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Raphael Mulenga,
Faculty of International Economic Relations,
Financial University under the Government of Russian Federation,
Moscow

Carlos Tembo,
Faculty of International Economic Relations,
Financial University under the Government of Russian Federation,
Moscow

ANALYZING FACTORS AFFECTING ECONOMIC GROWTH AND EVALUATING THE MACROECONOMIC MODEL IN ZAMBIA

Abstract: Economic development and growth are multifaceted processes that involve the enhancement of a nation's overall well-being, encompassing factors such as increased income and improved living standards. Sustainable development, characterized by balanced economic, social, and environmental progress, is a key goal. In this paper, factors influencing economic growth in Zambia include: real interest rate, broad money, exchange rate, inflation, gross domestic product (GDP) and 5 years bond yield rate. It is also cardinal to investment in human capital, technological advancements, infrastructure development, and effective governance. Achieving inclusive growth, where benefits are shared across different segments of society, is pivotal for long-term economic stability and prosperity.

Keywords: *Zambia, Economic development, Regression, Analysis, Econometric, Model, Panel data, Macroeconomic*

INTRODUCTION

In the modern world a country cannot prosper without development in all the sectors of the economy. So, we decided to look at some of the factors that influence the growth and development of this country.

Economic development is a key factor driving economic growth in an economy by creating new employment opportunities and improving quality of life.

The main purpose of this paper is to analyze the factors affecting economic development in Zambia.

LITERATURE REVIEW

Economic growth is a well-studied component of modern macroeconomics. Therefore, before embarking on new research on this topic, it is essential to provide a comprehensive overview of some of the most important empirical studies conducted to date.

Barro (1991) and Lucas (1988) are influential economists who have extensively contributed to the understanding of the relationship between education, human capital development, and economic growth in developing countries.

In 1991, Barro constructed a model which emphasizes the role of human capital accumulation in economic growth. He argues that investments in education lead to increased productivity and, consequently, higher economic growth. The model incorporates the idea that educated individuals contribute more efficiently to the economy, fostering innovation and technological progress [1].

On the other hand, Lucas in 1988 his work focuses on the endogenous growth theory, suggesting that human capital is a key driver of sustained economic growth. He contends that investments in education not only enhance individual productivity but also have positive externalities, benefiting the overall economy. Lucas highlights the importance of education in the creation and dissemination of knowledge, which fuels long-term economic development [2].

Both Barro and Lucas underscore the transformative impact of education on individual capabilities and its subsequent positive effects on overall economic performance.

Their research contributes to the understanding of human capital as a dynamic factor influencing innovation, technological progress, and, consequently, economic growth in developing countries.

Policymakers often draw on these insights to design strategies that prioritize education and skills development as fundamental components of broader economic development initiatives.

The work of Barro and Lucas has had a lasting impact on the economic literature, influencing discussions on education policy, development strategies, and the intricate links between human capital and economic growth in developing countries. Therefore, it is important to consider some immediate factors that influence the economic growth in Zambia.

Unlike the above theories, Sachs and Warner's seminal work in 2001 delves into the concept of the "resource curse," which refers to the paradox where countries rich in natural resources often experience slower economic growth and development.

In 2001, Sachs and Warner in their empirical analysis, investigates the relationship between natural resource abundance and economic performance across various countries. They find that, contrary to expectations, resource-rich countries tend to grow more slowly than those with fewer natural resources. The "resource curse" is attributed to various factors, including governance issues, corruption, and overdependence on a single sector, which can lead to economic instability and hinder diversification.

The research highlights that the mere presence of natural resources does not guarantee economic prosperity; effective management and governance are crucial.

Poorly managed resource wealth can lead to corruption, rent-seeking behavior, and economic volatility, undermining sustainable development efforts. Policy recommendations include transparent governance, prudent fiscal management, and efforts to diversify the economy to mitigate the risks associated with over-reliance on resource extraction. Sachs and Warner's work has had a significant impact on policy discussions, encouraging resource-rich nations to adopt careful management strategies to avoid the pitfalls associated with the resource curse. In my view, as a Nation it is important to have informed international development efforts and policies aimed at promoting responsible resource management for sustained economic development.

I. Table1. Initial data of factors affecting economic development in Zambia 2000- 2022.

	real interest rat	Broad money	Exchangr rate	inflation rate	gdp	5 yers bond yield rate
year	%	%	%	%	billion USD	%
2000	4,66476807	73,76265537	3,11084417	26,03041179	3,6	
2001	16,67746349	8,713283324	3,610935	21,39378218	4,09	
2002	21,61562428	28,16651197	4,398595	22,23334464	4,19	
2003	19,52534147	24,97760169	4,73327105	21,40157839	4,9	
2004	9,196933647	31,95664209	4,77887539	17,96778911	6,22	
2005	9,909085184	3,254967012	4,465	18,3244397	8,33	25,3473
2006	7,517820242	44,04808805	3,60166667	9,019572472	12,76	23,1886
2007	5,240870634	25,26645707	4,00166667	10,6573496	14,06	14,0561
2008	7,613795381	23,22862457	3,745	12,44557935	17,91	15,8568
2009	15,63363346	7,661231206	5,045	13,39525463	15,33	19,0026
2010	6,112942212	29,85907512	4,7975	8,501761334	20,27	17,3354
2011	6,951848616	21,70198037	4,86166667	6,429396811	23,46	12,87
2012	4,821684114	17,85942719	5,1475	6,575899708	25,5	14,202
2013	-0,19172	20,79157951	5,39648333	6,977676055	28,04	14,79
2014	5,821127547	12,6180853	6,15416667	7,806875536	27,14	16
2015	6,179215852	35,19247149	8,63166667	10,11059289	21,25	22,97
2016	1,715079428	-5,702272494	10,3075	17,86973008	20,96	28,5
2017	2,070262066	21,35614567	9,5175	6,577311542	25,87	17,2
2018	2,21586529	16,4780078	10,4583333	7,494571927	26,31	29
2019	2,469674325	12,54522469	12,89	9,150316443	23,31	15
2020	-3,749080532	46,44354934	18,3440926	15,73258514	18,11	32,4
2021	9	20,0184866	20	22,02123429	22,15	14,2
2022	9,25	24,97888	16,14	9,9	27,02	24,1

Endogenous variables include; consumer price index (CPI), GDP (Y) and 5-year Bond Yield Rate.

Exogenous variables in the model include; Exchange rate (EX), Interest Rate (R) and Broad Money (M2)

The dependent variable which inflation and independent variables which was investigated are money supply (broad money M2), Exchange rate and inflation rate.

1.1.Economic Laws that describe relationships between variables

2. Inflation (CPI) is explained by the level of GDP and increases with it increase, while inflation growth is slower than the growth of GDP.
3. The bond rate (BR) is explained by the size of GDP (Y), interest rate (R) and broad money (M2) increase with an increase in GDP and decreasing with an increase in the interest rate and Broad Money (M2).
4. Inflation (CPI), Broad money (M2) and Exchange (Ex) is the sum of Gross Domestic Product.

1.2. Initial form of the econometric model.

1. $Yt = \alpha 0 + \alpha 1Rt + \alpha 2M2t + \alpha 3Ext + \Im t$

Where, Yt – GDP, Rt – Interest Rate, M2 – Broad Money, Ext – Exchange Rate and $\Im t$ – disturbance term.

2. $BRt = \beta 0 + \beta 1Rt + \beta 2M2t + \beta 3Ext + \zeta t$

Where, BRt – 5year yield bond Rate. And ζt – disturbance term.

1. CPIt = λ0 + λ1Rt+ λ2M2t + λ3Ext + ξt

Where, CPI – Consumer Price Index (Inflation) and ξt – disturbance term.

α_0, α_1 α_2, α_3, β_0, β_1, β_2, $\beta_3 > 0$; $< \lambda_0, \lambda_1, \lambda_2, \lambda_3$

E(ℑt)= 0: E(ζt) =0: E(ξt)

σ(ℑt)=: cons σ(ζt) = cons: σ(ξt)=0

II. REGRESSION ANALYSIS

Table 2 shows the regression analysis

ВЫВОД ИТОГОВ			R	M2	EX
		2022	9,25	24,97888	16,14
Регрессионная статистика					
Множественный R	0,712292177		**CPI^2022**	18,26075215	
R-квадрат	0,507360145		**CPI^2022-**	10,22108759	
Нормированный R-квадрат	**0,393674024**		**CPI^2022+**	26,30041672	
Стандартная ошибка	**3,721431776**				
Наблюдения	17				
			Tcrit	2,160368656	
Дисперсионный анализ			**Fcrit**	3,410533645	
	df	*SS*	*MS*	*F*	*Значимость F*
Регрессия	3	185,4173118	61,80577061	**4,462815187**	0,023055415
Остаток	13	180,0377081	13,84905447		
Итого	16	365,4550199			

2.1. Estimated form of the model

CPI_t = 4,5 + 0,5R_t – 0,1$M2_t$ + 0,7EX_t + ξt

(3,1) (0,2) (0,1) (0,2). (3,7)

R^2_{adj} = 0,3937 F = 4,463

R^2 = 0,3947% in change in inflation is expected by the changes in interest rate, broad money and exchange rate by linear regression model.

R^2 is non-random, in order to confirm we need to do F test by comparing F value with F_{crit} fishier distribution. If F > F_{crit}, then R^2 is non-random and the quality of the specification of the model is high. In our case F > $F_{crt,}$ which means that the quality of specification of the model is high.

In order to check for adequacy of the model we do T-test. The result shown in table 3 below.

Table 3 shows the result of T-test of the model

t-статистика	*P-Значение*	*Нижние 95%*	*Верхние 95%*	*Нижние 95,0%*	*Верхние 95,0%*
1,444389815	0,172297116	-2,240989722	11,28277292	-2,240989722	11,28277292
2,070332117	0,058894328	-0,021445693	1,007705455	-0,021445693	1,007705455
-0,983895166	0,343125174	-0,226692476	0,084820391	-0,226692476	0,084820391
3,343711727	0,005284218	0,2401 06993	1,116808997	0,2401 06993	1,116808997

if absolute value of t- stat is more than student test value, coefficient is significant.

Based on the out of the regression analysis:

1. 1,0444389815 < 2,160368656 – insignificance
2. 2,07033211702845 > 2,160368656 – significance
3. -0,983895165708582 < 2,160368656 – insignificance
4. 3,34371172748322 > 2,160368656 – significance

Economic interpretation on the coefficients

- interest rates rise by 1%point, inflation will rise. 0.5% points up.
- A 1%point increase in broad money will increase inflation rate up to 0.1% points.
- When the exchange rate rises by 1%point, inflation rises by 0.7% points.

2.2. Table 4 demonstrate date for first Gauss Markov statements

ВЫВОД ОСТАТКА

Наблюдение	*Предсказанное Y*	*Остатки*
1	12,20577806	6,118661636
2	7,547135917	1,472436555
3	8,027981793	2,629367807
4	9,168560108	3,277019238
5	15,10966657	-1,714411936
6	8,672183684	-0,17042235
7	9,708039906	-3,278643096
8	9,124093562	-2,548193854
9	6,61276364	0,364912415
10	10,67173008	-2,864854546
11	10,9278562	-0,817263308
12	12,76435094	5,10537914
13	10,4841032	-3,906791663
14	11,54025617	-4,045684245
15	13,59417677	-4,443860331
16	11,82328268	3,909302463
17	21,10818822	0,913046075
	E (et)=	0,00

Average of the residuals is almost zero. Gauss Markov's first statement is confirmed.

Second Gauss Markov statement (Goldfeld-Quandt test)

Table 5 first region of the regression

ВЫВОД ИТОГОВ									
Регрессионная статистика									
Множественный R	0,950339059								
R-квадрат	0,903144326								
Нормированный R-квадрат	0,830502571								
Стандартная ошибка	2,018200102								
Наблюдения	8								
Дисперсионный анализ									
	df	*SS*	*MS*	*F*	*Значимость F*				
Регрессия	3	151,92195	50,64065061	12,4328539	0,017010803				
Остаток	4	16,292527	4,073131652						
Итого	7	168,21448							
	Коэффициенты	*дартная ош*	*t-статистика*	*P-Значение*	*Нижние 95%*	*Верхние 95%*	*Нижние 95,0%*	*Верхние 95,0%*	
Y-пересечение	18,19394194	3,6045173	5,047539027	0,00724359	8,186197418	28,2016865	8,186197418	28,20168646	
Переменная X 1	0,055325159	0,1909585	0,289723425	0,78642543	-0,474860716	0,58551103	-0,474860716	0,585511034	
Переменная X 2	-0,529394084	0,0982833	-5,386408119	0,00574401	-0,802272333	-0,25651584	-0,802272333	-0,256515836	
Переменная X 3	-0,25116516	0,2992556	-0,839299919	0,44853375	-1,08203177	0,57970145	-1,08203177	0,57970145	

Table 6. Third region of the regression.

ВЫВОД ИТОГОВ									
Регрессионная статистика									
Множественный R	0,90571188								
R-квадрат	0,82031402								
Нормированный R-квад	0,68554953								
Стандартная ошибка	2,77912731								
Наблюдения	8								
Дисперсионный анализ									
	df	*SS*	*MS*	*F*	*Значимость F*				
Регрессия	3	141,0401653	47,01338844	6,08701917	0,056780401				
Остаток	4	30,89419443	7,723548607						
Итого	7	171,9343597							
	Коэффициенты	*ндартная оши*	*t-статистика*	*P-Значение*	*Нижние 95%*	*Верхние 95%*	*жние 95,0*	*рхние 95,0%*	
Y-пересечение	5,73666827	6,504146363	0,882001719	0,427590212	-12,32173706	23,795074	-12,3217	23,79507	
Переменная X 1	0,27796277	0,384020923	0,723821938	0,509241157	-0,788250242	1,3441758	-0,78825	1,344176	
Переменная X 2	-0,04639966	0,13691451	-0,338895101	0,751732371	-0,426535279	0,333736	-0,42654	0,333736	
Переменная X 3	0,70541449	0,172707984	4,084434764	0,015043596	0,225900257	1,1849287	0,2259	1,184929	

According to Goldfeld – Quand test, the result in our case show that;
GQ = 0,527
1/GQ = 1,896
Fcrit = 6,388

In this case the value F critic is more than the value of GQ and 1/GQ, therefor we can conclude that residual values are homoscedastic, the second Gauss Markov The statements are confirmed and the coefficients of the regression model are unbiased, consistent and efficient.

Table 7. Shows 3rd Gauss Markov statement (Durbin Watson)

DW = 1,551

	0	dl	du	2	4-du	4-dl	4
alfa 0,05	0	0,397	1,71	2	2,29	3,603	4
alfa 0,01	0	0,672	1,432	2	2,568	3,328	4

DW value is between du and 4-du autocorrelation of residuals is not absent. We can conclude that third Gauss Markov statement is confirmed and coefficients of the regression model are unbiased, consistent and efficient. In other words, we may trust the values of the coefficients.

Table 8. Shows PANEL DATA SET ON FACTORS AFFECTING ECONOMIC GROWTH IN DEVELOPING COUNTRIES (2010 -2022)

Country	Year	GDP (Billion USD)	R (%)	M2 (%)	EX (%)	CPI (%)	FDI NET INFLOW (Billion USD)
Zambia	2010	20,27	6,112942212	29,85907512	4,7975	8,5	8,53
Zambia	2011	23,46	6,951848616	21,70198037	4,86166667	6,43	4,73
Zambia	2012	25,5	4,821684114	17,85942719	5,1475	6,58	6,79
Zambia	2013	28,04	-0,19172	20,79157951	5,39648333	7	7,49
Zambia	2014	27,14	5,821127547	12,6180853	6,15416667	7,81	5,56
Zambia	2015	21,25	6,179215852	35,19247149	8,63166667	10,11	7,45
Zambia	2016	20,96	1,715079428	-5,702272494	10,3075	17,87	3,16
Zambia	2017	25,87	2,070262066	21,35614567	9,5175	6,58	4,28
Zambia	2018	26,31	2,21586529	16,4780078	10,4583333	7,49	1,55
Zambia	2019	23,31	2,469674325	12,54522469	12,89	9,15	2,35
Zambia	2020	18,11	-3,749080532	46,44354934	18,3440926	15,73	1,35
Zambia	2021	22,15	9	20,0184866	20	22,02	-3,72
Zambia	2022	27,02	9,25	24,97888	16,14	9,9	-2,09
Botswana	2010	12,64	3,505910613	10,70163227	6,793625	6,95	1,73
Botswana	2011	15,11	-1,467619028	4,440318983	6,838233333	8,46	1,94
Botswana	2012	14	7,75460206	9,994029659	7,640525	7,54	1,05
Botswana	2013	14,27	8,5264764	8,434674305	8,398908333	5,88	0,47
Botswana	2014	15,47	-0,549018865	4,593309029	8,976083333	4,4	3,33
Botswana	2015	13,53	4,068311766	19,87549824	10,12899167	3,06	2,8
Botswana	2016	15,08	-4,117352079	5,391076852	10,90115833	2,81	0,95
Botswana	2017	16,11	9,782813754	2,71694718	10,34741667	3,31	1,62
Botswana	2018	17,03	6,440898186	8,318946648	10,199975	3,24	1,68
Botswana	2019	16,7	6,048673816	7,990081267	10,75586667	2,77	0,56
Botswana	2020	14,93	1,339872278	5,892459913	11,45624167	1,89	0,21
Botswana	2021	17,61	2,657246595	6,94127058	11,08725833	7,24	0,31
Botswana	2022	57	1,99855943	6,41686525	11,27175	12,45	-1,59
Namibia	2010	11,43	5,778789664	10,52192461	7,33025	4,87	2,52
Namibia	2011	12,52	4,734508011	11,6860117	7,300025	5,01	6,42
Namibia	2012	13,04	-2,344442065	4,14380678	8,193770833	6,72	7,99
Namibia	2013	12,04	4,084375506	12,78373634	9,750075	5,6	6,45
Namibia	2014	12,44	0,428951191	7,842805652	10,8428875	5,35	3,58
Namibia	2015	11,34	5,256452817	9,104842967	12,88192083	3,39	7,4
Namibia	2016	10,72	1,737319337	6,052806661	14,70876667	6,73	3,35
Namibia	2017	12,9	0,097994758	13,97997717	13,3129	6,15	2,18
Namibia	2018	13,68	5,471391556	6,390409566	13,23394167	4,29	1,71
Namibia	2019	12,54	8,86737456	10,53362751	14,44869042	3,72	-1,41
Namibia	2020	10,58	3,187815979	8,077048266	16,46326667	2,21	-1,42
Namibia	2021	12,31	5,0394173	9,30533788	14,778675	3,62	5,27
Namibia	2022	11,45	4,113616166	8,69119307	15,6029708	2,91	7,21
South Africa	2010	41,74	3,49095979	6,934029883	7,321221961	4,09	0,88
South Africa	2011	45,82	3,279301223	8,341284534	7,261132132	5	0,9
South Africa	2012	43,44	3,882872998	5,171730257	8,209968627	5,72	1,06
South Africa	2013	40,09	2,509245497	5,916590728	9,655056069	5,78	2,05
South Africa	2014	38,12	3,56702763	7,279487973	10,85265557	6,13	1,52
South Africa	2015	34,67	3,667742833	10,32364558	12,75893088	4,54	0,44
South Africa	2016	32,36	3,278251678	6,079448927	14,70961089	6,57	0,68
South Africa	2017	38,14	4,647315485	6,425536378	13,32380142	5,18	0,54
South Africa	2018	40,42	6,108760061	5,599615663	13,23392647	4,52	1,38
South Africa	2019	38,85	5,24371093	6,110245232	14,44842705	4,12	1,32
South Africa	2020	33,76	1,907151256	9,427326461	16,45910539	3,21	0,93
South Africa	2021	41,9	0,774484235	8,031663	14,77867821	4,61	9,86
South Africa	2022	11,77	6,940817746	7,871981	16,1458	6,91	0,7
Tanzania	2010	32,01	4,674687406	25,42692369	1395,625	6,2	5,66
Tanzania	2011	34,66	2,464304207	18,23953206	1557,433333	12,69	3,55
Tanzania	2012	39,65	4,591413721	12,48554433	1571,698333	16	4,54
Tanzania	2013	45,68	5,648641681	9,965542219	1597,555833	7,87	4,57
Tanzania	2014	49,96	9,655733868	15,56726288	1653,230833	6,13	2,83
Tanzania	2015	47,38	7,912936186	18,80915114	1991,390833	5,59	3,18
Tanzania	2016	49,77	7,896286481	3,44806722	2177,086667	5,17	1,74
Tanzania	2017	53,32	14,67369538	8,027227793	2228,856667	5,32	1,76
Tanzania	2018	57	14,02141763	4,48779672	2263,781667	3,49	1,7
Tanzania	2019	61,13	14,15692325	9,641209954	2288,206667	3,46	1,99
Tanzania	2020	62,41	16,27986521	5,677291562	2294,146151	3,29	1,1
Tanzania	2021	67,84	14,23775449	10,24948	2297,764226	3,69	1,36
Tanzania	2022	69,85	13,29032735	9,48909	2325,9437	4,8	1,23
Malawi	2010	69,6	11,14611158	33,14240723	150,4858333	7,41	1,39
Malawi	2011	80,04	8,480538295	35,65653858	156,5158333	7,62	10,15
Malawi	2012	60,28	12,47173731	22,93918518	249,1066667	21,27	-0,15
Malawi	2013	55,19	14,69812997	35,0710153	364,4058333	27,28	8,18
Malawi	2014	60,48	19,36231212	18,04549783	424,8966667	23,79	9,89
Malawi	2015	63,73	19,78896166	26,39839592	499,6058333	21,87	4,51
Malawi	2016	54,33	20,55136522	15,21015226	718,005	21,71	2,13
Malawi	2017	89,44	-13,91047608	34,00347204	730,2725	11,54	1,01
Malawi	2018	98,81	24,65007946	32,21188828	732,3333333	12,42	0,78
Malawi	2019	11,02	16,65852852	50,10941618	745,5406679	9,37	0,51
Malawi	2020	12,18	12,71574118	57,26659637	749,5274939	8,63	0,37
Malawi	2021	12,63	14,21966869	78,74271437	799,525	9,31	0,37
Malawi	2022	18,5	19,82557553	96,63795355	1149,289994	13,29	0,37

The data above the is collected from the official statistics of 6 African countries including; Zambia, Botswana, Namibia, South Africa, Tanzania and Malawi, recorded by the world bank.

Table 9. First Model Simple Regression (Pooled Ols)

```
Модель 1:
Объединенный (pooled) МНК, использовано наблюдений - 78
Включено 6 пространственных объектов
Длина временного ряда = 13
Зависимая переменная: GDPBillionUSD

             коэффициент   ст. ошибка   t-статистика   p-значение
  ------------------------------------------------------------------
  const       24.6145       4.23788        5.808        1.43e-07  ***
  CPI          1.23586      0.457503       2.701        0.0085    ***
  M2          -0.103197     0.152432      -0.6770       0.5005

Среднее завис. перемен  32.61321   Ст. откл. завис. перем  21.19292
Сумма кв. остатков      31476.60   Ст. ошибка модели       20.48629
R-квадрат               0.089845   Исправ. R-квадрат       0.065574
F(2, 75)                3.701759   P-значение (F)          0.029298
Лог. правдоподобие     -344.6886   Крит. Акаике            695.3771
Крит. Шварца            702.4472   Крит. Хеннана-Куинна    698.2074
параметр rho            0.735213   Стат. Дарбина-Уотсона   0.489064
обратите внимание на сокращенные обозначения статистики
```

The model shows that homoscedastic residual levels is present. By investigating parameter rho which demonstrate individual effect closer to one in our case. We can conclude that individual effects are present and we must do panel data model other than simple regression model.

There are two types of individual effects:

- Fixed effects
- Random effects

Table 10. Second Model Regression (Fixed Effect)

```
Модель 2:
Фиксированные эффекты, использовано наблюдений - 78
Включено 6 пространственных объектов
Длина временного ряда = 13
Зависимая переменная: GDPBillionUSD

            коэффициент   ст. ошибка   t-статистика   p-значение
  ------------------------------------------------------------------
  const       48.3779       4.18304       11.57        6.70e-18  ***
  CPI         -0.425957     0.359196      -1.186       0.2397
  M2          -0.759942     0.128619      -5.908       1.14e-07  ***

Среднее завис. перемен  32.61321   Ст. откл. завис. перем  21.19292
Сумма кв. остатков      10153.53   Ст. ошибка модели       12.04369
LSDV R-квадрат          0.706408   В пределах R-квадрат    0.334187
LSDV-оценка: F(7, 70)   24.06083   P-значение (F)          2.50e-16
Лог. правдоподобие     -300.5631   Крит. Акаике            617.1261
Крит. Шварца            635.9798   Крит. Хеннана-Куинна    624.6736
параметр rho            0.146727   Стат. Дарбина-Уотсона   1.492936
обратите внимание на сокращенные обозначения статистики

Совместный тест на выбранных регрессорах -
  Тестовая статистика: F(2, 70) = 17.5673
  p-значение = P(F(2, 70) > 17.5673) = 6.56644e-07

Тест на различие констант в группах -
  Нулевая гипотеза: Группы имеют общее пересечение
  Тестовая статистика: F(5, 70) = 29.4009
  p-значение = P(F(5, 70) > 29.4009) = 5.91841e-16
```

In the second model we must investigate joint test on named regressor of model two and do F test by comparing P value with alpha. In our case P value (6,6) is more than alpha. Comparing the first and second models, we can say that the first model is good.

However, we know that individual effects of the panel structure model maybe random. Therefor we must investigate model 3.

Table 11. Random Effect Model

```
Модель 3:
Случайные эффекты (GLS), использовано наблюдений - 78
Включено 6 пространственных объектов
Длина временного ряда = 13
Зависимая переменная: GDPBillionUSD

            коэффициент   ст. ошибка      z      p-значение
  ----------------------------------------------------------
  const       45.7505       8.81030      5.193     2.07e-07  ***
  CPI         -0.241168     0.358664    -0.6724    0.5013
  M2          -0.687830     0.127861    -5.380     7.47e-08  ***

Среднее завис. перемен  32.61321   Ст. откл. завис. перем  21.19292
Сумма кв. остатков      47974.19   Ст. ошибка модели       25.12448
Лог. правдоподобие     -361.1239   Крит. Акаике            728.2478
Крит. Шварца            735.3179   Крит. Хеннана-Куинна    731.0781
параметр rho            0.146727   Стат. Дарбина-Уотсона   1.492936
обратите внимание на сокращенные обозначения статистики

Межгрупповая дисперсия = 347.115
Внутригрупповая дисперсия = 145.05
тета (theta), использованная для квази-деусреднения (demeaning) = 0.823526
corr(y,yhat)^2 = 0.00444119

Совместный тест на выбранных регрессорах -
  Асимптотическая тестовая статистика: Хи-квадрат(2) = 29.3335
  p-значение = 4.26896e-07

Тест Бройша-Пагана (Breusch-Pagan) -
  Нулевая гипотеза: Дисперсия специфических для наблюдений ошибок = 0
  Асимптотическая тестовая статистика: Хи-квадрат(1) = 101.068
  p-значение = 8.88621e-24

Тест Хаусмана (Hausman) -
  Нулевая гипотеза: ОМНК оценки состоятельны
  Асимптотическая тестовая статистика: Хи-квадрат(2) = 5.94075
  p-значение = 0.051284
```

Comparing model 1 and model 3 we have to investigating Breusch-Pagan test of model 3 by comparing P value with alpha.

In our case the P value (4,27) is more than alpha. We can conclude that model one is better.

CONCLUSION AND RECOMMENDATIONS

Rapid economic development and long-term growth require avoiding frequent or severe economic shocks that adversely affect the economy. These shocks lead to higher exchange rates, higher interest rates and higher inflation.

Despite all the challenges facing the Zambian government, these are some of the ways the Zambian government can accelerate economic growth in the county.

Strengthening all national institutions whose diversity and volatility affect long-term growth rates, including the economic ownership structure. The structure of property rights, especially the freedom of private enterprise. The level of protection for private property rights (and individuals), including fight against corruption. Intensity of competition among providers and the national budget.

However, certain temporary growth mechanisms help overcome the limitation for such growth to be sustainable, it must be based on innovation. Furthermore, measures encouraging investors may be more helpful to the Zambian economy.

Increased investment, on the other hand, is highly recommended that the government also support more investment-promoting policies, as foreign direct investment shown to have a favorable impact in the short run but is minor in long run. These should attract more investors to stay longer. To ensure a favorable and consistent impact of current account balance (CAB) in long run, the Zambian government ought to ensure its economy diversifies its export base and improves its external debt management.

In Zambia, human capital can significantly contribute to economic development in several ways if the government invest in education and skill development centers which will helps the country to build a knowledgeable and skilled workforce, this will foster innovation and productivity and also enhance social, stability and political development, creating a conducive environment for economic growth, attracting investments, and ensuring long term stability.

REFERENCE

1. Barro, Robert J. “Economic Growth in a Cross Section of Countries.” *The Quarterly Journal of Economics*, vol. 106, no. 2, 1991, pp. 407–43. *JSTOR*, https://doi.org/10.2307/2937943. Accessed 10 Dec. 2023.
2. Beveridge, Andrew A. “Economic Independence, Indigenization, and the African Businessman: Some Effects of Zambia’s Economic Reforms.” *African Studies Review*, vol. 17, no. 3, 1974, pp. 477–90. *JSTOR*, https://doi.org/10.2307/523796. Accessed 10 Dec. 2023.
3. Chiziane, E., Gift, R., Kibugi, R., Wardell, D. A., Segger, M.-C. C., & Haywood, C. (2015). Annex 1.: International standards for sustainable land use and sustainable investment. In *Legal frameworks enabling sustainable land-use investment in Mozambique: Current strengths and opportunities for improvement* (pp. 49–50). Center for International Forestry Research. http://www.jstor.org/stable/resrep02393.10
4. Kagochi, John M., et al. “Does Financial Development hold the key to Economic Growth? The Case of Sub-Saharan Africa.” *The Journal of Developing Areas*, vol. 47, no. 2, 2013, pp. 61–79. *JSTOR*, http://www.jstor.org/stable/23612283. Accessed 10 Dec. 2023.
5. LEDERMAN, DANIEL, et al. “In Search of the Missing Resource Curse [with Comments].” *Economía*, vol. 9, no. 1, 2008, pp. 1–57. *JSTOR*, http://www.jstor.org/stable/40607907. Accessed 10 Dec. 2023.