

The causes of economic growth: Revisiting our ignorance

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Abstract: The sources of economic growth are a recurrent theme in economic literature. However, the full range of factors behind growth remains elusive. We are still somewhat ignorant about the forces that drive economic growth. A large part of economic growth remains unexplained through the typical analysis based on the productive factors of labor and capital. The original idea behind this research is that it moves away from the traditional analysis of economic growth and examines countries from a business perspective. If, in a company, we tend to look at the various sectors, why not look at the determinants of a country's growth in the same way? Therefore, we embrace the idea that our ignorance can be reduced if we consider countries as organizations whose performance depends on the level of their business administration areas: marketing, finance, human resources policies, information systems management, and research and development. This research aims to revisit previous works and deepen them. The methodology followed consists of improving the statistical analysis by increasing the variables used with a sample of 33 countries over a five-year period. We conclude that the approach is relevant and can explain more than 90% of the variation in per capita income.

Keywords: Business areas, Economic growth, Organizations, Solow.

1. Introduction

Economic growth can be defined as the increase in production and consumption of goods and services over time. It is usually measured by the rate of change in gross domestic product (GDP) or per capita income. Economic growth is influenced by numerous factors, from the more traditional productive resources, such as labor and capital, to the quality of institutions, the different policies pursued by countries, existing technology, etc. Since Solow's pioneering work, many models have been proposed to capture the true essence of the causes of growth [1]. We begin by briefly going through the major economic growth models, highlighting their main characteristics and authors.

The Solow-Swan model, created by Robert Solow and Trevor Swan in the 1950s, is one of the most significant and frequently applied frameworks for understanding economic growth. This model considers the existence of two production factors: labor and capital, both of which experience diminishing returns. It further suggests that technological advancement occurs at a consistent rate and is considered an external factor to the model. The model indicates that the steady-state level of output per worker is influenced by the savings rate, the depreciation rate, and the rate of population growth. Additionally, it demonstrates that the long-term growth rate of output per worker is solely determined by the pace of technological progress [2-4].

The endogenous growth model, created by Paul Romer and Robert Lucas during the 1980s and 1990s, presented a challenge to the Solow-Swan model by incorporating the concept of endogenous technological advancement [5]. The model assumes that technological progress arises from deliberate research and development (R&D) efforts and exhibits increasing returns to scale. Additionally, it

suggests that technological advancements can transfer between companies or sectors, generating positive externalities. The model illustrates that the long-term growth rate of output per worker is influenced by the incentives and policies governing research and development, innovation, and the enhancement of human capital [6-9].

The unified growth theory, formulated by Oded Galor in the 2000s, aims to elucidate the shift from periods of stagnation to sustained economic growth throughout human history. This theory assumes the existence of three production factors: physical capital, human capital, and natural resources, each influencing output and population growth in distinct ways. Additionally, it differentiates between two forms of technological advancement—Malthusian and non-Malthusian—highlighting their varied effects on income levels and fertility rates. Ultimately, the unified growth theory illustrates how the interplay between technological advancements, population trends, and the development of human capital can lead to diverse stages of economic growth [10].

More recently, the framework of new structural economics, established by Justin Lin and colleagues in the 2010s, provides insights into the structural transformation and diversification of economies at various developmental stages [11]. This approach categorizes industries into three types: traditional, modern, and new, each characterized by distinct features such as productivity levels, demand conditions, and comparative advantages. It further distinguishes between two kinds of constraints—hard and soft—that influence the viability and profitability of these industries. New structural economics assumes that an economy's optimal growth strategy is contingent upon its resource endowment structure, comparative advantages, and institutional quality.

1.1. *What We Don'T Know: Revisiting Our Ignorance*

A large part of economic growth remains unexplained and academics have been striving for decades to explore new models that encompass the overall nature of growth. However, the complete set of factors contributing to economic growth continues to be ambiguous and not entirely understood. Our understanding of the elements that propel growth remains limited and we are still somewhat *ignorant* when it comes to the forces that drive economics [12-14].

This paper is an extension of our previous research where we moved away from the traditional analysis of economic growth and examined countries from a business perspective [15]. By comparing countries to organizations whose performance depends on the standards of their areas of business administration - marketing, finance, human resources policies, information systems management, and research and development - we hope to reduce our *ignorance* regarding the causes of economic growth.

Given that some multinational organizations are on the scale of small countries, this assumption is not entirely unreasonable. Large multinational companies can be analyzed using various metrics. From revenues, profits, assets, and market capitalization to the number of employees, their power and size are undeniable [16]. Corporations such as Walmart, Amazon, Saudi Aramco, Apple, and Microsoft, among others, usually rank at the top of these metrics. However, some caution is needed when making these comparisons. Corporations are not countries and a direct analysis can be misleading. In our analysis, not wanting to go into detail on corporate power, we looked at the different most important business areas in large corporations and equated these areas to indicators in countries.

In Sá and Rodrigues [15] we analyzed countries as if they were large companies with well-defined administrative areas. The model defined was able to explain around 90% of the variation in per capita income.

In Sá, et al. [17] we examined countries from the perspective of the quality of their human resources. We carefully researched the observed variables—personal ethics, work ethics, and training/instruction—and concluded that they explained around 84% of the variation in per capita income.

We now propose to revisit these two previous works and extend the analysis to improve the models, increase the observed indicators, and expand our knowledge of the sources of economic growth.

2. The Research

We begin our analysis by listing the business areas, closely following the business areas already identified and analyzed in Sá and Rodrigues [15].

We have nine business areas under analysis: 1) strategy; 2) general management (organization through the organization chart, objectives setting, control, and coordination mechanisms); 3) human resources management (and within it three aspects are considered here: hiring both personal – character – and work ethics, and training/instruction); 4) marketing; 5) operations/production; 6) information systems management; 7) R&D; 8) finance/accounting; and 9) the administrative area (hygiene, security and energy).

Each area was evaluated using either data from official sources or indices from non-governmental organizations.

1) Strategy was implemented by assessing the proportion of trade (exports plus imports) relative to each country's GDP (World Bank indicators)^[18]. In a scenario where a country's domestic market is completely isolated, local products do not need to be competitive in terms of price, quality, or delivery, as consumers have no alternative options. Conversely, as market openness increases, consumers gain more freedom in their choices, leading to heightened competitive demands: domestic products are sold both within the country and abroad only when they possess a competitive edge. This concept is a fundamental aspect of strategy [18]; Anwar and Hasnu [19]; Sharma, et al. [20]; Gancia, et al. [21] and Messaoud [22].

2) General management was implemented through a survey conducted by Bloom, et al. [23].

3) Within Human resources, the extent of training was assessed through various factors, including the quality and enrollment rates of primary and higher education, along with training programs, as evaluated by the World Economic Forum in its Global Competitiveness Report (pillars 4.09, 4.10 and 5)[24]. Personal ethics were gauged using the Corruption Perception Index from the NGO Transparency International [25]. Furthermore, work ethics at the core of human resources were measured by the Entrepreneurship Index from the Global Entrepreneurship and Development Institute [26] which ranks countries based on criteria such as risk acceptance, networking capabilities, and openness to opportunities.

4) Marketing aims to analyze customer needs through research and subsequently offer them products, pricing, placement, and promotional strategies. This approach, known as the marketing concept, contrasts with the production concept and fundamentally revolves around adaptability. The quality of marketing was measured using an average of three indicators: the Economic Freedom Index created by the The Heritage Foundation [27] the Democracy Index from the Economist Intelligence Unit [28] and the Global Freedom Status provided by Freedom House [29]. Specifically, the Economic Freedom Index evaluates three aspects: the level of taxation, the degree of government involvement in the economy, and the level of competition in private markets, which includes the absence of monopolies, oligopolies, and dominant firms. The first two factors are interconnected unless persistent and unsustainable public deficits occur over time. Together with the latter, they determine the extent of consumer choice and the necessity for companies to adopt effective marketing strategies, especially in contrast to a strong presence of state-owned enterprises that typically inhibit competition.

5) Operations/production was evaluated by gross fixed capital formation relative to the GDP, in World Bank indicators.

6) Information systems management was defined using the average of three variables. Two of these variables were provided by the World Economic Forum in its Global Competitiveness Report (pillars 2.08, 2.09, and 9, for the years 2014–2017, a trend was calculated for the year 2018 and pillar 3 for the same year), while the third was derived from pillar 3.1 of the Global Innovation Index, which is developed through a collaboration between Cornell University, Insead, and the Cornell University INSEAD and the World Intellectual Property Organization [30].

7) The quality of the R&D department was also assessed based on the average of three factors: the Global Innovation Index along with two innovation metrics in the Global Competitiveness Report provided by the World Economic Forum (pillar 12 “Innovation” for the years 2014-2017, and pillar 12 “Innovation Capability” for the year 2018).

8) Finance/accounting was implemented as part of pillar 8 (financial market development) of the Global Competitiveness Report by the World Economic Forum.

9) The administrative area encompasses several key components: *hygiene*, assessed through the expectation of a Healthy Life as measured by the World Health Organization^[32]; *energy*, evaluated by the World Economic Forum (Global Competitiveness Report, pillars 2.09 and 2.10); and *security*, determined by the Global Peace Index from the NGO [31].

Table 1 provides a summary of the business variables, the indicators employed, and their corresponding sources.

Table 1.

Business administration areas, indicators, and corresponding sources.

Business administration areas				
Areas (And subareas)		Indicator/Operationalization		Source
1. Strategy		% exports + imports (Trade) on GDP		World Bank
2. General management		World management survey		Bloom et al survey
3. Human resources	Training/instruction		Instruction quality	World economic forum
	Selection	Personal ethics	Corruption perception index	Transparency international
		Work ethics	Global entrepreneurship index	Global entrepreneurship and development institute
4. Marketing		Economic freedom index		Heritage foundation
		Democracy index		The economist intelligence unit
		Global freedom status		Freedom house
5. Operations/production		% gross fixed capital formation on GDP		World Bank
6. Information systems		ICT adoption A (pillars 2.08, 2.09, and 9 for years 2014-2017 and trend calculated for 2018)		World economic forum
		ICT adoption B (pillars 2.08, 2.09, and 9 for the years 2014-2017; and pillar 3 for the year 2018)		
		ICTs (pillar 3.1 of the global innovation index)		Global innovation index
7. Research & development		Innovation A (Pillar 12 “Innovation” for years 2014-2017 and trend calculated for 2018)		World economic forum
		Innovation B (pillar 12 “Innovation” for the years 2014-2017; and pillar 12 “Innovation Capability” for year 2018)		
8. Finance/Accounting		Financial System		World economic forum
9. Administrative area		Hygiene	Healthy life expectancy	World health organization
		Security	Global Peace Index	Institute for economics and peace
		Energy	Electricity access and quality	World economic forum

Source: Sá and Rodrigues [15]

The innovations relating to the previous work in Sá and Rodrigues [15] are related to the selected variables. In the current research, additional indicators have been incorporated to enhance the reliability

of the model and to gain a deeper understanding of the factors that drive economic growth within the scope of the model:

- Related to the Economic Freedom Index, we have added the Democracy Index and the Global Freedom Status;
- In Information Systems, data has been added to the pillars already analyzed (ICT adoption A and B);
- In Research & Development, data relating to innovation was added to the model (Innovation A and B).

The new indicators are highlighted in the table.

The research used a sample of 35 countries, as identified in the study by Bloom et al., which assesses the quality of general management across various nations (Northern Ireland and Myanmar were excluded due to insufficient data for these regions, making a total of 33 countries).

The selection of the sample was based on several specific criteria: it included both cross-sectional and time series data; it ranged over a variety of countries, both developed and developing, members and non-members of the OECD; it required that data on all indicators be available for every country included; the time series period needed to be consistent to enhance the rigor and relevance of the findings; the sample had to account for external shocks, such as the subprime crisis or the COVID-19 pandemic; and finally, the objective was to ensure that the sample was as comprehensive as possible. The timeframe encompassed the years between the subprime crisis and the COVID-19 pandemic, resulting in a cumulative total of 165 observation points (33x5).

Table 2 shows the selection of countries.

Table 2.

Country selection.

OECD member	Non-OECD member
Australia	Argentina
Canada	Brazil
Chile	China
Colombia	Ethiopia
France	Ghana
Germany	India
Greece	Kenya
Ireland	Mozambique
Italy	Nicaragua
Japan	Nigeria
Mexico	Singapore
New Zealand	Tanzania
Poland	Vietnam
Portugal	Zambia
Spain	
Sweden	
Turkey	
United Kingdom	
United States	

Source: Sá and Rodrigues [15].

To highlight the cause-and-effect relationship, the independent variables are positioned one year ahead of the dependent variable, which is the national income per capita sourced from the World Bank. Thus, the independent variables pertain to the years 2014-2018, while the dependent variable relates to the period from 2015-2019.

3. Statistical Analysis and Results

A linear regression model was utilized for the data analysis, as it assumes a linear and additive relationship between the dependent and independent variables. This means that the expected value of the dependent variable is represented as a straight-line function of each independent variable while keeping the other variables constant. The slope of this line does not depend on the values of the other variables, and the impact of various independent variables on the expected values of the dependent variable is additive.

Variables were introduced according to their correlation with the dependent one (national income per capita) as long as the increase in R^2 is not offset by the non-significance (t-test) of the new variable parameters.

In the end, five business administration areas were accepted: strategy, work ethics within human resources, marketing, information systems, and R&D. The overall R^2 is 91% significant at zero level.

Table 3 shows the order in which the variables were introduced. First, information systems management, then strategy, then R&D, work ethics, and finally marketing.

Table 3.

The regression results: parameters, t-test and significance.

Dependent variable	Gross national income per capita at purchasing power parities	Model	$R^2 = 0.9145$		
			F test	Value = 339.98	Significance = 0.0000
Independent variables	Indicator	Parameter	T-test	Significance level	
1. Information systems management	ICT adoption A	366.1	6.78	0.000	
	ICT adoption B				
	ICTs				
2. Strategy	% exports + imports (Trade) on GDP	97.73	11.32	0.000	
3. R&D	Global innovation index	583	5.53	0.000	
	Innovation A				
	Innovation B				
4. Work ethics	Global entrepreneurship index	154.5	2.73	0.007	
5. Marketing	Economic freedom index	187.3	2.2	0.029	
	Democracy index				
	Global freedom status				

Source: Sá and Rodrigues [15].

Besides the R^2 , the model is homoscedastic as the P test assumes the value 0.42 (greater than 0.05), thus rejecting the heteroscedasticity hypothesis, and multicollinearity is absent. The issue of statistical independence of the errors does not apply as most of the sample is cross-section (33 countries) and not time series (5 years). Residual autocorrelation was not detected. The model does not suffer from multicollinearity since: -the R^2 of the model is superior to the R^2 of the regression of any independent variable on the others. The largest R^2 is with information systems as a dependent variable and assumes a value of 83% inferior to the 91% of the model;

- all t-tests on the parameters are above two. The t value of strategy, information systems, R&D, work ethics and marketing are respectively: 11.3 ; 6.8 ; 5.5 ; 2.7; and 2.2;
- the VIF value for all variables is below 10, respectively 5.9; 5.4; 5.3; 3.4; and 1.1 for information systems, work ethics, R&D, marketing and strategy.

By considering countries as large, diversified organizations whose competitiveness depends on the quality of their business administration areas, one can explain 91% of the variance in national income per capita of 33 countries, both developed and developing, during the five years in-between the subprime and Covid crisis.

Five business administration areas come outstanding: information systems; strategy; the R&D department; work ethics within human resources; and marketing.

The model is sound in terms of homoscedasticity and absence of multicollinearity, the t-tests of the variables parameters are all significant at zero level (except for marketing which is significant at 5% level), as well as the F test on the R^2 of 91%.

4. Conclusions

We ended up with a model that can explain around 91.5% of the variation in per capita income. This result represents a slight increase when compared to the result obtained in Sá and Rodrigues [15] suggesting that the perspective of looking at countries as organizations and linking economic growth to the quality of their business environments holds potential.

In this research, we set out to examine countries through the lens of multinational corporations. By evaluating key sectors, we have been able to assess how each contributes to the growth of a nation, measured by the dependent variable of national income per capita. Results suggest that the perspective of analyzing countries as organizations and linking economic growth to the quality of their sectors holds significant promise. This approach is distinctive and yields noteworthy results.

The more skeptical might argue that a country is not a business. It isn't, but the drivers of growth can be comparable. On the very limit, a national economy is the ultimate conglomerate, with many different business areas. This was our context of analysis and it proved to be a pertinent one. Yet, a large part of economic growth remains unexplained. In this research, we revisited explanatory variables of economic growth and aimed to reduce our *ignorance* on the subject.

This paper should thus be considered a further step in research to enlarge the sample both in terms of countries and period, as well as fine-tune the research by testing how the importance of the business administration areas is contingent upon geography, time, and country size, among others.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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