Why are we poorer than our parents? A Cross-Country Analysis of Absolute Intergenerational Mobility

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1 Introduction

The global GDP has been rising exponentially since the Industrial Revolution. In other words, the world is a much richer place today than it was at any point in the past centuries. At a cursory glance, the younger generations should be getting better off, thanks to this rising trend. In fact, some generations such as baby boomers have enjoyed rising living standards, home ownership, and a growing sense of prosperity. However, for the first time since the Industrial Revolution, successive generations, specifically Millennials and Generation Z, are not becoming wealthier than their parents. More precisely, the young generation faces falling real incomes, worse job prospects, chronic housing costs, and less social mobility. For instance, the generation of American children who were born in the 1980s had just a 50% chance of making more money than their parents, while this ratio was 90% during the post-war years in the U.S. Chetty et al. (2017). When it comes to today, on the other hand, among adults of working age in OECD countries, almost 65% fear they will not have as much financial security as their parents, and nearly the same percentage worry their children will have even less.

In most places, including the developed world, the class you are born into still dominates your chances to do well in life. For example, in the so-called "land of opportunities", there is just a 7% probability of moving from the bottom fifth of income distribution to the top fifth Chetty et al. (2014). Although the degree and the structure of social immobility are subject to change over time and places, it is a global issue affecting millions of lives. What is most striking is that the hidden privileges that are going on underneath the surface exacerbate the existing social mobility, but mostly stay as unseen and unheard. Thus, understanding and revealing these forces of social mobility is important for disadvantaged groups and future policy recommendations. Therefore, this study aims to contribute to the literature by approaching the issue from the point of view of change in living standards in terms of consumption level, education, and health, respectively.

2 Literature review

Established literature analyzed the social mobility phenomena by dividing it into several categories. First and foremost, mobility can be expressed as a set of escalators changing the social

status and possible opportunities of one during a lifetime or among generations. While the former is called "intra-generational", the latter is named as "inter-generational" mobility. Considering the former, it is important to note that mobility can be seen as upward or downward over a lifetime. In other words, one can experience income increase or decrease, and so does income position. In the inter-generational mobility case, on the other hand, the comparison is made in individual states in terms of income, occupation, health, and education between children and their parents CO-OPERATION and DEVELOPMENT. (2018).

When it comes to the determinants of inter-generational social mobility, Causa and Johansson (2011) shows that the parental background can influence offspring outcomes throughout several channels. The multidimensionality of the issue can be briefly summarized as follows: parents' education, so does their socioeconomic status impacts offspring's wages, educational attainment, and cognitive skills through income and education mobility.

Affirming previous discoveries by Corak and Heisz (1999) in 1999 and Becker and Tomes (1979), Chetty et al. (2014) found that 36.5 percent of kids born to parents in the highest income group stay in the same situation. The issue has been subject to much attention ranging from politicians to scholars, expressing their concern about the rising downfall of inter-generational mobility. Alan Kruger by introducing the Great Gatsby curve in 2012 predicted that due to the rise of income inequality in the United States, social mobility will have an exceptional decline in the following 25 years. Krueger (2012)

Additionally, mobility can be divided into 2 categories in terms of the measurement unit, namely absolute and relative mobility. While absolute mobility measures the degree to which living standards have improved or deteriorated, or the degree to which individuals perform better or worse than their parents in terms of wealth, employment, health, education, or other areas, the degree to which a person's prospects of success rely on where s/he or her/his parents were placed on the social ladder is known as relative mobility. By merging two categories of social mobility, our study embraces inter-generational absolute mobility. In other words, our aim is to show how the living standards of the young generation have changed compared to their parents, mainly in general consumption, education and health. It is known that general affordability is highly correlated with affordability in these areas, which will be captured by our selected variables.

2.1 Household Final Consumption

In the first model, we aim to substitute the variable 'housing' with 'wealth' and examine the overall impact of 'wealth,' encompassing housing prices, on consumption.

The impact of wealth on consumption has been extensively studied in economics, notably highlighted in Modigliani's work. Theoretical insights posit that 'wealth' significantly influences 'consumption'. Consumption patterns are shaped by anticipated income from labor, ownership of assets, and the consistent income derived from these assets. Thus, an individual's spending ability is not solely reliant on expected income but also on the magnitude of their asset holdings. Modigliani and Tarantelli (1975).

Empirical research by Ludwig and Sløk (2004) and Naik (2023) delves into the impact of wealth on consumption behaviors. By examining the size of the equity market and the influence of housing prices, evidence suggests a noteworthy impact of these variables on consumption.

Particularly, supporting evidence indicates that household spending increases in line with real housing price increments Ludwig and Sløk (2004)

2.2 Education Expenditure

A review of the existing literature shows that education expenditure is not only determined by economic factors, but also demographic, and political structure of the country has an effect. For example, Chatterji et al. (2015) attempts to determine the factors influencing state governments' per capita education spending in sixteen Indian states between 2001 and 2010. According to the econometric results, wealthier states invest more in education than do economically disadvantageous states. Moreover, the study reveals a lower share of the child population (0-14 years) has a significant impact on the education expenditure among Indian States. Mhlari and Mosikari (2020), on the other hand, finds out that GDP, population growth, and corruption are the determinants of the public education expenditure in SADC Economies (South Africa Development Community).

2.3 Health Expenditure

Economists have been using different methods and variables in analyzing Health expenditure panel data. Baltagi et al. (2017) used annual data of 167 countries of the world with two alternative panel models (Linear and heterogeneous panel) for health. they found that the income elasticity of countries depends on their relative income situation. Some papers used the panel cointegration model (Moscone and Tosetti (2010), Gerdtham et al. (1998)) which results in non-stationarity and cointegration of government health expenditure and income. Hartwig (2008) used the Baumol's model as their method and their finding was that the difference of earning and growth (Baumol's variable) has a substantial effect on health expenditure. Comparatively, Murthy and Okunade (2009) denoted the Positive impact of external aid on health expenditure of 80 percent of African countries.

2.4 Limitations

While this study aimed to investigate social mobility, It is essential to acknowledge certain limitations that impact the scope and depth of our analysis. One notable limitation is the unavailability of detailed household-level data and surveys. Social mobility research often benefits from access to comprehensive datasets that capture the nuances of individual and familial socioeconomic backgrounds. Unfortunately, due to constraints in data accessibility, we were unable to incorporate such information into our analysis. The absence of household-level data restricts our ability to delve deeply into the specific factors influencing mobility within families. Despite these limitations, we have employed alternative methodology and Macroeconomic data to provide an overview of social mobility within the scope of available resources. Given the constraints outlined above, we recommend that future studies in the field prioritize securing access to detailed household data and surveys. This would enable a more robust exploration of the multifaceted aspects of social mobility and contribute to a richer understanding of the factors influencing socioeconomic advancement.

3 Data

3.1 Household Final Consumption

The data set utilized in this study was sourced directly from the World Bank and OECD through the Stata package. It encompasses various indicators: household final consumption expenditure, GDP per capita, stock market capitalization, and private credit by deposit money from the World Bank; and national and regional house price data from the OECD. Due to disparities in data sources, included countries, and time periods, our research focused solely on the segments where variables align in terms of both country and temporal overlap.

Household Final Consumption Data Information and Source		
Variable	Definition	Source
Consumption	Households and NPISHs Final consumption expenditure, PPP	World Bank
Income	GDP per capita, PPP	World Bank
Housing Wealth	National and Regional House Price Indices	OECD
Financial Wealth	Stock market capitalization to GDP, %	World Bank
Credit	Private credit by deposit money banks and other financial institutions to GDP	World Bank

Table 1. HH Final Consumption Data information

The primary objective of this study is to examine the influence of wealth on consumption. In macroeconomics, the prevailing notion is that the consumption level is typically shaped by labor income and wealth. Therefore, adapting GDP as a proxy for income, we adapted two categories of wealth : financial and non-financial.

To measure financial wealth, we incorporated stock market capitalization. As the stock market expands, public holding of companies' stocks increases. With this perspective, we assume that movements in the stock market are strongly related to the fluctuations in financial wealth.

As for non-financial wealth, we chose the housing price index. There are two principal reasons for choosing this proxy. Firstly, we anticipate a robust relationship between housing prices and household Final Consumption, potentially playing a major role in addressing inter-generational mobility. What's more, non-financial wealth aligns with housing wealth, considering its proportion, according to (Alp and Seven (2019). Hence, we incorporated the housing price index as a representation of non-financial wealth, denoted as housing wealth.

Likewise, in accordance with the insights from the literature Alp and Seven (2019), we included credit. In fact, the relationship between debt and consumption has been a long-debated issue. Referencing Martínez Carrascal and Río Lopezosa (2004), the increase in debt has helped

to sustain the growth of consumption. Focusing on the relationship between debt and credit, we adopted private credit by deposit money as a proxy for credit. This indicator represents private credit provided through deposits in the financial system, reflecting the extent where financial institutions accept deposits and use them as a base to offer loans. Therefore, analyzing this variable will also be able to shed light on its impact on consumption.

3.2 Education expenditure

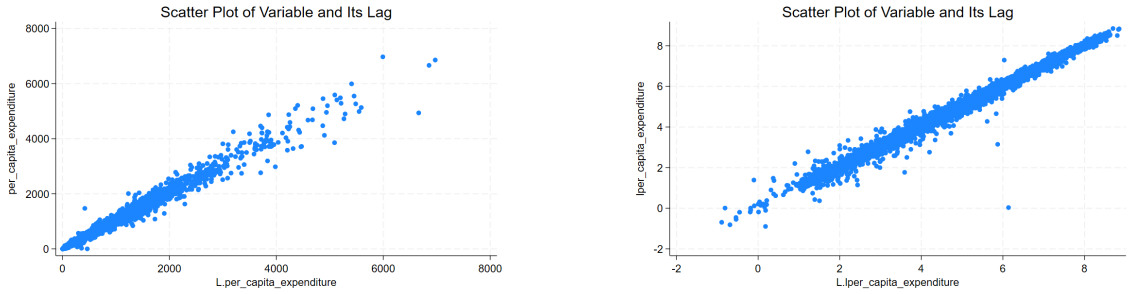
Education has long been seen as an indispensable part of human well-being and development. Thus, the determinants and the change in education expenditure throughout the period, namely between 1990 and 2020, were observed. However, due to the time constraint and the availability of the household-level data, the macro-level variable, called adjusted savings: education expenditure, was selected as the dependent variable.

Education Expenditure Data Information and Source		
Variable	Definition	Source
Education Expenditure	Adjusted savings: education expenditure (current US$)	World Bank
Lagged Education Expenditure	Adjusted savings: education expenditure (current US$) at t-1	World Bank
Tax Revenue	Tax revenue (current LCU)	World Bank
GDP	GDP per capita, PPP (current international $)	World Bank
Child Population	Population ages 0-14 (% of to population),	World Bank

Table 2. Education Expenditure Data Information

Furthermore, instead of working with the absolute value of education expenditure, the study embraced the per capita education expenditure as the dependent variable. When it comes to the choice of independent variables, thanks to the correlation plots, it was revealed that the correlation between education expenditure in the current period is highly determined by its value in the previous period.

As a diagonal trend from the bottom-left to the top-right observed in Figure 1., there is a strong positive correlation between the variable and its lag, both with the versions with non-logarithmic and logarithmic. Thus, lagged per capita expenditure was added to the model as the first regressor, which converted the model into a dynamic panel model. Second of all, the choice of other independent variables was made by taking into account the multicollinearity analysis to avoid possible correlation among them. Since none of the VIF of the regressors is higher than 10, it's assumed that there is no severe correlation between them.



Non-logarithmic Logarithmic

Figure 1. Two scatter plots of variables and their lags

3.3 Healthcare expenditure

Health Expenditure data information and source		
Variable	Definition	Source
public Health expenditure	Domestic general government health expenditure per capita (current US dollar)	World Bank
Income	GDP per capita (current US dollar)	World Bank
Share of the elderly	Population ages 65 and above	World Bank
Life expectancy	Life expectancy at birth, total (years)	World Bank
Mortality rate	Mortality rate, infant (per 1,000 live births)	World Bank

Table 3. Health Expenditure Data Information

[h]

Since the seminal papers of Kleiman (1974) and Newhouse (1977), National income has been known as primary determinant of Health expenditure among countries.

Even though so many other non-income proxies like structure of the population Culyer and Jonsson (1986), technological advancement Weisbrod and LaMay (1999) and indicators such as life expectancy and child mortality Jaba et al. (2014) have been proposed over the years; their significance and empirical verification remain uncertain.

It is noteworthy that another proposed proxy in the literature is the price of health services, as addressed by Grossman (2017). However, due to data scarcity and the variation in health price

policies across countries, we opted not to incorporate this variable into our analysis.

4 Empirical Approach

4.1 Household Final Consumption

Our goal in this section is to estimate the wealth effects on the level of consumption. The estimation is displayed as the following multiple regression model.

$$ln(C) = \beta 0 + \beta 1 ln(Y) + \beta 2 ln(HW) + \beta 3(FW) + \beta 4(PC) + \varepsilon$$

Where household final consumption is the dependent variable, C, and Y represents GDP, HW stands for the Housing Price Index, FW denotes financial wealth, and PC represents Private Credit.

In addition, we have performed a log transformation to linearize the data relationships and stabilize the variance.

From this model, we anticipate a positive response of consumption to all the variables. We expect a considerable impact of stock market and housing price on consumption. According to Poterba (2000) changes in stock prices affect households even without stock ownership, impacting consumer confidence and their perception of future economic conditions, potentially leading to reduced consumption due to uncertainty in the stock market. Furthermore, according to Campbell and Cocco (2007), regional house prices affect regional consumption growth, displaying a strong correlation between predictable changes in housing prices and consumption, especially for households likely to face borrowing constraints.

This effect carries substantial significance not only for homeowners but also for renters, providing important implications for our research. Rise in house prices stimulates consumption; for households owning homes, the increase in their asset value triggers an unrealized wealth effect, encouraging consumption. Conversely, for households without home ownership, it may increase current consumption due to discouraged saving motives. However, this interpretation has limitations in that it may vary depending on national characteristics and macroeconomic conditions.

Lastly, we expect that private credit will also positively impact consumption. We assume as banks increase their credit provision, it allows households to expand their borrowing ability.

4.2 Education Expenditure

The econometric model aims to explain the variation in per capita education expenditure with the selected independent variables. The regressors are assumed to be positively related to the outcome variable except the child population share.

For analysing the determinants of the per capita education expenditure and fitting them into a meaningful model, the tax revenue was converted into per capita tax capita by dividing it by the total population. To control for the economic outcome of a country, GDP per capita was used instead of the absolute GDP for the convenience of the model. Besides, the logs of the variables

were taken to avoid any measurement errors, as the logarithmic relationship is more relevant than a linear one for our model.

Considering these, the initial version of the model looks as follows:

$$ln(educex) = \delta_0 + \delta_1 ln(laggededuc) + \delta_2 ln(GDP) + \delta_3 ln(taxrev) + \delta_4 ln(childpop) + \epsilon$$

As the next step, adding region as a control variable enabled us to see the comparative impact of different types of regions:

$$ln(educex) = \delta_0 + \delta_1 ln(laggededuc) + \delta_2 ln(GDP) + \delta_3 ln(taxrev) + \delta_4 ln(childpop) + \delta_5 (region) + \epsilon$$

Thanks to this control, the study will be able to reveal how different regions concerning income levels affect the per capita education expenditure. Economic intuition assumes that bigger economies invest more in education, so an increase in the level of income might correspond to an increase in education expenditure. However, since our dependent variable is per capita education, the population effect should be taken into account.

4.3 Health Expenditure

Our last model examines the long-term relationship between government health expenditure and GDP, elderly population, life expectancy at birth and infant mortality, Using Annual World bank data from 1990 through 2020.

For our analysis, we present the following linear panel regression model:

$$ln(h) = \alpha_0 + \alpha_1 ln(Y) + \alpha_2 ln(PE) + \alpha_3 (LE) + \alpha_4 (MR) + \epsilon$$

Where ln(h) indicates natural logarithm of goverment health expenditure, ln(Y) is natural logarithm of GDP per capita and PE, LE and MR are population ages 65 and obove, Life expectancy and mortality rate respectively.

We expect to see elastic and statistically significant positive impact of all of the independent variables on health expenditure in the long-run.

5 Results

5.1 Household Final Consumption

By adapting the regression model, we initially examined its validity by examining multicollinearity and residual normality. It is revealed that all the variables had VIF values below 10, indicating the absence of multicollinearity issues.

Moreover, to check for heteroscedasticity, we conducted a Residual Analysis with Squared Variables. To inspect residual normality, Q-Q plots and Kernel density estimation were performed. Both tests confirmed that the residuals adhere to a normal distribution.

Then, we started by a comparison between the Fixed Effects model and the Random Effects model. We also transformed 'year' into a categorical variable, allowing us to dissect the impact on

Varible	VIF	1/VIF
ln(Private Credit)	1.51	0.663384
ln(GDP)	1.51	0.663766
ln(Financial Wealth)	1.34	0.744122
ln(Housing Wealth)	1.16	0.860293
Mean VIF	1.38	

Table 4. HouseHold Consumption Multicollinearity test

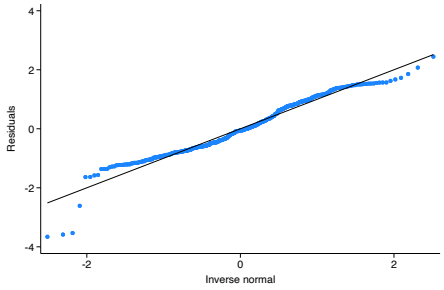


Figure 2. Q-Q plots

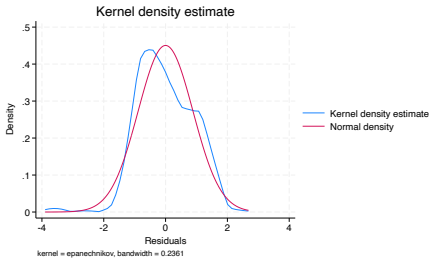


Figure 3. Kernel density estimation

the dependent variable for each individual year. The quantitative economic analysis is outlined in the table 5.

Upon rejecting the null hypothesis in the Hausman test, it favored the Fixed Effects model. However, considering the conclusion that the variance-covariance matrix is not positive definite, an overidentification test was additionally conducted. The result showed that we reject the null hypothesis of the existence of overidentifying restrictions, leading us to proceed with the Fixed Effects model.

Furthermore, given the properties of panel data, using the Fixed Effects model was highly preferrred, since it is important to get rid of influences caused by distinct characteristics inherent to each entity, allowing a concentrated focus on the relationships between variables.

With all variables being statistically significant at the 1% level, the coefficients showed significant results. Particularly, the R-squared value at approximately 0.95 proves the stability of the model. All independent variables exert positive effects on the dependent variable, aligning with our initial predictions. Specifically, GDP demonstrates the most substantial impact on consumption.

From the perspective of wealth effects, both Housing Wealth and Financial Wealth are analyzed to have a positive relationship with consumption. While the coefficient for Financial Wealth is statistically significant, its effect is deemed marginal. This analysis matches with prior literature suggesting that Housing Wealth has a more prominent impact on consumption compared to Financial Wealth.Belsky and Prakken (2004); Mehra (2001)

Private Credit also has a positive impact on consumption. Increased credit allows households to access additional funds, potentially leading to increased consumption through borrow-

	Pooled OLS	Fixed Effects	Random Effects
ln(GDP)	-1.018*** (-10.52)	0.699*** (17.23)	0.662*** (15.27)
ln(Housing Wealth)	1.357*** (11.59)	0.123*** (6.20)	0.131*** (6.15)
ln(Private Credit)	-0.365** (-3.20)	0.146*** (7.51)	0.139*** (6.63)
ln(Financial Wealth)	0.582*** (18.45)	0.0242*** (3.97)	0.0268*** (4.09)
cons	30.86*** (35.61)	17.82*** (45.99)	18.05*** (39.52)
N	439	439	439
		Sargan-Hansen test H0 : all overidentifying restrictions are valid P-value = 0.0000	

Table 5. HH consumption Model Estimation Result

Household Final Consumption as a dependant variable.The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

ing. Hence, during economic stability and favorable credit conditions, bank credit activity may positively influence household consumption. However, we also need to take the fact into consideration that rising economic uncertainty or interest rates could negatively affect household consumption.

The results hold significance at the 1% level from 2005 to the present. It represents the global trend of increased property values, stock market development, credit expansion, resulting in expanded consumption and reduced savings.

However, this result may vary across different economic circumstances and countries. Therefore, we set the income level of observed countries, which are HIC(High Income country), UMC(Upper Middle Income Country) and LMC(Low Middle Income country), as a control variable to re-estimate the changes in consumption level.

As a result, the coefficients for income, housing wealth, and private credit increased, while the impact of financial wealth was nearly zero and statistically not significant.

On top of that, It is convincing that a country's income level affects household consumption more than financial wealth variable. This is because the openness and size of the stock market are strongly linked to the income level of a country. Moreover, the coefficient in LMC countries appear to be at a higher level, indicating that while income level is important for determining consumption level, it also suggests that a significant portion of their income is used to maintain their consumption levels.

In conclusion, considering from the income levels of different countries, income, housing wealth, and credit still show significant positive effects, regardless of income levels in the region.

Variables	Coefficient	T-statistics
ln(GDP)	0.699	17.23***
ln(Housing Wealth)	0.123	6.20***
ln(Private Credit)	0.146	7.51***
ln(Financial Wealth)	0.0242	3.97***
Constant	17.82	45.99***
Observations	439	
R-squared	0.9531	

Table 6. HH consumption Fixed Effects Model

Household Final Consumption as a dependant variable.The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	Coefficient	T-statistics
ln(GDP)	0.952	33.52***
ln(Housing Wealth)	0.126	5.96***
ln(Private Credit)	0.168	8.05***
ln(Financial Wealth)	0.005	0.79
Regions		
LMC	4.96	4.73***
UMC	3.00	5.45***
Constant	14.70	44.75***
Observations	439	
R-squared	0.9382	

Table 7. HH consumption controlling income level

Household Final Consumption as a dependant variable.The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

5.2 Education Expenditure

The robustness section includes three different regressions, namely Pooled OLS, Random Effects Model, and Fixed Effects Model. After running all three regressions, it is clear to see that all three are correctly specified, given that P-value is less than 0.05 (prob>F=0.0000). However, the results of the Hausman test point out in favour of the Fixed Effect Model (FEM), which accounts for time variation and country specification. In order to compare the three regressions, the following table would be helpful:

	Pooled OLS	Fixed Effects	Random Effects
ln(Lagged per capita expenditure)	0.958*** (250.95)	0.780*** (78.06)	0.953*** (231.53)
ln(GDP)	0.0489*** (7.15)	0.179*** (10.26)	0.0539*** (7.36)
ln(Per capita tax revenue)	-0.0018 (-1.60)	0.346*** (7.63)	-0.0021 (-1.68)
ln(Child population)	-0.0177 (-1.51)	-0.0553 (-1.30)	-0.0187 (-1.46)
cons	-0.108 (-1.40)	-0.575* (-2.44)	-0.126 (-1.51)
N	3147	3147	3147
		Hausman test FEM preffered P-value=0.00	

Table 8. Per Capita Education Expenditures Model Estimation Result

Per capita education expenditures as a dependent variable.The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

By looking at the table, one can see that the previous level of per capita education expenditure has the biggest coefficient, as expected to be found by correlation spots. Second of all, all the variables except the child population share as a percentage of the overall population are significant at the selected significance level of 5%. Despite the insignificance, the negative relationship between the child share and per capita education expenditure makes sense, considering the younger population requires more investment in education. Since our research question relates the relationship between per capita tax revenue and per capita education expenditure the most, their interpretation will be the main focus. Accordingly, a 1% change in per capita tax revenue results in a 0.3% change in per capita education expenditure. Considering a proportion of tax revenue goes to education expenditure along with other public spending, the coefficient aligns with our expectations.

Table 9. shows the model where the regression is controlled by regions with respect to the income level. In the World Bank Data package of STATA, there are 4 categories for different levels of income, namely HIC, LIC, LMC, and UMC, as mentioned above. Despite this, the coefficients for HIC(High-Income country) are not found because it was selected as the reference region by

Variables	Coefficient	T-statistics
ln(Lagged per capita expenditure)	0.9510	227.71***
ln(GDP)	0.0400	5.0***
ln(Per capita tax revenue)	-0.0009	-0.71
ln(Child population)	-0.00139	-0.11
Regions		
LIC	-0.0927	-4.56***
LMC	-0.0568	-4.27***
UMC	-0.0388	-4.03***
Constant	-0.0204	-0.23

Table 9. Per capita education expenditure controlling income level

STATA. However, when one looks at the t-statistics of other regions, all of them are significant at the selected significance level. Moreover, the most striking fact about controlling for regions reveals that as the income level rises, the coefficient slightly falls in absolute terms. In other words, the relationship gets weaker and weaker with the fall, such as -0.093 at LIC and -0.0388 at UMC.

In addition, the education model suffers from some pitfalls. The Breusch-Pagan Test showed a result in favour of a potential heteroskedasticity. Second of all, the Arellano-Bond Test for Autocorrelation reveals evidence of autocorrelation in the first-differenced errors. However, the model does not indicate an omitted variable bias. Last but not least, a higher GDP is mostly associated with a high public education expenditure Frank (2023). In this sense, the reverse causality bias can be detected, if the causality is running from in the reverse order than our assumption.

5.3 Health Expenditure

The multicollinearity and residual normality analysis shows VIF calculated for each predictor variable is below 10 Which denotes that multicollinearity is not a significant concern.

Additionally, the result of the analysis on heteroscedasticity with the pagan test confirmed the normal distribution of the residuals.

Initially, We examine Whether the model exhibits one-way individual characteristics only or It can endure the correlation of different variables. The pooled OLS estimator denotes an exceptionally positive effect of GDP and the population of elderly on health expenditure. Also, Upon scrutinizing the fixed effects and random effects models, the analysis indicates an absence of correlation between individual-specific effects and the explanatory variable. Notably, the fixed effects model suggests constancy in unobserved heterogeneity over time, resulting in a p-value

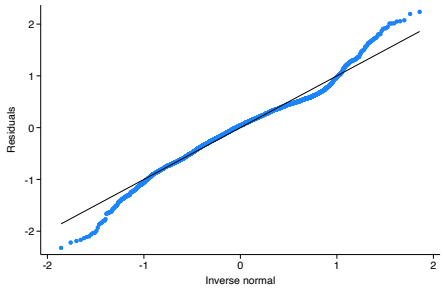


Figure 4. Q-Q plots

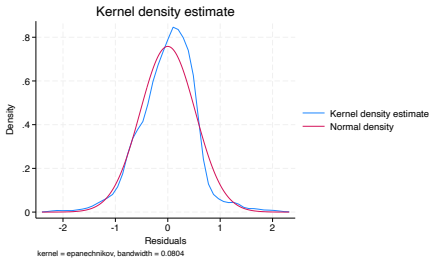


Figure 5. Kernel density estimation

below 0.05. The p-value for random effects model is also below 0.05. Also We conducted a Hausman test which resulted in rejecting the null hypothesis, hence fixed effects model has been selected.

	Pooled OLS	Fixed Effects	Random Effects
ln(GDP)	1.1848 (.0093793)***	.919413 (.016109)***	1.0505 (.014383)***
ln(Population of elderly)	.0073830 (.0028341)***	.3454976 (.0380593)***	.0239142 (.01057018)**
Life Expectancy	-.017906 (.002729)***	-.016843 (.003591)***	.005843 (.00336)**
Mortality Rate	-.0176176 (.0008631)***	.0001802 (.0009117)	.0004791 (.0009183)
cons	-3.59580 (.19389509)***	-6.756875 (.6022708)***	-4.915193 (.29508099)***
N	4816	4816	4816
		Hausman test FEM preffered P-value=0.00	

Table 10. Government Health Expenditure

Government health expenditure as a dependant variable.The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Since Autocorrelation in panel data can lead to inefficient and biased parameter estimates in regression models, we are using the Arellano-Bond test which specifically addresses the issue of autocorrelation in the first-differenced errors of dynamic panel data. Considering the result of Heteroscedasticity and multicollinearity test which shows the significance of the model, we can disregard mortality rate having a p-value more than 0.05. This shows essentially healthcare policies and individual characteristics of the countries have an effect on technological advancement variables (Life expectancy and mortality rate) and in this case mortality rate cannot show a relationship as such to healthcare expenditure.

Additionally by controlling for the income differences We can see that all the variables except mortality rate have positive effect on Health expenditure.

In conclusion, even though income and population of elderly and life expectancy at birth have significant and positive relationship with government health expenditure, The correlation of mortality rate variable with Health expenditure is absent, which may indicate various nations implement diverse healthcare strategies, potentially driven by factors such as healthcare system efficiency, public health interventions, and socio-economic determinants. This outcome underscores the complexity of the interplay between mortality rates, life expectancy, and health expenditure, highlighting the need to consider nuanced policy frameworks.

6 Conclusion

We analyzed the effects on three different dependent variables: Household Final Consumption, Education Expenditure, and Health Expenditure. Ultimately, in this concluding part, we interpret how the effects of these variables can be associated with inter-generational mobility.

First of all, our consumption regression model has shown that all the variables affect the consumption level positively. It supports the idea that the relationship between wealth and consumption level is significant.

We found that housing wealth has an impact on consumption regardless of the ownership. Also, increased private credit encourages households to expand their borrowing capacity, hence making them increase their consumption. While financial wealth is considered to have minor impact on consumption, it still appears to affect the consumption positively. This outcome remained the same when controlled income level.

Now that we know their relationship, we have to consider where this wealth comes from. The variables that represent possessed wealth are Housing Wealth, and Financial Wealth, which are considerably inherited by one's parents.

To specify this idea, we refer to a paper,Alvarez-Cuadrado and Long (2012), where they examine the effects of jealousy on exacerbating inequality. According to the paper, relative consumption based on jealousy leads to wealth inequality. Eventually, as current consumption increases, the motivation to save decreases, resulting in a diminishing weight on the inheritance passed down to children. Consequently, while the rich continue to accumulate wealth, the phenomenon arises where the poor inherit poverty.

Focusing on the diminishing bequest, this fact provides a crucial implication for our research question. In our model, 'wealth' is represented by housing and financial assets. The existence of such wealth significantly impacts consumption. Furthermore, the significance of holding cash assets in acquiring credit from financial institutions also influences consumption.

In conclusion, within the context of diminishing inheritance, maintaining a consumption level similar to that of parents has significant limitations. In addition to this, as wealth and poverty are inherited, inter-generational mobility is perceived to be challenging. In other words, we can conclude that as wealth plays an important role in one's consumption, the younger generation's consumption is highly dependent on their parents'. Hence, once again, upward mobility becomes increasingly difficult.

Secondly, when it comes to the education part, as the increasing cost of education is given by

Johnstone and Marcucci (2010), our model tried to find out the burden of this rising cost from a macroeconomic point of view. In other words, the study aimed to find whether this increasing cost of education is paid by the new generation and if so, does paying this cost really benefit them? Does paying more tax create better and more accessible education opportunities?

Considering tax paid by households finances public spending, including education expenditure Omodero and Dandago (2019), one can conclude that education expenditure should be a linear combination of the tax paid. For example, in our model, 1% rise in per capita tax revenue, rises per capita education expenditure by 0.3%, which is in line with our assumptions. However, an increasing per capita tax should theoretically and practically increase the chances of accessing a better education, as tax serves as an investment in returns to education in our line of thinking. In this sense, our model implies that more tax for education expenditures decreases the disposable income of one. Therefore, the hardship in financing education rises, given the additional costs coming along with enrolling at a school. Thus, it can be concluded that an ordinary person pays both more taxes and spends more on education. However, the returns of education, such as finding a good job, financing a housing, or investing in stocks are not sufficient compared to the effort and money spent on education. In conclusion, within the existing questionably fair tax system, an ordinary young person is worse off. Moreover, the other independent variables for the education regression were aligned with the initial assumptions.

Last but not least, it is hard to make a general conclusion about whether increasing the cost of education harms or benefits solely the young generation, as country dynamics and education policy highly differ in every region and country. Since education is a versatile concept, it is better to do further analysis to discuss the issue extensively.

Finally, We used government health expenditure as a proxy for standard of living which involves the allocation of financial resources by a government towards healthcare services and infrastructure as an indirect indicator of the overall well-being of its population. Governments allocate funds to health sectors to ensure access to quality medical care, disease prevention, and overall improvement of public health. That's why we decided to use health expenditure as an indicator of living standard, to see how it contributes to inter-generational social mobility.

As a result, we saw positive effects of income and the elderly population on health expenditure. However, we did not capture a specific relationship between the mortality rate variable and health expenditure, which we believe due to the complex interactions among healthcare systems, economic structures, and social policies.

However, the increased healthcare costs for the elderly implies higher tax burdens for the younger generation. In fact, according to the Organization (2015), the proportion of the elderly population is gradually rising globally due to increased life expectancy, and by 2050, it is estimated there would be two-thirds of the population aged 60 and above in low- and middle-income countries. Considering this phenomenon from a social perspective, it is possible to conclude that the aging population increases government health expenditure, ultimately transferring this burden to the younger generation.

In summary, the increase in government health expenditure allows younger generations to access better healthcare in terms of living standards. However, at the same time, it amplifies the socio-economic burden as they become responsible of a greater share of these costs.

However, as mentioned in the introduction, these models have limitations as they were not built on household data. Moreover, it overlooks the specificity of each country and simplifies the

model by excluding other factors influencing consumption, Education and Health expenditure. Nevertheless, the statistical significance of its impact on three dependent variables at the macro level is evident.

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```
*
*============================================================
*
* Date : January 2024
* Paper: Why are we poorer than our parents?
*        A Cross-Country Analysis of Absolute Intergenerational
Mobility
*
* Database used : - rfinan_world_bank_data.dta
*
*                 - oecd_data_2.dta
*                 - wbopendata
*
*
*
* Output :        - HH_final_consumption_data.dta
*                 -education expenditure (current US$)
*                 - Domestic general government health
expenditure per capita (current US$)
*
*
*
* Key variables : 1) Final consumption
*                   - Households and NPISHs Final consumption
expenditure, PPP
*                   - GDP per capita, PPP (current international
$)
*                   - Stock market capitalization to GDP (%)
*                   - Private credit by deposit money banks and
other financial institutions to GDP (%)

*                 2) Education
*                   - Tax revenue (current LCU)
*                   - GDP per capita, PPP (current international
$)
*                   - Population ages 0-14 (% of to population)
*                   - Total Population

*                 3) Health
*                   - Population ages 65 and above, total (share
of the elderly)
*                   - Life expectancy at birth, total (years)
*                   - GDP per capita (current US$)
*                   - Mortality rate, infant (per 1,000 live
births)
*============================================================
=============


*======================= 1. HouseHold Final Consumption
========================
```

```
41
42  clear mata
43  capture log close
44  clear
45
46                          * Pulling up Dataset from worldbank
47                          *================================
48
49
50  *world bank data - final consumption, gdp, privatecredit,
    financialwealth
51  *help wbopendata
52
53      wbopendata, indicator(NE.CON.PRVT.PP.CD; NY.GDP.PCAP.PP.CD;
    GFDD.DM.02; GFDD.DI.12 ) year(1990:2020) long clear
54
55      rename ne_con_prvt_pp_cd hhconsp //Households and NPISHs
    Final consumption expenditure, PPP (currentinternational $)
56      rename ny_gdp_pcap_pp_cd gdppc // GDP per capita, PPP
    (current international $)
57      rename gfdd_dm_02 financialwealth // Stock market
    capitalization to GDP (%)
58      rename gfdd_di_12 privatecredit //Private credit by deposit
    money banks and other financial institutions to GDP (%)
59      drop countryname region regionname adminregion
    adminregionname incomelevelname lendingtype lendingtypename
60
61      save "rfinan_world_bank_data.dta", replace
62
63
64                          * Pulling up Dataset from OECD
65                          *================================
66
67      clear
68      ssc install moss
69      ssc install sdmxuse
70      sdmxuse dataflow OECD
71      sdmxuse datastructure OECD, clear dataset(RHPI_TARGET) //
    National and Regional House Price Indices - Headline indicators
72      sdmxuse data OECD, clear dataset(RHPI_TARGET) dimensions()
    start(1990) end(2020)
73
74      *help sdmxuse
75      keep if  var == "RHPI" // Real House Price Index
76      keep if vintage == "VINTAGE_TOTAL"
77      keep if  measure == "IXOB"
78
79      drop if strpos(time, "Q") > 0 // to isolate yearly data
80      drop if strpos(time, "-") > 0 // to isolate yearly data
81      drop if regexm(reg_id, "[0-9]")
82
83      rename value housingindex
```

```
84      rename reg_id countrycode
85      rename time year
86      drop tl var vintage dwellings measure freq
87      destring year, replace
88
89      save "oecd_data_2.dta", replace
90
91
92                          * Merging the two dataset
93                          *================================
94
95      merge 1:1 countrycode year using "rfinan_world_bank_data.dta"
96      keep if _merge == 3
97      save "HH_final_consumption_data.dta", replace
98      encode countrycode, gen(country)
99      xtset country year
100     summarize
101     //missing observations for financial wealth
102
103     * general regression
104     xi : regress hhconsp gdppc housingindex financialwealth
    privatecredit i.country
105
106     * putting log for all variables
107     g lhhcons=log(hhconsp)
108     g lgdp=log(gdppc)
109     g lhousingindex=log(housingindex)
110     g lfinancialwealth=log(financialwealth)
111     g lprivatecredit=log(privatecredit)
112
113
114                         * Multicollinearity Analysis
115                         *================================
116
117     reg lhhcons lgdp lhousingindex lprivatecredit lfinancialwealth
118     vif
119     graph export "vif result.pdf", as(pdf) replace
120
121     //Since none of the VIF of the regressors have higher than
    10, it's not required to make further analysis.
122
123
124                         * Heteroscedasticity test
125                         *================================
126
127     regress lhhcons lgdp lhousingindex lprivatecredit
    lfinancialwealth i.year
128
129     predict residuals, residuals
130     gen squared_residuals = residuals^2
131
132     gen squared_lgdp = lgdp^2
```

```
133     gen squared_lhousingindex = lhousingindex^2
134     gen squared_lprivatecredit = lprivatecredit^2
135     gen squared_lfinancialwealth = lfinancialwealth^2
136 
137     regress squared_residuals squared_lgdp squared_lhousingindex
    squared_lprivatecredit squared_lfinancialwealth
138 
139     test squared_lgdp squared_lhousingindex
    squared_lprivatecredit squared_lfinancialwealth
140 
141                         * Residual normality
142                         *================================
143     *plot
144     qnorm residuals
145     kdensity residuals, normal // The conformity of residuals to
    a normal distribution validates the efficacy of the model
146 
147 
148                         * Robustness Section
149                         *================================
150 
151     *Pooled OLS
152     xi : regress lhhcons lgdp lhousingindex lprivatecredit
    lfinancialwealth
153     estimates store OLS
154 
155     *Random Effects Model
156     xtset country year
157     xtreg lhhcons lgdp lhousingindex lprivatecredit
    lfinancialwealth i.year, re
158     estimates store REM
159     xttest0
160 
161     // Since the P-value is less than 0.05
    (prob>chi2=0.0000),the model is correctly specified.
162 
163     *Fixed Effects Model
164     xtreg lhhcons lgdp lhousingindex lprivatecredit
    lfinancialwealth i.year, fe
165     estimates store FEM
166     // Since the P-value is less than 0.05 (prob>F=0.0000),the
    model is correctly specified.
167 
168     estimates table OLS FEM REM, se
169     esttab OLS FEM REM
170 
171     *Comparision of different estimated results
172     hausman FEM REM, sigmamore
173     // Prob > chi2 = 0.0000 - implies fixed model preferrable
    (V_b-V_B is not positive definite)...
174 
175     * Test of overidentifying restrictions: fixed vs random
```

```
effects
    xtreg lhhcons lgdp lhousingindex lprivatecredit
lfinancialwealth, re
    xtoverid // fe preferred, proceed with fe model


                        * Regressions
                        *================================

    * logged regression with fixed effect
    xtreg lhhcons lgdp lhousingindex lprivatecredit
lfinancialwealth i.year, fe // fixed effect
    summarize
    xtreg lhhcons lgdp lhousingindex lprivatecredit
lfinancialwealth, fe

    margins, dydx(*)
    marginsplot // plot


                         * Adding Control Variables
                         *========================

    *Regional Differences
    encode  incomelevel, gen(regions)
    tabulate regions
    xtreg lhhcons lgdp lhousingindex lprivatecredit
lfinancialwealth i.regions
    estimates store CV
    esttab


                        * Arellano-Bond Test for Autocorrelation
                        *================================

    xtabond lhhcons lgdp lhousingindex lprivatecredit
lfinancialwealth, lags(1)
    // Despite one variable showing insignificance with a
p-value above 0.05 in the Arellano-Bond dynamic panel-data
estimation, the overall model remains significant with a higher
Wald chi2 value. Additionally, thorough testing for
multicollinearity and Heteroscedasticity (Pagan test) confirms
the regression's significance. Considering this, while there's a
minor setback with one variable, the model as a whole is still
reliable and potentially useful for analysis.



                        * Omitted variable bias
                        *================================

```

```
215     xi : regress lhhcons lgdp lhousingindex lprivatecredit
    lfinancialwealth
216     estat ovtest
217     //The model explains approximately 61.41% of the variation
    in the data according to both R-squared and adjusted R-squared
    values. However, the Ramsey RESET Test suggests evidence of
    additional variables that are impacting the dependent variable,
    indicating the presence of omitted variables in the model
    (p-value < 0.05). While this model helps identify variables
    influencing the dependent variable, further consideration of
    additional variables and improvements to the model might be
    required.
218
219
220 *====================== 2. Education Expenditure
    ============================
221
222
223 clear mata
224 capture log close
225 clear
226
227                         * Pulling up Dataset from Worldbank
228                         *================================
229
230 wbopendata, indicator(NY.ADJ.AEDU.CD; GC.TAX.TOTL.CN; SP.POP.TOTL
    ; SP.POP.0014.TO.ZS; NY.GDP.PCAP.PP.CD) year(1990:2020) long clear
231
232 rename ny_adj_aedu_cd educexpen
233 rename ny_gdp_pcap_pp_cd gdppc
234 rename sp_pop_totl tpop
235 rename sp_pop_0014_to_zs childpopperc
236 rename gc_tax_totl_cn taxrevenue
237
238                         *Setting the panel structure
239                         *==========================
240
241 encode countrycode, gen(country)
242 xtset country year
243
244 // strongly balanced=the dataset in general has no missing
    observations. In other words, every single cross-sectional
    entity can be matched with a particular time series entity and
    all of those data points are complete.
245
246     gen per_capita_expenditure = educexpen / tpop
247     gen per_capita_tax = taxrevenue / tpop
248     by country: gen lagged_per_capita_expenditure = L.
    per_capita_expenditure
249
250     g lper_capita_expenditure=log(per_capita_expenditure)
251     g llagged_per_capita_expenditure=log(
```

```
lagged_per_capita_expenditure)
    g lgdp=log(gdppc)
    g lper_capita_tax=log(per_capita_tax)
    g lchildpopperc=log(childpopperc)

summarize

                        *Multicollinearity Analysis
                        *=========================

    reg lper_capita_expenditure llagged_per_capita_expenditure
lgdp lper_capita_tax lchildpopperc
    vif

//Since none of the VIF of the regressors have higher than 10,
it's not required to make further analysis.


                        *I benefited from correlation plots:

    tsset  country year
scatter per_capita_expenditure L.per_capita_expenditure, title(
"Scatter Plot of Variable and Its Lag")

tsset  country year
scatter lper_capita_expenditure L.lper_capita_expenditure, title(
"Scatter Plot of Variable and Its Lag")

// As observed a diagonal trend from the bottom-left to the
top-right in the scatter plot, there is a strong positive
correlation between the variable and its lag, both with the
versions with logaritmic and non-logaritmic. Thus, lagged per
capita expenditure was added to the model as one of the
regressors.



                         * ROBUSTNESS SECTION
                         *==================

    *Pooled OLS

    regress lper_capita_expenditure
llagged_per_capita_expenditure lgdp lper_capita_tax lchildpopperc
    estimates store OLS

    *Random Effects Model

    xtset country year
    xtreg lper_capita_expenditure llagged_per_capita_expenditure
lgdp lper_capita_tax lchildpopperc, re
    estimates store REM
```

```
292
293     // Since the P-value is less than 0.05
    (prob>chi2=0.0000),the model is correctly specified.
294
295     *Fixed Effects Model
296
297     xtreg lper_capita_expenditure llagged_per_capita_expenditure
    lgdp lper_capita_tax lchildpopperc, fe
298     estimates store FEM
299
300     // Since the P-value is less than 0.05 (prob>F=0.0000),the
    model is correctly specified.
301
302
303     *Comparision of different estimated results
304
305 estimates table OLS FEM REM, se
306
307     * Test for REM Random Effects Model or FEM Fixed Effects Model
308
309     xtreg lper_capita_expenditure llagged_per_capita_expenditure
    lgdp lper_capita_tax lchildpopperc, fe
310     estimates store FEM
311
312     xtreg lper_capita_expenditure llagged_per_capita_expenditure
    lgdp lper_capita_tax lchildpopperc
313     estimates store REM
314
315     hausman FEM REM
316
317     // Since Prob > chi2 = 0.0000, FEM is preferred, which
    accounts for time variation and country specified.
318
319                           * Adding Control Variables
320                           *========================
321
322     *Regional Differences
323
324     encode  incomelevel, gen(regions)
325     tabulate regions
326     xtreg lper_capita_expenditure llagged_per_capita_expenditure
    lgdp lper_capita_tax lchildpopperc i.regions
327
328
329                       *Test for Heteroskedasticity Breusch-Pagan
    Test
330
    *============================================
331
332     regress lper_capita_expenditure
    llagged_per_capita_expenditure lgdp lper_capita_tax lchildpopperc
     i.regions
```

```
333     hettest llagged_per_capita_expenditure lgdp lper_capita_tax
    lchildpopperc i.regions
334
335     // Since Prob > chi2 = 0.0000, we can soundly reject the
    Null Hypothesis of homosckedasticity, which means potential of
    heteroskedasticity
336
337                     *Arellano-Bond Test for Autocorrelation
338                     *====================================
339
340     xtabond lper_capita_expenditure
    llagged_per_capita_expenditure lgdp lper_capita_tax lchildpopperc
    , lags(1)  // Dynamic panel model. Since the p-value (0.0463) is
    less than 0.05, you would reject the null hypothesis. There is
    evidence of autocorrelation in the first-differenced errors.
341
342
343                     *Omitted variable bias
344                     *====================
345
346     regress lper_capita_expenditure
    llagged_per_capita_expenditure lgdp lper_capita_tax lchildpopperc
347     estat ovtest
348
349     //   Prob > F = 0.3623, indicating no omitted variable bias
350
351
352
353 *====================== 3. Government health expenditure
    ========================
354 clear mata
355 capture log close
356 clear
357
358                         * Pulling up Dataset from worldbank
359 *                        ==================================
360
361 help wbopendata
362 wbopendata, indicator(SH.XPD.GHED.PC.CD; NY.GDP.PCAP.CD; SP.POP
    .65UP.TO; SP.DYN.LE00.IN; SP.DYN.IMRT.IN) year(1990:2020) long
    clear
363
364
365
366 rename sh_xpd_ghed_pc_cd govhealthexp //Domestic general
    government health expenditure per capita (current US$)
367 rename ny_gdp_pcap_cd gdppc //GDP per capita (current US$)
368 rename sp_pop_65up_to oldpop //Population ages 65 and above,
    total (share of the elderly)
369 rename sp_dyn_le00_in lifeexpect //Life expectancy at birth,
    total (years)
370 rename sp_dyn_imrt_in mortalr //Mortality rate, infant (per
```

```
1,000 live births)


                        *Setting the panel structure
*                ================================

    * general regression
    regress govhealthexp gdppc oldpop lifeexpect mortalr
    encode countrycode, gen(country)
    xtset country year
    //strongly balanced

    * putting log for two variables

g lgovhealthexp=log(govhealthexp)
g lgdp=log(gdppc)
g loldpop=log(oldpop)


                            * Multicollinearity Analysis
                           *================================

    reg lgovhealthexp lgdp loldpop lifeexpect mortalr
    vif
    //Since none of the VIF of the regressors have higher than
10, it's not required to make further analysis.


                            * Robustness Section
                           *================================

    *Pooled OLS
    regress lgovhealthexp lgdp loldpop lifeexpect mortalr
    estimates store OLS

    *Random Effects Model
    xtset country year
    xtreg lgovhealthexp lgdp loldpop lifeexpect mortalr i.year, re
    estimates store REM


    *Fixed Effects Model
    xtreg lgovhealthexp lgdp loldpop lifeexpect mortalr i.year, fe
    estimates store FEM
    // Since the P-value is less than 0.05 (prob>F=0.0000),the
model is correctly specified.

    *Comparision of different estimated results

 estimates table OLS FEM REM, se
```

```
420       hausman FEM REM, sigmamore
421
422   *   Prob > chi2 = 0.0000 - implies fixed model preferrable
423
424
425   xtreg lgovhealthexp lgdp loldpop lifeexpect mortalr, re
426   xtoverid
427
428
429
430
431                           * Adding Control Variables
432                           *=========================
433
434       *Regional Differences
435
436       encode  incomelevel, gen(regions)
437       tabulate regions
438       xtreg lgovhealthexp lgdp loldpop lifeexpect mortalr i.regions
439
440
441
442                          * Heteroscedasticity Pagan test
443                          *================================
444
445       regress lgovhealthexp lgdp loldpop lifeexpect mortalr i.year
446
447       predict residuals, residuals
448       gen squared_residuals = residuals^2
449
450       gen squared_lgdp = lgdp^2
451       gen squared_loldpop = loldpop^2
452       gen squared_lifeexpect = lifeexpect^2
453       gen squared_mortalr = mortalr^2
454
455       regress squared_residuals squared_lgdp squared_loldpop
      squared_lifeexpect squared_mortalr
456
457       test squared_lgdp squared_loldpop squared_lifeexpect
      squared_mortalr
458
459
460
461
462                          * Arellano-Bond Test for Autocorrelation
463                          *================================
464
465       xtabond lgovhealthexp lgdp loldpop lifeexpect mortalr, lags(1
      )
466
467
468
```

```
                        * Residual normality
                        *================================
*plot
qnorm residuals
kdensity residuals, normal


                *Omitted variable bias
                *=====================

regress govhealthexp lgdp loldpop lifeexpect mortalr
estat ovtest
```