# Human Capital: "Travel Broadens the Mind"

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**Abstract**

This paper adopts an economic framework to examine the impact of international travel on human capital development. Using a fixed-effects instrumental variable estimator as the primary analytical approach, the study investigates a panel dataset covering 64 countries from 1995 to 2019. The findings reveal that international travel, measured through tourism openness, has a significant positive effect on human capital. These results underscore the importance of global human mobility—encompassing migration, international educational exchange, and tourism—in fostering the development and dissemination of knowledge, culture, and technology.

**Keywords**: travel; human capital development; economic growth and development
**JEL Classification**: C23; J24; O40

# 1 Introduction

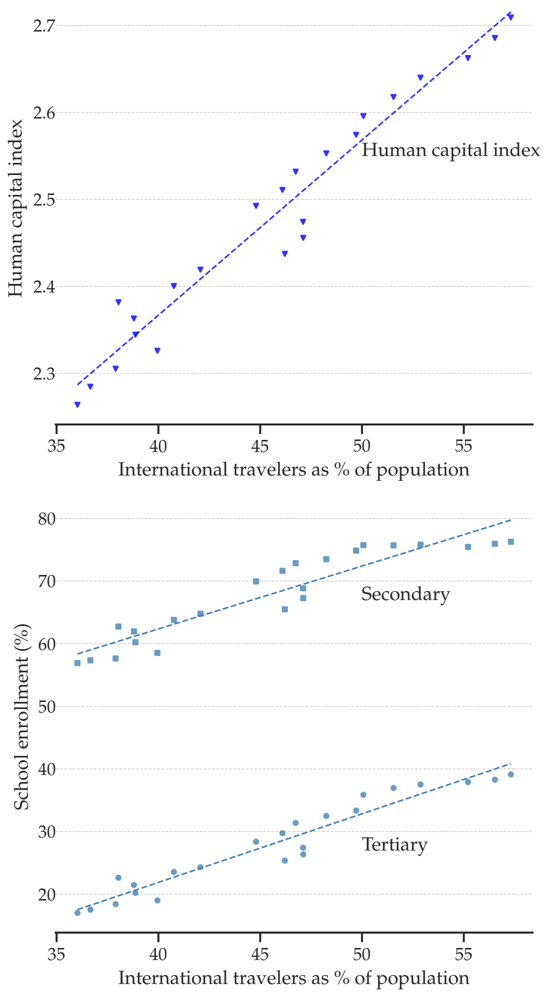
Human capital, a foundational concept in labor economics, refers to the stock of skills, knowledge, experience, and attributes possessed by individuals. Unlike physical capital, which can be bought, sold, and separated from its owner, human capital is embodied within individuals, accumulated over a lifetime, and often sharpened through regular application. Among various forms of capital, including factories, machinery, and financial assets, human capital plays the most pivotal role in the modern economy. This prominence arises from its contribution to advancing scientific and technical knowledge, which in turn boosts the productivity of labor and other inputs in production processes. This significance is well-documented in growth theories (see e.g., Barro and Sala-i-Martin 1995; Galor 2011; Lucas 1988; and Romer 1990).

Given its importance, substantial research has focused on identifying factors that enhance human capital. Both early and contemporary scholars, such as Becker (2009), Goldin (2024), and Mincer (1958), emphasize the critical roles of education, on-the-job training, and health. Additionally, Acemoglu and Autor (2011) highlight factors such as innate ability, school quality, non-schooling investments, and pre-market conditions (e.g., peer group effects). Another strand of literature explores human capital at the micro-level, considering it as a multidimensional construct encompassing components like socio-emotional skills, cognition, and nutritional status. These components interact and begin to develop early in life, even before birth (Attanasio, 2020). For instance, Lu, Black, and Richter (2016) provide evidence linking child development to socioeconomic factors such as poverty and poor nutrition.[1]

This paper examines human capital from a macroeconomic perspective, specifically focusing on the impact of human movement across borders—international travel—on its development. The age-old adage, "Travel broadens the mind," captures the essence of this relationship. When individuals travel to new countries, they bring their experiences, knowledge, and culture to share with host nations. Simultaneously, they acquire diverse ideas and perspectives from the host environment. This exchange fosters creativity and innovation (Hu and Wan, 2024), which, in turn, promotes economic growth (Lee and Chang, 2008; Paramati, Alam, and Chen, 2017). Consequently, the positive correlation between international travel (inbound and outbound visitors) and human capital development, as depicted in Figure 1, is unsurprising.

[1] See also Almond, Edlund, and Palme (2009) and Hamadani *et al.* (2014).

**Figure 1**: Relationship between human capital and international travelers.




Note: The data in both panels are time series from 1995 to 2019. Human capital index is the average of 184 countries' human capital index each year, sourced from the Penn World Table version 10.01. International travelers as % of population is the world's sum of international inbound and outbound visitors divided by the world's population. School enrollment rates are the world's school enrollment rates. The source of these variables is the World Development Indicators.

Since the onset of the new era of globalization in trade and migration following the fall of the Soviet Union in the 1980s, international travel has surged, contributing significantly to the global economy. In the early 1990s, only about 35% of the world population engaged in cross-border movement. By 2020, this figure had risen to 58%, as shown in Figure 1. Over the same period, human capital, as measured by indices such as the human capital index and school enrollment rates, nearly doubled.

Numerous studies have explored the impact of international travel on various dimensions of economic and social development. These include its effects on economic growth (Adedoyin, Erum, and Bekun, 2022; Chou, 2013), trade openness (Fernandes, Pacheco, and Fernandes, 2019; Wong and Tang, 2010), environmental pollution (Zhang *et al.*, 2020), and creativity (Hu and Wan, 2024). While our work relates to some of these themes, it differs both theoretically and empirically by focusing specifically on the relationship between international travel and human capital development.

We develop a theoretical framework grounded in consumer theory, reconceptualizing overseas travel not merely as consumption—its conventional economic interpretation—but also as an investment in human capital. Traveling abroad incurs costs for individuals in terms of resources but yields benefits through new experiences and potential mental health improvements. This perspective aligns with Schultz (1961), who documented migration as a key investment in human capital that enhances individuals' capabilities. Our theoretical model posits a positive interaction between international travel and human capital formation.

To empirically test this relationship, we analyze a panel dataset covering 64 countries over the period 1995–2019. Our initial benchmark analysis employs pooled ordinary least squares (OLS) and fixed effects (FE) models. To address potential endogeneity, we utilize an instrumental variable (IV) approach as our main empirical strategy. Specifically, we use the average cost of international travel—an exogenous variable in our model—as an instrument to obtain consistent parameter estimates for the human capital production function.

The results reveal a significant positive association between international travel (both inbound and outbound) and human capital development. These findings are robust across various measures of human capital. Our analysis underscores the value of policies that foster international travel, such as student exchange programs and tourism, for enhancing human capital.

The paper proceeds as follows. Section 2 introduces a static model linking human capital to international travel. Section 3 outlines the econometric model specifications and describes the dataset used in the analysis. Section 4 presents the empirical results and robustness checks, and section 5 concludes.

# 2 An Economic Framework: The Relationship between Human Capital and Travel

In this section, we develop a simple, static theoretical model of human capital formation, which underpins the empirical analysis in the subsequent section. We explore the relationship between the two key variables of interest: human capital and international travel, and use an instrumental variable approach to address potential endogeneity concerns.

The study of human capital development has a long history in economics, starting with the seminal work of Gary Becker (Becker, 1964). More recently, several prominent researchers have advanced the theoretical framework for understanding human capital formation, such as Attanasio *et al.*, 2020 and Cunha and Heckman, 2008, contributing to the broader discourse on the subject.

Consider an economy with a large number of households. At time $t$, the representative household produces output, denoted by $Y_t$, using a Cobb-Douglas production function:

$$Y_t = A_t K_t^{1-\alpha} \left[ h_t L_t \right]^{\alpha}, \tag{1}$$

where $\alpha \in (0.5, 1)$ is the labor share of output,[2] $A_t$ denotes productivity, $K_t$ stands for physical capital, $h_t$ represents human capital, and $L_t$ is labor. Without loss of generality, we normalize $A, K$ and $L$ to 1, simplifying the production function to $Y_t = h_t^{\alpha}$.

The human capital develops according to a linear function:[3]

$$h_t = \beta T_t + \beta^{\boldsymbol{H}} \boldsymbol{H}_t + e_t, \tag{2}$$

where $\beta$ and $\beta^{\boldsymbol{H}}$ are constant, and $\boldsymbol{H}_t$ is a multidimensional vector of factors that influence human capital, such as health, schooling, training, and environmental factors (e.g; peer group effects), which can be fixed or time-varying. $e_t$ represents a random shock capturing unobserved factors. As discussed earlier, international travel enhances human capital by facilitating learning through observation and interaction.

The representative household allocates its income, $Y_t$, between consumption of goods ($C_t$) and investment in international travel ($T_t$). The price of goods is normalized to 1,

[2] Historically, although the labor share has been declining globally, it still exceeds 50% of output, as discussed in Karabarbounis and Neiman (2014) and Kheng, McKinley, and Pan (2024).

[3] We use this linear form for simplicity, enabling a closed-form solution to the consumer's maximization problem and facilitating the empirical analysis in section 3.

and the price of international travel is $p_t$. The household's budget constraint is:

$$C_t + p_t T_t = Y_t. \tag{3}$$

Note that international travel is assumed to not conflict with labor time used in production; people travel during holidays or leave. The household's utility is derived from both consumption and international travel, represented by the utility function:

$$U(C_t, T_t) = \ln C_t + \ln T_t, \tag{4}$$

where $C_t > 0$ and $T_t > 0$. The household chooses the levels of consumption and travel to maximize its utility in Equation (4), subject to the constraints in Equations (1)–(3). This maximization problem results in the following demand for international travel:

$$T_t = \frac{h_t^{\alpha}}{2p_t - \alpha\beta h_t^{\alpha-1}}. \tag{5}$$

Equation (5) shows that the demand for international travel increases with higher human capital or income $h_t$,[4] and decreases with the real cost of travel $p_t$.

Equations (2) and (5) highlight the endogeneity in the model, as both human capital and international travel depend on each other. Therefore, the empirical analysis in the next section must account for this endogeneity issue.

## 3 Empirical Strategies and Data

We start with the baseline econometric model from Equation (2) that relates human capital to travel, as follows:

$$h_{it} = \beta_0 + \beta_1 \text{Travel}_{it} + \beta_2 \boldsymbol{X}_{it} + \beta_3 \boldsymbol{X}_i^{*} + e_{it}^{h}, \tag{6}$$

where the subscript $t$ denotes time, indexed by $1, 2, \ldots, T$; $i = 1, 2, \ldots, N$ refers to countries; $\beta_0$, $\beta_1$, $\beta_2$ and $\beta_3$ are constant; $h$ refer to human capital; $\boldsymbol{X}$ is a vector of control variables that vary across time and countries, including: i) schooling and training (both formal and informal), ii) health, and iii) financial development; $\boldsymbol{X}^{*}$ is a vector of unobserved time-invariant factors, such as innate ability and culture; and $e_{it}^{h}$ refers to cross-country and time-variant factors that are unobserved in this specification.

[4] The assumption $C > 0$ and $T > 0$, combined with $\alpha \in (0.5, 1)$, ensures that the first derivative of $T_t$ with respect to $h_t$ is positive in Equation (5). This is demonstrated in Appendix B.

To proxy human capital investment, we use three methods: the indicator method, the cost method, and the income method. The indicator method relies on school enrollment rates, average years of schooling, or literacy; the cost method is based on education spending; and the income approach is based on expected future earnings (Abraham and Mallatt, 2022).

To measure human capital ($h$), we use secondary and tertiary enrollment rates, similar to Barro (1991) and Kheng, Sun and Anwar (2017). Primary enrollment rates are not used because international travel typically requires a certain level of knowledge for people to navigate more confidently. Additionally, we use the human capital index constructed by Feenstra, Inklaar and Timmer (2015), which is based on the average years of schooling from Barro and Lee (2013), Cohen and Soto (2007), and Cohen and Leker (2014), along with the assumed return rate to education from Psacharopoulos (1994).

To measure investment in schooling and both formal and informal training, we use government expenditure on education per capita (PPP)[5] because education is largely publicly funded and provided in most countries (Goldin, 2024). We also include per-capita private credit (PPP) as a measure of financial development.[6] A more developed financial sector makes it easier and cheaper for people to access funds, which alleviates resource constraints for schooling or training. Following Banerjee, Mishra and Maruta (2021) and Goldin (2024), We use life expectancy at birth as a measure of overall health.

For the key regressor, ”Travel,” we measure it by tourism openness, defined as the sum of international inbound and outbound visitors as a proportion of the population. As discussed earlier, we expect this key variable to positively influence human capital development, so we hypothesize that $\beta_1 > 0$.

As a benchmark analysis, We first estimate Equation (6) using both ordinary least square (OLS) and fixed effects (FE) models. We then employ the instrumental variable (IV) approach to address the endogeneity issue arising from the correlation between the “travel” variable with the error term $e^h$ in Equation (5).[7] Since the variable $p$—the unit real cost of travel—appears only in Equation (5) and not in Equation (2), we use it as an instrumental variable. Moreover, there is no reasonable argument suggesting that the travel cost directly influences human capital development. Therefore, we

[5] Purchasing Power Parity, 2021 real international price $.

[6] Domestic credit to private sector as a percentage of gross domestic product is commonly used to gauge financial development (Pan, Dwumfour, and Kheng, 2024).

[7] Endogeneity issues can arise due to omitted explanatory variables, measurement errors, and simultaneity. In this case, reverse causality as outlined in the theoretical framework, is a concern.

obtain the reduced form equation as below:

$$\text{Travel}_{it} = \lambda_0 + \lambda_1 p_{it} + \lambda_2 \boldsymbol{X}_{it} + \lambda_3 \boldsymbol{X}_i^* + e_{it}^T, \tag{7}$$

where $e^T$ is the error term. The unit real cost of international travel $p$ is measured by the average cost of international inbound and outbound expenditures (including airfares and overboard expenses) per a passenger, divided by the consumer price index (see Table A2 of Appendix A for the details of all the variables used in this study).

We use an unbalanced annual dataset for 64 countries from 1995 to 2019.[8] We then select only countries with at least 10 years of data (see Table A1 of Appendix A for the list of countries). The data for the human capital index is sourced from the Penn World Table version 10.01, while data for the remaining variables is obtained from the World Development Indicators (WDI) of the World Bank. Table 1 presents the summary statistics of the variables.

**Table 1**: Summary statistics

| | Mean | Std | Min | Max |
|---|---|---|---|---|
| Human capital index | 2.817 | 0.563 | 1.364 | 3.892 |
| School enrollment, secondary (% gross) | 93.331 | 22.492 | 17.793 | 164.080 |
| School enrollment, tertiary (% gross) | 48.530 | 25.376 | 1.732 | 143.963 |
| International travel (tourism openness) | 1.630 | 1.600 | 0.007 | 8.948 |
| Life expectancy | 75.254 | 5.914 | 42.125 | 84.356 |
| Average real cost of international travel | 1.747 | 1.661 | 0.002 | 18.211 |
| Gov't exp. on edu. per capita (PPP '0000) | 15.756 | 14.153 | 0.168 | 69.167 |
| Private credit per capita (PPP '0000) | 282.772 | 328.381 | 0.745 | 1758.391 |

Note: The gross rates of school enrollment can exceed 100% if the number of students enrolled is greater than the number of students in the age group that corresponds to the educational level.

We observe that none of the variables are overly concentrated around their means. For instance, the human capital index ranges from 1.4 to 3.9, with a mean of 2.8 and a standard deviation of 0.6. International travel, as a proportion of the population, ranges from just 0.007 to almost nine times the population. This broad variation in the data provides a robust sample for the empirical analysis. We also report the correlation matrix of all variables in Table A3 of Appendix A.

[8] The data for the key variables, "travel" and "human capital," are jointly available only for this period.

# 4 Results and Discussion

## 4.1 Baseline results

We start with a simple pooled OLS estimation. The results in Table 2 indicate that the relationship between international travel and human capital development is positive and statistically significant at the 1% level across all model specifications. The significant positive effect remains robust across all three measurements of human capital: human capital index, secondary enrollment rates, and tertiary enrollment rates.

However, a limitation of the OLS estimation is its failure to account for time-invariant variables, such as innate ability. To address this, we further use a FE estimator to control for these time-invariant factors. The FE estimation results, shown in Table 3, confirm that the coefficients of our variables of interest remain positive and statistically significant at the 1% level. This suggests that an increase in international inbound and outbound travelers is significantly associated with an increase in human capital formation.

Although the OLS and FE estimators provide results consistent with our expectations, we now address the endogeneity issue. Specifically, our theoretical framework suggests the presence of a simultaneity problem, where human capital also influences international travel. Intuitively, individuals need a certain amount of knowledge, such as literacy and foreign language skills, to travel abroad and navigate the complexities of the world more confidently.

**Table 2**: Human capital and international travel, OLS estimates

| | Human capital index | | | | Secondary enrollment | | | | Tertiary enrollment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| International travel | 0.153*** | 0.058*** | 0.069*** | 0.057*** | 5.204*** | 0.886** | 0.679* | 0.100 | 5.313*** | 1.547*** | 1.676*** | 1.07647** |
| | (0.009) | (0.010) | (0.010) | (0.009) | (0.390) | (0.398) | (0.399) | (0.341) | (0.447) | (0.488) | (0.492) | (0.444) |
| Gov't exp. on edu. per capita | | 0.020*** | 0.007*** | 0.0005 | | 0.904*** | 1.152*** | 0.828*** | | 0.789*** | 0.634*** | 0.298*** |
| | | (0.001) | (0.002) | (0.002) | | (0.045) | (0.079) | (0.069) | | (0.055) | (0.098) | (0.090) |
| Private credit per capita | | | 0.0006*** | 0.0004*** | | | -0.012*** | -0.023*** | | | 0.007* | -0.004 |
| | | | (0.00008) | (0.00007) | | | (0.003) | (0.003) | | | (0.004) | (0.004) |
| Life expectancy | | | | 0.043*** | | | | 2.107*** | | | | 2.185*** |
| | | | | (0.003) | | | | (0.103) | | | | (0.134) |
| Observations | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 |
| R-squared | 0.19 | 0.37 | 0.40 | 0.52 | 0.14 | 0.37 | 0.37 | 0.55 | 0.11 | 0.25 | 0.25 | 0.40 |

Note: *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

**Table 3**: Human capital and international travel, FE estimates

| | Human capital index | | | | Secondary enrollment | | | | Tertiary enrollment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| International travel | 0.100*** | 0.079*** | 0.080*** | 0.033*** | 3.426*** | 2.198*** | 2.219*** | -0.351 | 7.575*** | 5.221*** | 5.335*** | 3.061*** |
| | (0.006) | (0.007) | (0.007) | (0.005) | (0.440) | (0.469) | (0.469) | (0.408) | (0.531) | (0.548) | (0.537) | (0.507) |
| Gov't exp. on edu. per capita | | 0.012*** | 0.009*** | 0.001 | | 0.663*** | 0.619*** | 0.227** | | 1.271*** | 1.028*** | 0.682*** |
| | | (0.001) | (0.001) | (0.001) | | (0.100) | (0.105) | (0.089) | | (0.116) | (0.120) | (0.110) |
| Private credit per capita | | | 0.0002*** | 0.00010*** | | | 0.004 | -0.005** | | | 0.021*** | 0.0133*** |
| | | | (0.00004) | (0.00003) | | | (0.003) | (0.002) | | | (0.003) | (0.003) |
| Life expectancy | | | | 0.051*** | | | | 2.774*** | | | | 2.455*** |
| | | | | (0.001) | | | | (0.128) | | | | (0.159) |
| Observations | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 |
| R-squared | 0.19 | 0.24 | 0.26 | 0.65 | 0.05 | 0.09 | 0.09 | 0.37 | 0.16 | 0.25 | 0.28 | 0.41 |
| Number of countrycode1 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 |

Note: *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

## 4.2 Main IV results

To address both endogeneity concerns and time-invariant factors, we adopt a FE-IV estimator as one of our primary estimation strategies. Given that we only have the real cost of travel as an instrument, all our model specifications are exactly identified, with each model having as many instruments as regressors.

Table 4 reports the results from the two-stage least square (2SLS) estimation. The coefficients for the key regressor, whether proxied by the human capital index, secondary enrollment rates, or tertiary enrollment rates, are positive and statistically significant across almost all model specifications. Similarly, life expectancy and per-capita private credit also show statistically significant positive associations with human capital development. However, government expenditure on education shows a statistically insignificant association with the dependent variables in most models, except for two specifications where it is negative and statistically significant. One possible explnation is that, although government expenditure on education positively affects human capital through investment in schooling, the taxes required to finance this expenditure could reduce households' disposable income, thereby lowering their ability to invest in travel. This reduction in travel investment could, in turn, limit human capital development.

Additionally, the first-stage regression results, alsp presented in Table 4, support our theoretical expectation: demand for international travel is negatively correlated with its cost, and this relationship is statistically significant at the 1% level across all specifications.

In summary, our findings suggest that an increase in international inbound and outbound visitors contribute to human capital development through learning by observing. In turn, higher levels of human capital enable individuals to travel more, creating a positive feedback loop between travel and human capital formation.

**Table 4**: Human capital and international travel, IV estimation

| Second stage | Human capital index | | | | Secondary enrollment | | | | Tertiary enrollment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| International travel | 0.276*** | 0.316*** | 0.296*** | 0.032 | 13.302*** | 15.485*** | 15.026*** | 1.711 | 25.208*** | 28.493*** | 26.661*** | 23.715*** |
| | (0.032) | (0.056) | (0.052) | (0.046) | (2.022) | (3.522) | (3.409) | (3.959) | (2.871) | (5.104) | (4.721) | (7.812) |
| Gov't exp. on edu. per capita | | -0.008 | -0.010** | 0.002 | | -0.445 | -0.476 | 0.092 | | -0.669 | -0.795* | -0.669 |
| | | (0.005) | (0.005) | (0.003) | | (0.318) | (0.318) | (0.273) | | (0.461) | (0.440) | (0.538) |
| Private credit per capita | | | 0.0003*** | 0.0001*** | | | 0.006* | -0.004 | | | 0.025*** | 0.0224*** |
| | | | (0.00005) | (0.00003) | | | (0.004) | (0.003) | | | (0.005) | (0.006) |
| Life expectancy | | | | 0.051*** | | | | 2.586*** | | | | 0.572 |
| | | | | (0.004) | | | | (0.382) | | | | (0.753) |
| Observations | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 |
| R-squared | | | | | | | | | | | | |
| Number of countries | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 |
| **First stage** | International travel | | | | | | | | | | | |
| | (1) | (2) | (3) | (4) | | | | | | | | |
| Average cost of international travel | -0.148*** | -0.094*** | -0.096*** | -0.056*** | | | | | | | | |
| | (0.017) | (0.016) | (0.016) | (0.016) | | | | | | | | |
| Anderson-Rubin Wald-test: F-stat | 117.85*** | 64.86*** | 59.87*** | 0.46 | 64.13*** | 34.45*** | 33.52*** | 0.19 | 151*** | 84.04*** | 78.24*** | 23.47*** |
| Observations | 1,120 | 1,120 | 1,120 | 1,120 | | | | | | | | |
| R-squared | 0.07 | 0.18 | 0.18 | 0.24 | | | | | | | | |
| Number of countries | 64 | 64 | 64 | 64 | | | | | | | | |

Note: *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

### 4.3 Robustness checks

#### 4.3.1 Lewbel (2012) heteroscedasticity-based identification

To assess the robustness of our results, we augment our external instruments with heteroskedasticity-based instruments, following the approach outlined by Lewbel (2012).

As Lewbel (2012) argues, heteroskedasticity-based instruments can be useful when external instruments are unavailable or to test the validity of existing external instruments. We briefly explain Lewbel's approach below. Consider the model:

$$Y_1 = X'\beta + Y_2\gamma + \varepsilon_1, \quad Y_2 = X'\alpha + \varepsilon_2$$

where $\varepsilon_1$ and $\varepsilon_2$ are the error terms which may be correlated, $Y_1$ is the dependent variable (the human capital index in our case), $Y_2$ is the endogenous variable (international travel), and $X$ is the vector of control variables. One key challenge is the possibility that no element of $X$ is excluded from the $Y_1$ equation, or that any element of $\beta$ is zero. To address this, Lewbel (2012) develops an identification strategy based on 2SLS estimator in the absence of external instruments for the endogenous variable $Y_2$. This strategy constructs valid instruments by exploiting the heteroskedasticity in $\varepsilon_2$.

The model assumes the standard conditions of non-singularity for the matrix $E(XX')$, and that $E(X\varepsilon_1) = E(X\varepsilon_2) = 0$. Furthermore, $\beta$ and $\gamma$ are assumed to be constants. There are also several critical assumptions for the Lewbel (2012) estimator, including $Cov(Z, \varepsilon_1\varepsilon_2) = 0$ and $Cov(Z, \varepsilon_2^2) \neq 0$, where $Z$ equals $X$ or is a subset of the elements in $X$. After estimating $\alpha$ and obtaining the residuals from the OLS regression of $Y_2$ on $X$, $\beta$ and $\gamma$ are estimated using the 2SLS regression with instruments $X$ and $(Z - \bar{Z})\hat{\varepsilon}_2$, where $\bar{Z}$ is the mean of $Z$.

Table 5 reports the results of the Lewbel (2012) IV estimates, with the human capital index as the proxy for human capital. Columns (1) to (4) present the results based on the standard instrumental variable, columns (5) to (8) report the IV estimates using the constructed instruments, and columns (9) to (12) show the results using external instruments augmented by the constructed instruments. The results clearly indicate that the coefficient for international travel is positive and statistically significant in almost all regressions, confirming the positive causal effect of international travel on human capital development.

Our results also show that the estimates from the standard IV approach are quantitatively larger than those from the augmented model. However, as documented in

Lewbel (2012), the estimates from the augmented model are more efficient. Overall, we find that international travel has a positive effect on human capital development, and our results are robust across alternative specifications.

### 4.4 Bounding values and omitted variable bias

Given that the timeframe of our data includes several major shocks, such as the Global Financial Crisis (GFC) and the European debt crisis, one might argue that these events could cause unobserved country heterogeneity, potentially generating coefficient instability. For instance, Nguyen, Castro and Wood (2024) find that banking crises have a more significant effect on human development and its components in developed countries, while debt and currency crises tend to have more harmful effects in developing countries. To address this, we examine the robustness of our results to omitted variable bias that could arise from unobserved country heterogeneity, such as these heterogeneous effects of financial crises.

To assess potential estimation bias from unobservable factors, we adopt the approach developed by Oster (2019), which is designed to estimate the degree of selection on unobservables and establish a lower bound that would confound the treatment effect. Oster's method uses information on coefficient and R-squared movements to calculate bounding values for the treatment effect. The underlying assumption is that observable covariates are a random subset of all relevant covariates, implying that the selection of observable and unobservable covariates is similar. Based on this, a lower bound estimate of the treatment effect can be derived from the movement in coefficients after the inclusion of additional observable covariates.

The method proposed by Oster (2019) is outlined as follows:

$$\Delta h = \beta \Delta \text{Travel} + \gamma \omega^o + W_2 + \varepsilon$$

where $h$ denotes human capital, *Travel* is the treatment variable, $\omega^o$ is a vector of observed covariates, and $W_2$ is a vector of unobserved covariates. Denoting $W_1 = \gamma \omega^o$, where all elements of $\omega^o$ are assumed to be orthogonal to $W_1$, we can infer that $W_1$ and $W_2$ are also orthogonal. The proportional selection relationship is given by:

$$\delta \frac{\delta_1 \text{Travel}}{\delta_1^2} = \frac{\delta_2 \text{Travel}}{\delta_1^2}, \tag{8}$$

where $\delta_i \text{Travel} = Cov(W_i, \text{Travel})$ and $\delta_i^2 = Var(W_i)$, for $i \in \{1, 2\}$. The parameter $\delta$ is the coefficient of proportionality that captures the relative importance of observables

**Table 5**: Lewbell (2012) IV estimates using heteroskedasticity-based instruments

| VARIABLES | Standard IV | | | | Generated IV | | | | Generated and External IV | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| International travel | 0.276*** | 0.317*** | 0.296*** | 0.032 | 0.108*** | 0.085*** | 0.081*** | 0.032*** | 0.109*** | 0.081*** | 0.078*** | 0.034*** |
| | (0.062) | (0.078) | (0.076) | (0.066) | (0.004) | (0.004) | (0.003) | (0.003) | (0.004) | (0.004) | (0.003) | (0.003) |
| Gov't exp. on edu. per capita | | -0.008 | -0.010* | 0.002 | | 0.011*** | 0.009*** | 0.002*** | | 0.012*** | 0.010*** | 0.002*** |
| | | (0.005) | (0.005) | (0.005) | | (0.001) | (0.001) | (0.001) | | (0.001) | (0.001) | (0.001) |
| Private credit per capita | | | 0.0003*** | 0.0001* | | | 0.0003*** | 0.0001*** | | | 0.0002*** | 0.00005** |
| | | | (0.000) | (0.000) | | | (0.000) | (0.000) | | | (0.000) | (0.000) |
| Life expectancy | | | | 0.051*** | | | | 0.053*** | | | | 0.053*** |
| | | | | (0.007) | | | | (0.001) | | | | (0.001) |
| Observations | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 |
| Hansen J stat | - | - | - | - | 229.89 | 204.59 | 185.44 | 229.86 | 233.80 | 231.56 | 233.13 | 227.54 |
| Hansen J $p$-value | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Note: *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

vs unobservables. For instance, $\delta = 1$ indicates that observed and unobserved factors have equal importance.

The estimated coefficient and the R-squared from the unconditional regression of $h$ on Travel are denoted by $\dot{\beta}$ and $\dot{R}$, respectively. The corresponding estimates from the controlled regression of $h$ on *Travel* and $\omega^o$ are $\tilde{\beta}$ and $\tilde{R}$. We define $R_{max}$ as the R-squared from a hypothetical regression of $h$ on all observable and unobservable covariates, including Travel. For the OLS estimates of $\dot{\beta}$ and $\tilde{\beta}$, the omitted variable bias is determined by auxiliary regressions of each element of $\omega^o$ on Travel, $W_2$ on Travel, and $W_2$ on Travel and $\omega^o$. Based on the proportional selection relationship in equation (8), the bias-adjusted treatment effect can be calculated as:

$$\beta^* \approx \tilde{\beta} - \delta[\dot{\beta} - \tilde{\beta}]\frac{R_{\max} - \tilde{R}}{\tilde{R} - \dot{R}}$$

Following Oster (2019), we use $\delta = 1$ since it is unlikely that unobservables have a larger impact than the observables included in the model. Additionally, Oster (2019) suggests a bound for $R_{\max}$, which we set as $R_{\max} = \min\{1.3\tilde{R}, 1\}$.

**Table 6**: Oster (2019) bound estimates

| | (1) Controlled effect | (2) Identified set |
|---|---|---|
| | $\tilde{\beta}$(S.E.) | $[\tilde{\beta}, \beta^*(min\{1.3\tilde{R}, 1\}, 1)]$ |
| Panel A: OLS estimation | | |
| International travel | 0.05717***(0.00882) | [0.05717, 0.15341] |
| Obs. | 1,120 | |
| $\tilde{R}^2$ | 0.51554 | |
| | | |
| Panel B: FE estimation | | |
| International travel | 0.03254***(0.00475) | [0.03254,0.09992] |
| Obs. | 1,120 | |
| $\tilde{R}^2$ | 0.65 | |

Note: *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 6 presents the bounding values for $\beta$ from both the OLS and FE models with full controls. For ease of comparison, column (1) reproduces the controlled-effect estimates for the human capital index used as the proxy for human capital, as shown in Tables 2 and 3. The bounds in column (1) clearly do not include zero, suggesting that our OLS and FE estimates are robust to potential omitted variable bias.

We also examine the width of the bound estimates. The OLS estimate of a 0.06% increase in human capital development for a 1% rise in international travel is robust, but the bound is slightly larger at 0.15%. Similarly, the FE estimate of a 0.03% increase in human capital development from international travel is robust, with the bound widening to 0.10%. Thus, Oster's (2019) bounding analysis suggests that the causal effect of international travel on human capital development is likely to be somewhat larger than the estimates presented in Tables 2 and 3, after accounting for potential omitted variable bias.

# 5 Conclusions

In this paper, we present a simple, static theoretical model that explores the relationship between human capital, international travel, and other key variables. We argue that overseas travel is not merely consumption, but also an investment in human capital, as it broadens one's perspective. Using a panel dataset of 64 countries from 1995 to 2019, we estimate the model employing instrumental variables as our primary empirical strategy. Our results indicate that a higher number of international inbound and outbound visitors is significantly associated with greater human capital development. These findings suggest that policies promoting human mobility, such as school exchange programs and educational excursions, are beneficial. This is because individuals learn not only through formal schooling and training but also by observing others, a phenomenon we refer to as ”network effects.”

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## Appendix A

**Table 1**: Country list

| | | | | |
|---|---|---|---|---|
| Australia | Ireland | Albania | Kuwait | El Salvador |
| Austria | Iceland | Armenia | Sri Lanka | Eswatini |
| Belgium | Israel | Bangladesh | Morocco | Thailand |
| Canada | Italy | Bulgaria | Malta | Tajikistan |
| Switzerland | Japan | Brazil | Mauritius | Tunisia |
| Chile | Lithuania | Cyprus | Malaysia | Ukraine |
| Colombia | Luxembourg | Algeria | Nepal | Uruguay |
| Costa Rica | Latvia | Ecuador | Panama | Zimbabwe |
| Germany | Mexico | Fiji | Peru | . |
| Estonia | Netherlands | Guatemala | Philippines | . |
| Finland | Norway | Indonesia | Paraguay | . |
| France | Poland | India | Romania | . |
| Greece | Slovenia | Jordan | Russian Federation | . |
| Hungary | United States | Cambodia | Saudi Arabia | . |

**Table 2**: Variable list

| Variable Names | Notations |
|---|---|
| (1) Human capital index | hc |
| (2) population, total | SP.POP.TOTL |
| (3) Consumer price index (cpi) (2010 = 100) | FP.CPI.TOTL |
| (4) Life expectancy at birth, total (years) | SP.DYN.LE00.IN |
| (5) Domestic credit to private sector (% of GDP) | FS.AST.PRVT.GD.ZS |
| (6) Government expenditure on education, total (% of GDP) | SE.XPD.TOTL.GD.ZS |
| (7) Int. tourism, number of arrivals | ST.INT.ARVL |
| (8) Int. tourism, number of departures | ST.INT.DPRT |
| (9) GDP per capita, PPP (constant 2021) | NY.GDP.PCAP.PP.KD |
| (10) Int. Tourism, expenditures for passenger transport items | INT.TRNX.CD |
| (11) Int. Tourism, receipts for passenger transport items | INT.TRNR.CD |
| (12) School enrollment, Secondary (% gross) | SE.SEC.ENRR |
| (13) School enrollment, Tertiary (% gross) | SE.TER.ENRR |

Note: We derive the following variables used in the models:

- Travel (tourism openness) = $(No.\ of\ arrivals + No.\ of\ departures)/population$
- Average real cost of travel = $\left(\frac{No.\ of\ arrivals}{receipts...items} + \frac{No.\ of\ departures}{expenditures...items}\right)/2cpi$
- Per-capita gov. exp. on edu. = $Gov.\ exp.\ on\ edu. \times GDP\ per\ capita$
- Per capita private credit = $Domestic\ credit... \times GDP\ per\ capita$

**Table 3**: Correlation matrix of all the variables

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| (1) Human capital index | 1.00 | | | | | | | |
| (2) Secondary enrollment | 0.70 | 1.00 | | | | | | |
| (3) Tertiary enrollment | 0.75 | 0.73 | 1.00 | | | | | |
| (4) International travel | 0.44 | 0.37 | 0.34 | 1.00 | | | | |
| (5) Average cost of int. travel | 0.12 | 0.16 | 0.03 | -0.25 | 1.00 | | | |
| (6) Gov't exp. on edu. per capita | 0.59 | 0.60 | 0.49 | 0.54 | 0.13 | 1.00 | | |
| (7) Private credit per capita | 0.59 | 0.46 | 0.44 | 0.40 | 0.24 | 0.85 | 1.00 | |
| (8) Life expectancy | 0.67 | 0.69 | 0.61 | 0.39 | 0.15 | 0.65 | 0.62 | 1.00 |

## Appendix B

The following proof responds to equation (5) that T is positive with respect to h. We reproduce equation (5) below and get rid of the subscript. And note that we also use the fact that $Y_t = h_t^\alpha$.

$$T = \frac{Y}{2p - \alpha\beta Y/h}.$$

Taking the first derivative of T with respect to h, we obtain

$$T' = \frac{Y'(2p - \alpha\beta Y/h) + \alpha\beta Y(Y'/h - Y/h^2)}{(2p - \alpha\beta Y/h)^2},$$

where x′ (x = T, Y) is the first derivative of x with respect its argument (h). We need to show that the numerator is positive. Using the fact that $Y' = \alpha Y/h$, the numerator becomes

$$Y'(2p - \beta Y/h).$$

Next, with the assumption that $C, T > 0$, we obtain

$$p > \alpha\beta Y/h.$$

This inequality is the result of the first-order conditions of consumer's maximization problem. Because the labor share $\alpha$ exceeds 50%, we get

$$2p > 2\alpha\beta Y/h > \beta Y/h.$$

This proves that $T' > 0$.