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Latin America and the Caribbean's Productivity: The Role of Pro-Market Policies, Institutions, Infrastructure, and Natural Resource Endowments

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Abstract: This paper examines the role played by pro-market policies, institutions, natural resources, and infrastructure on the total factor productivity (TFP) of twenty Latin American and Caribbean countries over the period 2000–2018. In estimating the TFP, we use the Färe-Primont index based on DEA. We have verified cointegration and estimated the long-run parameters by the grouped-mean FMOLS estimator. For measuring the impact of institutions, natural resources, and infrastructure, we have used the Productive Capacity Indexes of UNCTAD. We found a positive effect of all these variables on the TFP. Natural resources and energy play the most important role. Followed by information and communication technology and institutions quality. Transport infrastructure has played a minor role. The pro-market policies have been measured by the Fraser Institute indexes. We verified the positive impact of pro-market policies in the area of international trade and financial openness through six different variables. Finally, we considered three areas to measure the impact of domestic regulations and policies; credit, labor and business. We could verify a positive impact of credit and business pro-market policies, but we did not get statistically significant results from the labor regulations index.

Keywords: Latin America and the Caribbean (LAC); total factor productivity (TFP); Data Envelopment Analysis (DEA); Färe-Primont index (FPI); pro-market policies effects; economic freedom and productivity

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1. Introduction

In a recent article, Goldfajn, Martínez and Valdés asserted: " . . . The main risk in Latin America at present is that economic populism will gain ground and policymakers will discard the Washington Consensus policies altogether. That would be a mistake" (Goldfajn et al. 2021, p. 130). A sharp conclusion, for which we provide new evidence.

During the 1990s, there was broad agreement in favor of liberal reforms in Latin America and the Caribbean. However, these ideas began to unravel, and at the beginning of the XXI century, several Latin America and Caribbean (LAC) countries changed their direction towards statist and socialist development models. Rodrik (2018) attributes these shifts toward (left-wing) populism to the economic effects of globalization. Moreover, for the last two decades, there has been an increase in LAC countries that have been under some sort of autocratic leadership; these leaders consist of executives with overtly authoritarian tendencies (Velasco Guachalla et al. 2021).

These changes were not uniform. In some countries, there has been some respect for individual freedom and some degree of economic discipline. On the contrary, other governments have devolved into authoritarian systems and unstable economic systems. As Levitsky and Roberts (2011) have pointed out, in those countries where there exist consolidated democratic regimes and party systems, some moderate liberal policy has

prevailed to some degree. Contrarily, in other countries where there has been a crisis of democratic regimes and party systems, governments turned towards heterodoxy policy or directly to deepest statism.

Thus, despite initial agreement regarding the potential of these liberal reforms, as soon as these began—in the beginning and mid-1990s—several economic crises affected the region[1]. This has stirred some controversy and criticisms about their benefits (De Gregorio and Lee 2004; Goldfajn et al. 2021). Although the results were inconclusive, there was some research done that attempted to analyze the outcome of those reforms on economic growth (Easterly et al. 1997; Lora and Barrera 1998; Fajnzylber and Lederman 1999; Escaith and Morley 2000; Fernández-Arias and Montiel 2001; Correa 2002; Bandeira and García 2002; Chong and Zanforlin 2004; De Gregorio and Lee 2004; Santiago et al. 2020; Azam 2022, amongst others).

Besides the earlier studies referenced above, little attention has been paid to this topic during the last two decades, except for two recent works by Santiago et al. (2020) and Azam (2022). Moreover, as Égert (2016) has pointed out; there is little empirical evidence of the impact of structural policies and institutions on aggregate productivity. Even more, to the best of our knowledge, no study has estimated the impact of these policies on the region's productivity through econometrics techniques during the period of analysis proposed.

Therefore, a riveting question remains still valid in the region; are pro-market policies good economic institutions? To put it differently, can liberal policies be the key to LAC's development? Some studies, such as Doucouliagos and Ulubasoglu (2004), found strong evidence of a positive effect of economic freedom on total factor productivity (TFP). However, is this the case in the LAC region? These questions are not trivial, and they are part of the current debate throughout the LA region.

In addition, there is some disagreement about the channels through which the institution's influence on economic growth is manifested and the magnitude of its impact (Bluhm and Szirmai 2012). For example, some studies analyzed the influence of institutions on output (or output per capita) (Rodrik et al. 2004; Siddiqui and Ahmed 2013). Other authors examine the relationship between institutions, foreign direct investment, and domestic investment (Fukumi and Nishijima 2010; Farla et al. 2016) or between institutions and international competitiveness (Buitrago and Barbosa Camargo 2021), or that of Arora and De (2020), who integrate institutional economics with stakeholder theory, to examine the environmental sustainability practices in Latin America.

Although there are even an increasing number of works that have paid attention to the relationship between institutions and productivity (Hall and Jones 1999; Keita 2017; Kim and Loayza 2019), this relationship has not been widely analyzed. However, this last approach appears to be the most promising research channel for explaining the differences among countries since most of the cross-country variation in growth rates is explained by TFP (Easterly and Levine 2001). Furthermore, the pioneering work by Lora and Barrera (1997), which investigated the channels through which the impact of the reforms was produced in the LAC region, concluded that the main element had been the effect of these measures on total factor productivity. Hence, this is the approach that the present study will adopt, i.e., measuring the impact of pro-market policies and other key determinants on TFP[2].

Several works have estimated and evaluated the TFP performance of the region. In general, those works have concluded that the main problem which explains the failure in the development of the region is the drawback in achieving a sustainable catching-up process, i.e., the lack of economic convergence. Even more remarkably, their analysis suggests that the TFP stagnation is due to institutional problems, which slows down the adoption of better and more efficient technologies (Cole et al. 2004; Daude and Fernández-Arias 2010; Fernández-Arias 2017; Fernández-Arias and Fernández-Arias 2021). Nonetheless, none of these works measured the impact of these determinants through econometric techniques.

Thus, this paper aims to contribute to the actual debate by analyzing the effect of different policy areas and other main determinants on the TFP, trying to identify whether

pro-market policies have had a positive impact on TFP in the LAC region. Thereby, we will analyze five main policy areas; freedom to trade internationally, freedom of capital movements, credit market regulations, labor market regulations, and business regulations.

We measure the pro-market policy effects by nine indicators from the Fraser Institute indexes. We also include in our model the use of the Productive Capacity Indexes by UNCTAD considering five indicators; natural resource endowments, energy and information and communication technology availability, transport infrastructure and institutional quality.[3]

To carry out this analysis, we propose two innovations; the first one is to estimate the TFP through Data Envelopment Analysis (DEA) techniques and the Färe-Primont index (FPI), which is an additive, multiplicative and primal index (O'Donnell 2018). This means that it allows for multi-lateral and multi-temporal comparisons and that it is an economically ideal index. As far as we are aware, this is the first study using this approach in calculating the TFP for the LAC countries.

The second innovation is to measure the effect of the policy orientation (pro-market policies) and other key determinants estimating the effects on the TFP through cointegration techniques. Finally, it is worth noting that the period of the analysis is long enough to capture the effect of these determinants. Given the data restrictions and the aim of this paper, we will conduct our analyses for twenty LAC countries from the period 2000–2018.[4]

This article is organized as follows: after the introduction, Section 2 provides a theoretical framework. The model, variables and data are described in Section 3, and the methodology and results are shown in Section 4. Section 5 presents the discussion. Finally, Section 6 presents the concluding remarks and policy recommendations.

2. Theoretical Framework

As TFP is the main concern of this study, we will first consider some relevant determinants of the TFP in order to establish our basic model. In this regard, the approach that this paper will follow is based on Isaksson (2007); Kim et al. (2016); Kim and Loayza (2019), who have made an extensive review of the literature about the key determinants of TFP. They have identified, in general, six main components of productivity: (a) education, (b) innovation and technology, (c) resource endowment, (d) infrastructure, (e) market efficiency, and (f) institutions and policies.

Education has been proposed as a key determinant of productivity gains since it gives knowledge and develops skills, raising the capacities of the labor factor. Both innovation and human capital are important to disseminate and promote the incorporation of existing technologies and the development of new ones. However, we are not going to include any education variable in the model because it will be included in the productivity calculation as a production factor (see next section). Nor will we consider innovation due to the difficulties in measuring it and the lack of quality data.[5]

Natural resource endowments include; natural resources (renewables and non-renewables) and energy availability. Physical infrastructure considers; transport, information and communication technologies. These areas support and facilitate general economic activity (Kim and Loayza 2019). However, based on the "natural resource curse" hypothesis (NRCH), natural resource and energy endowments can be a cause of slowing down economic growth.

Nonetheless, both are important growth drivers for the LAC economies (Kristjanpoller et al. 2016; Le and Bao 2019; Zeeshan et al. 2020). The main evidence on the LAC region seems to contradict the NRCH since several works found no evidence that supports this hypothesis (Haber and Menaldo 2012; Blanco and Grier 2012; Toscani 2017; Papyrakis and Pellegrini 2019; Azam 2022).[6]

Infrastructure is another key area for economic development since it has some spillover effects that positively affect productivity (Hulten and Schwab 2000). In particular, the evidence for transport infrastructure indicates a positive effect on productivity and economic growth (Kim and Loayza 2019). It reduces fixed costs of production and promotes investments in new plants, which in turn boosts productivity (Bougheas et al. 2000; Agénor

2013). It can even raise the productivity of agriculture and promote new opportunities for non-farm businesses at the regional level (UNCTAD 2006).[7]

ICT affects productivity through a variety of channels (Lugones et al. 2007). It can produce a reduction in transaction costs or improve education and labor skills. For instance, Jayakar and Park (2013) have shown that those countries with wide broadband availability have experienced higher economic growth and enjoyed lower unemployment rates. Its impact at the firm level can be critical since ICT upgrades firms by improving data processing and communications, which facilitate decision-making, reduce transaction costs, and make the organization more efficient (Forman and van Zeebroeck 2012; Cardona et al. 2013; Grazzi and Jung 2016).

In general, it is expected a positive effect from ICT on productivity e.g., Cardona et al. (2013) have pointed out that the empirical evidence overwhelmingly proved this positive relationship. This conclusion has been confirmed for LAC economies by Grazzi and Jung (2016).

Market efficiency, in this context, requires a short definition. Kim et al. (2016, p. 3) define it as: " . . . the effectiveness and timeliness with which capital and labor are allocated through the constant renewal of businesses across sectors". Regarding this, Hall and Jones (1999) have pointed out that social infrastructure and the misallocation effect play the most important role in the TFP of an economy. Here is where policy orientation plays a key role since the most important misallocation effect is due to social infrastructure inefficiencies.

Some earlier works, such as those of Easterly et al. (1997); Fajnzylber and Lederman (1999); Fernández-Arias and Montiel (2001); Bandeira and García (2002); Chong and Zanforlin (2004); De Gregorio and Lee (2004), concluded that policy reforms—or the institutional quality—resulted in a positive impact on LA's growth. Despite everything, some researchers still have a skeptical opinion about those same results (Lora and Barrera 1998; Escaith and Morley 2000; Correa 2002). Nonetheless, it is worth mentioning that the period those works have analyzed is probably not wide enough to catch the full effects of these reforms.

A more recent study by Santiago et al. (2020) has covered a larger period than previous studies (1995–2015), including twenty-four LAC economies. It measured the effects of globalization and economic freedom on economic growth through an autoregressive distributed lag econometric model. Their results indicate that the social and economic dimensions of globalization have had a positive impact on economic growth, whilst the political dimension of it has not had any significant effect. The study has also found evidence of a negative impact of economic freedom on economic growth measured by the aggregated index of freedom of Heritage.

On the other hand, Azam (2022) studied fourteen LA countries over the period 2002–2018 using three indicators of World Governance Indicators from the World Bank; Corruption, Political Stability, and Government Effectiveness. The estimations were run by two techniques: panel autoregressive distributed lag and pooled mean group. From this work, it can be concluded that good governance is critical for boosting economic growth.

In general, institutions and policies affect economic potential. That is the reason for having 'good' institutions (North 1990; Hall and Jones 1999; Acemoglu et al. 2005). Moreover, institutional differences explain most of the differences in gross domestic product per capita among countries (Bluhm and Szirmai 2012).[8]

All the same, nowadays, there is an important consensus that the quality of institutions is crucial for economic growth, and the evidence is substantial. For instance, Bluhm and Szirmai (2012), who have made an extensive review of these issues, stated: that institutional differences explain most of the differences in gross domestic product per capita (GDPPC) among countries. Thus, seen differences in economic institutions are the root cause of differences in economic development (Acemoglu et al. 2005). As Rodrik et al. (2004, p. 135) have asserted: "the quality of institutions trumps everything else".

Here it is important to differentiate between institutions as a general concept, economic institutions, and policies. These are concepts that are closely related, and the distinction between them can be murky (Rodrik et al. 2004). Good institutions can be thought of as a

social framework that is the result of a long-term process that involves historical, cultural, and religious issues, amongst others.

Economic institutions include matters such as the legal system, government integrity, and basic civil rights, amongst others. This is a similar distinction to that proposed by Acemoglu and Robinson (2012) between economic institutions and political institutions. For these authors, economic institutions include property rights and law, freedom to contract and exchange, etc. Similarly, Easterly (2005) makes a distinction between institutions and policies. Economic policies can be thought of as a flow variable that affects contemporaneous economic efficiency.

Economic policies affect economic efficiency mainly through the misallocation effect. Regarding this, Hall and Jones (1999) posited that social infrastructure and the misallocation effect play the most important role in the productivity of one economy. Furthermore, Jones (2016) has claimed that misallocation provides one of the most important explanations for understanding the huge distortions observed in poor economies and their TFP differences. In that way, efficiency is strongly affected by economic policies, and it can be seen as a 'flow variable' identified by the contemporaneous policies that a government implements. In other words, these are part of the rules governing the economic system (Lloyd and Lee 2018).

The effect of economic institutions and economic policies on the private sector is critical since those policies that encourage investment positively impact TFP (Isaksson 2007). Furthermore, entrepreneurship potential is crucially affected by both economic institutions and policies. Both can contribute to boosting private investment, raising employment, and motivating innovations. Furthermore, if the policies generate incentives for entrepreneurship, the number of firms will increase, enhancing competition and improving the efficiency and productivity of the economy (Gnangnon 2020).

Outward-oriented policies have a substantial impact on productivity. Alcalá and Ciccone (2004) have posited that the benefits of international trade are manifested through gains in TFP. There is three channel through which exports growth affect productivity; (a) specialization, which raises productivity and product quality, (b) economies of scale, due to the size of the market; and (c) technological change, which is caused by the competition that exporters face at international markets (Burinskiene 2012).

Regarding imports, the positive impact of importing on productivity is stated by the learning-by-importing hypothesis. The hypothesis states that firms can take advantage of global specialization by using forefront technology inputs. Here international technology diffusion is the key vehicle for technology transfer (Wagner 2012). In addition, firms may improve productivity by using a higher quality of foreign inputs and by specializing in activities where they have strengths. Furthermore, technology embodied in inputs and capital goods brings about a catching-up process that produces improvements in TFP (Coe et al. 2009; Haider et al. 2021).

Financial and capital freedom is also important since it can provide funding to support economic activity and improve technological capabilities. It also enhances efficiency and is an important driver of technology transfer. Moreover, FDI is a key determinant of natural resource production and energy consumption, as well as an important promotor of financial development and economic growth in the LAC region (Zeeshan et al. 2020).

However, whilst trade liberalization may promote technology and knowledge diffusion, this transmission might be inhibited by a lack of absorptive capacity (Isaksson 2007). This can be due to domestic regulations or insufficient labor and entrepreneurship capacities. The negative effect of domestic regulations is an old problem in the LAC region, e.g., Cole et al. (2004) posited that Latin America's TFP gap was mainly accounted for by inefficient production, where international and domestic competitive barriers were the main reason.

Strong domestic regulations and red tape can reduce the entrance of new firms, as well as affect the optimal resource allocation, having a pervasive impact on the innovation process, which in turn, decreases productivity at the aggregate level (Nicoletti and Scarpetta

2003; Bouis et al. 2011; Andrews and Criscuolo 2013; Haltiwanger et al. 2014; Andrews and Cingano 2014).

This effect is more evident in small and medium-sized firms, which are negatively affected by market regulations and labor legislation (Isaksson 2007). Similarly, Égert (2016) found that anticompetitive regulations negatively impact TFP, while greater openness results in higher TFP. This study concludes that better institutions combined with lower barriers to trade and a friendly environment for investment amplify the positive impact of RandD spending on TFP.

Domestic financial development is crucial in financing capital accumulation. It allows investment opportunities to be easily seized. Hence, resources are allocated optimally, promoting specialization and productivity gains (Alfaro et al. 2009). However, if the financial sector is not efficient and/or highly controlled, these advantages do not materialize, such as in LAC economies, where it is frequent that firms have to rely on retained earnings for investment, delaying or losing investment opportunities.

As Isaksson has pointed out, "Financial repression, often exemplified by negative or artificially low real interest rates, thwarts incentives to save. They also distort the efficient allocation of savings into investment. Again, the negative effect on TFP growth is clear. It is important to learn more about the association between financial development and productivity growth" (Isaksson 2007, p. 36).

There is also evidence that shows that the distortions are driven by regulations in the labor and product market (Égert 2016), e.g., harsh employment legislation raises labor costs which affect the optimal reallocation process; therefore, if the restrictions dampen job reallocation, the productivity will decline (Haltiwanger et al. 2014; Andrews and Cingano 2014). However, the empirical evidence on the impact of labor regulations on job relocation is inconclusive (Haltiwanger et al. 2014).

Based on this theoretical framework, our main hypothesis is that pro-market policies and better-quality of institutions raise the TFP of the LAC region.

3. Model, Variables and Data

Based on our theoretical framework, we can formulate the main equation to be estimated as follow:

$$\text{TFP} = f\ (NatK; Energy, Transport; ICT; Institutions; Policy) \quad (1)$$

where TFP is the total factor productivity estimated by the methodology explained in the next subsection. NatK is an index that measures the availability of extractive and agricultural resources. Energy measures the availability, sustainability and efficiency of power sources. Transport measures the availability of roads and railways and air connectivity. ICT measures information and communication technology availability. Finally, Institutions is an aggregated index that measures our 'Economic Institution' variable. It includes areas such as political stability, corruption, rule of law, voice and accountability, and government efficiency. These variables (except TFP) are part of the Productive Capacity Indexes developed by UNCTAD (2021). These indexes have a scale of 0–100 and constitute the basic model from which we will analyze the impact of each of the different economic policy variables proposed.[9]

Finally, the variable 'Policy' will be measured by nine distinct indexes (see Table 1) that can be considered in two main areas; international opening and domestic regulations. Within international opening, we have six variables. The first two variables measure policies that directly affect international trade (MTR and Tariff), and the second two variables measure policies that affect the international capital flows (CC and FOCC). The last two variables in this area are general indexes that measure the whole outward-oriented policy effect (CMCP and FTI). Finally, we included three indexes that measure the effect of inward-oriented policies. These indexes measure the effect of government policies and regulations in areas such as the credit market (Credit), labor market (Labor) and business activities (Business).[10]

Table 1. Variables, definitions and sources.

Area	Description	Variable
Policy (International Opening)	*Mean tariff rate* is the unweighted mean of tariff rates applied to imports.	MTR
	Tariff is an index that includes aspects, such as; revenues from trade taxes (% of trade sector), mean tariff rate and its standard deviation.	Tariff
	Capital control is an index based on the International Monetary Fund reports on up to 13 types of international capital controls.	CC
	Financial openness and capital control is the simple average of these two indexes. The former is an index of de jure financial openness, based on "codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions". The second is CC previously defined.	FOCC
	Controls of the movement of capital and people is a general index that includes; 'financial openness', 'capital controls', and 'freedom of foreigners to visit'.	CMCP
	Freedom to trade internationally is a general index that includes; 'Tariff', 'Regulatory trade barriers', 'Black-market exchange rates' and 'Controls of the movement of capital and people'.	FTI
Policy (Domestic Regulations)	*Credit market regulations* consider issues, such as; 'ownership of banks', 'private sector credit', and 'interest rate control'.	Credit
	Labor market regulations include; 'hiring regulations and minimum wage', 'hiring and firing regulations', 'Centralized collective bargaining', 'hours regulations', 'mandated cost of worker dismissal', and 'conscription'.	Labor
	Business regulations consider areas, such as; 'administrative requirements', 'bureaucracy costs', 'starting a business', 'impartial public administration', 'licensing restrictions', and 'cost of tax compliance'.	Business

Source: Own elaboration.

These variables are indexes elaborated by the Fraser Institute. The scale of Fraser indexes is 0–10, and UNCTAD's indexes are scaled from 0–100; hence, in order to make the different parameters estimated relatively comparable, we have multiplied Fraser indexes by 10. The higher the score obtained by the index, the greater economic freedom.[11]

We propose a log–log model that will allow us to estimate elasticities. Therefore, all the variables are in logarithms.[12]

All estimations will include the variables in the first three main areas; Natural Resources (NatK and Energy), Infrastructure (Transport and ICT) and Economic Institutions (*Institutions*), and one variable of Policy each time. Thus, we have nine models, one for each policy variable (*MTR*; Tariff; *CCIE*; *FOCC*; *CMCP*; *FTI*; Credit; Labor; and Business).

Model 1: $TFP = f(NatK; Energy; Transport; ICT; Institutions; MTR)$
Model 2: $TFP = f(NatK; Energy; Transport; ICT; Institutions; Tariff)$
Model 3: $TFP = f(NatK; Energy; Transport; ICT; Institutions; CC)$
Model 4: $TFP = f(NatK; Energy; Transport; ICT; Institutions; FOCC)$
Model 5: $TFP = f(NatK; Energy; Transport; ICT; Institutions; CMCP)$
Model 6: $TFP = f(NatK; Energy; Transport; ICT; Institutions; FTI)$

Model 7: $TFP = f(NatK; Energy; Transport; ICT; Institutions; Credit)$
Model 8: $TFP = f(NatK; Energy; Transport; ICT; Institutions; Labor)$
Model 9: $TFP = f(NatK; Energy; Transport; ICT; Institutions; Business)$

TFP Calculation

Several works have measured and analyzed the performance of the TFP for the LA region. The most recent and relevant works are those of Daude and Fernández-Arias (2010); Ferreira et al. (2013); Araujo et al. (2014); Rodríguez-Apolinar and Fernández-Arias (2016); Fernández-Arias (2017); Fernández-Arias and Fernández-Arias (2021); Koengkan et al. (2022). All of them calculate the TFP using a growth-accounting approach, except Araujo et al. (2014), who estimate TFP using a parametric technique (stochastic-frontier model) and Koengkan et al. (2022), who estimate the TFP by both approaches; stochastic production frontier and data envelopment analysis.

These frontier approaches have several advantages for estimating TFP indexes over other techniques, especially the DEA non-parametric techniques, since it is more flexible than the parametric techniques. It performs better than other parametric techniques when technology is heterogeneous, and the assumption of constant returns to scale is relaxed (Van Biesebroeck 2007; Van Beveren 2012), two characteristics that are particularly important in our sample data.

For these reasons, we employ the DEA technique and Färe-Primont index (FPI) for estimating the TFP for the LAC region. This methodology is based on the advances developed by (O'Donnell 2008, 2010, 2011b, 2012, 2014, 2018).

FPI is constructed using output and input distance functions and has some important advantages over other similar indexes, being one of the most important that it allows for multi-lateral and multi-temporal comparisons. Furthermore, this index is what the literature names primal indexes, i.e., it is additive and multiplicative. For that reason, FPI is considered an exhaustive and ideal index since it satisfies all the relevant axioms and proofs in the index numbers theory (O'Donnell 2011a, 2011b).

Some of its advantages are: that it does not need to impose a specific functional form and, in contrast to the parametric frontier techniques, it does not need any assumption about the distribution of the inefficiency component. Moreover, it is not necessary to assume that all economic units are efficient and that the economic units follow a profit-maximization or cost-minimization behavior. In addition, no information about prices is required.[13]

TFP is defined as the relationship between outputs and inputs, represented as:

$$\mathrm{TFP_{it}} = \frac{\mathrm{Q_{it}}}{\mathrm{X_{it}}} \tag{2}$$

where $Q_{it} = D_0(x_0, q_{it}, t_0,)\ D_1(x_{hs}, q_0, t_0,)$ and $X_{it} = D_0(x_0, q_{hs}, t_0,)\ D_1(x_{it}, q_0, t_0,)$ are the aggregate function of output and inputs, respectively.[14]

To estimate the TFP, we use one Output (Real GDP at constant 2017 national prices (in mil. 2017US$)) and three inputs; Capital (Capital stock at constant 2017 national prices (in mil. 2017US$)), Labor (Number of persons engaged, in millions), and Human Capital (Human capital index)[15]. All data and variables are from Penn World Table version 10.0 (Feenstra et al. 2015)[16]. We included the twenty LA countries, and we added the USA as a benchmark for the frontier[17]. The results are reported in the Appendix A, Table A1.[18]

4. Methodology and Results

The first step will be to examine the properties of the series by checking if the variables are non-stationary. We will implement a second-generation test developed by Pesaran (2007), which is the cross-sectional Im-Pesarn-Shin (CIPS) test. This test has several advantages since it takes into account the potential cross-sectional dependence (CSD) problem and allows for heterogeneity in the autoregressive coefficient of the regression, as well

as among the units. Besides, it is also valid for panels where the number of cross-section units and the periods are similar (N ≈ T), and it shows good size properties even for small sample sizes.

Since we have only 19 periods in our data, we will report the truncated CIPS as it was recommended by Pesaran (2007). For all the tests, we chose the Modified Akaike criteria for the length lag selection, with a maximum of four lags. We have run all tests in levels; with a constant and constant plus trend. For the test in the first differences, we only report the results with a constant. The results reported in Table 2 confirm that all series contain unit roots, becoming stationary at the first difference. Therefore, they are I(1).

Table 2. Pesaran (2007) panel unit root tests.

	Level		1st Difference
Variables	**Constant CIPS**	**Const. + Trend CIPS**	**Constant CIPS**
TFP	−1.216	−1.434	−2.240 **
NatK	−1.296	−2.305	−3.070 ***
Energy	−1.722	−1.639	−3.168 ***
Transport	−1.991	−1.699	−2.878 ***
ICT	−1.775	−2.521	−2.917 ***
Institutions	−1.261	−2.229	−2.789 ***
MTR	−1.800	−2.608	−3.688 ***
Tariff	−1.489	−2.194	−3.022 ***
CC	−1.548	−2.031	−2.631 ***
FOCC	−1.644	−2.029	−2.857 ***
CMCP	−1.478	−2.264	−2.960 ***
FTI	−1.849	−1.811	−2.963 ***
Credit	−1.758	−2.441	−3.776 ***
Labor	−2.070	−2.305	−3.231 ***
Business	−1.905	−1.958	−2.494 ***

Pesaran's (2007) critical values: ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively.

Now we will evaluate some characteristics of our models since it will guide us in selecting the proper cointegration test and the suitable methodology for estimating the long-run parameters of each model.

The first step will be checking for CSD. In this case, we propose the CD test developed by Pesaran (2015). This test is robust even in the presence of structural breaks and I(1) variables, as well as for panels with short T and large N (Pesaran 2021). Under the null hypothesis of cross-sectional independence (or weak CSD), the CD statistic follows a normal distribution. We conducted the test on the residuals after estimating each regression by Fixed Effect-OLS.

It Is also critical to verify homogeneity in the parameters. Therefore, we will run the tests proposed by Bersvendsen and Ditzen (2021), which are based on Pesaran and Yamagata (2008). In addition, we consider the extension that allows estimating HAC robust standard errors (Blomquist and Westerlund 2013, 2016). We have chosen the Quadratic-Sphere kernel, and the bandwidth was set at 2, which is a usual value for this time dimension. This test compares the distance between slopes obtained by cross-sectional unit regressions and pooled FE regression, weighting the difference by the unit-specific standard errors. It calculates the Delta and Delta Adjusted statistic to test the null hypothesis that posits that the parameters are homogeneous across cross-sectional units.[19]

In Table 3, we show the results for both tests. As we can see, the nine models strongly fail to reject the null hypothesis for CSD and slope homogeneity. This implies that it can be assumed that CSD is not present in our estimations and that all slope coefficients are homogeneous across cross-sectional units.

Table 3. Pesaran's (2015) CSD test and Bersvendsen and Ditzen's (2021) slope homogeneity test.

Models	CSD Test		Slope Homogeneity Test.	
	CD-Stats.	*p*-Value	Delta Adj.	*p*-Value
Model 1	0.835	0.404	−0.041	0.967
Model 2	−0.174	0.862	−0.236	0.813
Model 3	−0.346	0.729	−0.929	0.770
Model 4	−0.780	0.436	−0.198	0.873
Model 5	0.061	0.951	−0.022	0.983
Model 6	−0.178	0.859	−0.152	0.879
Model 7	−0.879	0.379	−0.385	0.700
Model 8	−0.331	0.741	−0.065	0.948
Model 9	0.472	0.637	−0.155	0.877

So far, we have verified slope homogeneity, absence of CSD and that all the variables are I(1). Given these conditions, the number of explanatory variables, and the time dimension of our panel, we proposed the test developed by (Pedroni 1999, 2004) to verify cointegration where the null hypothesis is no cointegration. Its rejection implies that the error term is stationary and all panels are cointegrated. This test offers seven statistics; three are part of the group-mean statistics, which average the results of each country. The other four are panel statistics that pool the statistics along the within-dimension. All statistics are adjusted and are distributed as N(0, 1).

On the other hand, for estimating the long-run parameters of each model, we propose the non-parametric Fully Modified Ordinary Least Square (FMOLS) developed by (Pedroni 1996, 2000, 2001), in particular, the grouped-mean FMOLS, which shows a good performance in small panels or when the relation T/N is small. It estimates the parameters country-by-country, averaging them across countries in a second step, getting this way the mean long-run slope coefficients. The estimations are always consistent, and they are also efficient when slopes can be assumed homogeneous (an assumption that has already been validated).

In addition, this estimator, and the associated t-statistic, are very precise even when there is substantial cross-sectional heterogeneity. Furthermore, this non-parametric estimator does not need to assume a specific parametric form for estimating the nuisance parameters. Hence, it is generally more robust than other parametric estimators like Dynamic Ordinary Least Square (DOLS) (Pedroni 2000).

On the contrary, Kao and Chiang (2000), among others, have claimed that DOLS outperforms FMOLS. However, it is worth mentioning that most of the empirical evidence is based on models with only one or two regressors and a relatively large relation between time and cross-section units (T/N). Additionally, the DOLS estimator is conditioned on the data length and the number of variables in the model. For instance, in panels with many regressors and small T, a large number of lags and leads make the regression unfeasible, e.g., in our estimations.

Finally, Pedroni (2001) has also pointed out that the parameters estimated through the grouped-mean FMOLS method have a more useful interpretation than the pooled version since they can be interpreted as the mean value for the cointegrating vectors. This interpretation does not apply to the pooled estimator. This is another reason for choosing the grouped-mean FMOLS estimator.

The Pedroni's cointegration tests were run, including panel-specific time trends and specifying the lag structure for augmented Dickey–Fuller regressions by Akaike info criteria imposing a maximum of 4 lags. The method to estimate the long-run variance was the Bartlett kernel, and the lags to adjust for serial correlation were selected according to the Newey and West (1994) method. In Table 4, we show all the results of the cointegration tests. There, we can verify that all the test statistics strongly reject the null hypothesis, which means that the series in the nine models are cointegrated.

Table 4. Pedroni's cointegration tests. Group-mean statistics.

Models	Modified Phillips–Perron		Phillips–Perron		Augmented Dickey–Fuller	
	t	*p*-Value	t	*p*-Value	t	*p*-Value
Model 1	6.2883	0.0000	−1.8113	0.0350	−3.3393	0.0004
Model 2	6.2188	0.0000	−2.3157	0.0103	−2.7203	0.0033
Model 3	6.1496	0.0000	−4.3181	0.0000	−3.1019	0.0010
Model 4	6.4022	0.0000	−4.5867	0.0000	−2.4265	0.0076
Model 5	6.2988	0.0000	−2.1829	0.0145	−2.9033	0.0018
Model 6	5.9560	0.0000	−6.4185	0.0000	−4.3057	0.0000
Model 7	6.5821	0.0000	−5.1511	0.0000	−2.6047	0.0046
Model 8	6.6102	0.0000	−6.0577	0.0000	−4.2123	0.0000
Model 9	5.9985	0.0000	−3.6331	0.0001	−7.8411	0.0000

Confirming cointegration implies that the I(1) series are in long-run equilibrium; this proves the existence of a long-run relationship between the variables in the model. Moreover, as Pedroni (2019, p. 257) has pointed out: " ... the presence of cointegration brings with it a form of robustness to many of the classic empirical problems that lead to the so-called violation of the exogeneity condition for the regressors. Obvious examples include omitted variables, measurement error, simultaneity, reverse causality or anything that leads the data generating process ... ".

For estimating the long-run parameters, we use the grouped-mean FMOLS estimator. In all estimations, we include fixed effects and an individual linear trend as an additional deterministic regressor. We set (non-pre whitened) Bartlett kernel and Andrews' automatic bandwidth selection method to compute the long-run covariances. It was also considered the finite sample adjustment for standard errors and covariance in all estimations.

In the results shown in Tables 5–7, we present the coefficients estimated and their respective *p*-values (the first two columns of each estimation). In addition, since collinearity could be an issue with these sorts of explanatory variables, we added a third column with the uncentered Variance Inflation Factors (VIF) for measuring the level of collinearity between the regressors in each estimation. As a rule of thumb, if the VIF is less than 4, then collinearity is not a concern, but a value greater than 10 indicates a high level of collinearity. Finally, at the bottom of each table, we present the results of the CSD test of Pesaran (2015), reporting the CD-Statistics and their *p*-values.

The results are robust and consistent in all nine models. Except for Labor, in Model 8, and Transport in some models, all the parameters are statistically significant at usual significance levels of 0.01 and 0.05. Besides, the coefficients show the expected positive sign. It is also worthwhile noting that the VIF statistics for all the variables in all models are very low; therefore, collinearity is not an issue. Finally, Pesaran's test fails to reject the null hypothesis in almost all estimations except model 4. Thus, we can confirm that there is no evidence of CSD in eight of our nine models.

Table 5. Grouped-mean FMOLS. Models 1, 2 and 3.

	Model 1: Policy = MTR			Model 2: Policy = Tariff			Model 3: Policy = CC		
Variables	**Coef.**	***p*-Value**	**VIF**	**Coef.**	***p*-Value**	**VIF**	**Coef.**	***p*-Value**	**VIF**
NatK	1.200	0.006	1.181	1.495	0.001	1.106	1.751	0.000	1.388
Energy	0.890	0.000	1.323	0.931	0.000	1.527	0.992	0.000	1.216
Transport	0.060	0.024	1.126	0.073	0.001	1.177	0.051	0.090	1.132
ICT	0.242	0.000	1.538	0.269	0.000	1.542	0.287	0.000	1.764
Institutions	0.227	0.000	1.073	0.281	0.000	1.129	0.177	0.000	1.079
Policy	0.454	0.000	1.117	0.138	0.045	1.089	0.074	0.000	1.032
CD-Stat. and *p*-values in brackets	0.114	(0.909)		1.020	(0.294)		0.262	(0.793)	

Table 6. Grouped-mean FMOLS. Models 4, 5 and 6.

	Model 4: Policy = FOCC			**Model 5: Policy = CMCP**			**Model 6: Policy = FTI**		
Variables	**Coef.**	***p*-Value**	**VIF**	**Coef.**	***p*-Value**	**VIF**	**Coef.**	***p*-Value**	**VIF**
NatK	1.221	0.001	1.516	1.180	0.001	1.081	1.025	0.003	1.123
Energy	1.094	0.000	1.203	0.820	0.000	1.173	0.682	0.000	1.127
Transport	0.055	0.060	1.127	0.056	0.056	1.099	0.036	0.216	1.086
ICT	0.258	0.000	1.823	0.254	0.000	1.291	0.260	0.000	1.232
Institutions	0.210	0.000	1.076	0.255	0.000	1.035	0.203	0.000	1.040
Policy	0.178	0.000	1.024	0.068	0.001	1.010	0.129	0.000	1.061
CD-Stat. and *p*-values in brackets	3.712	(0.000)		−1.618	(0.106)		−0.804	(0.421)	

Table 7. Grouped-mean FMOLS. Models 7, 8 and 9.

	Model 7: Policy = Credit			**Model 8: Policy = Labor**			**Model 9: Policy = Business**		
Variables	**Coef.**	***p*-Value**	**VIF**	**Coef.**	***p*-Value**	**VIF**	**Coef.**	***p*-Value**	**VIF**
NatK	1.952	0.000	1.051	1.217	0.001	1.075	1.666	0.000	1.252
Energy	0.869	0.000	1.593	0.705	0.000	1.309	0.915	0.000	1.279
Transport	0.063	0.041	1.271	0.019	0.563	1.180	−0.029	0.391	1.190
ICT	0.287	0.000	1.707	0.281	0.000	1.479	0.284	0.000	2.004
Institutions	0.194	0.000	1.105	0.149	0.001	1.100	0.200	0.000	1.098
Policy	0.173	0.000	1.126	−0.014	0.537	1.073	0.052	0.022	1.303
CD-Stat. and *p*-values in brackets	0.997	(0.319)		−0.728	(0.467)		0.052	(0.959)	

5. Discussion

As we have mentioned before, the effect of natural capital and energy endowments is not so clear. Some hypotheses, e.g., the 'resource curse' hypothesis, assert that the effect could even be negative. However, our results indicate a significant positive impact on TFP. The result is in line with other works, such as Zeeshan et al. (2020), who have found a positive relationship between natural resources and economic growth in the LAC region. Furthermore, in all our estimates, these variables are the ones that have the greatest impact on the dynamics of TFP. Natural resource endowments are the most important determinant of TFP, with elasticities within the range of 1–2. This means that natural resource abundance is a key factor in pushing the LAC TFP toward the technology frontier. This effect can be explained by the technological boom registered in agriculture during the last two decades (Le Clech and Fillat-Castejón 2020) and its importance in the world agricultural supply (Le Clech and Fillat-Castejón 2017).

Energy availability is the second main determinant of productivity in the LAC region, with elasticities ranging from 0.6 to 1. Findings that agree with Kühl Teles and Cesar Mussolini (2012), who estimated an elasticity of approximately 0.41. Additionally, Le and Bao (2019) and Santiago et al. (2020) found that energy use has a positive impact on LAC economic growth. In general, natural resources and energy endowments are important growth drivers for the LAC economies (Kristjanpoller et al. 2016; Zeeshan et al. 2020).

The impact of transport infrastructure on TFP is extremely low, with elasticities that do not surpass a value of 0.07, getting non-significant estimations in some models. These findings are in line with those of Calderón et al. (2015), who found an elasticity of infrastructure in a range between 0.07 and 0.10. These low elasticities (when significant) find an explanation in that the region has low transport infrastructure density relative to its income level. In addition, its performance has been characterized as mediocre and uncompetitive (Fay et al. 2017). This combination of inefficiency and underdevelopment could explain the small or insignificant role played by this variable. In other words, LAC countries should reduce their shortcomings in infrastructure (Alaimo et al. 2008).

Regarding ICT infrastructure, its effect can be considered relatively lower than expected, with values that range from 0.24 to 0.29. However, these results are consistent with those verified by Hofman et al. (2016), who conclude that the role of ICT has been minimal in the LAC region. In sum, these results suggest that the availability of ICT has had relatively little impact on productivity in LAC economies. It can be explained by the low performance of the speed of diffusion and adoption of new technologies due to the economic structure in those countries, which were not able to get the expected spillover effects (Cardona et al. 2013; Gnangnon 2021). Despite this relatively low effect, same as Grazzi and Jung (2016), we can confirm a significant and positive effect between ICT and productivity.

We have also verified a significant and positive impact of the variable Institutions. This means that better quality of institutions leads to improvements in the TFP of the LAC region. The estimations are consistent between all models, with an estimated elasticity of around 0.2. This result agrees with the findings of Azam (2022), who concluded that good governance is critical for boosting economic growth in the LAC region and, in general, with several other earlier studies that concluded that the institutional quality resulted in a positive impact on LAC's economic growth (Easterly et al. 1997; Fajnzylber and Lederman 1999; Fernández-Arias and Montiel 2001; Bandeira and García 2002; Chong and Zanforlin 2004; De Gregorio and Lee 2004).

Regarding the pro-market policies, we have found that eight of the nine indexes proposed are statistically significant, and all the parameters indicate a positive impact on TFP. The only exception was Labor which was not statistically significant. This general result confirms that pro-market policies boost productivity in the region.

The two indexes that measure policies on international trade, (MTR and Tariff), have shown a positive effect (see Table 5), results that are similar to those previous studies that measured the impact on economic growth (Bandeira and García 2002; De Gregorio and Lee 2004). Especially the variable MTR, which is an index based on the unweighted mean of tariff rates applied to imports, demonstrates the relevance of trade policies in determining TFP in the LAC region. The elasticity estimated was 0.45, the highest value among the policy variables. Therefore, it is evident that the misallocation effect produced by protectionist policies can be critical for the development of the region. In this regard, we share the same conclusion as Isaksson (2007, p. 62); " ... trade openness (as a policy) is important and that, in terms of outcome, imports are crucial for TFP".

The estimated coefficients for our two measures of financial outward-oriented policies, namely, CC and FOCC (capital control and financial openness and capital control), were 0.074 and 0.178, respectively, both statistically significant at a 1% level (see Tables 5 and 6). These results are similar to those reported by Bandeira and García (2002), who estimated the impact of financial and capital openness on economic growth in the LAC region for a previous period of analysis. In general, these sorts of outward-oriented policies have a direct impact on the attraction of FDI, especially important for the natural resources and energy sectors in the LAC region. This result is consistent with that of Alfaro et al. (2009), who showed evidence that financial opening raises TFP via knowledge spillovers and technology transfers, as well as enhancing resource allocation.

Considering these results and the positive and statistically significant coefficient estimated for the two general indexes, CMCP and FTI (controls of the movement of capital and people and freedom to trade internationally), reported in Table 6, we can conclude that opening policies are associated with higher TFP growth. These results contradict those obtained by Santiago et al. (2020), who found that the general index of economic freedom of Heritage shows a negative impact on economic growth. Nonetheless, at the same time, they found that the general KOF Globalization Index (Gygli et al. 2019) positively impacts economic growth and that the KOF index of economic globalization has a positive effect on growth in the long run but not in the short run.[20]

Finally, we have examined the impact of three inward-oriented policies in three key areas of the economy, namely, the credit market, labor market and business. The results

reported in Table 7 confirm a positive and statistically significant coefficient in the credit market and business. However, we did not find any significant association between labor market flexibilization and TFP growth. This means, as was expected that fewer and/or better regulations lead to improvements in the TFP of the LAC countries.

We found strong evidence that financial freedom positively affects TFP. In other words, financial repression is bad for resource allocation since it thwarts capital accumulation. A similar effect was found by Bandeira and García (2002) and Bittencourt (2012) on economic growth for a previous period of analysis, e.g., Bittencourt (2012) emphasized the importance that a more open and competitive financial sector had in the LAC region for fostering entrepreneurship, which in turn stimulates economic growth.

Regarding the business environment, we found that the regulatory framework has a relevant impact on TFP. This finding is supported by a thorough investigation by Grazzi and Pietrobelli (2016), who examined firm performance in the LAC region. The study concluded that the benefits of improvements in governance, institutions, and other investment climate attributes had a positive impact on firm performance and wage levels, which in turn led to increases in productivity.

The result gathered by the labor market index can be explained by the structural transformation of the labor market in recent decades in the region, where the evidence has shown that the workforce has moved from high-productivity sectors to low-productivity activities, in many cases from agriculture and manufacturing towards low productivity services industry (Ferreira and da Silva 2015; Diao et al. 2019). Therefore, even though labor flexibility may have improved employment dynamics in the region, the structural effects of the region's economies led resources toward low-productivity activities.

6. Concluding Remarks and Policy Recommendations

We have examined the role of some of the key determinants of the TFP for the LAC region over the period 2000–2018 and estimated the effect of five key productive capacity indicators embodied in the PCI of the UNCTAD, namely; natural resource, energy availability, transport and ICT infrastructure, and institutions. We have also analyzed the individual impact of nine different pro-market policy indicators on the TFP of the region. We were able to verify cointegration in the nine models. Finally, we estimated the long-run parameters through the grouped-mean FMOLS estimator, which allows us to interpret the estimated coefficients as the mean value for the cointegrating vectors, i.e., the average effect on the TFP in the region.

Regarding our results, it is very important to highlight that almost all the variables used to measure pro-market policies have pointed in the same direction; this assures the robustness of our estimations. In sum, the results confirm that pro-market policies have a positive impact on TFP. We have obtained for all the relevant estimations a positive and statistically significant parameter, which sends a clear message, the more economic freedom, the more productivity.

Considering the results of the productive capacity indexes, we can confirm a positive effect of the natural resource endowments and energy availability on the TFP. These two variables play the most important role in relating to the parameter estimated. It follows ICT infrastructure. On the other hand, transport infrastructure has had a negligible impact.

It is also clear that better institutions and pro-market policies with solid foundations are essential for improving the productivity of the region; these variables attain a positive and significant parameter in our estimations. Domestic economic freedom improves productivity and, through it, economic growth and wealth as well. Alongside this, a legal framework that encourages private initiative, with fewer and more efficient regulations, may be the key to boosting productivity growth. Once again, these results indicate that the less the government influences the economy, the greater the TFP gains for the economy. For those reasons, being part of economic globalization can be crucial for this region.

In addition to the misallocation effect that policies on Credit and Business sector can produce, it is also important to foreground the effects of regulations. In several LAC

economies, firms must cut through the red tape, and it is an important determinant that affects TFP through its impact on market efficiency. Therefore, to achieve more productivity gains, it is important to promote efficiency in the domestic market by improving the quality of the regulations for both tradable and non-tradable economic activities. In addition, financial sector reform merits high priority on the policy agenda.

In this paper, we have collected evidence of the positive effect of pro-market policies on TFP in the region. The policy measures that can be recommended are well known. Most of them were offered two decades ago by many relevant economists. Just to mention one, we can illustrate the eight recommendations given by Sachs and Vial in 2001 in a document named "Latin American Competitiveness Report". These were: (1) Promote credible market-friendly reforms, (2) Improve institutions, (3) Invest in human capital, (4) Search systematically for efficiency gains, (5) Use your natural resources wisely, (6) Seek trade enhancement and enlargement of markets, (7) Development of local research and innovation capabilities and (8) Promote diversification of exports (Sachs and Vial 2001).

Many of these recommendations and their effects are well documented in the literature. However, all these reforms require a long-term plan that takes into account as precisely as possible the economic adjustments and structural changes that will be required. This is a difficult challenge to overcome from the perspective of populism. Likewise, this type of reform cannot be carried out in parts, hence the ninth and most important recommendation; "To be successful, countries must move in all dimensions at once" (Sachs and Vial 2001, p. 27).

To conclude, it is indisputable that for those policies affecting the external and domestic sectors, more economic freedom allowed means additional gains in productivity. To put it differently, having more economic freedom boosts productivity. In that sense, we can call "pro-market" policies "good economic institutions".

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Appendix A

Table A1. Total Factor Productivity 2000–2018. Färe-Primont index.

Year	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Dominican Rep.	Ecuador	El Salvador	Guatemala
2000	0.6749	0.1337	0.6717	0.3875	0.5492	0.1404	0.2144	0.2089	0.1400	0.2567
2001	0.6399	0.1344	0.6663	0.3918	0.5550	0.1434	0.2152	0.2144	0.1409	0.2608
2002	0.5718	0.1361	0.6726	0.3919	0.5636	0.1462	0.2243	0.2196	0.1426	0.2685
2003	0.6194	0.1384	0.6713	0.3978	0.5786	0.1504	0.2214	0.2221	0.1443	0.2732
2004	0.6659	0.1430	0.6973	0.4154	0.6002	0.1549	0.2219	0.2367	0.1456	0.2800
2005	0.7116	0.1481	0.7078	0.4278	0.6167	0.1588	0.2389	0.2454	0.1493	0.2871
2006	0.7537	0.1538	0.7222	0.4412	0.6423	0.1699	0.2579	0.2521	0.1535	0.2948
2007	0.8004	0.1592	0.7482	0.4485	0.6655	0.1829	0.2721	0.2535	0.1576	0.3054
2008	0.8106	0.1672	0.7644	0.4475	0.6703	0.1903	0.2728	0.2644	0.1580	0.3082
2009	0.7523	0.1709	0.7455	0.4286	0.6614	0.1878	0.2688	0.2615	0.1520	0.3048
2010	0.8105	0.1760	0.7756	0.4401	0.6735	0.1964	0.2833	0.2656	0.1529	0.3086
2011	0.8346	0.1824	0.7782	0.4514	0.6996	0.2019	0.2840	0.2812	0.1538	0.3166
2012	0.8076	0.1891	0.7682	0.4584	0.7071	0.2086	0.2837	0.2909	0.1543	0.3211
2013	0.8091	0.1989	0.7654	0.4606	0.7221	0.2107	0.2899	0.2983	0.1545	0.3281

Table A1. *Cont.*

Year	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Dominican Rep.	Ecuador	El Salvador	Guatemala
2014	0.7749	0.2065	0.7485	0.4552	0.7316	0.2155	0.3029	0.3028	0.1542	0.3374
2015	0.7818	0.2132	0.7105	0.4531	0.7309	0.2206	0.3148	0.2976	0.1552	0.3461
2016	0.7544	0.2190	0.6812	0.4496	0.7264	0.2271	0.3255	0.2898	0.1564	0.3505
2017	0.7605	0.2246	0.6849	0.4450	0.7175	0.2332	0.3308	0.2920	0.1572	0.3560
2018	0.7306	0.2304	0.6871	0.4521	0.7180	0.2366	0.3428	0.2911	0.1582	0.3619
Year	**Haiti**	**Honduras**	**Jamaica**	**Mexico**	**Nicaragua**	**Panama**	**Paraguay**	**Peru**	**Uruguay**	**Venezuela**
2000	0.0737	0.0984	0.0622	0.6888	0.0749	0.1227	0.1263	0.3399	0.1170	0.0428
2001	0.0721	0.0998	0.0629	0.6718	0.0764	0.1225	0.1265	0.3365	0.1123	0.0435
2002	0.0711	0.1024	0.0633	0.6597	0.0763	0.1243	0.1429	0.3490	0.1037	0.0390
2003	0.0705	0.1059	0.0655	0.6580	0.0775	0.1285	0.1462	0.3573	0.1045	0.0355
2004	0.0672	0.1109	0.0663	0.6709	0.0809	0.1369	0.1491	0.3680	0.1096	0.0414
2005	0.0677	0.1161	0.0668	0.6723	0.0836	0.1453	0.1493	0.3831	0.1175	0.0449
2006	0.0684	0.1219	0.0686	0.6862	0.0860	0.1560	0.1551	0.4068	0.1213	0.0482
2007	0.0699	0.1272	0.0695	0.6847	0.0892	0.1723	0.1618	0.4336	0.1280	0.0512
2008	0.0698	0.1302	0.0690	0.6747	0.0911	0.1860	0.1701	0.4612	0.1359	0.0527
2009	0.0710	0.1257	0.0660	0.6276	0.0871	0.1853	0.1679	0.4563	0.1405	0.0499
2010	0.0664	0.1290	0.0651	0.6471	0.0899	0.1926	0.1842	0.4805	0.1501	0.0484
2011	0.0692	0.1313	0.0660	0.6563	0.0945	0.2103	0.1884	0.4921	0.1557	0.0497
2012	0.0704	0.1340	0.0654	0.6648	0.0993	0.2254	0.1842	0.5013	0.1588	0.0517
2013	0.0724	0.1350	0.0656	0.6608	0.1029	0.2341	0.1960	0.5097	0.1637	0.0516
2014	0.0735	0.1364	0.0659	0.6662	0.1065	0.2386	0.2017	0.5034	0.1665	0.0490
2015	0.0734	0.1387	0.0663	0.6740	0.1101	0.2446	0.2040	0.5045	0.1650	0.0454
2016	0.0735	0.1413	0.0671	0.6801	0.1135	0.2491	0.2094	0.5111	0.1658	0.0374
2017	0.0734	0.1450	0.0675	0.6826	0.1172	0.2550	0.2164	0.5111	0.1685	0.0314
2018	0.0736	0.1472	0.0686	0.6858	0.1114	0.2566	0.2202	0.5178	0.1697	0.0251

Source: Own estimation.

Notes

1 Some authors, such as Krueger (2002) and Kuczynski and Williamson (2003), have asserted that the crisis that emerged at the end of the 1990s and early 2000s was caused due to the failure to implement the reforms fully. Later, discussions changed, moving the focus toward institutional deficiencies (Coatsworth 2005).

2 For an extensive review of different works and approaches, we recommend: Aron (2000); Ugur (2010); Bluhm and Szirmai (2012); Kim and Loayza (2019), amongst others.

3 These productive capacity indexes have been used in a recent work by Gnangnon (2021), who analyzed the impact of these variables on economic growth using a panel of 117 developing countries from 2000 to 2018.

4 The countries included are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela.

5 About measures such as 'investment in RandD' Isaksson (2007, p. 7) has pointed out, " ... statistical results may be affected by incomplete measures of knowledge and its proxies, which could lead to problems, such as weak correlations, and even to questioning what has actually been estimated".

6 The literature on this topic is extremely extensive. Therefore, we recommend some relevant reviews that can be found at; Deacon (2011); Van der Ploeg (2011); Frankel (2012); Badeeb et al. (2017); Papyrakis (2019), amongst others.

7 In Calderon and Servén (2014), there is a more detailed discussion on the linkage between infrastructure and productivity.

8 Lloyd and Lee (2018) is an extensive review of the recent literature on institutions and economic growth.

9 UNCTAD defines productive capacity in a broad sense as: " ... the productive resources, entrepreneurial capabilities and production linkages which together determine the capacity of a country to produce goods and services and enable it to grow and develop" (UNCTAD 2006, p. 62).

10 We did not consider the index Financial Openness alone because of its lack of variability. For that reason, we combined this with the capital control index.

11 A complete definition of these indexes can be found at: https://www.fraserinstitute.org/sites/default/files/uploaded/2022/economic-freedom-of-the-world-2022-appendix.pdf (accessed on 21 September 2022).

12 The variables CC and FOCC have few values equal to cero. In those cases, we calculated the logarithms as log(X + 0.1).

13 Jerzmanowski (2007) also discusses the advantage of DEA in estimating TFP.

14 For further details about the Färe-Primont index, we recommend reading O'Donnell (2014, 2018).

15 As Mankiw et al. (1992); Miller and Upadhyay (2000); Égert (2016), we also believe that it is important to include Human Capital as an input in the production function. Moreover, Ferreira et al. (2013) have concluded that the inclusion of human capital in the production function makes a crucial difference in TFP calculations for Latin America.

16 The database is available for download at www.ggdc.net/pwt (accessed on 7 October 2022).

[17] In order to estimate the production function, we consider the output approach, and we have conducted our estimations allowing for variable returns to scale and technical regress. We have used the program DPIN 3.0 for the calculations. For further details, see O'Donnell (2011a).

[18] When comparing our TFP's results with two estimations of Penn World Table (PWT10), cwtfp (Welfare-relevant TFP levels at current PPPs) and r (Welfare-relevant TFP at constant national prices), the panel correlations were 0.95 and 0.92, respectively.

[19] We only report the 'Delta Adjusted' statistics for this test, although we got the same results with the 'Delta' statistics. Results upon request.

[20] It is important to highlight that the problem with using general indexes like the general index of economic freedom of Heritage is that we do not know what specific area we measure since it includes many different fields of policy. Another issue that must be taken into account when using Heritage indexes is that they must be lagged since the data assigned for each year accounts for the facts that happened in the previous period, e.g., the data of 2022 accounts for measures collected between the middle of 2020 and the end of 2021. The authors have not made it clear whether they have taken this into account.

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