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Research Article

How unemployment in different age groups is affected by tourism

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Abstract

This study investigates the impact of tourism growth on unemployment rates across different age groups in Albania, using annual data from 2001 to 2022. We find that an increase in the number of tourists significantly reduces unemployment for the 20-34 age group, while it increases unemployment for those over 35 years old. No significant effect is found for the 16-19 age group. This suggests that policies promoting tourism development should consider potential negative consequences for older workers and implement measures to mitigate these effects.

Keywords: Tourism, Unemployment, Age-specific unemployment, Labor market dynamics, Economic development, Albania, Employment trends, Socioeconomic impact, Youth employment, Aging workforce

1. Introduction

Tourism is one of the sectors with potential for development in Albania (Schiopoiu and Ozuni, 2021). Based on the report of the World Travel and Tourism Council (WTTC), it turns out that in Albania 21.2% of employees work in this sector, namely in Tourism (246,700 employees). Translated into GDP, when the direct and indirect impact is taken into account, it turns out that 21.6% of GDP is precisely a product of tourism (WTTC, 2023). Therefore, one fifth of the workforce is engaged in the Tourism sector (WTTC, 2022).

Given that Tourism is receiving more focus day by day and is expected to further develop as a sector in the medium-term (Zhang, Xiong, Zhaojun & Lixiang, 2022), it is very important to study how it affects the lives of citizens. This study is focused on the impact of changes in the number of tourists on employment according to age groups. The data available from official employment statistics do not create a sufficient time frame to create studies and analyses of the impact of tourism, therefore I decided to look at the case of unemployment instead of employment. Therefore, the opposite of

employment, unemployment according to age groups, will be studied. To find out which age group's unemployment is most affected by the change in the number of tourists in Albania, this study performs regressions with annual tourism data and the number of unemployed over 2001-2022. The regression performed is OLS and diagnostic tests and model importance tests have also been conducted to determine whether the model used is appropriate or not. In the literature, we have various studies that look at gender differences, but no studies that show us whether the change in the number of tourist arrivals affects different age groups, in different ways and to different extents. Since the available annual data is for the number of unemployed individuals, I have calculated the proportion that a particular age group represents out of the total number of unemployed. The age groups for which unemployment data is available are: 16-19 years old, 20-34 years old, and over 35 years old. The period under consideration is the interval of the years 2001-2022 (INSTAT, 2024).

The constructed regression is a simple regression (also due to the small number of time series) to examine the impact that the change in the number of tourists has on unemployment by age group. Since the unemployment variable shows a trend over different periods, the trend is also included as a variable in the regression to remove this effect. In other words, the effect of the unemployment trend has been removed.

The regression performed is:

$$\textit{Age Group} = \beta_0 + \beta_1 * \textit{ln(tour)} + t \quad [1]$$

Where:

- *Age Group* is the proportion of unemployed individuals in a specific age group to the total number of unemployed.
- β_0 is the constant.
- β_1 is the impact coefficient.
- *ln(tour)* is the natural logarithm of the number of tourists.
- *t* is the trend.

The logarithm of the number of tourists was taken to improve the variance of the variable (large numbers) and also to look at the percentage change. We will try to answer the question of how much the proportion of unemployed people of a certain age will change when the number of tourists increases by 10%.

The results indicate that an increase in the number of tourists affects the unemployment rate of the 20-34 age group and those over 35, but the impact is opposite for the two age groups. For the unemployment rate of the 16-19 age group, the change in the number of tourists does not show a statistically significant impact.

The increase in the number of tourists has a positive impact on the younger age group of 20-34 years, reducing their unemployment rate relative to the total number of unemployed. Specifically, a 10% increase in the number of tourists would lead to a 0.32 percentage point decrease in unemployment for young people aged 20-34 compared to the total unemployed.

The opposite is true for the slightly older age group, those over 35. It seems that they are negatively affected by the increase in the number of tourists because their share of unemployed, compared to the total number of unemployed, increases. Specifically,

a 10% increase in the number of tourists would increase the share of unemployed people over 35 years old compared to the total unemployed by 0.35 percentage points. To test the significance of the model, we used the Reset test, which indicates that the constructed models are significant (does not have a misspecification of the model). Additionally, we performed a test for heteroskedasticity, which revealed issues at the 5% level of statistical significance. This could lead to shifts in the coefficients.
Dependent variable: Proportion of Unemployed. Independent variables: logarithm of the number of tourists, and trend.

Table 1. Results from the First Model: Impact on Unemployment Across Age Groups Due to an Increase in Tourist Numbers.

	16-19 yr.	20-34 yr.	35+ yr.
Impact	-0.003	-0.032	0.035
p-value	0.521	0.033	0.044
R square	0.903	0.919	0.934
Reset Test	0.001	0.540	0.447
Heteroscedasticity	0.926	0.005	0.026
P-Value (F-Stat)	0.000	0.000	0.000

Source: Personal Calculation
Since the model presented above shows issues with the heteroskedasticity test, we have constructed another model, now considering the first difference of the logarithm of the number of tourists in Albania.

2. Second Model based on the first difference of the log of the number of tourists

The same results as above are also shown when we consider the first difference of the logarithm of the number of tourists. There is a positive impact for the 20-34 age group, i.e., a decrease in the share of unemployment for this age group compared to the total, and a negative impact for the over 35 age group, i.e., an increase in the share of unemployed in this age group compared to the total. Now the interpretation has a difference:
An increase in the growth of tourists by 10% would lead to a 0.37 percentage point decrease in the share of unemployed people aged 20-34 compared to the total number of employed, and an increase of 0.42 percentage points in the share of unemployed people over 35 years old compared to the total unemployed.
Statistical significance tests show that both coefficients of the impact of tourism on unemployment for the 20-34 age group and those over 35 are significant. Meanwhile, the coefficient for the 16-19 age group remains insignificant even in this regression.
Model significance tests, the Reset test, shows that there is no case of model misspecification. Therefore, the model is constructed correctly.
Likewise, the heteroskedasticity test for the two significant models, the 20-34 age

group and those over 35, shows that we have no problems at the 5% level of statistical significance.
Dependent variable: Proportion of Unemployed. Independent variables: difference of the logarithm of the number of tourists, and trend.

Table 2 Results from the Second Model: Impact on Unemployment Across Age Groups Due to an Increase in Tourist Numbers.

	16-19 yr.	20-34 yr.	35+ yr.
Impact	0.177	-0.037	0.042
p-value	0.378	0.079	0.016
R square	0.865	0.918	0.932
Reset Test		0.917	0.940
Heteroscedasticity		0.058	0.079
P-Value (F-Stat)	0.000	0.000	0.000

Source: Personal Calculation
The results show that despite the positive impact that tourism can have on the economy, there are some issues that need attention, such as the case of unemployment among those over 35 years old. Policymakers should pay attention to this age group when making decisions related to employment or tourism, because this age group is more at risk.

3. **Conclusion**

Tourism is a sector with high development potential in the Republic of Albania and in recent years has been one of the most important contributors to Gross Domestic Product. According to the WTTC, over 21% of the workforce is employed in this sector.
Given the importance of tourism, the focus of this study has been to examine whether the increase in the number of tourists affects the employment of different age groups equally. The available data are for the years 2001-2022, and the age groups for which data are available are 16-19 years old, 20-34 years old, and over 35 years old. To examine the impact of the number of tourists on unemployment by age group, the proportion of unemployed people in an age group relative to the total number of unemployed was taken as the dependent variable.
The regression results show that the increase in the number of tourists does not change the share of unemployed people aged 16-19 compared to the total number of unemployed. Meanwhile, for the 20-34 age group, this impact is positive, where the increase in the number of tourists leads to a decrease in unemployment for this age group compared to the total number of unemployed. The opposite happens with the share of unemployed people over 35 years old compared to the total number of unemployed, where the impact is negative, meaning there is an increase in

unemployment.
The opposite effect on different age groups indicates that care must be taken with the development policies of this sector, as the impact of the increase in the number of tourists on the over-35 age group is negative, even though the effect on the 20-34 age group is positive.

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Annex

Table 3 Regression Results: Impact of Tourist Numbers on Unemployment Rate by Age Group

Dependent Variable: P20_34				
Method: Least Squares				
Date: 02/29/24 Time: 23:20				
Sample (adjusted): 2002 2022				
Included observations: 21 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNHUAJ(-1)	-0.037308	0.013291	-2.806946	D
C	0.936938	0.170799	5.485606	0.0000
@TREND	-0.004018	0.001973	-2.036913	0.0566
R-squared	0.917504	Mean dependent var		0.347398
Adjusted R-squared	0.908338	S.D. dependent var		0.061010
S.E. of regression	0.018471	Akaike info criterion		-5.013651
Sum squared resid	0.006141	Schwarz criterion		-4.864434
Log likelihood	55.64334	Hannan-Quinn criter.		-4.981267
F-statistic	100.0965	Durbin-Watson stat		0.965275
Prob(F-statistic)	0.000000			

Diagnostic Tests
The model explains almost 92% of the variance of the dependent variable and the F-statistic indicates that the model is significant.
The heteroskedasticity test below shows that at the 5% level of statistical significance, the model does not suffer from heteroskedasticity, therefore we can say that we have a good model.

Table 4

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	3.339706	Prob. F(2,18)		0.0584
Obs*R-squared	5.683589	Prob. Chi-Square(2)		0.0583
Scaled explained SS	4.755681	Prob. Chi-Square(2)		0.0928
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 02/29/24 Time: 23:27				
Sample: 2002 2022				
Included observations: 21				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.004072	0.003765	-1.081595	0.2937
LNHUAJ(-1)	0.000308	0.000293	1.050279	0.3075
@TREND	-8.34E-06	4.35E-05	-0.191894	0.8500
R-squared	0.270647	Mean dependent var		0.000292
Adjusted R-squared	0.189608	S.D. dependent var		0.000452
S.E. of regression	0.000407	Akaike info criterion		-12.64329
Sum squared resid	2.98E-06	Schwarz criterion		-12.49407
Log likelihood	135.7545	Hannan-Quinn criter.		-12.61090
F-statistic	3.339706	Durbin-Watson stat		1.727126
Prob(F-statistic)	0.058404			

The Reset test indicates that there is no case of model misspecification. Therefore, the model is constructed correctly.

Table 5

Ramsey RESET Test			
Equation: UNTITLED			
Specification: P20_34 LNHUAJ(-1) C @TREND			
Omitted Variables: Powers of fitted values from 2 to 3			
	Value	df	Probability
F-statistic	0.086827	(2, 16)	0.9173
Likelihood ratio	0.226692	2	0.8928
F-test summary:			
	Sum of Sq.	df	Mean Squares

Test SSR	6.59E-05	2	3.30E-05
Restricted SSR	0.006141	18	0.000341
Unrestricted SSR	0.006075	16	0.000380

LR test summary:

	Value
Restricted LogL	55.64334
Unrestricted LogL	55.75668

Unrestricted Test Equation:

Dependent Variable: P20_34

Method: Least Squares

Date: 02/29/24 Time: 23:37

Sample: 2002 2022

Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNHUAJ(-1)	-0.203500	0.443143	-0.459220	0.6523
C	4.605646	9.712178	0.474214	0.6418
@TREND	-0.021968	0.047025	-0.467164	0.6467
FITTED^2	-12.87277	33.24438	-0.387216	0.7037
FITTED^3	12.19751	30.87881	0.395012	0.6981
R-squared	0.918390	Mean dependent var		0.347398
Adjusted R-squared	0.897987	S.D. dependent var		0.061010
S.E. of regression	0.019486	Akaike info criterion		-4.833970
Sum squared resid	0.006075	Schwarz criterion		-4.585274
Log likelihood	55.75668	Hannan-Quinn criter.		-4.779996
F-statistic	45.01358	Durbin-Watson stat		1.028878
Prob(F-statistic)	0.000000			

The LM test indicates the presence of serial correlation, therefore the model should be examined carefully, because for this reason there may be an underestimation of standard errors, thus leading to incorrect statistical significance of the coefficients in the regression.

Table 6

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.983268	Prob. F(2,16)	0.0395
Obs*R-squared	6.980452	Prob. Chi-Square(2)	0.0305

Dependent Variable: RESID

Method: Least Squares

Date: 02/29/24 Time: 23:40				
Sample: 2002 2022				
Included observations: 21				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNHUAJ(-1)	0.005530	0.011764	0.470089	0.6446
C	-0.072040	0.151147	-0.476619	0.6401
@TREND	-0.000644	0.001746	-0.369017	0.7170
RESID(-1)	0.730049	0.258799	2.820911	0.0123
RESID(-2)	-0.367404	0.259555	-1.415518	0.1761
R-squared	0.332402	Mean dependent var		-2.19E-16
Adjusted R-squared	0.165503	S.D. dependent var		0.017523
S.E. of regression	0.016008	Akaike info criterion		-5.227245
Sum squared resid	0.004100	Schwarz criterion		-4.978549
Log likelihood	59.88607	Hannan-Quinn criter.		-5.173271
F-statistic	1.991634	Durbin-Watson stat		1.946610
Prob(F-statistic)	0.144380			

Meanwhile, when we examine the same regression with data for the unemployment of the over-35 age group (the share relative to the total unemployed), it turns out that the relationship between the variables is positive and statistically significant. A 10% increase in tourism would lead to an increase in the share of unemployed people over the age of 35 relative to the total unemployed by 0.42 percentage points. This shows that the change in the number of tourists has a positive effect on young people aged 20-34, but the consequence is on the over-35 age group.

The F-statistic indicates that the model is statistically significant even at very small levels of statistical significance. The R-squared shows that the model explains 93% of the variance in the share of unemployment of the over-35 age group relative to the total unemployed.

Table 7 ***Regression:***

Dependent Variable: P35PLUS

Method: Least Squares

Date: 03/01/24 Time: 00:02

Sample (adjusted): 2002 2022

Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNHUAJ(-1)	0.042339	0.015833	2.674066	0.0155
C	-0.089757	0.203465	-0.441141	0.6644

@TREND	0.006383	0.002350	2.716098	0.0142
R-squared	0.932256	Mean dependent var		0.601159
Adjusted R-squared	0.924729	S.D. dependent var		0.080202
S.E. of regression	0.022004	Akaike info criterion		-4.663645
Sum squared resid	0.008715	Schwarz criterion		-4.514428
Log likelihood	51.96828	Hannan-Quinn criter.		-4.631261
F-statistic	123.8538	Durbin-Watson stat		1.041280
Prob(F-statistic)	0.000000			

The Reset test indicates that the model is misspecified.

Table 8

Ramsey RESET Test			
Equation: UNTITLED			
Specification: P35PLUS LNHUAJ(-1) C @TREND			
Omitted Variables: Powers of fitted values from 2 to 3			
	Value	df	Probability
F-statistic	0.062350	(2, 16)	0.9398
Likelihood ratio	0.163033	2	0.9217
F-test summary:			
	Sum of Sq.	df	Mean Squares
Test SSR	6.74E-05	2	3.37E-05
Restricted SSR	0.008715	18	0.000484
Unrestricted SSR	0.008648	16	0.000540
LR test summary:			
	Value		
Restricted LogL	51.96828		
Unrestricted LogL	52.04979		
Unrestricted Test Equation:			
Dependent Variable: P35PLUS			
Method: Least Squares			
Date: 03/01/24 Time: 00:07			
Sample: 2002 2022			
Included observations: 21			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNHUAJ(-1)	-0.190101	0.697854	-0.272408	0.7888
C	1.475191	4.674116	0.315608	0.7564
@TREND	-0.028792	0.104543	-0.275404	0.7865
FITTED^2	9.270340	28.14158	0.329418	0.7461

FITTED^3	-5.159586	15.95502	-0.323383	0.7506
R-squared	0.932780	Mean dependent var		0.601159
Adjusted R-squared	0.915975	S.D. dependent var		0.080202
S.E. of regression	0.023248	Akaike info criterion		-4.480933
Sum squared resid	0.008648	Schwarz criterion		-4.232237
Log likelihood	52.04979	Hannan-Quinn criter.		-4.426959
F-statistic	55.50632	Durbin-Watson stat		1.011151
Prob(F-statistic)	0.000000			

The heteroskedasticity test indicates that the model does not suffer from heteroskedasticity since the p-value is greater than 0.05.

Table 9

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	2.937516	Prob. F(2,18)		0.0787
Obs*R-squared	5.167561	Prob. Chi-Square(2)		0.0755
Scaled explained SS	5.892502	Prob. Chi-Square(2)		0.0525
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 03/01/24 Time: 00:08				
Sample: 2002 2022				
Included observations: 21				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.006021	0.006341	-0.949534	0.3549
LNHUAJ(-1)	0.000450	0.000493	0.911192	0.3742
@TREND	-7.32E-06	7.32E-05	-0.099891	0.9215
R-squared	0.246074	Mean dependent var		0.000415
Adjusted R-squared	0.162305	S.D. dependent var		0.000749
S.E. of regression	0.000686	Akaike info criterion		-11.60062
Sum squared resid	8.46E-06	Schwarz criterion		-11.45140
Log likelihood	124.8065	Hannan-Quinn criter.		-11.56823
F-statistic	2.937516	Durbin-Watson stat		1.602852
Prob(F-statistic)	0.078697			

This model also, like the one above, suffers from serial correlation, so the results should be viewed with caution, due to the underestimation that may have occurred in the standard errors.

Table 10

Breusch-Godfrey Serial Correlation LM Test:				
F-statistic	4.208733	Prob. F(2,16)		0.0340
Obs*R-squared	7.239358	Prob. Chi-Square(2)		0.0268
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Date: 03/01/24 Time: 00:12				
Sample: 2002 2022				
Included observations: 21				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNHUAJ(-1)	-0.007284	0.013845	-0.526131	0.6060
C	0.094431	0.177920	0.530749	0.6029
@TREND	0.000901	0.002051	0.439301	0.6663
RESID(-1)	0.714081	0.249140	2.866178	0.0112
RESID(-2)	-0.447814	0.248439	-1.802508	0.0903
R-squared	0.344731	Mean dependent var		1.20E-16
Adjusted R-squared	0.180914	S.D. dependent var		0.020875
S.E. of regression	0.018892	Akaike info criterion		-4.895879
Sum squared resid	0.005711	Schwarz criterion		-4.647183
Log likelihood	56.40673	Hannan-Quinn criter.		-4.841906
F-statistic	2.104366	Durbin-Watson stat		1.862168
Prob(F-statistic)	0.127731			

When we look at the results for the 16-19 age group, it turns out that their share of unemployed relative to the total is not affected by the change in the number of tourists. This is because the coefficient of the variable of the change in the number of tourists is statistically insignificant.

Table 11 Regression:

Dependent Variable: LN16_19				
Method: Least Squares				
Date: 03/01/24 Time: 00:13				
Sample (adjusted): 2002 2022				
Included observations: 21 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNHUAJ(-1)	0.177372	0.196165	0.904198	0.3778
C	7.659178	2.520810	3.038380	0.0071

@TREND	-0.129998	0.029116	-4.464845	0.0003
R-squared	0.865185	Mean dependent var		8.672770
Adjusted R-squared	0.850205	S.D. dependent var		0.704367
S.E. of regression	0.272613	Akaike info criterion		0.370040
Sum squared resid	1.337726	Schwarz criterion		0.519258
Log likelihood	-0.885422	Hannan-Quinn criter.		0.402424
F-statistic	57.75801	Durbin-Watson stat		0.752053
Prob(F-statistic)	0.000000			

Table for the regression of the share of unemployed in an age group against the number of tourists:

Table 12 Regression 1:

Dependent Variable: _16_19_VJEC/GJITHSEJ				
Method: Least Squares				
Date: 06/03/24 Time: 21:20				
Sample (adjusted): 2001 2022				
Included observations: 22 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNHUAJ	-0.003026	0.004623	-0.654644	0.5205
C	0.125044	0.060126	2.079692	0.0513
@TREND	-0.002488	0.000671	-3.708664	0.0015
R-squared	0.903486	Mean dependent var		0.052343
Adjusted R-squared	0.893327	S.D. dependent var		0.019856
S.E. of regression	0.006485	Akaike info criterion		-7.112488
Sum squared resid	0.000799	Schwarz criterion		-6.963709
Log likelihood	81.23737	Hannan-Quinn criter.		-7.077440
F-statistic	88.93175	Durbin-Watson stat		0.778908
Prob(F-statistic)	0.000000			

Table 13 Regression 1:

Dependent Variable: _20_34_VJEC/GJITHSEJ				
Method: Least Squares				
Date: 06/03/24 Time: 21:20				
Sample (adjusted): 2001 2022				
Included observations: 22 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

LNHUAJ	-0.031967	0.013856	-2.307062	0.0325
C	0.877266	0.180219	4.867782	0.0001
@TREND	-0.005091	0.002011	-2.532377	0.0203
R-squared	0.919102	Mean dependent var		0.352961
Adjusted R-squared	0.910586	S.D. dependent var		0.065006
S.E. of regression	0.019438	Akaike info criterion		-4.917037
Sum squared resid	0.007179	Schwarz criterion		-4.768259
Log likelihood	57.08741	Hannan-Quinn criter.		-4.881990
F-statistic	107.9318	Durbin-Watson stat		0.835141
Prob(F-statistic)	0.000000			

Reset test: The Reset test indicates that the model is well-specified.

Table 14

Ramsey RESET Test				
Equation: UNTITLED				
Specification: _20_34_VJEC/GJITHSEJ LNHUAJ C @TREND				
Omitted Variables: Powers of fitted values from 2 to 3				
	Value	df	Probability	
F-statistic	0.639250	(2, 17)	0.5399	
Likelihood ratio	1.595266	2	0.4504	
F-test summary:				
	Sum of Sq.	df	Mean Squares	
Test SSR	0.000502	2	0.000251	
Restricted SSR	0.007179	19	0.000378	
Unrestricted SSR	0.006677	17	0.000393	
LR test summary:				
	Value			
Restricted LogL	57.08741			
Unrestricted LogL	57.88504			
Unrestricted Test Equation:				
Dependent Variable: _20_34_VJEC/GJITHSEJ				
Method: Least Squares				
Date: 06/03/24 Time: 21:21				
Sample: 2001 2022				
Included observations: 22				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

LNHUAJ	0.167826	0.292147	0.574458	0.5732
C	-3.702152	6.910546	-0.535725	0.5991
@TREND	0.023694	0.045785	0.517512	0.6115
FITTED^2	15.08538	25.33312	0.595481	0.5594
FITTED^3	-12.46563	23.34401	-0.533997	0.6003
R-squared	0.924760	Mean dependent var		0.352961
Adjusted R-squared	0.907057	S.D. dependent var		0.065006
S.E. of regression	0.019818	Akaike info criterion		-4.807731
Sum squared resid	0.006677	Schwarz criterion		-4.559767
Log likelihood	57.88504	Hannan-Quinn criter.		-4.749318
F-statistic	52.23622	Durbin-Watson stat		0.757965
Prob(F-statistic)	0.000000			

Heteroskedasticity Test: The Heteroskedasticity Test for this regression is 0.0263, which indicates it is significant at the 5% level of statistical significance and suffers from heteroskedasticity.

Table 15

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	7.022594	Prob. F(2,19)		0.0052
Obs*R-squared	9.350655	Prob. Chi-Square(2)		0.0093
Scaled explained SS	7.319246	Prob. Chi-Square(2)		0.0257
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 06/03/24 Time: 21:21				
Sample: 2001 2022				
Included observations: 22				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000586	0.003576	0.163755	0.8717
LNHUAJ	-6.29E-05	0.000275	-0.228694	0.8215
@TREND	5.71E-05	3.99E-05	1.431635	0.1685
R-squared	0.425030	Mean dependent var		0.000326
Adjusted R-squared	0.364507	S.D. dependent var		0.000484
S.E. of regression	0.000386	Akaike info criterion		-12.75670
Sum squared resid	2.83E-06	Schwarz criterion		-12.60792
Log likelihood	143.3237	Hannan-Quinn criter.		-12.72165
F-statistic	7.022594	Durbin-Watson stat		1.784960
Prob(F-statistic)	0.005208			

Table 16 Regression 1:

Dependent Variable: _35_VJEC_E_LART/GJITHSEJ				
Method: Least Squares				
Date: 06/03/24 Time: 19:38				
Sample (adjusted): 2001 2022				
Included observations: 22 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNHUAJ	0.034995	0.016195	2.160896	0.0437
C	-0.002336	0.210637	-0.011092	0.9913
@TREND	0.007579	0.002350	3.225109	0.0045
R-squared	0.933717	Mean dependent var		0.594694
Adjusted R-squared	0.926740	S.D. dependent var		0.083937
S.E. of regression	0.022719	Akaike info criterion		-4.605109
Sum squared resid	0.009807	Schwarz criterion		-4.456330
Log likelihood	53.65620	Hannan-Quinn criter.		-4.570061
F-statistic	133.8255	Durbin-Watson stat		0.862773
Prob(F-statistic)	0.000000			

Reset Test: The Reset test indicates that the model is well-specified.

Table 17

Ramsey RESET Test			
Equation: UNTITLED			
Specification: _35_VJEC_E_LART/GJITHSEJ LNHUAJ C @TREND			
Omitted Variables: Powers of fitted values from 2 to 3			
	Value	df	Probability
F-statistic	0.844119	(2, 17)	0.4472
Likelihood ratio	2.082983	2	0.3529
F-test summary:			
	Sum of Sq.	df	Mean Squares
Test SSR	0.000886	2	0.000443
Restricted SSR	0.009807	19	0.000516
Unrestricted SSR	0.008921	17	0.000525
LR test summary:			
	Value		
Restricted LogL	53.65620		
Unrestricted LogL	54.69769		
Unrestricted Test Equation:			
Dependent Variable: _35_VJEC_E_LART/GJITHSEJ			

Method: Least Squares				
Date: 06/03/24 Time: 21:22				
Sample: 2001 2022				
Included observations: 22				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNHUAJ	-0.506931	0.440207	-1.151574	0.2654
C	2.991335	2.451789	1.220062	0.2391
@TREND	-0.107718	0.095166	-1.131898	0.2734
FITTED^2	26.82150	21.59737	1.241887	0.2311
FITTED^3	-15.47453	12.28219	-1.259916	0.2247
R-squared	0.939705	Mean dependent var		0.594694
Adjusted R-squared	0.925518	S.D. dependent var		0.083937
S.E. of regression	0.022908	Akaike info criterion		-4.517972
Sum squared resid	0.008921	Schwarz criterion		-4.270007
Log likelihood	54.69769	Hannan-Quinn criter.		-4.459559
F-statistic	66.23690	Durbin-Watson stat		0.816548
Prob(F-statistic)	0.000000			

Heteroskedasticity Test: The Heteroskedasticity Test for this regression is 0.0263, which indicates it is significant at the 5% level of statistical significance and thus the model suffers from heteroskedasticity.

Table 18

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	4.431158	Prob. F(2,19)		0.0263
Obs*R-squared	6.997658	Prob. Chi-Square(2)		0.0302
Scaled explained SS	7.745920	Prob. Chi-Square(2)		0.0208
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 06/03/24 Time: 21:23				
Sample: 2001 2022				
Included observations: 22				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001534	0.006327	-0.242511	0.8110
LNHUAJ	9.21E-05	0.000486	0.189343	0.8518
@TREND	5.55E-05	7.06E-05	0.786180	0.4415
R-squared	0.318075	Mean dependent var		0.000446
Adjusted R-squared	0.246294	S.D. dependent var		0.000786

S.E. of regression	0.000682	Akaike info criterion	-11.61571
Sum squared resid	8.85E-06	Schwarz criterion	-11.46693
Log likelihood	130.7728	Hannan-Quinn criter.	-11.58067
F-statistic	4.431158	Durbin-Watson stat	1.610179
Prob(F-statistic)	0.026333		