raeai et al. (2018), proving that oil prices indirectly affect *sukuk*'s prices via their effects on the expected inflation rate and real interest rate. In Indonesia, the determination of domestic oil prices has been left to the market mechanism. The government no longer subsidizes the price of fuel oil, so the increase in fuel prices does not burden the government budget so much. The effect is that the increase in world oil prices does not affect the issuance of government *sukuk*. Nazlioglu et al. (2020) conclude that oil prices have a different impact on bond prices depending on whether the country is an exporter or importer of oil and the level of that country's economic development. Oil price determines government budget revenues and aggregate economic demand (Al-raeai et al., 2018).

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

The results of short-term estimates identify that significant factors positively influence the issuance of government sukuk are the budget deficit and infrastructure financing. It indicates that in the short term, the issuance of government sukuk is still urgently needed by the government to cover budget deficit spending and infrastructure financing. It happens because government sukuk is very low risk and is not influenced by interest or exchange rates. Meanwhile, in the long term, sukuk infrastructure financing with a negative relationship direction is a significant factor influencing the issuance of government sukuk.

The findings of this study imply that along with the availability of good infrastructure in the economy, the government must slowly reduce the allocation of government sukuk issuance for infrastructure financing. The government should diversify the allocation of sukuk to key sectors that have been using high-risk external funding (using foreign debt). In addition, the government should promote trust the Indonesian and foreign investors regarding government sukuk as a reliable investment instrument. It is expected that the government sukuk market will expand and become an important source of financing for economic development, particularly infrastructure development.

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