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Fiscal Decentralization and the Human Development Index: A Cross-Border Empirical Study

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Abstract: Many countries have implemented fiscal decentralization reform in recent decades, which has had a profound impact on their national development. The aim of this paper is to study the relationship between fiscal decentralization and national development. To achieve this goal, we validated our proposition with panel data of 50 countries covering the period of 1991–2020 and used IV estimation to correct any potential endogeneity, with the Geographic Fragmentation Index as an instrumental variable. We used the Human Development Index (HDI) to measure the level of national development, as it is a composite index that includes the three dimensions of economy, education, and health. The results show that there is a significant hump-shaped relationship between fiscal decentralization and the HDI. This result was robust when it was tested on an alternative sample covering the period of 2010–2021. The policy implication determined here is that governments should choose a moderate degree of fiscal decentralization in order to promote national development. We also discuss how to determine such a moderate degree of fiscal decentralization.

Keywords: fiscal decentralization; Human Development Index; sustainable development; government spending

1. Introduction

Fiscal decentralization is helpful in giving full play to the information advantages and initiatives of local governments, as well as in increasing economic efficiency [1–3]. However, decentralization may also intensify intergovernmental competition and distort the fiscal choices or the composition of expenditures; for example, crowding out expenditures lacking direct economic effect, such as public health, education, social welfare, etc., eventually exert an adverse impact on national development [4–9]. Therefore, fiscal decentralization may impact the economic and social development of a country [10]. In this paper, we attempt to address the following research question: what is the relationship between fiscal decentralization and national development?

National development is usually measured by the Human Development Index (HDI), which is considered to be a more comprehensive index than economic growth [11,12]. The HDI has been annually reported as an important part of the Human Development Report of the United Nations Development Program (UNDP) [13,14]. The HDI consists of three equally weighted indicators, namely health, education, and income level. This index is widely used to measure national development because of the following factors: (1) the HDI contains development-related information, such as that concerning education and health, and can better reflect national development compared to traditional indicators such as GDP or per capita GDP [15]; (2) it can be used to measure and compare the development levels of most countries of the world due to its simple composition and minimal data requirements;

and (3), although its structure is simple, it has a rich connotation and represents the essential abilities that are necessary for human development, namely the ability to lead a long and healthy life, to obtain knowledge, and to access the resources needed for a decent standard of living [16,17].

As reviewed in the next section, there may be a hump-shaped relationship between fiscal decentralization and national development; however, to the best of our knowledge, no one has empirically examined this theoretical viewpoint. For example, Lockwood (2002) [18] found that regional or local governments may find it difficult to coordinate in order to internalize interjurisdictional externalities, whereas the cost of centralization is reduced "responsiveness" to the preferences of regions with respect to the provision of public goods. As concluded by Janeba and Wilson (2011) [19], complete decentralization is inefficient because governments compete for scarce capital by lowering their capital taxes and levels of public goods to inefficiently low levels, whereas complete centralization is also inefficient because it is determined by the minimum winning coalition within a legislature. Therefore, both absolute centralization and absolute decentralization lead to reduced efficiency and exert a negative impact on national development [6]. The theory of optimal decentralization has been supported by some empirical studies. Thiessen's (2003) [20] empirical results showed that both extreme decentralization and extreme centralization are associated with disadvantages in terms of economic growth. In summary, the relationship between fiscal decentralization and the HDI is a research question that needs to be further studied.

Therefore, the aim of this paper is to examine the hump-shaped relationship between fiscal decentralization and the HDI. The results reported in this paper may be relevant for both researchers and policy makers. First, this paper further supports the theory of optimal decentralization from a new and more comprehensive perspective. Second, the results reported in this paper have important policy implications, that is, governments should choose a moderate level of fiscal decentralization in order to promote economic development. We also explore how to determine a moderate (or an optimal) degree of decentralization in the Discussion Section (Section 5). Finally, the results reported herein also provide a reference for sustainable development policy making. We used the HDI to study optimal decentralization, rather than economic growth, because the HDI contains important information beyond the scope of economic growth, namely that with respect to education and public health. These two factors play a crucial role in national sustainable development.

The remainder of this paper is organized as follows: Section 2 is a literature review of optimal decentralization. In Section 3, we introduce the methods and data used in the present study. In Section 4, we report our empirical results, and, in Section 5, we present our conclusions and a discussion of the results.

2. Literature Review

Many previous studies have pointed out (either explicitly or implicitly) that there is an optimal or desirable degree of decentralization between complete centralization and complete decentralization, such as those by Besley and Coate (2003) [21], Lockwood (2002) [18], Thiessen (2003) [20], Lorz and Willmann (2005) [22], Janeba and Wilson (2011) [19], and Che et al. (2017) [23], etc. Most of these researchers explored optimal decentralization from a perspective of the multitier intergovernmental distribution of public goods. Oates (1972) [24] stated that there is an "efficient" level of decentralization for the provision of public goods at which the additional benefit from less policy uniformity is balanced by the loss resulting from the less-efficient internalization of externalities. Gordon's (1983) [25] study further showed that complete decentralized decision making can lead to inefficiencies, since local governments ignore the effects of their decisions on the utility levels of nonresidents. Based on this work, Lockwood (2002) [18] constructed a theoretical framework to explore the most desirable degree of fiscal decentralization and found that both centralization and decentralization are inefficient, failing to achieve Pareto optimality. Specifically, regional or

local governments may find it difficult to coordinate in order to internalize interjurisdictional externalities or to exploit economies of scale, whereas the cost of centralization is reduced "responsiveness" to the preferences of regions, with respect to the provision of public goods [18]. The optimal choice between centralization and decentralization can be seen as a tradeoff between the internalization of externalities and the responsiveness to local preferences [26]. When the level of externalities is low, and regional preference heterogeneity needs to be considered, the decentralized provision of public goods is preferable; however, when the level of externalities is high, the centralized provision of public goods is more favorable [21]. This concept is tenable whether the government is benevolent or nonbenevolent [26]. Therefore, centralized or decentralized provision should be selected according to the characteristics of the public goods, which can help to achieve the social optimum [22].

In previous studies, researchers have investigated optimal decentralization from the perspective of competition or the incentive factors of regional governments and have concluded that both decentralization and centralization are inefficient, and that there is an optimal degree of decentralization between the two extremes. As shown by Janeba and Wilson (2011) [19], complete decentralization is inefficient because governments compete for scarce capital by lowering their capital taxes and the level of public goods to inefficiently low levels, whereas complete centralization is inefficient because it is determined by the minimum winning coalition within the legislature. Che et al. (2017) [23] illustrated this tradeoff in determining the optimal degree of decentralization by using China as a case study and found that excessive decentralization weakens the concerns of bureaucrats with respect to their political careers, thereby weakening their incentive to work, whereas insufficient decentralization results in too few authorities for such incentives to be turned to productive use. They also found that the level of democracy is positively correlated with the optimal degree of decentralization by comparing the equilibrium optimal degree of decentralization in the contexts of autocracy and democracy, indicating that the theory of optimal decentralization is tenable in both democratic and autocratic countries [23]. In our working paper, we have stated that excessive expenditure decentralization is not conducive to adequate macroeconomic control or for taking advantage of economies of scale, whereas insufficient expenditure decentralization is not conducive to giving full play to the initiatives and information advantages of local governments [6]. Therefore, both situations lead to a decrease in efficiency and the welfare of residents.

The theory of optimal decentralization has also been supported by some practical cases and empirical studies. For example, there has been debate about the appropriate sharing of tax and expenditure between federal and state governments since the drafting of the U.S. constitution [27]. In Canada, similar debates have been made more acute as a result of the separatist movement in Quebec. In the European Union, the principle of subsidiarity, as introduced in the Maastricht Treaty, "remains vague and capable of conflicting interpretations" [28]. In China, the problem of "excessive decentralization" has attracted considerable attention (in recent years, China's regional government expenditure has accounted for more than 85% of the total government expenditure), and centralized reform is called for [23]. In addition to these cases, Thiessen's (2003) [20] empirical results showed that both extreme decentralization and extreme centralization are associated with disadvantages in terms of economic growth. A growing list of literature suggests that an optimal level decentralization can be identified in both a theoretical and empirical sense. Researchers have studied optimal decentralization from different perspectives, such as with respect to regional state capacity [29], social welfare [30], environmental policy [31,32], public debt accumulation [33], and innovation [34].

In summary, both excessive decentralization and excessive centralization can lead to a decrease in efficiency and resident welfare, and an optimal degree of decentralization can be identified between these two extreme situations. Moreover, the theory of optimal decentralization has been well-supported by existing cases and empirical studies. Therefore,

we hypothesized that there may be a hump-shaped relationship between decentralization and the HDI that has not been empirically studied to date [35], as follows:

Hypothesis 1. *Fiscal decentralization has an inverted U-shaped impact on national development.*

3. Methods and Data

3.1. Empirical Framework

In order to estimate the impact of fiscal decentralization on national development, we followed the empirical framework proposed by the fiscal decentralization and development literature [3,6,36]. For robustness of empirical analysis, we used three estimation methods simultaneously. First, we adopted panel fixed-effects regressions (two-way FE) as our base estimation method to explore the effects of variation over time, with respect to fiscal decentralization and national development across countries. Second, the LSDV (least square dummy variables) method was used to deal with cross-sectional correlation problems. Finally, owing to the potential for endogenous issues, we also used an IV approach, using the Geographic Fragmentation Index (GFI) first introduced by Canavire-Bacarreza et al. (2020) [36] as an instrument for fiscal decentralization. The basic panel regression equation is expressed as follows:

$$\text{HDI}_{it} = \alpha_i + \mu_t + \gamma_2 D_{it} + \gamma_3 D_{it} * D_{it} + \gamma_3 X_{it} + \varepsilon_{it} \tag{1}$$

where i and t indicate countries and years, respectively; HDI is short for the Human Development Index; and D is a measure of expenditure decentralization. We used the square of D to test the inverted U-shaped relationship between fiscal decentralization and the HDI. Furthermore, X is a set of dummy variables and control variables. A detailed description of the data sources for these variables can be found in Table 1.

Table 1. The Descriptions and Data Sources of variables.

Variable	Description	Source
HDI	The Human Development Index. Its value ranges from 0 to 1, with higher values corresponding to better performance in national human development.	UNDP
Fiscal decentralization	Share of subnational expenditure in total government expenditure (%).	IMF-GFS
Geographic Fragmentation Index (GFI)	The GFI reflects the weighted probability that two individuals taken at random in the country do not live in similar altitude zones, with the weight matrix calculated as the average distance between altitudes.	Canavire-Bacarreza et al. (2016) [36]
Government size	Share of fiscal revenue in GDP (%).	IMF-GFS
Human capital	Secondary school enrollment (% gross).	World Bank
Population	Natural logarithm of actual population.	World Bank
Openness	The share of export and import in GDP (%).	UNCTAD
Dependence on natural resources	The share of total natural resources rents in GDP (%). Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents. The higher the value, the more dependent the country is on natural resources.	World Bank
Ethnic Fractionalization	The Ethnolinguistic Fractionalization Indices for the year 1985. Its value ranges from 0 to 1.	Roeder (2001) [37]
Democracy	Current level of democracy. On a scale from 0 to 10, with higher values corresponding to higher democratic level.	Polity IV Dataset

Table 1. *Cont.*

Variable	Description	Source
Corruption	The Transparency International Corruption Perceptions Indices for the year 2008. Its value ranges from 0 to 10, with higher values corresponding to lower level of corruption.	Transparency International
Time dummy	In the sample of short-run effect, time dummies are created with the years from 2010 to 2016. In the sample of long-run effect, time dummies are created with 5 periods, namely 1991–1995, 1996–2000, 2001–2005, 2006–2010, and 2011–2015.	—
Region dummy	A scale from 1 to 6, respectively, represents Europe and Central Asia, Latin America and Caribbean, Sub-Saharan Africa, North America, East Asia and Pacific, and the Middle East and North Africa.	World Bank

Note: (1) UNCTAD is short for the United Nations Conference on Trade and Development. (2) The Ethnolinguistic Fractionalization Indices can be found in Roeder, P. G. 2001. Ethnolinguistic Fractionalization (ELF) Indices, 1961 and 1985, Mimeo, http://weber.ucsd.edu/~proeder/elf.htm (accessed on 11 April 2023) [37] (3) The Transparency International Corruption Perceptions Indices can be found at: http://www.gwdg.de/~uwvw/ (accessed on 11 April 2023).

3.2. Variables

(1)   Explanatory Variable: Fiscal Decentralization

Our main explanatory variable is the share of subnational expenditures among the total government expenditures as a measure of fiscal decentralization. This is one of the most widely used measures of fiscal decentralization in the empirical literature [3,20,36,38]. This GFS-based measure (GFS, which is short for the government finance statistics produced by the International Monetary Fund, considers the share of subnational expenditures (or revenues/taxes) among total government expenditures as a measure of fiscal decentralization. Given the wide use of this measure in empirical studies, many researchers simply call it the "GFS-based measure" for short.) is not perfect and has been criticized because it does not capture the real autonomy of subnational governments well and tends to overstate the actual level of decentralization [39]. Hence, considerable effort has been dedicated to constructing indices of fiscal decentralization, such as those proposed by Hooghe et al. (2010) [40]. However, there is no evidence that index measures are more effective than other measures, or that they yield more consistent results [38]. There is also no empirical evidence that the GFS-based measure is less effective than other measures as a proxy for the relative level of a country's fiscal decentralization, or that it is subject to systematic measurement errors across countries [3,36]. Ultimately, we chose the GFS-based measure of expenditure decentralization and accepted its imperfection because it allows us to utilize large samples that include multiple developing countries, thereby helping us to obtain empirical results with general significance.

(2)   Endogeneity Problems and Instrumental Variables

Existing studies on the impact of fiscal decentralization on economic development suffer from an endogeneity problem [41]; whereas fiscal decentralization may directly and indirectly affect economic growth, many governments have embarked on decentralization reforms in the pursuit of accelerated economic growth. In order to address this two-way causal relationship between fiscal decentralization and economic growth, existing studies have used a variety of techniques, including system-GMM and IV approaches [3,38].

In the case of fiscal decentralization and the HDI, we can similarly expect the presence of a two-way causal relationship. On the one hand, fiscal decentralization affects economic growth, public health, education, social welfare, and other determinants of national development [42]. On the other hand, governments may seek to enhance national development by adjusting their decentralization policies in areas such as health, education, social welfare, etc., leading to an endogeneity problem [43].

In order to solve potential endogeneity problems, we adopted the Geographic Fragmentation Index (GFI) developed by Canavire-Bacarreza et al. (2016) [44] as an instrumental

variable. First, there is a strong correlation between the GFI and fiscal decentralization. Canavire-Bacarreza et al. (2016) [44] pointed out that the GFI is an important factor affecting fiscal decentralization and empirically tested this argument. As an instrumental variable, the advantage of the GFI over other geographical factors (e.g., total country area) is that it is a time-varying variable and can be used to estimate the time effect of panel data. Secondly, geographical factors are strictly exogenous, that is, they may affect economic activities and national development, whereas economic activities and national development do not affect geographical factors. Thirdly, the GFI has proven to be a suitable instrumental variable for empirical research on fiscal decentralization [36].

The GFI reflects the weighted probability that two individuals selected at random in a country do not live in similar altitude zones, with the weight matrix calculated as the average distance between altitudes. Thus, the index is simply calculated as follows:

$$\text{GFI} = 1 - \sum_{j=1}^{J} \sum_{i=1}^{N} \left(w_{ij} \frac{n_i}{N} \right)^2 \tag{2}$$

where $\frac{n_i}{N}$ is the share of the population by elevation and w_{ij} measures the distance between altitude *i* and altitude *j*. The values of this measure range from zero, which corresponds to a case in which all of the population is settled in the same altitude zone, to one, which corresponds to the implausible case in which each person lives at a different altitude. In general, geographic fragmentation increases with the number of altitude zones.

The GFI data were acquired from NASA's Earth Observing System Data and Information System (EOSDIS) hosted by the Center for International Earth Science Information Network (CIESIN) at Columbia University. The data were available for the years 1990, 1995, 2000, and 2010. Given the low level of variation in the GFI over time, to address the missing values for 2001–2005, we assumed them to be the same as they were for 2006–2010. In addition, because the GFI data were available for only the five periods mentioned above, we also applied a lag period of expenditure decentralization as an alternative instrumental variable.

(3) Control Variables

First, we controlled for the variables commonly used for canonical specification in empirical research analyzing economic development issues, namely human capital, population, and openness [45]. Specifically, we adopted the secondary school enrollment rate as a measure of human capital [20,38,39], population was measured by the natural logarithm of the actual population, and openness was measured by the proportion of total import and export trade relative to the total GDP [3,36,38,46].

Secondly, although it is not regularly considered in the empirical study of the effects of fiscal decentralization, we controlled for government size, as measured by the revenue-to-GDP ratio. Fiscal decentralization is generally constrained by the government's financial capacity [47], and if fiscal decentralization leads to a smaller public sector (because of increased competition among levels of administration), and there is a negative relationship between the public sector size and growth, then there will be a positive bias in the estimation [48].

Thirdly, we controlled for the dependence on natural resources, as measured by the share of total natural resource rent relative to the total GDP, since the presence of natural resources is likely to affect national development [49]. Revenues from natural resources such as fossil fuels and minerals can make up a significant proportion of the GDP; however, their exploitation in the present will not only reduce future development and living standards but is also likely to cause environmental pollution and ecosystem damage [50].

Fourthly, institutional, environmental, and ethnic fractionalization issues are considered to play important roles in economic growth and social harmony; therefore, we chose democracy, corruption, civil liberty, and ethnolinguistic fractionalization as control variables, with reference to [3,36,46]. Democracy was measured by the democracy index

according to the Polity IV dataset. Corruption was indicated by the Transparency International Corruption Perceptions Indices of Transparency International. Civil liberty was determined by Freedom House. Ethnic fractionalization was measured by the Ethnolinguistic Fractionalization (ELF) Indices built by Roeder (2001) [37].

Finally, in this paper, we introduced time and region dummy variables to avoid missing the variable problems caused by time or regional differences [38]. The region dummy variables were created according to the World Bank's division method, namely Europe and Central Asia, Latin America and the Caribbean, East Asia and the Pacific, Sub-Saharan Africa, North America, South Asia, and the Middle East and North Africa.

3.3. Data and Imputation

Given the existing data information constraints, we compiled a panel of 50 countries (see Table 2 for the complete list), including 20 developed countries and 30 developing countries, mainly distributed in six regions, namely Europe and Central Asia, Latin America and the Caribbean, Sub-Saharan Africa, North America, East Asia and the Pacific, and the Middle East and North Africa. The main consideration determining the selection of countries for inclusion in the sample was confirmation that there were data available for the selected countries on expenditure decentralization and other control variables.

Table 2. Sample of Countries by Development Level and Region.

Country	Region	DC	Country	Region	DC
Afghanistan	Middle East and North Africa	N	Kazakhstan	Europe and Central Asia	N
Albania	Europe and Central Asia	N	South Korea	East Asia and Pacific	Y
Armenia	Europe and Central Asia	N	Latvia	Europe and Central Asia	N
Australia	East Asia and Pacific	Y	Lithuania	Europe and Central Asia	N
Austria	Europe and Central Asia	Y	North Macedonia	Europe and Central Asia	N
Azerbaijan	Europe and Central Asia	N	Malta	Europe and Central Asia	Y
Belarus	Europe and Central Asia	N	Mauritius	Sub-Saharan Africa	N
Belgium	Europe and Central Asia	Y	Moldova	Europe and Central Asia	N
Bosnia and Herzegovina	Europe and Central Asia	N	Mongolia	East Asia and Pacific	N
Brazil	Latin America and Caribbean	N	Netherlands	Europe and Central Asia	Y
Canada	North America	Y	New Zealand	East Asia and Pacific	Y
Chile	Latin America and Caribbean	N	Norway	Europe and Central Asia	Y
China	East Asia and Pacific	N	Paraguay	Latin America and Caribbean	N
Colombia	Latin America and Caribbean	N	Peru	Latin America and Caribbean	N
Costa Rica	Latin America and Caribbean	N	Romania	Europe and Central Asia	N
El Salvador	Latin America and Caribbean	N	Russian Federation	Europe and Central Asia	N
Estonia	Europe and Central Asia	Y	South Africa	Sub-Saharan Africa	N
Georgia	Europe and Central Asia	N	Spain	Europe and Central Asia	Y
Germany	Europe and Central Asia	Y	Sweden	Europe and Central Asia	Y
Honduras	Latin America and Caribbean	N	Switzerland	Europe and Central Asia	Y
Hungary	Europe and Central Asia	Y	Thailand	East Asia and Pacific	N
Iceland	Europe and Central Asia	Y	Turkey	Europe and Central Asia	N
Israel	Middle East and North Africa	Y	Ukraine	Europe and Central Asia	N
Japan	East Asia and Pacific	Y	United Kingdom	Europe and Central Asia	Y
Kazakhstan	Europe and Central Asia	N	United States	North America	Y

Note: DC indicates whether it is a developed country, according to the standards of CIA's World Fact Book and IMF, where Y is short for yes and N is short for no.

(1)　Sample for Basic Regression

The basic regression sample is a comprehensive (time-series and cross-country) dataset comprising 50 countries for the period of 1991–2020. With reference to Canavire-Bacarreza et al. (2020) [36], we averaged the values for five-year periods to smooth the data over the macroeconomic cycle, which allowed us to explore the long-run effects. This resulted in a cross-country dataset covering six periods, namely 1991–1995, 1996–2000, 2001–2005, 2006–2010, 2011–2015, and 2016–2020. A summary of statistics for this sample is reported in Table 3.

Table 3. Summary Statistics.

Variables	Sample for Basic Regression (1991~2020)							
	Obs	Mean	Std. Dev.	Skewness	Kurtosis	Jarque–Bera	max	min
HDI	300	0.73	0.11	0.00	0.27	0.0373	0.94	0.31
Fiscal decentralization	237	0.31	0.17	0.01	0.53	0.0385	0.85	0.00
GFI	300	0.34	0.08	0.00	0.00	0.0450	0.48	0.05
Government size	247	0.34	0.10	0.00	0.00	0.0547	0.95	0.15
Human capital	293	0.93	0.22	0.11	0.00	0.0463	1.60	0.16
Ln_Population	300	16.31	1.73	0.13	0.11	0.0422	21.03	11.23
Openness	298	0.88	0.44	0.00	0.00	0.0453	3.07	0.00
Dependence on natural resources	298	0.04	0.05	0.00	0.00	0.0453	0.37	0.00
Ethnic Fractionalization	300	0.40	0.22	0.12	0.00	0.0453	0.89	0.00
Democracy	300	7.55	3.38	0.00	0.71	0.0263	10.00	0.00
Corruption	300	5.04	2.05	0.16	0.00	0.0455	9.30	1.30
Variables	Sample for Robustness Check (2010–2021)							
	Obs	Mean	Std. Dev.	Skewness	Kurtosis	Jarque–Bera	max	min
HDI	600	0.81	0.11	0.00	0.18	0.0199	0.95	0.46
Fiscal decentralization	600	0.29	0.19	0.00	0.07	0.0215	0.85	0.00
Government size	600	0.37	0.12	0.00	0.00	0.0225	0.90	0.00
Human capital	600	1.15	0.22	0.19	0.00	0.0229	1.64	0.00
Ln_Population	600	16.35	1.67	0.10	0.13	0.0207	21.04	11.54
Openness	600	0.92	0.45	0.00	0.00	0.0225	3.26	0.00
Dependence on natural resources	600	0.04	0.06	0.00	0.00	0.0225	0.46	0.00
Ethnic Fractionalization	600	0.39	0.24	0.16	0.00	0.0228	0.89	0.00
Democracy	600	7.56	3.11	0.00	0.25	0.0189	10.00	0.00
Corruption	600	5.06	2.23	0.10	0.00	0.0226	9.30	1.30

Note: In order to save space, we retained two decimal places, for example, the Skewness of HDI is 0.00, not because it is equal to 0, but because it is very small.

(2)   Sample for Robustness Check

The sample used for the robustness check is a comprehensive panel (time-series cross-country) dataset comprising 50 countries for the period of 2010–2021. A summary of statistics for this sample can be found in Table 3.

(3)   Data Imputation

Because some data were missing for some variables, we adopted complementary methods depending on the actual situation. First, the mean value interpolation method was adopted. For example, if data for 2010 and 2012 were available, but data for 2011 were missing, we used the average value of 2010 and 2012 to replace the value for 2011. We also adopted the nearest-neighbor interpolation method, which was used to deal with missing data for variables that were very stable over time, such as the natural logarithm of the total population. The clustering mean interpolation method was also adopted, whereby a missing value was supplemented by the mean value of the region or organization to which the country belonged. If partial data for a variable were missing for a given period (5 years), for example, if there were only 3 years of data, we took the average value of those 3 years as the data for the whole period. Specifically, for the period of 2006–2010, fiscal decentralization data for Turkey were only available for 2008, 2009, and 2010; therefore, we used the average value of these 3 years as the average value for the whole period. Since this method was applied to long periods of time and across all countries, it did not cause any major problems. In addition, for some variables with serious missing data issues, we did not make any supplements or modifications. For example, the expenditure decentralization data for the United Arab Emirates before 2011 were all missing; therefore, we did not make any interpolation.

3.4. Correlation Matrix of All Variables

The correlation matrix of all variables can be seen in Table 4. The first column shows that there is a positive correlation between fiscal decentralization and the dependent variable HDI; however, it is not significant, perhaps because their relationship is non-linear. Government size (the proportion of fiscal revenue in GDP), human capital, openness, and democracy have a significant and positive correlation with HDI, while dependence on natural resources, ethnic fractionalization, and corruption have a significant and negative correlation with HDI. Furthermore, as the second column shows, the instrumental variable GFI is significantly and positively correlated with the explanatory variable fiscal decentralization, but not significantly correlated with the dependent variable HDI. This implies that the GFI is a good instrumental variable. Moreover, the correlation matrix of the two samples is similar, therefore, the database is robust and meaningful for empirical study.

Table 4. Correlation Matrix.

Variables	Sample for Basic Regression (1991~2015)										
	Y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}
HDI (Y)	1										
Fiscal decentralization (X_1)	0.31	1									
GFI (X_2)	0.14	0.14 ***	1								
Government size (X_3)	0.33 ***	0.06	−0.40 ***	1							
Human capital (X_4)	0.83 ***	0.27 ***	−0.20 ***	0.43 ***	1						
Ln_Population (X_5)	0.04	0.56 ***	0.39 ***	−0.18 **	0.00	1					
Openness (X_6)	0.11 *	−0.30 ***	−0.48 ***	0.14 *	0.11 *	−0.55 ***	1				
Dependence on natural resources (X_7)	−0.12 *	0.03	0.20 ***	−0.15 **	−0.09	0.07	−0.07	1			
Ethnic Fractionalization (X_8)	−0.16 ***	0.16 *	0.13 **	−0.19 ***	0.00	0.15 **	−0.11 *	0.10	1		
Democracy (X_9)	0.56 ***	0.01	−0.09	0.11	0.46 ***	−0.11 *	0.03	−0.42 ***	−0.11 *	1	
Corruption (X_{10})	−0.80 ***	0.34 ***	−0.08	0.33 ***	0.63 ***	−0.04	0.01	−0.31 ***	−0.12 *	0.65 ***	1

Variables	Sample for Robustness Check (2010−2016)									
	Y	X_1	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}
HDI (Y)	1									
Fiscal decentralization (X_1)	0.42	1								
Government size (X_3)	0.26 ***	−0.05	1							
Human capital (X_4)	0.72 ***	0.31 ***	0.18 ***	1						
Ln_Population (X_5)	0.04	0.51 ***	−0.25 ***	−0.04	1					
Openness (X_6)	0.16 ***	−0.14 **	0.16 ***	0.12 **	−0.54 ***	1				
Dependence on natural resources (X_7)	−0.15 ***	0.11 **	−0.17 ***	−0.08	0.07	−0.09 *	1			
Ethnic Fractionalization (X_8)	−0.19 ***	0.11 **	−0.09 *	0.05	0.15 ***	−0.17 *	0.10 *	1		
Democracy (X_9)	0.47 ***	−0.05	0.03	0.32 ***	−0.20 ***	0.06	−0.34 ***	−0.14 *	1	
Corruption (X_{10})	−0.83 ***	0.35 ***	0.16 ***	0.59 ***	−0.03	0.10 *	−0.29 ***	−0.12 *	0.61 ***	1

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4. Results

4.1. Basic Regression

In this study, we started with FE and LSDV estimations (see Table 5). As the result of Model 1.1 shows, the coefficients of fiscal decentralization and fiscal decentralization square are 0.102 and −0.181, respectively, which are statistically significant. It should be noted that the indicators used to measure ethnic fractionalization and corruption change very little over time, therefore, they were not incorporated in the FE estimation. These are measured by the Ethnolinguistic Fractionalization Index and the Transparency International Corruption Perceptions Index (see Table 1), as referenced in the works of Enikolopov and Zhuravskaya (2007) [7] and Canavire-Bacarreza et al. (2020) [36].). In order to include them in the model and address the cross-sectional correlation issue in FE estimation, we also adopted LSDV estimation as an alternative FE scheme. The results of the LSDV estimation using Model 1.2 show that the coefficients of fiscal decentralization and fiscal decentralization square are 0.102 and −0.181, respectively, which is consistent with the results of Model 1.1, with significance at the 5% level. These results are stable, but they should be interpreted with caution because of the potential endogeneity problem.

Table 5. Basic regression results (1991–2020).

	(1.1)	(1.2)	(1.3)	(1.4)
	FE	LSDV	FE2SLS	EC2SLS
Fiscal Decentralization	0.102 **	0.102 **	0.345 ***	0.323 ***
	(0.040)	(0.049)	(0.090)	(0.088)
Fiscal Decentralization^2	−0.181 *	−0.181 **	−0.472 ***	−0.474 **
	(0.079)	(0.089)	(0.131)	(0.215)
Government Size	−0.155	−0.155	−0.177	−0.169
	(0.150)	(0.160)	(0.171)	(0.165)
Human Capital	0.051 ***	0.051 ***	0.060 ***	0.063 ***
	(0.009)	(0.008)	(0.014)	(0.021)
Population	0.002	0.002	0.003	0.001
	(0.012)	(0.012)	(0.018)	(0.003)
Openness	0.016 **	0.016 **	0.016 **	0.017 **
	(0.007)	(0.007)	(0.007)	(0.008)
Dependence on Natural Resources	−0.092 **	−0.092 **	−0.131 **	−0.137 **
	(0.045)	(0.046)	(0.035)	(0.059)
Ethnic Fractionalization		0.141 ***		0.105 ***
		(0.022)		(0.019)
Democracy	0.001 ***	0.001 ***	0.001 ***	0.001 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Corruption		−0.056 ***		−0.029 ***
		(0.007)		(0.002)
Constant	0.812 ***		0.932 ***	0.651 ***
	(0.191)		(0.187)	(0.091)
Time Dummy	YES	YES	YES	YES
Region Dummy	YES	YES	YES	YES
R^2		0.994		
F/Wald	204.11 ***	245.22 ***	167.54 ***/324.17 ***	572.51 ***
Number of countries	50	50	50	50
Observations	233	233	233	231

Note: Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

To deal with the potential endogeneity problem, we employed the FE2SLS and EC2SLS approaches, with the GFI as an instrumental variable. The FE2SLS results of Model 1.3 show that the coefficients of fiscal decentralization and fiscal decentralization square are 0.345 and −0.472, respectively. For EC2SLS, an error-corrected IV approach can be used to estimate the variables that do not change over time. The results for both the FE2SLS and the EC2SLS show that there is a hump-shaped relationship between fiscal decentralization and the HDI. The longer fiscal decentralization exists in a particular country, the smaller the marginal impact of decentralization on various outcomes. On one hand, decentralization may intensify intergovernmental competition and distort the fiscal choices or the composition of expenditures, for example, by crowding out the expenditures lacking direct economic effect, such as public health, education, social welfare, etc., eventually exerting an adverse impact on national development. On the other hand, it is difficult to coordinate in order to internalize interjurisdictional externalities, with respect to the provision of public goods, in the case of excessive decentralization.

The results, with respect to our control variables, presented in Table 5, show that human capital, openness, and democracy are significantly and positively associated with the HDI. In addition, corruption and dependence on natural resources are significantly and negatively associated with national human development. It is important to note that corruption is measured by the Transparency International Corruption Perceptions Indices, with higher values corresponding to lower levels of corruption. The remaining control variables are not statistically significant.

4.2. Robustness Check

For a robustness check, in this study, we used FE and LSDV to estimate the effect of fiscal decentralization on the HDI for the period of 2010–2021 (see Table 6). Models 2.1 and 2.2 show that the coefficients of fiscal decentralization and fiscal decentralization square are 0.123 and −0.221, respectively, which is consistent and statistically significant. Furthermore, the absolute values of the coefficients of fiscal decentralization in Model 2.2 are larger than those in Model 1.2, with an improved significance level relative to that in Model 1.2. One reason for this result is missing data. There was a considerable amount of missing data in the sample for the period of 1991–2020 (see Table 3), which did not result in a strongly balanced panel. Secondly, short-run economic fluctuations disturb the estimation results of basic regression because of their effect on the HDI. For example, the 2008 international financial crisis crashed the macroeconomic stability of most countries in the world, leading to many problems that constrained national development, such as declines in GDP and income level, etc.

Table 6. Results of the robustness check (2010–2021).

	(2.1)	(2.2)	(2.3)	(2.4)
	FE	LSDV	FE2SLS	EC2SLS
Fiscal Decentralization	0.123 ***	0.123 ***	0.115 ***	0.191 **
	(0.041)	(0.020)	(0.031)	(0.088)
Fiscal Decentralization^2	−0.221 **	−0.221 ***	−0.199 ***	−0.373 **
	(0.090)	(0.051)	(0.056)	(0.147)
Government Size	0.003	0.003	0.018 *	0.026 **
	(0.009)	(0.008)	(0.009)	(0.012)
Human Capital	0.021 ***	0.021 ***	0.031 ***	0.035 ***
	(0.005)	(0.005)	(0.005)	(0.008)
Population	−0.040 *	−0.040 *	−0.028 *	−0.009 *
	(0.021)	(0.022)	(0.015)	(0.004)
Openness	−0.003	−0.003	−0.004	−0.004
	(0.009)	(0.007)	(0.006)	(0.005)
Dependence on Natural Resources	−0.042 **	−0.042 ***	−0.045 ***	−0.051 ***
	(0.018)	(0.007)	(0.009)	(0.016)
Ethnic Fractionalization		0.091 **		0.047 *
		(0.033)		(0.025)
Democracy	−0.001	−0.001	0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Corruption		−0.088 ***		−0.033 ***
		(0.009)		(0.003)
Constant	0.978 ***		0.815 ***	0.472 ***
	(0.322)		(0.201)	(0.055)
Time Dummy	Yes	Yes	Yes	Yes
Region Dummy	Yes	Yes	Yes	Yes
R^2	-	0.996		
F/Wald	413.23 ***	489.21 ***	315.74 *** /689.12 ***	714.44 ***
Number of Countries	50	50	50	50
Observations	600	600	550	550

Note: Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

In order to address potential endogeneity problems, we adopted the FE2SLS and EC2SLS approaches, with a lag period of fiscal decentralization as an instrumental variable. Models 2.3 and 2.4 show that, for FE2SLS and EC2SLS, the coefficients of fiscal decentralization and fiscal decentralization square are positive and negative, respectively, and both pass the significance test. A comparison of the results for FE, LSDV, and 2SLS shows that there is a significant hump-shaped relationship between fiscal decentralization and the HDI in this period, indicating that the empirical results are robust, further supporting our basic hypothesis.

We took the results of the EC2SLS method as the final valid results because the issues of endogeneity and estimation bias are well addressed through this method. As Models 1.4 and 2.4 show, the coefficients of fiscal decentralization are, respectively, 0.323 and 0.191, and the coefficients of fiscal decentralization square are, respectively, 0.474 and −0.373. This shows that the hump-shaped relationship between fiscal decentralization and the HDI is more apparent in a longer period. In addition, it implies that the impact of fiscal decentralization on the HDI is more pronounced in the long term.

With respect to the control variables, population, corruption, and dependence on natural resources are negatively and significantly associated with the HDI. On the contrary, government size and human capital are positively and significantly correlated with the HDI. The other control variables are not statistically significant.

5. Discussion

Our hypothesis is validated in the Results Section (Section 4), that is, fiscal decentralization has an inverted U-shaped impact on national development. Fiscal decentralization is helpful in giving full play to the information advantages and initiative of local governments, resulting in increased economic efficiency [1–3]. However, decentralization may also intensify intergovernmental competition and distort the fiscal choices or the composition of expenditures, for example, by crowding out expenditures lacking direct economic effect, such as public health, education, social welfare, etc., eventually exerting an adverse impact on national development [4–9]. As shown by Lockwood (2002) [18], regional or local governments may find it difficult to coordinate in order to internalize interjurisdictional externalities, whereas the cost of centralization is reduced "responsiveness" to the preferences of regions with respect to the provision of public goods. Janeba and Wilson (2011) [19] concluded that complete decentralization is inefficient because governments compete for scarce capital by lowering their capital taxes and the level of public goods to inefficiently low levels and that complete centralization is also inefficient because it is determined by the minimum winning coalition within a legislature. Therefore, both absolute centralization and absolute decentralization reduce efficiency, exerting a negative impact on national development [6].

This result is similar to that reported in the work of Thiessen (2003) [20], whose empirical results showed that both extreme decentralization and extreme centralization are associated with disadvantages in terms of economic growth. He posited that there is a hump-shaped relationship between fiscal decentralization and economic growth. However, this result differs from that reported in the present study. We used the HDI to measure the level of economic development and found that there is a hump-shaped relationship between decentralization and the HDI.

Overall, moderate fiscal decentralization is the optimal choice for national development. On one hand, a list of past studies shows that fiscal decentralization helps to enhance economic growth. On the other hand, excessive decentralization intensifies the competition of local governments, resulting in a preference of local governments to use fiscal funds for expenditures with direct economic effects, such as infrastructure construction, thereby crowding out expenditures lacking economic effects, such as environmental protection, public health, education, and social welfare. Evidence of such perverse effects can be found in the previously published literature for countries such as Spain [51], China [52], Indonesia [53], and some European countries [4].

6. Conclusions

The main goal of this study was to empirically investigate the impact of fiscal decentralization on national development. We first adopted FE and LSDV estimations to examine the relationship between fiscal decentralization and the HDI using panel data from 50 countries covering the period of 1991–2021, then used IV estimation to correct for potential endogeneity, with the Geographic Fragmentation Index as an instrumental variable. We found that there is a hump-shaped relationship between fiscal decentralization

and the HDI. This result was further supported by a robustness check with a short-run sample covering the period of 2010–2021. This implies that moderate fiscal decentralization is the optimal choice for national development.

There are three theoretical implications. First, the previous empirical studies of fiscal decentralization mainly focus on the economic growth effect of fiscal decentralization, while this paper studies the relationship between fiscal decentralization and national development with the HDI, which will enrich the literature in this research field. Second, with the continuous development of human society, people have noticed that economic growth is not the only pursuit of human development; therefore, studying the HDI helps to call people's attention to comprehensive development [54]. Third, the empirical result shows that moderate fiscal decentralization is the optimal choice for national development.

From these, we derived the following practical and policy implications: governments should choose a moderate level of fiscal decentralization in order to promote national development. From the perspective of our results, combined with existing studies, excessive fiscal decentralization weakens the macro-control ability of central governments and the scale effect of the supply of public goods, whereas insufficient decentralization restrains the enthusiasm and autonomy of local governments [55]. These two situations both reduce the efficiency of the supply of public goods and the total utility of agents, which is not conducive to national development [19]. Therefore, policy makers should choose a moderate level of fiscal decentralization. Concrete and relevant policy implications should be provided for specific countries because, in countries with excessive decentralization, the government should recentralize power, whereas, in countries with insufficient decentralization, decentralization reform should be implemented.

We take China as an excessive decentralization case, providing some concrete and relevant policy implications. Existing research on fiscal decentralization generally supports the notion that fiscal decentralization reform is an important cause of the rapid economic growth in China. However, the average proportion of local fiscal expenditure relative to total fiscal expenditure has exceeded 85% for the past 10 years, i.e., the decentralization level is very high, which restricts further development in China to some extent. Excessive decentralization may also intensify intergovernmental competition and distort the fiscal choices or the composition of expenditures, for example, by crowding out expenditures lacking direct economic effect, such as public health, education, social welfare, etc., eventually exerting an adverse impact on national development. Secondly, intense intergovernmental competition also aggravates local protectionism and the fragmentation of the domestic market, thereby reducing production efficiency. Thirdly, excessive fiscal decentralization has seriously distorted regional resource allocation, resulting in serious regional imbalances in economic development. The areas with better economic endowments can provide better public goods, such as medical care and education, which then attracts more capital and human resources; therefore, such regions develop faster—and vice versa. All of these problems have become important factors restricting the sustainable development of China. Therefore, the central government should implement recentralization reform and provide more public goods, especially those related to medical care and education, in order to alleviate the problems mentioned above. What is the best way to determine the moderate or optimal level of fiscal decentralization? This is an important question that needs further study and discussion. The work of Jin and Martinez-Vazquez (2021) [6] provides a reference case. They identified a hump-shaped relationship between fiscal decentralization and sustainable development and used the Lind–Mehlum method to calculate the optimal level of fiscal decentralization.

Our results, with respect to optimal decentralization, are also meaningful for the sustainable development of a country. Some countries pursue rapid economic growth in the short term, making sacrifices in the areas that lack direct economic effects, such as the environment, education, and public health. For example, as mentioned above, excessive fiscal decentralization in China has led to fierce competition among local governments in terms of economic growth, with the crowding out of fiscal expenditures lacking direct

economic effect, such as the environment, public health, and education expenditures. Excessive fiscal decentralization has also negatively affected sustainable development in China. Therefore, determining a desirable level of fiscal decentralization is also conducive to the sustainable development of a country. In addition, a future research question to be explored pertains to the relationship between fiscal decentralization and sustainable development.

How to determine the "optimal decentralization level" may be the future study direction. It should not be that the optimal level of fiscal decentralization is a static and general proposition, but a dynamic one, responding to the current conditions of a country. First, the country size is an important determinant of fiscal decentralization [3,56]. The larger the country, the farther apart the residents will be from the administrative center, and more powers will be required to be allocated to local governments to manage their affairs far away from the center. Secondly, Ligthart and Oudheusden (2017) [38] suggested that federal countries need to allocate more power to local governments than unitary countries. Thirdly, Panizza (1999) [56] and Canavire-Bacarreza et al. (2020) [36] showed that the higher the degree of ethnic fractionalization, the more fiscal decentralization is needed. Moreover, Jilek (2018) [57] pointed out that the population and country size jointly affect fiscal decentralization, which means that countries with higher population densities require higher degrees of fiscal decentralization. Therefore, the determination of the optimal level of decentralization requires, at the very least, consideration of the country size, national structure, ethnic fractionalization, population density, and other conditions.

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