DEPENDENCE OF POVERTY DEPENDENCE ON INDONESIAN ECONOMIC FUNDAMENTALS: SFAVAR APPROACH

**Rusiadi, Ade Novalina, Muhammad Isa Indrawan, Rahmat Hidayat,
Bakhtiar Efendi, Rahmad Sembiring, Samrin, Hasrul Azwar Hasibuan,
Muhammad Dharma Tuah Putra Nasution, Yossie Rossanty**

Faculty of Social Science, Universitas Pembangunan Panca Budi,
Medan, Indonesia

Andysah Putera Utama Siahaan and Solly Aryza

Faculty of Science and Technology, Universitas Pembangunan Panca Budi,
Medan, Indonesia

ABSTRACT

This paper analyzes the degree of poverty dependence with economic fundamentals in Indonesia over the long term. Economic fundamentals are a vital measure of price stability, purchasing power, and poverty control. Long-term analysis using Structural Factor-Augmented Vector Autoregression (SFAVAR). The results of the study found that the degree of poverty dependence on economic fundamentals is very high, both short, medium and long-term. Indonesia is highly dependent on strong fundamentals. The most vulnerable fundamentals of poverty are short-term interest, medium-term rates, and long-term exports.

Key words: exchange rate, interest, pdb, exports, foreign exchange reserves, price stability, poverty, SFAVAR.

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1. INTRODUCTION

Macroeconomic stability reflects a strong economic fundamentals position [1]–[3]. Economic stability and fundamentals interact and contribute closely to poverty [4]. Bittencourt says poverty is highly dependent on macro conditions and price stability such as economic growth, domestic credit, foreign exchange rates and interest rates [5]. The growth of foreign exchange reserves in 2005 decreased by 4% due to the high inflation rate, high inflation rate caused

decreasing purchasing power and increasing poverty [6]. The fundamentals of the exchange rate have a negative impact on the money market then continue to output, inflation, and poverty [7], [8]. The tightening of the interest rate can also protect price fluctuations and control of poverty [9]–[15]. The phenomenon of existing problems where there is a link between economic fundamentals and poverty. In 2009 exports experienced a very large decline up to 17.60% caused by the impact of the global economic crisis. Similarly, GDP growth declined from a year earlier, GDP growth in 2009 reached 4.42%. And in 2013 the GDP declined considerably by almost 6% from the previous year.

Figure 1 Price Stability (%) and Number of Poor (million) in Indonesia

Figure 1 summarizes the degree of poverty dependence and price stability. Yodiatmaja (2012) mentions changes in interest affect the macroeconomics and price stability so that poverty increases. Price instability as a financial tightening effect will have an impact on overall macroeconomic stability [16][17]–[21]. The economic crisis in Indonesia 1997 preceded the depreciation of the exchange rate, the plight of 2008 was preceded by the decline of common stocks. Weak economic fundamentals exacerbate the financial crisis and increase the number of poor people. The importance of this study is determined by the degree of dependence between economic fundamentals and poverty. The study will also find the degree of relationship of any fundamental economic variable with debt, both interest, exchange rate, GDP, export, and inflation. The increase or decrease in the degree of primary economic linkage will increase and decrease the poverty rate and vice versa requirements.

2. THEORIES

An open economic model links between macro variables and foreign trade. Export as a clear economic indicator:

$$y = c + i + g + x$$

If net real exports are positive, then domestic production is higher than the sum of consumption, investment, and government consumption. The actual use of households is determined by the real output of aggregate and the real interest rate, i.e. $c = C(y, r)$. The real consumption of the firm is also determined by the actual output of aggregate and the real interest rate, i.e., $i = I(y, r)$. Net real exports are a negative function of relative export prices with imports $[Q]$ and corresponding domestic outputs with abroad $[y^*]$, i.e.:

$$x = x\left(Q, \frac{y}{y^*}\right)$$

Substitution to (1.8) will produce the IS model in an open economy:

$$y = C(y, r) + I(y, r) + G + x\left(Q, \frac{y}{y^*}\right)$$

$$y = D(r, Q, y^*, g)$$

where $D_r, D_Q < 0$ and $D_{YF}, D_G > 0$. The equation formulation (1.10) in the form of an explicit function exemplifies the aggregate output $\ln(Y_t) = y_t$ and the relative price is $\ln(Q_t) = q_t$. IS open economy model in linear form can be formulated with three equations, that is:

$$y_t = \beta_0 + \beta_1 r_t + \beta_2 q_t + v_t$$

where $\beta_1, \beta_2 < 0$. The real interest rate is the nominal interest rate reduced by inflation expectations, such as:

$$r_t = R_t - E_t(p_{t+1} - p_t)$$

The relative price of domestic products to foreign products depends on the exchange rate. Suppose that the domestic price level is $\ln(P_t) = p_t$, the price level abroad is $\ln(P_t^*) = p_t^*$ and the domestic exchange rate is $\ln(E_t) = e_t$, so the relative price is:

$$Q_t = \frac{P_t}{E \times P_t^*} \text{ atau } q_t = p_t - (e_t + p_t^*)$$

The LM model of two equations, namely money demand and interest rate parity conditions. The domestic interest rate $[R]$ is the foreign interest rate $[R^*]$ plus the expected depreciation of the domestic currency exchange rate. The demand for money stock and interest-rate parity conditions are:

$$m_t - p_t = \alpha_0 + \alpha_1 y_t + \alpha_2 R_t + \varepsilon_t$$

$$R_t = R_t^* + E_t(e_{t+1} - e_t)$$

From the equation (1.11-1.14) it is known that the price level and the interest rate abroad are exogenous variables. The domestic interest rate and exchange rate are endogenous variables, while the relative price determination, the real aggregate output, and the real interest rate are adjusted to the Classical model or Keynesian model. The formulation of the open economic IS model can be formulated by substituting equations (1.12) and (1.13) to (1.11), such as:

$$y = \beta_0 + \beta_1 [R_t - E_t(p_{t+1} - p_t)] + \beta_2 [p_t - (e_t + p_t^*)] + v_t$$

Interest rate parity (1.14B) can be used in the IS model and LM model to eliminate the nominal interest rate. Therefore the IS model and LM model are:

$$y = \beta_0 + \beta_1 [R_t^* + E_t(e_{t+1} - e_t) - E_t(p_{t+1} - p_t)] + \beta_2 [p_t - (e_t + p_t^*)] + v_t \quad (1.16A)$$

$$m_t - p_t = \alpha_0 + \alpha_1 y + \alpha_2 [R_t^* + E_t(e_{t+1} - e_t)] + \varepsilon_t$$

From (1.16A) and (1.16B) it is known that endogenous variables are price level and exchange rate. The movement of p_t and e_t values is determined by ecosystem variables, shocks or shocks on government spending and foreign revenues $[v_t]$ as well as shock or shock on money demand $[\varepsilon_t]$. Classical model analysis on the exogenous variable steady-state and

economic shocks explains that the values of $v_t = 0$ and $\varepsilon_t = 0$, $\Delta m_t = \Theta$, $\Delta y_t = 0$ dan $\Delta p_t^* = \Theta^*$. Similarly $R^* = r^* + \Theta^*$ steady-state of exchange rate expectations $E_t(e_{t+1} - e_t) = e_{t+1} - e_t$ are constant. First-differenced from equations (1.16A) and (1.16B) are respectively:

$$y = \beta_0 + \beta_1[R_t^* + E_t(e_{t+1} - e_t) - E_t(p_{t+1} - p_t)] + \beta_2[p_t - (e_t + p_t^*)] + v_t$$

$$0 = \beta_1[0 + 0] + \beta_2[\Delta p - \Delta e - \Theta^*]$$

$$m_t - p_t = \alpha_0 + \alpha_1 y + \alpha_2[R_t^* + E_t(e_{t+1} - e_t)] + \varepsilon_t$$

$$\Theta - \Delta p = \alpha_2 [0]$$

From (1.17B) it is shown that domestic inflation rate is equal to the growth rate of the domestic money stock. Equation (1.17A) explains that $0 = \Delta p - \Delta e - \Theta^*$, therefore $\Delta e = \Theta - \Theta^*$, the rate of change in the domestic currency exchange rate is the difference in the rate of growth in domestic money stocks with the growth rate of foreign money stocks. If $[\Theta > \Theta^*]$ then the price or exchange rate of foreign currency appreciation or exchange rate of domestic currency depreciation. If $[\Theta = \Theta^*]$ then the price or exchange rate of domestic and foreign currency is stable, and if $[\Theta < \Theta^*]$ then the price or exchange rate of foreign currency depreciation or exchange rate of domestic currency appreciation.

First differenced from $q_t = p_t - (e_t + p_t^*)$ is $\Delta q = \Delta p - \Delta e - \Theta^* = 0$; it means the relative price of imports in domestic currency is constant at steady-state conditions. The shock effect on the exchange rate and the price level is based on the assumption that the values of p_t^* , R_t^* and m_t are constant in the long run so the equation 1.16A) and (1.16B) can be written in the form of:

$$B_t = \beta_1[E_t(e_{t+1} - e_t) - E_t(p_{t+1} - p_t)] + \beta_2[p_t - e_t] + v_t$$

$$-p_t = C + \alpha_2[E_t(e_{t+1} - e_t)] + \varepsilon_t$$

where B and C are the constants of all the variables and parameters contained in each equation. From (1.18A) and (1.18B) it is shown that the exchange rate and domestic price level are determined by the shock of government consumption and foreign output as well as the demand for money, such as:

$$p_t = \theta_{10} + \theta_{11} v_t + \theta_{12} \varepsilon_t$$

$$e_t = \theta_{20} + \theta_{21} v_t + \theta_{22} \varepsilon_t$$

where $E_t p_{t+1} = \theta_{10}$ dan $E_t e_{t+1} = \theta_{20}$. Substitutions (1.19A) and (1.19B) to (1.18A) and (1.18B) will produce the equation:

$$B_t = \beta_1[-\theta_{21}v_t - \theta_{22}\varepsilon_t + \theta_{11}v_t + \theta_{12}\varepsilon_t] + \beta_2[\theta_{10} + \theta_{11}v_t + \theta_{12}\varepsilon_t - \theta_{20} - \theta_{21}v_t - \theta_{22}\varepsilon_t] + v_t$$

(1.20A)

$$-(\theta_{10} + \theta_{11}v_t + \theta_{12}\varepsilon_t = C + \alpha_2[-\theta_{21}v_t - \theta_{22}\varepsilon_t] + \varepsilon_t$$

There are six parameters in the system of equations (1.20A) and (1.20B) there are two parameters whose value has been determined, θ_{10} and θ_{20} . From these two equations it is known that the system of equations is satisfied with four condition parameters or coefficients, such as:

1. $0 = \beta_1[-\theta_{21} + \theta_{11}] + \beta_2[\theta_{11} - \theta_{21}] + 1,$
2. $0 = \beta_1[-\theta_{22} + \theta_{12}] + \beta_2[\theta_{12} - \theta_{22}],$
3. $-\theta_{11} = -\alpha_2\theta_{21}$ dan
4. $-\theta_{12} = -\alpha_2\theta_{22} + 1.$

From these four parameters obtained the coefficient solution $[\theta]$ by substitution of each parameter value, such as:

1. $\theta_{11} = \alpha_2 / [(1 - \alpha_2)(\beta_1 + \beta_2)],$
2. $\theta_{21} = 1 / [(1 - \alpha_2)(\beta_1 + \beta_2)],$
3. $\theta_{22} = 1 / (\alpha_2 - 1),$ dan
4. $\theta_{12} = 1 / (\alpha_2 - 1).$

The values of $\beta_1, \beta_2 < 0$ and $\alpha_2 < 0$, so the coefficients are $\theta_{11} > 0$ and $\theta_{12}, \theta_{21}, \theta_{22} < 0$. It means that the price-level response to government consumption shocks and output abroad $[v_t]$ is positive and the price-level reaction to the domestic money supply shock $[\varepsilon_t]$ is negative. Similarly, the domestic currency exchange rate response to government consumption shocks and overseas output $[v_t]$ and shock of domestic money stock $[\varepsilon_t]$ is negative. The money stock value is $m_t = m - \varepsilon_t$; it is an explanation that the price level will decrease and the domestic currency exchange rate will appreciate in case of the unexpected drop in money stock $[m_t]$. Overseas prices level $[p_t^*]$ are assumed to be constant so that the price response relative $[q_t = p_t - (e_t + p_t^*)]$ to the shocks $[v_t]$ and $[\varepsilon_t]$ are respectively $\theta_{11} - \theta_{21} = -1/(\beta_1 + \beta_2)$ and $\theta_{12} - \theta_{22} = 0$. Given the value of $\beta_1 + \beta_2 < 0$, so the $[q_t]$ response to the shock $[v_t]$ is positive, or the relative price $[q_t]$ will rise if the excitement of government consumption and output abroad $[v_t]$ is positive. In contrast, the $[q_t]$ response to the shock $[\varepsilon_t]$ is zero or surprise of the money stock does not affect the relative price $[q_t]$. The following figure shows the SFAVAR model of long term prediction framework

Figure 2 SFAVAR Model Long Term Prediction Framework

3. METHODOLOGY

The data analysis model uses SFAVAR analysis. This model is able to make predictive pattern of financial market integration in the short, medium and long term of simultaneous effect between variables [22]. The FAVAR model has X_t represents the vector $N \times 1$ of the time series of economic variables, Y_t represents the vector $M \times 1$ of the observable macroeconomic variable that is part of X_t , and F_t represents the $K \times 1$ vector of the unobserved factor that captures most of the information on X_t . According to Bernanke et al. (2005), dynamic relations (F_t, Y_t) can be represented in the following equation.

$$\begin{bmatrix} F_t \\ Y_t \end{bmatrix} = \Phi^*(L) \begin{bmatrix} F_{t-1} \\ Y_{t-1} \end{bmatrix} + v_t, \leftrightarrow \Phi(L) \begin{bmatrix} F_t \\ Y_t \end{bmatrix} = v_t$$

$\Phi(L) = I - \Phi^*(L)L = I - \Phi_1 L - \dots - \Phi_d L^d$ is the coefficient matrix, and v_t is the error term with the mean zero and covariance matrix Q . Equation (1) is factor-augmented vector autoregression or FAVAR [23]. Due to the unobserved factor, equation (1) can not be estimated directly. However, the shared element of the observable variable can be interpreted as the universal forces that drive the dynamics of the economy, so the time series relationship of the information variable X_t , the observable variable Y_t and the F_t factor can be summarized in the dynamic model of $X_t = \Lambda_f F_t + \Lambda_y Y_t + \epsilon_t$.

4. RESULT AND DISCUSSION

The FAVAR analysis is useful for filtering out feasible factors analyzed in VAR.

Table 1 FAVAR result

Factor Method: Maximum Likelihood					
Date: 04/24/18 Time: 13:07					
Covariance Analysis: Ordinary Correlation					
Sample: 2003 2017					
Included observations: 15					
	Unrotated Loadings		Communality Uniqueness		
	F1	F2			
SBI	-0.810804	-0.037751	0.658829	0.341171	
PDB	0.752178	0.641833	0.977722	0.022278	
KURS	-1.020014	0.342324	0.984643	0.067443	
JPM	-0.758906	-0.576642	0.908454	0.091546	
INF	-0.620154	0.046858	0.386787	0.613213	
CDEV	0.877846	0.462846	0.984840	0.015160	
EKS	0.859655	0.391175	0.892024	0.107976	
KD	0.655441	0.747882	0.988930	0.011070	
Factor	Variance	Cumulative	Difference	Proportion	Cumulative
F1	4.122928	4.122928	1.448271	0.606528	0.606528
F2	2.674657	6.797585	---	0.393472	1.000000
Total	6.797585	10.92051		1.000000	

The FAVAR result states that the variables worthy of further analysis are SBI, exports, GDP, foreign exchange reserves, food price stability and the number of poor people. It can be seen from the highest value of uniqueness. Then tested the assumptions, namely stationary test, cointegration test, lag stability test structure and the determination of optimal lag level, then the next step is to analyze the VAR. This analysis is conducted to determine whether there is a simultaneous relationship (interrelated or mutual contribution) between variables, as exogenous variables and endogenous variables by incorporating the time element (lag). Here is the result of VAR table analysis.

Table 2 Structural VAR result

Structural VAR Estimates
Date: 04/24/18 Time: 14:03
Sample (adjusted): 2004 2017
Included observations: 14 after adjustments
Estimation method: method of scoring (analytic derivatives)
Failure to improve after 1 iterations
Structural VAR is just-identified

Model: $Ae = Bu$ where $E[uu'] = I$
Restriction Type: short-run text form
 $@e1 = C(1)*@u1$
 $@e2 = C(2)*@e1 + C(3)*@u2$
 $@e3 = C(4)*@e1 + C(5)*@e2 + C(6)*@u3$
 $@e4 = C(7)*@e1 + C(8)*@e2 + C(9)*@e3 + C(10)*@u4$
 $@e5 = C(11)*@e1 + C(12)*@e2 + C(13)*@e3 + C(14)*@e4 + C(15)*@u5$
 $@e6 = C(16)*@e1 + C(17)*@e2 + C(18)*@e3 + C(19)*@e4 + C(20)*@e5 + C(21)*@u6$
where

VAR Model - Substituted Coefficients:

$$CDEV = -0.0361440054087*CDEV(-1) + 0.222392397719*EKS(-1) - 1909.61544246*INF(-1) - 2392.00599739*JPM(-1) + 0.0291258881434*PDB(-1) + 1646.97416103*SBI(-1) + 67693.9106172$$

$$EKS = 0.733478626543*CDEV(-1) + 0.457919859731*EKS(-1) + 1538.62461681*INF(-1) + 2324.76512894*JPM(-1) - 0.00783804131747*PDB(-1) - 5486.58990158*SBI(-1) - 814.087596557$$

$$INF = -7.38626841056e-05*CDEV(-1) - 1.29604949841e-05*EKS(-1) - 0.23666367619*INF(-1) - 0.632999432998*JPM(-1) - 3.85069742952e-06*PDB(-1) - 0.291589699414*SBI(-1) + 47.4361124066$$

$$JPM = 4.10688561001e-05*CDEV(-1) - 3.09128222468e-05*EKS(-1) + 0.366175944747*INF(-1) + 0.628570530254*JPM(-1) - 1.94994097616e-06*PDB(-1) - 0.0725497005242*SBI(-1) + 14.7902258703$$

$$PDB = 1.40201909684*CDEV(-1) - 1.12649372767*EKS(-1) + 5030.18761402*INF(-1) + 9981.61914328*JPM(-1) + 1.14815871145*PDB(-1) - 5051.99673219*SBI(-1) - 483745.513021$$

$$SBI = -5.56345989762e-06*CDEV(-1) - 2.03540251107e-05*EKS(-1) + 0.00989907896717*INF(-1) - 0.28146725305*JPM(-1) - 1.75788824129e-06*PDB(-1) + 0.196061115082*SBI(-1) + 22.4526846297$$

Estimates made for IRF are focused on the response of a variable on the change of one standard deviation from the variable itself or other variables contained in the model.

Figure 3 Impulse Response Function**Table 3** Response of All Variables Against Other Variables

Policy Recommendations	INF			JPM		
	1	5	15	1	5	15
CDEV	-	+	+	-	-	+
EKS	+	+	+	+	+	+
INF	+	-	-	-	+	-
JPM	0	-	-	+	-	-
PDB	0	-	-	0	-	-
SBI	0	-	-	0	+	-

* (First Priority), ** (Second Priority)

1 (short-term), 5 (medium-term), 15 (long-term)

These results suggest price fluctuations and weak economic fundamentals lead to a rise in the number of poor people, rising inflation in both the short, medium and long-term. The negative impact of rising interest rates will increase prices and economic instability [24]. Interest is as the primary factor of strong economic fundamentals and inflation [25]. The tightening of the interest rate can also protect the price fluctuations [26]. Fundamental requirements include liquidity in the money market [27]. Interest is highly functional in strengthening economic fundamentals [28], [29].

Variance Decomposition results can be seen in the following table:

Table 4 Decomposition for Fundamental Economics

Period	Level 1	Level 2
Short-term (Period 1)	Interest 44,87%	Exchange Rate 30,24%
Medium-term (Period 5)	Exchange Rate 42,41%	Export 32,99%
Long-term (Period 15)	Inflation 35,17%	Export 332,36%

Table 5 Decomposition for Foverty

Period	Level 1	Level 2
Short-term (Period 1)	Interest 15,54%	Inflation 7,54%
Medium-term (Period 5)	Exchange Rate 49,62%	Export 12,56%
Long-term (Period 15)	GDP 2818	Export 23,67%

Based on Table 3 to 5, it is known that the degree of dependence in controlling short-term poverty through interest, medium by exchange rate and length through GDP. It turns out that interest, exchange rate, GDP, and exports are very dominant in influencing the number of poor people. (Kuncoro, 2014), Agustina (2016) there is a strong degree between economic fundamentals and poverty. Prasetyo (2010), Hambarsari (2016) stated that economic growth affects the number of poor people. Hambarsari (2016) and Alfian (2011) economic growth and inflation are very strong in influencing the number of poor people. Then Adila (2010), Son (2014) and Aswani (2015) stated that economic growth and exports affect the poor.

5. CONCLUSIONS

The degree of dependence of poor people with economic fundamentals such as interest, exchange rate, GDP, exports, and inflation is very high. In the short-term interest, it can affect the degree of dependence on the poor, followed by exchange rates and GDP. While exports also have a degree of dependence on the number of poor people. Poverty in Indonesia is very dominant due to the access of small capital ownership, the utilization of the less natural potential and the very uneven distribution of income.

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