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OSMOSIS BETWEEN HUMAN CAPITAL AND DEVELOPMENT AND ITS IMPACT ON THE 21stCENTURY ECONOMY- A REVIEW

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Abstract

In the knowledge-based economy of the 21stcentury, educated human resources are seen as a capital asset invested in the entity, and human capital theory seeks to explain, from an economic perspective, the phenomena arising from this process. The development of education and scientific spheres requires huge long-term investments, which must be analyzed from a social approach. Neither evaluation experience nor the methods applied provide a clear-cut solution, so evaluating an investment in human capital is a complex problem from both a practical and a scientific point of view. This research started from the hypothesis that investing in human capital will provide competitive advantage and sustainability in the complex world of the economic environment, reviewing the theory and evidence on the economics of human capital. Triangulation was chosen as a research method being considered the most adequate for the expected results and additionally because it allows to identify the most relevant aspects of this field that endorsed the proposed hypothesis. The main conclusion and results are that the emphasis has been placed on human capital just at the personal level, rather than at the level of unity and organization. Furthermore, research into the channels that have a causal effect on development has revealed that education is considered an instrument of developing human capital that promotes direct economic growth. Data analysis demonstrates that the theory of human capital is a convincing explanation for economic growth. In addition, the findings of the research have shown that the debate over equality vs. efficiency in economic development is centred on the human capital dimension.

Key words**:** *knowledge-based economy, human resources, economic development*

INTRODUCTION

Human capital theory was implemented in pre-modern eras after its development and application to modern economies. A key criticism of the human capital theory at first, which the author herself disagree with, was that it was inapplicable to the Industrial Revolution because there was no obvious correlation between economic expansion and literacy throughout early modern Europe (Allen, 2003) [2]. By utilizing different metrics of human capital and taking a closer look at various periods of economic history, research conducted over the past ten years has challenged this assertion. A number of economists find that formal education played a significant role in the Industrial Revolution using panel data on regional enrollment rates from 1816 to 1882, with relatively high pre-industrial levels of education accelerating the adoption of technology (Becker, 2009) [6]. The paradox that human capital is a powerful predictor of economic success today but not, it seems, during the Industrial Revolution is also addressed by Squicciarini and Voigtlander (2014) [19]. A lack of focus on the top of the skills distribution, the entrepreneurs and engineers that propelled early modern nations from stagnation to growth, is said to be the reason why prior research failed to uncover the impact of labor force skills on economic growth. They conclude that the existence of knowledge elites predicts regional economic growth after 1750 with great clarity using data from France. This illustrates one of the drawbacks of using population averages to measure education (even when considering abilities rather than years of schooling)—they don't take the distribution of education into account. At earlier periods of economic history, the relationship between education and economic expansion has been shown. According to economists who have studied the history of the Roman Empire, the empire's economic expansion was the result of

investments in human capital, which were higher than they had ever been in Europe before 1500. The educated workforce of Japan contributed to the country's quick and widespread embrace of Western technology, and we shouldn't overlook the role that human capital played in the economic development of the Jews. Meanwhile, rising literacy rates in the late 19th century contributed to Protestant economic prosperity. The contribution of education to rising labor productivity and labor participation throughout American history is also worth mentioning. Lastly, we recall the relevance of large-scale human capital accumulation in fuelling the economic miracles in East Asia during the 1960s and 1990s.

The economics of human capital is reviewed in this study, with a particular emphasis on the educational component of human capital and how it affects economic growth in emerging nations. The emphasis is on economic growth, or the change in gross domestic product, while acknowledging that human capital accumulation affects a number of other factors, including social development and health.

MATERIALS AND METHODS

This study begins by reviewing the idea of human capital and then labor market research on its relationship with individual income before turning to its impact on aggregate income, tracing the development of economic theory on this topic from its inception to its inclusion in macroeconomic growth models. As a result of recent developments in the evaluation of human capital, it was also taken into consideration how the estimation of the effect of education on development has evolved.

It is not merely an intellectual exercise to comprehend the subtleties of the function of human capital in development. Proof of it can influence public policy and encourage it, ensuring that limited resources are invested effectively in human productive capacity to speed up economic growth and reduce poverty. In addition to summarizing research on how human capital affects economic growth through labor productivity, it was also drawn attention to new data that shows how crucial it is to invest in people in order to advance equity and environmental sustainability, both of which are essential for sustaining economic growth in the twenty-first century. In order to achieve these objectives, it was approached a mixed research methodology, namely triangulation whereby there were overlaid data from three categories of resources: literature, documents, and data provided by globally recognized research tools. Using this method, the degree of convergence of the data obtained was an indicator of the validity of the results.

RESULTS AND DISCUSSIONS

Human capital and the labour market

Although the importance of education in the economy had been acknowledged for millennia, human capital did not start to take center stage in economic modeling until the 1960s, in part due to measurement issues. Explaining salary disparities in industrialized economies was among the initial uses of human capital in economics. Jacob Mincer recommended using the number of years spent in school as an indicator of human capital, contending that the primary goal of education is to prepare students for the workforce. He developed the following human capital earnings function on the basis of this concept (Mincer, 1974) [13]:

$$\ln y = \ln y_0 + rS + \beta_1 X + \beta_2 X^2 \qquad (1)$$

where:

y is a person's earnings on the job, S is the number of years the person spent in school, X is the number of years the person has worked in the field, and y0 is the expected minimum wage for a worker with no training or experience. The average returns to education and job experience, which the earnings function is intended to quantify, are represented by the variables r and β1, respectively. This kind of equation has been defined in a variety of ways, along with the inclusion of various factors like race and gender, and it serves as the foundation for a

substantial body of work that examines the relationship between education and income. Empirical studies of human capital will increasingly depend on educational attainment as measured by years of schooling (for microstudies) and average years of schooling in the next decades (for macro studies).

The Mincerian technique has been applied to a number of labor markets, as reviewed by Greek economists Psacharopoulos and Dimitrios Patrinos [16]. According to their data, every extra year of education results in a 10% increase in earnings near the middle of the distribution (r = 0.1). Yet, the marginal return to a year of education varies significantly over time, by geography, and by education level and demographic group. They discover that women's education has an added benefit (9.8% for a year of female education versus 8.7% for male education). The labour market data for working men from the 1960s to the 1990s suggests that in developing countries, primary education provided the highest returns, with the marginal benefit of education declining with years of schooling. They also demonstrate that the returns to education are higher in low-income areas (Patrinos, 2011) [14].

Although the Mincer studies provide empirical proof that education accounts for a large portion of the variation in individual incomes in emerging nations, they have a number of drawbacks. The strategy does not account for the benefits of education in the informal sector because it only permits the analysis of formal jobs with wage data (typically for men). However there is growing proof that education boosts both the informal economy's output and job prospects in the expanding digital economy. Additionally, there is a body of research (Huffman, 2001) [11] demonstrating that education increases agricultural output, particularly in settings where farmers have access to low-cost agricultural technologies as a result of their education.

The Mincerian approach has also been criticized for failing to adequately account for the complexities of contemporary labor markets. The benefit of education in enhancing a worker's job security is not adequately captured by the Mincerian approach, which is particularly important in post-crisis economies with high unemployment rates. Also, it is unclear if the best way to gauge a person's human capital is by counting the number of years they spent in school (which ignores the quality of education). Microeconomic data that measure levels of abilities acquired via education (an output of education) rather than years spent in school are receiving more and more attention (an input to education).

Econometric quantification of human capital

The dilemma of endogeneity stands in the way of accurately evaluating how human capital build up affects development. The notion that education spurs growth or, more accurately, the fact that governments engage in education only after they have established the financial resources to do so is reflected in the positive correlation between education and development indicators. Richard Ainley Easterlin uses historical data from 25 sizable countries to show a connection between primary school enrollment and economic growth. He points out that in industrialized countries, the spread of public education came before economic take-off, and that in many countries, high economic growth was not followed by a sharp increase in primary school enrollment (Easterlin, 1981) [8].

Economists have just recently been able to formally address this sequencing issue. Improvements in developing country data, combined with advancements in econometric methodology (panel methods, instrumental variables), have made it possible to incorporate human capital in economic modeling in ways that were not previously possible and have strengthened the case for the link between human capital and development (Prelipcean and Ungureanu, 2023) [15]. In a recent example, R. Barro and J. Lee use the 10-year difference in parental education as an instrumental variable for current educational attainment to adjust for the simultaneity of education and development. They estimate a macroeconomic return of 5-12% for one additional year of average schooling (Barro, 2013) [5].

Once more, they use a recently created panel dataset on educational attainment and regional economic growth to apply a Lucas model of human capital externalities. They draw the conclusion that, as a regional extension of the national-level research conducted in the 1990s and 2000s, human capital has a substantial explanatory capacity for regional variance in income.

The second modeling issue is related to measuring human capital. Rates of schooling and years of schooling, the two most common indicators of human capital, are more likely to be inputs into the creation of human capital than outcomes of an individual's education. Additionally, the model implicitly assumes that the value of a school year in the United States and the Republic of the Democratic Republic of the Congo is the same in an effort to establish a relationship between human capital and economic growth based on data regarding school years from more than one country. Also, the concept compares a primary school year to a year in a doctoral program (Aghion, et al., 2009) [1].

The tremendous expansion of education in emerging nations and the increase in average school life have not led to widespread economic growth. The adjusted net primary enrolment ratio in developing nations climbed from 80% in 1990 to 90% in 2011. Throughout the previous 20 years, net enrolment ratios have dramatically increased. The amount of money spent on education domestically and by donors has also greatly increased, indicating a rising understanding of the value of a foundational education for growth.

E. Hanushek and E. Wössmann, two economists, conclude that if performance indicators are incorporated into the model, the level of performance as assessed by years of education statistically becomes negligible in explaining country disparities in per capita income. This suggests that education only influences economic growth inasmuch as education results in the acquisition of skills, and that the development of cognitive skills rather than the amount of time spent in school affects income and economic growth (Hanushek, 2007) [9]. Additionally, there is some evidence that certain materials have a more significant effect on growth than others. In fact, these measurement problems can help to explain a lot of the data that refutes the human capital theory. For instance, the decline in educational standards at the end of the Soviet era can be used to explain the apparent paradox of a substantial stock of human capital (measured by years of schooling) and the economic collapse of the Soviet Union (Didenko, et al., 2013) [7].

Higher education has seen some adoption of the signaling hypothesis; for instance, according to economist C. Holmes, the expansion of higher education has no statistically meaningful relationship to economic growth (Holmes, 2013) [10]. Yet, this outcome is dependent on the human capital proxy used. Both the number of researchers employed and technical skills at the completion of compulsory school are significant determinants of economic growth, and both are correlated with higher education quality. The association between education and development is strong if human capital is correctly quantified to include variances in the abilities transmitted through school. If non-formal education, lifelong learning, and vocational training can be taken into account thanks to improvements in measurement and data gathering, this relationship is likely to become even more obvious.

Human capital and the quality of economic growth

The focus of discussions thus far has been on the effects of higher labor productivity and economic development, as measured by per capita GDP growth rates. However, there are also ways that human capital might boost economic growth, especially in light of current global trends like equity and resilience. The interaction between equity and education constitutes the initial channel. Both developing and industrialized nations have seen an increase in income disparity in recent decades. Faster and more durable growth are closely correlated with lower net inequality. Income inequality is mostly a result of educational inequality. According to a study on Brazil, education inequality accounts for 29% of the country's excessive income

inequality (which is higher than average globally compared to the United States), skill premia account for 32% (the wage gap by skill level in Brazil is 50% higher than in the United States), and public transfers account for 39%. (e.g. urban subsidies, retirement pensions). The majority of the income inequality in Brazil is caused by education since skill premiums are somewhat impacted by education distribution (education affects the relative supply of skills). Human capital also contributes to economic growth through its effect on equity to the extent that equity promotes economic growth. There is also some evidence to support the theory that economic disparity contributes to the recurrent economic crises that have wreaked havoc on the global economy for centuries (Atkinson, 2011) [3].

A secondary channel via which education enhances the quality of economic progress is the growing threat posed by climate change. According to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2013), a 2°C increase in the global average temperature will result in economic losses of about 1% of yearly GDP and more violent heatwaves and droughts that will cause food and water shortages. Developing nations with high levels of female education do better in the face of natural disasters, preventing economic progress from being offset by climate change, by regulating incomes and weather patterns.

According to some economists, a strong and equitable stock of human capital is necessary not only for the quantity of growth but also for its quality in order to ensure that high growth rates in developing countries are sustainable and long-lasting. This is supported by recent studies on equity and disaster resilience (Thomas, et al., 2000) [20].

Exogenous growth models, which specify per capita income as a function of physical capital, the size of the labor force, assumed (exogenous) rates of technological progress, saving, population growth, and residual total factor productivity, were used by economist Robert Solow to investigate differences in the economic output of different countries in the 1950s (which increases the productivity of capital and labour). Hence, all components of economic output are observable (physical capital and labour) (Balan, 2021) [4]. By regressing the logarithm of per capita income on the logarithms of saving rate, depreciation rate, technical growth rate, and population growth rate, the basic exogenous growth model is applied to the data. The fundamental exogenous growth model has positive aspects, but empirical studies reveal that it is ultimately irreconcilable with reality. According to a standard Solow Swan regression, the residual accounts for the remaining half of the variation in per capita income (total factor productivity). The predicted sizes of the effects of saving and labor force expansion are excessive, nevertheless. For instance, the wealth disparity between the US and India could only be explained by implausibly vast variations in the stock of physical capital. The capital-to-income ratio has a default value of 0.6 according to the baseline specification, although in reality, the overall capital-to-income ratio is closer to 0.3:

$$Y(t) = K(t)^{a} (A(t) L(t))^{1-\alpha} \qquad (2)$$

where:

Y(t) is production for time period t, K(t) is the stock of physical capital at time t, L(t) is the size of the labor force at time t, A(t) is a residual, catch-all variable, and is the elasticity of output with regard to physical capital. Exogenous growth rates g and n are used to measure the growth of A and L over time, while a fixed percentage of production, s, is saved and put into physical capital each period. These flaws show that the basic Solow-Swan model omits essential variables that influence economic growth. Given the compelling evidence that education plays a key role in determining income at the individual level, it follows that human capital plays a significant role in determining the income and growth of nations. As a result, it should be taken into account when performing Solow-Swan growth accounting exercises. Mankiw, Romer, and Weil (1992) [12], who added human capital to the Solow-Swan exogenous growth model, empirically

evaluated this hypothesis. They used cross-country regressions that included human capital as a component of production along with labor and physical capital to examine the association between investments in human capital and economic progress. The proportion of young people (12–17 years old) enrolled in secondary schools in a country, multiplied by the percentage of the working-age population that is of secondary school age, serves as an approximation of the pace of human capital accumulation in their expanded model (15-19 years old). For non-oil economies, they discovered that a 1% rise in their substitution measure raises GDP per person of working age by 0.66%. This effect is statistically quite significant:

$$Y(t) = K(t)^{\alpha} H(t)^{\beta} (A(t) L(t))^{1-\alpha-\beta} \quad (3)$$

where:
Y(t) is output for time period t, K(t) is the stock of physical capital at time t, L(t) is the size of labor force at time t, H(t) is the stock of human capital at time t, A(t) is a residual, catch-all variable, and is the elasticity of output with respect to physical capital and β is the elasticity of output with respect to human capital.
The shortcomings of the original Solow-Swan model are resolved by human capital accounting. Eighty percent of the variation in per capita income among countries is explained by the augmented model. In the expanded model, the suggested alpha coefficient is reduced to a more logical 0.33. When the elasticity of production with regard to saving rises from 0.5 in the initial version to 1, the income disparity between wealthy and poor countries can no longer be explained by implausible variations in physical capital inventories.
Many studies have examined the link between macroeconomic development and human capital using different human capital proxies. Greek economists G. Psacharopoulos and A. Arriagada [16] proposed average years of schooling as a proxy for human capital in the paper "The Educational Composition of the Labor Force: An International Comparison," and they created a dataset of average years of schooling for the working age population in 146 countries since 1950. (Psacharopoulos, 1986) [16]. This dataset has emerged as the most important human capital proxy for calculating global growth.
The returns to human capital that are calculated in macroeconomic research are typically two to three times larger than those that are estimated in microeconomic studies (Ungureanu, 2020) [21]. Education externalities can be used to explain some of the variances in micro and macro estimates of returns to human capital. Just the benefit to the student who is receiving the education is included in wage-based return estimations. But, the economic advantages of education go beyond the person. Knowledge is a shared good, free from competition and exclusion. Robert Emerson Lucas Jr. incorporated externalities into his endogenous growth model to account for this and ensure that each individual is more productive when surrounded by highly trained individuals (Lucas, 1988) [17].
Evidence suggests that the impact of education varies depending on education level, demographic group, and early stage of development at the micro level. Although there is no discernible connection between primary education and economic growth, the vast sample size may obscure country-specific idiosyncrasies. For instance, a case study of India utilizing data from 1966 to 1996 revealed that primary education's strong benefits have a greater impact on economic growth than those from higher levels of education (Self, 2004) [18].
Basic education is essential for catching up (providing workers with the skills to apply technologies at the global frontier), while higher education is necessary for advanced economies to grow. This is because the relationship between educational attainment at various levels and economic growth depends on a country's level of development (giving workers the skills to innovate and push the global technological frontier further). These cross-country regression analyses could have an issue due to the human capital measurements they employ. This restricts the model's application to emerging nations since

it ignores differences in primary school enrollment among them. Enrollment and years of education are often poor indicators of human capital. The quality of education is not taken into account, and they only record the inputs rather than the results of an educational system. In fact, the outcomes of economic growth models are sensitive to the choice of human capital measure, so the ability to precisely measure human capital is necessary for the valid empirical support of the human capital theory.

CONCLUSIONS

A variety of freedoms, such as political rights and choices, freedom from compulsion, and freedom from income poverty, are gradually activated as part of development. People can obtain the skills they need to practice various freedoms and access essential human rights through education. Hence, development has education as both a means and an end. The argument between justice and efficiency in economic development is mostly driven by the question of human capital. There is no such trade-off, according to mounting data reviewed in this study, and equity and growth are development objectives that can be pursued concurrently. Investing in education, particularly basic education in developing economies, becomes a clear priority as a result. Both emerging and developed economies extensively subsidize education, and there is compelling evidence that investing in human capital pays off for both the public and the private sector. However, there are non-market components of well-being that are influenced by the accumulation of human capital, such health and civic involvement, which are ignored in GDP per capita growth even though they can influence economic growth.

It has been extremely challenging to thoroughly analyze the subject of human capital in the current study, despite the concept's high level of attention among academics. Furthermore, research on human capital has advanced through time and is now occasionally seen as a subset of research on intellectual capital.

It is considered that it is vital to extend the concept in larger aspects based on my study of human capital efforts. Human capital has been emphasized only at the person level rather than at the unit and organizational levels, where it can work at a wider level, which has led to the word being advocated as a justification for advancing the subject of human resource development. Examining the evidence on the channels that have a causal effect on development, education is viewed as a means of developing human capital that directly promotes economic growth. The analysis of the available data demonstrates that the human capital theory is a convincing explanation for economic growth. According to this theory, investments in human productive capacity result in a more mobile, adaptable, autonomous, and creative workforce that is able to learn new tasks and apply technologies and equipment to boost production.

But, this is not supposed to be the sole explanation. The spatial perspective on development places a strong emphasis on the value of ecology, climate, and the surrounding environment for human health. According to the institutional view of development, a crucial element in economic growth is how society is organized and the productive incentives it provides to people and businesses. The human capital theory holds that by making economic transactions easier, trust and social cohesion promote economic growth. These opinions should be viewed as a supplement to the human capital theory because they are not mutually exclusive. Although the development of human capital is a necessary component for social advancement, impoverished nations' recent economic performance has proven that it is insufficient for economic success. It must be accompanied with welcoming institutions and regulations that enable people to use their education to pursue economic opportunities. The findings of this research help us to understand that the equality vs efficiency debate in economic development is centered on the size of human capital. There is no such trade-off, and equity and growth are development objectives that may be pursued

concurrently, according to mounting evidence. Investing in education, particularly basic education in developing economies, becomes a clear priority as a result. Both emerging and developed economies extensively subsidize education, and there is compelling evidence that investing in human capital pays off for both the public and the private sector. However, there are non-market components of well-being that are influenced by the accumulation of human capital, such health and civic involvement, which are ignored in GDP per capita growth even though they can influence economic growth.

The future research on human capital needs to be examined further. Human resource development experts could look closely at the connections between human capital and other factors, such as how it might improve the development of human resources in specific industries and how it might be essential to fostering employee engagement.

At the same time, a future research will be extended on the EU rural development programs for the industrialization of the rural ecosystem, alternative paradigms in the rural development process, smart rural development in the context of public-private partnerships, and the level of rural development in Romania. Although these directions are currently speculative and may be examined from other angles depending on the development and findings of the research, applicable and impartial conclusions for this area of study would be useful.

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