

*Inflation's Role
on Tertiary
Enrollment: A
Global Study*

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Introduction & Motivations

- Why even look at enrollment in higher education?
 - U.S. tertiary enrollment decreased 5% from 2009 to 2019 (National Center for Education Statistics)
- Enrollment plays a role in governmental aid budgets, supply of labor, staff shortages and wage equilibrium
 - Less aid leading to higher tuitions
 - Industry vacancies caused by COVID-19 pandemic: can enrollment meet its demands?
- Can we establish a baseline for any connection between inflation rates and tertiary enrollment?
 - If baseline exists, how static is it?
 - Elasticity of potential university students?



Literature Review

- Ewing, Beckert, and Ewing (2010)
 - Males tended to forgo college in times of economic growth and females tended to attend college more heavily in times of inflation from 1963-2004 (U.S.)
- Hemelt and Marcotte (2011)
 - Enrollment by headcount and credit hours were significantly impacted by real increases in tuition, but that the impact on enrollment by full-time freshmen was not statistically significant at the 5% level from 1991-2006 (U.S.)
- Long (2014)
 - Enrollment, measured by total fall enrollment and the adjusted fall enrollment was found to increase during the period of the American 2008 recession from prior years 2004-2005 beyond the increase accounted for by the time trend (U.S.)



Model and Hypotheses

$$\text{enrollment} = \beta_0 + \beta_1 \text{inf} + \beta_2 \log(\text{gdp}) + \beta_3 \log(\text{ni.per.capita}) + \beta_4 \text{ue} + \beta_5 \text{free} + u$$

- where u represents the mean-zero, normally distributed error term
- Logarithmic transformations imposed on GDP and NI per capita for percent change interpretation
- Does inflation (β_1) affect enrollment worldwide?
 - $H_0 : \beta_1 = 0$
 - $H_a : \beta_1 \neq 0$



Data Used

- Data gathered for 143 countries for year 2019
- **Enrollment (*enrollment*)**: gross total enrollment in tertiary education measured as a percentage of the total population of that age group chosen by the government [World Bank]
- **Inflation (*inf*)**: annual growth rate of the GDP deflator [World Bank], chosen over CPI due to its incorporation of all prices, not just consumer spending
- **NI per capita (*ni_per_capita*)**: a proxy for median income of country that acts as ability to afford higher ed; average income per person in a country [World Bank]
- **GDP (*gdp*)**: acts as a proxy for development stage of country and cultural beliefs surrounding education [World Bank]
- **Unemployment (*ue*)**: controls for influxes of prospective students [World Bank]
- **Free tuition availability (*free*)**: a proxy for financial aid, "1" indicates government offers citizens free tuition [World Population Review]
- 13 dropped due to missing values in unemployment and NI per capita, leading to end sample size of 130



Dummy Variable *free*: Justifiable?

- Data for 2019 were not available, so closest year (2022) was chosen in conjunction with other variables as if from the year 2019
- 2022 data deemed to have no significant differences from 2019 data
 - Data for free tuition were published in January 2022
 - Enrollment data for 2019 implies a traditional start date in the fall, with the other variables encompassing a 12-month average for 2019
- Free tuition programs are not instantaneous
 - A lag of a little over a year is not enough time for a country to legislate and pass functional program

Summary Statistics of Model Variables

Table 1: Summary Statistics of Model Variables

Statistic	N	Mean	St. Dev.	Min	Max
enrollment	143	49.639	29.153	3.092	148.531
inf	143	3.420	5.892	-4.456	50.921
ni_per_capita	131	13,749.690	15,768.220	199.888	65,600.050
ue	140	6.602	4.768	0.100	28.470
free	143	0.154	0.362	0	1
gdptril	143	2.345	6.736	0.0002	53.983

Results

Table 3: Model Summary

	<i>Dependent variable:</i>	
	Ordinary Standard Errors	enrollment Heteroskedastic Robust Standard Errors
	(1)	(2)
inf	1.379*** (0.335)	1.379*** (0.491)
log(gdp)	0.805 (0.713)	0.805 (0.594)
log(ni_per_capita)	16.716*** (1.484)	16.716*** (1.394)
ue	0.378 (0.363)	0.378 (0.469)
free	5.561 (4.912)	5.561 (5.726)
Constant	-126.897*** (19.052)	-126.897*** (14.723)
Observations	130	130
R ²	0.625	0.625
Adjusted R ²	0.610	0.610
Residual Std. Error (df = 124)	18.535	18.535
F Statistic (df = 5; 124)	41.361***	41.361***

Note:

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



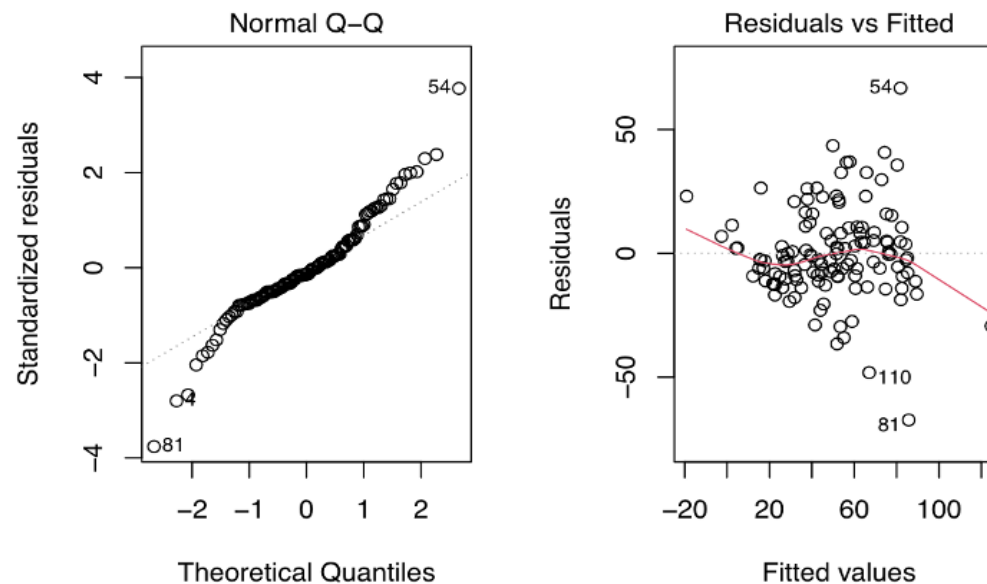
Model Assumptions: Upheld?

- World Bank and World Population Review data rely on reported data from each country
 - Caused exogenous sample selection based on exclusion of countries that did not report inflation, but missing at random does not cause bias or inconsistency in OLS estimators
- Possible endogenous sample selection if countries did not report enrollment data
 - Missing not at random causes bias but does not change magnitude of estimate, which is more important here than statistical significance
- Possible violation of exogeneity assumption: omitted variable bias due to unquantifiable variables such as social customs, political atmosphere, infrastructure
 - Omitted variables represented adequately through GDP and NI per capita

Model Assumptions: Upheld?

- Homoskedasticity may be violated, so heteroskedastic robust standard errors used
- Normality of errors may be violated but asymptotic normality may be relied upon due to decent sample size for small number of predictors

Figure 3: Diagnostic Plots of Regression Model





Limitations of Study

- Lack of available data limited possibility for the better fit panel data approach
 - Enrollment affected on year-by-year basis, or evens out over time?
 - Lagged variables: changes in tuitions, financial aid announcements, job outlook, economic expectations
 - Elasticity of students could not be explored
- Various unquantifiable control variables potentially omitted
 - Social customs, political atmosphere, infrastructure, average cost of attendance
 - Possibility of omitted variable bias
- Dummy variable *free* encompassing data for year 2022 instead of 2019
- Not all countries reported data
 - Possible exogeneous sample selection?



Significance and Implications

- A significant positive effect on enrollment could cause a jump in current economic conditions
 - Global GDP deflator rose from 1.8% in 2020 to 4.1% in 2021 (The World Bank)
 - Answer to labor shortage?
- Potential students rather attend at higher prices to combat said prices with higher potential earnings of a degree
 - Direct effect of inflation or byproduct of expansion stage of business cycle?
- More loans taken out due to increased enrollment and/or lower real interest rates?
 - Biden Administration student loan forgiveness plan
- Shift in governmental policy towards education budgets?
 - Lower future tuition prices?

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Thank you International
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