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The impact of institutional quality, natural resources, and finance-growth on China's economic recovery: An empirical study

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ABSTRACT

Developing economies are opening up to trade & financial expansion, which may impact the economic evolution. This research adds in literature by investigating the connection between financial development, institutional quality, natural resources, and their impact on China's economic performance (1977–2021). The Johansen cointegration technique examines the long-run cointegrating relationship among variables.The vector error correction model captures the longrun and short-run co-efficients. The results reveal that high population expansion lowers growth but natural resource quality and institutional quality have the opposite effects. The results of the study show that the nexus between gross fixed capital formation & financial development do not stimulate growth, but rather institutional quality moderates effect of natural resource rent on finance. In short, this study provides a novel hypothesis for policymakers to evaluate the significance of institutions in developing realistic estimates and policy inputs and support a robust role for institutional quality and natural resource exploration for rapid growth.

1. Introduction

With consistent growth rates of around 10% for the last three decades, China has been the second-strongest global superpower since socialists within the Chinese Communist Party started a framework for economic liberalization in December 1978. China is also the second-biggest exporter of products worldwide. There have long been debates about the significance of capital accumulation, the quality of institutions and natural assets, and how they influence economic activity. An indicator of macroeconomic stability that reveals the importance of international trade and the level of a nation's economic openness to trade is the total trade value as a percentage of gross domestic product. China is the nation's biggest supplier of goods acting as a major exporter of a region, with an astounding 38% of its GDP vulnerable to trade. Economists noticed that resource-rich countries often expand more slowly than resource-poor ones in the early 1950s. Is this a worrying question? The Dutch illness model and institutional quality were the two main theories that were developed in response to the question (Sachs and Warner, 1995). Numerous trainings highlighted institutions' value and effectiveness in preventing corruption and rent-seeking behaviour due to excessive resources' tendency to hinder economic growth (Norman, 2009; Isham et al., 2005).

According to (Ross, 2001), institutions can be endogenous in terms of resource endowments. According to certain empirical studies, recognized quality (INSQ) only describes an important proportion of outdoor disparities within economic expansion. A country's provinces have different levels of institutional quality like China's provinces have uniform constitutional and legal frameworks, but the institutional quality varies depending on the historical period (Acemoglu et al. 2001). The conventional economic theories have been extensively studied in relation to economic growth. A methodology for evaluating institutional quality and measuring this qualitative topic has been attempted by recent institutional economics research. High-quality institutional frameworks accelerate growth by encouraging economic actions like increasing productivity & reserve provision that are additionally effective. Defending possessions, human rights, lowering transaction costs, then avoiding rent-seeking conduct, all enhance individual freedom of choice and help the economy to flourish (Ahmed, (Khan et al., 2020).

The literature also discovered a connection between established superiority (INSQ), Foreign Direct Investment (FDI), openness to trade,

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and GDP. Literature has also made the case that the best institutional quality is trade openness, which supports the impact of trade openness scheduled monetary development (EG). While on the other side, developing economies do not have as many trade advantages, that can raise questions about the influence of established superiority (INSQ). Established superiority (INSQ) accelerates economic progress and makes the situation easier for people from different backgrounds to share knowledge and technology. Yet, the literature mostly ignores our study's fundamental innovation that results from established superiority (INSQ) on economic evolution via financial expansion, natural resources & economic expansion.

These research intentions are on the way to investigate how China's established superiority (INSQ) has influenced its economic development. This demonstrates that developing nations are opening up to trade & financial expansion (FD), which may impact the economic evolution. This study is unusual in that it offers fresh justifications for how China's natural resources, institutional strength, rapid population growth and financial development will affect the income growth of any country over the short and long terms. Institutional economics has become more popular in recent literature for predicting income evolution. Due to this fact, the current research aims to explore the association among established superiority (INSQ), renewable energy resource usage, and financial development in the region of Chinese economy.

Analysis has been done on income growth concepts, models & numerical effects on labour, technological innovation, physical & human capital. The established superiority (INSQ), financial growth & the availability of natural resources, however, are now represents the prominent impact on growth. To better understand China's organizational quality, monetary sector development and income growth expansion we are doing some research.

As far as we are aware, the author has read a lot of literature on the subject, there hasn't been a lot of research done on the connections between China's established superiority (INSQ), its renewable and non-renewable energy usage, its financial improvement, and its financial development. This study is a modest attempt to address a breach within the previous studies about China. Following this assumption, the research questions of the currents study are as following:

1.1. Research question

- Does the monetary advancement (FD), organizational quality (INSQ), rapid population growth & natural reserve (NR) usage affect China's economic growth?
- Is there a substantial, favourable short & long-term interactive impact of the institutional quality, natural resource, population growth and FD on economic growth?
- What would be the contribution of given variables on economic growth of the china?

1.2. Objectives of the study

The study attempts to analyse the aims listed below:

- To find cooperative relationship amongst financial advancement, population growth, natural resource, institutional quality & economic performance of china.
- To investigate the effect of monetary expansion (FD) & institutional quality taking place within economic performance of china.
- To experimentally study short term and long term relationship among the financial advancement, population growth, natural resource, institutional quality & economic performance of the China
- To give suitable conceivable policy sanctions founded on the experiential findings

The paper's remaining sections are organized as follows: A review of previous works is described within section titled "Literature review." The segment under "Model, methodology & data" examines the methodology and data sources, "Econometric section" discuss the empirical estimation as well as the econometric approaches are mentioned. The section titled "Results and Discussion" this segment explains robustness checks & provides a discussion of the empirical findings. The "Conclusion & policy proposal" section addresses results & any potential program considerations according to the study's findings.

2. Literature review

An assessment about the freshest pertinent literature is conducted. Existing literature regarding the economic growth has been thoroughly examined and has attracted the interest of several scholars and academics worldwide. As a result, numerous academics studied the connection amongst the above-mentioned variables & financial expansion.

Ji et al. (2014) examined the relationships amongst source profusion, organizational quality & monetary expansion and discovered that reserve profusion had favourable influence over monetary expansion at the province stages within Chinese region. On the other side, investigated the mechanisms by which international shocks are transmitted & its influence over growth of emerging economies. They discovered that, on average, this impact is little. However there are variations throughout time and across cross sections. The institutional quality index was created using principal component analysis, similar to how (Asghar et al., 2020) attempted to explain how organizational quality affects monetary progress in Asia's emerging regions. The necessity to enhance organizational qualities was discovered to be necessary for enhancing economic growth (Poshakwale & Ganguly 2015). In their study of the organizational agenda's intervening character over the influence of marketplace concentration in the ASEAN-5 (Chan et al., 2015), discovered that higher bank concentration lowers the effectiveness near aimed at profitable panels. Nonetheless, a healthier official background shows a big part in increasing bank productivity, which leads to more industry concentration.

The firm's decision in an economy like Zhang is influenced by institutional quality and procedure (2016) The impact of institutional arrangements on a firm's decision to issue private or public debt is examined, and discovered those institutions ensure remarkable impact not only taking place a company's choice of debt and both on their choice to sell bonds in the foreign reserves industry as well as the mature duration in the local bond market. On the other hand, technology import has little to no effect on the capacity for regional innovation in places with poor economic and legal institutional quality (Wu et al., 2020); inspected the things about official excellence over economic growth aimed at 29 emerging economies between the ages of 2002 and 2015 and discovered the official excellence had a favourable influence happening development. Public investment also diminishes the favourable impact of international direct financial and trade openness on productivity expansion. Overall, the economic growth is significantly impacted.

(Dwumfour and Ntow-Gyamfi, 2018) looked at the connection between economic performance & environmental assets for African nations by integrating institutional quality in the financial management and using the GMM approach for such years 2000–2012. They claimed that the evaluation of economic development influences the quantitative link between financial development and natural resources. According to their empirical study, natural resources have a favourable impact on economic expansion (measured by domestic lending to the private sector) and are used as proxies for this effect via resource rent. The inverse influence of resource rents on financial development is also lessened by institutional quality. Oil reliance as a gauge of environmental assets was employed by (Dwumfour and Ntow-Gyamfi, 2018) for the Nigerian economy as they applied the Johansen co - integration method when assessing the relation across resources and finance for the years 1981–2015. They indicate toward the long-term existence of a link

between the factors. Additionally, their empirical study shows that oil rent promotes monetary development. The causality study showed that oil rents cause economic progress, but the contrary is not true. Similarly (Shahbaz et al., 2018), used a functional finance form to look at how natural resources affect the revenue performance of the US economy. They also consider capitalization, education, and industrial growth as other elements influencing monetary development. For investigating the lengthy connections among the variables, the bounds testing technique to co - integration test is being used, and (Bayer and Hanck, 2013) approach is used to examine the validity of long-term empirical evidence. Their robust empirical findings confirm the validity of co - integration test.

Furthermore, they highlighted that resources have a favourable effect on economic growth. Finance growth is positively affected by business expansion and education, but is negatively impacted by capitalization. Their examination of causation also demonstrates the presence of a feedback relationship between natural capital expansion and monetary development. By incorporating oil revenues as a measure of the resource extraction and financial sector development index proposed by (Svirydzenka, 2016) for the United States (Khan et al., 2019), looked at the connection between natural resource and financial development. By incorporating institutional quality into the financial demand function from 1984 to 2016, they conducted ARDL bounds testing for co - integration test. Their empirical evidence reports the collinearity among capital formation and its factors. They also pointed out that resource rents restrict revenue performance, refuting the claim made by (Shahbaz et al., 2018). The adverse association between environmental assets and monetary development is lessened by macroeconomic stability. Their examination of the causal association between resource rents and financial sector development shows a unidirectional causal relationship.

Using panel CCEMG and AMG medium to long term approximation (Balcilar et al., 2019), looked at the effects of industrialization on financial development using data from 36 countries. They pointed out that although economic globalisation enhances the efficiency of financial organizations in recipient nations, it also effectively impacts the growth of the banking sector. Employing statistics from belt and road countries (Lee et al., 2022), looked into the correlation among financial institutions and industrialization. They observed that globalisation improves financial products in target nations, which has an effect on financial advancement.

Additionally, the mixed results of all studies suggest that greater market openness can mitigate the resource curse. Similar to this (Tsani, 2013), investigates the connections between capital expenditures, governance, and regulatory factors and how these relate to discussions of the underdevelopment and the variables affecting governance and institutional factors. He concludes that capital funds are essential for dealing with the deterioration of bank profitability and administration driven about by resource abundance. The resource curse theory predicts a negative relationship between energy exploitation and economic expansion (Shuai and Zhongying, 2009). Nevertheless, there was no such association in the sector-by-sector comparison of banking sector development and economic growth in African and Asian economies. The gap between the marginal effects of agricultural, health and educational supports expands as social performance increases, in accordance with (Maruta et al., 2020). Because of the inadequate institutional framework and the fact that relevance of governance metrics is frequently a major factor in luring FDI inflows (Peres et al., 2018),'s research on developing nations suggests that the significance of macroeconomic stability is little.

The function of institutions at the regional level is also studied within publications like (Qiang and Jian, 2020). Institutional variables are categorised according to the degree of market resource allocation, market openness, and property rights diversification using sphere panel data from 2005 to 2018. This investigation supports the resource curse theory at the Chinese provincial level. Using panel data from 44 African countries from 1996 to 2016, Epo and Nochi Faha (2020) analyse the roles of governments, environmental assets, and economic expansion. There are several correlations between environmental assets and financial growth, depending on the organizational quality indicator and the resource extraction measurement (Egbetokun et al., 2020). used the example of Nigeria to draw the conclusion that public investment needs to be improved in order to lessen environmental damage in the context of economic growth. In their investigation of the linkage among both natural resource rent and financial sector development (Khan et al., 2020), which takes into account the crucial significance of institutional reliability, they come to the conclusion that while public investment has a moderate effect on resource finance, its impact above and below the threshold level is ambiguous and can occasionally be both positive and negative.

In contrast (Godil et al., 2020), explored how monetary expansion (FD) plus quality of institutions affected the environment & discovered that, Overall, the effectiveness of institutions had a favourable effect on CO2 emissions. Moreover, IT and financial development have a detrimental effect on CO2 emissions. In a similarly vein (Elsalih et al., 2020), done A 2002–2014 investigation into the relationship between systemic quality and ecological performance in 28 oil-producing countries demonstrates the importance of financial services sector development for enhancing environmental performance and bolstering the ecologic Inverted u - shaped curve theory's theoretical foundations.

As per Literature review discussed above, it is clear that a lot of research has been conducted in the European countries but unfortunately, the research done is lacking on the connection between China's institutional quality, its natural resources, its financial development, it's population growth and its economic growth in case of Chinese region. In order to narrow the disparity in the standing works about Chinese region, this study is a modest attempt.

3. Data, model and methods

This study examines the relationship between China's financial development, population growth, and quality of institutions, available natural renewable & non-renewable energy resources and economic performance using time series data covering 45 years, from 1977 to 2021. Economic performance or growth measured by the Gross Domestic Product (GDP) that is actually measured in constant 2010 US dollars (Khattak et al., 2021).

Natural resources (NR) as Natural Resource Rent refers to the percentage of Overall Oil and natural gas Rent to Gross Domestic Product (GDP) of a Region. It consists of oil rents, coal, gas, mineral, and forest rentals and is based on World Bank Global Development Indicators for the sample period. There were a few considerations why we adopted this proxy. This is the best proxy for resource revenue because it gauges resource income, which is more effective than rent seeking and other techniques. Additionally, this proxy is extensively used in multiple prominent and knowledge on various aspects, such (Shahbaz et al., 2018; Bhattacharyya et al., 2010, 2014; Khan et al., 2020). Domestic credit to the private industry (as a percentage of GDP) is used to quantify financial advancement (FD). The most sensitive variable in the basic growth model is gross fixed capital formation (GFKF), measured as gross fixed capital formation and percent of GDP (Wu et al., 2020). POP stands for population, and population growth (annual %) is used to assess it. The term "institutional quality" (INSQ) is measured as "trade openness of a country"; that can promote institutional excellence is international openness (Rodrik et al., 2004). All the study variables are selected on the basis of the review of literature. Concept of this proxy is taken from the working paper of "The Determinants of Institutional Quality. More on thr Debate" by Jose Antonia Alonso y Carlos Garcimartin predicted that the third aspect that can promote institutional quality is global openness. It is because organizations are dynamically efficient. Primarily, it promotes a more energetic, sophisticated, and demanding environment, boosting the demand for prestigious institutions. Furthermore,

international openness encourages a much more competitive situation, which can thwart rent-seeking, bribery, and racism. (Rodrik et al., 2004; Rigobon and Rodrik, 2004; Islam and Montenegro, 2002).

Secondary time series data is gathered from World Development Indicators (WDI). The following is how the studies econometric model, which depicts the operational connection that exists between the dependent and study variables:

$$GDP = f\ (FD, INSQ, NR, GFKF, POP) \quad (1)$$

$$GDP_t = \beta_0 + \beta_1\ FD_t + \beta_2\ NR_t + \beta_3\ INSQ_t + \beta_4\ GFKF_t + \beta_5\ POP_t + U_t \quad (2)$$

$$\ln(GDP_{t)=}\beta_0 + \beta_1\ \ln(FD_t) + \beta_2\ \ln(NR_t) + \beta_3\ \ln(INSQ_t) + \beta_4\ \ln(GFKF_t) + \beta_5\ \ln(POP_t) + U_t \quad (3)$$

To prevent problems with heterocadsticity, Equation (3) reflects the transformation of the model into a natural logarithm. Where Ut signifies the stochastic error term and $\boldsymbol{\beta_0}$ represents the intercept term, while 1, 2, 3, 4, and 5 indicated the elasticities of the explanatory variables.

3.1. Econometric estimations

As previously noted, since the data is time series, the first step is to determine that whether the data is stationary; if so, the Johansen cointegration methodology, that is employed to assess long-run cointegration and the outcomes or final decision taken in light of trace statistics and Max-Eigen statistics, which indicates how many cointegration equations there are, is suggested for estimation of the concerned variables. To confirm that the chosen research variables have long-term causal connections, a vector error correction model is employed to identify both short- and long-term connection. If the co - integrating term is significantly negative, it demonstrates that our model is convergent. Wald test was intended to see if there was any short-term causation seen between research variables. Through using Jarque-Bera test, residual normality is assessed, and it is established that residuals have a normal distribution. Breusch-Pagan-Godfrey test is employed to identify whether the variance of error term is steady, which demonstrates there isn't a difficulty with heteroskedasticity whenever trying to figure out serial correlation among some of the residuals. Breusch-Godfrey to make absolutely sure there are no issues with serial correlation among some of the residual, the Serial Correlation LM Test will be used. A cumulative sum control chart and a cumulative sum control chart square would've been established for the model's overall stability. Durbin-Watson statistics are used to evaluate the autocorrelation and usually reveal minimal issues with correlation between error terms (see Fig. 1).

4. Result and discussion

4.1. Descriptive statistics and covariance analysis

The summary statistics of our study variable from 1977 to 2021 are provided in the current study using box plots, and Table 1 provides the descriptive and inferential statistics for all research variables to demonstrate that every variable has an assumption of normality. (See Fig. 2). Correlational & covariance analyses of study variables are shown in Table 1, as compared to that. Table 2 shows that there is a very high significant positive correlation (0.85123) amongst the financial development & fixed capital formation as well as a very low inverse association found (−0.0746) between the GDP growth rate and gross fixed capital creation. When all of the explanatory variables have correlation coefficients under 0.85, multicollinearity is not an issue. There is no difficulty with multicollinearity among the model variables, as shown by Table 2's coefficients, which are all less than 0.85 except for one (Krammer, 2010).

4.2. Unit root tests

Table 3 illustrates the results of ADF test for variables lnGDPPC, lnINS, lnNR, lnPOP, lnGFKF.

The findings indicate that most variables at the level where Ho is accepted are not significant. But, after accounting for the first difference, the variable becomes significant, Ho is rejected, and the significance level favors the alternative hypothesis. As a result, we can adopt VECM for further analysis since the variables are stationary at the initial difference and having order *I*(1) integration. Both the VECM and VAR models demand that all of the variables in the model conclude at the initial difference.

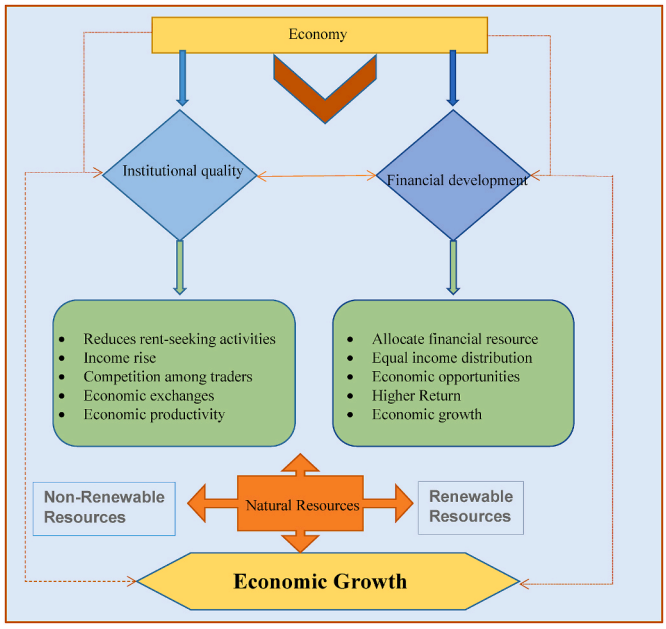

Fig. 1. Framework of the study.

Table 1
Descriptive statistics.

	FD	GDPGR	GFKF	INSQ	NR	POPGR
Mean	102.1375	9.236707	34.99036	35.02994	5.960741	0.931396
Median	103.5984	9.185205	33.16806	35.15142	4.851472	0.912701
Maximum	182.4326	15.19154	44.51877	64.47888	19.22440	1.610071
Minimum	49.74084	2.300000	23.98875	8.384615	1.047273	0.314091
Std. Dev.	34.73119	2.858926	6.274056	14.77857	4.822087	0.415407
Skewness	0.288223	−0.014681	0.121364	0.137282	1.344407	0.146316
Kurtosis	2.324762	2.874883	1.639023	2.370614	4.156222	1.457610
Jarque-B	1.445102	0.030280	3.503820	0.864438	15.70538	4.518436
Probability	0.485512	0.984974	0.173442	0.649067	0.000389	0.104432

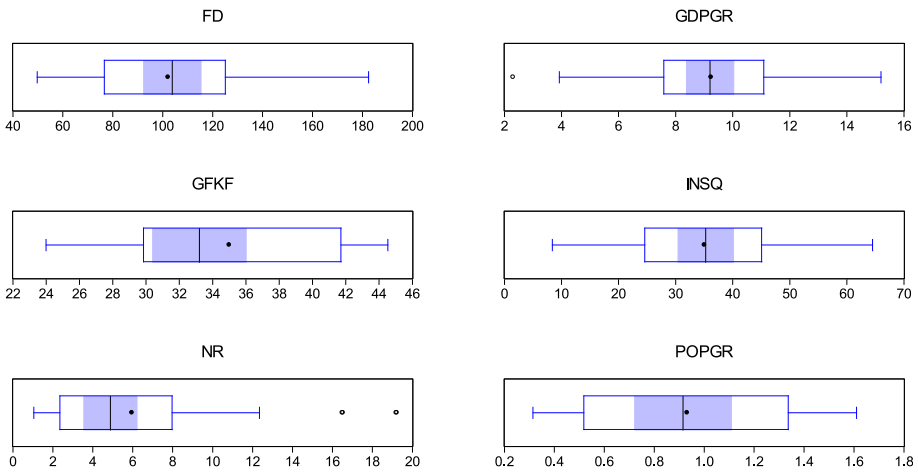

Fig. 2. Summary statistics through box plots.

Table 2
Covariance analysis.

Covariance Correlation Probability	FD	GDPGR	GFKF	INSQ	NR
GDPGR	−35.08052				
	−0.361516				
	0.0159				
GFKF	181.2916	−1.315551			
	0.851322	−0.075048			
	0.0000	0.6283			
INSQ	323.2121	7.162243	67.07860		
	0.644347	0.173459	0.740265		
	0.0000	0.2601	0.0000		
NR	−123.8448	0.825118	−16.32469	−37.81802	
	−0.756672	0.061244	−0.552136	−0.543020	
	0.0000	0.6929	0.0001	0.0001	
POPGR	−12.33479	0.219970	−2.317201	−4.706384	1.089593
	−0.874828	0.189527	−0.909758	−0.784450	0.556596
	0.0000	0.2179	0.0000	0.0000	0.0001

Table 3
Results of unit root test.

	Trend/ const	On Level	At First Difference	Level of Integration
LnGDPPC	t, c	−1.592014		*I*(1)
			−5.250069***	
LnINS	T			*I*(1)
		−0.891600	−6.822555***	
LnFD	T			*I*(1)
		−2.322841	−5.849306***	
LnNR	T			*I*(1)
		−1.937292	−6.091864***	
LnPOP	t,c			*I*(1)
		−1.944672	−2.270287***	
LnGFKF	C	−4.467959	−5.664706***	*I*(1)

Note: The symbols ***, **, and * denote levels of significant around 1%, 5%, and 10%, respectively.

4.3. Determine the optimal lag for the model

A restricted Random effect model is the VECM framework. It is only through the existence of a co - integrating between two variables can the VECM model also be developed. The lag sequence of the variables affects co - integration test significantly, so wrong lag ordering could lead in false co - integration test. A high lag order may lead to a reduction of degrees of freedom that would weaken a precision for estimation methods. It will impact the accuracy of the parameter estimation if the lag ordering is just too small because it will encourage the inaccuracy to auto correlate. The paper determines the optimum ordering of the VAR model in view of something like this, making it possible to choose the appropriate number of lags (Zhang and Xie, 2019). With the VAR model, it is vital to choose the right lag for the model (Table 4).

According to the AIC criteria, the author thinks the optimal lag 5 is suitable.

4.4. Cointegration test

Because all the variables are stationary at first difference, the Johansen cointegration test is employed to estimate longrun relationship among relevant variables. The results show that four co - integrating equations exist on the premise using trace statistics and Max-Eigen statistics. Tables 5a & 5b displays the precise findings of the Johansen cointegration test.

The two most common Johansen cointegration test methods are trace and maximal eigenvalue tests. The findings of both approaches are displayed in Tables 5A and 5B The null hypothesis (H_0) claims that there is no cointegration and H_0 is rejected when the P value falls below 0.05 at the 5% threshold of significance using the trace statistic and the max – eigenvalue approach. Consequently, there is cointegration between financial development, natural resource development, institutional quality, population expansion, and economic growth. The normalized cointegrating long term parameters from chosen parameters for desired Growth rate function are presented underneath:

Chi-Square numbers are provided in brackets:

Table 4
Model lag test.

Lags	LogL	LR	FPE	AIC	SC	HQ
0	−482.3759	NA	3034.267	25.04492	25.30085	25.13675
1	−264.5552	357.4494	0.277234	15.72078	17.51231	16.36357
2	−221.1104	57.92641	0.216669	15.33900	18.66612	16.53274
3	−174.1833	48.13037	0.181496	14.77863	19.64135	16.52333
4	−118.6841	39.84560	0.161711	13.77867	20.17699	16.07433
5	35.02058	63.05832*	0.003001*	7.742535*	15.67644*	10.58915*

Note: ***, **, * represents significant level at 1%, 5%, and 10% level of significance.

Table 5a
Trace test of Johansen cointegration.

No of CE(s)	Eigenvalue	Statistics	0.05 Critical Value	Prob.**
None *	0.987618	383.0240	95.75366	0.0001
At most 1 *	0.884934	211.7549	69.81889	0.0000
At most 2 *	0.865662	127.4271	47.85613	0.0000
At most 3 *	0.506632	49.13876	29.79707	0.0001
At most 4 *	0.423566	21.58525	15.49471	0.0053
At most 5	0.002570	0.100368	3.841466	0.7514

Note:
* Indicates that the theory was invalidated just at α = 0.05. There stands a cointegration relationship between variables.

Table 5b
Maxi-Eigenvalue test of Johansen cointegration.

No of CE(s)	Eigenvalue	Statistics	0.05 Critical Value	Prob.**
None *	0.987618	171.2691	40.07757	0.0001
At most 1 *	0.884934	84.32778	33.87687	0.0000
At most 2 *	0.865662	78.28837	27.58434	0.0000
At most 3 *	0.506632	27.55351	21.13162	0.0054
At most 4 *	0.423566	21.48488	14.26460	0.0031
At most 5	0.002570	0.100368	3.841466	0.7514

Note:
* Indicates that the theory was invalidated just at α = 0.05. There stands a cointegration relationship between variables.

$$\ln(GDP_t) = 2.243714 + 0.017845\ln(INS_t)(0.00171) - 0.005969\ln(FD_t)(0.00127) + 0.038961\ln(NR_t)(0.00417) - 0.002754\ln(GFKF_t)(0.04541) - 0.207857\ln(POP_t)(0.00662) + U_t \quad (4)$$

We discovered that, in line with expectations, natural resources positively and significantly impact growth. This implies that altering the natural resources by just one unit will result in a change of 0.04 percent in growth. As projected, institutional quality is positive and significant, this suggests that a change of one point in institutional quality will result in a change of 0.02 percent in growth. Negative and significant population growth translates to a 0.20 percent change in growth for every point change in population. Gross fixed capital formation is similarly negative but negligible while financial development is negative and large.

4.5. Estimating VECM model

The consistency of every non-stationary parameter must be ready to assume the experimental design according to the conventional approach to the VAR model. The simple VAR model will eliminate a great deal of useful information and provide false conclusions if some time series variables are not steady. Besides that, the VAR model eliminates the long-term equilibrium relationship and only assesses the short-term instability between variables, resulting in a negative impact on the predetermined parameter of the VAR model. To construct a traditional regression analytical framework, it is essential to systematically turn an erratic time series into a stabilized series. Engle & Granger developed the VECM model to solve this issue by integrating the cointegration with error correction models. At the moment, the VECM model has proven itself as a typical instrument known for series data evaluation. Since all parameters could be treated as endogenous constructs in the cointegration-transformed VECM model, unobserved heterogeneity issues are minimized. On the contrary hand, the VECM model can compute both the short-term dynamic error correction process and the long-term stability interaction of variables. A vector error correction model is applied to find causal relationships between the variables over the short and long terms. Two components of the ECM represent short run dynamics and long run dynamics. Following is the error correction model of the study in equation (5):

Table 6
Wald Tests estimation output.

Dependent Variable: DlnGDP			
Variables	Test Statistics ($\chi 2$)	Df	Probability
DlnFD	1.394952	(4, 13)	0.2897
DlnGFKF	2.699853	(4, 13)	0.0775
DlnINSQ	1.220153	(4, 13)	0.3494
DlnNR	2.239553	(4, 13)	0.01210
DlnPOP	5.942569	(4, 13)	0.0060

The t-statistics of parameters are in parenthesis:

$$\Delta\ln(GDP_t) = 2.243714 + 0.017845\Delta\ln(INS_t)[-10.4184] - 0.005969\Delta\ln(FD_t)[4.69562] + 0.038961\Delta\ln(NR_t)[-9.34448] - 0.002754\Delta\ln(GFKF_t)[4.57778] - 0.207857\Delta\ln(POP_t)[0.41570] + U_t \quad (5)$$

Diagnostic Tests:

$$R^2 = 0.843867 \text{Adjusted } R^2 = 0.543612 \text{F} - \text{statistic} = 2.810497(0.027683)$$

Negative ECM terms suggests that our model stays converging towards the long run path to identify the short run causality. Four cointegrating equations were discovered using the Johansen cointegration technique. Long run convergence is determined by cointegrating, which describes the speed of convergence and the long-term causal connection between financial expansion, gross fixed capital formation, natural resources institutional quality, including population expansion and economic growth. The outcomes also show the significant and negative coefficient of error correction term (ECM (−1)) and explain that each period corrects an average of 1.7 percent of the divergence of the long-term equilibrium. Probability value the F-indicator demonstrates that the model as a whole is important and overall goodness of fit to the data is explained by R-square, which is 0.84. This shows that explanatory variables account for 84% of the variations in the dependant variable.

Table 6 represents the output of the Wald investigation used to determine whether the variables have a short-term causal relationship. Gross fixed capital creation, resource expansion, population growth rate, and income development were found to have a short-term causal link, but not financial sector development or institutional quality.

Table 7
Diagnostic tests for the VECM model.

Diagnostic Tests	F-Statistics	Probability
Normality	3.915518	0.141174
Heterocadsticity	1.112072	0.4704
Serial correlation	0.107971	0.8986
Autocorrelation	1.766086	–

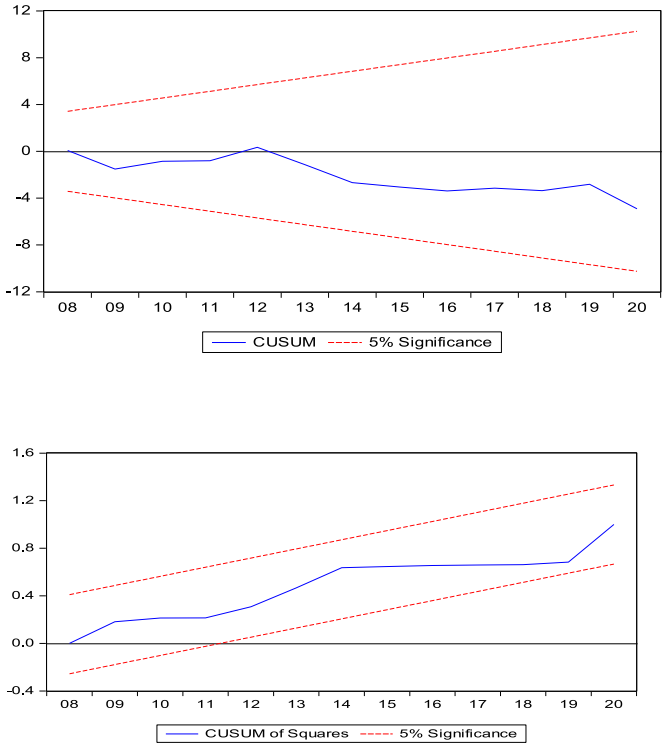

Fig. 3. Cusum and cusum of squares plots.

4.6. Model stability test

Using the Jarque-Bera test, residual normality is examined, and it's learned that residuals have a normal distribution. Breusch-Pagan-Godfrey investigation was used to examine the variance of error, which is a constant and indicates that there is no heteroskedasticity issue when attempting to determine the serial correlation between the residuals. Breusch-Godfrey Application of the Serial Correlation LM Test demonstrates that there isn't an issue with serial correlation among the residuals. Durbin-Watson statistics is used to examine autocorrelation and finds no issues with correlation between error items. Table 7 shows the results,

4.7. VECM model stability test

In order to determine the model's overall stability, a cumulative sum control chart and a cusum square chart are created. It is found that the model is completely stable. The plots in Fig. 3 demonstrate that the variance and parameters remain insensitive while using CUSUM and CUSUM sq at probability value of 5%.

5. Conclusion and policy recommendations

The current study examines the connections between China's economic expansion and its institutional factors, natural resources and financial development from 1977 to 2021. The long-run cointegrating equations were estimated in this study using normalized parameter estimates. The outcomes of every unit root test show that every parameter follows the stationary procedure just at level. Yet, the Johanson co - integration test results reveal long-run relationships between the variables under investigation, while the initial difference makes it stationary. The results of the VECM model also show the convergence rate towards long-term equilibrium. According to cointegrating coefficients, natural resources and the quality of institutions both have favourable & significant effects on economic development. Gross fixed capital formation is negative but negligible, while population growth is negative and significant, financial development is negative and significant, and so on.

5.1. Policy recommendations & future research direction

This research demonstrates a broad range of policy implications to policy makers, stakeholders, & governments in general, particularly to the perspective of financial expansion, constructed on the empirical findings. First, considering the favourable properties of natural assets on financial progress, more focus should be placed on resource exploration. Government officials should create such avenues to advance the exploration of natural resources. The Chinese government may act accordingly to establish a reward program that fosters investment. The policymaker can minimise ecological resources' effects on development by doing this. Second, officials need to strengthen the nation's institutions and give more thought to coordinating economic activity and the institutions that comprise an economic system. The government should use proactive tactics to enforce strict laws and educate the public about institutional efficiency and quality. Controlling political instability, governmental authority, corruption, enhancing the judiciary, upholding the rule of law, and fostering good governance are all ways to improve institutional quality. High-quality institutions give society members important information and motivation to participate in public causes. Finally, policymakers should focus on slowing down the nation's population growth. To do this, the government and authorities can take a proactive stance through public awareness initiatives. Finally, to achieve better economic growth, policymakers should invest more money in natural resource exploration to counteract the flood of population growth. They should also focus more on sustainable and effective institutional quality in the nation, establish a writ of state, put the rule of law into practice, speed up justice, control corruption, and maintain effective governance. The present study has some limitations; in the future, researchers should consider the same model for developed and developing regions and may use the IMF's financial development index as well as other crucial variables like exchange rates and governance indices to better understand this relationship.

Author statement

JH conceptualized the idea and did analysis. CH drafted the paper, GA run the analysis and PM revised the manuscript.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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