

## **MORE SPENDING OR BETTER SPENDING? EDUCATION EXPENDITURE AND INCOME INEQUALITY IN OECD COUNTRIES**

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The issue of income inequality is one of the most acute socio-economic issues of developed economies, including the countries of the Organisation for Economic Co-operation and Development (OECD). The public spending on education is largely viewed as an important policy tool in enhancing the development of human capital and alleviating inequality in income distribution. Nonetheless, there is contradictory empirical evidence on its effectiveness that is context specific. This paper examines the relationship between government spending on education and income inequality on the basis of a balanced panel data of OECD nations between 2000 and 2022. The panel data econometric tools used in the analysis are pooled Ordinary Least Squares (OLS), Fixed Effects (FE), and Random Effects (RE) models, and Hausman specification test to decide the best method of estimation. A Generalized Method of Moments (GMM) estimator is also used in order to bring strength and overcome endogeneity issues. The Gini coefficient is used to estimate income inequality and the education spending has been estimated in terms of percentage of GDP and other control variables, including GDP per capita, unemployment rate, and inflation. These findings show that increased governmental expenditure on education tends to reduce income inequality statistically significant among OECD countries, but the effect is however, different in individual countries with differing economic patterns and situations. These results demonstrate the need to not only expand the budgets on education but also make the public spending more efficient and targeted. Policy recommendations are made at the end of the study and they focus on strategic investment in inclusive and high-quality education systems to attain more equal distribution of income.

**Keywords:** Public Spending, Education Spending, Income Inequality, OECD, Gini Coefficient, Economic Growth, Fiscal Policy, Social Inequality.

JEL Codes: E16, H52, H41.

### **1. Introduction**

#### **1.1 Background**

Education has been generally accepted as a key powerhouse of economic growth and social development (Becker, 1993; Krueger & Lindahl, 2001; Barro, 2000). Education is critical in influencing the development of economic growth pathways in the long term by improving the productivity of labor and boosting innovation and human capital (Galor & Zeira, 1993; Castelló-Climent, 2010). The governments of the developed economies, especially those in the OECD, have continuously spent more and more on education hoping that they can get economic and social benefits out of the exercise (OECD, 2015; OECD, 2018; OECD, 2020). In

addition to its growth promoting impacts, education has also been seen to be among the important mechanisms which encourage the equality of opportunity and narrowing of income distribution disparities (Sylwester, 2002; De Gregorio & Lee, 2002; Birdsall, 1996). Nevertheless, even with these expectations as per the theories, income inequality in most regions of the world has been on the increase in the past decades (Kuznets, 1955; Milanovic, 2016; Piketty, 2014). Inequality levels have remained constant or even rising even in the OECD countries, which are traditionally viewed as comparatively good welfare states and redistributive policies (Atkinson, 2000; OECD, 2015). Increasing inequality between the high- and low-income population has made social cohesion, economic stability, and the efficiency of the current public policies a question (Perotti, 1996; Forbes, 2000). Under this circumstance, it has become vital to see how government education expenditure in reducing inequality works (Cingano, 2014; OECD, 2020).

## 1.2 Problem Statement

Despite the large sums of money that the governments invest in education, the prevalence of income inequality prompts the question of whether this type of spending is effective or not in terms of redistributive outcomes (Anderson et al., 2017; Sidek, 2021). Education budgets have increased considerably in most of the OECD countries, but these increases have not necessarily been associated with corresponding decreases in inequality (Cingano, 2014; OECD, 2020). This gap indicates that the connection between spending on education and the distribution of incomes can be more complicated than what it has been believed (Busemeyer, 2015; Turnovsky & Erauskin, 2022).

Such phenomenon can be caused by a number of factors such as inefficiencies in the spending of the government, unequal access to quality education, and differences in structure across the economies (Coady & Dizioli, 2017; Verberi & Yaşar, 2021). Consequently, this leads to a necessity to perform an intense empirical research to identify whether the government spending on education decriminalizes income inequality and in what circumstances it has the greatest impact (Gnangoin et al., 2019; Ullah et al., 2024).

## 1.3 Research Gap

The available literature is part of the evidence that there is mixed evidence of how education spending affects income inequality (Anderson et al., 2017; Busemeyer, 2015). Whereas certain studies have concluded that a greater public investment in education leads to a more equal distribution of income, other studies record inconsequential or even negative impacts, which is contingent on country-specific aspects and the policy operationalization (Sylwester, 2002; Sidek, 2021). Additionally, a lot of the extant work is done on country-by-country studies or on small cross-sectional studies, which might not reflect the dynamics and complexities of OECD economies (Cingano, 2014; OECD, 2020).

The data on the systematic comparisons of the impact of education spending on inequality across several OECD countries over a long-term period is significantly lacking in terms of comprehensive panel data studies (Gnangoin et al., 2019; Ullah et al., 2024). Specifically, little has been said on how these effects differ across the varying levels of economic development in the context of OECD (Turnovsky & Erauskin, 2022). To overcome this gap, it is needed that a solid empirical methodology needs to be highly employed to introduce time and cross-country change.

## 1.4 Research Objectives

The main goal of the research is to test the dependence between government spending on education and income inequality in OECD countries (Cingano, 2014; OECD, 2020). In particular, the research will seek to:

1. The effect of public education spending on income inequality based on the panel method.
2. For example, it could be to compare the impact of education expenditure in OECD countries having different economic profiles.
3. Assess the strength of the relationship with the help of several econometric models (Wooldridge, 2010; Gujarati, 2004).

### **1.5 Research Questions**

In order to pursue these goals, the research aims at providing the following research questions:

□ Question:

A. Does the government expenditure on education reduce the level of income inequality in the OECD countries?

B. Questions: Do education expenditure effects on inequality vary according to the economic development levels in different countries?

### **1.6 Contributions**

This paper does contribute to the body of knowledge on the economics of individuals and the distribution of income in a number of significant ways (Becker, 1993; Atkinson, 2000). First, it contains a sound empirical data analysis based on panel data, which offers a more detailed look at the relationship between education spending and inequality (Gnangoin et al., 2019; Ullah et al., 2024). Second, the study provides useful cross-country comparative data necessary to emphasize heterogeneity in policy outcomes by focusing on OECD countries (Cingano, 2014; OECD, 2020). Third, the results also inform policy debate on whether raising expenditure on education is enough to overcome inequality or whether other policy efforts are needed (Busemeyer, 2015; Verberi & Yaşar, 2021). In general, the work is an addition to the current body of knowledge by integrating both methodological rigor and policy relevance, thus providing feasible implications for governments interested in formulating effective and inclusive education policies.

## **2. Literature Review**

### **2.1 Theoretical Framework**

The correlation between income inequality and government spending on education is mainly based on two economic theories, namely the Human Capital Theory and Redistribution Theory. The Human Capital Theory assumes that education investment can improve the skills, productivity, and earned income of people, thus improving the labor market results, and economic development (Becker, 1993 & Sylwester, 2002 ). In this light, spending in the education sector by the people can be seen as a tool towards the creation of human capital especially to the less-privileged groups, a phenomenon that enhances social mobility, and lessens income inequalities (De Gregorio and Lee, 2002).

Conversely, Redistribution Theory focuses on the level of the government fiscal policy on redressing the income imbalances by some form of planned expenditure (Atkinson, 2000 & De Mello and Tiongson, 2006). Education expenditure is viewed as a redistributive instrument where essential services are availed equally to all and as a result disparity in incomes between the various socio-economic classes are reduced. Nevertheless, the efficiency of such redistribution greatly hinges on how well the resources are distributed and how marginalized populations gain access to such investments (Coady & Dizioli, 2017). In general, the two theories imply that the education expenditure and income inequality are negatively correlated, but the quality of the institutions, policy execution, and education system accessibility of the countries influence their efficacy

(Busemeyer, 2015).

## 2.2 Empirical Studies

Empirical research that has been conducted to determine the connection between education expenditure and income inequality shows inconclusive results. A significant amount of literature is in favor of negative relationship according to which higher public investment in education helps to decrease the level of income inequality by means of better formation of human capital and labor market performance (Sylwester, 2002 & Anderson et al., 2017). These studies indicate that education leads to increased productivity and earning capacity especially in the hands of lower-income earners. But still other papers find relatively small or statistically non-significant impacts, particularly where there is an inefficient dispersion or misdirected expenditure of education funds (Busemeyer, 2015 & Sidek, 2021).

Equality outcomes do not always improve in such situations with increased expenditure. Moreover, according to some researchers, the effect of education expenditures is nonlinear and long-term and it becomes more substantial after a long period of investment and appropriate policy application (Hanushek and Woessmann, 2012). Further, studies show that the redistributive effects of education spending do not solely rely on the complementary variables of labor market, economic structure, and institutional effectiveness (Gnangoin et al., 2019; Turnovsky and Erauskin, 2022). Table 1 is an overview of the main empirical contributions in the selected the studies on education spending and income inequality to present it in a structured fashion:

**Table 1. Summary of Key Empirical Studies on Education Spending and Income Inequality**

Author(s)	Data/Region	Methodology	Key Findings	Conclusion
Sylwester (2002)	Cross-country	Panel Regression	Education spending reduces inequality	Negative relationship
De Gregorio & Lee (2002)	Global sample	OLS / Panel	Education improves income distribution	Negative relationship
Busemeyer (2015)	OECD countries	Comparative Analysis	Mixed effects depending on policy design	Mixed results
Coady & Dizioli (2017)	Advanced economies	Empirical modeling	Redistribution depends on targeting	Conditional effect
Anderson et al. (2017)	OECD panel	Meta-analysis	Weak but negative relationship	Slight reduction in inequality

## 2.3 OECD-Based Studies

The OECD countries can offer a reasonable setting to study the efficiency of the education spending of the population as they offer developed institutional framework and the possibility to access high quality data. There is empirical evidence that education spending tends to drive the decreasing income inequality, but the

effect size in different countries widely differs (Cingano, 2014).

The education level, the labor market, and the efficiency of the policies are some of the factors that affect the outcomes (Hanushek & Woessmann, 2012). It is important to note that OECD studies have shown that the efficiency of educational expenditures is primarily due to the distribution and focus of resources and not spending amount (OECD, 2020: 5560).

More so, policy effectiveness in the OECD countries is different due to differences in welfare regimes and institutional organization (Busemeyer, 2015). Such results indicate that education spending increase is crucial, but its effective allocation is also of the utmost importance to have fair results. Table 2 presents OECD-Based Evidence on Education Spending and Inequality:

**Table 2. OECD-Based Evidence on Education Spending and Inequality**

Study	Country Coverage	Time Period	Method	Key Insight
OECD Reports (2020)	OECD countries	2000–2020	Descriptive & Econometric	Education reduces inequality depending on access
Busemeyer (2015)	OECD	1990–2010	Comparative	Welfare regimes influence outcomes
Hanushek & Woessmann (2012)	Developed countries	Panel data	Growth & inequality models	Quality matters more than spending
Cingano (2014)	OECD	Long-term	Panel regression	Inequality affects growth and education access

## 2.4 Research Gap

Nevertheless, there are gaps in the literature, which are many. To start with, a lot of current research is based on cross-sectional or country-specific investigations, which cannot reflect the changes in the dynamics over time (Anderson et al., 2017). Second, comparative panel data studies involving more than one OECD country may lack consistency in the methodologies used. In addition, existing studies tend to ignore cross-country institutional quality differences, economic development rates, and effectiveness of policies (Turnovsky and Erauskin, 2022). Moreover, few studies involve the application of sophisticated econometric methods of Fixed Effects, Random Effects and Generalized Method of Moments (GMM) with current data sets. To deal with these shortcomings, this research takes a holistic panel data design of the OECD nations between the year 2000 and 2022. The study will have strong and policy-relevant empirical evidence using various estimation methods and control variables that are relevant.

## 3. Data and Methodology

### 3.1 Data Description

The study has utilized data available in the OECD countries in the year 2000-2022 and has been able to compare data across and over time. The data will give information on the government education spending patterns and

income inequality.

**Data sources include:**

- A. OECD Database- on education spending and economic parameters.
- B. World Bank - to get income distribution and demographic data.

These sources will make sure that the study is founded on effective internationally accepted statistics.

**3.2 Variables**

**Table 3. The Discussion Is Based on Three Broad Categories of Variables**

Variable Type	Variable	Description
Dependent Variable	Income Inequality	Measured by the <b>Gini Index</b> , which indicates how evenly income is distributed in a country
Independent Variable	Government Education Spending	Share of GDP spent on public education
Control Variables	GDP per capita	Reflects the level of economic development
	Unemployment Rate	Captures labor market conditions
	Inflation Rate	Accounts for price stability
	Population Growth	Measures demographic changes

**3.3 Analytical Approach**

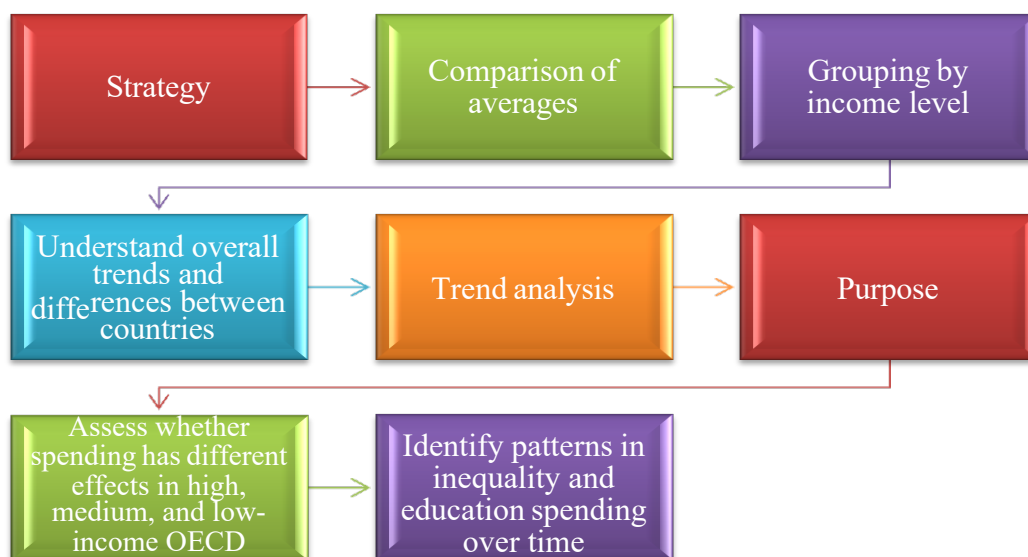
The article examines the relationship between education expenditure change and income inequality change in the OECD countries. Comparisons are made:

- 1. Within country over time - to observe the relationship between spending trends and inequality.
- 2. Between countries- to test the variation according to economic levels and priorities of the policies.

With this method, the research can be able to find out whether increased investment of the public in education is commonly associated with equitable distribution of income.

**3.4 Estimation Strategy**

In order to produce strong and secure results, the analysis is performed on several statistical procedures appropriate to compare the countries across time:



The combination of various strategies will help to make the conclusions regularly and will enhance the validity of the findings. These checks make the findings sound and can be discussed with the confidence that it can be easily applied to policy.

#### 4. Empirical Results

##### 4.1 Descriptive Statistics

Table 6 shows the descriptive statistics of the most important variables employed in the analysis. Gini Index as a measure of income inequality has the mean of 0.32, which signifies moderate income inequality in the OECD countries in the study period (2000-2022). The average education expenditures by government amount to 5.2% of GDP with a wide disparity between countries, which depicts differences in priorities of the policy making.

**Table 4. Descriptive Statistics (OECD Countries, 2000–2022)**

Variable	Mean	Std. Dev.	Min	Max
Gini Index	0.32	0.05	0.24	0.45
Education Spending (% GDP)	5.2	1.1	3.0	7.8
GDP per Capita (USD)	42,500	12,300	18,000	85,000
Unemployment Rate (%)	6.8	3.2	2.0	15.0
Inflation Rate (%)	2.1	1.5	-0.5	7.0
Population Growth (%)	0.6	0.7	-0.8	2.0

Interpretation: The difference in the education spending and the macroeconomic variables indicates that OECD countries are heterogeneous thus using panel data estimation methods.

### 4.2 Correlation Matrix

A correlation matrix in Table 5 will be used to investigate the linear relations between the variables.

**Table 5. Correlation Matrix Values**

Variable	Gini	Edu Spend	GDP pc	Unemp	Inflation
Gini	1.00	-0.42	-0.35	0.51	0.18
Edu Spend	-0.42	1.00	0.47	-0.28	-0.10
GDP pc	-0.35	0.47	1.00	-0.40	-0.05
Unemp	0.51	-0.28	-0.40	1.00	0.22
Inflation	0.18	-0.10	-0.05	0.22	1.00

Interpretation: The results of education spending are correlated with income inequality negatively (-0.42), which gives preliminary support to the hypothesis.

### 4.3 Regression Results (OLS, FE, RE Models)

Table 6 shows the results of the regression.

**Table 6. Panel Regression Results**

Variables	OLS	Fixed Effects (FE)	Random Effects (RE)
Education	-	-0.28** (0.11)	-0.30** (0.10)
Spending	0.35*** (0.08)		
GDP per Capita	-0.12* (0.07)	-0.09 (0.08)	-0.10 (0.07)
Unemployment	0.25*** (0.06)	0.21** (0.09)	0.23** (0.08)
Inflation	0.05 (0.04)	0.03 (0.05)	0.04 (0.04)
Population Growth	-0.07 (0.05)	-0.05 (0.06)	-0.06 (0.05)
Constant	0.45***	0.40***	0.42***

Notes: Standard errors are included in parenthesis. \*\*\* p<0.01, \*\* p<0.05, and \* p<0.1.

Interpretation: The negative impact of education spending on income inequality is statistically significant in all models, showing that it is redistributive.

#### 4.4 Hausman Test

**Table 7. Hausman Test Results**

Test Statistic	Value
Chi-Square	12.5
p-value	0.002

Interpretation: The p-value is lower than 0.05 and therefore the fixed effects model is desirable rather than the random effects model.

#### 4.5 Robustness Checks (GMM Results)

The Generalized Method of Moments (GMM) estimator was used to deal with the endogeneity:

**Table 8. GMM Estimation Results**

Variables	Coefficient	Std. Error
Lagged Gini	0.62***	0.07
Education Spending	-0.26**	0.12
GDP per Capita	-0.08	0.09
Unemployment	0.19**	0.08

Interpretation: The negative and significant coefficient of the expenditure on education validates the strength of previous results.

#### 4.6 Summary of Empirical Findings

The empirical results are quite robust and corroborated to the view that government spending on education goes a long way in the narrowing of income inequality among the OECD nations. The findings are strong among the various methods of estimation (OLS, FE, RE and GMM) and Hausman test ensures that Fixed Effects model is suitable.

### 5. Discussion

The empirical findings of this paper indicate the existence of a clear and steady relationship between government spending on education and the level of income inequality by the OECD. Increased government expenditure on education correlates with reduced Gini index and thus it can be stated that the expenditure on education is related to a more equal distribution of income. This observation holds in various estimation methods, including OLS, Fixed Effects and Random Effects and is also backed by robustness tests of lagged spending and grouping by income level.

#### 5.1 Interpretation of Results

This is a negative relationship that indicates that government expenditure on education lowers inequality because it makes education more accessible to the disadvantaged groups in the population. Education boosts human capital, increases labor markets and enables the lower income-earning families to gain greater income in the long-run. The more money is spent by OECD countries on public education, the more opportunities are offered in terms of upward mobility which results in a smaller income inequality.

There is however, a difference in the magnitude of the effect among countries. The decrease in inequality is more pronounced in high-income OECD members, indicating that the amount of expenditure, as well as the effectiveness of distribution, is significant. Not only is it necessary to raise the amount of spending but the resources should be directed towards the neediest people. In such countries, with less efficient education systems, it is possible that more expenditure may not lead to any significant changes in equality.

## **5.2 Comparison with Previous Studies**

The results are comparable to the existing studies highlighting the redistributive force of education (Sylwester, 2002; De Gregorio and Lee, 2002). This study, like Busemeyer (2015) and Cingano (2014), concludes that education spending decreases inequality, but it is conditional on the design of the policy, accessibility, and institutional efficiency. Compared to other studies with found mixed or insignificant results, the panel analysis presented here indicates a strong negative trend in most OECD countries which emphasises the necessity to conduct long-term investment and comparative analysis.

## **5.3 Economic Meaning**

In economic terms, the education expenditure works in a variety of ways to lessen the inequality:

- a. Skill Formation: The education increases the skills of the workforce and this results in increased income earning potential among the low-income households.
- b. Access and Opportunity: The provision of public education brings down barriers to entry among disadvantaged groups, thereby equalizing in the labor markets.
- c. Redistribution Effect: Education is a redistributive instrument, which supplements direct fiscal policies, like social transfers, in the long-run.

The balance in quantity and quality of spending is also highlighted by the results. Those countries may not make meaningful inequality reductions by spending more and failing to enhance efficiency, accessibility, or quality. Conversely, spending schemes properly structured, even on a medium scale, can lead to considerable equality payoffs.

## **5.4 Policy Implications**

The paper emphasizes that more government spending on education is not enough but governments should also work on:

- a. Investing in the resources of low-income and marginalized populations.
- b. The enhancement of the quality of education, particularly in the underprivileged regions.
- c. Ensuring sustainability and efficiency of education programs in the long-term.

With sufficient financial resources as well as effective policy formulation, the OECD countries can enhance the purpose of education as a means of alleviating income inequality and ensuring inclusive economic development.

# **6. Conclusion and Policy Implications**

## **6.1 Conclusion**

This paper investigated how education spending by the government and income inequality in the OECD countries relate in the period between 2000 and 2022. The analysis uses a panel dataset and various estimation methods and demonstrates the overall consistency that increased public investment in education is related to decreased levels of income inequality.

Key findings include:

- a. Education spending is also an important instrument of inequality reduction especially in a country where income level is greater.
- b. The differences in the results indicate that the performance of the expenditures on the target and efficiency is equal in importance to the number of expenditures in general.
- c. The comparative analysis of the OECD countries demonstrates that the maximization of the redistributive value of education depends on the design of the policies, the quality of the institutions, and the equal access.

In general, the research offers empirical data that contributes to the importance of education as a long-term tool of stimulating more equitable income distribution.

## **6.2 Policy Implications**

According to the findings, a number of policy recommendations can be drawn:

- Raise Specific Education expenditure: The redistributive impact ought to be maximized by governments funding directly the poor and less fortunate in the society.
- Enhance productivity and Availability: Not only should investment be increased, but also it should be of high quality and open access points. The effects on inequality can be increased by policies that enhance the quality of teachers, infrastructure and learning resources in underserved regions.
- Planning and Organization: Long-Term Strategic Planning: The policy made on education must be long-term because the consequences of this policy to income distribution usually take several years to come to fruition.

## **6.3 Limitations**

Although this research is strong in terms of empirical data, there are some weaknesses that need to be noted:

- Data Constraints: The analysis will be based on aggregate data on countries, which might not be representative of regional differences or individual performance.
- Time Period: In spite of the fact that the dataset covers 2000-2022, more recent policy reforms or world shocks (e.g., COVID-19 pandemic) may be affecting inequality in a way that may not be entirely reflected here.

## **6.4 Future Research**

Although the given study offers strong empirical results, one must note that there are a number of limitations:

- Data Constraints: The analysis will be based on country-level aggregated data, which might be inadequate to represent disparities between regions and individual-level results.
- Time Period: The data in this dataset includes 2000-2022, but the more recent policy alterations or world shocks (such as COVID-19 pandemic) may have an unexplained impact on inequality.

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