ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-2-227-238
JEL D31, E24, H63

Does Institutional Setting Contribute to the Public Debt — Income Inequality Relationship in Developing Economies?

V.B. Nguyen
University of Finance — Marketing (UFM), Ho Chi Minh City, Vietnam

ABSTRACT

In the context of increasing globalization, income inequality is one severe problem in several countries because it widens the income gap between the rich and the poor, which leads to social instability. Narrowing this gap has become one of the main agendas in many developing countries to satisfy the millennium goals proposed by the United Nations. Meanwhile, government expenditure is one crucial fiscal instrument as it contributes significantly to running the economy and overcoming economic cyclicality. In particular, governance/institutional can positively adjust the public debt — income inequality relationship in developing economies. The **purpose** of the study to identify the impact of institutional quality, public debt and their interaction on income inequality on a balanced data panel of 34 developing economies for the period 2002–2020. For monitoring endogenous problems and serial autocorrelation in empirical equations, two-step and one-step system GMM (Generalized Method of Moments) assessments are used. The results from the study show that public debt and the quality of institutions increase income inequality, but their interaction narrows it. These results seem to be counter-intuitive. Besides, education enhances income inequality in these economies. The **results** of the study provide some policy recommendations for reducing the inequalities in society through public debt and the quality of institutions in developing economies. Accordingly, governments in developing economies should use spending financed by public debt to support low-income individuals through social transfers throughout economic development. Importantly, they should spend more on education and health to help the poor improve their skills and knowledge, narrowing the income difference between the rich and the poor. In particular, they should be prudent in controlling and managing public debt to avoid a public debt crisis and social instability.

Keywords: institutional quality; public debt; income inequality; developing economies; system GMM; difference GMM; debt crisis; social instability

For citation: **Nguyen V.B. Does institutional setting contribute to the public debt — income inequality relationship in developing economies? *Finance: Theory and Practice.* 2024;28(2):227-238. DOI: 10.26794/2587-5671-2024-28-2-227-238**

ОРИГИНАЛЬНАЯ СТАТЬЯ

Влияет ли институциональное устройство на взаимосвязь государственного долга и неравенства доходов в развивающихся странах?

В.Б. Нгуен
Университет финансов и маркетинга (UFM), Хошимин, Вьетнам

АННОТАЦИЯ

В условиях растущей глобализации неравенство доходов является одной из серьезных проблем в ряде стран, поскольку оно увеличивает разрыв в доходах между богатыми и бедными, что приводит к социальной нестабильности. Сокращение этого разрыва стало одной из основных задач во многих развивающихся странах для достижения целей тысячелетия, предложенных Организацией Объединенных Наций. Между тем, государственные расходы являются одним из важнейших фискальных инструментов, поскольку они вносят значительный вклад в управление экономикой и преодоление экономической цикличности. В частности, управление/институты могут положительно корректировать взаимосвязь между государственным долгом и неравенством доходов в развивающихся экономиках. **Цель** исследования — определить влияние качества институтов, государственного долга и их взаимодействия на неравенство доходов на сбалансированной панели данных 34 развивающихся экономик за период с 2002 по 2020 г. Для контроля эндогенных проблем и серийной автокорреляции в эмпирических уравнениях применяются двухшаговые и одношаговые системные GMM (Generalized Method of Moments) оценки. В работе получены интересные

результаты, свидетельствующие о том, что государственный долг и качество институтов увеличивают неравенство доходов, но их взаимодействие сужает его. Эти результаты кажутся контринтуитивными. Кроме того, образование усиливает неравенство доходов в этих странах. **Результаты** исследования позволяют сформулировать некоторые политические рекомендации по снижению неравенства доходов в обществе с помощью государственного долга и качества институтов в развивающихся экономиках. Так, правительствам развивающихся стран следует использовать расходы, финансируемые за счет государственного долга, для поддержки людей с низким уровнем дохода посредством социальных трансфертов на протяжении всего периода экономического развития. Важно отметить, что они должны больше тратить на образование и здравоохранение, чтобы помочь бедным улучшить свои навыки и знания, сокращая разницу в доходах между богатыми и бедными. В частности, они должны быть благоразумны в контроле и управлении государственным долгом, чтобы избежать кризиса государственного долга и социальной нестабильности.

Ключевые слова: государственная задолженность; неравенство доходов; институциональное качество; развивающиеся экономики; системная ГММ; разностная ГММ; долговой кризис; социальная нестабильность

Для цитирования: **Nguyen V.B. Does institutional setting contribute to the public debt — income inequality relationship in developing economies? *Финансы: теория и практика.* 2024;28(2):227-238. DOI: 10.26794/2587-5671-2024-28-2-227-238**

INTRODUCTION

Income inequality in society becomes a global challenge in most economies under rising globalization, as it can lead to political and social instability. Narrowing the income gap across economies is one of the eight-millennium goals set up by the United Nations. Public spending plays a crucial role in the fiscal policies of governments. It plays a more active role in fiscal policy by running the economy and overcoming economic cyclicality. Governments actively spend less for a fast-growing economy with high inflation (the contractionary policy with decreased spending) and more for an economic recession with high unemployment (the expansionary policy with increased spending) (V. B. Nguyen [1]). In particular, governments can spend more to help low-income individuals access healthcare and education through social transfers to decrease the income difference between rich and poor individuals. However, increasing public spending financed by debt can cause high public debt. Economic history shows that public debt crises often lead to economic crises, such as the European sovereign debt crisis in 2009 with high public debt of the PIIGS group (Ireland, Portugal, Italy, Spain, Greece), the financial crisis in East Asian countries officially in 1997 with the collapse of the Thai baht, and the Latin American debt crisis of the 1980s. As a result, these economies must implement austerity policies and lose economic sovereignty to get rescue packages from the IMF or World Bank. Their citizens face uncertain economic prospects with a high unemployment rate. Therefore, governments must control and manage public debt with strict fiscal discipline to avoid a public debt crisis in the future. Despite the crucial role of public debt in narrowing the gap in income inequality in society, its effect on inequality can remain a controversial topic. Since the birth of the GINI index in 1912, several related studies have examined the impact of public debt on inequality. Unfortunately, no studies consider the role of institutional quality in the public debt — income inequality relationship. Does governance/institutional quality contribute to the public debt — income inequality relationship in developing economies? The paper looks for the answer as a novel contribution to the literature.

Given the related topic, M. Chatzouz [2] and K. Borissov and A. Kalk [3] develop theoretical frameworks to indicate the effect of public debt on income inequality. M. Chatzouz [2] suggests a simple analytical model to note how government debt affects wealth inequality through altruism. Meanwhile, K. Borissov and A. Kalk [3] develop a theoretical model of AK economic growth with public debt/fiscal deficits funded by income taxes and the presence of positional concerns. The analysis reports that policies focusing on reducing initial inequality through public debt can widen inequality in the future. This paper discovers that institutional quality/governance can significantly contribute to the public debt — income inequality relationship in developing economies. According to S. Li and L. Filer [4], developing economies have relation-based governance (poor institutional quality). These economies lack the appropriate resources to deal with the income gap in society. Policies and regulations (institutional quality) in these economies focus on enhancing economic growth, which mainly benefits the rich. In particular, social spending in these economies (Asia, Latin America, sub-Saharan Africa) is relatively low across countries, and social transfers only play a less crucial role in economic development, according to

E. Ortiz-Ospina and M. Roser [5]. They mainly use spending financed by public debt on infrastructure and partly on health and education, which are equally benefited by all citizens, increasing the income difference between poor and rich individuals. As a result, public debt and institutional quality widen income inequality. However, because high public debt can cause a public debt crisis and social instability, some regulations and policies (institutional quality) in these economies control and manage public debt strictly, which leads to a decline in government debt. Because of this, the interaction term between institutional quality and public debt can narrow income inequality.

In short, global income inequality is one of the most severe problems, while high public debt may lead to an economic crisis and social instability. In particular, institutional quality/governance can contribute to the public debt — income inequality relationship in developing economies. Given these facts, the paper employs two-step and one-step system-GMM estimators to check the influences of public debt, governance/institutional quality, interaction terms on income inequality for a sample of 34 developing economies from 2002 through 2020.

The paper shows the structure as follows. The introduction in Section 1 provides a theoretical framework, and Section 2 notes some facts on global public debt and global income inequality. The literature review in Section 3 reports the impacts of public debt on inequality, and Section 4 describes the empirical model and research data. Finally, Section 5 notes estimated results and discussion, while Section 6 suggests a conclusion and some policy implications.

OVERVIEWS OF THE GLOBAL PUBLIC DEBT AND GLOBAL INCOME INEQUALITY IN DEVELOPING ECONOMIES

Global Public Debt in Developing Economies

According to the International Monetary Fund,[1] global public debt will make up 97.8% of GDP worldwide in 2021. Compared to last year, it is 0.8% lower, but it remains high due to a high fiscal response by governments to tackle the spread of COVID-19 pandemic. The statistical data from the IMF note that global public debt is now up to $ 88 trillion but will decrease by 1% in 2022 and then steady at 97% of GDP. Furthermore, preliminary estimates from the IMF indicated that global borrowing in 2020 issued by households, governments, and nonfinancial corporations will total $ 226 trillion, an increase an increase of $ 27 trillion from 2019. Notably, low-income and emerging economies accounted for only 7% of the worldwide accumulation of debt in 2020, but developed economies and China captured 90%.

Meanwhile, the International Monetary Fund[2] reports that high government debt should not increase severe concerns about the sustainability of public debt. However, highly indebted developing and emerging economies can find it hard to borrow. To handle the sharp increase in public debt in developing economies, international institutions like the WB (World Bank) and the IMF (International Monetary Fund) have provided debt relief, concessional loans, and grants in 2020. In particular, low-income developing economies need urgent finance for coronavirus control measures, health & education, and social services, especially support for food programs in economies facing malnutrition risk.

Global Income Inequality in Developing Economies

An official report by U. DESA[3] shows that income and wealth inequality have risen in several developing economies within past three decades, but the trends seem differently across countries. Furthermore, some large middle-income economies have experienced increases in income inequality since 1990. Notably, income inequality in China rose in both urban and rural areas.

Although Latin America and Africa are still the regions with the highest income inequality levels, inequality has decreased in 17 out of the 19 Latin American economies. Disparities in income kept rising in South Africa over the post-apartheid period, despite the expansion of social protection and sustained economic growth. High wage gaps, high polarization in the labor force, and persistently high unemployment were the causes leading to high-income inequality in this country in 2015. Income inequality in many economies in the Caribbean and Latin America increased during the 1990s due to a

[1] International Monetary Fund. 2021 Update of the IMF Global Debt Database. 2021a. URL: https://www.imf.org/en/News/Seminars/Conferences/2021/12/15/2021-update-of-the-imf-global-debt-database#:~:text=The%202021%20update%20of%20the, percent%20of%20GDP%20in%202020 (accessed on 16.12.2021).

[2] International Monetary Fund. Fiscal Monitor Update, January 2021. 2021b. URL: https://www.imf.org/en/Publications/FM/Issues/2021/01/20/fiscal-monitor-update-january-2021 (accessed on 16.12.2021).

[3] DESA U. World social report 2020: Inequality in a rapidly changing world. New York, NY: Department of Economic and Social Affairs, United Nations. 2020.

decade of widening wage gaps and strong economic instability. However, it has decreased since 2000. Since 2010, it has risen in Mexico, Brazil, and Argentina.

Most economies in Asia enjoyed high-income inequality in the 1990s. In particular, in China, the income gap rose in the 1990s as well as the early 2000s, but has decreased since 2008 because this country effectively implements policies aimed at dealing with income inequality and poverty, and regional income inequalities have decreased.

Notably, the income shares of the top 1% rose in 59 out of 100 economies. In 2015, the 1% richest earned over 20% of income in 18 economies, including the United States, the United Arab Emirates, Turkey, Thailand, the Russian Federation, India, Chile, and Brazil. Although income inequality in Brazil has declined, the income shares of the richest 1% before transfers and taxes rose to 28.3% in 2015 from 26.2% in 2001.

It is hard to determine whether the circumstances of income inequality seen in some economies are the start of a long-term trend or a temporary change. Some economies may have reached the possibility frontier of inequality — the maximum level of wealth and income inequality that can be socially acceptable and possible. Unfortunately, recent trends in labor wealth and income inequality recommend that economic inequality keep rising in the coming years.

LITERATURE REVIEW

Most investigations have recently researched the relationship between income inequality and public debt. Notably, the number of studies on the impacts of government debt on income and wealth inequality is not large.

Regarding the effect of income inequality on government debt, some studies (R. Arawatari and T. Ono [6], S. Röhrs and C. Winter [7], C. March and R.K. von Weizsäcker [8], N. Maebayashi and K. Konishi [9]) develop theoretical models, and others (E. Aksman [10], W. Luo [11], J. Carrera and P. de la Vega [12]) carry out the empirical investigation. R. Arawatari and T. Ono [6] develop a theoretical model to show the conflict of fiscal policy across and within generations in which public debt and income inequality vary. The analysis notes that low-inequality economies implement a contractionary fiscal policy on the side of low levels of public debt, while high-inequality economies realize an expansionary fiscal policy on the side of high levels of public debt. Similarly, S. Röhrs and C. Winter [7] suggest a theoretical model indicating the effect of government debt reduction on wealth and income inequality. It shows that a decline in public debt leads to a good distribution of wealth and income. Notably, C. March and R.K. von Weizsäcker [8] suggest a theoretical model to highlight the mediating role of coordination in the effect of wealth inequality on government debt. More recently, N. Maebayashi and K. Konishi [9] reported an endogenous growth model focusing on the relationship between government debt sustainability and income inequality. The analytic results indicate that public debt sustainability affects both the size of government debt and income inequality. E. Aksman [10] does not find the impact of inequality on public debt using the bias-corrected LSDV estimator for all European Union countries from 1995 to 2015. Recently, W. Luo [11] employed the fixed effects model for a sample of OECD members between 1970 and 2010. He finds that capital income inequality decreases public debt, but labor income inequality increases. Lately, J. Carrera and P. de la Vega [12] applied the system-GMM (S-GMM) estimator and the dummy variable dynamic least square (D-LSDVC) estimator for a balanced panel of 158 countries from 2000 to 2019, reporting a positive contribution of income inequality to public debt.

Regarding the effect of government debt on wealth and income inequality, C. S. Lee [13] uses the FEM (fixed-effects model) and the REM (random-effects models) for a group of 64 developing and advanced countries between 1970 and 1994. He notes that public debt increases income and wealth inequality in limited democracies or non-democracies but decreases it in fully institutionalized democracies. Meanwhile, M. Azzimonti et al. [14] suggest a multi-country theoretical model with incomplete markets. They report that government debt rises along with the volatility in uninsurable income. Furthermore, the analysis finds that the rise in income and wealth inequality in several industrialized economies is linked to this higher risk. These researchers suggest some mechanisms to prevent a sovereign debt crisis induced partly by increased income inequality. Similarly, L. T. Tung [15] finds public debt narrows income inequality using FEM and REM for 17 emerging and developing economies in Asia and the Pacific from 1980 to 2018. More recently, G. Biglaiser and R. J. McGauvran [16] used the fixed effects model for a group of 71 developing countries between 1986 and 2016. They find that debt restructurings widen income inequality. In the same vein, W. L. Obiero and S. G. Topuz [17] employ the ARDL model for time series data in Kenya

from 1970 through 2018. They note that public and internal debt increase income inequality in the long term.

To summarize, the literature review shows that (i) no studies test the significant role of governance/institutional quality in the public debt — income inequality relationship in developing economies, and (ii) no studies apply the two-step and one-step system-GMM estimators that can deal with serial autocorrelation and endogenous phenomena in the empirical models. Therefore, this paper highlights these two aspects as a research gap to contribute to the literature.

METHODOLOGY AND RESEARCH DATA

Methodology

From the literature review, the paper uses the empirical equation as follows:

$$GIN_{it} = \gamma_0 + \gamma_1 GIN_{it-1} + \gamma_2 DEB_{it} + \gamma_3 IN_{it} + \\ + \gamma_2 \left(DEB \times IN\right)_{it} + X_{it}\gamma' + \sigma_i + \tau_{it}, \quad (1)$$

where i, t denotes the country index, time index. GIN_{it} is the Gini index, a proxy of income inequality with a value from 0 to 100, where 0 reports complete equality (everyone has the same income) and 100 reports the highest inequality level; GIN_{it-1} is an initial value of inequality; DEB_{it} is public debt (% GDP); IN_{it} is one of the six governance dimensions (corruption control, law rule, government effectiveness, regulatory quality, political stability, voice &accountability), a proxy of governance/institutional environment; $\left(DEB \times IN\right)_{it}$ is the interaction between public debt and governance/institutional quality. X_{it} consists of control variables such as economic growth, education, and unemployment; σ_i is a time-invariant, country-specific, unobserved effect and τ_{it} is an error term; γ_0, γ_1, γ_2, and γ' are estimated parameters. Following studies like C.S. Lee [13] and G. Biglaiser and R.J. McGauvran [16], the paper uses education and economic growth as control variables. Furthermore, the paper also uses unemployment in the empirical equations, as it can significantly contribute to income inequality.

The paper employs Equation (1) to check the effects of public debt, governance/institutional quality, and interaction on income inequality for a balanced panel of 34 developing economies. Some serious issues in econometrics stem from regressing Equation (1). First, economic growth, public debt, unemployment may be endogenous variables. They may correlate with σ_i, which results in endogenous problems. Secondly, some fixed effects, such as culture, geography, customs, and anthropology, may correlate with some regressors in the empirical equations. These fixed effects exist in σ_i. Thirdly, a serial autocorrelation comes from the presence of GIN_{it-1}. Finally, the dataset contains a large unit of economies (M = 30) but a short length of observations (H = 19). These issues may make the OLS regression biased. The REM and FEM can not tackle serial autocorrelation and endogenous phenomena. Meanwhile, the IV-2SLS estimator requires some appropriate instruments out of independent variables in the empirical model. Following R.A. Judson and A.L. Owen [18], the paper employs the system and difference GMM to estimates and check the robustness.

D. Holtz-Eakin et al. [19] are the first proposers of GMM M. Arellano and S. Bond [20]. So far, two kinds of GMM are available: the difference and the system. The past values of persistent variables provide little information about their future changes in the difference GMM estimator, making the lags in the empirical equation's weak instruments. Therefore, the system-GMM (S-GMM) seems better than the difference-GMM (D-GMM) (M. Arellano and O. Bover [21]).

The two-step GMM estimators are better than the one-step GMM estimators in regression. However, employing the two-step GMM estimators in some research samples (like our small one) will be a problem (D. Roodman [22]). The proliferation of instrumental variables that quadratically rises as the dimension of time rises will exist, which makes the number of instruments outweigh the number of panel units. The solution is to apply the thumb rule to keep the number of instrumental variables less than or equal to the number of panel units (D. Roodman [22]). The paper employs Arellano-Bond (AR), Sargan, Hansen statistics to test the validity of instrumental variables in the GMM estimators. The AR(2) searches the serial autocorrelation in the first difference of errors, while the Sargan, Hansen tests detect endogenous problems.

Research Data

The data contain the Gini index, public debt, governance indicators, GDP per capita, primary school enrollment, and unemployment. The study extracts them from the World Bank and the International Monetary Fund. Due to unavailable

Table 1

Data Description

Variable	Definition	Type	Source
Income inequality (GIN)	'Gini index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution'	value	World Bank
Public debt (DEB)	'Gross debt consists of all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future (% GDP)'	%	IMF
Economic growth (GDP)	'GDP per capita is gross domestic product divided by midyear population'	ln	World Bank
Education (EDU)	'Gross primary school enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown'	%	World Bank
Unemployment (UNE)	'Unemployment refers to the share of the labor force that is without work but available for and seeking employment'	%	World Bank
Institutional quality 1 (IN1)	Regulatory Quality	level	World Bank
Institutional quality 2 (IN2)	Rule of Law	level	World Bank
Institutional quality 3 (IN3)	Voice and Accountability	level	World Bank
Institutional quality 4 (IN4)	Control of Corruption	level	World Bank
Institutional quality 5 (IN5)	Government Effectiveness	level	World Bank
Institutional quality 6 (IN6)	Political Stability and Absence of Violence/Terrorism	level	World Bank

Source: Compiled by the author.

data on the Gini index, the sample consists of 34 developing economies[4] between 2002 and 2020.

The study presents the descriptive statistics, definition, and correlation coefficient matrix in *Table 1–4*. The results in *Table 3* show that education and economic growth are positively associated with inequality, but unemployment is negatively associated with it. The value of correlation coefficients among control variables is low (lower than 0.8), so the study uses all of them in the empirical models. However, the value of all correlation coefficients between the six dimensions of governance is high (higher than 0.8), so the paper employs them separately in the models.

ESTIMATED RESULTS

S-GMM Estimates

Table 5, 6, respectively, show the two-step and one-step S-GMM estimates across all empirical models. Each column is a model corresponding to one governance dimension. The paper detects that public debt is endogenous in all regression procedures. Thus, it uses public debt as an instrument in GMM style and income inequality, economic growth, institutional quality, education, and unemployment as instruments in IV style. The results in *Table 5* indicate that public debt and institutional quality widen income inequality,

[4] Armenia, Argentina, Belarus, Bolivia, Bulgaria, Brazil, Costa Rica, Chile, Colombia, China, Croatia, El Salvador, Dominican Republic, Ecuador, Georgia, Hungary, Honduras, Indonesia, Kyrgyz Republic, Kazakhstan, Malaysia, Moldova, Mexico, Pakistan, Paraguay, Panama, Poland, Peru, Russian Federation, Romania, Turkey, Thailand, Ukraine, Vietnam.

Table 2

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Income inequality (GIN)	646	40.516	8.688	24	59.5
Public debt (DEB)	646	42.294	20.190	3.879	147.203
Economic growth (GDP)	646	6662.293	4065.923	676.269	16661
Education (EDU)	646	103.812	9.020	70.894	146.827
Unemployment (UNE)	646	6.906	4.039	0.398	20.71
Regulatory Quality (IN 1)	646	−0.351	0.553	−1.394	1.592
Rule of Law (IN 2)	646	−0.091	0.528	−1.129	1.275
Voice and Accountability (IN 3)	646	−0.285	0.723	−2.810	1.261
Control of Corruption (IN 4)	646	0.015	0.598	−1.622	1.538
Government Effectiveness (IN 5)	646	−0.322	0.575	−1.371	1.433
Political Stability (IN 6)	646	−0.119	0.709	−1.766	1.292

Source: Compiled by the author.

Table 3

The Matrix of Correlation Coefficients

	GIN	DEB	GDP	EDU	UNE
GIN	1				
DEB	−0.005	1			
GDP	0.119***	−0.081***	1		
EDU	0.505***	0.026	0.187***	1	
UNE	−0.126***	0.124***	0.205***	0.111***	1

Source: Compiled by the author.

Note: ***, **,* — note significance level at 1%, 5%, 10% respectively.

Table 4

The Matrix of Correlation Coefficients Among Governance Indicators

	IN1	IN2	IN3	IN4	IN5	IN6
IN1	1					
IN2	0.834***	1				
IN3	0.501***	0.428***	1			
IN4	0.777***	0.812***	0.410***	1		
IN5	0.888***	0.876***	0.535***	0.861***	1	
IN6	0.617***	0.446***	0.402***	0.627***	0.603***	1

Source: Compiled by the author.

Note: ***, **,* — note significance level at 1%, 5%, 10% respectively.

Table 5

Institutional quality, public debt and income inequality: Twostep S–GMM estimates Dependent variable: Income inequality (Gini index)

Variables	IN1	IN2	IN3	IN4	IN5	IN6
Gini index (–1)	0.919*** (0.010)	0.922*** (0.013)	0.946*** (0.007)	0.926*** (0.011)	0.925*** (0.010)	0.925*** (0.010)
Public debt	0.001 (0.008)	0.019** (0.009)	0.003 (0.007)	0.017** (0.007)	0.012* (0.007)	0.015** (0.007)
Institutional quality	0.763*** (0.245)	1.010*** (0.405)	0.679*** (0.262)	0.947*** (0.255)	0.493** (0.229)	0.612*** (0.177)
Public debt*Ins. quality	–0.017*** (0.004)	–0.020*** (0.004)	–0.014** (0.006)	–0.015** (0.006)	–0.006 (0.006)	–0.009** (0.003)
Economic growth	0.000 (0.000)	–0.000 (0.001)	0.000 (0.000)	–0.001 (0.001)	–0.001 (0.000)	–0.000 (0.001)
Education	0.028*** (0.013)	0.026** (0.011)	0.015* (0.008)	0.034*** (0.008)	0.034*** (0.008)	0.029** (0.012)
Unemployment	–0.030** (0.015)	–0.023 (0.018)	–0.011 (0.017)	–0.027 (0.016)	–0.026 (0.015)	–0.029** (0.016)
Instrument	16	15	15	16	16	17
Country/Observation	34/578	34/578	34/544	34/578	34/578	34/578
AR(2) test	0.393	0.391	0.922	0.381	0.390	0.389
Sargan test	0.585	0.895	0.198	0.119	0.734	0.233
Hansen test	0.768	0.951	0.174	0.554	0.380	0.152

Source: Compiled by the author.

Note: ***, **,* – note significance level at 1%, 5%, 10% respectively.

but their interaction narrows it. Furthermore, education decreases income inequality. These estimates are relatively consistent for all governance indicators.

It seems counter-intuitive that the interaction decreases income inequality, although public debt and institutional quality increase. In practice, developing economies have poor institutional quality. Governments in these economies do not have enough resources to tackle the income gap. They design, formulate, implement the policies and regulations (institutional quality) to promote economic growth, which mainly benefits the rich, while the poor get a little from the outcomes of economic growth. It widens income inequality in society. In terms of public debt, two main issues increase income inequality: debt use and service. For debt use, governments use public spending financed by debt on infrastructure, health, and education that are equally benefited by all citizens. Social spending in these economies is low, and social transfers only play a less crucial role in economic development, increasing income inequality. For debt service, governments use tax revenue to pay off debt. Except for personal income tax, some taxes like the value-added tax (VAT), the import tax on goods and services, and the excise tax are applied equally between the rich and the poor. It sets up inequality between the rich and the poor for their contribution to the government's debt repayment. Concerning income, the poor will contribute more than the rich, thus widening income inequality. C. S. Lee [13] and W. L. Obiero and S. G. Topuz [17] note that public debt increases income and wealth inequality. In particular, C. S. Lee [13] emphasizes that a rise in public debt leads to worse income distribution in non-democracies or limited democracies. Some regulations and policies (institutional quality) in developing economies are enforced to control and manage public debt seriously to avoid a public debt crisis and social instability due to high public debt, which decreases public debt. A decline in public

Table 6

Institutional quality, public debt and income inequality: One–step S–GMM estimates Dependent variable: Income inequality (Gini index)

Variables	IN1	IN2	IN3	IN4	IN5	IN6
Gini index (–1)	0.928*** (0.009)	0.925*** (0.009)	0.943*** (0.009)	0.924*** (0.009)	0.929*** (0.009)	0.928*** (0.010)
Public debt	0.001 (0.011)	0.022*** (0.009)	0.022** (0.011)	0.017** (0.008)	0.018** (0.009)	0.020** (0.008)
Institutional quality	0.793** (0.417)	1.055*** (0.373)	0.974* (0.582	0.854*** (0.337)	0.215 (0.344)	0.443* (0.246
Public debt*Ins. quality	–0.019* (0.011)	–0.023*** (0.008)	–0.020* (0.012)	–0.016** (0.008)	–0.000 (0.008)	–0.010* (0.005)
Economic growth	0.000 (0.000)	–0.000 (0.001)	–0.000 (0.000)	–0.000 (0.001)	–0.001 (0.001)	–0.000 (0.000)
Education	0.019** (0.008)	0.021** (0.009)	0.012 (0.008)	0.027*** (0.009)	0.028*** (0.010)	0.015 (0.010)
Unemployment	–0.015** (0.020)	–0.032* (0.018)	–0.021 (0.019)	–0.037* (0.019)	–0.028 (0.018)	–0.026 (0.019)
Instrument	16	15	16	16	16	16
Country/Observation	34/578	34/578	34/544	34/578	34/578	34/578
AR(2) test	0.176	0.164	0.910	0.159	0.167	0.173
Sargan test	0.283	0.895	0.366	0.144	0.415	0.264

Source: Compiled by the author.

Note: ***, **,* — note significance level at 1%, 5%, 10% respectively.

debt will reduce inequality between the rich and the poor in terms of public debt use and taxation to pay government debt. Consequently, the interaction between public debt and institutional quality reduces income inequality.

This finding suggests that governments in developing economies should use spending financed by public debt to support low-income individuals through social transfers throughout their economic development. Importantly, they should spend more on education and health to help the poor improve their skills and knowledge, narrowing the income difference between the rich and the poor. Income inequality is one of the inherent social natures of human development, meaning that we cannot eliminate it but can reduce it. In particular, equality and efficiency are two but opposite sides of the same coin, so when acting on one side, it affects the other side and vice versa. Governments should recognize it as the tradeoff between efficiency and equality throughout economic development. Increasing equality (or decreasing inequality) leads to decreasing efficiency and vice versa. In particular, they should control and manage public debt because rising public debt can lead to a public debt crisis and social instability. One possible solution is to reform the tax system in developing countries to ensure that the payment of taxes (VAT tax, import tax on goods and services, excise tax, etc.) is more equitable between the rich and the poor.

Education boosts income inequality. Education is a public good that governments supply for free, and students do not pay the money to attend public schools. However, wealthy families agree to pay fees to send their children to high-quality private schools. Students from these families receive better knowledge and skills than students from average families. Therefore, students from wealthy families easily find high-income jobs and get more promoted, which increases income inequality. This finding can be found in T. Kaulihowa and C. Adjasi [23] and A. Demir et al. [24].

Table 7

Institutional quality, public debt and income inequality: Twostep D–GMM estimates Dependent variable: Income inequality (Gini index)

Variables	IN1	IN2	IN3	IN4	IN5	IN6
Gini index (–1)	0.179*** (0.059)	0.258*** (0.055)	0.336*** (0.070)	0.380*** (0.053)	0.258*** (0.037)	0.243*** (0.043)
Public debt	0.035** (0.017)	0.038*** (0.004)	0.015** (0.006)	0.041*** (0.011)	0.026** (0.011)	0.037*** (0.008)
Institutional quality	3.795*** (1.353)	2.028*** (0.758)	1.556*** (0.539)	9.214*** (1.973)	2.336*** (0.510)	2.044*** (0.516)
Public debt*Ins. quality	–0.041** (0.020)	–0.015** (0.007)	–0.032*** (0.011)	–0.084*** (0.024)	–0.026** (0.010)	–0.026** (0.012)
Economic growth	0.104*** (0.010)	0.104*** (0.006)	0.077*** (0.006)	0.102*** (0.010)	0.088*** (0.010)	0.092*** (0.006)
Education	0.037*** (0.007)	0.038*** (0.006)	0.027*** (0.006)	0.033*** (0.007)	0.036*** (0.006)	0.027*** (0.007)
Unemployment	–0.601*** (0.111)	–0.487*** (0.053)	–0.281*** (0.051)	–0.394*** (0.108)	–0.432*** (0.087)	–0.502*** (0.077)
Instrument	32	34	34	34	34	34
Country/Observation	34/510	34/510	34/510	34/510	34/510	34/510
AR(2) test	0.777	0.805	0.928	0.698	0.911	0.720
Sargan test	0.399	0.246	0.172	0.222	0.151	0.464
Hansen test	0.569	0.560	0.397	0.298	0.515	0.437

Source: Compiled by the author.

Note: ***, **, * — note significance level at 1%, 5%, 10% respectively.

Robustness Check

To check the robustness of the S-GMM estimates, the paper uses the two-step D-GMM for equation (1). Similar to the two-step S-GMM estimates, the results across all models in Table 7 show that public debt and institutional quality increase income inequality, but their interaction decreases it. Furthermore, education and economic growth enhance income inequality, but unemployment reduces it. When the unemployment rate increases, governments increase transfer spending to subsidize the unemployed, who are low-skilled, low-income people. Besides, governments increase spending to train these people and help them find better jobs. Thus, unemployment reduces income inequality.

CONCLUSION AND POLICY IMPLICATIONS

Public spending financed by debt plays a crucial role in running the economy, while income inequality is one of the global challenges facing developing economies. Governments in these economies can use public debt to tackle the income gap in society. Institutional quality can affect the public debt — inequality relationship in these economies. Given these facts, the paper checks the impacts of public debt, institutional quality, and interaction on income inequality for a panel dataset of 34 developing economies from 2002 through 2020. It applies the S-GMM and D-GMM for estimation and robustness checks. The results show that public debt and institutional quality

widen income inequality, but their interaction narrows it. Besides, education enhances income inequality.

The findings in the paper imply that governments in developing economies should use public debt appropriately to handle income inequality in society between the rich and the poor. They should increase public spending financed by debt to support low-income individuals through social transfers. More importantly, they should spend more on health and education to improve the poor's skills and knowledge, which enhances their income and reduces the income gap in society. However, they should be prudent in controlling and managing public debt to avoid a public debt crisis and social instability. Future research can study the contribution of governance/institutional quality to the external/domestic public debt — income inequality relationship.

ACKNOWLEDGEMENTS

This research work was supported by the University of Finance and Marketing (UFM). University of Finance and Marketing (UFM), Ho Chi Minh City, Vietnam.

БЛАГОДАРНОСТИ

Данная исследовательская работа выполнена при поддержке Университета финансов и маркетинга (UFM). Университет финансов и маркетинга (UFM), Хошимин, Вьетнам.

REFERENCES

1. Nguyen V. B. The effect of government debt on private investment in advanced economies: Does institutional quality matter? *Scientific Annals of Economics and Business*. 2022;69(1):133–144. DOI: 10.47743/saeb-2022–0006
2. Chatzouz M. Government debt and wealth inequality: Theory and insights from altruism. Munich Personal RePEc Archive. MPRA Paper. 2014;(77007). URL: https://mpra.ub.uni-muenchen.de/77007/1/Chatzouz.pdf
3. Borissov K., Kalk A. Public debt, positional concerns, and wealth inequality. *Journal of Economic Behavior & Organization*. 2020;170:96–111. DOI: 10.1016/j.jebo.2019.11.029
4. Li S., Filer L. The effects of the governance environment on the choice of investment mode and the strategic implications. *Journal of World Business*. 2007;42(1):80–98. DOI: 10.1016/j.jwb.2006.11.006
5. Ortiz-Ospina E., Roser M. Government spending. Our World in Data. 2023. URL: https://ourworldindata.org/government-spending
6. Arawatari R., Ono T. Inequality and public debt: A positive analysis. *Review of International Economics*. 2017;25(5):1155–1173. DOI: 10.1111/roie.12299
7. Röhrs S., Winter C. Reducing government debt in the presence of inequality. *Journal of Economic Dynamics and Contro*l. 2017;82:1–20. DOI: 10.1016/j.jedc.2017.05.007
8. March C., von Weizsäcker R. K. Coordinating intergenerational redistribution and the repayment of public debt: An experimental test of Tabellini (1991). *Social Choice and Welfare*. 2020;55(2):301–323. DOI: 10.1007/s00355–020–01242–6
9. Maebayashi N., Konishi K. Sustainability of public debt and inequality in a general equilibrium model. *Macroeconomic Dynamics*. 2021;25(4):874–895. DOI: 10.1017/S 1365100519000336
10. Aksman E. Do poverty and income inequality affect public debt? *Gospodarka Narodowa = The Polish Journal of Economics*. 2017;292(6):79–93. DOI: 10.33119/GN/100744
11. Luo W. Inequality and government debt: Evidence from OECD panel data. *Economics Letters*. 2020;186:108869. DOI: 10.1016/j.econlet.2019.108869
12. Carrera J., de la Vega P. The impact of income inequality on public debt. *The Journal of Economic Asymmetries*. 2021;24: e00216. DOI: 10.1016/j.jeca.2021.e00216
13. Lee C.-S. Income inequality, democracy, and public sector size. *American Sociological Review*. 2005;70(1):158–181. DOI: 10.1177/000312240507000108
14. Azzimonti M., De Francisco E., Quadrini V. Financial globalization, inequality, and the rising public debt. *The American Economic Review*. 2014;104(8):2267–2302. DOI: 10.1257/aer.104.8.2267
15. Tung L. T. Can public debt harm social development? Evidence from the Asian-Pacific region. *Journal of International Studies*. 2020;13(2)-48–61. DOI: 10.14254/2071–8330.2020/13–2/4
16. Biglaiser G., McGauvran R. J. The effects of debt restructurings on income inequality in the developing world. *European Journal of International Relations*. 2021;27(3):808–829. DOI: 10.1177/13540661211001425

17. Obiero W. L., Topuz S. G. Do public and internal debt cause income inequality? Evidence from Kenya. *Journal of Economics, Finance and Administrative Science*. 2022;27(53):124–138. DOI: 10.1108/JEFAS-05–2021–0049
18. Judson R. A., Owen A. L. Estimating dynamic panel data models: A guide for macroeconomists. *Economics Letters*. 1999;65(1):9–15. DOI: 10.1016/S 0165–1765(99)00130–5
19. Holtz-Eakin D., Newey W., Rosen H. S. Estimating vector autoregressions with panel data. *Econometrica*. 1988;56(6):1371–1395. DOI: 10.2307/1913103
20. Arellano M., Bond S. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*. 1991;58(2):277–297. DOI: 10.2307/2297968
21. Arellano M., Bover O. Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*. 1995;68(1):29–51. DOI: 10.1016/0304–4076(94)01642-D 22. Roodman D. How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal*. 2009;9(1):86–136. DOI: 10.1177/1536867X0900900106
22. Kaulihowa T., Adjasi C. FDI and income inequality in Africa. *Oxford Development Studies*. 2018;46(2):250–265. DOI: 10.1080/13600818.2017.1381233
23. Demir A., Pesqué-Cela V., Altunbas Y., Murinde V. Fintech, financial inclusion and income inequality: a quantile regression approach. *The European Journal of Finance*. 2022;28(1):86–107. https://doi.org/10.1080/1351847X.2020.1772335

ABOUT THE AUTHOR / ИНФОРМАЦИЯ ОБ АВТОРЕ

Van Bon Nguyen — PhD, Assoc. Prof. in Finance — Banking, Lecturer, UFM Research Team, University of Finance — Marketing (UFM), Ho Chi Minh City, Vietnam
Ван Бон Нгуен — PhD, доцент кафедры финансов и банковского дела, преподаватель, исследовательская группа UFM, Университет финансов и маркетинга (UFM), Хошимин, Вьетнам
https://orcid.org/0000-0002-6281-9893
nv.bon@ufm.edu.vn
boninguyen@gmail.com

Conflicts of Interest Statement: The author has no conflicts of interest to declare.
Конфликт интересов: автор заявляет об отсутствии конфликта интересов.

The article was submitted on 03.01.2023; revised on 03.02.2023 and accepted for publication on 26.02.2023. The author read and approved the final version of the manuscript.
Статья поступила в редакцию 03.01.2023; после рецензирования 03.02.2023; принята к публикации 26.02.2023.
Автор прочитал и одобрил окончательный вариант рукописи.