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Are bond markets, economic growth, and institutional quality related? Evidence from VECM estimation

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Abstract

This study investigates the interrelationships between bond markets, economic growth, and institutional quality of middle-income countries from 2005 to 2020. We find that economic growth and institutional quality explain bond markets in the long run and short run. We find that there is an association between institutional quality, economic growth, bond market development.

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1. Introduction

Schumpeter (1911) theorized that innovation and entrepreneurship drive economic growth. As innovative new ventures need to be financed, a well-developed financial system that harnesses savings, and allocates resources to such productive enterprises provides the engine for innovation. Empirical support for this thesis was provided by Rajan and Zingales (1998) who found that external financing permitted faster growth in countries with advanced financial markets. One area of financial development is the development of bond markets. Bond market development is characterized by a plentiful supply of fixed-interest debt securities, with low interest rates, available to businesses to allocate to entrepreneurial ventures, spurring economic growth. The assumption of such a linear, monotonic association between finance and growth has been challenged by mediators, such as institutional quality. Strong banking institutions, impartial judicial institutions, and democratic political institutions facilitate the allocation of credit productively, while corruption and nepotism misallocate resources. Law et al. (2013) observed that a threshold level of institutional quality had to be achieved before the positive effect of finance on growth could be grasped. Accordingly, in this work, we specifically examine the concurrent effects of institutional quality infrastructure on the finance-economic growth nexus, with a particular focus on bond markets development only, as the associations between bond markets and economic growth have been limited in the empirical literature.

Our approach to exploring relationships between institutional quality, economic growth, and bond market development consists of 1) presenting data-driven observations, 2) listing empirical results, and 3) finally, stating hypotheses for future testing.

2. Data-Driven Observations

a. Institutional Quality and Economic Growth

Intuitively, a secure banking system, impartial judicial system, and democratic political institutions facilitate economic growth. Businesses receive assurances that bank accounts cannot be expropriated, that they have equal access to loans, and use a variety of payment and investment services. The court system provides legal redress to uphold contracts with suppliers, distributors, and employees. A free press exposes corruption and nepotism in the allocation of capital. The joint effect of these forces permits businesses to thrive without fear.

Conversely, a growing economy requires a secure banking system, and an impartial judicial system. As businesses enter into relationships with joint venture partners, suppliers, exporters, and importers, the judicial system must support the enforcement of contracts. As revenue grows, a secure banking system is needed to store increasing amounts of capital.

Hypothesis 1: Does institutional quality cause economic growth, or does economic growth cause institutional quality?

b. Bond Markets Development and Economic Growth

Well-built bond markets will provide businesses with short and long-term debt at varying interest rates. Risky projects will require higher interest payments, while those of lesser risk will have lower interest rates. Businesses, thus, have a variety of choices to satisfy their borrowing needs, increasing economic growth.

Conversely, as economies grow, businesses will expand into both risky and low-risk projects. They will need an easy source of debt capital to finance future expansion, in

order to sustain high levels of growth. They will demand loans, and debt securities of varying maturities.

Hypothesis 2: Does bond market development cause economic growth, or does economic growth cause bond markets?

c. Institutional Quality and Bond Market Development

A central bank (quality institution), that is committed to low inflation, adjusts interest rates to achieve full employment with price stability. Keeping interest rates at a low level permits the bond market to offer inexpensive debt, increasing the number of bonds offered at varying maturities. Conversely, a developed bond market results in power for the banking sector, and the brokerage industry. As more loans of higher value are used to support government and private industry projects, bankers, and brokers will have increasing input into central bank decisions through links with politicians and central bank agencies.

Hypothesis 3: Does institutional quality causes bond market development, or does bond market development cause institutional quality.

We state hypotheses for future empirical testing, based on the results obtained.

Hypothesis 1: As results in Case 1, Case 4, and Case 7 suggest unidirectional causality between institutional quality and economic growth, we propose the following hypothesis.

Hypothesis 1: Does institutional quality cause economic growth, or does economic growth cause institutional quality ?

Hypothesis 2: As Cases 18 fail to find that bond market development causes economic growth, bit that there might be an association between economic growth and bond markets, we state the following hypothesis for further testing,

Hypothesis 2: There may be an association between economic growth and band market development.

Hypothesis 3: Cases 1-5, and Case 7 suggest that bond market development Granger causes institutional quality. We state the following hypothesis for further examination,

Hypothesis 3: Does bond market development cause institutional quality ?

3. Modelling Strategy

We deploy data from the World Bank's *WDI* for the selected middle income countries (MICs) from 2005 to 2020.

We use twenty institutional quality indicators (INQ[1]), eight bond markets indicators (BOM[2]), and economic growth (GDP[3]).[4] A highlight of our work is that we include *eight bond market* coverages; hence, we consider eight cases. In each case, the common variables are economic growth and institutional quality, used as a composite index. This tactic, which is distinctive to this work, allows us to investigate whether the causality between these variables diverges with diverse proxies of bond markets.

For model specification, this study considers the following function.

$$\Delta BOM_{it} = \lambda_0 + \lambda_1 \Delta INQ_{it} + \lambda_2 \Delta GDP_{it} + \xi_{it} \qquad [1]$$

[1] It is extracted by the World Bank's CPIA. The principal component analysis (PCA) is deployed to get the institutional quality composite index (CQI). The details of institutional indicators to have CQI and the PCA analysis are not available here to conserve space.

[2] It includes domestic private debt securities (DPR), international private debt securities (IPR), domestic public debt securities (DPU), international public debt securities (IPU); gross portfolio debt assets (GPA), gross portfolio debt liabilities (GPL), international debt issues (IDI), and a composite index (CBM). The PCA is also deployed here to have this composite index. Unfortunately, this PCA analysis's details are unavailable here to conserve space.

[3] It is % change of per capita gross domestic product.

[4] We follow the works of previous authors for identifying these variables (Pradhan et al., 2016).

This study deploys a vector error correction model (**VECM**[5]) to study the interrelationships between BOM, INQ, and GDP.

$$(\mathbf{1}-\boldsymbol{L})\begin{bmatrix}\boldsymbol{\Delta BOM_{it}}\\ \boldsymbol{\Delta INQ_{it}}\\ \boldsymbol{\Delta GDP_{it}}\end{bmatrix}=\begin{bmatrix}\boldsymbol{\eta_{1j}}\\ \boldsymbol{\eta_{2j}}\\ \boldsymbol{\eta_{3j}}\end{bmatrix}+\sum_{k=1}^{q}(\mathbf{1}-$$

$$\boldsymbol{L})\begin{bmatrix}\boldsymbol{\partial_{11ik}} & \boldsymbol{\partial_{12ik}} & \boldsymbol{\partial_{13ik}}\\ \boldsymbol{\partial_{21ik}} & \boldsymbol{\partial_{22ik}} & \boldsymbol{\partial_{23ik}}\\ \boldsymbol{\partial_{31ik}} & \boldsymbol{\partial_{32ik}} & \boldsymbol{\partial_{33ik}}\end{bmatrix}\boldsymbol{X}\begin{bmatrix}\boldsymbol{\Delta BOM_{it-k}}\\ \boldsymbol{\Delta INQ_{it-k}}\\ \boldsymbol{\Delta GDP_{it-k}}\end{bmatrix}+\begin{bmatrix}\boldsymbol{\gamma_{1i}}\\ \boldsymbol{\gamma_{2i}}\\ \boldsymbol{\gamma_{3i}}\end{bmatrix}\boldsymbol{ECM_{it-1}}+\begin{bmatrix}\boldsymbol{\varepsilon_{1it}}\\ \boldsymbol{\varepsilon_{2it}}\\ \boldsymbol{\varepsilon_{3it}}\end{bmatrix} \quad [2]$$

Where ECM_{t-1} is lagged error-correction term, the log of the variables is engaged to standardise the data for empirical analysis.

3. Estimated Results and Discussion

The study first checks cross-sectional dependency (CSD), order of integration (unit root, UR), and co-integration (CI) among these three variables. Our empirical results indicate that variables are I (1) [i.e., integrated of order one] and cointegrated, specifying a long-run link between bond markets, institutional quality, and economic growth. Moreover, it is valid for all eight cases, regardless of bond market proxies.[6]

Subsequently, we scan the long- and short-run nexus between bond markets, institutional quality, and economic growth. In this regard, we have eight cases. From Cases 1-2, we include domestic debt securities (DPR/ DPU) with INQ and GDP; from Cases 3-4, we include international debt securities (DPR/ DPU) with INQ and GDP; from

[5] It can be noted that we have first estimated equation [1] and observed that these estimated results are not statistically significant. Subsequently, we have adopted this error correction model to investigate the long-term lead-lag relationships between these variables.

[6] The results of these tests (CSD, UR, and CI) are not displayed to conserve space.

Cases 5-7, we include portfolio assets (GPA/GPL/ IDI) with CQI and PEG; and for Case 8, we include a composite index (CBM) with CQI and GDP.

Table 1 presents the VECM results.[7] From the empirical results, we observe the followings:

- ✓ Our results confirm that ECM coefficients are negative and significant when BOM is the dependent variable, representing the animation of co-integration interactions between the variables in consideration in eight cases. This signifies that bond markets converge towards their long-run pathways in reaction to deviations in institutional quality and economic growth.
- ✓ For Case 1, Case 4, and Case 7, we novelty the bidirectional (feedback) causality between institutional quality and economic growth; and a unidirectional causality from bond markets to institutional quality.
- ✓ For Case 1, Case 4, and Case 7, we find unidirectional causality from institutional quality to bond market development, and from institutional quality to economic growth.
- ✓ For Case 2 and Case 5, results confirm the feedback causality between institutional quality and economic growth; and the bidirectional causality between bond markets and institutional quality.
- ✓ For Case 3, we obtain the feedback causality between institutional quality and economic growth; and a unidirectional causality from institutional quality to bond markets.
- ✓ For cases 6 and 8, we have the feedback causality between economic growth and institutional quality.

[7] We engage lag length 1 for all variables based on Bayesian Information Criterion (BIC).

Table 1. Results of VECM Estimation

Predictand	Explanatory variables and ECM$_{-1}$											
	Case 1				**Case 2**				**Case 3**			
	ΔGDP	**ΔCQI**	**ΔDPR**	**ECM$_{-1}$**	**ΔGDP**	**ΔCQI**	**ΔDPU**	**ECM$_{-1}$**	**ΔGDP**	**ΔCQI**	**ΔIPU**	**ECM$_{-1}$**
ΔGDP	------	6.58*	0.07	-0.089	------	6.38*	0.04	-0.058	------	6.83*	0.20	-0.003
ΔCQI	18.1*	------	41.7*	-0.001	19.1*	------	85.4*	-0.006	16.8*	------	2.25	-0.001
ΔBOM	0.15	3.16	------	-0.01*	0.01	28.4*	------	-0.001*	0.06	20.7*	------	-0.01*
	Case 4				**Case 5**				**Case 6**			
	ΔGDP	**ΔCQI**	**ΔIPR**	**ECM$_{-1}$**	**ΔGDP**	**ΔCQI**	**ΔGPA**	**ECM$_{-1}$**	**ΔGDP**	**ΔCQI**	**ΔGPL**	**ECM$_{-1}$**
ΔGDP	------	6.54*	0.05	-0.03	------	6.28*	1.25	-0.01	------	6.58*	0.04	-0.001
ΔCQI	17.3*	------	8.43*	-0.01	17.4*	------	6.96*	-0.01	16.8*	------	0.21	-0.001
ΔBOM	0.02	13.3	------	-0.01*	0.01	8.48*	------	-0.03*	0.11	0.47	------	-0.05*
	Case 7				**Case 8**							
	ΔGDP	**ΔCQI**	**ΔIDI**	**ECM$_{-1}$**	**ΔGDP**	**ΔCQI**	**ΔCBM**	**ECM$_{-1}$**				
ΔGDP	------	6.45*	0.39	-0.003	------	6.64*	0.42	-0.001				
ΔCQI	16.7*	------	1.53	-0.001	16.8*	------	1.96	-0.002				
ΔBOM	0.10	6.59*	------	-0.014*	0.05	3.71	------	-0.014				

Note 1: All notations are demarcated in the text

Note 2: *BOM* is engaged for DPR, DPU, IPR, IPU, GPA, GPL, IDI, and CBM.

***Note 3*:** *: p<.01.

Over and above, Hypothesis 1 is considerably supported The feedback relationship between institutional quality infrastructure and economic growth in the short-run in Cases 1, 4, and 7 is apparent. On the other hand, Hypothesis 3 is partially supported by bond markets development Granger causes institutional quality only in Cases 1-5 and Case 7. However, we do not find any support for Hypothesis 2 in Cases 1-8. Hence, the overall inference is that instructional quality substantially impacts economic growth, together directly and indirectly, through bond markets development.

The study also deploys additional diagnostic assessments to guarantee the robustness of our results and findings. They include dynamic ordinary least squares

(OLS), fully modified OLS, generalized methods of moments, generalized impulse response functions, and error variance decomposition analysis.[8]

We state hypotheses for future empirical testing, based on the results obtained.

Hypothesis 1: As results in Case 1, Case 4, and Case 7 suggest unidirectional causality between institutional quality and economic growth, we propose the following hypothesis.

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4. Conclusion and Policy Implication

Our analysis shows a significant causal relationship between institutional quality infrastructure, bond markets, and economic growth, both in the short and long run. Institutions, such as a secure banking system and impartial judiciary provide the environment for businesses to grow. Over time, economic growth promotes the progress of quality institutions that protect intellectual property, and enforce contracts. Developed

[8] It is noted that these additional diagnostic findings are not presented in the text to conserve space. But they can be reported upon request.

bond markets provide access to credit for business expansion, strengthening the role of financial intermediaries (institutions).

Empirical research in finance suggests greater transparency in the bond market, than in the market for bank loans. Bond markets do not have the screening and monitoring capabilities of banks, in evaluating borrowers. Therefore, bond markets are more dependent than banks on the institutional quality provided by their locations, as such institutional quality will ensure the screening and monitoring necessary to reduce the riskiness of borrowers. It can be noted that an example consistent with our result is Japan, which is a middle-income emerging economy one century ago. In other words, this progression was observed in Japan's transition from a middle-income country to a high-income country (Anderson and Makhija, 1990; Nakabayashi, 2019; Uchida and Satake, 2009).

Moral hazard or making risky bond issues due to protections afforded by government to bondholders, may be alleviated by increasing the institutional quality for law enforcement. This action would deter bond issuers from making excessively risky bond issues, as they would be legally prevented from such action, thereby strengthening institutional quality.

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