Econometric modeling between legal dimension of governance and economic growth in some Arab countries

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Summary:

  This study aimed to identify the impact of the legal dimension of governance on the economic growth of a sample of Arab countries, by determining the impact of the following variables: rule of law, Regulatory Quality , trade openness, and capital formation on the dependent variable: economic growth represented by the per capita of gross domestic product in 12 countries, during the period 2000-2022, based on panel data and the stata15 program.

  The study concludes that the best model for estimating the static panel model is the random effects model, Findings also show that the rule of law index, Regulatory quality, and trade openness had a significant and positive impact on economic growth, but the total capital formation index have no significant effects.

  Keywords: Governance; Economic growth; Arab countries.

Jel Classification Codes : O40, P24 , O16**.**

I- Introduction:

All countries are endeavoring to achieve a high economic performance that enhances their status in the world. Economic growth is known to be related to several factors and determinants mentioned in various economic theories including economic, non-economic, institutional reform, and good governance.

Given the rising interest in the relationship between governance and economic growth, understanding how governance contributes to stimulating economic growth through its political, legal, and administrative dimensions is an urgent need for policymakers and decision-makers, especially in Arab countries with low economic growth rates and lagging development indicators. It can be attributed to countries' weak ability to carry out legal reforms to encourage investment and provide a suitable environment for business.

1.1. The problem of the study:
The problem of this study revolves around the following key question:
- How has the legal dimension of governance affected Arab countries' economic growth during 2000-2022?

1.2. Study hypothesis:
To answer this problem, the study is based on the following primary hypothesis:
The legal dimension of governance positively affects the performance of economic growth in Arab countries.

1.3 The importance of the study:
The importance of the study stems from the role that governance plays, in its legal dimension, in achieving economic growth. It has become one of the most debated topics by today's economists and politicians, both nationally and internationally.

1.4. Objectives of the study:
This study aims primarily to evaluate the extent to which the legal dimension of governance affects the economic growth of Arab countries during the period (2000-2022) through the use of Cross-Sectional data models (Panel Data).

1.5. Study Methodology:
Given the nature of the study and since we intend to achieve its general objective and test its hypotheses, the quantitative standard approach will be relied upon using panel data models and applied using STATA 2015 statistical software.

1.6. Previous studies:

* study (Alimi and Ben Dhiab,2023) :This study is aimed at analyzing the effect of the governance index and the governance components index on economic growth in 48 developing countries over the period 2002-2020. Corruption control, the effectiveness of the government, political stability, and regulatory quality are but a few of the many variables taken into account by the governance components index. The findings of the study show that governance has an asymmetric effect on economic growth. Moreover, the results indicate that enhancing governance in developing countries can obstruct economic growth in them.

* study (Misi Lopes, Packham ;2023): this paper examines the influence of the six World Governance Indicators (WGIs) , on the real GDP growth of five emerging markets, the BRICS (Brazil, Russia, India, China, and South Africa) countries, and three advanced economies, the United States, Germany and Japan. The analysis is based on a panel data set containing the six WGIs along with further macroeconomic variables (government debt, external debt, current account balance, trade balance, budget balance, foreign exchange rate and short-term interest rate), with annual data from 1996 to 2018. We find that regulatory quality has a positive impact on economic growth, We also find a negative impact of rule of law on economic growth, but this effect is not

robust.. A principal component analysis on the WGIs shows that governance is diverse across countries, while stable over time. The first two PCs capture more than 95% of the WGIs variance and are able to cluster emerging and developed markets.

* study (Afolabi ;2019) used a panel to look at the impact of governance on sustainable development in West Africa from 2002 to 2016. He discovered that voice and accountability, political stability, government effectiveness, and the rule of law all have a positive impact on development, whereas regulatory quality and corruption control have a negative impact on short-term growth. Nonetheless, all governance indexes have a positive impact on development in West African countries over long periods.

* study (Mira and Hammadache;2017) studies the relationship between the implementation capacity of governance principles, and the economic performance of 45 developing countries. They use several regression model estimations similar to Samarasinghe on the dependent variables GDP growth rate and GDP per capita, along with explanatory variables such as commodity prices, risk perception indexes and economic growth rates of dominant developed countries. Their findings indicate that given the broad concept of good governance, it is rather difficult to assume a positive correlation between governance and growth, its find that four of the six variables have a positive correlation with GDP growth; however, only two of these variables are significant: government effectiveness and political stability and reduction of violence .

II. The concept of governance and its indicators:

There have been many definitions given to governance depending on the entities that mentioned it, their fields, and their dimensions.

2.1 The concept of governance:

The World Bank defines good governance as "the processes and institutions through which authority is exercised in a country. It relies on a reasonable management of institutions, and the selection and coordination of policies to provide good and effective services (World Bank,, 1992, p. 01) .

The International Monetary Fund (IMF) views governance as "a working method that relates transparency to the government's performance and effectiveness in managing public resources. It ensures also the necessary environment for the functioning of the private sector." ((FUND, 2000, p. 06)

The United Nations Development Program refers to governance as "the exercise of economic, political, and administrative authority to manage state affairs at all levels. It includes the mechanisms, processes, and institutions through which citizens and groups express their interests, exercise their legal rights, fulfill their obligations, and accept mediation to resolve their disputes" ((UNDP, 1997, p. 07)

2.2 Governance Indicators:
To estimate a country's level of governance, the analysis relies primarily on three main criteria or dimensions. Each criterion is measured by two indicators ((Kaufmann, 2008, pp. 7-8):
A- Political dimension indicators: which includes:

- Participation and accountability indicator: it measures the ability of citizens of a State to participate in the choosing process of their Government, as well as their freedom of expression, association, and free media. Enjoying political freedom and participating in decisions that concern people's lives are among the basic principles that contribute to developing societies and raising their economic growth rates.

- Political Stability Index: This index measures the extent to which governments are likely to be destabilized or overthrown by unconstitutional and illegal means.

B- Economic dimension indicators: which includes:

- Government effectiveness index: this indicator measures the quality of public and civil services, and their independence from political pressures, the quality of policy formulation and implementation, and the credibility of the Government's commitment to these policies.

- Corruption Controlling Index: This index measures the extent to which public authority is exercised to achieve personal gains, as well as the control of the state's capabilities by the elite and personal stakeholders.

C- Indicators of the legal dimension: which include:

- Regulatory Quality Index: This indicator measures the extent of the government's ability to formulate and implement policies and regulations that permit the promotion and development of the private sector to increase economic growth and achieve development. laws and Regulatory may hinder the private sector's contribution to the development of society, such as obtaining licenses and government approvals to exercise Business. Those procedures waste investment opportunities for the private sector and hinder faster development.

- Rule of Law Index: It measures the extent of customers' confidence in the government's application of the law equally to all individuals and organizations. In particular, the confidence in contract enforcement, protection of property rights, police and court work, as well as crimes and violence occurrence

III. The practical aspect of the study:

This part aims to measure the legal dimension impact of governance on economic growth in Arab countries. To achieve this goal, a standard model will be estimated that includes a set of explanatory variables related to the subject of the study.

The data used in the study is called time-sectional data or panel data, which is a set of observations that are repeated among a group of individuals, companies, and countries, over several periods. It combines the characteristics of both cross-sectional data and time series simultaneously. This data contains necessary information that deals with the dynamics of time and multiple vocabulary, therefore, it contains two dimensions, a time dimension represented by the number of years of study T, and a cross-sectional dimension represented by the group of countries on which the study will be conducted and usually symbolized by N, we will assess the three static panel models, where the first refers to the pooled regression model, the second refers to the fixed effects model, while the third model represents random effects. After estimating these models, we compare them using appropriate statistical tests (Eon., Lee, 2008, p. 584).

3.1. Study sample and data sources:

This study aims to measure the legal dimension impact of governance on economic growth during the period (2000-2022) (T=23), for a sample of 12 Arab countries (N=12): Algeria, Tunisia, Morocco, Egypt, Jordan, Bahrain, Kuwait, the Kingdom of Saudi Arabia, Oman, Lebanon, Emirates, and Qatar. So, the total sample size is 276 observations (N*T=276). As for the data sources, we relied on the World Bank database.

3.2. Study variables and model:

After effecting the experimental studies, the average GDP per capita (economic growth) will be relied upon as the dependent variable, and the Regulatory Quality index, rule of law, capital formation, and trade openness as explanatory variables, according to the following mathematical formula:

LGDPPC=f (RQ, RL, K, OPEN)

Where:

LGDPPC: the average GDP per capita.

RQ: Regulatory Quality index .

RL: rule of law index.

 K: capital formation index.

OPEN: trade openness index.

To examine the impact of the legal dimension of governance on economic growth in Arab countries, the following basic regression equation will be relied upon:

$$LGDPPC= \beta0+\beta1RQit+\beta2RLit+\beta3kit+OPEN +\varepsilon it \dots(1). \ i=1\dots N, \ t=1\dots T$$

Where: i represents the countries, t represents the period, and εit is the random error limit.

3.3. Estimating and comparing static panel data models.

In this part of the study, we will estimate the basic models for static panel data as a preliminary stage. In the second stage, we will perform basic tests to compare these models and select the appropriate one.

.3.3.1 Evaluating a pooled regression model:

The estimation results mentioned in the table show that the estimated model is statistically significant, as proven by the probability value of Fisher's statistic (0.0000), which is less than the significance level of 0.01.

Table N°1 :results of Evaluating a pooled regression model

Variable	Coefficient	Prob.
RQ	0.7912242	(0.0000)
RL	0.2618931	(0.081)
k	0.0020547	(0.777)
OPEN	-0.000978	(0.539)
C	8.990127	(0.0000)
R2	0.3242	
F-statistic	32.50	
Prob(F-statistic)	(0.0000)	

Source : Prepared by the researcher based on the outputs of Stata 15 (see Appendice 1)

3.3.2 .Evaluating the fixed effects model:

The estimation results mentioned in the table show that the estimated model is statistically significant, as proven by the probability value of Fisher's statistic (0.0000), which is less than the significance level of 0.01.

Table N°2 :results of Evaluating the fixed effects model

Variable	Coefficient	Prob.
RQ	-0.0210727	(0.642)
RL	-0.1057364	(0.013)
k	0.0029499	(0.061)
OPEN	0.0028439	(0.000)
C	8.635294	(0.000)
R2	0.1931	
F-statistic	15.56	
Prob(F-statistic)	(0.000)	

**Source : Prepared by the researcher based on the outputs of
Stata15 program (see Appendice 2)**

3.3.3 . Evaluating the random effects model:

The estimation results mentioned in the table, show that the estimated model is statistically significant, as proven by the probability value of Fisher's statistic (0.0000), which is less than the significance level of 0.01.

Table N° 3 :results of Evaluating the random effects model

Variable	Coefficient	Prob.
RQ	-0.0176013	(0.697)
RL	-0.1009689	(0.016)
k	0.028611	(0.067)
OPEN	0.0028966	(0.000)
C	8.63184	(0.000)
R2	0.1939	
F-statistic	62.95	
Prob(F-statistic)	(0.000)	

Source : Prepared by the researcher based on the outputs of Stata 15 program (see Appendice 3)

3.4. Comparison between the three (03)estimated models:

After assessing the three models for the panel data in the first stage, we compare these models in the second stage.

*Comparing between the pooled regression model and the fixed effects model:

We will rely on Fisher's test (Test-F) to compare the pooled regression model and fixed effects model. The hypotheses of this test are as follows:
H0: The pooled regression model is adequate.
H1: The fixed effects model is adequate.

Table N° 4 :results of Fisher's test

test	(F-statistic)	Prob.
(Test-F)	1047.66	0.000

Source : Prepared by the researcher based on the outputs of Stata 15 program (see Appendice 4)

The test results shown in the table; show that the probability value of Fisher's test is at 1%. Thus, we reject the null hypothesis that affirms the homogeneity of country segments and accept the alternative hypothesis declaring that the fixed effects model is appropriate.

*Comparing between the pooled regression model and the random effects model:
We will rely on (breusch - and pagan) test to compare the pooled regression model and random effects model. The hypotheses of this test are as follows:
H0: The pooled regression model is adequate.
H1: The random effects model is adequate.

Table N° 5 :results of (breusch - and pagan) test

test	value	Prob.
) breusch - and pagan	chibar2(01) = 2596.08	0.000

Source : Prepared by the researcher based on the outputs of Stata 15 program (see Appendice 5)

The test results shown in the table; show that the probability value of breusch - and pagan test (0.0000), which is less than the significance level of 0.05. Thus, we reject the null hypothesis and accept the alternative hypothesis declaring that the random effects model is appropriate.

*Testing the comparison between the fixed effects model and the random effects model:

We will rely on the Hausman test to compare the fixed effects and random effects models. The hypotheses of this test are as follows:

H0: The random effects model is appropriate.

H1: The fixed effects model is appropriate.

Table N°6 :results of Hausman test

test	value	Prob.
Hausman test	2.84	0.5851

Source : Prepared by the researcher based on the outputs of Stata 15 program (see Appendice 6)

Based on the results of the Hausman test, we note that the probability value (0.5851) is greater than the significance level of 0.05. Therefore, we accept the null hypothesis: the random effects model is the most appropriate.

Through the results of the previous three tests, we conclude that the appropriate model for the study sample data is the random effects mode. It means that the source of the difference between the Arab countries in question is due to the random variable rather than the fixed section.

3.5. Random effects model tests:

We perform a set of statistical and measurement tests to guarantee the validity and suitability of the model for random effects. It is shown in the table below.

Table N°7 :results of Random effects model tests

test	Test name	value	Prob.
autocorrelation	Wooldridge test	161.302	0.000
Panel Groupwise Heteroscedasticity Tests	lagrange Multiplier (LM test)	1.11e+04	0.000
	Likelihood ratio (LR test)	178.126	0.000
	Wald test	6.20e+o5	0.000
cross-sectional independence	pesaran test	6.794	0.000

Source : Prepared by the researcher based on the outputs of Stata 15 program (see Appendices7,8;9)

We note, according to the Waldridge test, that the null hypothesis was rejected. Thus, an autocorrelation problem is present at the 1% level of significance. The three heterogeneity of variance tests (LM test, LR test, and Wald test) also indicate that the null hypothesis is not rejected. So, there is a heterogeneity problem. In what concern variance, the Pesaran test indicated acceptance of the null hypothesis. Hence, a cross-sectional correlation problem is found in the random effects model. For the purpose of getting rid of these problems, the standard errors of the parameters must be corrected using the possible generalized least squares method according to the FGLS parks amount. The estimated results obtained are explained below:

Table N° 8 :results of generalized least squares method according to the FGLS parks amount

Variable	Coefficient	Prob.
RQ	0.1264513	0.000
RL	.0736358	0.029
k	.0008589	0.369
OPEN	0010387	0.002
C	8.748222	0.000
R-squared	(0.9729)	

Source : Prepared by the researcher based on the outputs of Stata 15 program (see Appendice 10)

IV . RESULTS AND DISCUSSION:

We notice from the table that each of the explanatory variables has an impact on economic growth. Besides, the relationship between the explanatory variables and the dependent variable is strong, as indicated by the high value of the coefficient of determination R2. It reveals that the explanatory variables explain approximately 97% of fluctuations in economic growth. The results also show that the explained variables are statistically significant at the 1% level, except for the capital strength variable (K). The estimated results shown in the table also show the following results:

- The Regulatory quality (RQ) variable: its effect was positive and significant on the per capita share of the GDP. Increasing the Regulatory quality index by 1% leads to an increase in the per capita share of the GDP by 0.126%. In general, this rise is attributed to the provision of legislation and the expansion of liberties, which, in turn, emerged a legal environment providing confidence and security in the investment climate. It increases as well the vitality of the economic environment, stimulates work, productivity, and innovation, and adjusts the economic movement in the direction that achieves economic goals and growth.

- The Rule of Law Index (RL) has a positive and significant impact on the per capita share of the GDP. In simpler terms, increasing the rule of law index by 1% leads to an increase in the per capita share of the GDP by 0.073%, because of the law's role in achieving justice in the distribution of income and wealth among members of society.

- The capital formation variable (K) has a positive non-significant effect on the per capita share of the gross domestic product because of the weak production capacity of the sample countries, the inefficiency of the production system, as well as the weak absorptive capacity of the national economy despite the development efforts made by governments. Study countries try desperately to diversify the structure of the national economy.

- As for trade openness (OPEN), it had a positive and significant impact on the per capita share of the GDP. In other words, an increase in trade openness by 1% leads to an increase in the per capita share of the GDP by 0.001%, which proves that trade openness is a major determinant of economic growth in the study sample countries. It may lead to an improvement in exports and encourage local industry.

V. Conclusion:

This study aimed to assess the impact of governance indicators with a legal dimension on economic growth for a sample of 12 Arab countries during the period (2000-2022). To achieve the goal of the study, Panel Data and the possible generalized least squares method were employed according to the FGLS parks quantity. The study reached a set of results that can be summarized as follows:
- ✓ The best and most appropriate model for the study sample data is the random effects model.
- ✓ The results showed that most of the model's parameters are statistically acceptable and that the model, as a whole, is significant.
- ✓ The study showed that governance, through its legal dimension, had a positive and significant impact on the economy. This conclusion has been conducted by studying indicators of the Regulatory quality as well as the law rule.
- ✓ The results showed that trade openness has a positive impact on economic growth.

In light of the study's conclusions, the following **recommendations** can be addressed:
- ✓ governments and policymakers in Arab countries must shift their attention to governance as a determinant of economic growth. More specifically, they should adopt policies that will lead to strengthening the authority of law and the Regulatory quality.
- ✓ Arab countries should ensure the economic growth that will then guarantee them means to establish the governance system that will sustain this growth in the long run. They are

simultaneously called upon to build the strong institutions that promote accountability, and facilitate the functioning of the rule of law.

✓ The urgent need to respect the principles of law, lay its foundations, and implement a package of legal, political, and economic reforms to provide the enabling environment for growth and development in the Arab countries.

✓ Working to improve the performance of the foreign trade sector and encourage trade openness by eliminating quantitative, qualitative, and regulatory restrictions.

✓ Encouraging trade exchanges between Arab countries by unifying the market for goods and services, increasing intra-trade, and facilitating the movement of capital to enhance opportunities for economic integration.

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1. Appendices:

Appendice N° 01 : pooled regression model

```
Source | SS df MS Number of obs = 276
------------+------------------------------ F(4, 271) = 32.50
Model | 82.229013 4 20.5572532 Prob > F = 0.0000
Residual | 171.391525 271 .632441052 R-squared = 0.3242
------------+------------------------------ Adj R-squared = 0.3142
Total | 253.620538 275 .922256502 Root MSE = .79526
-------------------------------------------------------------------------------
LnGDPPC | Coef. Std. Err. t P>|t| [95% Conf. Interval]
------------+------------------------------------------------------------------
RQ | .7912242 .1766761 4.48 0.000 .443392 1.139056
RL | .2618931 .1496253 1.75 0.081 -.0326825 .5564688
k | .0020547 .0072309 0.28 0.777 -.0121812 .0162906
Open | -.000978 .0015899 -0.62 0.539 -.0041082 .0021523
_cons | 8.990127 .2063533 43.57 0.000 8.583868 9.396386
```

Appendice N° 02 : fixed effects model

```
Fixed-effects (within) regression Number of obs = 276
Group variable: country Number of groups = 12
R-sq: Obs per group:
within = 0.1931 min = 23
between = 0.0878 avg = 23.0
overall = 0.0816 max = 23
F(4,260) = 15.56
corr(u_i, Xb) = 0.1686 Prob > F = 0.0000
-------------------------------------------------------------------------------
LnGDPPC | Coef. Std. Err. t P>|t| [95% Conf. Interval]
------------+------------------------------------------------------------------
RQ | -.0210727 .04528 -0.47 0.642 -.110235 .0680896
RL | -.1057364 .0422284 -2.50 0.013 -.1888895 -.0225833
k | .0029499 .0015659 1.88 0.061 -.0001337 .0060334
Open | .0028439 .0004778 5.95 0.000 .0019031 .0037848
_cons | 8.635294 .0535299 161.32 0.000 8.529886 8.740701
------------+------------------------------------------------------------------
sigma_u | .96553406
sigma_e | .12059872
rho | .98463873 (fraction of variance due to u_i)
-------------------------------------------------------------------------------
F test that all u_i=0: F(11, 260) = 1047.66 Prob > F = 0.0000
```

Appendice N° 03 : Random-effects model

```
Random-effects GLS regression Number of obs = 276
Group variable: country Number of groups = 12
R-sq: Obs per group:
within = 0.1930 min = 23
between = 0.1020 avg = 23.0
overall = 0.0946 max = 23
Wald chi2(4) = 62.95
corr(u_i, X) = 0 (assumed) Prob > chi2 = 0.0000
-------------------------------------------------------------------------------
LnGDPPC | Coef. Std. Err. z P>|z| [95% Conf. Interval]
------------+------------------------------------------------------------------
RQ | -.0176013 .045206 -0.39 0.697 -.1062035 .0710009
RL | -.1009689 .0420764 -2.40 0.016 -.1834371 -.0185006
k | .0028611 .0015636 1.83 0.067 -.0002034 .0059257
```

Open | .0028966 .0004756 6.09 0.000 .0019645 .0038287
_cons | 8.63184 .2869026 30.09 0.000 8.069521 9.194159
sigma_u | .97705301
sigma_e | .12059872
rho | .9849934 (fraction of variance due to u_i)

. estimates store Random

Appendice N° 05 : Breusch and Pagan Lagrangian multiplier test

Breusch and Pagan Lagrangian multiplier test for random effects
LnGDPPC[country,t] = Xb + u[country] + e[country,t]
Estimated results:
| Var sd = sqrt(Var)
---------+----------------------------
LnGDPPC | .9222565 .9603419
e | .0145441 .1205987
u | .9546326 .977053
Test: Var(u) = 0
chibar2(01) = 2596.08
Prob > chibar2 = 0.0000

Appendice N° 06 : Hausman test

. hausman fixed random
---- Coefficients ----
| (b) (B) (b-B) sqrt(diag(V_b-V_B))
| fixed random Difference S.E.
-------------+--
RQ | -.0210727 -.0176013 -.0034714 .0025876
RL | -.1057364 -.1009689 -.0047675 .003579
k | .0029499 .0028611 .0000887 .0000859
Open | .0028439 .0028966 -.0000527 .0000462
----
b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 2.84
Prob>chi2 = 0.5851

Appendice N° 07 : Wooldridge test for autocorrelation

xtserial $ylist $xlist
Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
F(1, 11) = 161.302
Prob > F = 0.0000

Appendice N° 08 : Panel Groupwise Heteroscedasticity Tests

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* Panel Groupwise Heteroscedasticity Tests
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Ho: Panel Homoscedasticity - Ha: Panel Groupwise Heteroscedasticity
- Lagrange Multiplier LM Test = 1.11e+04 P-Value > Chi2(11) 0.0000
- Likelihood Ratio LR Test = 178.2611 P-Value > Chi2(11) 0.0000
- Wald Test = 6.20e+05 P-Value > Chi2(12) 0.0000

Appendice N° 09 : Pesaran's test of cross-sectional independence

xtcsd, pesaran abs
Pesaran's test of cross-sectional independence = 6.794, Pr = 0.0000
Average absolute value of the off-diagonal elements = 0.531

Appendice N° 10 :FGLS regression (Parks)

Cross-sectional time-series FGLS regression
Coefficients: generalized least squares
Panels: heteroskedastic
Correlation: common AR(1) coefficient for all panels (0.9729)
Estimated covariances = 12 Number of obs = 276
Estimated autocorrelations = 1 Number of groups = 12
Estimated coefficients = 5 Time periods = 23
Wald chi2(4) = 40.22
Prob > chi2 = 0.0000

LnGDPPC | Coef. Std. Err. z P>|z| [95% Conf. Interval]
-------------+--
RQ | .1264513 .0301933 4.19 0.000 .0672736 .185629
RL | .0736358 .0337454 2.18 0.029 .007496 .1397756
k | .0008589 .0009557 0.90 0.369 -.0010142 .0027321
Open | .0010387 .0003343 3.11 0.002 .0003836 .0016938
_cons | 8.748222 .0682006 128.27 0.000 8.614551 8.881893

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