Fiscal Decentralization and Economic Growth: A Nonlinear Model for Provinces of Iran

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Abstract

Economists and policy-makers believe that the fiscal decentralization is an effective strategy to promote economic growth. This study intends to analyze the relationship between fiscal decentralization and economic growth in Iran, over the period of 2001-2007 across the 30 provinces of the country. A nonlinear fixed effect panel model is specified. The results show that fiscal decentralization has a positive effect on economic growth of Iran.
Keywords: Fiscal Decentralization (FD), Economic Growth, Nonlinear, Iran.

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1- Introduction

The relationship between fiscal decentralization and economic growth has been analyzed by a number of economists. This Linking has mainly three reasons[1]: firstly, growth is seen as an objective of fiscal decentralization and efficiency in the allocation of resources in the public sector; secondly, it is an explicit intention of governments to adopt policies that lead to a sustained increase in per capita income and thirdly, per capita growth is easier to measure and to interpret than other economic performance indicators. Several economists have made the case for fiscal decentralization as a means of promoting long-run economic growth based on the view that it leads to better resource allocation and a more productive.

As Oates (1993) explained, "the basic economic case for fiscal decentralization is the enhancement of economic efficiency: the provision of local outputs that are differentiated according to local tastes and circumstances results in higher levels of social welfare than centrally determined and more uniform levels of outputs across all jurisdictions.", or fiscal decentralization provides incentives for local governments to innovate in the production and supply of public goods and services[2],or that competition among different levels revenue constraints.[3]

In contrast, Tanzi(1995) and Ter-Minassian (1997) focus in general on the fiscal decentralization can create for macroeconomic policy coordination, and for implementing stabilization policies in particular. According to Davoodi and Zou(1998) and Zhang and Zou(1998), the negative association between fiscal decentralization and economic growth may indicate that in practice local governments may not be responsive to local citizens' preferences and needs. This can occur when local officials are not elected by local citizens and when local citizens may be too poor to "vote with their feet."

2 – Literature Review

Most empirical studies have focused on the share of sub-national government revenue or expenditure in consolidated (national and sub-

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1- Breuss & Eller (2004).
2- Vazquez & McNab (2003).
3- Brennan & Buchanan (1980).

national) government revenue or expenditure as the measure of fiscal decentralization. A number of recent studies have explored the impact of fiscal decentralization in various countries. In the Table 1, we have summarized these studies.

Table1: Empirical studies summary Dependent Variable: the annual growth rate of real per capita Gross province Product

Authors (Years)	Study Region & Time	Variable of FD*	Analytical Framework	Empirical Methodology	Relation Between FD & Economic Growth
Zhang and Zou (1998)	28 provinces of China (1980-92)	FD-EXP, FD-EXP$_{EB}$, FD-XP$_{B+EB}$	Barro (1990), Levine and Renelt (1992) and Davoodi and Zou (1998)	Fixed Effect Models. GLS estimation	Negative and significant
Xie, Zou, Davoodi (1999)	50 states of USA(1948-94)	FD-EXP	Davoodi and Zou (1998)	Time series analysis. OLS estimation.	Negative but not significant
Lin & Liu (2000)	28 provinces of China (1970-93)	MRR-REV	Mankiw, Romer and Weil (1992) and Solow (1956)	Fixed Effect Models Province and Time Dummies	Positive and significant
Zhang & Zou (2001)	29 provinces of China(1987-93) & 16 major states of India (1970-94)	FD-EXP FD-REV	Barro (1990) and Zhang and Zou (1998)	Fixed Effect Models in China. Application to India: Estimations with a five year forward-moving average of real per capita income growth.	Negative and significant in China and Positive and significant in India
Akai & Sakata (2002)	50 states of USA (1992-96)	FD-EXP FD-REV	Xie, Zou, Davoodi (1999)	OLS and Fixed Effects Model, Time Dummies	Positive and significant
Akai,Nishimura, Sakata (2004)	50 states of USA (1992-97)	FD-EXP FD-REV	Barro (1990) & Xie, Zou, Davoodi (1999)	Fixed Effect Models with Province and Time Dummies. Ml estimation.	A "hump-shaped" relationship between FD & Economic Growth
Jin, Quian & Weingast (2005)	29 provinces of China (1982-92)	FD-EXP, FD-EXP$_{EB}$, FD-XP$_{B+EB}$	Zhang and Zou (1998)	variable dummy that grasps the effects of the national macroeconomic fluctuations	Positive and significant
Malik, hassan and Hussain (2006)	4 provinces of Pakistan (1971-2005)	FD-EXP FD-REV	Zhang and Zou (1998)	Time series analysis. OLS estimation.	Positive and significant & A "hump-shaped" relationship between FD & Economic Growth

Variable of FD*: (F.D.: Fiscal Decentralization)
FD-EXP: ratio of local government expenditure to combined state and local government expenditure.
FD-EXP$_{EB}$: ratio of provincial extra budgetary to central extra-budgetary spending (per capita terms).
FD-EXP$_{B+EB}$: ratio of consolidated (budgetary + extra budgetary) provincial spending to consolidated central spending (per capita terms).
FD-REV: ratio of local government revenue to combined state and local government revenue
MRR-REV: the marginal retention rate of national budget revenues collected at the provincial level.

3- Methodology and Model:

The first effort to formalize the relationship between Economic Growth and fiscal decentralization is Davoodi and Zou(1998) which is the most commonly used analytical framework in the literature. Following Barro(1990) & Davoodi and Zou (1998),we will setup a theoretical model of fiscal decentralization and economic growth in order to frame our empirical investigation for Iran. While Barro's model introduced government expenditure in the production function of an endogenous growth model, Davoodi and Zou(1998) improved it by detailing three levels of government. We will do the same here by defining these levels as the federal and provincial levels. Decentralization will therefore be represented as a higher share of sub national (provincial) government spending on total government spending. The production function is Cobb-Douglas, where k represents the level of private capital stock, which can be considered as a measure of both human and physical capital. Total government spending is divided in the two components federal (f) and provincial (p) government spending on goods and services respectively. The variables are all measured on a per capita basis. $y = k^\alpha f^\beta p^\gamma$, $\alpha + \beta + \gamma = 1$ (1)

Total government spending (g) is allocated as follows: $g = f + p$ and $f = \theta_f . g$, $p = \theta_p . g$. When federal government's share of total expenditure is θ_f and provincial government's share is θ_p

Consolidated government spending is financed by a flat income tax at a rate τ, which we will assume constant and *Petroleum Revenue* (*PRev*). We also make the further assumption of a balanced growth path, i.e. the government will not run any deficits or surpluses. To determine the long-run growth rate of the economy, we need to analyze the consumption and investment decisions made by the individuals.

We consider one representative agent facing an infinite planning horizon who maximizes his discounted utility subject to his dynamic budget constraint:

$$k^\bullet = dk / dt = (1 - \tau)y - c = (1 - \tau)k^\alpha f^\beta p^\gamma - c \qquad (2)$$

And the government's budget allocation:

$$g = \tau y + p\mathrm{Re}v \qquad (3)$$

He takes as given the government's announcement of the fix tax rate and the spending by the different levels of governments. The representative agent's preferences have the following form:

$$U(c) = \int_0^\infty \frac{c^{1-\sigma}}{1-\sigma} e^{-\rho t}; \sigma > 0, \sigma \neq 1 \qquad (4)$$

Where c is per capita private consumption and ρ is a positive time discount rate. The individual chooses his optimal consumption path {c (t): $t \geq 0$} and his investment path to determine the level of capital stock {k (t): $t \geq 0$}.To find this optimal allocation of resources by the individual, we write down the Hamiltonian:

$$H_i = \frac{c^{1-\sigma}}{1-\sigma} e^{-\rho t} + \lambda\{(1-\tau)(k^\alpha f^\beta p^\gamma) - c\} \qquad (5)$$

Where λ is a dynamic Lagrange multiplier.
By differencing on c and k we find the first order conditions $F.O.C$:

$$H_{ci} = \frac{\partial H}{\partial c} = 0 \Rightarrow c^{-\sigma} e^{-\rho t} = \lambda \qquad (6)$$

$$H_{ki} = \frac{\partial H}{\partial k} = -\dot{\lambda} \Rightarrow \lambda(1-\tau)\frac{1}{\phi}\alpha k^{\alpha-1} f^\beta p^\gamma = -\dot{\lambda} \qquad (7)$$

$$H_{\lambda i} = \dot{k}_i \Rightarrow \dot{k} = (1-\tau)(k^\alpha f^\beta p^\gamma) - c \qquad (8)$$

Using thetransversality condition $\lim_{t\to\infty} k\lambda e^{-\rho t} = 0$, the budget constraint 4 and by fixing the initial capital stock to k (0) = 1, we can find the growth rate of the economy.

$$\frac{\dot{y}}{y} = \frac{\alpha}{\sigma}[(1-\tau)\tau^{\frac{1-\alpha}{\alpha}} \theta_f^{\frac{\beta}{\alpha}} \theta_p^{\frac{\gamma}{\alpha}} - \rho] \qquad (9)$$

Equation (9) shows that the long-run growth rate of per capita output is a function of the tax rate and the spending (Revenue) shares of the different levels of government. Thus, we see that the government can influence the growth rate of the economy by choosing among different spending (Revenue) shares for the federal and provincial levels.

The model explicitly introduces the trade-off between provincial and federal government expenditure (Revenue) which is an important result of fiscal decentralization. This solution gives us an equation for empirical

implementation where decentralization is measured as the share of local governments in total public spending. The Equation (9) is nonlinear and can be estimated using the Nonlinear estimators for panel data. What the previous studies have to present a linear regression equation which attempt to be a linear approximation to the nonlinear specification. Equation (10) is a empirical form of Equation (9) which we use in estimation.

$$Growth = c(1) + c(2)*(1-\tau)\tau^{C(3)}\theta_p^{c(4)/c(2)}\theta_f^{c(5)/c(2)} + \sum_{i=1}^{N-1} c_{(i)}D_i \qquad (10)$$

List and definition of variables:

Growth: the growth rate of real per capita Gross Domestic Product in province i at time t.

θ_p : Proxy for fiscal decentralization that including:

FDTREV i.e.: Ratio province of Tax Revenue to consolidated government Tax Revenue.

FDREV i.e.: Ratio province of Tax Revenue to consolidated government Total Revenue.

θ_f : Proxy for fiscal centralization

τ_{it} : Tax rate, percentage of province tax on province GDP i at time t.

Our primary concern in this empirical analysis is the sign and significance of the coefficient of $c(4)$ the fiscal decentralization.

D_i Is a vector of $i-1$ province fixed-effects (i.e. intercept province dummies).

4- Empirical results:

We estimate the growth regression equation (9) using the Nonlinear panel data fixed effect, with the set of regional dummy variables. To sum up, regression results in table (2) shows that over the period 2001-2007 there is a positive and significant nonlinear relationship between fiscal decentralization and economic growth in Iran Provinces. It implies that higher fiscal decentralization associated with higher economic growth. The explanatory power of the regressions is relatively high (adjusted R^2 0.28) and the critical F values would lead us to accept the general fixed-effect model of the Explanatory variables on growth.

5- Conclusions:

The main focus of this paper is to provide evidence on The Nonlinear relationship between fiscal decentralization and economic growth for Iran Provinces. First, we set up a simple Analytical model to give a basic result of fiscal decentralization and economic growth. We used a cross-province fixed-effect panel data regression model over the 2001-2007 periods to investigate whether fiscal decentralization has any growth impact.

The positive association between fiscal decentralization and provincial economic growth has been found to be consistently significant and robust in Iran. This finding consistence with light of the conventional wisdom that fiscal decentralization usually makes a positive contribution to local economic growth.

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Table 2: Regression Results

Dep. Var: Provincial real Per Capita GDP Growth rate

Variable	FD Variable:FDTREV		FD Variable:FDREV	
	Coefficient	Prob.	Coefficient	Prob.
Concept	-1427	0.01	-496	0.17
C(2)	1361	0.02	453	0.25
C(3)	-0.01	0.49	-0.08	0.36
C(4)	22	0.00	0.28	0.00
C(5)	-351	0.01	-378	0.12
AE	144	0.00	60	0.03
AW	154	0.00	72	0.02
AD	170	0.00	90	0.01
ES	142	0.00	58	0.02
EI	186	0.00	105	0.00
BO	195	0.00	111	0.00
CH	183	0.00	106	0.00
KHJ	194	0.00	116	0.00
KHR	132	0.00	47	0.07
KHS	182	0.00	102	0.67
KZ	106	0.01	11	0.00
ZA	185	0.02	106	0.00
SE	180	0.00	103	0.00
SI	170	0.00	91	0.01
FA	141	0.00	57	0.04
GH	172	0.00	92	0.01
QO	170	0.00	93	0.01
KO	170	0.00	91	0.01
KE	153	0.00	71	0.02
KS	163	0.00	83	0.01
KB	139	0.03	21	0.58
GO	162	0.00	80	0.02
GI	156	0.00	74	0.01
LR	163	0.00	83	0.01
MZ	142	0.00	57	0.05
MA	165	0.00	83	0.01
HO	160	0.00	78	0.01
HA	163	0.00	82	0.01
YZ	181	0.00	101	0.00