

# Institutional Kuznets curve? An empirical analysis with panel data

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## ABSTRACT

The hypothesis that institutions directly influence income distribution has been defended by numerous authors. However, it may be observed that institutions are deteriorating in developed economies, which poses the question: could a phenomenon similar to the Kuznets curve be applied? Using the *Worldwide Governance Indicators* index of the quality of institutions from the World Bank, and data on per capita GDP from the Maddison project (using a sample of 156 countries in the period of 1996–2015), there appears to be empirical evidence in favour of the existence of an institutional Kuznets curve, using the Prais-Winsten estimation and the Generalised Method of Moments (GMM).

## 1. Introduction

The concept of 'institution' does not have a unanimous definition amongst economists. It is a concept that includes both informal aspects (customs, social conventions, etc.) and formal aspects (laws, political regime, etc.) For this paper we accept the description by La Porta et al. (1997), La Porta et al. (1998), Glaeser et al. (2004) and Acemoglu et al. (2001, 2002, 2014, 2012, 2016). We take institutions to be organisations that affect the results of an economy, such as contract fulfilment, property rights, or political and similar systems. These, by turn encourage incentives and opportunities in the economic sphere (such as savings, investment and innovation) or on the contrary, discourage them. There are two conclusions to be drawn from research centring on institutions: Firstly, that they play a fundamental role in a country's economic performance, and secondly, developing countries have worse institutions than developed countries.<sup>1</sup>

Institutions are the backbone of the economy, therefore it is logical to assume that developed economies have beneficial institutions. However, it may be the case that developed countries' institutions are losing quality, giving rise to a possible Institutional Kuznets curve. This loss of quality may be associated with the growing importance of money in politics, which allows the elite in control of the economy to impose rules favourable to them, since they finance electoral campaigns (Milanovic,

2016). Or it may be due to the pressures of globalisation, which deplete the State's capacity (Lee et al., 2007).

The Kuznets curve has been applied in many situations to explain the behaviour of some economic phenomena. So far, the most famous application is the environmental Kuznets curve, but there are other cases. In this paper we will investigate whether the quality of institutions complies with this inverted-U Kuznets pattern with empirical data and two econometric techniques to test whether this hypothesis is robust or not. This proposition of an institutional Kuznets curve is the main contribution as this field has not been explored in depth so far. However, in addition to this contribution, this paper lays the foundations for the opening of numerous lines of research such as the explanation of this behaviour, the possible differences between different geographical locations and the relevance of historical heritage in the evolution of the aforementioned institutional quality.

Finally, we will close this article with the political implications of knowing that such a pattern exists, i.e., institutions are warned that there are forces that could be improving the functioning of the economy at the high price of deteriorating institutional quality.

## 2. Data

This paper aims to verify the existence of a Kuznets curve in the area

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<sup>1</sup> The comparison arises from the definitions of institutions as "inclusive" or "extractive", Acemoglu (2012), with the former being better than the latter.

of institutions, which requires a measurement of institutional quality and the associated income level.

The measurement of institutional quality used is an approximation of the level of a country's governability. This is taken to be the institutions that enable a state to exercise sovereignty and comprises the systems that allow a government to come to power, or to be substituted; the mechanisms to posing and implementing appropriate policies, and the respect with which economic agents treat institutions.

In the World Bank's annual *Worldwide Governance Indicators* there are six indicators considered fundamental to a country's institutional quality, in a sample of 212 regions. These regions are internationally recognised sovereign states, or areas of special administration such as Hong Kong. These variables are bound between  $-2.5$  and  $2.5$ . The dimensions studied by the World Bank are:

- *Corruption control*: which evaluates the domination of elites over public authorities, using privileges for private benefit, taking into account both major and minor corruption.
- *Effective governance*: Quantifies the credibility of a government's commitment, the quality of its services and ability to draw up and implement public services, regardless of outside pressures.
- *Political stability and absence of violence*: calculates the probability of economic instability or of violence arising from political decisions, including terrorism.
- *Regulatory quality*: estimates the capacity of a government to formulate and implement policies that promote private sector growth.
- *Rule of Law*: establishes the perception of agents in as much as their trust and abidance of the laws of society, particularly the fulfilment of contracts, property rights, the police and courts, as well as the probability of delinquency and violence
- *Voice and responsibility*: evaluates citizens' capacity to participate in the selection of a government, and in civil and human rights.

Therefore, the index of institutional quality used in this paper has been obtained by taking the arithmetic means of the values of each of the aforementioned dimensions, thereby synthesising them into a single value. In order to simplify the inclusion of this index into the model, this variable has been classified so that it remains positive throughout its domain, with a new limit of between 1 and 3100.

The Maddison project has been used as a source because it provides information on very long-term income levels from a wide sample of 169 countries. Here we find the 156 countries from which we draw information to subsequently deduce institutional quality. If we were to use other sources, we would incur missing values. Information is used from the latest updated version (Bolt et al., 2018), which establishes the per-capita GDP income in parity to purchasing power in constant dollars in 2011.

Table 1 shows the descriptive statistics relative to the variables used in this model.

### 3. Assessment of the institutional Kuznets curve

Economists have tested the Kuznets (1955) curve hypothesis using multiple formulas. Numerous works state such a curve really exists; Greenwood and Jovanovic (1990), Higgins and Williamson (1999), Barro (2008), Martínez-Navarro et al. (2020) and Martínez-Navarro

et al. (2022). On the other hand, research by Fields (1989), Deininger and Squire (1996; 1998) and Rattan (2012) states the contrary; there is no evidence that inequality and development follow the pattern described by Kuznets. The hypothesis has also been tested using inverse causality, such as Benabou (1996), Banerjee and Duflo (2000) and Castelló-Climent (2010), who all conclude that the variables are endogenous. The Kuznets hypothesis has also been applied to different fields, such as the environmental Kuznets curve (Grossman and Kruger, 1991; Selden and Song, 1994; Stern 2004, and Hiroki 2018, Shahbaz et al., 2018; Nasir et al., 2019; Pham, 2020; Shahbaz et al., 2020; and Nasir et al., 2021), the Kuznets health curve recently suggested by Costa-Font et al. (2018), or more recently the Crowding out Kuznets Curve proposed by Nasir et al. (2020) Likewise, applications of the Kuznets curve to bizarre situations can also be found, as in the case of Antonakakis and Collins (2018) who expose the suicidal Kuznets curve. However, the hypothesis has not been applied to the area of institutions despite being a feasible starting point, considering the development of institutions that initially accompanies economic progress and growth. According to Milanovic (2016), this has waned recently due to the growing influence of money in the political sphere, arguing that elites are receiving special treatment through the finance of electoral campaigns in the states where they operate. Also, as Kunieda and Takahashi (2022) claim by applying an occupational choice growth model, and later compiled by Sasaki (2022), there is an intuition of a possible institutional Kuznets curve, highlighting that it may or may not occur in an economy depending on the proportion of capital in the economy. This research aims to fill the gap left by these authors and to try to answer whether or not such an institutional Kuznets curve occurs using empirical data from 156 countries and optimal econometric analysis techniques. Obviously, the underlying mechanisms supporting this hypothesis may be hard to see and explain, since although economic progress is easily measurable and obvious, institutional quality is not, and cannot be easily quantified. Nevertheless, it may be interesting to consider this hypothesis should it be supported by further study, when it comes to focusing state efforts for the long-term future of the country.

We have chosen to carry out an assessment of a quadratic function, just as Kuznets (1995) and all successive studies of his hypothesis have done, using the Prais-Winsten estimation and GMM. The Prais-Winsten estimation is an improved version of the Cochrane-Orcutt estimation that takes care of the serial correlation of type AR (1), and heteroscedasticity of the model, without losing the first observation of each individual in the sample. We have applied the Wooldridge test for autocorrelation and the modified Wald statistic for groupwise heteroscedasticity to the sample, as shown in Table 2.

Here we can see that the sample has both correlation and heteroscedasticity, just as expected a priori, because both variables show trends and the spectrum of countries is wide, containing both highly

**Table 2**

Tests performed on the regressions for the total sample.

Autocorrelation test		Heteroscedasticity test		Unit root test		
F	t	F	t	Variable	Statistic	p-value
231.93	0.000	1.8·10 <sup>5</sup>	0.000	IQ	−19.70	0.000
				GDP pc	−18.84	0.000

Source: Compiled by the author.

**Table 1**

Descriptive table of variables.

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Index of institutional quality	2.635	1.516,84	886,82	12	3094
GDP pc	2.635	15.250,70	17.863,73	511	156.144

Source: Compiled by the author.

Note: All data provided are unweighted averages.

developed and developing countries. Likewise, in the same table it can be seen that we have also carried out the unitary roots test of [Levin et al. \(2002\)](#) on the institutional quality and GDP pc data series, rejecting in both cases the existence of unitary roots. Therefore, we can conclude that we have stationary series, which means that the unconditional joint probability distribution does not change when shifted in time. Thus, the model to be estimated will be the following:

$$IQ_{i,t} = \alpha + \beta_1 GDPpc_{i,t-1} + \beta_2 GDPpc_{i,t-1}^2 + \varepsilon_{i,t} \quad (1)$$

Where IQ refers to the approximate Institutional Quality based on the governability variables from the World Bank; GDPpc and GDPpc (squared) represent GDP per capita and GDP per capita squared; the sub-indexes  $i$  and  $t$  refer to the country and year observed, respectively. The GDPpc is delayed by one year because we believe the current quality of institutions is the result of government efforts during a previous period. Therefore, we can identify whether the relationship between variables follows the form of an inverted U proposed by Kuznets, providing  $\beta_1 > 0$ ;  $\beta_2 < 0$  and  $|\beta_1| > |\beta_2|$ . Likewise, the case may arise where there were no relation if  $\beta_1 = \beta_2 = 0$  or this relation were monotonic if  $\beta_1 \neq 0$  y  $\beta_2 = 0$ . If the first relation described is fulfilled, we can then apply the mathematical theory to obtain the vertex, which would coincide with the level of income at which institutions begin to lose quality.

$$GDPpc^* = \frac{-\beta_1}{2\beta_2} \quad (2)$$

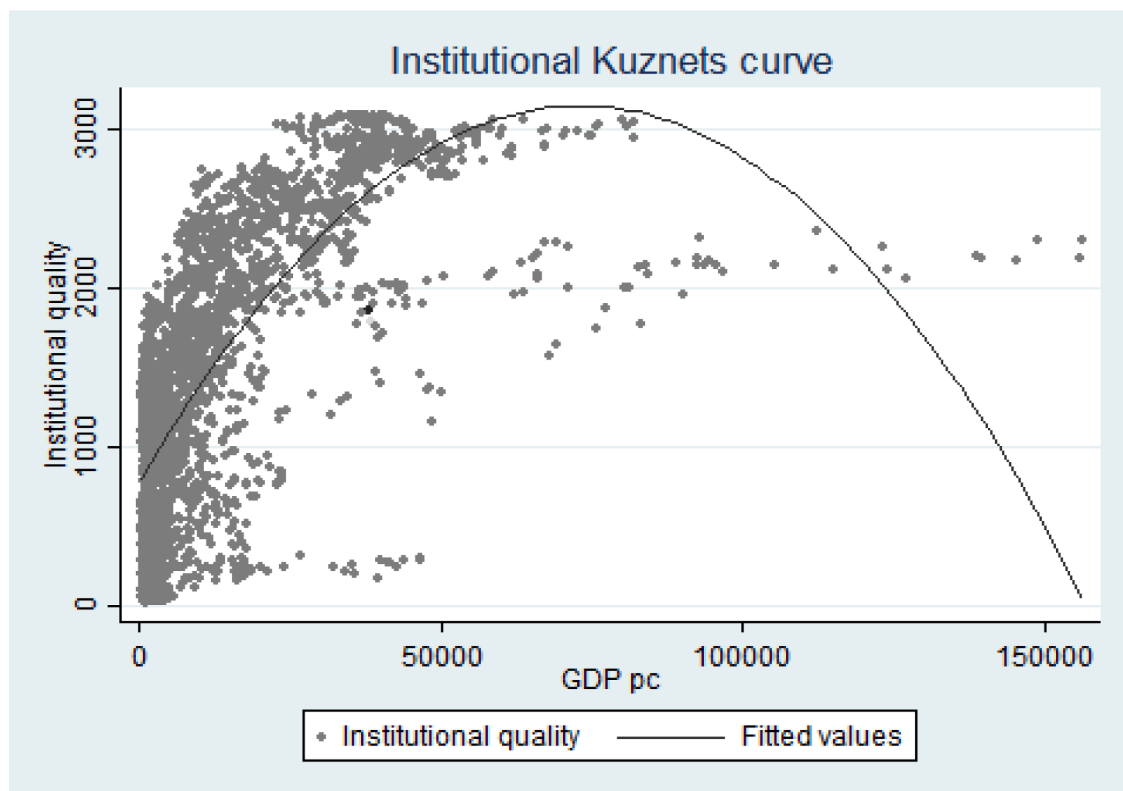
Lastly, by using temporary data from each country, we have the advantage of counting on the possible structural effects of each cross-sectional data, isolating the unobserved heterogeneity intrinsic to each country. Although it may be criticised that the economic variables we are using show no great yearly variations, it is important for this analysis to have temporary data for two reasons. First, the estimation of temporary data permits the identification of different causes for specific

unobserved individual heterogeneity, and therefore assumes these will be more precise than if we were not to have that information. Second, the fact that they are temporary provides a test of the sensitivity of a Kuznets curve with the inclusion of a covariable, which via a dummy, captures the years in which the Great Recession dented the world economy.

#### 4. Results

The most immediate results of this analysis are illustrated in [Fig. 1](#), which shows the cloud of points generated with the institutional quality variables and GDP per capita of each country, at each moment.

It can be seen how the estimated trend of the point cloud follows a quadratic function curve that perfectly follows the inverted U-shape described by Kuznets (1995). However, in terms of the real data, i.e. the scatter plot, it appears to show a simple increasing function. This fact can be read through two perspectives: the first is that countries do not show such high levels of institutional quality that they begin to clearly show institutional deterioration, so we are visualising the representation of the first part of this curve. Once this inflection point is reached, it could hypothetically see institutional quality stabilising or even slowly declining. A second reading could argue that the dissociation between trends and observations can be explained by the sample's absence of white noise, which may call for additional empirical analysis in order for the cloud to be more precise. Despite this, one may observe a specific polynomial association, this is a degree 2 polynomial characteristic of parabolas, with the terms  $\beta_1$  negative and  $\beta_2$  positive if the equation to be assessed is similar to the first mentioned (1). At this point, it should be noted that we are working with all the data as a whole. For this reason, it may be the case that in some countries there has been an increase in institutional quality while in others there has been a decrease in institutional quality. This particular issue has not been covered in this paper.



**Fig. 1.** Scatter plot of Iq with respect to gdp pc.

Source: Compiled by the author. Data on institutional quality have been calculated from World Bank data and GDPpc data have been collected from the Maddison Project.

By adjusting the institutional quality variable to the per capita GDP, as observed in Table 3, the econometric analysis based on the Prais-Winsten estimation and the generalised method of moments (GMM), show evidence in the different specifications in favour of a quadratic polynomial typical of the inverted Kuznets curve.

These estimates are representative since we obtain a determination coefficient of 0.73, which indicates that the variation in institutional quality is explained by 73% of the country's income level. Increasing this coefficient by 0.1% by including the covariate that reflects the years of the Great Recession on the world economy.

Likewise, before discussing the coefficients, it should also be noted that the Hansen test indicates that the model estimated through the System GMM methodology is not over-identified, and that as expected, there is autocorrelation. We know this because the Wooldridge test indicated it to us previously and we can expect it because we know the variables, and both have a tendency and depend on their past.

Similarly, we also find that the results of estimates with respect to the income variables, do not change, despite discounting the impact of the Great Recession on institutional quality. Therefore, we can conclude that the impact of the world economic crisis has negatively affected institutional quality. However, we can not blame institutional deterioration entirely on the Great Recession, since the coefficients associated with income variables remain steady when this variable is included in the model. Overall, results also suggest that the point of inflection of per capita GDP oscillates between 74,000 and 84,000 dollars. That is to say, institutional quality increases up to this margin, once it has passed this limit of economic development, it eventually diminishes.

## 5. Discussion

This research demonstrates empirical evidence of the existence of an institutional Kuznets curve, showing a quadratic function in the form of an inverted U between institutional quality and economic development. Said evidence has been discovered using panel data estimation techniques with a large sample of heterogeneous countries, consistent with the inclusion of external controls, such as the impact of the Great Recession.

One possible interpretation of the results is that a country can only fully develop its institutions once it reaches a certain level of progress,

**Table 3**  
Results of regressions.

PRAIS-WINSTEN ESTIMATION				
Institutional quality <sub>i</sub>				
Regressors	Basic model Estimates	t	Model with covariable Estimates	t
GDP pc	0,056 <sup>a</sup>	30,47	0,056 <sup>a</sup>	30,32
GDP pc <sup>2</sup>	−3,17 · b <sup>a</sup>	−12,42	−3,17 · b <sup>a</sup>	−12,32
Intercept	938,88 <sup>a</sup>	45,37	944,47 <sup>a</sup>	45,50
Great Recession			−41,41 <sup>a</sup>	−3,41
R <sup>2</sup>	0,7334		0,7344	
SYSTEM GMM ESTIMATION				
Regressors	Basic model Estimates	t	Model with covariable Estimates	t
GDP pc	0,064 <sup>a</sup>	11,43	0,649 <sup>a</sup>	11,23
GDP pc <sup>2</sup>	−4,30 · b <sup>a</sup>	−5,79	−4,35 · b <sup>a</sup>	−5,65
Intercept	776,69 <sup>a</sup>	11,98	838,13 <sup>a</sup>	13,50
Great Recession			−152,87 <sup>a</sup>	−6,84
Num. Instruments	39		40	
Tests	Estimates	p-value	Estimates	p-value
m1 test	1,24	0,216	0,10	0,920
m2 test	−0,53	0,598	−0,98	0,329
Hansen test	101,97	0,000	101,78	0,000

Note: a significant up to 1%; b = 10−7; The null of the m1 and m2 test is the absence of first- and second-order serial correlation in the disturbances, respectively. The null of the Hansen test is the adequacy of moment conditions.

since these require human and economic resources, both of which are rare commodities in developing countries. An explanation for such a view may be found in the connection between democracy and GDP. That is to say, that democracy is more robust when a country is more fully developed (Przeworski, 2004). Another explanation may come from Inglehart (1987), who held that economic development was undeniably linked to changes in social values. Changes that manifested as social concerns which institutions have to answer for in order to satisfy the population.

Finally, a possible limit to our analysis is the fact that our calculations are largely based on a measure of governability which reflects the quality of institutions. But without taking into account all of the dimensions of institutional quality, we do not believe this is entirely captured in all its expressions. This may lead to a systematic underestimation of institutional quality by not taking into account such social values as traditions, or a country's business culture. Equally, it should be taken into account that this research only relates institutional quality to per-capita income. Therefore, our interpretations centre exclusively on the traditional aspects of the Kuznets curve, and not on studies exclusively centred on institutions, as may be the case with Pejovich (2012) and Christie (2018). Moreover, this bivariate analysis also limits us in formulating hypotheses that could explain this behaviour, since we have no knowledge of how other variables interact in this scenario. Nevertheless, it was proposed in order to investigate exclusively the hypothesis of the curve and also for this work to serve as a basis for opening up new avenues of research.

## 6. Conclusions

Indeed, unlike using HDI to measure progress, there is currently no standard measure of institutional quality, rather there are many. For instance, the index of economic freedom used by Zhou (2018), or the proposal we present in this paper, closer to governability than to the presence of capitalism in each country- a measure used by Zhou. This research contributes to the literature by specifically applying Kuznets theory to institutions. To be precise, we hold that a Kuznets curve is generated by examining the relation between the quality of institutions and economic development. Furthermore, we suggest there is a tipping point of between 74,000 and 89,000 dollars after which institutions begin deteriorating. In other words, economic development initially works as a stimulus for increasing institutional quality, but after a certain point, this begins to deteriorate due to factors that may be studied in future research. These factors may be the influence of the world economy or globalisation on the country's economy, or the excessive influence of the elite in more advanced economies. Therefore, the hypothesis that the quality of institutions has diminished in recent years, in the form of an inverted U, warns us that there exist elements in a developing economy that work against institutional quality. In this regard, it is worth noting that it is not necessary for states to increase public spending more in their economies, but rather to spend better, trying to carry out truly efficient policies, as evidenced in the research by Molina-Morales et al. (2013).

The political conclusions to be drawn from these results are that countries aspiring to healthy and efficient institutions must promote the development of prevention measures and efficient mechanisms to guarantee their institutions do not falter in their efforts, either because of the external influence of elite groups or because of the world economy. Moreover, in addition to ensuring institutional quality, these preventive measures should be accompanied by redistributive proposals to enable appropriate subsidy policies, since, as Kunieda and Takahashi (2022) reveal, high quality institutions will improve the living standards of their populations. Therefore, institutions must be aware that there are factors that could be improving the functioning of the economy at the high price of deteriorating institutional quality, which, let us remember, is measured through the population's confidence in the laws, the ability of citizens to participate in the government of their country and the



credibility of the government itself, amongst other dimensions taken into account.

Finally, because the measurement of institutional quality is still not clearly defined by the economic community, being a limiting factor in our analysis, this research must be revised in the future with the aim of better defining institutional quality. Furthermore, in this paper a bivariate analysis has been used to capture only the relationship between the two variables, in future studies it would be ideal to revisit this question with more variables that can help explain the behaviour of this curve. It would also be interesting to conduct a more focused study on the differences between countries with extractive institutions and inclusive institutions using other types of econometric techniques such as Pooled Mean Group (PMG) that can identify convergence between different groups. This could also establish the basis of the historical heritage of each country in the evolution of its institutions, as may be the case of countries on the American or African continent that were colonised by Europeans, as evidenced in Martínez-Navarro et al. (2022) for the case of the Kuznets curve on inequality in African countries.

## Declarations

We, the undersigned authors of this article, declare that **we have no conflict of interest** and that no involvement of humans or animals was necessary for this work. Therefore, **consent to participate is not required**.

Furthermore, should the article be accepted for publication, no author or institution would declare any conflict of interest, as **no funding** has been received for this study and there are **no competing interests** with the authors' affiliations, as these are limited to teaching, not research. Therefore, they have the **consent to publish** this manuscript.

Furthermore, the data and materials used for this study have been extracted from Web of Science and Scopus, and are available to all those who have access to these sources or, failing that, the authors can send the file with all the data on request. We then declare that the data and materials are available.

Furthermore, no funding has been received for this study, which further supports that there are no competing interests.

Finally, the authors' contributions are as follows.

## CRedit authorship contribution statement

**Diego Martínez-Navarro:** Investigation, Methodology, Writing – original draft, Writing – review & editing. **Ignacio Amate-Fortes:** Methodology, Writing – review & editing. **Almudena Guarnido-Rueda:** Writing – review & editing. **Francisco J. Oliver-Márquez:** Writing – review & editing.

## References

- Antonakakis, N., Collins, A., 2018. A suicidal Kuznets curve? *Econ. Lett.* 166, 90–93.
- Acemoglu, D., Simon, J., Robinson, J.A., 2001. Colonial Origins of Comparative Development: an Empirical Investigation. *Am. Econ. Rev.* 91, 1369–1401.
- Acemoglu, D., Simon, J., Robinson, J.A., 2002. Reversal of Fortune: geography and Institutions in the Making of the Modern World Income Distribution. *Q. J. Econ.* 117, 1231–1294.
- Acemoglu, D., Robinson, J.A., 2012. *Why Nations Fail: The origins of power, Prosperity and Poverty*. Crown, New York.
- Acemoglu, D., Gallego, F.A., Robinson, J.A., 2014. Institutions, human capital, and development. *Annu. Rev. Econ.* 6 (1), 875–912.
- Acemoglu, D., Robinson, J.A., 2016. *Paths to Inclusive Political institutions*. Economic history of Warfare and State Formation. Springer, Singapore, pp. 3–50.
- Banerjee, A., Duflo, E., 2000. Inequality and Growth: What Can the Data Say? Massachusetts Institute of Technology, Department of Economics. Working Paper 00-99.
- Barro, R., (2008). *Inequality and Growth Revisited*. Asian Development Bank: working Paper Series on Regional Economic Integration: 14. Accessed November 3, 2004. [http://aric.adb.org/pdf/workingpaper/WP11\\_20Inequality\\_and\\_Growth\\_Revisited.pdf](http://aric.adb.org/pdf/workingpaper/WP11_20Inequality_and_Growth_Revisited.pdf).
- Benabou, R., 1996. Inequality and Growth. *NBER Macroecon. Annu.* 11, 11–92.
- Castelló-Climent, 2010. Inequality and growth in advanced economies: an empirical investigation. *J. Econ. Inequal.* 8 (3), 293–321. Springerpages.
- Christie, C., 2018. The indexical scope of adios: a relevance theoretic analysis of discursive constructions of gender and institutions and their impact on utterance interpretation. *J. Politeness Res.* 14 (1), 97–119.
- Costa-Font, J., Hernandez-Quevedo, C., Sato, A., 2018. A Health 'Kuznets' Curve? Cross-Sectional and Longitudinal Evidence on Concentration Indices'. *Soc. Indic. Res.* 136 (2), 439–452.
- Deininger, K., Squire, L., 1996. A New Data Set Measuring Income Inequality. *World Bank Econ. Rev.* 10, 26. <https://doi.org/10.1093/wber/10.3.565>.
- Deininger, K., Squire, L., 1998. New ways of looking at old issues: inequality and growth. *J. Dev. Econ.* 57, 259–287. PII: S0304-3878(98)00099-6.
- Fields, G.S., 1989. Changes in Poverty and Inequality in Developing Countries. *World Bank Res. Obs.* 4 (2), 167–185. <https://doi.org/10.1093/mbro/4.2.167>.
- Glaeser, E.L., La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2004. Do institutions cause growth? *J. Econ. Growth* 9 (3), 271–303.
- Greenwood, J., Jovanovic, B., 1990. Financial development, growth, and the distribution of income. *J. Polit. Economy* 98 (5), 1076–1107. Part 1.
- Grossman, G.M., Kruger, A.B., 1991. *Environ. Impact North Am. Free Trade Agreement* 2–25.
- Hiroki, 2018. Relationship between entrepreneurial activity and the value of carbon dioxide emission reduction in the economic development stage. *Corp. Res.* (32), 5–22. Enlace. <https://ci.nii.ac.jp/naid/120006412913/>.
- Inglehart, R., 1987. Value change in industrial societies. *Am. Political Sci. Rev.* 81 (4), 1289–1303.
- Kunieda, T., Takahashi, M., 2022. Inequality and institutional quality in a growth model. *Evol. Inst. Econ. Rev.* 19 (1), 189–213.
- Kuznets, S., 1955. Economic growth and income inequality. *Am. Econ. Rev.* 45 (1), 1–28.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 1997. Legal Determinants of External Finance. *J. Finance* 52, 1131–1150.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 1998. Law and Finance. *J. Political Economy* 106, 1113–1155.
- Levin, A., Lin, C.-F., Chu, C.-S.J., 2002. Unit root tests in panel data: asymptotic and finite-sample properties. *J. Econom.* 108, 1–24.
- Maddison Project Database, version 2018 Bolt, Jutta, Robert, Inklaar, de Jong and Jan Luitzen van Zanden, Herman, 2018. Rebasings 'Maddison': New Income Comparisons and the Shape of Long-Run Economic Development. Maddison Project Working paper 10.
- Martínez-Navarro, D., Amate-Fortes, I., Guarnido-Rueda, A., 2020. Inequality and development: is the Kuznets curve in effect today? *Economía Política* 1–33.
- Martínez-Navarro, D., Amate-Fortes, I., Guarnido-Rueda, A., 2022. The Kuznets Curve Hypothesis Checked Out on Up-To-Date Observations in African Countries. *J. Asian Afr. Stud.* 57 (4), 819–840.
- Milanovic, B. (2016). Introducing Kuznets waves: how income inequality waxes and wanes over the very long run. *Vox Centre for Economic Policy Research Policy Portal*, February, 26.
- Molina-Morales, A., Amate-Fortes, I.Y., Guarnido-Rueda, A., 2013. Social Expenditure in the European Union. Does Inequality Matter? *J. Econ. Issues* 47 (3), 745–764.
- Nasir, 2019. Role of financial development, economic growth & foreign direct investment in driving climate change: a case of emerging ASEAN. *J. Environ. Manage.* 242, 131–141, 2019.
- Nasir, 2020. Implications of Government Borrowing for Corporate Financing in Emerging Economies: a Crowding Out Kuznets Curve. *Rev. Pac. Basin Financ. Mark. Policies* 23 (2). <https://doi.org/10.1142/S0219091520500174>.
- Nasir, 2021. Environmental degradation & role of financialisation, economic development, industrialisation and trade liberalisation. *J. Environ. Manage.* 277, 2021, 111471, ISSN 0301-4797.
- Pejovich, S., 2012. *Economic Analysis of Institutions and Systems*, 33. Springer Science & Business Media.
- Pham, et al., 2020. Environmental consequences of population, affluence and technological progress for European countries: a Malthusian view. *J. Environ. Manage.* 260, 110143, 2020ISSN 0301-4797.
- Przeworski, A., 2004. Democracy and Economic Development. In: Edward, D.M., Richard, S. (Eds.), *The Evolution of Political Knowledge*. Ohio State University Press, Columbus.
- Rattan, D., (2012). *Exploring the Kuznets Curve and the 'Latin American Effect' in Latin America*. International Economic Review: Post Recession Challenges & Analyses ed. Kishore Kulkarni. (Daryaganj: Matrix Publishers, pp. 277–287.
- Sasaki, H., 2022. Special feature: economic dynamics—Growth, capital, labor, technology, and money. *Evol. Inst. Econ. Rev.* 19 (1), 159–167.
- Selden, T.M., Song, D., 1994. Environmental quality and development: is there a Kuznets curve for air pollution emissions? *J. Environ. Econ. Manage.* 27 (2), 147–162.
- Shahbaz, et al., 2018. Environmental degradation in France: the effects of FDI, financial development, and energy innovations. *Energy Econ.* 74, 843–857, 2018Pages.
- Shahbaz, et al., 2020. UK's net-zero carbon emissions target: investigating the potential role of economic growth, financial development, and R&D expenditures based on historical data (1870–2017). *Technol. Forecast. Soc. Change* 161, 120255, 2020.
- Stern, D.I., 2004. The rise and fall of the environmental Kuznets curve. *World Dev.* 32 (8), 1419–1439.
- Zhou, Y., 2018. Human capital, institutional quality and industrial upgrading: global insights from industrial data. *Econ. Change Restructuring* 51 (1), 1–27.