

# Estimating the Global Effects of the Covid-19 Pandemic on GDP Growth Rate

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- Annual data of 217 countries from 1973-2022 from the World Bank
- Variables: Annual GDP Growth Rate, GDP Per Capita, Unemployment rate, Real Effective Exchange rate Index, Tariff rate, High Technology Exports, Current Health Expenditure, Working age Population, Labor Force Participation rate of working age population

# Income Categorization

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- Low-income countries: GNI per capita of \$1,045 or less.
- Lower-middle-income countries: GNI per capita between \$1,046 and \$4,095.
- Upper-middle-income countries: GNI per capita between \$4,096 and \$12,695.
- High-income countries: GNI per capita of \$12,696 or more.

# Average Growth rate by Income Level

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- Country level fixed effects models
- 2 Base models with all variables as control, one consists of an interactive term Covid:Income level
- 3 Restricted models with no interactive term
- 3 Restricted models with interactive term

# Base Models

Table 3: Base Models

	<i>Dependent variable:</i>	
	<i>gdpgr</i>	
	(1)	(2)
urate	-0.181*** (0.057)	-0.178*** (0.051)
exrate	-0.004 (0.023)	-0.007 (0.025)
tarrate	0.082 (0.093)	0.084 (0.092)
hightechexp	-0.052 (0.042)	-0.052 (0.041)
healthexp	-1.157*** (0.218)	-1.152*** (0.216)
pop	-2.488 (1.776)	-2.861 (1.763)
pop_sq	0.015 (0.014)	0.018 (0.014)
labparttr	0.031 (0.050)	0.028 (0.052)
covid	-6.405*** (0.509)	-5.776*** (0.531)
incomeLow		-3.875** (1.716)
incomeLower mid		-0.431 (1.542)
incomeUpper mid		-0.490 (1.235)
covid:incomeLow		2.002 (1.226)
covid:incomeLower mid		-2.544 (2.579)
covid:incomeUpper mid	15	-2.050* (1.206)
Observations	809	809
R <sup>2</sup>	0.503	0.511
Adjusted R <sup>2</sup>	0.441	0.445
Residual Std. Error	2.822 (df = 718)	2.812 (df = 712)

# Restricted Models with no Interactive Term

Table 4: Restricted models with no interactive term

	<i>Dependent variable:</i>		
		gdpgr	
	(1)	(2)	(3)
urate	-0.282*** (0.058)	-0.205*** (0.057)	-0.257*** (0.053)
tarrate	0.033 (0.071)		
exrate		-0.009 (0.021)	
hightechexp	0.001*** (0.0001)	-0.044 (0.039)	0.001*** (0.00004)
healthexp	-1.225*** (0.216)	-0.811*** (0.217)	-0.940*** (0.221)
labpartr	-0.023 (0.036)		
pop		-0.477*** (0.123)	-0.406*** (0.111)
covid	-6.608*** (0.488)	-6.973*** (0.488)	-7.126*** (0.444)
Observations	1,206	908	1,401
R <sup>2</sup>	0.514	0.481	0.498
Adjusted R <sup>2</sup>	0.444	0.424	0.434
Residual Std. Error	3.023 (df = 1055)	2.845 (df = 817)	3.018 (df = 1240)

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01



# Restricted Models with Interactive Term

Table 5: Restricted models with interactive term

	Dependent variable:		
	(1)	gdpgr (2)	(3)
urate	-0.270*** (0.057)	-0.198*** (0.052)	-0.251*** (0.052)
tarrate	0.030 (0.068)		
exrate		-0.012 (0.022)	
hightechexp	0.002*** (0.0001)	-0.044 (0.038)	0.002*** (0.0002)
healthexp	-1.296*** (0.209)	-0.807*** (0.215)	-0.952*** (0.220)
labpartr	-0.024 (0.037)		
pop		-0.463*** (0.124)	-0.382*** (0.113)
covid	-4.941*** (0.532)	-6.394*** (0.541)	-6.185*** (0.553)
incomeLow	-0.346 (1.585)	-3.748** (1.586)	-1.173 (1.310)
incomeLower mid	0.588 (1.335)	-0.506 (1.451)	-0.325 (1.035)
incomeUpper mid	-0.519 (0.961)	-0.561 (1.241)	-0.674 (0.868)
covid:incomeLow	-2.760*** (1.030)	1.788*** (0.632)	-0.187 (1.012)
covid:incomeLower mid	-3.823*** (1.122)	-2.730 (2.666)	-1.307 (1.158)
covid:incomeUpper mid	-3.007*** (0.960)	-1.796* (1.013)	-2.232** (0.889)
	17		
Observations	1,206	908	1,401
R <sup>2</sup>	0.526	0.487	0.503
Adjusted R <sup>2</sup>	0.456	0.426	0.437
Residual Std. Error	2.992 (df = 1049)	2.838 (df = 811)	3.010 (df = 1234)

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

# Residual plot of Base Models

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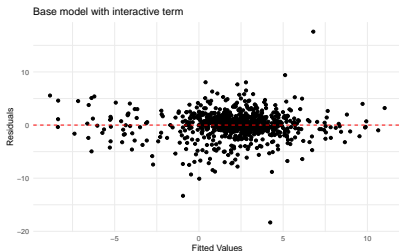
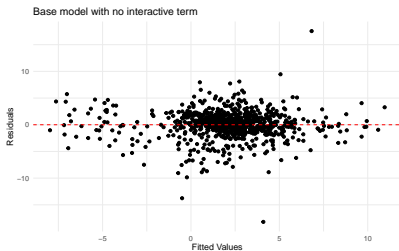
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# Residual plot of Restricted Models with no Interactive term

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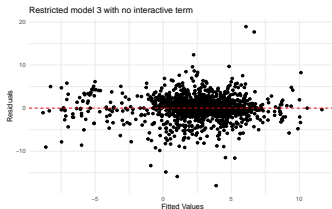
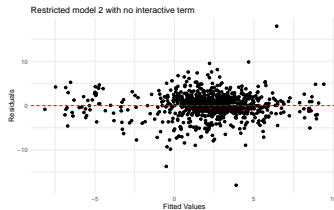
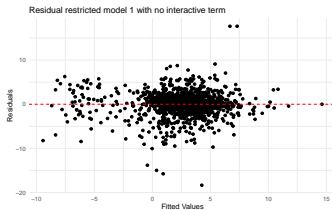
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# Residual plot of Restricted Models with interactive term

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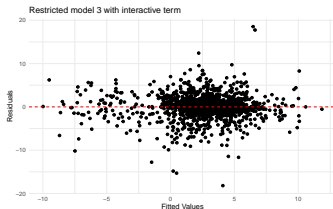
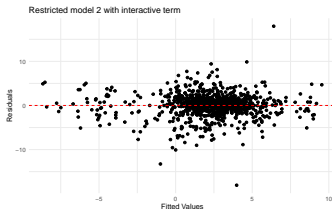
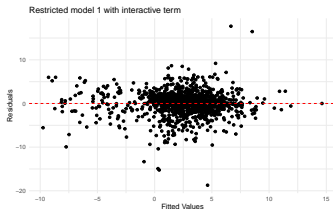
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# Breusch-Pagan Test Results

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Model	BP Statistic	Df	P-value
1 (Base model with no int term)	19.016	9	0.02505
2 (Restricted model 1 with no int term)	16.818	6	0.009978
3 (Restricted model 2 with no int term)	14.541	6	0.02415
4 (Restricted model 3 with no int term)	17.972	5	0.002981
5 (Base model with int term)	32.482	15	0.005532
6 (Restricted model 1 with int term)	18.108	12	0.1125
7 (Restricted model 2 with int term)	26.675	12	0.008605
8 (Restricted model 3 with int term)	22.285	11	0.02225

# Conclusion

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- Covid had a significant impact on the global economy as suggest by all models
- High-income countries are less impacted by the pandemic than others
- Restricted model 1 suggests:
  - High-income countries: -4.941%
  - Upper middle income countries: -7.948%
  - Lower middle income countries: -8.764%
  - Low-income countries: -7.7%