Fiscal decentralization, institutional quality, and government size: an asymmetry analysis for Asian economies

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ABSTRACT
This study aims to examine the asymmetric effects of fiscal decentralisation and institutional quality on government size for selected Asian economies. The study employs asymmetric autoregressive distributed lag (ARDL) methodology by using time series data ranging from the period 1984 to 2017. The results show that positive shocks in expenditures decentralisation (ED) enhance government size in Japan, Kazakhstan, Thailand, Turkey, and reduces it in Korea, Rep. in the long-run. While negative shock in ED reduces government size in Pakistan, Thailand, Turkey and increases it in Kazakhstan and Mongolia in the long-run. Whereas asymmetric results in the long-run show that a positive shock in revenue decentralisation (RD) increases government size in Pakistan, Japan, Kazakhstan, Thailand, and Turkey, and a negative shock in RD decreases government size in Pakistan, Mongolia, Thailand, and Turkey. Our asymmetric results of institutional quality are also country-specific.

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Introduction
Due to a disastrous event throughout the world in the first half of the 20th century, the need for fiscal decentralisation and strong national governments increased. Two world wars and a great depression are major factors that lead to countries’ increased dependence on central governments. The peak of decentralisation came in the 1950s and then began to decline. Again a heavy trend towards decentralisation began in the early 1970s which became commonly referenced as a “prescription for growth” for developing economies. After the failure of the Soviet Union, decentralisation’s momentum accelerated across the globe, especially in China and Latin American nations. By the 1990s, countries began to converge to mid-levels of decentralisation (Thiessen, 2005). Both developed and developing countries have been improving their public sector performance while turning towards the devolution of their responsibilities towards local governments (Oates, 1999).

Decentralisation of powers most commonly refers to fiscal decentralisation that is the transmission of powers from central to sub-national governments. In other words, it is the transmission of policymaking concerns from the federal authority to local authorities regarding expenditure and revenue collection. It is believed that fiscal decentralisation is an important instrument for policymakers to gain financial efficiency and ensure good governance as the local governments are given financial independence. Furthermore, fiscal devolution is the easiest dimension to quantify and compare. The most common measures of fiscal decentralisation are sub-national shares of revenue and expenditure. Therefore, decentralisation is a route through which the responsibilities and resources are transferred to subnational governments in such a way that resources can be used in a better way, public living standards can be improved and workload can be shared among all levels of governments. In low-income countries, decentralisation has been opted to eradicate poor governance and macroeconomic instability; however, in western countries, it is opted to offer public goods in a more cost-effective manner. Decentralisation originated in Latin American countries due to the political pressure of their citizens for pursuing democratisation. In short, decentralisation is thought to carry political authorities closer to the general public and bring out equality in the establishment of public goods to various localities of the same country.

Fiscal decentralisation theories can be expressed in two groups of development; the first-generation theory of fiscal decentralisation and the second-generation theory of fiscal decentralisation. The basic idea of fiscal
decentralisation is given by Hayek (1945), who noted that fiscal decentralisation better reflects the preferences of the people and improves economic efficiency in the provision of public sector goods and services. The first-generation theory of fiscal decentralisation is developed by Hayek (1945), Tiebout (1956), Musgrave (1959), Oates (1972), and Brennan and Buchanan (1980). In modern times, the second-generation theory of fiscal decentralisation has been developed by Oates (2005), which noted that political institutions improve economic efficiency with fiscal decentralizations. The second-generation theory draws on insights from various economic theories like the theory of principal-agent, theory of contract, theory of firms, and theory of asymmetric information (Oates, 2005).

A key benefit of decentralisation is that local governments are supposed to have a greater knowledge of public choices than that of the central government. It is noticed that when local governments are involved in decision-making, it results in enhancing the overall efficiency of the government. Furthermore, tax collection increases in the decentralised setup of governments because local governments have direct access to the local community. It is expected that due to decentralisation the relative size of government gets affected. The debate on this issue starts from the “Leviathan hypothesis” formulated by Hayek (1945), Musgrave (1959), and Brennan and Buchanan (1980) which states that “government intrusion into the economy will be smaller when the public sector is decentralized”. Many researchers investigated this Leviathan Hypothesis empirically mostly for samples of Latin American countries and OECD economies. The existing studies on fiscal decentralisation effect on government size have two main strands: the first one indicates a negative link of fiscal decentralisation on size of government (Marlow, 1988; Ehdai, 1994; Rodden, 2003; Cassette & Patt, 2010; and Golem & Perovic, 2014; Carniti, Cerniglia, Longaretti, & Michelangeli, 2019); while the second strands establish a positive link between fiscal decentralisation and size of government (Nelson, 1986; Grossman, 1989; Wu & Lin, 2012, Canavire-Bacarreza, Martinez-Vazquez, & Yedgenov, 2020). However, the present study is important to improve the existing literature of economics by giving the asymmetric results of fiscal decentralisation and institutional quality on government size in the context of Asian economies.

The link between institutions and government size is one of the most interesting research areas which need to be explored adequately. As the government plays the role of an endogenous element in the economic and political system so the government is responsible for the implementation of economic policy. However, the behaviour of the government is directly and indirectly determined by numerous institutional limitations that include the political system (Snowdon & Vane, 2005; Borini, Maclean, Pereira, Pavan, & Hourneaux Junior, 2018; Ross, 2019). Furthermore, the political system is tense with certain conflicts of interests like exploitation of political power and misuse of public funds; conflict over the allocation of redistributive transfers; and clash over the distribution of resources among themselves. Political bodies play a significant role in the resolution of these kinds of conflicts of interest. The literature reveals that the stability of the good quality of political institutions affects the relative size of government (Saleem, Shahzad, Khan, & Khilji, 2019; Arora & Chong, 2018; Shabbir, Bashir, Abbasi, Yahya, & Abbasi, 2020). However, economists also argue that government institutions show a key function in formatting government size and efficiency in the world. Plaček et al. (2020) familiarised the key determinants of local government efficiency in analysis namely fiscal centralisation, information asymmetry, competition among municipalities, bureaucratic behaviour, intergovernmental grants and transfers, fiscal illusion, municipality size, and institutional environment. Khan and Hanif (2020) found that institutional quality contributes significantly in determining the relationship between output growth and government size in Pakistan.

Many studies have tried to validate the symmetric impacts of fiscal decentralisation and institutional quality on the size of government by using annual data for different countries, for instance; Stein (1999) for Latin America, Chong and Gradstein (2007) for developing and developed economies, Prohl and Schneider (2009) for 29 economies, Makreshanska and Petrevski (2016) for Europe, and Thanh and Canh (2019) for Vietnam. These studies report mixed findings, some studies report significant impacts of fiscal decentralisation on the size of government while some studies report insignificant impacts of fiscal decentralisation on the size of government. None of the above-mentioned studies have considered the asymmetric impacts of fiscal decentralisation and institutional quality on government size. Previous panel studies also faced the problem of aggregation bias (Bahmani-Oskooee & Karamelikli, 2021), we disaggregate the analysis for each economy separately for efficient and robust results of Asian economies. This approach gives us country-specific findings due to country-specific heterogeneity. This study has also contributed theoretically as well empirically. This study deviates from the theoretical arguments of Hayek (1945) and Oates (1972), who noted the linear relationship between fiscal decentralisation and government
size. While we assumed that nonlinear relationship between fiscal decentralised and government size and also extend the empirical literature in direction. We fill this gap by employing Shin et al. (2014) asymmetric ARDL methodology that examines the asymmetric effects of institutional quality and fiscal decentralisation on the government size in Asian economies. The literature on this area is an infant but we extend the empirical literature in direction and address the literature gap.

In general perception, fiscal decentralisation along with good quality institutions enhances the size of subnational governments while lessening the overall size of the public sector. Thus, it is essential to examine the direction of impact between fiscal decentralisation, institutional quality, and government size with a precise focus on the query of whether decentralisation of fiscal resources leads to a decrease or an upsurge in the magnitude of the public sector. A common proposition behind previous empirical literature is that the impacts of fiscal decentralisation and institutional quality on government size are symmetric, meaning that centralisation improves the government size, decentralisation must worsen it. In the asymmetric analysis, a positive shock to the institutional quality mean that an increase in institutional quality (rich quality of institutions), and a negative shock to the institutional quality means that a decrease in institutional quality (poor quality of institutions). While positive shock in institutional quality enhances the government size and negative shock in institutional quality must worsen it. How useable is this proposition? Could the impacts of decentralisation and institutional quality on government size be asymmetric? Since the nonlinear ARDL approach is introduced in advanced econometric, some old relationships are getting new empirical attention. Therefore, this paper aims to test this hypothesis by using the annual time series data of ten Asian economies. The ten Asian economies are selected on the availability of the dataset. Based on the literature of earlier studies relating to fiscal decentralisation, institutional quality, and government size, this study is the pioneer of its kind in this area.

The main contribution of this empirical study is to explore broadly the decentralisation debate and experience in the case of Asian economies. In this way, the study makes an effort to gauge the impacts of expenditure and revenue decentralisation on government size in Asian economies. The study also incorporates the quality of institutions in assessing the function of fiscal decentralisation in determining the size of the government. One of the significances of the present study is that it is a fresh attempt to empirically analyse the asymmetric link between government size, institutional quality, and fiscal decentralisation in Asian economies. This study is very important in policymaking in Asian economies as well as in other nations.

The rest of the paper is structured as follows: Section 2 deals with the literature review and section 3 describes the details of the model, data description, and variables. While section 4 describes a detailed discussion of results; and section 5 gives the conclusion with some policy recommendations.

**Literature review**

Decentralisation is a controversial topic whose merits have been debated by economists and policymakers for decades. The efficient provision of public goods is the predominant argument in favour of decentralisation. This section delivers literature relating to fiscal decentralisation, institutional quality, and government size. Brennan and Buchanan (1980) are the pioneers in originating the Leviathan hypothesis and noted that “total government intrusion into the economy should be smaller, ceteris paribus, the greater the extent to which taxes and expenditures are decentralized”. Their study assumes the inseparability of revenue and expenditure decentralisation. Furthermore, the study depicts that the government plays the role of a gigantic monster, which tries to achieve maximum revenues through money creation, increase in taxation, and debt. This kind of role of government leads to expanding the government size. Under this strategy, the centralised government tries to disguise and promote its selfish interests. Another issue is that the government does not have any access to regulate taxpayers. Brennan and Buchanan (1980) suggest two methods to control this Leviathan. One way is the provision of a balanced budget and inadequacy of government tax and other fiscal instruments through constitutional constraints and another way is the decentralisation of government’s power through expenditure and revenue decentralisation. Jia, Ding, and Liu (2020) show that fiscal decentralisation reform is simultaneously improving the tax autonomy of the economy. Song, Du, and Tan (2018) indicate that fiscal decentralisation can stimulate total green factor productivity in China. Canavire-Bacarreza et al. (2020) find that subnational expenditure decentralisation has stimulated GDP per capita growth by 0.82% and revenue decentralisation has stimulated GDP per capita growth by 0.57%. The results also show that expenditure decentralisation is comparatively more effective on GDP
per capita growth than revenue decentralisation. While Carniti et al. (2019) identify the bell-shaped nexus of expenditure decentralisation and growth in European economies.

In the earlier study, Oates (1985) investigates the link between fiscal decentralisation and size of government for a sample of 43 developing and developed countries and 48 states of the United States. Tax receipts are used to measure relative government size. The study finds no significant relationship in both samples. Similarly, Nelson (1986) also reports the non-existence of the Leviathan hypothesis for the US. It is argued that instead of using tax receipts to measure government size, most of the studies are using the portion of government expenditures in the economy as a proxy to measure government size. It can be justified as an expenditure-based measure of government size that provides complete resource absorption of government as compared to revenue receipts. In the case of the US, Marlow (1988) uses the ratio of total government expenditure to the gross national product as a proxy for measuring government size. The study uses sub-national expenditure as a portion of total government expenditures to measure decentralisation. The paper also reports a negative significant link between fiscal decentralisation and government size. Grossman (1989) investigates the Leviathan hypothesis for the US by incorporating the role of grants. Government size is regressed on expenditure decentralisation and vertical imbalance. The study reports a positive relationship between fiscal decentralisation and government size. The study suggests that grants play a positive role in the expansion of the public sector. Ehdai (1994) investigates the Leviathan hypothesis on two samples. Sample one includes 26 countries in 1977 and sample two consists of 30 countries in 1987. The study reports a negative influence of fiscal decentralisation on the relative size of government. Tanzi and Schuknecht (1997) argue in their study that probable social gains could be availed with smaller government size whose expenditure ranges between 30 to 40 percent of GDP.

Shadbegian (1999) also tries to examine the influence of fiscal decentralisation on the relative size of government in the US. Direct general expenditures relative to gross state products are employed to measure government size. Results specify a positive association between government size and decentralisation along with the negative effect of collusion on fiscal discipline. On the other hand, Stein (1999) makes an effort to explore the Leviathan hypothesis for 19 Latin American and Caribbean countries and OECD countries. The study highlights that the allocation function of government is mostly related to decentralisation. Along with expenditure decentralisation, the study also uses fiscal imbalance and some institutional variables in the empirical analysis. Government size is measured by the size of the public sector as a share of GDP. The study concludes that decentralisation tends to enlarge government size.

To inspect the influence of fiscal decentralisation on the sub-national, national, and aggregate government sizes, Jin and Zou (2002) conducted a panel analysis of thirty-two industrial and developing economies. The results conclude that expenditure decentralisation decreases the size of national governments and revenue decentralisation increases the size of subnational governments but the increase is less than the reduction in the size of the national government, which leads towards the smaller total government. In count, the vertical imbalance leads to enhanced subnational government sizes, national governments, and the total number of overall governments. On the other hand, Rodden (2003) investigates the association between government size, quality of institutions, and fiscal decentralisation for 29 OECD countries. The study concludes that fiscal decentralisation limits the development of government size in decentralised economies. Fiva’s (2006) study also incorporates the role of institutions in investigating the Leviathan hypothesis for 18 OECD countries and revealed that revenue decentralisation reduces the size of government; however, expenditure decentralisation enlarges the size of government.

Chong and Gradstein (2007) propose that neither the government size nor the tax burden deteriorates economic performance. The study reports a positive significant link between government size and institutional quality as the relative size of the public sector expands with the enforcement ability of institutions. The findings of the study also concluded that the quality of all facilities delivered by the government as well as its efficiency tends to increase significantly as the quality of institutions improves. Carmignani’s (2009) study is based on three presumptions regarding the relationship between government instability, institution quality, and income redistribution. Firstly, it proposes that poor quality institutions lead to income inequality, however, redistribution declines income inequality. Secondly, a positive trend in income inequality enhances the chances of government termination and lastly, higher chances of government termination lead to enhance income distribution. The results of the study strongly support these three proposed conjectures. The study suggests that poor quality of institutions increases income inequality, but this effect can be vanished out if the authority has the choice to
embraces redistributive policies. While taking into account the role of institutions, Prohl and Schneider (2009) report a strong negative link between decentralisation and government size.

Cassette and Paty (2010) also incorporate the role of institutions in investigating the Leviathan hypothesis for 15 European Union economies. The findings show that decentralisation also reduces the central government size while enhancing the sub-national government’s size. Moreover, vertical imbalances have also improved the sizes of subnational and national governments’ sizes. However, Wu and Lin (2012) found a statistically insignificant association between fiscal decentralisation and the size of government in China. While taking into account the role of institutional quality, Ashworth, Galli, and Padovano (2013) stated that expenditure decentralisation improves the size of government, while revenue decentralisation is raised by sub-national governments’ size of the economy. Liberati and Sacchi (2013) conclude that property tax is negatively and significantly affecting local government size while grants lead to the expansion of government size. Golem and Perovic (2014) examine the Leviathan hypothesis for a sample of 23 OECD countries. The results show a negative association between government size and revenue decentralisation. Afonso and Jalles (2016) advocate that government size has a negative effect on the level of real GDP; however, institutions have a positive influence on the real GDP per capita as well as government size. The empirical literature also suggests that strong institutions can improve economic growth (Asamoah, Mensah, & Bondzie, 2019; Saleem et al., 2019; Shabbir & Muhammad, 2019; Shabbir & Yaqoob, 2019; Arif et al., 2020; Agyapong, 2021).

Furthermore, the results show that weak institutions have a negative influence on government size, while strong institutions have a positive effect on government size in the economy. Most recently, Qiao, Ding, and Liu (2019) investigate this relationship in 76 developing and developed economies for the period of 1972-2013. The study finds a strong negative link between fiscal decentralisation and government size. While previous studies have assumed that institutional quality and fiscal decentralisation have a symmetric influence on government size. The main drawback of the above studies and findings is that they assumed institutional quality and fiscal decentralisation to have symmetric effects on the government size. We are unable to find a single study having a focus on examining the asymmetric impacts of fiscal decentralisation and institutional quality on government size in the case of Asian economies as well the globe. The present study is a move in this direction to fill the gap in the stock of literature affecting fiscal decentralisation, institutional quality, and government size debate.

**Model, methodology, and data**

**Materials & methods**

To test the hypothesis that fiscal decentralisation and institutional quality have asymmetric effects on government size in Asian economies, we hold the model specification of Cassette and Paty (2010), therefore the econometric specification is given as:

\[ GS_t = \delta_0 + \delta_1 FD_t + \delta_2 IQ_t + \delta_3 GDP_t + \epsilon_t \] (1)

Where GS is government size, FD is fiscal decentralisation that includes expenditure decentralisation and revenue decentralisation, IQ is the institutional quality index, and GDP is a control variable. The model is measured from the government size of Asian economies, therefore, we suppose the coefficient of \( \delta_1 \) to be negative and \( \delta_2 \) to be positive based on empirical literature. Equation (1) gives us long-run coefficient estimates of OLS or any other method, while the error-correction approach also provides short-term effects. However, a methodology that gives the results of long and short-run effects is called Pesaran, Shin, and Smith (2001) linear ARDL approach. We propose Equation (1) in an error-correction model (ECM) as follows:

\[
\Delta GS_t = \alpha_0 + \sum_{i=1}^{n} \phi_i \Delta GS_{t-i} + \sum_{i=0}^{n} \lambda_i \Delta FD_{t-i} + \sum_{i=0}^{n} \sigma_i \Delta IQ_{t-i} + \sum_{i=0}^{n} \eta_i \Delta GDP_{t-i} + \delta_1 GS_{t-1} + \delta_2 FD_{t-1} + \delta_3 IQ_{t-1} + \delta_4 GDP_{t-1} + \epsilon_t
\] (2)

Pesaran et al. (2001) endorse the typical F statistics to test the null hypothesis \( H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = 0 \) against the alternative of \( H_1 : \delta_1 \neq 0, \delta_2 \neq 0, \delta_3 \neq 0, \text{and} \ \delta_4 \neq 0 \). If the F statistic is significant in the model, this means that cointegration exists, for which they tabulate new small sample’s critical values in this process (Saleem, Shabbir, & Bilal Khan, 2020 and Saleem, Shabbir, Khan et al. 2020). In Equation (2), the estimates of the coefficients devoted to the “delta” indicators reproduce short-run coefficients impacts and estimates of \( \delta_2-\delta_4 \) normalised
on $\delta_1$ reflect long-run impacts. Indeed, under the ARDL method, all variables of the model could be a mixture of both, but not $I(2)$. A major assumption behind Equation (2) is that a shock in the fiscal decentralisation and institutional quality variable has linear behaviour and effects on the government size in Asian economies separately. While we deviate from the conventional assumption, therefore fiscal centralisation improves government size, fiscal decentralisation must worsen it. Therefore, partial sum processes of negative and positive changes in the IQ variables are also added in the empirical analysis. More precisely:

$$FD^+_t = \sum_{n=1}^{t} \Delta FD^+_t = \sum_{n=1}^{t} \max(\Delta FD^+_t, 0)$$  \hspace{1cm} (3)$$

$$FD^-_t = \sum_{n=1}^{t} \Delta FD^-_t = \sum_{n=1}^{t} \min(\Delta FD^-_t, 0)$$  \hspace{1cm} (4)$$

$$IQ^+_t = \sum_{n=1}^{t} \Delta IQ^+_t = \sum_{n=1}^{t} \max(\Delta IQ^+_t, 0)$$  \hspace{1cm} (5)$$

$$IQ^-_t = \sum_{n=1}^{t} \Delta IQ^-_t = \sum_{n=1}^{t} \min(\Delta IQ^-_t, 0)$$  \hspace{1cm} (6)$$

Shin et al. (2014) offered to replace the positive shocks ($FD^+_t$ and $IQ^+_t$) and negative shocks ($FD^-_t$ and $IQ^-_t$) variables in the error-correction model of Equation (2). Therefore, both terms (negative & positive changes and negative & positive shocks) have been similarly used in prior literature. The result is the asymmetric/nonlinear ARDL model given by Equation (7):

$$\Delta GS_t = \alpha_0 + \sum_{i=1}^{n} \theta_i \Delta GS_{t-i} + \sum_{i=0}^{n} \phi_i \Delta FD^-_{t-i} + \sum_{i=0}^{n} \psi_i \Delta FD^+_{t-i} + \sum_{i=0}^{n} \varphi_i \Delta IQ^+_{t-i} + \sum_{i=0}^{n} \sigma_i \Delta IQ^-_{t-i} + \sum_{i=0}^{n} \eta_i \Delta GDP_{t-i}$$

$$+ \delta_1 GS_{t-1} + \delta_2 FD^+_{t-1} + \delta_3 FD^-_{t-1} + \delta_4 IQ^+_{t-1} + \delta_5 IQ^-_{t-1} + \delta_6 GDP_{t-1} + \epsilon_t$$  \hspace{1cm} (7)$$

Although Equation (7) seems symmetric/linear, they are usually denoted as asymmetric/nonlinear ARDL models due to the two-time series variables. Shin et al. (2014) establish the latest econometric approach called as nonlinear model (Equation (7)) by using OLS, while diagnostic tests will remain the same. Once the asymmetric ARDL is estimated, a few additional suppositions can be tested. First, if $\Delta FD^+_{t-i}$ ($\Delta IQ^-_{t-i}$) and $\Delta FD^-_{t-i}$($\Delta FD^+_{t-i}$) accept dissimilar lag orders in either model, it will show the short-run asymmetries. Second, if the coefficient estimate of $\Delta FD^+_{t-i}$ ($\Delta IQ^-_{t-i}$) and $\Delta FD^-_{t-i}$($\Delta FD^+_{t-i}$) is different at the same lag (i), it will show the short-run asymmetric impacts. Finally, we will apply the Wald test for the short and long-run dynamic asymmetries of FD and IQ on government size. However, both the symmetric Equation (2) and asymmetric model Equation (7) are measured in the next section.

**Data description and variables**

The empirical study covers the period from 1984 to 2017 for selected ten Asian economies, namely, Pakistan, Armenia, Azerbaijan, Iran, Japan, Kazakhstan, Korea, Rep., Mongolia, Thailand, and Turkey. These Asian economies are selected on the availability of the dataset. The dataset on institutions as well expenditure decentralisation and revenue decentralisation are available till 2017, thus this study is using data from 1984 to 2017 for analysis. All the required data is retrieved from the World Development Indicators of World Bank and Government Financial Statistics of International Monetary Fund (IMF), and the International Country Risk Guide (ICRG). While Pakistan’s dataset of expenditure decentralisation and revenue decentralisation is taken from the State Bank of Pakistan. This study is using the overall public sector. While separate analysis of various government levels is not econometrically possible due to small data observation when we break the dataset. The detailed variables description is also described in Table 1. Government size is calculated as total government expenditures as a percent of GDP in the economy. The study has used two measures of fiscal decentralisation (FD); for instance, expenditure decentralisation and revenue decentralisation. Expenditure decentralisation is calculated as the ratio of own spending to general government spending and revenue decentralisation is measured as the ratio of own revenues to general government revenues. The degrees of expenditure and revenue decentralisation with
government size are reported in Table 2 for ten selected Asian economies and graphical analysis is also given in Appendix A. While the institutional quality index is composed of six indicators, for instance, government stability, law and order, control over corruption, military in politics, law and order, democratic accountability and bureaucracy quality. The data of these variables are taken from ICRG. GDP per capita is our control variable and its data is taken from WDI.

### Empirical results and discussion

The goal of the paper is to explore the asymmetric impacts of fiscal decentralisation and institutional quality on government size in ten selected Asian economies from 1984 to 2017. Therefore, as a first step to estimate the model, stationarity properties of data are analysed by using the Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) unit root statistics. The ADF statistics indicate that GS, ED, RD, and GDP are non-stationary at the level or I(0) and become stationary at the first difference I(1) in Pakistan in Table 3. While IQ is stationary at a level in Pakistan which implies that the variables of the models fulfil all the conditions of the ARDL approach. However, PP statistics revealed that all indicators are non-stationary at the I(0) and become stationary at I(1) in Pakistan. The results are also recapped for Armenia, Azerbaijan, Iran, Japan, Kazakhstan, Korea, Rep., Mongolia, Thailand, and Turkey. As shown in Table 3 that all the variables are a mixture of I(0) and I (1), and none of the indicators are integrated at I (2).

Table 4 describes the long-run and short-run outcomes of linear ARDL. In panel A, the short-run coefficients of ED transmit a negative impact on government size in Pakistan, Armenia, and Iran. However, the short-run coefficient of ED has a positive significant impact on government size in Japan and Kazakhstan. The coefficient estimates for Pakistan, Armenia, and Azerbaijan show that RD has a significant and positive impact on government size in the short-run. Contrary results have been revealed in Iran and Turkey, in which, ED has a negative significant impact on government size. Also, short-run outcomes indicate that IQ has a negative impact on government size in Pakistan and Mongolia, while IQ has a positive impact on government size in Azerbaijan, Japan, and Thailand. Furthermore, in the short-run, GDP has a positive impact on government size in Pakistan while, coefficient estimate of GDP is negative in case of Armenia, Japan, Korea, Rep., Mongolia, and Thailand.

In panel B, ED and RD have a significant and positive impact on government size in Pakistan and Kazakhstan in the long run. Similarly, the results also show that RD has a significant positive impact on government size in Armenia and Mongolia. This implies that higher expenditure and revenue decentralisation expand the government size, thus these findings contradict the Leviathan Hypothesis in Pakistan. This finding is consistent with the evidence documented by Stein (1999) for Latin America, Jin and Zou (2002) for 32 developing and industrial countries, Wu and Lin (2012) for China, Baskaran (2011) for 18 OECD countries, and Ashworth et al. (2013) for 28 countries. However, the coefficient of institutional quality is significant and positive in Pakistan and Azerbaijan it shows that improvement in quality of institutions results in rising the government size in the long term. This finding is also in line with Kaya and Kaya (2020), who noted that institutional quality matters to the economy size in

### Table 1. Descriptive statistics of data.

| Variables          | Symbol | Definition                                                                                       | Data source |
|--------------------|--------|-------------------------------------------------------------------------------------------------|-------------|
| Government Size    | GS     | Total government expenditures as a percentage of GDP                                            | WDI         |
| Expenditure Decentralisation | ED     | Expenditure decentralisation (ratio of own spending to general government spending)              | IMF         |
| Revenue Decentralisation | RD     | Revenue decentralisation (ratio of own revenues to general government revenues)                  | IMF         |
| Institutional quality | IQ     | Institutional quality is the index of six indicators, include government stability, control over corruption, military in politics, law and order, democratic accountability and bureaucracy quality | ICRG        |
| GDP per capita     | GDP    | GDP per capita (constant 2010 US$)                                                             | WDI         |

### Table 2. Descriptive statistics of Asian economies.

|              | Pakistan | Armenia | Azerbaijan | Iran | Japan | Kazakhstan | Korea, Rep. | Mongolia | Thailand | Turkey |
|--------------|-----------|----------|------------|------|-------|------------|-------------|----------|----------|--------|
| GS           | 16.07     | 12.53    | 14.73      | 12.19| 16.90 | 12.28      | 12.22       | 16.69    | 13.29    | 12.13  |
| ED           | 0.45      | 0.05     | 0.03       | 0.06 | 0.42  | 0.47       | 0.56        | 0.29     | 0.12     | 0.10   |
| RD           | 0.25      | 0.06     | 0.003      | 0.56 | 0.27  | 0.32       | 0.23        | 0.18     | 0.07     | 0.04   |
emerging economies. The coefficient on GDP is significant and negative in Pakistan and Mongolia which indicates that an upsurge in GDP tends to decline the government size. This result also conflicts with Wagner’s law who noted that income level increases the government size. While Wagner’s law has been proved in Armenia, Azerbaijan, Kazakhstan, and Thailand.

Panel C reports the diagnostic statistics of the ARDL model. The result displays that F-test statistics are significant in 6 out of 10 economies, which implies that the long-run relationship also exists in the model. The ECM test is another test for Cointegration that is significant in 7 economies, which implies that Cointegration is supported by F-test and ECM. Moreover, the long-run estimates are reliable because of significant ECM and F-tests in 6 and 7 cases. The diagnostic statistics reveal that models are free from autocorrelation and heteroscedasticity problems. While RESET test statistics are also insignificant, it implies that all models are correctly specified. Additionally, CUSUM and CUSUM square tests also show stability in estimated coefficients of ARDL models.

Table 5 describes the long run and short run NARDL regression results. In short-run, the positive shock of ED has a negative significant influence on government size in Armenia, Iran, and Mongolia while the positive shock of ED exerts a positive significant impact on government size in Japan, Thailand, and Turkey. While the negative shock of ED has a negative significant influence on government size in Pakistan, Japan, Thailand, and Turkey while the negative shock of ED exerts a positive significant impact on government size in Mongolia. This implies that ED has an asymmetric influence on government size in terms of magnitude and direction. Furthermore, the negative and positive shock of ED has similar results in the long and short term.

Similarly, negative and positive shock in RD has a similar direction in magnitude in Azerbaijan, Armenia, Korea, Rep., Iran, Kazakhstan, while the opposite direction in magnitude in Pakistan, Japan, Mongolia, Thailand, and Turkey in the short run. Empirical results of negative and positive shocks in RD are maintained in the long run. Overall asymmetric results of fiscal decentralisation are not signifying the linear Leviathan Hypothesis in our study. The findings get support from results obtained by Jin and Zou (2002) for the 32 industrial and developing economies, Wu and Lin (2012) for China, Baskaran (2011) for the 18 OECD countries, Golem and Perovic (2014) and Stein and Caro (2017) for the panel of Latin American and OECD countries.

From the long-term estimates of IQ, it is evident that positive shock in IQ has significant impacts on government size in Pakistan, Azerbaijan, Japan, and Thailand in long run, while effects are significantly different in magnitude.
This finding is consistent with Sobhee (2010), who noted that institutional quality improves the government size in Sub-Saharan economies. This implies that institutional quality has increased the institution’s work efficiency, in response, increases the government size in Azerbaijan, Japan, and Thailand. This also suggests that institutional quality matters in regulating the government size in the economy. While positive shock in institutional quality contracted the government size in Pakistan and Mongolia in long run. The possible reason is that institutional reforms improve governance quality by shrinking the government size in Pakistan and Mongolia. Interestingly, a negative shock also improves the government size in Pakistan, Armenia, Azerbaijan, Japan, and Thailand in long run. Short-run asymmetric results of IQ are maintained and similar to long-run estimates. GDP has a positive impact on the size of government and the coefficient is statistically significant in Pakistan, Azerbaijan, Kazakhstan, Korea Rep., and Mongolia in the long term. Our asymmetric results are country-specific due to country-specific heterogeneity. The results also show that the GDP has a significant effect on government size in the long-run suggesting that the increase in GDP meaningfully contributes to determining the size of government in Pakistan. However, the opposite result is found in Turkey, which suggests that GDP decreases government size in the long run.

We have also described a few extra diagnostic tests of NARDL model in panel C. The ECM values in all Asian economies are negative and significant, it infers that the rate of adjustment towards the long-run equilibrium is about 36%, 45%, 77%, 39%, 19%, 83%, 17%, 45%, 34%, and 84% over each year for Pakistan, Armenia,
Table 5. Long and short-run estimates of NARDL.

| Short-run estimates | Pakistan | Armenia | Azerbaijan | Iran | Japan | Kazakhstan | Korea, Rep. | Mongolia | Thailand | Turkey |
|---------------------|----------|---------|------------|------|-------|------------|------------|----------|----------|--------|
| $\Delta E_{t-1}$  | 0.208    | -2.103  | 4.363      | -4.622*** | 1.410*** | 0.406      | -0.019     | -0.762*** | 1.726*** | 2.094*** |
|                     | (0.928)  | (1.732) | (0.312)    | (2.632)   | (5.865)  | (0.321)    | (0.210)    | (1.682)  | (2.521)  | (2.392) |
| $\Delta E_{t-2}$  | 0.278    | 0.178*  | 0.112      | 1.112     | 1.912    | 0.986      | 0.356      | 2.215    | 1.027    | 0.871   |
| $\Delta E_{t-3}$  | 0.947    | 0.192** | 0.631***   | 0.123     | 0.123   | 0.123      | 0.123      | 0.123    | 0.123    | 0.123   |
| $\Delta E_{t-4}$  | 2.710**  | 3.845** | 0.567      | 0.367     | 0.367   | 0.367      | 0.367      | 0.367    | 0.367    | 0.367   |

| Diagnostic statistics | ECM(-1)  | $t$-test  | ADLJ2  | LM  | Hetero  | RESET  | CUSUM  | CUSUM square  | Wald-ED-SR  | Wald-ED-LR  | Wald-RD-SR  | Wald-RD-LR  | Wald-IQ-SR  | Wald-IQ-LR  |
|-----------------------|----------|-----------|--------|-----|---------|--------|--------|---------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| $\Delta E_{t-1}$  | -0.36**  | -0.45*   | -0.77** | -0.39* | -0.19*  | -0.83** | -0.17*  | -0.45**       | -0.34**     | -0.84**    | -0.45**     | -0.34**     | -0.84**     | -0.45**     | -0.34**     |
| $\Delta E_{t-2}$  | (2.75)   | (1.85)   | (2.45)  | (2.17) | (1.97)  | (2.04)  | (1.72)  | (2.35)        | (2.25)      | (2.85)     | (2.25)      | (2.25)      | (2.85)      | (2.25)      | (2.25)      |
| $\Delta E_{t-3}$  | 3.56     | 4.56*    | 2.12    | 6.44*  | 10.5**  | 4.56*   | 3.45*   | 7.17**        | 2.56*       | 7.17**     | 2.56*       | 7.17**      | 2.56*       | 7.17**      | 2.56*       |
| $\Delta E_{t-4}$  | 0.94     | 0.94     | 0.92    | 0.92   | 0.92    | 0.92    | 0.92    | 0.92          | 0.92        | 0.92       | 0.92        | 0.92        | 0.92        | 0.92        | 0.92        |

Azerbaijan, Iran, Japan, Kazakhstan, Korea, Rep., Mongolia, Thailand, and Turkey respectively. Regarding the presence of co-integration, only in 6 economies asymmetry Cointegration is supported by F test in NARDL diagnostic estimates. The results show that LM, RESET, and heteroscedasticity test statistics values are insignificant in our models, which implies that residuals are autocorrelation-free, no problem of heteroscedasticity, and the model is not suffering from misspecification. We have further functional the CUSUM and CUSUM of square tests to the estimated residuals. All models show the stability which is specified with "S" for the stable, except three models. For the robustness of our analysis, we have applied the Wald test for concerned variables asymmetries. In the

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Note: * indicates 1% significance level, ** indicates 5% significance level, *** indicates 10% significance level. The critical values of LM, RESET, and Wald tests statistics are 2.71(3.84) at 10% (5%) significance level. T-statistics are reported in parentheses.
Wald test, the results of asymmetries suggest that negative and positive changes in ED, RD, and IQ affect government size differently in Pakistan, Armenia, Iran, Japan, Kazakhstan, Korea, Rep., Mongolia, Thailand, and Turkey in the short and long-run in panel C. Thus, our results are robust and consistent having applied several diagnostic checks and confirm the asymmetric impact of fiscal decentralisation and institutional quality on government size.

Conclusion and policy recommendations

This empirical study examines the asymmetric effects of fiscal decentralisation and institutional quality on the size of government by using the annual dataset of selected Asian economies from 1984 to 2017. The results show that positive shock in ED has a positive significant effect on government size in Japan, Kazakhstan, Thailand, and Turkey, while negative shocks in ED have a negative effect on government size in the long term in Pakistan, Thailand, and Turkey. The asymmetric long-term results reveal that negative shocks in ED tend to increase government size in Kazakhstan and Mongolia. Similarly, the positive shock of RD has a positive effect on government size in Pakistan, Japan, Kazakhstan, Thailand, and Turkey. However, a negative shock to RD has reduced the government size in Pakistan, Mongolia, Thailand, and Turkey while the adverse impact is found in negative shock in Kazakhstan in the long run. The results show that short-run asymmetries exist in ED and RD in some selected Asian economies. The asymmetric findings show that the Leviathan hypothesis is incorrect in the case of fiscal decentralisation in Asia. The findings also show that asymmetric effects have deviated from the systematic effects in Asian economies.

The results also disclosed that positive shock in IQ increases government size in Azerbaijan, Japan, Thailand and negative shock in IQ also increases government size in Pakistan, Armenia, Azerbaijan, Japan, Kazakhstan, Thailand, in the long run. This implies that IQ expands the size of the government in most Asian economies. The attained outcomes show that an asymmetric effect also exists in terms of magnitude and direction and asymmetric effects are also deviating from the symmetric effect. In NARDL models, coefficients on the control variables are significant and hold expected signs. While, GDP has a significant positive impact on government size in Pakistan, Azerbaijan, Kazakhstan, Korea, Rep., Mongolia, which implies that economic size increases the government size in Pakistan, Azerbaijan, Kazakhstan, Korea, Rep., Mongolia. However, economic size contracts the government size in Turkey.

Based on the empirical outcomes, some economic policy implications are suggested for the provincial and federal governments of Asian economies as well as developing economies. The policymakers can pay attention to the fiscal decentralisation and quality of institutions by formulating the size of the public sector. National and provincial level institutional quality is essentials to be strengthened. Authorities should also focus on rationalisation of tax rates and types along with accumulating capability of tax administration to manage and collect revenues. It is also vital to upsurge tax collection that is crucial to control the chronic deficit of any economy. There is a need for such a fiscal strategy that leads to better utilisation of tax revenue in financing public sector investment efficiently in Asian economies. Policymakers formulate such rules and regulations that limit the government to sustain the specified public expenditure and make more production-oriented uses of domestic resources. As for the applicable research in the future, more empirical studies can be carried out by using asymmetric ARDL methods, which would provide clues to the researchers to reach more comprehensive results concerning fiscal decentralisation, institutional quality, and government size nexus, especially in developing economies. Indeed, the applications of asymmetric causality could be more helpful and fruitful, this would be essential for more targeted policy implications. A similar analysis can be conducted for other economies as well developing economies.

Disclosure statement

The authors declare that they have no conflict of interest.

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**Data availability statement**

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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**Figure A1.** Government size, expenditure decentralisation, revenue decentralisation in Asia.
Figure A1. Continued.