Fiscal Decentralization, Income Distribution and Economic Growth: A Case Study for Iran

[1]Mehdi Sadeghi Shahdani, [2]Akbar Komijani,
[1]Mohammad Hadi Zahedi Vafa and [1]Mohammad Ghaffary Fard
[1]Department of Economics, University of Imam Sadegh, Tehran, Iran
[2]Department of Economics, University of Tehran, Tehran, Iran

Abstract: Theory of decentralization in order to increase productivity and efficiency of governments and regional balance has been considered. In this study by using augmented neoclassic model, the direct and indirect effects of fiscal decentralization on economic growth is evaluated over the period of 2001-2008 across the 30 provinces of Iran. Researchers find that there are linear positive relationship between expenditure decentralization and economic growth, however revenue decentralization appears to have nonlinear positive effect on economic growth. The indirect effect of fiscal decentralization through its positive influence on income distribution also has been examined.

Key words: Fiscal Decentralization (FD), economic growth, income distribution, panel data, Neoclassic Model, Iran

INTRODUCTION

One of the main policy objectives of market-based economic reform is to improve living standards through economic growth, Fiscal Decentralization (FD) policies are being pursued by many developing countries as part of this general strategy. The direct and indirect relationship between FD and economic growth has been examined during the last 3 decades. Linking economic growth and FD together has mainly three reasons: firstly, growth is seen as an objective of FD 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 (Zhang and Zou, 1998).

In this study, researchers examine the current state of knowledge in the economics literature on the relationship between FD and economic growth and analyze whether FD also indirectly influences economic growth through its impact on income distribution in Iran. As decentralization moves to the forefront of policy options being considered by developing and transitional countries and often figures prominently among the prescriptions offered by international organizations, it becomes more important to understand better the relationship between FD, income distribution and economic growth. If FD positively or negatively influences economic growth directly or indirectly (the latter though the income distribution channel) then policymakers need to be aware of these relationships when formulating and implementing decentralization policy.

The research is organized as follows; first discuss the relationship between FD, income distribution and economic growth then develop an augmented neoclassical model of economic growth that incorporates both the potential indirect effect of FD on economic growth through income distribution and the potential direct effect of FD on economic growth. By using panel data for period 2001-2008 of 30 provinces of Iran, researchers estimate the impact of FD on income distribution and economic growth.

Review of literature: While theory indicates a positive impact of FD on economic growth due to efficiency gains, the empirical verifications are only in part able to support this hypothesis. As reviewing the literature, it is found that there are three approaches; Representative Agent Model, Overlapping Generation Models and Augmented Neoclassic Models to showing direct and indirect relationship between FD and economic growth. Oates (1999) detects a significant and robust positive correlation between FD and growth. Lin and Liu (2000) show that China's overall growth rate depends positively on FD mainly via efficiency improvements of resource allocation rather than via inducing more investment. Yilmaz (1999) finds for unitary countries a significant positive impact of

Corresponding Author: Mehdi Sadeghi Shahdani, Department of Economics, University of Imam Sadegh, Tehran, Iran

FD on per capita growth while his results for federal countries are inconclusive. Zhang and Zou (1998) detect a positive effect of the per capita FD shares on Indian regional economic growth, albeit the effect is only significant in the case of the per capita revenue share. A significant and robust negative impact of FD on China's provincial economic growth is revealed by Zhang and Zou (1998). Key infrastructure projects with nation-wide externalities which are too decentralized in China are the main reason for this result. Comparing this study with Lin and Liu (2000), it becomes clear that interestingly, FD induces diverse growth performances at the national and at the provincial level.

Davoodi and Zou (1998) find for the developing countries also a negative effect of FD on growth, albeit not significant and for the developed countries no clear relationship. Woller and Phillips (1998) concur with Davoodi and Zou (1998) in finding no significant and robust relationship in LDCs. At best, they are able to detect a weak inverse relationship between the revenue share and growth.

Xie *et al.* (1999) find for the US states also insignificant coefficients on local and state spending shares but they argue referring to their adopted theoretical model that insignificant FD shares indicate consistency with growth maximization. However, the model could even be wrong and insignificance could also indicate that FD is irrelevant to growth and should have no effect observing the impacts on growth. Thiessen (2003) chooses a somewhat alternative approach. He tests the hypothesis of a hump-shaped relationship between FD and economic growth.

In the case of too much decentralization, inter-jurisdictional externalities cannot be internalized; negative growth effects are the consequence. The same holds for a low level of decentralization: unconsidered preferences lead to inefficiencies in the provision of public goods, what inhibits, in turn economic growth. This theoretical trade-off construction indicates that the optimal degree of FD lies somewhere in between of an extremely high and an extremely low one. Thieben finds that the hump-shaped relationship is particularly pronounced in the countries with highest per capita income. While there is evidence that low per capita income countries grow linearly with higher decentralization degrees.

Furthermore, researcher tests the convergence of the FD shares towards a medium degree implementing three dummy variables which represent a low, medium and high degree of FD. Within the sample of 21 OECD countries, the low and high degree are significant at the 10% level while the medium degree is significant at the 5% level. The medium degree is associated with higher long-run

per-worker growth than either a low or high degree. In this way, the observed trend of convergence among high-income OECD countries towards a medium degree of FD tends to promote economic growth. Akai and Sakata (2002) classify their data set for FD variables also into high, medium and low degrees of FD in order to test the robustness of their estimations. All coefficients of the classified expenditure shares are highly significant at the 1% level and show positive signs. Thus, FD is conducive to growth regardless of the current degree of decentralization.

Interestingly, the group with a low degree of FD shows the highest coefficient, indicating that US states with a low degree of FD tend to grow stronger. Martinez-Vazquez and McNab (2003) using an international panel data set, they find that fiscal decentralization appears to reduce the rate of inflation in the sample countries and it does not appear to directly influence economic growth. FD, however appears to have an indirect, positive effect on growth through its positive influence on macroeconomic stability. Wingender (2005) uses time-series and panel data regressions to investigate the impact of decentralization on economic growth in Canada for the 1961-2004 period.

Evidence suggests that decentralization has contributed positively to growth in some provinces but aggregated data do not present clear evidence of a significant impact. Iimi (2005) using the Instrument Variables (IV) technique with the latest cross-country data for the period from 1997-2001, he found that FD has a significant positive impact on per capita GDP growth.

Martinez-Vazquez and Sepulveda (2010) examined an empirical analysis with data of a large number of countries for the period 1971-2001 and conclude that FD has significant effects on income inequalities. Yao (2006) find the effect of FD on poverty reduction with data of 97 countries over the period 1975-2001. His estimation shown nonlinear relationship between FD and poverty. Neyapti (2006) examined the effect of FD on income distribution for 36 countries, the panel investigation indicates that revenue decentralization may have a favorable impact on income distribution if accompanied with good governance.

A model of FD, economic growth and income distribution: The objectives in this study are; to account for the direct relationship between FD and economic growth and to incorporate the potential influence of FD on income distribution into the aggregate production function and therefore examine the indirect influence of decentralization on growth through its impact on income distribution.

Researchers develop an augmented neoclassical model of economic growth to examine the role played by FD. We assume a Cobb-Douglas production function for the entire economy so that production at time t is given by Mankiw *et al.* (1992).

$$Y_t = V_t K_t^\alpha H_t^\beta G_t^\varphi L_t^\theta \qquad (1)$$

$$\alpha, \beta, \varphi, \theta > 0$$

and;

$$\alpha + \beta + \varphi + \theta \geq 1$$

Where:

Y_t	=	Output
V_t	=	The level institutional factors
L_t	=	Labor
K_t, H_t and G_t	=	The stocks of private, human and public capital at time t, respectively

Researchers define V_t as the product of the level of technology and other institutional factors at time t:

$$V_t = F(A_t, D_t, IJ_t) \qquad (2)$$

Where:

A_t = The level of technology
D_t = The level of FD
IJ_t = Measures income distribution

D_t is synonymous with the direct effect of FD on output. If FD indirectly influences output through its impact on income distribution then it will indirectly influence economic output through IJ_t. Researchers further assume that L and A grow exogenously at rates n and g, respectively and that the income distribution is a function of among other things, FD:

$$IJ_t = g(D_t, X_t) \qquad (3)$$

Where X_t is a vector of other exogenous variables explaining the behavior of income distribution over time including the output and inflation. Researchers assume that physical capital and human capital are subject to decreasing returns to scale. This implies that the economy over the long-run will tend to constant private capital-labor, human capital-labor and public capital-labor ratios. Decentralization may thus affect output through two channels, a potential direct effect on output and a series of potential indirect effects, one of which is income distribution.

To determine the influence of FD on economic growth, we must first determine the steady state levels of the physical inputs in the production function.

Researchers assume that the same production function applies to all forms of reproducible capital and consumption so that one unit of capital can be costless transformed into one unit of consumption and vice versa. Decreasing marginal returns to all forms of reproducible capital are assumed. Private, human and public capital over time is governed by:

$$
\begin{aligned}
k_{(t)} &= i_k y_{(t)} - (n + g + s) k_{(t)} \\
h_{(t)} &= i_h y_{(t)} - (n + g + s) h_{(t)} \qquad (4) \\
g_{(t)} &= i_g y_{(t)} - (n + g + s) g_{(t)}
\end{aligned}
$$

Lets i_k, i_h and i_g be the fractions of output invested in private, human and public capital, respectively. Solving for stocks of capital in steady state then the steady state levels of the stocks of private, human and public capital per unit of labor are:

$$
k_{(t)}^* = \left[\frac{i_k^{1-\beta-\varphi} i_h^\beta i_g^\varphi}{n + g + s} \right]^{\frac{1}{1-\alpha-\beta-\varphi}}
$$

$$
h_{(t)}^* = \left[\frac{i_h^{1-\alpha-\varphi} i_k^\alpha i_g^\varphi}{n + g + s} \right]^{\frac{1}{1-\alpha-\beta-\varphi}} \qquad (5)
$$

$$
g_{(t)}^* = \left[\frac{i_g^{1-\alpha-\beta} i_k^\alpha i_h^\beta}{n + g + s} \right]^{\frac{1}{1-\alpha-\beta-\varphi}}
$$

Expanding V_t and taking the natural logarithm yields from Eq. 1 and 2 and substituting Eq. 5, the steady state level of output per unit of labor is:

$$
\begin{aligned}
Lny_{(t)}^* = {}& LntT_{(t)} + LnD_{(t)} + LnP_{(t)} + LnIJ_{(t)} - \\
& \frac{\alpha + \beta + \varphi}{1 - \alpha - \beta - \varphi} Ln(n + g + s) + \frac{\alpha}{1 - \alpha - \beta - \varphi} Lni_k + \\
& \frac{\beta}{1 - \alpha - \beta - \varphi} Lni_h + \frac{\varphi}{1 - \alpha - \beta - \varphi} Lni_g
\end{aligned}
$$

Thus, the steady state output is dependent upon the accumulation of reproducible capital, the stock of technology, the direct effect of decentralization on output and the indirect effect of decentralization through the income distribution index. We can calculate the speed of convergence to steady state per capita output using the equation:

$$\frac{d\ln y_{(t)}}{dt} = \lambda \left[Lny_{(t)}^* - Lny_{(t)} \right] \qquad (7)$$

Where, $\lambda = (n + g + \delta)(1 - \alpha - \beta - \varphi)$. Defining $y(0)$ as the initial level of per capita output, the evolution of per capita output over time is given by:

$$y = (1 - e^{-\lambda t}) \begin{bmatrix} LnD_{(t)} + LnP_{(t)} + LnIJ_{(t)} - \dfrac{\alpha + \beta + \varphi}{1 - \alpha - \beta - \varphi} Ln(n + g + s) + \\ \dfrac{\alpha}{1 - \alpha - \beta - \varphi} Lni_k + \dfrac{\beta}{1 - \alpha - \beta - \varphi} Lni_h + \\ \dfrac{\varphi}{1 - \alpha - \beta - \varphi} Lni_g - Lny_{(0)} \end{bmatrix}$$

(8)

Researchers hypothesize that the income distribution index (Gini coefficient) is determined by per capita output, square of per capita output, inflation rate and FD as:

$$LGin_{it} = \alpha + B_1 LGDppo_{it} + B_2 LGDppo\,\hat{}\,2_{it} + \\ B_3 Lp_{it} + B_4 LD_{it} + B_5 LSU_{it} + U_{it}$$

(9)

Where $(i = 1, ..., I)$ and $(t = 1, ..., N)$ refer to province i at time t. The detailed specification of variables in Eq. 9 is as follows:

$LGin_{it}$ = Log of Gini coefficient index in province, i at time, t

$LGDppo_{it}$ = Log of per capita Gross Domestic Product (GDP) in province, i at time, t

$LGDppo\hat{}2_{it}$ = Log of per capita Gross Domestic Product (GDP) square in province, i at time, t

Lp_{it} = Log of the annual change in the consumer price in province, i at time, t

Ld_{it} = Log of FD measures; the ratio of total province revenues to total province expenditures (revenue decentralization) and the ratio of total province expenditures to general government expenditures (expenditure decentralization) in province, i at time, t

LSU_{it} = Log of energy subsidies in province, i at time, t

Drawing on the neoclassical economic growth literature, researchers specify the base estimation equation for growth in per capita GDP as:

$$LGDppo_{it} = \alpha + B_1 LD_{it} + B_2 LGin_{it} + B_3 LTGO_{it} + \\ B_4 LI_{it} + B_5 LSN_{it} + B_6 DUM4 + U_{it}$$

(10)

$LGDppo_{it}$ = Log of per capita Gross Domestic Product (GDP) in province, i at time, t

Li_{it} = Log of public investment in province, i at time, t

$LTGO_{it}$ = Log of the ratio of tax revenue to Gross Domestic Product (GDP) in province, i at time, t

LSN_{it} = Log of the ratio of university students to population in province, i at time, t proxy for human capital

U = The disturbance term that is assumed to be serially uncorrelated to the explanatory variables and dum 4 is dummy variable which takes the value of one in the case of under developed provinces and zero otherwise

RESULTS AND DISCUSSION

Researchers determine whether empirical support exists for the hypotheses of the direct and indirect of FD on economic growth. Researchers estimate the income distribution and economic growth regression Eq. 9 and 10 using the panel data technique. The regression includes the two kind of FD, Expenditure Decentralization (EXPD) and Revenue Decentralization (REVD). We use fixed effect of Generalized Linear Square Method by Hausman test. Regression results in Table 1 show that there are a negative and near significant relationship between REVD and income distribution over 2001-2008 in provinces of Iran. A 1% increase in REVD appears to induce an approximate 0.02% decrease in income distribution index. The estimated coefficient for EXPD is statistically significant in Iran. It shows that a 1% increase in the level of EXPD induces a 0.03% decrease in the income distribution index. We now examine whether FD directly affects economic growth and also whether there is an indirect impact on economic growth through the income distribution channel. The empirical results are shown in Table 2. There is a statistically significant direct relationship between EXPD and growth in per capita GDP. Researchers also examined whether a non-monotonic relationship exists between REVD and economic growth by including the square of REVD as an additional variable. The estimated coefficients for square REVD terms were significant and negative.

Table 1: Regression results; the impact of fiscal decentralization on income distribution index (Dependent var. log (Gini index))

Independent var.	Model 1	Model 2
Constant	1.5 (1.78)*	-0.69 (-7.2)*
Per capita gross domestic product	-0.5 (-2.8)*	-0.23 (-3.56)*
Per capita gross domestic product square	0.02 (2.3)*	0.04 (3.35)*
Revenue decentralization	-0.02 (-1.2)	-
Expenditure decentralization	-	-0.03 (-3.6)*
Inflation rate	0.03 (1.5)***	0.01 (1.73)***
Subsidy	0.04 (2.5)*	0.03 (2.3)*
Adjusted R^2	82	91
Observations	200	200
No. of province	30	30
Prob (F-statistic)	100%	100%
Method	Pooled EGLS	Pooled EGLS
Regression Model	Fixed effect	Fixed effect
Hausman statistic	18.3	7.3

Table 2: The impact of fiscal decentralization on economic growth (Dependent var. log (per capita Gross Domestic Product))

Independent var	Model 1	Model 2
Constant	4.07 (6.9)[*]	5.6 (9.1)[*]
Revenue decentralization	0.2 (2.8)[*]	-
Revenue decentralization square	-0.13 (-4.7)[*]	-
Expenditure decentralization	-	0.6 (8.5)[*]
Income distribution	-0.3 (-2.9)[*]	-0.2 (-1.6)[*]
Investment	0.5 (18.6)[*]	0.5 (2.07)[*]
Ratio of tax revenue to Gross Domestic Product	0.06 (1.4)[*]	0.08 (2.5)[**]
Ratio of university students to population	0.67 (10.9)[**]	0.8 (11.9)[*]
Dum4	-0.27 (-1.9)[*]	-0.54 (-5.5)[*]
Adjusted R^2	99	96
Observations	200	200
No. of province	30	30
Prob (F-statistic)	100%	100%
Method	Pooled EGLS	Pooled EGLS
Regression Model	Fixed effect	Fixed effect
Hausman statistic	21.61	139.3

All variables are log; t-statistic in parentheses. [*],[**],[***]Signify the 1, 5 and 10% level of significance, respectively

The finding appear to support those of in the literature who have to detect a statically, significant direct relationship between FD and economic growth in Iran. Researchers also find empirical support for an indirect relationship between FD and growth through the income distribution channel. Thus, a 1% increase in FD, all else being equal, would appear to reduce Gini index over time and in turn, indirectly enhance economic growth.

CONCLUSION

The main purpose of this study was to provide evidence on the relationship between fiscal decentralization and economic growth for Iran. First, researchers develop an Augmented Neoclassical Model of economic growth to examine the role played by fiscal decentralization. By augmenting the model, researchers can explicitly examine how fiscal decentralization may indirectly influence economic growth through its impact on income distribution. We examined the linkages between fiscal decentralization, income distribution and economic growth over the time 2001-2008 in Iran provinces. The finding suggest that expenditure decentralization has significant positive effect on economic growth.

It also affects positively indirect effect on economic growth through its beneficial impact on income distribution. The other significant finding of this study is that there appear to exit a nonlinear relationship between revenue decentralization and economic growth and the positive effect improving income distribution through revenue decentralization in provinces of Iran indirectly affects economic growth. The results also showed that in addition the fiscal decentralization policies for increasing economic growth, policies to increase fiscal and human capital and improve income distribution should be given to in the provinces.

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