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Economic, Social and Institutional determinants of Public Debt in the ASEAN+3

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ABSTRACT

Understanding public debt enables policymakers of countries to devise measures on how to create sound decisions to reduce, if not fully eradicate it. This paper explores the economic, social and institutional determinants of public debt in the ASEAN+3. Specifically, this paper looks at how the GDP per capita, balance of payments, unemployment rate, poverty headcount ratio, gini index, and corruption perception index contribute to the public debt of the ASEAN+3. Constructing a fixed-effects panel regression model of the ASEAN+3's debt to GDP ratio by the three determinants, the results show that the social and institutional determinants were statistically significant in affecting the ASEAN+3's public debt. For the social determinants, unemployment and gini index has positive effects while poverty headcount ratio has negative effects on the public debt in ASEAN+3. For the institutional determinant, the researcher found that the corruption perception index of the ASEAN+3 has positive effects on its public debt.

KEYWORDS: ASEAN+3, Fixed-effects, Public debt

1.   INTRODUCTION

Countries who experience budget deficits, crises, poverty, and other economic problems often resort to foreign and domestic loans to make up for their budget needs. Oftentimes, the financial and resources support that the countries across the world are receiving came from the World Bank and the International Monetary Fund as external debts (Simarmata, 2013). The Philippines, for instance is getting the majority of its foreign loans from the said institutions (Briceño & Perote, 2020).

Throughout the years, because of various economic problems and crises that countries in the ASEAN+3 are experiencing, the majority of them resort to both domestic and external public debt. While some countries in the ASEAN+3 has seen a decline in their public debt like the Philippines, Myanmar and Brunei, however majority of them still are experiencing increasing public debt.
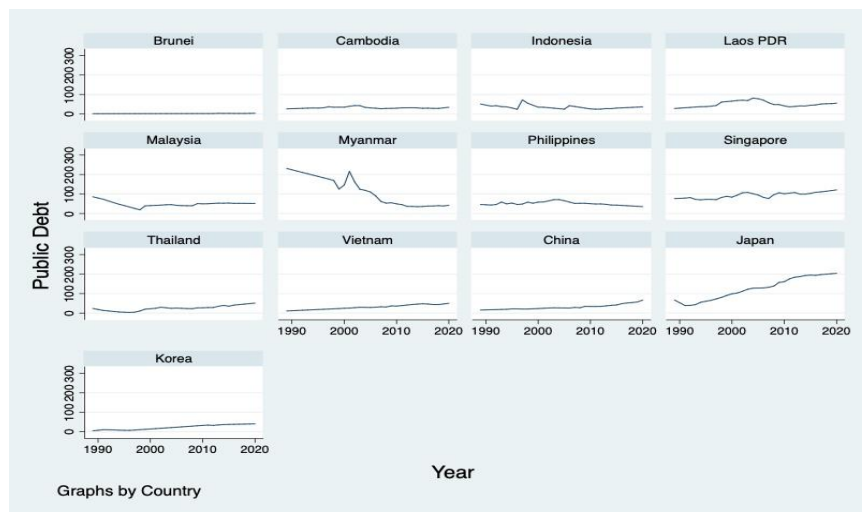

Figure 1: *The debt to GDP ratio in ASEAN+3 from 1989 to 2020*
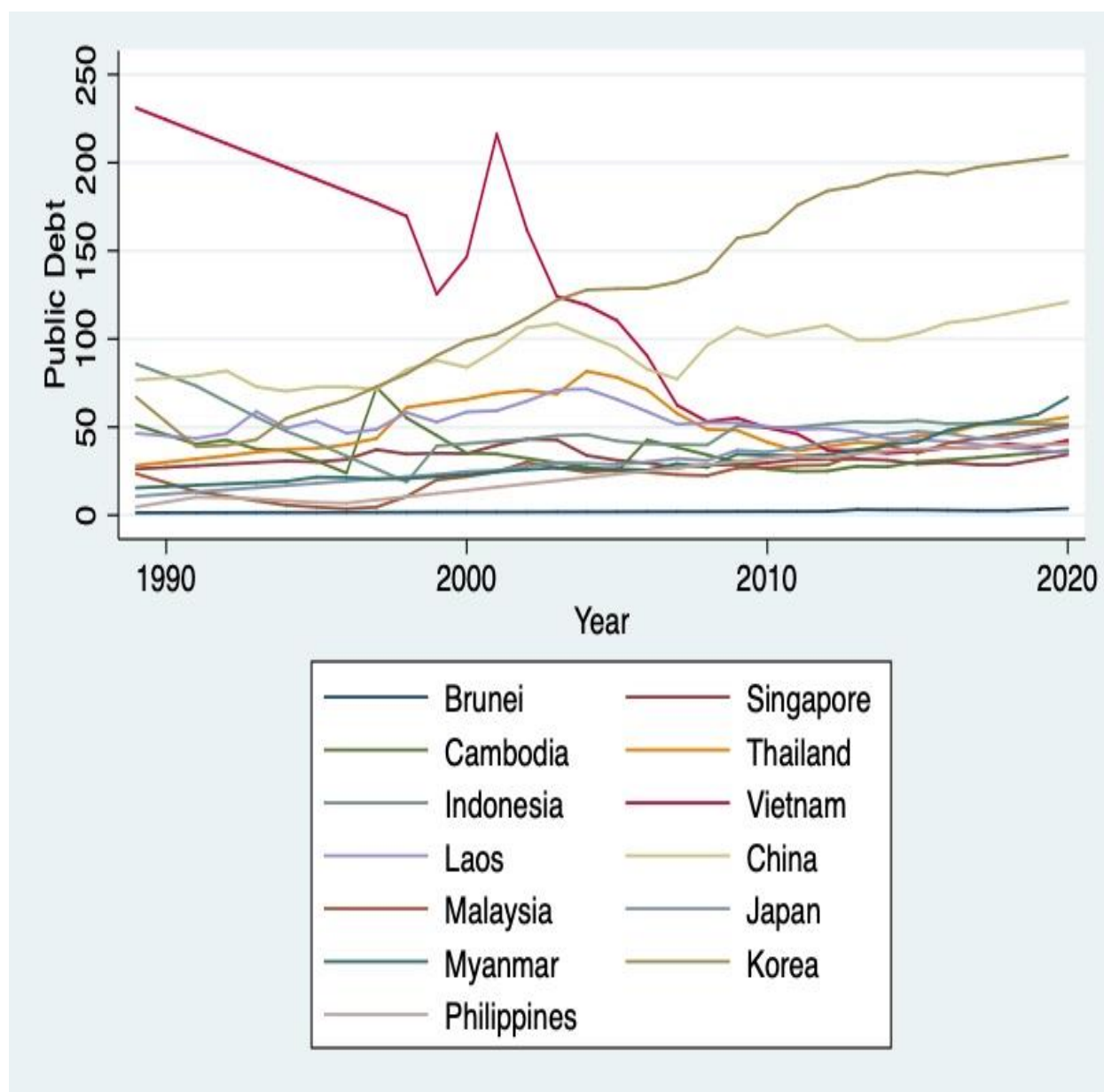
Figure 2: *The debt to GDP ratio in ASEAN+3 from 1989 to 2020 (in overlay)*

Different economic studies have been concentrated on specific and/or isolated factors to explain public debt evolution. Economic growth, interest rate, life expectancy at birth, unemployment, government effectiveness were among the major determinants of its evolution (Briceño & Perote, 2020). For instance, slowdown in GDP per capita growth rate is seen as a determinant in an increase in debt-GDP ratio (Kumar, 2010). Meanwhile, other papers also suggest that budget deficit, real exchange rates, and flow of foreign aids are also the main determinants of public debt (Al-Fawwaz, 2016).

In western perspectives, previously accumulated public debt, unemployment and population size, are determinants of public debt while real GDP growth, FDI inflows, gross capital formation and trade balance have significant impacts on limiting the public debt (Filip, 2019). In the paper of Ullah, Anjum, & Rahim (2014), they mentioned that, in Pakistan, fiscal deficit, nominal exchange rate and trade openness are statistically significant determinants of external debt as they increase the debt burden. And finally, Carrera & De La Vega (2021) suggests that the dynamics of public debt are not only associated to the traditional determinants associated with the tax smoothing across a business cycle, but also to the political and fiscal pressures stemming from changes in inequality and unemployment.

This paper, which is about the determinants of public debt in the ASEAN+3 seeks to provide an insight on whether or not the ASEAN+3 public debt is determined by its economic, social and institutional well beings. Generally, this paper aims to determine the effects of the economic, social and institutional well-being of the ASEAN+3 to its public debt.

Specifically, this paper aims to answer the question; Does the GDP per capita, balance of payments, unemployment rate, poverty headcount ratio, gini index, and corruption perception index contribute to the public debt of the ASEAN+3?

In answering the given question, the researcher will undertake this objective:

1. Determine the effects of GDP per capita, balance of payment, unemployment rate, poverty headcount ratio, gini index and corruption perception index from 1989-2020 to the debt-GDP ratio of the ASEAN+3.

It is through this paper that the dynamics of the ASEAN+3 public debt will not only be looked at the economic lenses, but in the social and institutional lenses altogether. This sways from previous studies which explored public debt in different independent variables. This paper hopes to contribute to literature by providing a perspective whether or not the ASEAN+3 public debt is driven by the economic, social and institutional well-being of the countries.

To arrive to the answer to the question of this paper, the researcher will utilize panel regression analysis. Regression analysis determines if the independent variable influences the dependent variable. In determining the impact of GDP per capita, balance of payment, unemployment rate, poverty headcount ratio, gini index and corruption perception index from 1989-2020 to the debt-GDP ratio of the ASEAN+3 countries, the researcher utilized this econometric model:

$$Pdebt_{it} = \beta_0 + \beta_1\,GDPP_{it} + \beta_2\,BOP_{it} + \beta_3\,UnEmp_{it} + \beta_4\,PovHR_{it} + \beta_5\,GiniIndex_{it} + \beta_6\,CorrPI_{it}\varepsilon + \varepsilon$$

WHERE:
   Pdebt= Ratio of Public Debt to GDP;
   GDPP= GDP per capita;
   BOP= Balance of Payment
   Unemp= Unemployment Rate
   PovHR= Poverty Headcount Ratio
   *Gini*Index= Gini Index
   CorrPI= Corruption Perception Index
   β_0 = the intercept (the predicted value of the Debt to GDP ratio if the regressors value
   are zero;
   ε = the error of the estimate;
   i denotes country; and
   t denotes time.

2. METHODOLOGY
A. Data
This paper utilized panel data from the ASEAN+3 countries. The time period covered were from 1989-2020. The period were paneled with the economic, social and institutional determinants of the countries. For the economic determinants of the ASEAN+3 countries, the researcher utilized the GDP per capita and balance of payments; for the social determinants, the researcher utilized the unemployment rate, poverty headcount ratio and gini index, and for the institutional determinant, the researcher utilized the corruption perception Index of the ASEAN+3 countries.

The GDP per capita, balance of payment, unemployment rate, poverty headcount ratio and gini indexes were culled from the databases of the world bank, whereas the corruption perception index was mined from the databases of the Heritage Foundation's index of economic freedom.

Table 1: Variables used in the study

Variables		Definition
Dependent Variable	Debt to GDP ratio	The debt to GDP ratio is the share of a country's public debt to its GDP. In this paper the debt to GDP ratio is expressed in percentage.
Independent Variables	GDP per capita	The GDP per capita is the gross domestic product of a country divided by its population. In this paper, the GDP per capita is expressed in current US dollars.
	Balance of payments	The balance of payments is the current account balance of a countries. It is the sum of net exports of goods and services, net primary income, and net secondary income. In this paper, the balance of payments is expressed in current U.S. dollars.
	Unemployment rate	The unemployment refers to the share of the labor force that is without work but available for and seeking employment. In this paper, the unemployment rate is expressed in percentage.
	Poverty headcount ratio	The poverty headcount ratio is the percentage of the population living on less than $1.90 a day at 2011 international prices. In this paper, the ratio is expressed in percentage.
	Gini Index	The gini index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. In this paper, the gini index is expressed by the numbers 0-100. A Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.
	Corruption Perception Index	The corruption perception index refers to an index that scores countries on the perceived levels of their government corruption. In this paper, the corruption perception index is expressed by the numbers 0-100. A corruption perception index of 0 represents highly corrupt country, while an index of 100 implies a very clean government.

Table 1 shows the variables utilized in this study. The dependent variable in the study is the debt to GDP ratio, whereas the independent variables are the GDP per capita, balance of payments, unemployment rate, poverty headcount ratio, gini index, and the corruption perception index of the ASEAN+3 countries.

B. Summary Statistics
Table 2: Descriptive statistics of the regressors

Variables		Observations	Mean	Std. Dev	Min	Max
Dependent Variable	Debt to GDP ratio	416	50.94092	45.21172	1.373333	231.0571
Outcome Indicators	GDP per capita	416	5.299406	3.965093	-13.12673	14.52564
	Balance of payments	416	2.38e+10	5.69e+10	-3.06e+10	4.21e+11
	Unemployment rate	416	3.034267	1.821615	.13	9.32
	Poverty headcount ratio	287	34.32699	24.63107	.6	97
	Gini Index	337	38.64526	9.793943	12.94	95.82
	Corruption Perception Index	338	18.05521	22.21784	1.3	87

Table 2 shows the summary statistics of the variables used. There are a total of 416 observations. For the dependent variable, the average debt to GDP ratio of the ASEAN+3 countries is 50.94, the minimum value is 1.37 and the maximum value is 231. For the GDP per capita, the average is 5.29, the minimum value is -13.12 and the maximum value is 14.52. For the balance of payment, the average is 2.38, the minimum value is 5.69 and the maximum value is 4.21. For the unemployment rate, the average is 3.03, the minimum value is .13 and the maximum value is 9.32. For the poverty headcount ratio, the average is 34.32, the minimum value is .6 and the maximum value is 97. For the gini index, the average is 38.64, the minimum value is 12.94 and the maximum value is 95.82. For the corruption perception index, the average is 18.05, the minimum value is 1.3 and the maximum value is 87.

C. Tests of Collinearity and Multicollinearity

To test that the variables utilized in the model do not exhibit collinearity, the researcher, before performing the fixed effects, random effects and Hausman test has performed a test of collinearity by correlating the variables. The correlation table could be found at the appendix. After the correlation was performed, and upon knowing that the variables are not correlated, the researcher also had regressed the variables using multiple linear regression analysis so he can proceed to the test of multicollinearity via the variance inflation factor (VIF). The results of the VIF could also be found in the appendix. With a mean VIF of 1.26 and all the other variables exhibiting VIF's not greater than 5, this shows that there is no multicollinearity in the model.

D. Estimation

As discussed, this paper estimated the impact of the economic, social and institutional determinants of the ASEAN+3 countries to its public debt using panel regression. The panel regression has two models: the fixed effect and the random effect. In choosing between the models, the researcher performed the Hausman test. In the Hausman test, if the Prob>chi2 is less than 0.05, the null hypothesis (Ho) which is that the preferred model is random effects will be rejected and the alternate hypothesis (Ha) which is that the preferred model is fixed effects will be accepted. With a Prob>chi2 of 0.025 after the Hausman test was performed, the researcher therefore, rejected the null hypothesis and adapted the alternate hypothesis that is why the fixed effects was used in this paper. The results of the Hausman test can be seen in the appendix.

3. RESULTS AND DISCUSSION

Table 3. *Regression Results*

Variables	(fixed effects) Pdebt	(random effects) Pdebt
GDPP	-.3321035 (0.180)	-.316679 (0.211)
BOP	2.49e-12 (0.900)	1.14e-11 (0.553)
Unemp	3.372205*** (0.007)	1.293057 (0.195)
PovHR	-.2231067*** (0.003)	-.0515605 (0.422)
GiniIndex	.8098527*** (0.000)	.7245891*** (0.000)
CorrPI	.1732319*** (0.004)	.1940098*** (0.001)
Constant	5.012484 (0.406)	8.271951 (0.180)
Observations	224	224
R-squared	0.2537	0.2270
Number of ASEAN+3	13	13

P values in parenthesis
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

The comparison between the fixed and random effects will lead to three important insights. First, assuming that the unobserved effect across the ASEAN+3 is random, the effects of unemployment on public debt decreases twice, from 3.37 to 1.29, but it becomes insignificant. The same also would happen on poverty headcount ratio. Its effect on public debt would decrease twice from -0.22 to -0.5, but it also would become insignificant. On the other hand, if the model to be used was random effects, only two variables from the independent would be significant in predicting public debt, and these are gini index and corruption perception index. However, since the Hausman test has proven that the fixed effect model shows more significant relationship between the variables and ASEAN+3's public debt, the random effect model results were rendered insignificant.

The fixed effects estimation has shown that the variables with a statistical influence on ASEAN+3's public debt are unemployment rate, poverty headcount ratio, gini index and corruption perception index. This leaves GDP per capita and balance of payments as variables which do not significantly influence ASEAN+3's public debt.

In terms of unemployment, holding all other variables constant, for every one percentage point increase in unemployment, the public debt in ASEAN+3 increases by 3.37%. For poverty headcount ratio, holding all variables constant, a percentage increase in the ASEAN+3's poverty headcount ratio would result to a 0.22 decrease in the public debt. For gini index, holding all variables constant, a percentage increase would result to a 0.81% increase in the public debt. And lastly, for corruption perception index, holding all variables constant, a percentage point increase in the corruption perception index, would result to a .17% increase in the public debt of the ASEAN+3 countries. These significant relationships are shown with a 1% level of significance showing that the p values of the significant variables when regressed with public debt are all less than 0.01.

4. CONCLUSION

As seen in the results of the model, unemployment, poverty headcount ratio, gini index, and corruption index all contribute to the increased value of the public debt in the ASEAN+3. This means that from among the economic, social and institutional determinants of public debt in the ASEAN+3, only the social and institutional determinants contribute to public debt. In looking at the relationship between public debt and unemployment, (Fedeli & Forte, 2013) argued that while there are many reasons for unemployment, in OECD countries, it is oftentimes combated using deficit spending. That is, their higher unemployment rates requires fiscal stimulus that are funded by public debt. In the case of Cameeron, external public debt is seen as a means to reduce poverty. So increased poverty would mean higher public debt as the government targets the reduction of poverty by external public borrowing (Mbang, 2021).

In the case of how social determinants influence public debt, unemployment's effect on the ASEAN+3's public debt is positive. This means that, an increase in unemployment in the ASEAN+3 increases the public debt of the countries. This is so because unemployment oftentimes result to reduced production in the economy while increasing the number of people who are dependent on social aids and government programs (Cheng, Díaz-Cassou & Erce, 2018). With this increased number of people being more dependent on the government, while the states income in decreasing, the budget deficit of the countries only be resolved by borrowings, both domestic and external (Alam & Taib, 2013). On the other hand, Valčić, Samodol, & Valčić, (2021) argues that financial development measured by loans and GDP can be sufficient for economic growth as borrowing could help reduce unemployment.

In terms of poverty headcount ratio, the resulting effect of it on the ASEAN+3's public debt is negative. That means that, as the poverty headcount ratio increases, the public debt decreases. This contradicts various literatures. As papers would often claim that as the poverty headcount ratio of a country increases as a result of increased number of poor people, the state borrowing is also expected to increase (Ozigbu, 2018; Koo & Oh, 2019; Sani, & Yahaya, 2021).

In terms of the gini index, the resulting effect of it on the ASEAN+3's public debt is positive. That means that, as the gini index increases, the public debt also increases (Arawatari & Ono, 2015). Often, higher gini indexes are associated with higher public debt (Salti, 2015). The gini index is a measure of income inequality in the population. A higher gini index means there is inequality in the population. Now, if the increases in the gini index in the ASEAN+3 increases public debt, it is so because the higher the gap is between the rich and the poor, the higher the chances of the poor being unable to meet their needs. With a very high number of people again depending on social pension and other government aids, this would mean increases in the expenses of the government (Mertens, 2017) which often result to deficits in the next fiscal budget. And one way to make up the deficit is to again borrow both domestically and externally, thereby increasing the public debt of the country.

In the case of how the institutional determinants influence public debt, the effect of corruption perception index on the ASEAN+3's public debt is positive. This means that, an increase in the corruption perception index of the country results to increased public debt. The corruption perception index is a measurement being utilized by the Transparency International to rank countries by their perceived level of public sector corruption. A higher corruption perception index score, means that a country has lesser corruption. Looking at the result of this paper which shows that the higher the corruption perception index of the countries in the ASEAN+3, the higher its public debt becomes. Investors are confident to invest in countries with lesser corruption (Walsh & Yu, 2010). Likewise, the same thing goes with extending loans. However, this contradicts previous literature. Like in the case of Spain and other countries that shadow economy and corruption show a direct and significant relationship with public debt (González-Fernández, & González-Velasco, 2014; Cooray, Dzhumashev, & Schneider, 2017). But, despite this, the international monetary fund for instance, is interested in lending to countries with less corrupt social institutions and government (Hillman, 2004).

5. RECOMMENDATIONS

Because unemployment increases the public debt of countries in the ASEAN+3, and increased public debt is not always good for a country, there is a need for countries within the region to provide for alternatives to reduce, if not fully eradicate their problems with unemployment as reducing unemployment would also result to reducing the public debt of the ASEAN+3 countries. In the case of gini index which also increases the public debt of the ASEAN+3 countries, there is also a need to enforce policies that would reduce inequalities between the population. Reducing inequalities through tax and benefits system, for instance, if done well, could result to a decrease in the public debt of the ASEAN+3 countries.

On the other hand, the increased corruption perception index results to higher public debt because it increases the confidence of the creditors. If the creditors are assured that there is less corruption in a country, then there will be a higher chance for them to lend money. In this case, it is not necessarily advisable to say that ASEAN+3 countries should do measures to decrease its corruption perception index just so they could reduce the public debt, but rather, it is advisable for the countries to increase their corruption perceptions index score so creditors would be confident to lend them money in cases there is a need during crises and budget deficits.

Finally, in poverty headcount ratio, since the results of this paper contradicts previous literature which suggests that increased poverty headcount ratio results to higher public debt, there is a need for further studies on this context. Future researchers may opt to develop and adopt models which could furtherly explain why in the ASEAN+3 context, increased poverty headcount ratio causes public debt to decrease.

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Appendix

Data Summary

```
. summarize Pdebt GDPP BOP Unemp PovHR Gini CorrPI
```

Variable	Obs	Mean	Std. Dev.	Min	Max
Pdebt	416	50.94092	45.21172	1.373333	231.0571
GDPP	416	5.299406	3.965093	−13.12673	14.52564
BOP	416	2.38e+10	5.69e+10	−3.06e+10	4.21e+11
Unemp	416	3.034267	1.821615	.13	9.32
PovHR	287	34.32699	24.63107	.6	97
GiniIndex	337	38.64526	9.793943	12.94	95.82
CorrPI	338	18.05521	22.21784	1.3	87

Correlation Matrix

```
. corr Pdebt GDPP BOP Unemp PovHR Gini CorrPI
(obs=224)
```

	Pdebt	GDPP	BOP	Unemp	PovHR	GiniIn~x	CorrPI
Pdebt	1.0000						
GDPP	0.0505	1.0000					
BOP	−0.0615	0.1997	1.0000				
Unemp	−0.0576	−0.1306	0.2921	1.0000			
PovHR	0.2012	0.1899	−0.1768	−0.3561	1.0000		
GiniIndex	0.4117	0.2562	0.0287	−0.0632	0.0179	1.0000	
CorrPI	0.1082	−0.1903	0.0746	−0.0579	−0.3545	−0.1857	1.0000

Measure of Multicollinearity using Variance Inflation Factor (VIF)

```
. vif
```

Variable	VIF	1/VIF
PovHR	**1.40**	**0.714042**
Unemp	**1.33**	**0.750391**
CorrPI	**1.28**	**0.779819**
GDPP	**1.22**	**0.820373**
BOP	**1.20**	**0.832322**
GiniIndex	**1.11**	**0.901689**
Mean VIF	**1.26**	

.: Given that the mean VIF is 1.26 and all the other variables are exhibiting VIF's not greater than 5, this shows that there is no multicollinearity in the model.

Hausman Run

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. hausman fe re
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Note: the rank of the differenced variance matrix (**5**) does not equal the number of coefficients being tested (**6**); be sure this is what you expect, or there may be problems computing the test. Examine the output of your estimators for anything unexpected and possibly consider scaling your variables so that the coefficients are on a similar scale.

	—— Coefficients ——			
	(b)	(B)	(b–B)	sqrt(diag(V_b–V_B))
	fe	re	Difference	S.E.
GDPP	−.3321035	−.316679	−.0154245	.
BOP	2.49e−12	1.14e−11	−8.88e−12	5.03e−12
Unemp	3.372205	1.293057	2.079148	.7472009
PovHR	−.2231067	−.0515605	−.1715463	.0361018
GiniIndex	.8098527	.7245891	.0852637	.0234906
CorrPI	.1732319	.1940098	−.020778	.

```
                 b = consistent under Ho and Ha; obtained from xtreg
         B = inconsistent under Ha, efficient under Ho; obtained from xtreg

   Test:  Ho:  difference in coefficients not systematic

            chi2(5) = (b–B)'[(V_b–V_B)^(−1)](b–B)
                    =        12.80
          Prob>chi2 =       0.0253
          (V_b–V_B is not positive definite)
```

: Given that Prob>chi2 is less 0.05, we reject Ho and accept Ha, that is, a fixed-effect model is preferred.