Impact of Fiscal Decentralization on Economic Growth: Empirical Evidence from Pakistan

[1]*Dr Arif Hussain,* [2]*Afifa Anjum Khattak,* [3]*Dr Junaid Athar Khan* [4]*Muhammad Imran Khan and* [5]*Masroor Shah*

ABSTRACT

The current study investigated the impact of fiscal decartelization on economic growth of Pakistan while considering the fiscal decentralization measures i.e., Provincial Tax revenue, Provincial Local Revenues, Federal Transfers and Total Provincial Revenue. The current study followed quantitative and descriptive type of the research.The data for the independent variables (i.e., Provincial Tax revenue, Provincial Local Revenues, Federal Transfers and Total Provincial Revenue) and dependent variable (i.e., Real GDP) was collected from different sources such as Pakistan Economic Survey (various issues) and OECD, World Bank, World Development Indicators (WBWDI), State Bank of Pakistan (SBP) etc. The data will be collected for a period between 1980 and 2020. The values of regression coefficient for provincial local revenue(41.39114) at significance level of (p=0.0023 and t=2.547661) indicated that provincial local revenue contributes more to the economic growth. Similarly, the values of regression coefficients for provincial tax revenue, federal transfers, and total prosocial revenue were -18.61227, 47.37730 and 14.74753 and significant at (p=0.0031 and t=-2.229872), (p=0.0017 and t=3.837237) and (p=0.0044 and t=2.044444) respectively, indicating that provincial tax revenue, federal transfers, and total prosocial revenue are also having significant impact on economic growth. The study suggested that provincial and local levels governments should be given more autonomy and authority in fiscal matters.

INTRODUCTION

Fiscal decentralization is a process whereby local governments are given authority over the economic activities in a locality. To do this, various levels of government must define their respective fiscal obligations. These fiscal tools and processes are aimed at making public

[1] *Assistant Professor, Institute of Business Studies and Leadership, Abdul Wali Khan University, Mardan. arifhussain@awkum.edu.pk*

[2]*Lecturer, Institute of Management Studies University of Peshawar. afifakhattak@uop.edu.pk*

[3] A*ssistant Professor, Institute of Business Studies and Leadership, Abdul Wali Khan University, Mardan. Junaid@awkum.edu.pk*

[4] *MS Scholar, Institute of Business Studies and Leadership, Abdul Wali Khan University, Mardan. Imran_khan7750@yahoo.com*

[5] *Scholar, Faculty of Management Sciences, International Islamic University, Islamabad. masrorshah84@gmail.com*

goods more accessible (Bahl, & Bird, 2018). According to Nursini(2019), fiscal decentralisation refers to the transfer of decision-making power to a lower level of government. The fiscal decentralisation, according to Sanogo(2019), entails "a transfer of duty linked with accountability to sub-national governments." As a result, it may be seen as the capacity of local governments to collect tax income and allocate it to various programmes within the boundaries of legal requirements. Even though resource redistribution may occur as a result, some people believe fiscal decentralisation promotes economic development. To enhance efficiency in the public sector, create competition among subnational governments in providing public services, and encourage economic development via fiscal decentralisation are all common goals (Park, Park, & Nam, 2019).

Lower-level governments have varying levels of power. As a result, in certain nations, economic development initiatives have been decentralized completely or partially. All economic development programs may be delegated to lower-level governments, or just a portion of them may be. When it comes to power, legal connections exist between different levels of government, according to Amin(2018). For example, welfare programs may be organized and implemented in a state or county with the help of fiscal decentralisation - which is also known as devolution of power(Lamba, Allo, & Lamba, 2019).

When it comes to decentralisation, it does not only mean allocating distinct duties or functions to various levels of government; it may also mean creating co-occupied jurisdictions where one level of government can influence the choices made by the other government to a variable degree. Regulations, the ability to overturn choices, or financial involvement are all examples of outside pressures. According to a study of the research, determining the precise distribution of authority is challenging. It is possible to draw incorrect conclusions regarding the impact of fiscal decentralisation on economic development if unsuitable or unclear fiscal decentralisation methods are utilized(Kuai, Yang, Tao, & Khan, 2019).

Various levels of government inside and across countries have investigated fiscal decentralisation. A country-specific approach has been utilized in certain research, while a multi-country approach has been used in others. Study after study has examined the effects of fiscal decentralisation at the federal, state, and municipal levels(Di Novi, Piacenza, Robone, &Turati, 2019). As a result, fiscal decentralisation is becoming more common. It is critical to examine the effects of fiscal decentralisation on economic development as many nations move toward it(Khan, Ali, Dong, & Li, 2021). As there exists an inconsistent limited results for the empirical evidence for impact of fiscal decentralization on economic growth in

context of Pakistan, the current study filled the research gap through investigating the impact of fiscal decartelization on economic growth of Pakistan while considering the fiscal decentralization measures defined by Shoufeng(2017) i.e., Provincial Tax revenue, Provincial Local Revenues, Federal Transfers and Total Provincial Revenue

Research Objectives

- ➢ To investigate the impact of Provincial Tax revenue on economic growth of Pakistan.
- ➢ To analyze the impact of Provincial Local Revenues on economic growth of Pakistan.
- ➢ To examine the impact of Federal Transfers on economic growth of Pakistan.
- ➢ To investigate the impact of Total Provincial Revenue on economic growth of Pakistan.

Literature Review

Concept of Fiscal decentralization

In spite of the fact that FD is a wide term with many facets, its definition and measurement are still up for debate. By definition, decentralisation is the process of shifting power and responsibility from the national/central government to regional or subnational governments (Sugiyanto, Digdowiseiso, & Setiawan, 2018). In this sense, decentralisation involves more than just a change in the public sector. Contrary to popular belief, it does not limit itself to the interactions between one or a few actors. There are four major aspects of decentralisation involved in the transfer of power from national to subnational levels: political, administrative, market, and fiscal. In order to promote political decentralisation, constitutional or statutory changes, the formation and growth of pluralistic political parties, and support for democratic development at the local level must all be undertaken. Admin decentralisation is the process of transferring planning, funding, and management responsibilities for public services from the federal government to state and local governments and semi-autonomous entities(Yang, Tang, & Zhang, 2020). Another way to say it is that private sector decentralisation is when government tasks are transferred to the private sector. When it comes to the connection between national and local government finances, fiscal decentralisation is a good solution. Fiscal decentralisation, on the other hand, refers to the transfer of financial power and responsibility for public services to lower levels of government. The section discusses Pakistan's efforts towards fiscal decentralisation(Sanogo, 2019).

Fiscal Decentralization Measures for Pakistan

The objective of the study, four measures will be used to precisely evaluate different dimensions of fiscal decentralisation and to assess their impact on economic growth in Pakistan. These measures of fiscal decentralisation are explained below:

a. Provincial Tax revenue:

Provincial Tax revenue is defined as the provincial own tax revenues. This indicator measures the revenue raising authority of SNG and it represents revenues over which provinces have full discretion. If SNGs have higher own source revenues, it shows higher fiscal autonomy and would indicate a higher level of fiscal decentralisation(You, Zhang, & Yuan, 2019).

b) Provincial Local Revenues:

Provincial Local Revenues is an additional measure of local fiscal autonomy and it takes into account the revenues that are domestically generated within the provincial boundaries. The domestic tax, as well as the non-tax revenues, marks the local, provincial revenues. The non-tax proceeds contain revenues from fines, user charges, interest, dividends and profits from autonomous bodies(Thanh, &Canh, 2020).

c) Federal Transfers:

In developing countries, federal transfers to provinces play an important role in shaping local budgets. Although, federal transfers to provinces increase funds availability to provinces; however, at the same time, it indicates SNG's fiscal dependency on the centre. Intergovernmental transfers depict the vertical fiscal imbalance in the country(Yang, Tang, & Zhang, 2020).

d) Total Provincial Revenue: Total provincial revenue represents the total budgetary strength of the SNG. This measure takes into account the total availability of financial resources at the provincial level(Zhang, Zhang, & Liang, 2017).

Theoretical review

The below section presents the relevant theories that provides the theoritical underpinning to the construct of the study.

Neoclassical Growth Theory

Economic development, according to neoclassical theory, relies on the inputs of labour and capital. To put it another way, economic development is fueled by the availability of labour and capital (Korbutiak, Lysenko, Sokrovolska, Oleksyn, &Yurii, 2019). As the returns to factors of production diverge, production factors will migrate across areas. To put it another way, until regional factor returns are equalised, production factors will shift. According to the

neoclassical growth model, areas with high capital-labor ratios will have high wage rates. In contrast to high-rent areas, low-rent areas have faster population and labour growth, as well as greater increase in the rental rate(Khan, Ali, Dong, & Li, 2021).

Growth Pole Theory

The growth pole hypothesis is another popular explanation for explaining how something grows. When economic activity concentrates in one area, dynamic forces of attraction lead to further economic development, according to this idea. City growth differs from growth in the suburbs, according to this hypothesis. To put it another way: Cities are seen as development engines due to their high concentrations of manufacturing and service companies(Di Novi, Piacenza, Robone, &Turati, 2019). It is hypothesised that connections between rural and urban regions would lead to "trickle down" of urban growth advantages to rural areas. Population and employment growth rates are higher in growth poles than in the area where they are situated, therefore they are called "growth centres." Additionally, the growth rate of the growth pole should be higher than a certain proportion of the overall growth rate of the area. In this theory, it was established that the rate of economic growth depends on the distribution of economic activity in a given area. It is based on the idea that areas are out of balance and that imbalances such as excessive demand and supply for goods and services may contribute to development. According to this idea, economic development may be generated by price signals in decentralised markets, as well as by governments and big corporations exercising control over the growth process(Nursini, 2019).

Impact of fiscal decentralization of economic growth

Theories and empirical evidence disagree on whether decentralisation is a successful approach for promoting economic growth and development, particularly in developing nations. This argument continues. Decentralization may theoretically be seen as a method to boost economic development while also opening up many possibilities for improved governance. Fiscal devolution from the federal government to the states and municipalities may improve public service delivery efficiency, which will help spur economic development. According to the hypothesis, economic development has a positive relationship4 with decentralisation(Kuai, Yang, Tao, & Khan, 2019). In contrast, if decentralisation is not followed by improvements in the capacity of local government machinery and greater political accountability, it may have a detrimental impact on economic development. Some academic research suggests that the effective distribution of decentralisation advantages would lead to increased growth due to its influence on economic development. Many

empirical studies, however, have shown that the impact of fiscal decentralisation on economic development varies from country to country(Amin, 2018).

Many studies have been conducted in China on fiscal decentralisation, including those by Zhang and Zou (2004).The Chinese economy was examined in Lin and Liu's research on fiscal decentralisation in 2000 to see whether it had a beneficial impact. To find out whether fiscal decentralisation improves the economy, they do experiments. They used a Cobb-Douglas production function as their econometric model. A country's per capita production is calculated by taking into consideration three factors: per capita capital, technological level, and the share of the population employed. Technological progress and financial resources determine the growth rate of production. Differences in the distribution and endowment of resources and institutions are all part of technological advancements. Also included in the technology variable are non-observable features unique to a particular place(Amin, 2018).

Hypotheses

The following hypotheses are based on the previous discussion.

H1: There is existing significant impact of Provincial Tax revenue on the economic growth of the Pakistan.

H2: There is existing significant impact of Provincial Local Revenues on economic growth of the Pakistan.

H3: There is existing significant impact of Federal Transfers on the economic growth of the Pakistan.

H4: There is existing significant impact of Total Provincial Revenue on the economic growth of the Pakistan.

<div align="center">RESEARCH METHODOLOGY</div>

Research Design

The current study followed quantitative and descriptive type of the research.

Research Population

The data for the independent variables (i.e, Provincial Tax revenue, Provincial Local Revenues, Federal Transfers and Total Provincial Revenue) and dependent variable (i..e, Real GDP) was considered as the study population.

Data Collection

Secondary data will be used in the current study. The data for the independent variables (i.e., Provincial Tax revenue, Provincial Local Revenues, Federal Transfers and Total Provincial Revenue) and dependent variable (i.e., Real GDP) was collected from different sources such

as Pakistan Economic Survey (various issues) and OECD, World Bank, World Development Indicators (WBWDI), State Bank of Pakistan (SBP) etc. The data will be collected for a period between 1980 and 2020.

Variables measurement

Below table presents the summary of variables and their measurement

S.no	Variable	Type of Variable	Measurement Proxy
1	Economic Growth	Dependent	Real GDP growth (at constant prices)
2	Provincial Tax revenue	Independent variable	Provincial tax revenue ratio*
3	Provincial Local Revenues	Independent variable	Provincial tax+non-tax revenue ratio*
4	Federal Transfers	Independent variable	Federal transfers to provinces ratio*
5	Total Provincial Revenue	Independent variable	Total provincial revenue ratio*
6	Trade openness	Control Variable	(Exports + Imports) /GDP
7	Labor force	Control Variable	Labour force participation rate

* Fiscal decentralisation measures were expressed as a ratio to total government revenues

ANALYSIS

Descriptive analysis

The results of descriptive analysis are presented in the below table.

Table: Descriptive analysis

Variables	Variable type	Mean	SD	Minimum	Maximum
Real GDP	Dependent	4.660976	1.997325	-0.400000	8.710000
Provincial Tax Revenues	Independent	0.012106	0.017850	0.004891	0.094764
Provincial Local Revenue	Independent	0.005407	0.005003	0.000508	0.032302
Federal Transfers	Independent	0.259259	0.121842	0.075825	0.534657
Total Provincial	Independent	0.017513	0.017853	0.005792	0.098320

Revenues					
Govt Expenditures	Control	0.112484	0.040489	0.036298	0.182553
Trade Openness	Control	0.403281	0.066614	0.268117	0.533477
Labour Force	Control	44.35634	14.12277	25.65000	69.82000
Govt Revenues	Control	0.096543	0.013830	0.071567	0.125893
Inflation	Control	8.635222	4.107391	2.529328	20.90451

The table shows that mean value for real GDP i.e., the dependent variable was 4.660976, the value of standard deviation for this variable was 1.997325, minimum value of real GDP was measured as -0.400000 while the maximum value for this variable was 8.710000. The findings of the real GDP in Pakistan is recorded as higher among the developing countries as lower GDP is recorded by studies like Cucari et al. (2018), in developing countries and Ehkioya et.al, (2021) in under developed countries. Most analysts currently considers that GDP growth of 2.5% to 3.5% per annum is the most that our economy can safeguard without adverse effects Hafsi and Turgut (2019).Provincial tax revenue is recorded as lower in comparison to findings of other research in case of other developing countries, as Brave (2018), reports mean value of Provincial tax revenue as 0.10031 while Hanefah (2018) reported Provincial tax revenue for Bangladesh as 0.12314. While the labor force mean value is measured higher in Pakistan as compared to other developing countries. The studies of Muttakin et al. (2020) examined Labour force value of 12.4232 and Katmon (2019), measured Labour force value of 22.4421. While the Provincial Local Revenue and Federal Transfers values for the mean are inconsistent with the studies of Hafsa and Turgut (2019). Compared to the industrialized countries, the mean value of Total Provincial Revenues in Pakistan was as low. But for the Total provincial revenues in the emerging countries, the value in Ibrahim and Nanefah (2016) is also very comparable, as 0,0421 and 0.02213 for Bangladesh (Muttakin et al. 2015), as Barako and Brown (2018) stated 0,1502 in Kenya.

Correlation analysis

The results of the correlation analysis are presented in the below table.

Table. Correlation analysis

Variables	RealGDP	ProvTaxRev	ProvLocRev	FedTrans	TotProvRev	GovExpen	TradeOpe	Infl	LabForce	GovtRev
Real GDP	1									
ProvTaxRev	-0.019697	1								
ProvLocRev	0.045302	0.162121	1							
FedTrans	0.328828	0.381423	0.103548	1						
TotProvRev	0.032390	-0.054501	-0.187414	-0.000985	1					
GovExpen	0.269639	0.609493	0.302952	0.208008	-0.143495	1				
Trade Open	0.179645	-0.015503	0.162121	-0.281848	-0.187301	0.050031	1			
Infl	0.077131	-0.015503	0.162121	-0.281848	-0.187301	0.050031	-0.015503	1		
LabForce	-0.487730	-0.281848	-0.187301	0.609493	0.302952	0.609493	0.302952	0.21	1	
Govt Rev	0.129042	-0.245886	-0.249382	-0.347693	0.299293	0.244060	0.140783	0.96	-0.032390	1

Concludingly, the results of correlation analysis show that independent variables provincial local revenue, federal transfer and total provincial revenue are having a positive relationship with economic growth while the provincial tax revenue is having a negative relationship with economic growth.

Multicollinearity

Variance inflation factor (VIF) are computed to test the multicollinearity. variance inflation factors (VIFs) are computed as VIF q = 1 / (1 - q).

Table: Multicollinearity

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.002263	43.87784	NA
Provincial Tax Revenues	0.012462	22.84615	1.091461
Provincial Local Revenue	1.394505	19.13514	1.042697
Federal Transfers	0.007299	5.932812	1.124462
Total Provincial Revenues	0.002744	1.755928	1.050329
Inflation	2.160106	5.241457	1.063519
Govt Expenditures	0.021845	1.18238	1.040720
Trade Openness	0.001257	43.81829	1.023411
Govt Revenues	0.003521	1.536641	1.045531
Labor Force	0.00135	34.24352	1.035642

It is evident from the following table that there is no substantial multicollinearity in the study's explanatory variables since the variance inflation factor for each variable is less than 5.

Regression analysis

The results of the regression analysis are presented in the below table.

Table: Regression Analysis

Dependent Variable: LREAL_GDP
Method: Least Squares
Date: 09/05/21   Time: 19:51
Sample: 1980 2020
Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.895736	3.246422	2.124104	0.0313
PROVINCIALOCALREV	41.39114	16.24762	2.547661	0.0023
PROVINCIAL_TAX_REVENUES	-18.61227	8.346791	-2.229872	0.0031
FEDERAL_TRANSFERS	47.37730	12.34672	3.837237	0.0017
TOTAL_PROVIN_REVENUES	14.74753	7.213464	2.044444	0.0044
TRADE_OPENNESS	-2.161507	0.924224	-2.338725	0.0025
LABOUR_FORCE	-1.344305	0.597937	-2.248239	0.0318
INFLATION	0.058664	0.026951	2.176691	0.0234

GOVT_REVENUES	12.08937	5.346451	2.261195	0.0029
GOVT_EXPENDITURES	1.021791	0.464349	2.200480	0.0033

R-squared	0.329325	Mean dependent var	1.458309
Adjusted R-squared	0.134613	S.D. dependent var	0.552674
S.E. of regression	0.051431	Akaike info criterion	2.715543
Sum squared resid	0.494257	Schwarz criterion	4.133488
Log likelihood	-25.16864	Hannan-Quinn criter.	4.867736
F-statistic	169.1342	Durbin-Watson stat	2.124675
Prob(F-statistic)	0.013380		

The above table shows that the value of Adjusted R square is 0.329325. This means that a unit change in independent variables (i.e., Provincial Tax Revenues, Provincial Local Revenue, Federal Transfers and Total Provincial Revenues) predicts 32 percent change in the dependent variable i.e., economic growth.

The values of the regression coefficient show the impact of the individual independent variable on the dependent variable. When the value of the regression coefficient is higher at the value of significance then it means that the independent variables in contributing more to the dependent variable (Crowther & Lancaster, 2012). As the above table shows that the value of regression coefficient for provincial local revenue is 41.39114 at significance level of (p=0.0023 and t=2.547661), this means that provincial local revenue has significant impact on economic growth and contributes more to the economic growth. Similarly, the values of regression coefficients for provincial tax revenue, federal transfers, and total prosocial revenue are -18.61227, 47.37730 and 14.74753 that are significant at (p=0.0031 and t=-2.229872), (p=0.0017 and t=3.837237) and (p=0.0044 and t=2.044444) respectively. These significant values shows that provincial tax revenue, federal transfers, and total prosocial revenue are also having significant impact on economic growth.

Conclusion

The major purpose of the research is to become familiar with the fiscal decentralisation attitude of Pakistan and its effect on economic development of the nation over the long term. The topic of recourse mobilisation between provincial and federal governments is not that easy and straight forward but is regarded complicated and complex occurrence. In the current research, we have examined both (Govt. Revenues and Expenditure) indicators of the fiscal policy. Based on the empirical data, it indicates that province and municipal levels

governments should be granted greater autonomy and power in budgetary affairs. No doubt, fiscal autonomy would produce more resources; boost trust and also make federating unit more responsible. Further, fiscal decentralisation would lessen provincial reliance on central and development; the process would speed at the grass root level. In addition, the focus of federal Govt. on the national problem would be intensified and economic progress would be expedited. In short, the economic loss which stems from lack of capacity development mechanism in provinces and central interference in provincial concerns will be rectified.

REFERENCES

Alexeev, M., Avxentyev, N., Mamedov, A., &Sinelnikov-Murylev, S. G. (2019). Fiscal decentralization, budget discipline, and local finance reform in Russia's regions. *Public finance review*, *47*(4), 679-717.

Amin, K. Z. (2018). Fiscal Decentralization as an Approach to Finance and Achieve SDGs in Africa1. *A Research Paper Presented to the UNECA's High Level Policy Dialogue on Development Planning in Africa*.

Bahl, R., & Bird, R. M. (2018). *Fiscal decentralization and local finance in developing countries*. Edward Elgar Publishing.

Bartolini, D., Sacchi, A., Salotti, S., &Santolini, R. (2018). Fiscal decentralization in times of financial crises. *CESifo Economic Studies*, *64*(3), 456-488.

Di Novi, C., Piacenza, M., Robone, S., &Turati, G. (2019). Does fiscal decentralization affect regional disparities in health? Quasi-experimental evidence from Italy. *Regional Science and Urban Economics*, *78*, 103465.

Ding, Y., McQuoid, A., &Karayalcin, C. (2019). Fiscal decentralization, fiscal reform, and economic growth in china. *China Economic Review*, *53*, 152-167.

Finžgar, M., &Brezovnik, B. (2019). Direct international comparison of EU member states fiscal decentralization systems with the Conceptual Index of Fiscal Decentralization (CIFD) in the Context of European Charter of Local Self-Government (ECLSG). *Transylvanian Review of Administrative Sciences*, *15*(56), 41-59.

Hao, Y., Chen, Y. F., Liao, H., & Wei, Y. M. (2020). China's fiscal decentralization and environmental quality: theory and an empirical study. *Environment and Development Economics*, *25*(2), 159-181.

Khan, Z., Ali, S., Dong, K., & Li, R. Y. M. (2021). How does fiscal decentralization affect CO_2 emissions? The roles of institutions and human capital. *Energy Economics*, *94*, 105060.

Korbutiak, A., Lysenko, Z., Sokrovolska, N., Oleksyn, A., &Yurii, E. (2019). United territorial communities in Ukraine in the context of fiscal decentralization. *Problems and Perspectives in Management*, *17*(2), 217.

Kuai, P., Yang, S., Tao, A., & Khan, Z. D. (2019). Environmental effects of Chinese-style fiscal decentralization and the sustainability implications. *Journal of Cleaner Production*, *239*, 118089.

Lamba, A., Allo, P. K., & Lamba, R. A. (2019). Effect of fiscal decentralization policy of regional economic imbalances towards economy growth in Eastern Indonesia. *International Journal of Social Sciences and Humanities*, *3*(2), 112-127.

Melnyk, L., Sineviciene, L., Lyulyov, O., Pimonenko, T., &Dehtyarova, I. (2018). Fiscal decentralization and macroeconomic stability: the experience of Ukraine's economy. *Problems and Perspectives in Management*, *16*(1), 105-114.

Mihálik, J., Horváth, P., &Švikruha, M. (2019). Give me liberty or give me money: the fiscal decentralization and autonomy of regional governance in Slovakia. *European Journal of Government and Economics (EJGE)*, *8*(1), 96-109.

Nursini, N. (2019). Poverty Alleviation in the Context of Fiscal Decentralization in Indonesia. *Economics & Sociology*, *12*(1), 270-368.

Park, S., Park, M. G., & Nam, K. M. (2019). Growth effects of fiscal decentralization with weak economic motivation: the case of South Korea. *The Annals of Regional Science*, *63*(3), 399-436.

Pasichnyi, M., Kaneva, T., Ruban, M., &Nepytaliuk, A. (2019). The impact of fiscal decentralization on economic development. *Investment Management and Financial Innovations*, *16*(3).

Sanogo, T. (2019). Does fiscal decentralization enhance citizens' access to public services and reduce poverty? Evidence from Côte d'Ivoire municipalities in a conflict setting. *World Development*, *113*, 204-221.

Shan, S., Ahmad, M., Tan, Z., Adebayo, T. S., Li, R. Y. M., &Kirikkaleli, D. (2021). The role of energy prices and non-linear fiscal decentralization in limiting carbon emissions: Tracking environmental sustainability. *Energy*, *234*, 121243.

Shan, S., Ahmad, M., Tan, Z., Adebayo, T. S., Li, R. Y. M., &Kirikkaleli, D. (2021). The role of energy prices and non-linear fiscal decentralization in limiting carbon emissions: Tracking environmental sustainability. *Energy*, *234*, 121243.

Shkolnyk, I. O., Melnyk, T., &Mershchii, B. (2018). Assessment of institutional conditions of fiscal decentralization in Ukraine.

Shoufeng, H. (2017). A study of impacts of fiscal decentralization on smog pollution. *The Journal of World Economy*, 02.

Sugiyanto, E., Digdowiseiso, K., & Setiawan, H. D. (2018). Fiscal Decentralization and Routine Conflict in Indonesia. *Journal of Applied Economic Science*, *13*(4 (58)).

Thanh, S. D., &Canh, N. P. (2020). Fiscal decentralization and economic growth of Vietnamese provinces: The role of local public governance. *Annals of Public and Cooperative Economics*, *91*(1), 119-149.

Wen, H., & Lee, C. C. (2020). Impact of fiscal decentralization on firm environmental performance: evidence from a county-level fiscal reform in China. *Environmental Science and Pollution Research*, *27*(29), 36147-36159.

Yang, Y., Tang, D., & Zhang, P. (2020). Effects of fiscal decentralization on carbon emissions in China. *International Journal of Energy Sector Management.*

You, D., Zhang, Y., & Yuan, B. (2019). Environmental regulation and firm eco-innovation: Evidence of moderating effects of fiscal decentralization and political competition from listed Chinese industrial companies. *Journal of cleaner production*, *207*, 1072-1083.

Zhang, K., Zhang, Z. Y., & Liang, Q. M. (2017). An empirical analysis of the green paradox in China: From the perspective of fiscal decentralization. *Energy Policy*, *103*, 203-211.