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High Public Debt in Japan: The Institutional Quality Perspective

Waqar Mehmood[1], Rasidah Mohd-Rashid[2], Attia Aman-Ullah[3*], Atul Karim Patwari[4] and Attiqa Aman-Ullah[5]

[1] Department of Economics, Islamia University of Bahawalpur, 63100 Bahawalpur, Pakistan
[2]School of Economics, Finance & Banking, Universiti Utara Malaysia, 06010, Sintok, Kedah, Malaysia
[3]School of Business Management, Universiti Utara Malaysia, 06010, Sintok, Kedah, Malaysia
[4]University of Tabuk, 71491 Tabuk, Saudi Arabia
[5]Virtual University of Pakistan, 10370, Islamabad, Pakistan

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ABSTRACT

This study aims to look at the long-term and short-term links between institutions' quality and public debt. The analysis seeks to shed light on two key aspects: firstly, the influence of country-level institutional quality on public debt, and secondly, the duration of the effects or shocks caused by this relationship. This research employs time-series data spanning from 1996 to 2017 to examine the relationship between institutional quality at the country level and public debt in Japan. Various econometric techniques were employed to analyse the determinants of public debt in Japan, including 'The Unit Root Test, Johansen's Co-integration Analysis, Vector Error Correction (VEC) Model, Variance Decomposition, Impulse Response Analysis, Pairwise Granger Causality Test, and The Toda-Yamamoto Model'. The results of the estimation demonstrate a statistically significant correlation between country-level institutional quality and public debt, both in the long and short term. The evidence indicates that factors such as Voice and Accountability (VA), Political Stability (PS), Government Effectiveness (GE), and Regulatory Quality (RQ) have a negative and statistically significant impact on public debt. Conversely, the Rule of Law (RL) and Control of Corruption (CC) exhibit a positive and statistically significant influence on public debt. The occurrence of public debt can frequently be attributed to the insufficient focus of policymakers, which can be attributed to governance deficiencies. Hence, the implementation of public debt management is necessary to mitigate the possibility of default. The findings indicate that it would be advisable for Japan to enact comprehensive policies aimed at mitigating public debt.

Keywords: Country-Level Institutional Quality, Japan, Public Debt, Time Series Analysis

1. INTRODUCTION

Scholars and governments have carried out in-depth investigations of the issuance of public debt to understand its factors and to alleviate its adverse impact on the economy (Heimberger, 2023; Kaur et al., 2022; Reis, 2022). The impact of external debt on economic development has a non-linear pattern, wherein a negative effect is observed once a specific debt to gross-domestic product (GDP) ratio is reached (Panizza & Presbitero, 2014).

*Corresponding Author: attiaamanulah@yahoo.com

As previously witnessed, the financial crunch of 2007/08 caused a hike in public debt among both developed and developing nations. Importantly, Japan's government debt has been on an increasing trend since 1996, reaching 198.9% of its GDP (see Figure 1). Japan records the highest national debt-GDP ratio compared to other countries, followed by Italy in second place, then France, Canada, and the United Kingdom (UK) (Business Insider, 2017). Higher levels of debt pose detrimental impacts on economic development. The persistent upward trend in debt ratios has led to uncertainty among economic institutions with regards to the long-term sustainability of fiscal policies and their potential impact on the global economy. Regardless of these vital issues, infusing cash into the economy is not the proper way to attain financial recuperation and long-haul monetary advancement except if combined with a compelling and productive administering system (Aikins, 2009). Aikins (2009), further added that the absence of suitable economic policies and regulatory frameworks exposes a nation's financial system to potential crises, hence endangering the overall stability of the economy. Therefore, economic development has been associated with government practices such as country-level institutional quality (CLIQ) and also how the government governs directly or indirectly (Pradhan, 2011).

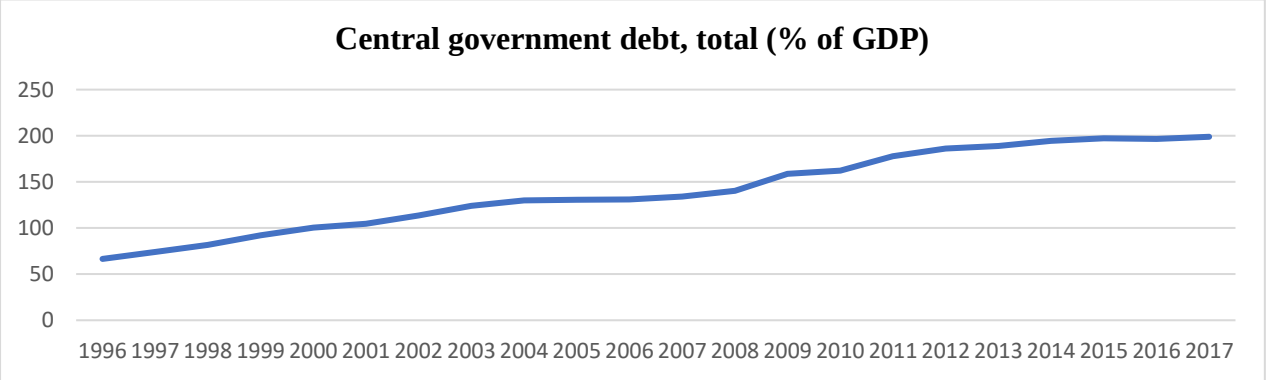


Figure 1. Public Debt of the Government of Japan (International Monetary Funds (IMF) – 2016)

The effects of public debt on a country's economy, including those of developing countries, are contingent upon factors such as the magnitude of the debt, as well as the institutional quality-related policies in that country. Presbitero (2008) discovered that debt ratios are lower in nations with low institutional quality regardless of the debt size. Similarly, based on the data on CLIQ between the years 1996 and 2017 collected from the Worldwide Governance Indicators database, investment, growth, and benefit attainment from debt relief policies are driven by institutional quality to a certain extent (Dessy & Vencatachellum, 2007). During that period, the governance performance of Japan as measured by the World Governance Indicator was between 0.50 and 1.60 out of 2.50. Meanwhile, 'France, Canada, Germany, and the UK' scored 1.38 to 2.40 out of 2.50 in all six dimensions, namely, 'VA, PS, GE, RQ, RL, and CC'. These scores reveal the weak governance performance of Japan in comparison to France, Canada, Germany, and the UK. The lower performance of CLIQ causes higher fiscal deficits, which impair economic sustainability and lead to high national debts. Consequently, a broad consensus on good governance was formed, stating that well-governed nations can effectively manage public debts (Dessy & Vencatachellum, 2007). Therefore, countries need to minimise their cost of borrowing and financial risks while simultaneously improving the domestic debt market. Good governance helps in maintaining economic stability and advancing a country's financial system. Many studies have demonstrated the negative impacts of poor governance on financial growth (Mo, 2001). Nevertheless, there has been a limited amount of scholarly investigation conducted regarding the influence of institutional quality on the level of public debt. Furthermore, there is a scarcity of research that has investigated the regional variations in the effects of institutional quality on public debt, particularly in the context of developed countries like Japan. Previous studies examining the relationship between institutional quality and public debt have mostly focused on the corruption index as a driver of governance, while neglecting other relevant factors. Hence, this study aims to

investigate the impact of governance on the level of public debt in order to address these knowledge gaps. This research aims to analyse the impact of institutional quality on public debt in Japan, utilising six globally recognised governance measures.

This study aims to enhance comprehension of the consequences by evaluating the influence of incompetent governance on public debt, with a specific focus on the context of Japan. Japan has been beleaguered by setbacks since the 1990s due to deflation and sluggish growth, and the government's attempts to correct the scenarios of low prices, costly imports, and high debt-GDP ratios have been futile. This situation exposes Japan to vulnerabilities and may cause declines in trade by increasing their public debt and destroying future economic growth. A solution is needed to address the problems faced by the country in order to boost its economic and financial development. Additionally, the implementation of this solution has the potential to mitigate the country's vulnerability to both domestic and global financial disruptions, as well as political uncertainties. According to the IMF (2016), political risks rank as the sixth most probable global risk. Specifically, failure of the ruling government such as corruption, political deadlock, failure to maintain law and order, and the implementation of inappropriate rules could worsen a country's financial and economic condition. Hence, this study is expected to provide some useful suggestions for politicians in those countries regarding the macroeconomic implications of governance on public debt management. The present research significantly enhances the current literature by conducting a thorough investigation of the correlation among institutional quality and public debt in Japan. The study utilises a range of econometric methods, including 'The Unit Root Test, Johansen's Co-integration Analysis, VEC Model, Variance Decomposition, Impulse Response Analysis, Pairwise Granger Causality Test, and The Toda-Yamamoto Model', to analyse the effects of institutional quality on public debt in both the short and long term. This comprehensive method enables a detailed comprehension of how various aspects of institutional quality, such as Voice and Accountability (VA), Political Stability (PS), Government Effectiveness (GE), Regulatory Quality (RQ), Rule of Law (RL), and Control of Corruption (CC), impact public debt in Japan. Thus, the study demonstrates a significant statistical correlation between institutional quality at the national level and public debt in Japan, emphasising the influence of institutional elements on a country's fiscal performance.

2. LITERATURE REVIEW

Several academic studies and models in the field of political economy have provided evidence that a specific level of debt can potentially improve a country's economic growth (Beyene & Kotosz, 2022; Fan et al., 2023; Özmen & Mutascu, 2023). This phenomenon is influenced by two factors that have been identified: 1) the purported role of public debt in mitigating fluctuations Barro (1979), and 2) the role of public debt in redistributing wealth, as demonstrated by Debortoli and Nunes (2008), among other scholars. However, the realisation of these positive effects seems contingent upon the presence of effective governance. According to Kaufmann et al. (1999), governance refers to the customs and institutions through which the exercise of authority takes place inside a country's borders. The authors of the study introduced six global governance indicators, utilising a scale that spans from 0 to 100. A higher numerical value on this scale signifies a greater degree of institutional quality or good governance. The aforementioned definition includes three important parts: (a) the ways in which governments are chosen, monitored, and replaced; (b) the government's ability to make and carry out effective policies; and (c) the respect that both the public and the government show for the institutions that run the country. The six factors described above encompass 'VA, PS, GE, RQ, RL, CC'.

Furthermore, the prevalence of higher accountability when the government imposes taxes and spends the proceeds due to the close relationship between the population (voters in the context of democracy) and the political decision-makers (Mello & Barenstein 2001). Bird et al. (2008) highlighted the key role of VA in minimising corruption towards establishing a more

sufficient degree of taxation power in developed and developing nations. In their study, Chauvin and Kraay (2007) observed a positive association between effective governance and the build-up of public debt. Their findings revealed that countries with stronger institutional structures, particularly over the period from 1993 to 2003, were more likely to receive debt relief. According to Alesina and Weder (2002), the significance of institutional quality in determining the allocation of debt reliefs throughout the 1990s was found to be minimal. However, in the early 21st century, creditors began to recognise the importance of institutional quality and started considering it as a critical component in the decision-making process. Researchers have directed their attention towards examining the impact of governance on public debt using six elements. Their primary objective is to identify the elements that determine the amount and composition of government debt, with a particular emphasis on the political and institutional factors that contribute to the accumulation of public debt. In pursuit of this objective, Alesina and Tabellini (1990) formulated a constructive theory concerning fiscal deficits and government debt, positing that the existence of substantial public debts can be attributed to a lack of consensus among those in positions of authority. Additional notable studies that align with this concept include the works of De Haan and Sturm (1997) as well as Woo (2006), both of which emphasise the importance of governance in the accumulation of public debt.

Other scholars believe that public debt build-up is affected by governance via the political misrepresentation of rent-oriented activities (Yared, 2010). The proponents of this theory suggest that in-office government officials tend to capitalise on rent-oriented activities by leaning towards huge capital investments to the detriment of those that are labour oriented. This notion will be further explicated by focusing on the effect of numerous government indexes on public debt. Public corruption entails all forms of public governance incompetence that lead to the utilisation of public funds that deviate from the actual goal of improving the well-being of the people (Alt & Lassen, 2014). Other governance indexes also have direct or indirect associations with public debt. Kaufmann et al. (2011), stated that there are possible interrelations between the six governance dimensions. For instance, improved accountability instruments can lower corruption, while enhanced government effectiveness can lead to a healthier regulatory environment. Meanwhile, deference to the rule of law results in impartial government selection and replacement as well as less public office exploitation for personal benefits. The authors further noted that it is highly likely for the six governance dimensions to have significant and positive correlations across nations.

The study conducted by Méon and Sekkat (2005) provided evidence to support the notion that corruption's negative consequences are amplified in the presence of weak rule of law, inadequate governance, and political instability. In a graver context, the occurrence of political corruption has the potential to result in detrimental consequences for the three fundamental aspects of government, including the 'legislative, executive, and judiciary'. Furthermore, there are conceptual obstacles that impede the accurate assessment of public expenditure, which encompasses a multitude of objectives. The reason for this is because outputs from the public sector are commonly sold through non-market channels, which implies a lack of pricing data and thus makes it difficult to quantify these outputs. This particular component plays a crucial role in the manifestation of corruption. Government effectiveness is influenced by a range of elements, including outcomes, regulatory quality, and adherence to the rule of law. Therefore, a lack of effective control over corruption negatively impacts the efficiency of investments. In his study, Bosco (2016) conducted an analysis of previous and current perspectives pertaining to the underlying causes of corruption within the European public and political domains. The findings revealed that a favourable opinion of the efficacy and proficiency of public policies serves to mitigate the adverse consequences of corruption-induced poverty. The extent to which regulatory standards are adhered to provides insight into the government's capacity to develop and enforce impactful policies and regulations that facilitate and stimulate growth within the

private sector. Hence, ambiguities in the law open up room for the occurrence of corruption. Imprecise and complicated regulations allow individuals in authoritative positions to engage in discretionary acts. This will, in turn, pave the way for manipulative acts leading to the prevalence of corruption. Moreover, the more government actors engage in regulatory manipulations, the higher the prevalence of bribery. Despite the general condemnation on weak governance and corruption in a majority of past scholarly studies, there are still some that view corruption in an idealistic way (Méon & Weill, 2010). This idealistic view of corruption asserts that the practice increases efficiency in countries with devastatingly ineffective institutions. The advocates of this view argue that bribery is beneficial for economies that are overwhelmed by bureaucracy. They claim that it can ease rigid regulations, facilitate the growth of commerce, drive the efficient usage of investments and time, maintain low wages, or even unite a country from a political stand.

The presence of a shadow economy has been attributed to inadequate governance, particularly with regards to the enforcement of legal frameworks. The study conducted by Schneider and Enste (2000) provided evidence to support the notion that restrictions imposed by regulation and bureaucracy have a dual impact on both competition and market operations. These factors not only impair the functioning of markets but also create an environment conducive to the occurrence of corrupt activities. When contracts are viewed as lacking enforceability or protection, individuals and enterprises are more likely to be incentivised to participate in the informal economy. The emergence of a sentiment of despair may occur within the public when there exists both perceived and actual instances of widespread corruption, ineffective allocation of taxpayer funds, conspicuous and insufficient governmental transparency, and inadequate safeguarding of individuals' rights under the legal system. According to the findings of Friedman et al. (2000) an escalation in the occurrence of illicit activities is associated with a decline in income tax. According to the study conducted by Méon and Sekkat (2005) it was observed that the negative consequences of corruption are further intensified in situations characterised by weak adherence to the rule of law, inadequate governance, and political strife. Kaufmann et al. (2011) indicated that government officials tend to approve large capital investments as opposed to labour-oriented ones to take full advantage of rent-based activities. Hence, when a government funds its spending via debt accumulation and when corruption occurs, more debts need to be amassed which would lead to higher debt servicing costs. Corrupt practices of this nature result in an increase in public indebtedness and the associated expenses of servicing these loans, as significant investment projects and public expenditures are commonly financed by borrowing. These methods also result in a reduction of available cash for other essential expenditures and a decline in the quality of existing infrastructure, such as roads and buildings. Meanwhile, greater emphasis is placed on new profitable projects (Tanzi & Davoodi, 2012). The empirical research conducted by Delavallade (2006) provides evidence supporting the premise that corruption is associated with increased allocation of public funds towards public services, order, fuel and energy, as well as culture and defence. Conversely, it suggests that lower levels of public expenditure are directed towards ‘education, health, and social protection’.

Nations with corrupted governments will find it hard to secure external funding from global capital markets, which will impede their growth and development (Mohd-Rashid et al., 2023). Incidentally, especially for open economies, all these will discourage foreign investments (FDI) and thus reducing the likelihood of future growth. In the context of developing countries where economic growth depends on FDI, Adams and Opoku (2015) asserted the crucial economic role of good governance and high-quality regulations in enhancing the sub-Saharan Africa FDI benefits. Undeniably, highly effective and quality regulations paint the picture of how efficient a government is in formulating and implementing rigorous policies and regulations that allow for and drive private sector growth. According to Henisz (2000) political economy theory, governments control, regulate,

and adjudicate business sectors. They play an important role in developing legislation that regulates the economy and establishes the competitive environment and factor endowment, as well as the regulatory environment in which business activities take place. Compliance with such regulations promotes an effective fight against corruption and, as a result, aids in the reduction of public debt. In their study, Mehmood et al. (2021) conducted an investigation on the correlation between the quality of institutions at the country level and the level of public debt in the Pakistani market. The study spanned the years 1996 to 2018. The research findings indicate that there is a positive relationship between public debt in Pakistan and factors such as 'VA, RQ and CC'. Based on the research findings, it can be observed that a country characterised by inadequate institutional quality conveys significant indications of an unfavourable financial state. Consequently, this leads to an escalation in public debt owing to inefficiencies.

Improvements in institutional quality, on the other hand, can help to increase market transparency, and as a result, public debt may decrease (Mehmood et al., 2022). Tarek and Ahmed (2017) investigated the relationship between governance and public debt in MENA countries from 1996 to 2015. According to the findings, political stability and the absence of violence, regulatory quality, and the rule of law all have a significant impact on public debt in MENA countries. They went on to say that institutional quality is critical in mitigating fiscal and external crises caused by terrorist attacks, high war costs, and low oil prices. The literature on the relationship between institutional quality and public debt has evolved significantly, However, Prior research has extensively examined the broader economic implications of institutional quality, including its impact on economic growth, investment, and fiscal policy effectiveness. However, the specific linkage between various dimensions of institutional quality and public debt, especially in the context of developed countries like Japan, has not been thoroughly explored. Thus, the present research significantly enhances the current literature by conducting a thorough investigation of the correlation among institutional quality and public debt in Japan. The study utilises a range of econometric methods, to analyse the effects of institutional quality on public debt in both the short and long term.

3. METHODOLOGY

3.1 Data Source and Sample Frame

The variable of interest in this research is public debt to GDP ratio, which is considered as the dependent variable. According to the IMF, this ratio signifies the relative magnitude of central public debt, wherein government debt constitutes over 90% of the overall debt. The primary focus of this study revolves around the institutional quality at the country level. This particular attribute is evaluated by the use of diverse constructions, such as 'VA, PS, GE, RQ, RL, and CC' as suggested by (Ogunniyi et al., 2020). The ranking system assigns a numerical value ranging from 0 to 100, indicating the level of governance quality, with lower scores representing worse governance and higher scores indicating stronger governance. The Political Stability and Absence of Violence/Terrorism (PD) and Control of Corruption (CLIQ) indices of Japan are determined using annual data spanning from 1996 to 2017, which is sourced from the IMF and the World Governance Indicators.

3.2 Empirical Model

The link between CLIQ and PD was investigated by the implementation of a classical co-integration study utilising an econometrics model. The study employed several statistical techniques, including the Granger-causality Test, the Co-integration Test, the VEC Model, and the Toda-Yamamoto Model. The objective of this study is to ascertain the frequency of both short- and long-term associations between CLIQ and PD within the Japanese setting.

3.3 Stationarity Test

In general, economic time series tend to exhibit non-stationarity, leading to the occurrence of faulty regressions and erroneous estimations. The identification of the non-stationary state of the variables was accomplished by conducting the Augmented Dickey-Fuller (ADF) unit root test (1979) with the estimate equation provided below:

$$\Delta y_t = \alpha_0 + \alpha_1 t + \delta y_{t-1} + \alpha_i \sum_{i=1}^{p} \Delta y_{t-i} + \varepsilon_t \quad (1)$$

In this context, y_t represents the time series variable used for evaluating public debt. The constant term is represented by α_0, while the trend in time is captured by t. The estimated coefficient is denoted as δ, and the error term is represented by ε_t. Additionally, p refers to the maximum lag length. The test examines the non-stationary null hypothesis ($\alpha = 0$) in comparison to the alternative stationary hypothesis ($\alpha \neq 0$). The selection of the appropriate lag duration was conducted by Schwarz Bayesian Criteria (BIC).

3.4 Co-integration Test

The Johansen test was employed to assess the null hypothesis of no co-integration between the CLIQ percentiles and PD, in contrast to the alternative co-integration hypothesis. This test utilises the probability ratio to verify the hypothesis. The Johansen test comprises of two tests, namely the trace test and the max eigenvalue test. The equations for the trace test (2) and maximum test (3) are presented below.

$$\lambda_{trace}(\mathrm{r}) = -\mathrm{T} \sum_{i=r+1}^{n} ln(1-\lambda_i) \quad (2)$$

$$\lambda_{\max}(\mathrm{r}, \mathrm{r}+1) = -\mathrm{T} ln(1-\lambda_{r+1}) \quad (3)$$

In the equation, r represents co-integration vector, T represents the sample size, and λi represents the canonical correlation.

3.5 Vector Error Correction (VEC) Model

The short- and long-term dynamic relationships were identified using the VEC Model, of which the linear expression is as follows:

$$\lambda Y_{t,i} = \alpha_i + \gamma_i \beta_i Y_{t-1} + \sum_{z=1}^{n} \Gamma_{j,i} \Delta Y_{t-j,i} + \varepsilon_{t,i} \quad (4)$$

where $Y_{t,i} \equiv (X_i, M_j)$ is a vector of variables (X_i = *PD* and M_j = VA, PS, GE, RQ, RL, and CC), α is a vector of constant stand for the linear trend, *T* is the matrix denoting the short-run correlation, and β_i is the co-integration vector. The error correction coefficient (γ) with a negative sign in the range of $-1 < \gamma < 0$ identifies the adjustment speed to the long-run equilibrium path. This information helps in comprehending the variable's reaction to shock.

3.6 Granger Causality Test

This study used Granger Causality (Engle & Granger, 1987) to identify the prevalence of co-movements, i.e., the causality path between CLIQ and PD and whether it can help identify the long-run stable equilibrium. To attain all the objectives mentioned above, the equations below were used:

$$X_t = \sum_{i=1}^{n} \alpha_i Y_{t-i} + \sum_{j=1}^{n} \beta_i X_{t-j} + \mu_{1t} \quad (5)$$

$$Y_t = \sum_{i=1}^{m} \lambda_i X_{t-i} + \sum_{j=1}^{m} \sigma_i Y_{t-j} + \mu_{2t} \quad (6)$$

where X_t, is the public debt, Y_t is the six dimensions of country-level institutional quality (VA, PS, GE, RQ, RL, and CC), α_i, β_i, λ_i, and δ_i are the coefficients, $\mu_{1;2t}$ are the error terms presumed to be uncorrelated, and *m* and *n* are the maximum number of lags. Equation (5) demonstrates how variable *X* is determined by the lagged values of *Y* and *X*, while equation (6) presents the reverse, i.e., how variable *Y* is affected by itself and the lagged *X* variable. Meanwhile, the Granger-Causality denotes that lagged *Y* influences *X* and lagged *X* influences *Y* (equations 5 and 6, respectively).

3.7 Toda-Yamamoto Model

As an alternative to Granger Causality, the Toda-Yamamoto Method (1995) was used to analyse the causation via the Wald statistic (an asymptotic X^2-distribution). The test entails using the extra lags employed independently based on the integration order. Indeed, the variables can either be co-integrated or otherwise. Below are the equations for the multivariate VAR ($n + z_{max}$) entailing public debt and country-level institutional quality:

$$X_t = \omega + \sum_{j=1}^{n} \theta_i X_{t-1} + \sum_{j=n+1}^{n+z_{max}} \theta_i X_{t-1} + \sum_{j=1}^{n} \delta_i Y_{t-1} + \sum_{j=n+1}^{n+z_{max}} \delta_i Y_{t-1} + \mu_1 \quad (7)$$

$$Y_t = \psi + \sum_{j=1}^{n} \phi_i Y_{t-1} + \sum_{j=n+1}^{n+z_{max}} \phi_i Y_{t-1} + \sum_{j=1}^{n} \beta_i X_{t-1} + \sum_{j=n+1}^{n+z_{max}} \beta_i X_{t-1} + \mu_2 \quad (8)$$

where *X* = public debt and *Y* = VA, PS, GE, RQ, RL, and CC, respectively; ω, θ, δ, ψ, φ, are β are the coefficients; z_{max} is the maximum (optimal number) order of integration, and $\mu_{1;2t}$ is the white-noise errors. There are two steps to the Toda-Yamamoto Model: first is the lag length (*m*) choice and second is the maximum integration order (z_{max})[4].

4. RESULTS AND DISCUSSIONS

4.1 Descriptive Results

The statistical measures of CLIQ and PD from 1996 to 2017 are displayed in Panel A of Table 1. The present study utilised a descriptive statistical approach to demonstrate the associations between the variables through the utilisation of measures such as (mean, median, maximum, minimum, and standard deviation). In relation to the observations made on public debt, it was determined that the average value was 141 percent. The middle value, known as the median, was discovered to be 132.524. Furthermore, the range of values varied between 66.499 and 198.900 percent, representing the least and maximum values respectively. According to a report by Business Insider in 2017, the above-mentioned statistics indicate that Japan's public debt is significantly higher when compared to that of other Asian and emerging countries. In addition, CLIQ employed statistical calculations to determine percentile rankings ranging from 0 (indicating weak governance) to 100 (indicating good governance). These rankings were based on many variables including (VA, PS, GE, RQ, RL, and CC). The results indicate that the variable VA exhibited a mean value of 78.941 and a median value of 79.064. The observed values ranged from 74.627 to 84.977. The dataset under consideration, denoted as PS, exhibits a mean value of 85.178 and a median value of 83.886. The range of values within the dataset spans from 77.404 to 93.085. GE scored a mean value of 88.579 and a median value of 88.571. The range of values observed for this data set ranged from 81.421 to 96.154. The data set for RQ yielded a mean of

81.014 and a median of 82.521, with values ranging from 68.878 to 90.385. The data collected by RL revealed a mean value of 88.201 and a median value of 88.490. The range of values observed ranged from 84.158 to 90.500. In conclusion, CC's data set yielded a mean value of 87.635 and a median value of 87.344. The range of values observed ranged from 82.323 to 92.788. These values indicate that Japan's governance shows relative weakness when compared to other developed countries such as the France, Canada, Germany, and the UK. Both local and foreign investors encounter elevated levels of uncertainty when making investments in a country characterised by a low CLIQ.

Next, Panel B shows Japan's general trend concerning the performance of its CLIQ. VA reported 81.00 and 80.30 percentiles in 1996 and 2017, respectively. PS recorded 88.30 and 89.05 percentiles in 1996 and 2017, respectively, with the latter being the lowest performance ever for the country. GE documented 81.42 and 93.27 percentiles in 1996 and 2017, respectively. RQ achieved 72.83 and 89.90 percentiles in 1996 and 2017, respectively. RL recorded 89.45 and 89.90 percentiles in 1996 and 2017, respectively. Finally, CC displayed an upward trend from 1996, achieving a 90.38 percentile in 2017. Hence, it can be concluded that all six country-level institutional-quality performance dimensions in Japan are relatively weak in comparison to those of other developed nations.

Table 1 Results of Descriptive Statistics

PANEL A	Mean	Median	Max	Min	Std. Dev.
PD (ratio)	141.303	132.524	198.900	66.499	41.232
VA (percentile)	78.941	79.064	84.977	74.627	3.312
PS (percentile)	85.178	83.886	93.085	77.404	4.721
GE (percentile)	88.579	88.571	96.154	81.421	4.300
RQ (percentile)	81.014	82.521	90.385	68.878	6.337
RL (percentile)	88.201	88.490	90.500	84.158	1.894
CC (percentile)	87.635	87.344	92.788	82.323	3.461

PANEL B	VA	PS	GE	RQ	RL	CC
1996	81.00	88.30	81.42	72.83	89.45	84.41
1998	74.63	93.09	83.42	70.98	90.50	84.02
2000	75.62	88.36	86.67	80.00	87.13	85.79
2002	75.62	88.89	83.16	68.88	84.16	82.32
2003	83.58	82.91	85.71	81.63	84.65	84.34
2004	82.69	82.52	89.16	82.27	88.04	85.85
2005	81.25	82.52	85.78	86.76	87.56	84.39
2006	76.92	90.82	91.71	87.25	89.95	89.27
2007	75.96	82.61	88.83	84.95	89.47	85.44
2008	75.48	77.40	88.35	83.50	88.94	88.83
2009	79.62	84.83	88.52	82.78	87.68	89.00
2010	81.04	77.73	90.43	81.82	87.68	91.43
2011	82.16	81.99	89.57	81.99	87.32	91.00
2012	84.51	78.20	88.63	84.36	87.79	91.94
2013	84.98	82.94	93.84	82.94	90.14	92.42
2014	79.31	80.00	96.15	84.13	89.42	92.79
2015	78.82	89.05	95.19	85.10	89.42	91.35
2016	77.34	82.38	95.67	90.38	89.42	90.87

2017	80.30	89.05	93.27	89.90	89.90	90.38

4.2 Unit Root Test

Before determining the relationship between CLIQ and PD, a unit-root test was performed for every variable by employing the ADF test to ascertain the non-presence of unit roots. The variables of VA, PS, GE, RQ, RL, and CC are hypothesised to be non-stationary, i.e., possessing a unit root based on the null hypothesis (H_0). Hence, an ADF test was performed, and the findings indicated the presence of unit root at the level and the first difference (see Table 2). These variables have the order 1 integration, proving the existence of long-run combinations (Engle & Granger, 1987). As such, a co-integration test was performed to decide the possibility of long-run relationships (see Table 3).

Optimal lag was achieved by applying the Hannan-Quinn Criteria (HQC), the Akaike Information Criteria (AIC), and the Schwarz Bayesian Criteria (BIC). As previously specified by the criteria mentioned above, the proper number of lags is 1. Hence, the hypothesis of non-relationship can be overruled if all the series are stationary, including when they are non-existent. The variables need to be co-integrated to ensure the presence of a long-run relationship between them. Hence, the Johansen and Juselius (1990) Co-integration Test was conducted on the CLIQ and PD relationship. The overall result of the Johnson tests for lags of 1 to 2 is presented in Table 4. Based on the trace and maximum test, two co-integration relationships between CLIQ and PD were identified. Implication-wise, although the series (i.e., VA, PS, GE, RQ, RL and CC) are non-stationary in their individual capacities, their linear mixture is stationary. Hence, a long-run balanced relationship among the variables is established.

Table 2 Results of the Augmented Dickey-Fuller (ADF) Test

	Level				**First difference**			
ADFT	**Intercept**		**Trend and Intercept**		**Intercept**		**Trend and Intercept**	
PD	t-Stat	prob.*	t-Stat	prob.*	t-Stat	prob.*	t-Stat	prob.*
	-2.1816	0.2145	-2.6299	0.2685	-9.1654	0.0000***	-9.1305	0.000***
Test critical values:								
1% level	-3.5074		-4.067		-3.5083		-4.0682	
5% level	-2.8951		-3.4623		-2.8955		-3.4629	
10% level	-2.5847		-3.1575		-2.585		-3.1578	
VA	-2.1816	0.2145	-2.6299	0.2685	-9.1654	0.0000***	-9.1305	0.0000***
Test critical values:								
1% level	-3.5074		-4.067		-3.5083		-4.0682	
5% level	-2.8951		-3.4623		-2.8955		-3.4629	
10% level	-2.5847		-3.1575		-2.585		-3.1578	
PS	-1.8768	0.3416	-1.5136	0.8172	-8.8363	0.0000***	-8.9144	0.0000***
Test critical values:								
1% level	-3.5113		-4.0724		-3.5113		-4.0724	
5% level	-2.8968		-3.4649		-2.8968		-3.4648	
10% level	-2.5856		-3.159		-2.5856		-3.1589	
GE	-1.6998	0.4278	-3.1938	0.0925	-9.2701	0.0000***	-9.2307	0.0000***
Test critical values:								
1% level	-3.5074		-4.067		-3.5083		-4.0682	

5% level	-2.8951		-3.4623		-2.8955		-3.4629	
10% level	-2.5847		-3.1575		-2.585		-3.1578	
RQ	-1.6258	0.4652	-2.6125	0.276	-9.2368	0.0000***	-9.1817	0.0000***
Test critical values:								
1% level	-3.5074		-4.067		-3.5083		-4.0682	
5% level	-2.8951		-3.4623		-2.8955		-3.4629	
10% level	-2.5847		-3.1575		-2.585		-3.1578	
RL	-1.7915	0.3824	-2.0456	0.5681	-9.1656	0.0000***	-9.1720	0.0000***
Test critical values:								
1% level	-3.5074		-4.067		-3.5083		-4.0682	
5% level	-2.8951		-3.4623		-2.8955		-3.4629	
10% level	-2.5847		-3.1575		-2.585		-3.1578	
CC	-1.3682	0.5943	-2.6305	0.2682	-7.3113	0.0000***	-7.2688	0.0000***
Test critical values:								
1% level	-3.5074		-4.067		-3.5113		-4.0724	
5% level	-2.8951		-3.4623		-2.8968		-3.4648	
10% level	-2.5847		-3.1575		-2.5856		-3.1589	

Note: (*) = 10% significance, (**) = 5% significance, (***) = 1% significance.

Table 3 Results of Johansen's Co-integration Test

Panel A: Unrestricted Co-integration Rank Test (Trace)				
Hypothesised		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.3968	207.361	77.8188	0.0000
At most 1	0.18747	85.0265	54.6815	0.0000
At most 2	0.08357	49.3014	35.4582	0.0122
At most 3	0.15895	34.7875	47.8561	0.0459
At most 4	0.04665	13.668	19.9371	0.0925
At most 5	0.00867	2.10683	6.6349	0.1466
At most 6	0.0106	0.9167	3.84147	0.3383
Panel B: Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesised		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.3968	122.334	39.3701	0.0000***
At most 1	0.18747	50.239	32.7153	0.0000***
At most 2	0.08357	21.1195	33.8769	0.0502***
At most 3	0.15895	11.5611	25.8612	0.0612**
At most 4	0.04665	2.10683	18.52	0.0781**
At most 5	0.00867	5.8448	14.2646	0.6332
At most 6	0.0106	0.9167	6.6349	0.3383

Note: Trace and Max eigenvalue denoting two co-integration equations at 1%; (***) denotes the dismissal of the null hypothesis at 1%.

Table 4 Results of Lag Structure

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1485.2	NA	23675578	36.8451	37.052	36.9281
1	-958.53	949.348	179.3934*	25.05020*	26.70562*	25.71438*
2	-948.34	16.6053	479.9113	26.0085	29.1124	27.2538
3	-929.8	27.0067	1089.362	26.7606	31.313	28.5871
4	-883.82	59.0413	1342.453	26.8351	32.836	29.2427
5	-785.31	109.4516*	499.6563	25.6127	33.0621	28.6015
6	-766.87	17.3013	1554.503	26.3673	35.2652	29.9372
7	-725.02	32.0408	3377.67	26.5436	36.89	30.6947

Notes: (*) = optimal value of each information criterion's, AIC = Akaike Information Criterion, FPE = Final Prediction Error, HQC = Hannan-Quinn Criterion, BIC = Schwarz Bayesian Criterion.

4.3 Vector Error Correction (VEC) Test

Following confirmation of the long-run equilibrium relationships, the VEC Model was carried out to determine the dynamical link between CLIQ and PD. The VEC identifies public debt fluctuations and adjustments as a reaction to variations in CLIQ. VEC explicates the amount of time needed by Japan economic-wise to adjust to its long-run equilibrium. Hence, this approach is beneficial for determining the existence of any correction mechanism following the divergence of public debt from the long-run equilibrium pathway. The final estimated equation of long run and short run scenario is reported in Table 5 of Panel A and B.

According to the result in Panel A of Table 5, the error term coefficients of VA, PS, GE, and RQ were found to be significantly negative by the error-correction models while RL and CC were significantly positive factors of public debt. Following Tran and Jeon (2011), this study adopted the VEC approach by altering its variables. The error correction term's coefficient measuring the adjustment speed towards the long-run equilibrium was significantly negative at 1% and lower than 1, which is deemed as fitting. The outcomes support the usage of the model's error correction model (ECM) specifications. A key finding entails the ECM's statistical significance which suggests that public debt is adjusted to rectify the long-run disequilibrium between itself and its determinants. The ECM's coefficient is higher than unity in the long run, indicating a high adjustment speed to equilibrium. This coefficient shows the speed at which CLIQ adjusts to public debt.

This study's parameter estimates are within a sound range and propose a reasonably modest reaction to public debt by CLIQ. High percentiles of RL and CC indicate a high level of public debt. This finding suggests that a high debt level can also lead to public investments such as infrastructural developments that can increase the capability of supplying the total output (Baumol & Peston, 1955; Haavelmo, 1945). Meanwhile, high VA, PS, GE, RQ, and RL percentiles indicate a low level of public debt. As such, increased public debt is damaging as an extensive fiscal policy raises the existing intake, thus leading to lower savings rates. As a result, interest rate levels rise, thus lowering private sector investments and slowing down growth. All these will in turn, cause crowding of investments and capital and reduction in long-run output as proven by (Diamond, 1965; Modigliani, 1961; Saint-Paul, 1992).

Further, Table 5 of Panel B reports the short-run results of VECM (co-integrating equation) that confirms the findings of long-run equilibrium with 9% of adjustment speed. The result reports that VA, PS, GE, RQ, and RL are positive significant, while control of corruption is negative

significant in short-run scenario of public debt. Based on the findings, public debt has a coefficient of determination (adjusted R^2) of between 71.41 per cent, suggesting that 72% of the variants in the dependent variable are justified by the independent variables. It is noteworthy that the error terms coefficient is highly substantial as compared to that of other works. This finding indicates a rapid adjustment speed or that the Japanese market responds efficiently to external shocks. Taking cues from studies such as Tran and Jeon (2011), the time to carry out the halfway adjustments were computed using the estimated error-correction (ECT) coefficient. The outcomes confirm that the variables are made up of a co-integrated set.

Table 5 Panel VEC Model Estimation Results

Panel A Long-run Scenario		**Panel B Short-run Scenario**
Co-integrating equation		-0.0918
		-4.6546
VA	-2.6807	0.4190
	-5.0950	2.5740
PS	-3.0550	0.6720
Panel B Short-run Scenario		**Panel A Long-run Scenario**
	-10.6903	2.3834
GE	-0.5564	0.2800
	-2.7733	2.9228
RQ	-0.4713	4.0350
	-5.0421	7.2009
RL	1.0222	1.6400
	3.2275	2.6911
CC	0.5250	-0.2900
	2.9308	-2.4642
C	-10.0555	0.0101
		4.9040
R-squared	0.7141	
Adj. R-squared	0.6520	

Additionally, the forecast error variance decomposition (FVD) was also computed along with the impulse response functions to gain a better insight into the structural link between CLIQ and PD (refer to Table 6 and Figure 2). It was found that VA, PS, GE, RQ, RL and CC are significantly affected public debt, as demonstrated by the causality test (Granger-Causality and Toda-Yamamoto Test). The criteria mentioned above facilitate the identification of the related degree of CLIQ and its relationship with the variance in public debt, specifically the 1st, 5th, and 10th month forecasts of the error variances. The VA, PS, GE, RQ, RL and CC were shown to be the prominent in spreading the forecasted error variances of public debt, with respective contributions of 1.4%, 11.6%, 4.68%, 2.35%, 0.25%, and 3.2%.

4.4 Variance Decomposition

Table 6 Results of Variance Decomposition of Public Debt

Period	**S.E.**	**PD**	**VA**	**PS**	**GE**	**RQ**	**RL**	**CC**
1	4.2645	100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	5.4075	99.829	0.0051	0.1012	0.0130	0.0118	0.0395	0.0001

3	6.3772	98.3055	0.0720	1.0609	0.1535	0.1374	0.0295	0.2409
4	7.2070	95.5856	0.2239	2.5863	0.4355	0.4725	0.0232	0.6728
5	7.9680	92.2623	0.4229	4.3296	0.8733	0.8944	0.0217	1.1957
6	8.6762	88.7904	0.6380	6.0552	1.4544	1.3082	0.0311	1.7225
7	9.3425	85.3895	0.8526	7.6676	2.1559	1.6690	0.0567	2.2084
8	9.9736	82.1557	1.0582	9.1395	2.9484	1.9620	0.1021	2.6339
9	10.5741	79.1253	1.2505	10.4719	3.8009	2.1876	0.1688	2.9948
10	11.1473	76.3088	1.4275	11.6754	4.6839	2.3526	0.2569	3.2946

Impulse Response Functions (IRFs) allow the exploration of how a shock on a certain variable affects the others or the response of a certain variable to the shock experienced by another. The IRF was employed to determine the response of public debt to one standard deviation shock of VA, PS, GE, RQ, RL, and CC. The IRFs were calculated for a prospect of 10 months. Figure 2 demonstrates how dynamically public debt responded to the shocks in VA, PS, GE, RQ, RL, and CC, whereby the series were indicated to have shown no volatile comportment. Based on inspection of the graph, it also seems that VA, PS, GE, and RQ affected public debt negatively along with the confirmed positive effect of RL and CC. The shock in RL and CC had caused a hike in public debt, specifically in the initial 3–5 months. While the positive impact may be due to the increase in the CLIQ performance, which in turn decreases the public debt concentration.

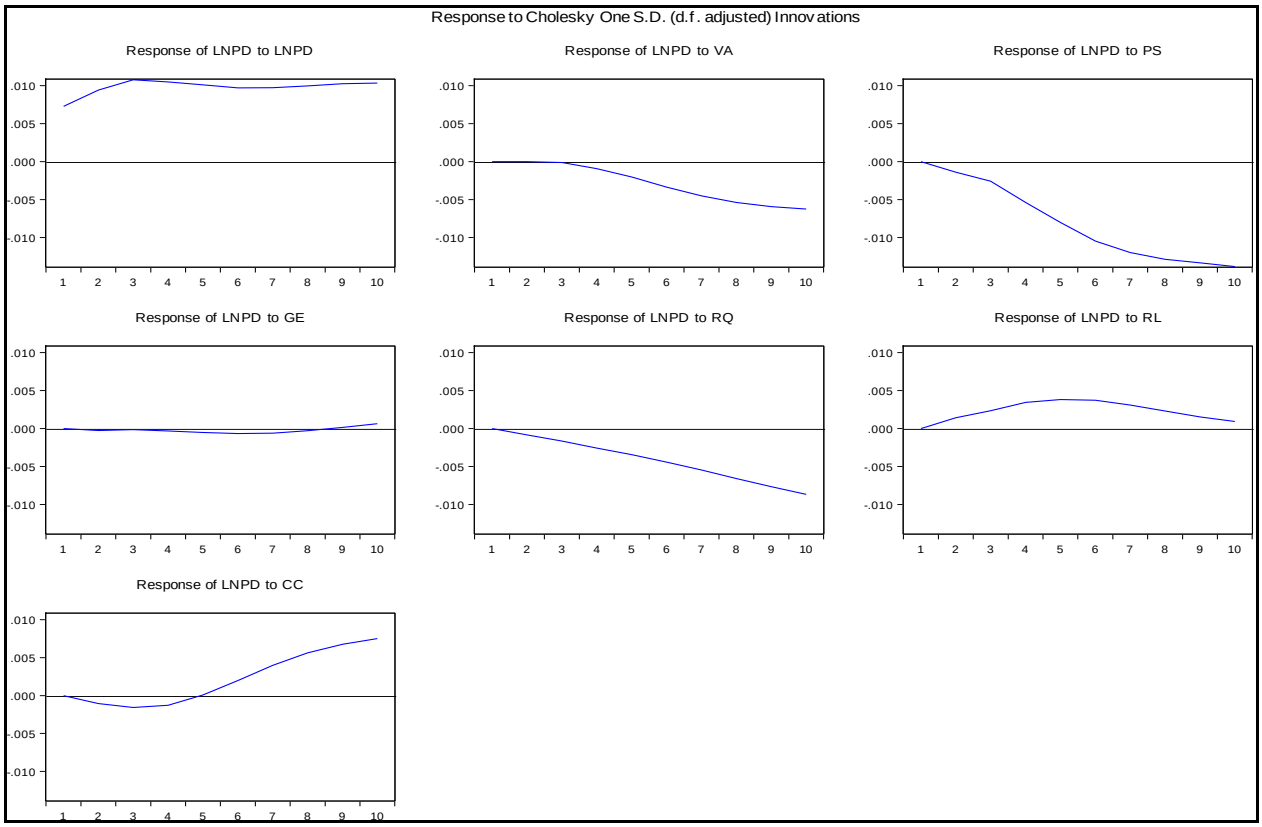


Figure 2. Impulse Response

"Note: The impulse response is with a one standard deviation shock. The (…) dotted red lines denote one standard deviation error at a 95% confidence interval."

4.5 Pairwise Granger Causality Tests

The relationship between institutional quality at the country level and public debt, as depicted in Table 7, is established using the Granger Causality Test. The influence of public debt is determined by six elements of CLIQ, specifically, 'VA, PS, GE, RQ, RL, and CC'.

Table 7 Results of Pairwise Granger Causality Tests

Null Hypothesis:	**F-Statistic**	**Prob.**
$VA \nrightarrow PD$	2.0016	0.0871
$PD \nrightarrow VA$	2.7674	0.0999
Null Hypothesis:	**F-Statistic**	**Prob.**
$PS \nrightarrow PD$	1.7159	0.0638
$PD \nrightarrow PS$	1.3554	0.2476
$GE \nrightarrow PD$	2.0400	0.0771
$PD \nrightarrow GE$	6.8687	0.0104
$RQ \nrightarrow PD$	2.1172	0.0703
$PD \nrightarrow RQ$	3.3384	0.0712
$RL \nrightarrow PD$	3.1485	0.0870
$PD \nrightarrow RL$	1.6541	0.2019
$CC \nrightarrow PD$	2.8109	0.0618
$PD \nrightarrow CC$	4.5302	0.0362
$PS \nrightarrow VA$	3.2202	0.0763
$VA \nrightarrow PS$	0.4583	0.5003
$GE \nrightarrow VA$	0.2154	0.6437
$VA \nrightarrow GE$	4.6175	0.0345
$RQ \nrightarrow VA$	0.0182	0.8932
$VA \nrightarrow RQ$	0.3085	0.5809
$RL \nrightarrow VA$	3.3546	0.0706
$VA \nrightarrow RL$	7.0338	0.0096
$CC \nrightarrow VA$	0.7447	0.3906
$VA \nrightarrow CC$	1.6253	0.2059
$GE \nrightarrow PS$	0.6266	0.4308
$PS \nrightarrow GE$	1.2465	0.2674
$RQ \nrightarrow PS$	0.2672	0.6066
$PS \nrightarrow RQ$	4.0073	0.0491
$RL \nrightarrow PS$	4.1911	0.0666
$PS \nrightarrow RL$	2.9270	0.0868
$CC \nrightarrow PS$	0.6237	0.4319
$PS \nrightarrow CC$	3.0823	0.0828
$RQ \nrightarrow GE$	3.6966	0.0403
$GE \nrightarrow RQ$	1.8905	0.1728
$RL \nrightarrow GE$	3.0128	0.0910
$GE \nrightarrow RL$	0.3741	0.5424
$CC \nrightarrow GE$	1.7346	0.1914
$GE \nrightarrow CC$	0.2381	0.6269

$RL \nrightarrow RQ$	0.0002	0.9868
$RQ \nrightarrow RL$	2.7790	0.0992
$CC \nrightarrow RQ$	0.2178	0.6419
$RQ \nrightarrow CC$	0.6163	0.4346
$CC \nrightarrow RL$	3.8244	0.0536
$RL \nrightarrow CC$	4.1167	0.0873

4.6 Toda-Yamamoto Test

The Toda-Yamamoto Test indicates two situations (see Table 8). Firstly, the null hypothesis of no causality at a 1% significance level can be rejected for VA, PS, GE, and RQ, which is substantial in explaining public debt. Secondly, the null hypothesis with regard to RL and CC cannot be rejected. Meanwhile, the Granger Test indicates that public debt can be significantly explained by VA, PS, GE, and RQ, i.e., public debt could be reduced if CLIQ improves.

Table 8 Yoda-Yamamoto Results

Dependent variable: public debt (PD)			
Excluded	**Chi-sq**	**df**	**Prob.**
VA	6.181	2	0.045 ***
PS	230.85	2	0.0000 ***
GE	110.89	2	0.0000 ***
RQ	236	2	0.0000 ***
RL	1.612	2	0.4461
CC	2.783	2	0.5091
All	588.316	12	1

Note: (*) = 10% significance, (**) = 5% significance, (***) = 1% significance.

5. CONCLUSION

This study examined the extent to which CLIQ can explain and influence the level of public debt in Japan during the period from 1996 to 2017. This paper contributes to the existing literature on public debt by offering a comprehensive analysis of CLIQ, specifically highlighting the unfavourable market conditions in Japan resulting from its persistent public debt burden. The present study included many statistical techniques, including 'The Unit Root Test, Johansen's Co-integration Analysis, VEC Model, Variance Decomposition, Impulse Response Analysis, Pairwise Granger Causality Test, and The Toda-Yamamoto Model'. These methodologies were utilised to investigate the relationship between the explanatory factors and public debt. Therefore, based on econometric methods, the investigations have revealed the significant influence of various indicators, including 'VA, PS, GE, RQ, RL and CC'. These indicators are indicative of an unfavourable economic environment that is associated with higher levels of public debt. The empirical findings demonstrate a statistically significant correlation between the quality of institutions at the country level and the level of public debt, both in the long term and in the short term. The results suggest that there is a positive correlation between a country's weak governance and its public debt to GDP ratio.

Particularly, the findings suggest for the implementation of robust policy for Japan to reduce its public debt by establishing PS, reducing violence, maintaining regulatory quality, and implementing the rule of law, as all these factors may reduce government debt. Additionally, the Japanese government should focus on the determinants of the quality of their institutions.

Therefore, they need to minimise private gains and also implement and formulate strong policies and regulation so that all citizens can express their views effectively. Likewise, structures and programmes that are prone to corruption need to change and be monitored regularly, which in turn could lead to effective debt management. By doing this, the use of public funds and other government allocations should be goal-oriented in order to improve the welfare of citizens.

Besides, to reduce public debt, the government should frequently track the relationship between governance and public debt ratio. The Japanese government can reinstate the country's budget balance and lessen its public debt by reducing and streamlining the government's expenditure as well as practising a more rigorous fiscal policy. Lastly, positive outcomes can be achieved by introducing strategic measures to improve and solidify the quality of the government and its public institutions. Such actions call for a critical political change for Japan, which has been facing severe fiscal and external disproportions in recent years caused by major policy setbacks including deflation, slow growth, and low fiscal revenues.

In this study, a limited number of variables are utilised to explain the relationship among CLIQ and public debt. Therefore, more variables, for instance, geopolitical risk, foreign direct investment, inflation and unemployment can be used in future studies.

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