Effects of adult mortality rate on educational attainment: empirical analysis using cross-country panel data

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Abstract
Previous empirical studies have not paid enough attention to the effect of adult mortality rate, which is defined as the probability of dying between the ages of 15 and 60, on differences in educational attainment among countries. We hypothesise that the adult mortality rate negatively affects educational attainment because a lower probability of surviving after retirement discourages human capital accumulation in the youth. We conducted an empirical analysis using cross-country panel data of OECD countries, with a sample in which retirement was more common. We compared the results with those of non-OECD countries. We found that adult mortality rate had a significantly negative effect on educational attainment for OECD countries, but we could not find significant results for non-OECD countries. A lower adult mortality rate could increase educational attainment in countries where retirement at old age is common. The empirical results also showed that income per capita and fertility do not significantly influence educational attainment in OECD countries; rather, parents’ educational attainment and accessibility to education influence educational attainment in OECD and non-OECD countries.

Keywords Educational attainment · Adult mortality rate · OECD countries · Panel data

JEL Classification I21 · J10 · O11

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Introduction

This study empirically investigated the effects of the adult mortality rate on the difference in educational attainment among countries using cross-country panel data. In this study, the term educational attainment is meant to be average years of total education completed. In this study, we examined the total education of the population aged 25–29 years. We also defined adult mortality rate as the probability of dying between the ages of 15 and 60, referring to the [36]. Education is essential for economic development because it formulates the quality of the labour force and increases productivity [26, 28]. Therefore, analysing the determinants of educational attainment could present critical implications for economic development. In addition, educational attainment differs greatly among countries, therefore, it is important to examine what determines the difference in educational attainment.

Demographic transition, including mortality transition, is a stylized aspect of economic development. When a country begins to develop, its child mortality rate tends to decrease rapidly. The adult mortality rate starts to decline later and continues to decline in many countries. The child mortality rate is already low in many developed countries, and there may be little opportunity for a lower child mortality rate. However, the adult mortality rate is still declining; thus, it is important to consider the implications of lower adult mortality rates [23].

The focus of this study was the adult mortality rate, not life expectancy at birth. Life expectancy at birth is defined as the number of years a newborn is expected to live if the current mortality pattern does not change. Many countries publicise life expectancy statistics at birth more than the adult mortality rate; therefore, life expectancy at birth might be familiar to the general public. However, it is not suitable for our research to analyse the effect of life expectancy at birth because the effect of life expectancy at birth presents a mixed effect on adult and child mortality rates and cannot identify the effect of adult mortality rate.

We hypothesise that a decline in the adult mortality rate contributes to an increase in educational attainment. A decline in adult mortality rate increases the probability of survival after retirement. A higher probability of surviving after retirement can encourage investment in human capital, thereby causing increased educational attainment. Previous studies have not analysed the determinants of educational attainment using cross-country data, and the effect of the adult mortality rate on the difference in educational attainment among countries remains unsolved. Possibly, the retirement system is not developed in developing countries, although the retirement of the elderly is common in many developed economies [12]. As a representative of the sample in which retirement at old age is common, we considered OECD countries. We tested our hypothesis by estimating the determinants of educational

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1 Demographic transition includes transition of fertility. We do not discuss this issue in this paper due to space limitations.
2 For example, Barro and Sala-i-Martin [2] and Bloom, Canning, and Graham [6] used life expectancy at birth in the empirical research. However, Kinugasa and Mason [24] insisted the problems of using life expectancy at birth.
attainment using cross-country data from OECD countries. We compared the results with those of non-OECD countries and global data.

Figure 1 presents the changes in the average educational attainment of those in the age range of 25–29 years and the adult mortality rate in OECD and non-OECD countries and the world.³ Educational attainment was much higher in OECD countries than in the global average or non-OECD countries. It increased from 1970 to 2010 at almost the same speed in the OECD countries; however, it increased more rapidly in non-OECD countries in the 1970s and the 1980s. The adult mortality rate in OECD countries was much lower than the world average and continues to decrease almost constantly. Globally and in non-OECD countries, the adult mortality rate decreased rapidly in the 1970s and the 1980s and slightly increased in the 1990s and at the start of the 2000s due to the prevalence of HIV and civil wars in Africa. The adult mortality rate continued to decrease from 2003 to 2019.⁴ Overviewing Fig. 1, there seems to be a negative correlation between the adult mortality rate and educational attainment. However, detailed empirical analysis is necessary to clarify the effect of adult mortality on educational attainment.

The remainder of this paper is organised as follows. In the next section, we review previous studies on this topic. The third section explains the data and the empirical model. We discuss the empirical results in the fourth section. Finally, the last section concludes the paper.

**Literature reviews**

Several previous studies have investigated the effect of the adult mortality rate on educational attainment.⁵ Theoretical studies have indicated that a decline in adult mortality can induce human capital investment, which can increase educational attainment. A decline in adult mortality rate increases the probability of survival after retirement. It increases the necessity of earning a higher income for their youth and saving more to consume after retirement. This situation encourages the young generation to invest in human capital. Therefore, the adult mortality rate has a negative effect on educational attainment [8, 14, 19–21, 27, 29, 31]. The above-mentioned theoretical studies have not conducted enough econometric analysis although they contributed to extending elaborate theory. Further discussion on the empirical application of this theory is necessary.

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³ As explained later, OECD and non-OECD countries are the representatives of developed and developing countries, respectively. The statistics in Fig. 1 are the averages of the sample countries in our empirical analyses. Moreover, the adult mortality rate is the average of male and female statistics.

⁴ Data since the COVID-19 pandemic were unavailable. However, we suspect that adult mortality rate increased due to the pandemic in 2020.

⁵ Ben-Porath [5] established the basic theory about the effect of life expectancy on educational attainment. Ben-Porath argues that increased life expectancy, which leads to increasing lifetime working hours, induces individuals to invest more in education. However, retirement is more common in developed countries, where life expectancy tends to be longer and the theory may not be directly applicable for the present situation.
Fig. 1 Historical change in educational attainment and adult mortality rate. (a) Educational attainment of 25–29 years (years). (b) Adult mortality rate. Source: World Bank [35] for (a). World Bank [36] for (b)
Previous studies have analysed the effect of life expectancy or mortality rate on variables related to educational attainment. For example, Jayachandran and Lleras-Muney [18] showed that a 70% reduction in female maternal mortality risk increased female life expectancy by 1.5 years and increased female literacy by 2.4% in Sri Lanka. They found a rapid decrease in maternal mortality between 1946 and 1953 in Sri Lanka to identify the effect of a longer horizon on education and exclude other health effects on education. In addition, Sun et al. [33] analysed the relationship between mortality and illiteracy rates using a difference-in-differences analysis and cross-province data in China. The results showed that a decline in mortality lowered the illiteracy rate and increased the average schooling years.

Few prior studies have empirically analysed the determinants of educational attainment using world panel data. Explaining disparities in educational attainment within a country can provide interesting insights but cannot identify the determinants of disparities among countries. Our study is unique in that it identifies the effects of differences in adult mortality rate on differences in educational attainment among countries. When we empirically analyse the effect of adult mortality rate on educational attainment, we need to consider whether retirement at old age is common. People tend to continue working in an agricultural society, and the retirement age may not be applicable. It is important to conduct an empirical analysis using a sample of countries where retirement at old age is common. We considered OECD countries as representative of countries where retirement at an old age is common. We conducted an empirical analysis using data from OECD countries and compared the results with those of non-OECD countries and the world.

**Model and data**

We conducted an empirical analysis on the effect of adult mortality rate on educational attainment based on the discussion in the previous sections. We used country-level panel data from the World Development Indicators and education statistics for 5 years (1990, 1995, 2000, 2005, and 2010). The panel dataset was unbalanced. We

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6 Empirical research on the determinant of educational attainment has attracted attention of economists. Japanese researchers have analysed the differences in educational attainment by prefecture or region in Japan [16, 17, 32, 34].

7 Prettner et al. [30] analysed the determinants of educational attainment using the world data. The authors analyse the effect of fertility rate on educational attainment. However, their study primarily contributes to establish a theoretical model, and their empirical analysis only confirms the theoretical implications. On the other hand, many previous studies about the determinants economic growth and saving conducted empirical analysis based on world panel data. For example, please refer to Mankiw et al. [28], Barro and Sala-i-Martin [2], Higgins and Williamson [15], Kelley and Schmidt [22] and Kinugasa and Mason [24].

8 There have been different ways of discussion regarding the reason of increase in retirement in old age especially in developed countries. Mandatory retirement could be one way of managing labour in a formal company [25]. Retirement pension benefits encourage workers to retire earlier [1, 7, 9, 12, 13]. Costa [10] emphasised the role of growing wealth. It would be important to consider endogenous retirement, but it should be noted that much part of retirement can be decided institutionally. If labourers are not employed as is common in rural farm and self-employed, they will not retire at old age and continue working.
determine whether the empirical model was a fixed or a random effects model using the Hausman test.

We estimated the following equation: the hypothesised signs were indicated below the variables. Table A1 presents the definitions and descriptive statistics of each variable.

\[
\text{Log Education} = \beta_0 + \beta_1 \text{Adult Mortality} + \beta_2 \text{Fertility} \\
+ \beta_3 \text{Log Parents Edu} + \beta_4 \text{Log GDP} + \beta_5 \text{Capacity}
\]  

(1)

In Eq. (1), the dependent variable \( \text{Log Education} \) was logged educational attainment. It was the average years of education, including primary, secondary, and tertiary education, of those aged 25–29 years. \( \text{Adult Mortality} \) is defined as the adult mortality rate. \( \text{Fertility} \) is the total fertility rate, and \( \text{Parent's Edu} \) is the average number of years of total education of those aged 65 years and older. \( \text{GDP} \) is per capita GDP. \( \text{Capacity} \) was a variable for accessibility to educational institutions.

The hypotheses for Eq. (1) are as follows: We expect the adult mortality rate to have a negative effect on educational attainment. A decrease in the adult mortality rate indicated a lower probability of death by 60 years and the necessity of financing consumption after retirement. Therefore, people who expect lower adult mortality rate tend to educate themselves to raise their lifetime income during the working-age period to finance post-retirement consumption.

We expect the fertility rate to have a negative effect on educational investment because of the quality and quantity of trade-offs suggested by Becker [3] and Becker and Barro [4]. Parents’ educational attainment can influence their preference for children’s education and will have a positive effect on educational attainment. A higher GDP per capita was expected to promote educational attainment because more people are likely to afford education.

To capture the availability of educational institutions (primary, secondary, and tertiary education) when adults aged 25–29 were in school, we used the ratio of the size of enrolment and population of their cohorts aged 10–14 years. As Currie and Moretti [11] suggested, higher capacity of educational institutions promoted educational attainment. Accessibility to educational institutions is an important factor, and we expect the capacity of educational institutions to increase educational attainment. Even if the address information of respondents and geographical accessibility to school is available, it will be impossible to educate all those living near each school because of spatial and physical issues. Therefore, we chose aggregate country-level data to reflect the number of students as the capacity of schools.

We estimated Eq. (1) using cross-country panel data. As previously discussed, our hypothesis was related to retirement at an old age. Fewer people tend to retire

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9 We analyse the educational attainment of this age group, because most people have already graduated from school by this age. Empirical analysis for older age groups is possible but we will need older data for the lagged variable, for which the sample is insufficient. Moreover, older people are more likely to have migrated, which can result in a larger bias. However, conducting empirical analysis for different age groups can contribute to this area of research.
in countries where most are self-employed or engaged in agriculture. We supposed that most people in developed countries have a retirement age. As a representative of developed countries, we chose the OECD countries. We estimated the equations using data from OECD countries. We compare the results with those of non-OECD countries and the world.

Note that an endogeneity problem may occur between adult mortality rate and fertility on educational attainment in our analysis. Educational attainment can improve knowledge of health and may decrease adult mortality rates. Moreover, educational attainment can decrease the number of children because of the higher educational expenses per child. To address this problem, we took the 10-year lag for each variable. Taking the lag can overcome the endogeneity problem to a certain extent.

**Empirical results**

Based on the discussion in the previous section, we estimated Eq. (1). Table A1 shows the descriptive statistics of the data for OECD countries, non-OECD countries and the rest of the world. Table A1 showed that educational attainment was higher in OECD countries than in the other two cases. The adult mortality rate was also lower in OECD countries. The total fertility rate was lower in OECD countries than in the world and non-OECD countries; the minimum fertility rate for non-OECD countries was 1.21; thus, there was a significant variation in fertility in non-OECD countries. In common with OECD countries, non-OECD countries and rest of the world, parents’ educational attainment was lower than people aged 25–29 years. This implied an improvement in the educational attainment of younger generations. The average per capita GDP of OECD countries was much higher than that of non-OECD countries. Accessibility to educational institutions was also higher in the OECD countries. The statistics showed that the standard deviation of the variables was smaller in OECD countries than in the world or non-OECD countries, indicating that variables have less variance in OECD countries.

Table 1 lists the estimated results for Eq. (1). In OECD countries, the adult mortality rate has a significantly positive effect on educational attainment. Our hypothesis was supported; however, the adult mortality rate does not have significant effects in non-OECD countries and rest of the world. The adult mortality rate has a positive effect on educational attainment only in OECD countries. It indicated that the adult mortality rate could influence human capital formation in areas where retirement at old age was common. A lower probability of dying during working age may increase the motivation to earn more with higher wages due to higher educational attainment.

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10 Kinugasa and Mason [24] and Yamaguchi and Kinugasa [37] insisted on the importance of empirical analysis with cross-country data separating the whole world into subsamples.

11 We did not use the instrumental variable method in the analysis because it was difficult to find the appropriate instrumental variables. However, it might need careful discussion in future research.
We also found that fertility does not have a significant effect on educational attainment in OECD countries, whereas it was significant in non-OECD countries and the world. Perhaps fertility was already low in OECD countries; therefore, having fewer children might not significantly increase educational attainment. The effect of fertility was significantly negative. Thus, higher fertility in developing countries may prevent higher educational attainment. Parents’ education had significantly positive effects on educational attainment in all three estimations. It indicated that the effect of the educational policy could extend for a long time. The current increase in educational attainment can increase the children’s generation.

Per capita GDP does not have a significant effect on educational attainment in OECD countries, although it has significant positive effects in non-OECD countries and the world. This was probably because public education was better organised in OECD countries, allowing access to educational institutions regardless of income level. The share of developing countries was higher among non-OECD countries; therefore, the results indicated that income level was more important in developing countries. Low incomes made it difficult for people in developing economies to attain higher educational attainment. The coefficient of capacity was positive and significant at the 10% level in OECD countries and significant at the 1% level in non-OECD countries and the world. It implied that accessibility of education was a more critical determinant of education in non-OECD countries than in OECD countries.

| Table 1 | Empirical results for the determinants of educational attainment |
|---------|---------------------------------------------------------------|
|         | OECD | Non-OECD | World |
| Adult Mortality | $-1.07^{***}$ | $-0.15$ | $-0.14$ |
| Fertility | $-0.03$ | $-0.04^{***}$ | $-0.05^{***}$ |
| Log Parents’ Edu | $0.19^{***}$ | $0.19^{***}$ | $0.19^{***}$ |
| Log GDP | $-0.04$ | $0.09^{***}$ | $0.05^{***}$ |
| Capacity | $0.04^{*}$ | $0.19^{***}$ | $0.13^{***}$ |
| Constant | $2.57^{***}$ | $0.94^{***}$ | $1.35^{***}$ |
| $R^2$ | 0.43 | 0.81 | 0.83 |
| Obs | 96 | 177 | 273 |
| Value of $\chi^2$ (Prob > $\chi^2$) | 2.99 | 2.31 | 3.30 |

Coefficient values are shown on the left side and $t$-values are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. For all three estimations, the random effects model was selected based on the Hausman test.
We estimated Eq. (1) by substituting the adult mortality rate with life expectancy at birth for comparison. We hypothesised that life expectancy at birth positively affected educational attainment because a higher life expectancy at birth can be related to a lower adult mortality rate. Table A2 presents the results. These results differ from those in Table 1. Life expectancy at birth significantly affected educational attainment in OECD countries; however, the fit model was better when we estimated the equation with the adult mortality rate. The coefficients of life expectancy at birth were positive and significant for non-OECD countries and the world. The coefficients of life expectancy at birth indicated the mixed effects of adult and child mortality rates and health status. Perhaps, life expectancy at birth reflected the information of child mortality to a great extent. It seemed to have a stronger effect on educational attainment for non-OECD countries and the rest of the world than the adult mortality rate. Therefore, the adult mortality rate can influence educational attainment only where retirement at an old age is common.

Conclusion

There has been insufficient empirical research on the effect of the adult mortality rate on the difference in educational attainment among countries. Moreover, many empirical studies use data on life expectancy at birth to express longevity; however, this might not be the best measurement because life expectancy at birth cannot exclude the effect of child mortality rate. The effects of adult mortality should be discussed separately from child mortality when considering educational attainment. Our empirical results indicated that a lower adult mortality rate increases educational attainment in OECD countries, where retirement is considered to be common, but not in non-OECD countries or the whole world.

For OECD countries, a lower adult mortality rate is a key determinant of educational attainment. Although educational attainment in developed countries is already high, it is important to further increase educational attainment to create global innovation. Therefore, policies to improve adult health and decrease mortality are important. We could not find a significant effect of the adult mortality rate on educational attainment in non-OECD countries. Improvements in medical technology have decreased adult mortality rates in these countries. However, we do not find any evidence that it contributed to higher educational attainment. Increasing formal employment or savings for old age would grant incentives to higher education and increase educational attainment.

We also have the following policy implications. Parents’ educational attainment can remarkably influence children’s educational attainment in both OECD and non-OECD countries. Therefore, improving current educational attainment can lead to higher educational attainment in the next generation. Access to educational institutions is also an important determinant of educational attainment. Developing an educational infrastructure, such as the number of schools or teachers, is essential, especially in developing countries.
High fertility can prevent developing countries from achieving higher educational attainment than non-OECD countries. Efforts to lower fertility, for example, increasing the availability of contraception, would be effective in these countries. Lower income can also be an obstacle to higher educational attainment in non-OECD countries, and it is important to sever the strong relationship between income level and educational attainment. Non-OECD countries should provide educational opportunities for everyone, regardless of income level. For example, organising public education, fellowship, and subsidising educational costs are essential. Moreover, fiscal and monetary policies to increase income would benefit educational attainment in non-OECD countries.

Future research should also consider the effects of health conditions on educational attainment. Perhaps the data on adult mortality rates include health status information, which can influence educational attainment. In addition, the COVID-19 pandemic has affected adult mortality globally. It could be a new challenge to analyse the effects of the coronavirus on educational attainment, considering the changes in morality, economy, and lifestyle.

Appendix

List of countries

The list of OECD countries in our data is as follows:

Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Republic, Latvia, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Slovenia, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.

The list of non-OECD countries is as follows:

Albania, Algeria, Argentina, Bahrain, Bangladesh, Barbados, Benin, Botswana, Brazil, Bulgaria, Burundi, Cameroon, Central African Republic, China, Colombia, Congo, Dem. Rep., Congo, Rep., Costa Rica, Cote d’Ivoire, Cuba, Cyprus, Ecuador, Egypt, El Salvador, Fiji, Gabon, Guatemala, Honduras, Hong Kong, Indonesia, Iraq, Jordan, Kenya, Kuwait, Kyrgyz Republic, Lao PDR, Lesotho, Liberia, Lithuania, Malawi, Malaysia, Mali, Malta, Mauritania, Mauritius, Moldova, Mongolia, Morocco, Nepal, Nicaragua, Niger, Pakistan, Panama, Paraguay, Peru, Philippines, Qatar, Romania, Russian Federation, Rwanda, Senegal, Sierra Leone, Singapore, Swaziland, Thailand, Togo, Tunisia, Uganda, Ukraine, United Arab Emirates, Venezuela, Zambia, and Zimbabwe.

The world data include both OECD and non-OECD countries.
Table A1  Source and definition of variables and descriptive statistics

| Variables    | Source | Definitions                                                                 |
|--------------|--------|-----------------------------------------------------------------------------|
| Education    | [35]   | Average years of total education (25–29 years)                              |
| Adult Mortality | [36] | Probability of dying between the ages of 15 and 60 (10-year lag)            |
| Fertility     | [36]   | Total fertility rate (10-year lag)                                         |
| Parents’ Edu | [35]   | Average years of total education (older than 65 years)                      |
| GDP           | [36]   | GDP per capita (constant 2011 US dollars) (10-year lag)                     |
| Capacity      | [36]   | 15-lagged enrollment/population 25–29 years                                |
| Lifeex        | [36]   | Life expectancy at birth (10-year lag)                                     |

Descriptive statistics

| Variables    | OECD   | Non-OECD | World |
|--------------|--------|----------|--------|
| Education    | 96     | 177      | 273    |
| Adult Mortality | 96    | 177      | 273    |
| Fertility     | 96     | 177      | 273    |
| Parents’ Edu | 96     | 177      | 273    |
| GDP           | 96     | 177      | 273    |
| Capacity      | 96     | 177      | 273    |
| Lifeex        | 96     | 177      | 273    |

| Variables    | OECD   | Mean | Standard deviation | Max  | Min |
|--------------|--------|------|--------------------|------|-----|
| Education    | 12.00  | 1.19 | 14.70              | 8.50 |     |
| Adult Mortality | 0.12  | 0.04 | 0.30               | 0.70 |     |
| Fertility     | 1.76   | 0.46 | 4.02               | 1.15 |     |
| Parents’ Edu | 8.21   | 2.43 | 13.40              | 2.78 |     |
| GDP           | 29,410.87 | 16,038.26 | 81,732.48 | 4784.84 |
| Capacity      | 2.61   | 0.30 | 3.27               | 1.52 |     |
| Lifeex        | 75.63  | 2.96 | 81.08              | 66.39 |     |

| Variables    | OECD   | Mean | Standard deviation | Max  | Min |
|--------------|--------|------|--------------------|------|-----|
| Education    | 7.78   | 2.77 | 13.2               | 1.39 |     |
| Adult Mortality | 0.24  | 0.12 | 0.61               | 0.07 |     |
| Fertility     | 4.22   | 1.86 | 7.63               | 1.21 |     |
| Parents’ Edu | 3.2    | 2.24 | 11.39              | 0.14 |     |
| GDP           | 5241.74 | 10,038.5 | 68,507.52 | 251.58 |
| Capacity      | 1.89   | 0.63 | 4.25               | 0.32 |     |
| Lifeex        | 63.18  | 10.16| 78.2               | 31.63 |     |

| Variables    | OECD   | Mean | Standard deviation | Max  | Min |
|--------------|--------|------|--------------------|------|-----|
| Education    | 9.26   | 3.09 | 14.70              | 1.39 |     |
| Adult Mortality | 0.19  | 0.11 | 0.61               | 0.07 |     |
| Fertility     | 3.36   | 1.92 | 7.63               | 1.15 |     |
| Parents’ Edu | 4.96   | 3.33 | 13.40              | 0.14 |     |
| GDP           | 13,740.77 | 16,991.62 | 81,732.48 | 251.58 |
| Capacity      | 2.15   | 0.64 | 4.25               | 0.32 |     |
| Lifeex        | 67.56  | 10.26| 81.08              | 31.63 |     |

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Table A2  Empirical results for the effect of life expectancy at birth on educational attainment

|                         | OECD       | Non-OECD   | World     |
|-------------------------|------------|------------|-----------|
| Log Lifeex              | 1.01***    | 0.33*      | 0.37**    |
|                         | (2.72)     | (1.91)     | (2.48)    |
| Fertility               | −0.02      | −0.03*     | −0.04***  |
|                         | (−1.01)    | (−1.76)    | (−3.06)   |
| Log Parents’ Edu        | 0.18***    | 0.19***    | 0.18***   |
|                         | (5.70)     | (6.47)     | (7.83)    |
| Log GDP                 | −0.04      | 0.08***    | 0.04**    |
|                         | (−1.41)    | (3.46)     | (2.50)    |
| Capacity                | 0.03       | 0.18***    | 0.13***   |
|                         | (1.04)     | (6.05)     | (5.75)    |
| Constant                | −1.93      | −0.40      | −0.14     |
|                         | (−1.37)    | (−0.58)    | (−0.23)   |
| $R^2$                   | 0.42       | 0.81       | 0.84      |
| Obs                     | 96         | 177        | 273       |
| Value of $\chi^2$ (Prob > $\chi^2$) | 2.57       | 1.97       | 5.37      |
|                         | (0.77)     | (0.85)     | (0.37)    |

Coefficient values are shown on the left side and t-values are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. For all three estimations, the random effects model was selected based on the Hausman test.

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