Fiscal Decentralization and Economic Growth: A Test for Granger Causality

Illoong Kwon*

Abstract: This paper tests the existence and the direction of causality between fiscal decentralization and economic growth. The previous literature has implicitly assumed that decentralization causes economic growth, and has largely ignored the possibility that economic growth can cause fiscal decentralization as well. This paper applies the Granger-causality test to panel data from 21 countries between 1975 and 1995, and finds that fiscal decentralization does not cause economic growth, but that economic growth causes fiscal decentralization.

Keywords: fiscal decentralization, economic growth, Granger causality

INTRODUCTION

With the New Public Management, there has been a growing trend for decentralization in both developed and developing countries (Iimi, 2005). In particular, fiscal decentralization, the delegation of fiscal power from the national government to subnational governments, is viewed as part of a reform package to enhance the performance of public sectors (Davoodi & Zou, 1998). Consequently, recent studies have focused on measuring the impact of fiscal decentralization on economic growth. So far, however, the empirical evidence is mixed and ambiguous (see for example Oates, 2002; Asatryan, 2010).

This paper examines the existence and the direction of causality between fiscal decentralization and economic growth using the Granger-causality test. Based on panel data from 21 countries between 1975 and 1995, the homogenous Granger-causality tests suggest that fiscal decentralization does not cause economic growth. Instead, the tests suggest that economic growth causes fiscal decentralization.

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These findings contradict the implicit or explicit assumption of earlier studies that fiscal decentralization causes economic growth, and provide a potential explanation for the mixed empirical evidence in those studies.

One argument for the causality from fiscal decentralization to economic growth is the "decentralization theorem" by Oates (1972). When differences exist in demand schedules and cost functions for public goods across jurisdictions, if the national government cannot distinguish this difference, fiscal centralization can imply a uniform level of public goods consumption across all jurisdictions. With fiscal decentralization, however, the local governments can reflect the heterogeneity across jurisdictions and adjust the level of public goods consumption accordingly, which should improve efficiency and lead to higher economic growth.

Another argument is that fiscal decentralization would induce vertical (national vs. subnational governments) and horizontal (among subnational governments) competition (Tiebout, 1956; Weingast, 1995). Then, competing governments would have an additional incentive to improve efficiency and social welfare, which should lead to faster economic growth.

However, it is also possible that economic growth causes fiscal decentralization. For example, national-government-driven economic growth may lead to faster economic growth initially but greater inequality among jurisdictions (Williamson, 1965). Then, after economic growth reaches a certain level, such a country may have to decentralize fiscal power to improve regional equality and social stability. In this case, economic growth causes fiscal decentralization, not the other way around.

Likewise, after economic growth reaches a certain level, consumers in different jurisdictions may look for more diverse goods and services beyond homogenous necessities. Then, fiscal decentralization to empower local governments to reflect such regional heterogeneity would be efficient.

Therefore, causality can run in either direction between decentralization and economic growth. In particular, from a simple correlation between decentralization and economic growth, one cannot conclude that decentralization causes economic growth.

It is, however, generally difficult to test the causality between two variables, and there exists no definitive statistical test for the direction of causality. With this caveat, the Granger-causality test has been most popular. As discussed in the Empirical Methodology section below, the Granger-causality test relies on an intuitive idea that if X can help in predicting Y, but Y cannot help predicting X, X must cause Y.

While the original Granger-causality test was developed for time series data, the Granger-causality test for panel data has been developed recently. In this paper, I apply the homogenous Granger-causality test for panel data by Hurlin and Venet (2001) and Hurlin (2004).

Following the previous literature, I use the ratio of subnational government spending to total government spending reported in the International Monetary Fund's *Government Finance Statistics*[1] as a measure of fiscal decentralization (see for example Davoodi & Zou, 1998; Thiessen, 2003; Yilmaz, 2000; Iimi, 2005). I also measure economic growth by the growth rate of real GDP per capita as reported by the World Bank.

With these measures, the homogenous Granger-causality tests suggest that fiscal decentralization does not cause economic growth. This result is robust to various other measures and specifications. Interestingly, however, the test also shows that economic growth causes fiscal decentralization.

These results are significant in several ways. First, they show that implicit or explicit assumptions in the previous literature that fiscal decentralization causes economic growth may be incorrect. Second, if fiscal decentralization does cause economic growth, the current measure for fiscal decentralization (that is, the *Government Finance Statistics* expenditure decentralization measure) may not reflect fiscal decentralization correctly. Third, if economic growth causes fiscal decentralization, the typical empirical specification in the previous literature, in which economic growth is an independent variable, would suffer from the reversed causality bias.

It is worth re-emphasizing that there exists no definitive statistical test for causality. Thus, the Granger-causality tests must be interpreted with great caution, and the evidence presented in this paper is suggestive at best, not conclusive. Despite these caveats, as far as I know, this paper is the first to formally test the causality between fiscal decentralization and economic growth, and the first to show that economic growth may cause fiscal decentralization and not the other way around.

RELATED LITERATURE

Theoretically, fiscal decentralization delegates decision rights to local governments that have better information about demands and costs for the provision of public goods in local jurisdictions. Therefore, Oates' decentralization theorem states:

> In the absence of cost-savings from the centralized provision of a good and inter-jurisdictional externalities, the level of welfare will always be at least as high (and typically higher) if Pareto-efficient levels of consumption are provided in each jurisdiction than if any single, uniform level of consumption is maintained across all jurisdictions (Oates, 1972).

1. http://www.imf.org/external/pubs/ft/gfs/manual/aboutgfs.htm.

Then, fiscal decentralization should improve the efficiency of the public sector and lead to faster economic growth.

Also, if labor and capital are very mobile and choose the best location to operate, fiscal decentralization can lead to competition among local governments for more efficient provision of public goods (Tiebout, 1956; Weingast, 1995). Then, fiscal decentralization should lead to faster economic growth as well.

Empirically, however, the evidence has been mixed and ambiguous. Davoodi and Zou (1998), for example, use panel data from 46 countries between 1979 and 1989, and find that fiscal decentralization has a weakly negative effect on economic growth in developing countries and no significant effect in developed countries. Iimi (2005), on the other hand, uses more recent panel data from 51 countries between 1997 and 2001, and finds that fiscal decentralization has a significantly positive effect on economic growth. Woller and Phillips (1998) use panel data from 23 countries between 1974 and 1991, and find no significant relationship.

In response to this mixed evidence, Thornton (2007) and Stegarescu (2005) attempt to improve the measure of fiscal decentralization. However, Thorton (2007) and Baskaran and Feld (2009) find no significant relationship in OCED countries, even with the better measure for fiscal decentralization. Also, Iimi (2005) attempts to control for possible omitted variable bias using instrument variable estimation, and finds positive effects. Enikolopov and Zhuravskaya (2003), however, show that the positive effect holds for developing countries only. Moreover, Iimi (2005) uses only four years of data, and cannot measure the long-term effect of fiscal decentralization.

It is interesting to note that all these empirical studies have implicitly assumed that fiscal decentralization causes economic growth, and have not considered the possibility of the reversed causality. As discussed in the beginning, economic growth can also cause fiscal decentralization.

Williamson (1965) and Green (1969), for example, show that in the early period of economic development, regional inequality arises both within countries and across countries, but eventually reaches a peak and declines thereafter during the advanced stage of growth. One explanation is that if regional inequality reaches a peak, it will exacerbate the inefficiency of fiscal centralization (Oates, 1972) and lead to social unrest. Therefore, the government may have to respond with fiscal decentralization to reduce regional inequality. Note that in this explanation early economic growth and growing regional inequality cause fiscal decentralization.

To my best knowledge, however, there has been no formal empirical analysis to test the existence and the direction of causality between fiscal decentralization and economic growth.

EMPIRICAL METHODOLOGY

To test the existence and the direction of causality between fiscal decentralization and economic growth, I apply the Granger-causality test for panel data. The original Granger-causality test (Granger, 1969) was developed for time series data and has been widely used as a standard econometric tool.[2]

The idea of Granger causality is simple. "A variable X Granger-causes Y if Y can be better predicted using the histories of both X and Y than it can using the history of Y alone." More specifically, to test a null hypothesis that X does not Granger-cause Y, one can estimate the following model:

$$Y_t = \beta_0 + \sum_{j=1}^{J}\beta_j Y_{t-j} + \sum_{k=1}^{K}\gamma_k X_{t-k} + \varepsilon_t \quad (1)$$

Then one can simply use an F-test to examine the null hypothesis that $\gamma_1 = \cdots \gamma_K = 0$.

More recently, the Granger-causality test for panel data has been developed. In this paper, I use a simple adaptation of the Granger-causality panel data approach with fixed coefficients, proposed by Hurlin and Venet (2001) and Hurlin (2004).

Let us denote the level of fiscal decentralization and the growth rate of GDP per capita in country i at time t by FD_{it} and $Growth_{it}$. To test whether fiscal decentralization causes economic growth, I estimate the following equation:

$$Growth_{it} = \beta_0 + \sum_{j=1}^{J}\beta_j Growth_{it-j} + \sum_{k=1}^{K}\gamma_k FD_{t-k} + \delta_i + \varepsilon_{it} \quad (2)$$

where δ_i is the country fixed effect. In an F-test, if the null hypothesis that $\gamma_1 = \cdots \gamma_K = 0$ is rejected, it would suggest that fiscal decentralization Granger-causes economic growth.

The choice of lags J and K is important. Insufficient lags can yield autocorrelated errors, while too many lags reduce the power of the test. Thus, I will check the robustness of the results with a varying number of lags.

Likewise, to test whether economic growth causes fiscal decentralization, with slight abuse of notations, I estimate the following equation:

$$FD_{it} = \beta_0 + \sum_{j=1}^{J}\beta_j FD_{it-j} + \sum_{k=1}^{K}\gamma_k Growth_{t-k} + \delta_i + \varepsilon_{it} \quad (3)$$

Again, in an F-test, if the null hypothesis that $\gamma_1 = \cdots \gamma_K = 0$ is rejected, it would

2. For this contribution among others, Clive Granger won the Nobel Prize in Economics in 2003.

suggest that economic growth Granger-causes fiscal decentralization.

It is also possible to have bidirectional causality. That is, fiscal decentralization may cause economic growth, and economic growth may also cause fiscal decentralization.

Conceptually, the idea of Granger causality has several components. First, it assumes temporality—only past values of X can cause Y. Second, it assumes exogeneity. As Sims (1972) has pointed out, a necessary condition for X to be exogenous of Y is that X fails to Granger-cause Y. Similarly, the idea of Granger causality implies independence in that variables X and Y are only independent if each fails to Granger-cause the other.

As emphasized in the beginning, however, Granger causality is not a definitive test for causality. In particular, if there exists a third variable with different lags that affect both X and Y, one can erroneously conclude Granger causality. Also, in equations (2) and (3), it is assumed that the coefficients are the same for all countries; this is called the homogenous Granger-causality test. Therefore, even when we reject the homogenous Granger causality in panel data, it is still possible to have causality in some individual countries. Therefore, the results from the Granger-causality test must be interpreted as suggestive rather than conclusive evidence.

Finally, for Granger-causality testing, it is important that each variable is stationary. If both variables are nonstationary, they can have spurious correlation (Granger & Newbold, 1974; Philips, 1986). Therefore, I will employ the Levin, Lin, and Chu (2002) and Harris and Tzavalis (1999) panel unit root tests before proceeding to Granger-causality tests.

DATA

Following the previous studies, I use the ratio of subnational government expenditure to total government expenditure as a proxy for fiscal decentralization. The primary data source for this measure is the International Monetary Fund's *Government Finance Statistics*. To measure economic growth, I use the annual growth rate of real GDP per capita from the World Bank.

To measure the long-term effects, it is important to have long enough time series. Also, for the panel unit root tests (discussed in more detail in the Empirical Results section below), I need a balanced panel. Since the *Government Finance Statistics* fiscal decentralization measure is missing for many countries, I end up with 21 countries yielding 441 observations between 1975 and 1995. Table 1 shows the list of countries and their average fiscal decentralization and GDP growth rates.

Table 1. Summary Statistics by Country

Country	Fiscal Decentralization (%)	Growth Rate of real GDP per capita (%)
Australia	40.96	1.70
Austria	30.66	2.06
Canada	57.33	1.51
Denmark	45.15	1.98
Dominican Republic	3.25	1.68
Finland	38.37	1.67
France	18.47	1.70
Germany	41.92	2.24
India	45.48	2.89
Indonesia	11.89	5.09
Ireland	24.68	3.50
Israel	10.94	1.92
Malaysia	18.90	4.47
Mexico	19.59	0.99
Netherlands	25.15	1.66
Norway	34.20	2.97
Spain	20.34	1.71
Sweden	37.56	1.28
Thailand	10.22	6.04
United Kingdom	25.27	1.94
United States	43.88	1.96

Figure 1 shows a plot of these average measures. There is significant heterogeneity in both fiscal decentralization and economic growth rates across countries. For example, the United States has 43.88 percent fiscal decentralization and a 1.96 percent average growth rate. Indonesia has 11.89 percent fiscal decentralization and a 5.09 percent average growth rate. Therefore, it is important to control for heterogeneity across countries in the empirical analysis.

The simple correlation between average fiscal decentralization and average growth rate is -0.36. This does not support the hypothesis that fiscal decentralization leads to faster economic growth. It is also consistent with some of the previous studies that have found a negative effect of fiscal decentralization on economic growth (see for example Davoodi & Zou, 1998; Baskaran & Feld, 2009; Rodriguez-Pose & Ezcurra, 2010).

Figure 1. Fiscal Decentralization and Economic Growth: Cross-Country Variation

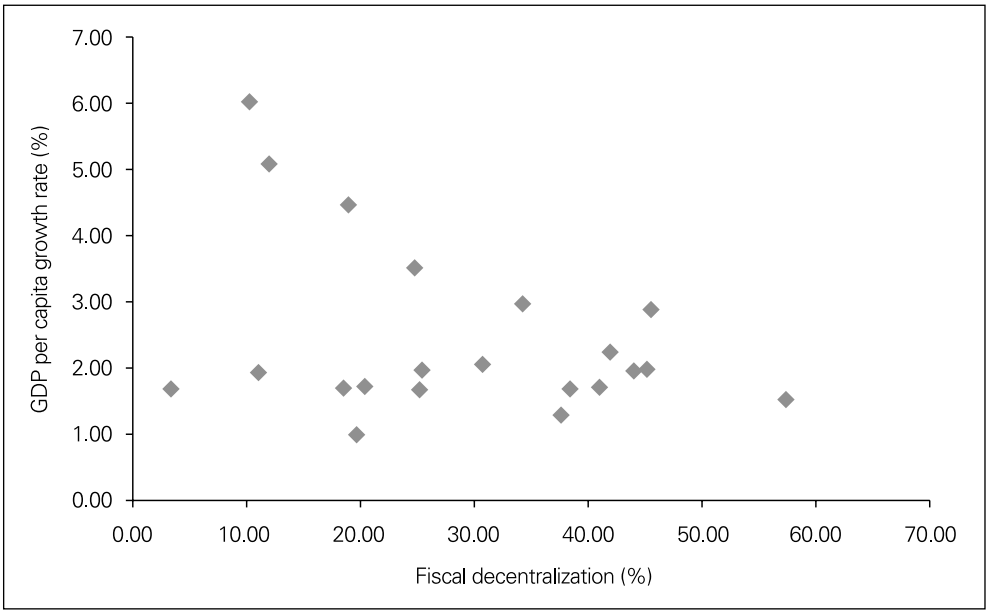


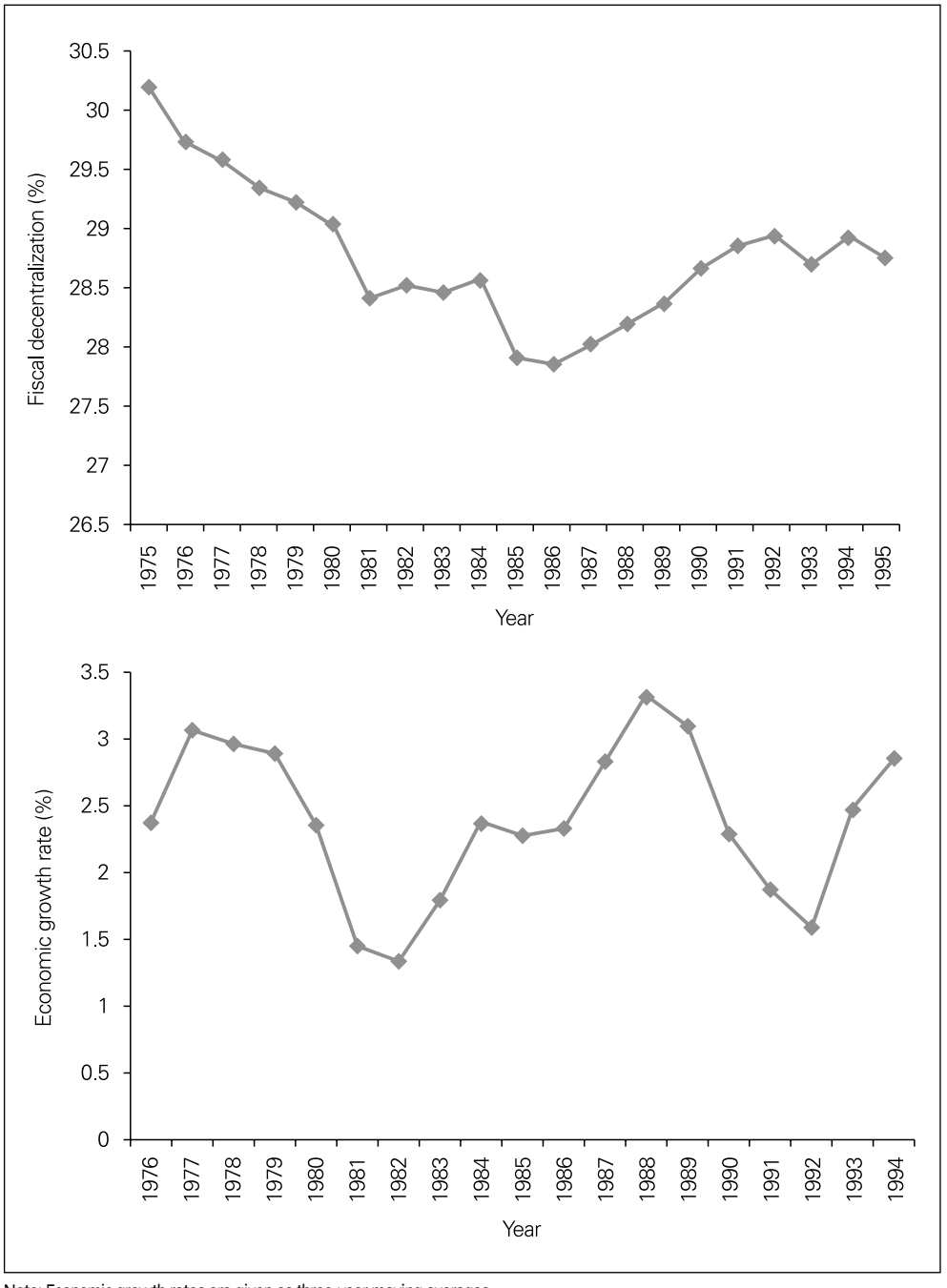
Figure 2 shows the time trends of the cross-country average fiscal decentralization and economic growth rates. Since there exist large fluctuations of economic growth rates, for easier disposition, I use the three-year moving averages of the economic growth rates in figure 2.

It is interesting to note that the decline of economic growth around 1982 is followed by the decline of fiscal decentralization around 1986. Also, the rise of economic growth around 1989 is followed by the rise of fiscal decentralization around 1992. Even though these figures offer hardly any evidence for causality, they suggest that the causation may run from economic growth to fiscal decentralization.

EMPIRICAL RESULTS

As discussed above, the Granger-causality tests require the variables to be stationary. To test whether the fiscal decentralization and economic growth measures are stationary, I use the Levin, Lin, and Chu (2002) panel unit root test (denoted by LLC) and the Harris and Tzavalis (1999) panel unit root test (denoted by HT). The LLC test is recommended for panel data with 10 to 250 cross-section units and 25 to 250 time series. Since our panel data have only 21 years of time series, I also apply the

Figure 2. Fiscal Decentralization and Economic Growth: Time Variation



Note: Economic growth rates are given as three-year moving averages.

HT test, which is more robust for shorter panel data.

The null hypothesis in these tests is that the variables are nonstationary. Therefore, rejecting the null hypothesis in these tests would imply that the variables are stationary. Note that both tests require the panel data to be balanced, as they are in our data.

Because the annual growth rates of real GDP per capita have large fluctuations with the business cycle, following the previous studies, I use the three-year averages of the economic growth rate and fiscal decentralization measures. This process reduces the number of time series from 21 to 7. In the next section, I will test the robustness of the results when annual data are used.

Table 2 shows that the LLC panel unit root test rejects the null hypothesis for both economic growth and fiscal decentralization, and suggests that both variables are stationary. However, the HT panel unit root test rejects the null hypothesis only for economic growth, not for fiscal decentralization. Therefore, it is possible that the level of fiscal decentralization is not stationary. Alternatively, as shown in table 2, a test for the growth rate of fiscal decentralization shows that it is stationary in both tests.

Table 2. Panel Unit Root Tests

	LLC	HT
Economic growth	-54.5525 (0.0000)	-9.4946 (0.0000)
Fiscal decentralization	-21.7043 (0.0000)	0.9529 (0.8297)
Growth rate of fiscal decentralization	-8.2073 (0.0000)	-11.634 (0.0000)

Note: The table shows the adjusted t-statistics for the Levin, Lin, and Chu panel unit test (LLC), and the z-statistics for the Harris and Tzavalis test (HT). P-values are in parentheses.

In the next section, I will check the robustness of the results when the growth rates of fiscal decentralization are used instead of the level of fiscal decentralization.

To test whether fiscal decentralization Granger-causes economic growth, I estimate equation (2) with two or three lags.[3] In table 3, columns [1] and [2] show that controlling for the lags of economic growth, fiscal decentralization does not help predict economic growth. In particular, the F-test for the joint significance of the lags of fiscal decentralization shows no statistical significance. Therefore, contrary to the implicit assumption in earlier studies, fiscal decentralization does not seem to cause economic growth.

3. The Hausman test rejects the random effect model. Thus, I control for the country fixed effects.

Table 3. Granger-Causality Tests

	Dependent variable			
	Economic growth		Fiscal decentralization	
	[1]	[2]	[3]	[4]
Economic growth (-1)	-0.1847* (0.1039)	-0.3476** (0.1373)	0.2649** (0.1092)	0.3156** (0.1249)
Economic growth (-2)	-0.2537** (0.1201)	-0.3813*** (0.1425)	-0.0776 (0.1263)	-0.1660 (0.1297)
Economic growth (-3)		-0.3342* (0.1769)		-0.2293 (0.1609)
Fiscal decentralization (-1)	-0.0131 (0.1018)	-0.0710 (0.1324)	0.7305*** (0.1070)	0.8352*** (0.1204)
Fiscal decentralization (-2)	-0.0863 (0.0995)	0.1248 (0.1441)	-0.3245*** (0.1046)	-0.3440** (0.1311)
Fiscal decentralization (-3)		-0.1218 (0.1261)		0.1903 (0.1147)
Observations	105	84	105	84
R-squared	0.0996	0.1751	0.4343	0.5381
F test for causality (p-value)	0.4822	0.7704	0.0322	0.0016

Standard errors in parentheses.
*** p<0.01; ** p<0.05; * p<0.1
Note: In columns [1] and [2], the F-test is for the null hypothesis that the lags of fiscal decentralization are jointly insignificant. In columns [3] and [4], the F-test is for the null hypothesis that the lags of economic growth are jointly insignificant.

To test whether economic growth Granger-causes fiscal decentralization, I estimate equation (3) with two or three lags as well. In table 3, columns [3] and [4] show that controlling for the lags of fiscal decentralization, economic growth can help predict fiscal decentralization. Formally, the F-test for the joint significance of the lags of economic growth shows statistical significance at the 5 percent or 1 percent level depending on the number of the lags. These results suggest that economic growth Granger-causes fiscal decentralization, but not vice versa.

ROBUSTNESS OF RESULTS

Recall that the panel unit root tests suggest that the level of fiscal decentralization may not be stationary, but the growth rate of fiscal decentralization is. Therefore, to test the robustness of the results, I re-estimate the models using the growth rate of fiscal decentralization instead of the level of fiscal decentralization (table 4).

Table 4. Growth Rate of Fiscal Decentralization

	Dependent variable			
	Economic growth		Growth rate of fiscal decentralization (GFD)	
	[1]	[2]	[3]	[4]
Economic growth (-1)	-0.1967* (0.1034)	-0.3517** (0.1369)	0.0043 (0.0033)	0.0056 (0.0034)
Economic growth (-2)	-0.2881** (0.1185)	-0.4000*** (0.1378)	-0.0061 (0.0037)	-0.0087** (0.0034)
Economic growth (-3)		-0.3301* (0.1764)		-0.0056 (0.0044)
GFD (-1)	3.7947 (3.4710)	2.7284 (3.9228)	-0.3689*** (0.1097)	-0.3775*** (0.0970)
GFD (-2)	0.8204 (3.8516)	1.0775 (4.8726)	-0.1886 (0.1217)	-0.2463** (0.1204)
GFD (-3)		5.1893 (5.2630)		-0.0983 (0.1301)
Observations	105	84	105	84
R-squared	0.0970	0.1785	0.1832	0.3559
F test for causality (p-value)	0.5408	0.7136	0.076	0.0025

Standard errors in parentheses.
*** p<0.01; ** p<0.05; * p<0.1
Note: In columns [1] and [2], the F-test is for the null hypothesis that the lags of fiscal decentralization growth rate are jointly insignificant. In columns [3] and [4], the F-test is for the null hypothesis that the lags of economic growth are jointly insignificant.

Table 4 shows that using the growth rate of fiscal decentralization does not change the qualitative results. Columns [1] and [2] of table 4 show that the lags of the growth rates of fiscal decentralization do not help predict economic growth rates. However, columns [3] and [4] show that the lags of the economic growth rates do help predict the growth rate of fiscal decentralization. Therefore, even when I measure fiscal decentralization based on its growth rate, fiscal decentralization does not seem to Granger-cause economic growth. Instead, economic growth Granger-causes fiscal decentralization.

So far, I have used the three-year averages of economic growth rate and fiscal decentralization. Even though using the three-year averages smoothes out the excessive fluctuations of economic growth rates, it greatly reduces the number of time series in our panel data. As Hurlin (2004) shows, if the number of time series is not large enough, the Granger-causality tests may not be valid. Therefore, as shown in table 5, I repeat the analysis using the annual observations of economic growth rates and fiscal decentralization.

Table 5. Panel Unit Root Tests with Annual Data

	LLC	HT
Economic growth	-7.2385 (0.0000)	-19.6254 (0.0000)
Fiscal decentralization	-2.4862 (0.0065)	0.2137 (0.5846)
Growth rate of fiscal decentralization	-7.0556 (0.0000)	-25.5258 (0.0000)

Note: The table shows the adjusted t-statistics for the Levin, Lin, and Chu panel unit test (LLC), and the z-statistics for the Harris and Tzavalis test (HT). P-values are in parentheses.

Table 5 shows that the panel unit root tests for the annual data yield the same qualitative results as in table 2. That is, the LLC panel unit root test suggests that both the economic growth rate and the level of fiscal decentralization are stationary. However, the HT panel unit root test suggests that the level of fiscal decentralization is not stationary. On the other hand, both tests show that the growth rate of fiscal decentralization is stationary.

Therefore, as shown in table 6, I test Granger causality between economic growth and the growth rate of fiscal decentralization using the annual data.[4] Because the data are annual, to measure long-term effects, I use five- to seven-year lags.

In table 6, columns [1], [2], and [3] show that controlling for the lags of the economic growth rate, the lags of the growth rates of fiscal decentralization have no significant effect on the economic growth rate. That is, I cannot reject the null hypothesis that fiscal decentralization does not Granger-cause economic growth.

Columns [4], [5], and [6] of table 6 show that controlling for the lags of the growth rate of fiscal decentralization, the lags of the economic growth rate have significant positive effects on the growth rate of fiscal decentralization. Therefore, economic growth Granger-causes fiscal decentralization, not the other way around. Note that this result is the same as the one from the previous section using the three-year averages. Therefore, these qualitative results seem to be robust to various specifications and measurements.

4. The Granger-causality test between economic growth and the level of fiscal decentralization shows qualitatively similar results and is not reported.

Table 6. Granger-Causality Tests with Annual Data

	Dependent variable					
	Economic growth			Growth rate of fiscal decentralization (GFD)		
	[1]	[2]	[3]	[4]	[5]	[6]
Economic growth (-1)	0.3517*** (0.0598)	0.3300*** (0.0629)	0.3337*** (0.0633)	-0.0003 (0.0024)	-0.0005 (0.0025)	0.0010 (0.0022)
Economic growth (-2)	-0.1531** (0.0601)	-0.1842*** (0.0661)	-0.1488** (0.0663)	0.0023 (0.0024)	0.0010 (0.0026)	0.0009 (0.0023)
Economic growth (-3)	-0.0172 (0.0613)	-0.0225 (0.0637)	-0.0804 (0.0678)	-0.0026 (0.0025)	-0.0011 (0.0025)	-0.0017 (0.0024)
Economic growth (-4)	-0.1454** (0.0600)	-0.1550** (0.0628)	-0.0898 (0.0627)	0.0072*** (0.0024)	0.0067*** (0.0025)	0.0078*** (0.0022)
Economic growth (-5)	-0.0401 (0.0588)	-0.0238 (0.0650)	-0.0455 (0.0654)	-0.0053** (0.0024)	-0.0038 (0.0026)	-0.0050** (0.0023)
Economic growth (-6)		-0.046 (0.0629)	-0.0328 (0.0662)		-0.0036 (0.0025)	-0.0035 (0.0023)
Economic growth (-7)			-0.1240* (0.0637)			-0.0025 (0.0022)
GFD (-1)	3.0784** (1.3874)	3.2475** (1.4933)	2.1401 (1.5395)	0.1059* (0.0562)	0.0671 (0.0589)	0.0704 (0.0536)
GFD (-2)	0.3035 (1.3463)	0.0870 (1.4279)	-0.7005 (1.4790)	-0.1693*** (0.0545)	-0.1507*** (0.0563)	-0.1391*** (0.0515)
GFD (-3)	-0.4173 (1.3163)	-0.6563 (1.3971)	-0.9312 (1.4230)	-0.2040*** (0.0533)	-0.2204*** (0.0551)	-0.1932*** (0.0495)
GFD (-4)	1.5828 (1.3281)	1.1911 (1.3746)	0.2655 (1.4356)	0.0650 (0.0538)	0.0277 (0.0542)	0.0787 (0.0500)
GFD (-5)	0.8186 (1.4682)	1.1850 (1.5122)	1.1796 (1.4963)	-0.2452*** (0.0595)	-0.2290*** (0.0596)	-0.2294*** (0.0521)
GFD (-6)		-0.8171 (1.5505)	-1.5204 (1.5350)		-0.1025* (0.0611)	-0.0938* (0.0534)
GFD (-7)			-1.5693 (1.6036)			0.1056* (0.0558)
Observations	315	294	273	315	294	273
R-squared	0.1816	0.1859	0.2097	0.1517	0.1683	0.2511
F-test (p-value)	0.2648	0.2691	0.4371	0.055	0.0398	0.001

Standard errors in parentheses.
*** p<0.01; ** p<0.05; * p<0.1
Note: In columns [1], [2], and [3], the F-test is for the null hypothesis that the lags of the fiscal decentralization growth rate are jointly insignificant. In columns [4], [5], and [6], the F-test is for the null hypothesis that the lags of economic growth are jointly insignificant.

CONCLUDING REMARKS

Theoretically, the previous literature has focused on the impacts of fiscal decentralization on economic growth or the overall efficiency of public sectors. The classic channels that make fiscal decentralization cause economic growth are information asymmetry and heterogenous preference (Hayek, 1948; Oates, 1972) and interjurisdictional competition (Tiebout, 1956; Weingast, 1995). Despite the growing trend of fiscal decentralization, however, the empirical evidence for its impact on economic growth is mixed and ambiguous.

This paper shows that the implicit assumption of the previous literature that fiscal decentralization causes economic growth may be incorrect. The Granger-causality tests for the panel data of 21 countries between 1975 and 1995 suggest that economic growth causes fiscal decentralization but not vice versa.

These results may explain why the previous empirical evidence on the impact of fiscal decentralization is ambiguous. More importantly, these results suggest that fiscal decentralization is endogenous. Consequently, research on its impact must first analyze what causes it.

I must re-emphasize that the Granger-causality test is not a definitive test for causality, and that more studies are needed to confirm the direction of causality between fiscal decentralization and economic growth. Thus, the main contribution of this paper is in taking the first step in that direction.

REFERENCES

Asatryan, Z. 2010. *Fiscal decentralization and economic growth in OECD countries: A Bayesian model averaging approach*. Mimeo, Humboldt-Universitat zu Berlin.

Baskaran, T., & Feld, L. P. 2009. *Fiscal decentralization and economic growth in OECD countries: Is there a relationship?* CESifo Working Paper No. 2721. Munich: CESifo Group.

Davoodi, H., & Zou, H. 1998. Fiscal decentralization and economic growth: A cross-country study. *Journal of Urban Economics*, 43: 244-257.

Enikolopov, R., & Zhuravskaya, E. 2003. *Decentralization and political institutions.* CEPR Discussion Paper No. 3857. London: Centre for Economic Policy Research.

Granger, C. W. J. 1969. Investigating causal relations by econometric models and cross-spectral methods. *Econometrica*, 37: 424-438.

Granger, C. W. J., & Newbold, P. 1974. Spurious regressions in Econometrics. *Journal of Econometrics*, 2: 111-120.

Green, A. G. 1969. Regional inequality, structural change, and economic growth in Canada, 1890-1956. *Economic Development and Cultural Change*, 17(4): 567-583.

Harris, R. D. F., & Tzavalis, E. 1999. Inference for unit roots in dynamic panels where the time dimension is fixed. *Journal of Econometrics*, 91(2): 201-226.

Hayek, F. A. 1948. *Individualism and economic order*. Chicago: University of Chicago Press.

Hurlin, C. 2004. *Testing Granger causality in heterogenous panel data models with fixed coefficients*. Mimeo, University of Orleans.

Hurlin, C., & Venet, B. 2001. *Granger causality tests in panel data models with fixed coefficients*. Working Paper Eurisco 2001-9, Universite Paris IX Dauphine.

Iimi, A. 2005. Decentralization and economic growth revisited: An empirical note. *Journal of Urban Economics*, 57: 449-461.

Levin, A., Lin, C., & Chu, C. J. 2002. Unit root tests in panel data: Asymptotic and finite sample properties. *Journal of Econometrics*, 108(1): 1-24.

Oates, W. E. 1972. *Fiscal federalism*. London: Harcourt Brace.

Oates, W. E. 2002. Fiscal federalism and European Union: Some reflections. Working Paper, University of Pavia.

Philips, P. C. B. 1986. Understanding spurious regressions in econometrics. *Journal of Econometrics*, 33(3): 311-340.

Rodriguez-Pose, & Ezcurra, R. 2010. Is fiscal decentralization harmful for economic growth? Evidence from the OECD countries. *Journal of Economic Geography*, 10(3): 3-34.

Sims, C. A. 1972. Money, income, and causality. *American Economic Review*, 62(4): 540-552.

Stegarescu, D. 2005. Public sector decentralization: Measurement concepts and recent international trends. *Fiscal Studies*, 26: 301-333.

Thiessen, U. 2003. Fiscal decentralization and economic growth in high income OECD countries. *Fiscal Studies*, 24(3): 237-274.

Thornton, J. 2007. Fiscal decentralization and economic growth reconsidered. *Journal of Urban Economics*, 61(1): 64-70.

Tiebout, C. 1956. A pure theory of local expenditures. *Journal of Political Economy*, 64(5): 416-424.

Weingast, B. R. 1995. The economic role of political institutions: Market-preserving federalism and economic development. *Journal of Law, Economics & Organization*, 11(4): 1-31.

Williamson, J. G. 1965. Regional inequality and the process of national development: A description of the patterns. *Economic Development and Cultural Change*, 13(4) Part 2: 1-84.

Woller, G. M., & Phillips, K. 1998. Fiscal decentralization and LDC economic growth: An empirical investigation. *Journal of Development Studies*, 34: 139-148.

Yilmaz, S. 2000. The impact of fiscal decentralization on macroeconomic performance. In National Tax Association (ed.), *Proceedings of the 92nd Annual Conference on Taxation, 1999* (pp. 251-260). Washington, DC: National Tax Association.