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The Analysis of the Effect of Private and State Educational and Health Care Expenditures on the Economic Growth of Iran[1]

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Abstract

Investment in educational and health sector is one of significant factors for economic growth in many countries. Lots of studies have been done in this field, However, The simultaneous effect of education and health and the importance of private and state sectors in economic growth of Iran have not been surveyed. Because of the significance of this investigation, various types of behavior in private and state sector in these areas, we have investigated the effects of private and state educational and health care expenditures on the economic growth of Iran using Auto-Regressive Distributed Lags (ARDL) method from 1965 to 2011. Statistical ramifications showed that state health care expenditures had a positive and significant effect on economic growth. However, private health care expenditures showed no significant effect on growth. Private educational expenditures had a positive significant effect on economic growth. However, State educational expenditures had a negative effect on economic growth which is not surprising because educational system faces serious problems such as discordance between the educational system and needs of society and labor market.

Keywords: Economic Growth, State and Private Educational Expenditures, State and Private Health Care Expenditures

Introduction

Economic growth in Iran is one of the main concerns of policy makers. In the past, physical capital was growth driving force and the role of heterogonous labor force didn't have the required position in the theoretical analysis. Today, theoretical and empirical literature showed that development of human capital, improvement of the quality of labor force and his health is one of the main ways of increasing economic growth in communities and this important factor has key role in productivity. The increase of productivity and human resources income lead to the increase of high quality in life and the increase of saving that are of great importance in continuing dynamic economic growth. Based on the importance of the quantity investigation of the relations in Iran economy, it is attempted that the effect of human capital is investigated separately in private and state sectors on economic growth of Iran. To do this, by theoretical and empirical studies, economic growth model is explained. By applying the data during 1965-2011 and econometric models by Microfit software (4), behavior parameters in Iran economy are estimated and the quantity results were evaluated. Finally, the results and politic recommendations were presented.

Theoretical basics

The theoretical models of growth showed that various factors are effective on economic growth of the countries. Human capital is one of the important factors (Barro, 1996). Human capital reflects the skills, capacities, personal capability via training human resources increasing the quality and quantity of production (Beyengju, 2002). Based on Augmented Solow Model (1956), human capital in the initial studies was entered as input in production function as training beside the physical capital (Lucas, 1988; Solow, 1956). Then, it was defined in the form of health and an exact analysis of the effect of human capital on economic growth was presented (Barro, 1996).

Most of the economists showed that residual factor as the explanatory of the important sector of the growth of advanced countries depends upon education directly or indirectly (Emadzade, 2000). Thus, invest-

[1] Based on MA thesis

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ment in education was taken into attention in the early 1960s by economists and policy makers. In this period, investment in formal and informal education increased the skill of human resources and improvement of labor force productivity and Total Factor productivity and provided the required dynamics for the economic and social development in advanced countries (Elmi and Jamshidnejad, 2007). In the theoretical framework of human capital theory, Schultz (1961) and Becker (1975) believed that education expenditure increased productivity and real wage of people. Romer endogenous growth theory (1990) was based on the framework that creation of a new idea is directly dependent upon human capital. It is expected that investment in education and improvement of the expenditures and capital accumulation increased research and development of economic growth. People by permanent accumulation of knowledge as "Intentional effort" as it was said by Lucas (1988), as "learning by doing" based on Autume and Michael (1993) theory increased productivity, capital and labor. Thus, it lagged descending returns rule in practice and increased economic growth. Second, education improves adaptability and allocated efficiency. Because skilful workers allocate the resources with high efficiency are more capable in response to the new situations (Autume and Michael, 1993; Nelson and Phelps, 1966). Third, education leads to more benefits or positive social external outcomes (Self and Grabowski, 2004). The health labor force is strong and prepared mentally and physically and by high productivity can receive high wages. More wage leads to high saving and consumption and finally the economic growth (Weil, 2005; Strauss and Thomas, 1998). On the other hand, health improvement via the reduction of sick leaves (Pauly *et al.*, 2002), increasing life expectancy and reduced morality rate and increasing the participation of the poorest people in the society in labor market and the number of capital return years and labor force and more saving for retirement increased the physical investment and production (Ozcan *et al.*, 2000; Muysken *et al.*, 2003; Weil, 2005). Third, better health in case of stability of other conditions reduced the health care expenditures of the government in future and it is possible that the resources are spent in human and non-human investment sector (Mojtahed and Javadipour, 2004). Howitt (2005) believed that mother and child health has an important role in human capital of childhood period of a person and increase of economic growth. He considered this issue a good justification for investment of government on children and mothers health care. Scheffler (2004) showed that in most of the developing countries, birth rate and dependency load are high. Thus, saving and investment and production are low. In these countries, health services in family control and population control reduce birth rate and the dependency load. Mushkin (1962), Fuchs (1966), Grossman (1972) and Van Zon and Muysken (2001) believed that the investment expenditure in health is necessary to increase production.

Review of literature

Asterious and Agiomirgianakis (2001) by Johansen co-integration method and Lucas growth model (1988) investigated the long-term relationship between economic growth and education in Greece during 1960-94. In the present study, it is assumed that the mechanism of human skill development is education. The results of the study showed that there is a long-term positive relation between economic growth and registration rate in various sections. The results of the study of Clarke and Islam (2003) during 1995-99 showed that the effect of health care expenditures of government on economic growth in Thailand was more than developed country of Australia. Akram *et al.*, (2008) by Romer (1990) and Barro (1996) model and co-integration methods of Engle – Granger and Johansen showed that per capital GDP of Pakistan during 1972-2006 and in long –term had positive relation with health index. Barro (2002) by panel data of 100 countries during 1960 to 1990 showed that educating men at 25 years old or above in high school and high levels had significant effect on growth. Beraldo *et al.*, (2003) by MRW (Mankiw, Romer and Weil) and group panel data method from OECD countries showed that the effect of general expenditures on production was high compared to the health care expenditures in private sector. The effect of state and private expenditures of education on economic growth was not statistically significant. Rivera and Curias (2004) by developing Solow model (1956) and using panel data method of various regions in Spain showed that government infrastructure expenditure in health and education didn't have significant effect on economic growth but the current expenditures of government health had positive relation with economic growth of Spain. Park (2006) by endogenous growth model and data of 94 developed and developing countries during 1960-95 showed that dispersion index of human capital of population increased the productivity and provided the economic growth improvement and provided high development of human capital and education compared to other locations. Baldacci *et al.*, (2007) by endogenous growth model and panel data of 118 developing countries during 1971-2000 showed that education and health care expenditures developed economic growth. Li and Huang (2009) by MRW model

investigated the data of 128 provinces of China during 1978-2005. The results of the study showed that health and education had positively significant effect on economic growth. The findings of Bloom *et al.*, (2009) showed that the increase of life expectancy and reduction of fertility rate of improving health in the society are the main factors of economic growth in China and India during 1960-2000. However, education of labor force had significant effect on growth of these two countries. Shindo (2010) showed that the increase of Education subsidies in long term improved the economic growth of two regions of Jiangsu and Liaoning during 1985-2000. Narayan *et al.*, (2010) by augmented production function, Wasteland co-integration methods and panel data during 1974-2007 showed that health and research and development expenditures in long-term had positive effect on economic growth of five southeast Asian countries but the education expenditures didn't have any significant effect on growth. Laabas and Weshah (2011) on a 30-country sample of developing and developed countries showed that education quality had positive effect on economic growth of both groups of countries. The study of Neagu (2012) showed that education alone and health and education together had positive effect on economic growth of Romani. Hanushk (2013) showed that labor force education in developing countries had positive effect on economic growth.

Some studies showed that it is possible that the effect of education and health on economic growth is negative. Such studies are Diamond (1989), Lau *et al.*, (1991), Islam (1995) and Kewka and Morrissey (2000). Diamond applied private investment, total government expenditures to GDP, infrastructural expenditures ratio to GDP and current expenditures of social sector to GDP and current education expenditures to GDP as explanatory variables of economic growth in 38 developing countries and found that except current expenditures of social sector and education with negative effect on growth, other variables had positive effect on economic growth. Lau *et al.* investigated 58 developing countries, from 1960 through 1986. In this study real GDP was considered as dependent variable and some variables as quantities of capital, labor, and average educational attainment of the labor force were considered as explanatory variable. They measured the percentage change in a region's real GDP in response to an increase of one year in the average education. The results showed that in some developing countries, the increase of one year education didn't have significant effect on GDP growth and it had negative effect in some countries. The results of the study were consistent with the empirical study done by Islam based on pooled data. Also, Kewka, and Morrissey (2000) by co-integration methods of Engle – Granger and Granger causality showed that public expenditures of education and health didn't have significant effect on economic growth of Tanzania during 1965-96. Some of the studies showed that health care expenditures had no significant effect on economic growth. Cullis and West (1979) showed that health care expenditures had no significant effect on economic growth.

Easterly and Rebelo (1993) found that the effect of health expenditures on the growth of countries was negative and insignificant. In local studies, the relationship between education and health was investigated. Salehi (2002) by human capital model MRW showed that academic years and education expenditures had positively significant effect on economic growth in Iran during 1966-1996. Mojtahedi and Javadipour (2004) by augmented Solow growth model (1956) and panel data technique and 33 developing countries showed that human capital as physical capital had positive effect on economic growth. Taghavi and Mohammadi (2006) by endogenous growth model and Granger co-integration test during 1959-2002 and empirical-scientific study of Jamshidnejad (2007) by Lucas growth model (1988) during 1972-2003 supported the effect of improvement of indices as adult's literacy rate and academic years rate of labor force and generally education on economic growth of Iran. Also, Ghanbari and Baskha (2008) by neoclassic growth model and Johansen and Juselius method found that physical capital, active population, health expenditures of government had positively significant effect on economic growth of Iran during 1959-2004. Almasi *et al.*, (2008) introduced endogenous economic growth as a function of human capital, physical capital and foreign debt and by five-step Johansen method showed that the long-term effect of human capital (the ratio of educated labor force) on economic growth of Iran during 1971-2005 was more than physical capital. Almasi and Sepahban (2009) by applying Granger causality relation showed that in short-term and long-term, there was a mutual relationship between literacy rates of adults of economic growth of Iran during 1971-2005. Emadzade *et al.*, (2009) by production function based on production function on Mincer wage equation and panel data of 75 countries separated by three income groups showed that education and health of human resources on production of two groups of the countries with high and average income had positively significant association but in the countries with low income, only education had positive effect on economic growth. Salmani and Mohamamdi (2009) by Augmented Product Factor (APF) and ARDL method

found that health expenditures of government in long-term had positively significant effect on Iran economic growth during 1971 to 2002. The results of vector error correction model (VECM) of the study of Mahdavi and Naderian (2010) showed that there is a mutual relationship between human capital and economic growth without Iran oil during 1961-2001 in long-term and short-term. There is no short-term relation between economic growth and human capital but there is a long-term relation as mutual. Ahmadi Shad Mehri *et al.*, (2010) by ARDL showed that average education years of labor force and health care expenditures ratio to GDP had positively significant effect on productivity level and economic growth of Iran during 1978-2005. Also, the results of causality test showed a one-way casual relation from human capital and total factor productivity. Behbudi *et al.*, (2011) investigated the relationship between per capita health expenditures and income per capita in the countries with low and average income and Iran was in this group. The results showed a causal one-way relation from income to per capital health expenditures. Komeijani *et al.*, (2012) by ARDL showed that human capital in high education had positively effect on productivity of labor force and economic growth in Iran. Haji Khodazade *et al.*, (2013) investigated the elasticity of education in Uzawa–Lucas's Growth Model for Iran economy. The results showed that education had positively significant effect on Iran economy growth. Finally, Tari *et al.*, (2013) by ARDL method showed that public health expenditures had positive effect and private sector health expenditures had negative effect on economic growth of selected developing countries.

As is shown, many empirical studies emphasized on the positive effect of education and health on human capital and increasing productivity, income and economic growth. There are other empirical studies showing the insignificance or negative effect of human capital on economic growth. The contradictory results without considering the political, structural and institutional differences of the studied countries can be due to the difference of methodology and the type of applied econometric technique. The study of empirical researches showed that human capital in education dimension emphasized on the average education years and education expenditures and in health emphasized on life expectancy and health expenditures. As life expectancy is dependent upon the health condition of the society and using education and health expenditures separate the state and private investment in education and health. In the present study, human capital based on expenditures and health and the separated variables is investigated. The effect of expenditures based on education and health and state and private on economic growth was investigated.

Materials and Methods

As using non-stationary time series in common econometric methods leads to spurious regression, it is required that before any estimation, stationary aspect of time series is investigated. Time series is stationary if mean, variance and covariance and its correlation coefficient is independent from time (Bhaskara, 1994). The Augmented Dickey-Fuller (ADF) is one of the most famous methods in this issue. After the investigation of the stationary aspect of the variables to estimate the long-term relation between the model variables, various methods including Auto-Regressive Distributed Lags (ARDL) method are used. According to Laurenceson and Chai (2003) the most important feature of this dynamic method is considering short-term responses among the studied variables. It also presented a non-bias estimation of long-term coefficients in which t-statistics is reliable. The advantage of this method is that it takes sufficient numbers of lags in order to capture the data generating process in a modeling General to –Specific framework. The stages of estimation of ARDL model are as following. At first the stationary time series of the variables is investigated. Then, by unit root test, at the same time with the selection of the number of optimal lag variables, dynamic model is estimated and by Schwarz Bayesian Criterion, optimal lag of the model is selected. This method is saving time based on the small sample size in the number of lags and the degree of freedom of the model is increased (Pesaran and Shin, 1997). By the results in the first stage and co-integration test of Banerjee, Dolado, and Mestre based on short-term dynamic model, if the co-integration relation is not rejected, the long-term model coefficients between the variables are estimated. Finally, by estimation of error correlation model, short-term dynamic structure of the model is estimated.

Based on the theoretical and empirical basics, the effect of educational and health care expenditures of private and state sectors was investigated via Augmented Aggregate Production Function (APF) Growth Model based on growth accounting approach. As is shown, in many researches of economic growth, APF model is applied. For example, the study of Fosu and Magnus (2006) can be mentioned. APF model is including Neoclassic production function as inventory of physical capital and labor force

and it includes other effective variables on economic growth as human capital and other effective variables on economic growth via total factor productivity. The general view of APF model is as following:

$$Y_t=A_tCA_t^{p}LF_t^{\eta} \quad (1)$$

Where Y_t is total economy production at time t that is measured by real GDP(GDPt). At,Cat, LFt denote total factor productivity, physical capital inventory and labor force, respectively. In neoclassic growth model, total factor productivity as production function residual includes other effective factors on economic growth. Based on the studies, total factor productivity is a function of human capital:

$$A_t=f\left(HC_t,C_t\right)=HC_t^{\varphi}C_t^{\delta} \quad (2)$$

Where totals factor production of production (At) is dependent upon human capital (HCt) and other effective factors (Ct). As it was said, human capital is including two main sectors of education and health and it is considered as the alternative of human capital. According to the study of Braldo *et al.*, (2003) human capital (HC) is considered as following:

$$HC_t=g\left(GE_t,PE_t,GH_t,PH_t\right)=GE_t^{\beta1}PE_t^{\beta2}GH_t^{\beta3}PH_t^{\beta4} \quad (3)$$

Where Get is general (state) education expenditures and PHt is private sector education expenditures and GHt and PHt indicated health expenditures in state and private sectors, respectively. By replacing the equations (2), (3) in equation (1), we have:

$$Y_t=C_t^{\ddot{a}}HC_t^{\phi}CA_t^{\tilde{n}}LF_t^{\varsigma}=C_t^{\ddot{a}}GE_t^{\hat{a}1}PE_t^{\hat{a}2}GH_t^{\hat{a}4}CA_t^{\tilde{n}}L_t^{\varsigma} \quad (4)$$

In this model, considering the effective factors on economic growth, state and private sector expenditures of education and health separately were investigated. By getting logarithm of equation (4), the equation is explicated as:

$$lGDP_t=c_t+\beta_1lGE_t+\beta_2lPE_t+\beta_3lGH_t+\beta_4lPH_t+\beta_5lCA_t+\beta_6lLF_t+u_t \quad (5)$$

Where $lGDP$ is GDP logarithm; lGE is general expenditure logarithm; lPE is logarithm of private sector expenditures; lGH is logarithm of general sector health expenditures; lPH is logarithm of private sector health expenditures, lCA is logarithm of cash capital; lLF is logarithm of labor force per person[1] and u is disturbance term. Parameters $\beta_i, i=1,...6$ indicate the elasticity of GDP to explanatory variables. It can be said that model parameters are positive. The data of the study were obtained from Database of Islamic Republic of Iran central bank. The study period was 1965-2011 and variables except labor force with unit person is based on billion Rial and fixed price of 1997. The data analysis was done by econometric models Auto-Regressive Distributed Lags (ARDL) method by Microfit 4 software.

Results

The study of stationary test of model variables was done by Augmented Dickey-Fuller (ADF) and it showed that all the variables are full of rank I(1) (Table).

Based on non-stationary variables in the level and stationary at level 1, the following Auto-Regressive Distributed Lags (ARDL) is presented:

$$lGDP_t=\theta_0+\sum_{i=1}^{S}\alpha_ilGDP_{t-i}+\sum_{j=0}^{n1}\theta_{1j}lGE_{t-j}+\sum_{j=0}^{n2}\theta_{2j}lPE_{t-j}+\sum_{j=0}^{n3}\theta_{3j}\ lGH_{t-j}$$
$$+\sum_{j=0}^{n4}\theta_{4j}lPH_{t-j}+\sum_{j=0}^{n5}\theta_{5j}lCA_{t-j}+\sum_{j=0}^{n6}\theta_{6j}lLF_{t-j}+u_t \quad (6)$$

Where, θ_0 denotes intercept, α_i lagged dependent variable coefficients and θ_{ij} explanatory and lagged variables coefficients. In estimation of this model, at first the maximum number of lag is selected by the researcher. As the data are annual, the number of the lags is 1 or 2 (Tashkini, 2005). The results of estimation of dynamic short-term model are shown in Table 2.

F calculation statistics (558.201) compared to critical F of table at significance level 5% showed that explication of the model statistically is not rejected. The investigation of the distinguishing statistics of the main items of the regions is estimated to be sure of the validity and reliability of the estimated parameters in Table (3).

The above calculation statistics at error level 5% showed that disturbance term didn't exhibit autocorrelation and Hetroscedasticity and it had normal distribution. Also, the functional form of the model is not rejected. As absolute value of t-statistics of the table is less than absolute value of Banerjee, Dolado, and Mestre calculation statistics at confidence interval 95% (Table 4), the long-term equilibrium equation between the variables is not rejected. Thus, the long-term coefficients of the model and error correction model are estimated.

[1] Logarithm of labor force is active population logarithm in the required period.

Table 1. The quantity results of Augmented Dickey-Fuller (ADF)

Variable	Intercept	Process	Test statistics	Critical value	Significance level	Result
LGDP	×	×	-2.710	-3.527	0.05	1(1)
DLGDP	×	-	-3.504	-2.940	0.05	1(0)
LGE	×	×	-1.922	-3.527	0.05	1(1)
DLGE	×	-	-6.349	-2.940	0.05	1(0)
LPE	×	×	-3.516	-3.527	0.05	1(1)
DLPE	×	-	-4.447	-2.940	0.05	1(0)
LGH	×	×	-2.074	-3.527	0.05	1(1)
DLGH	×	-	-6.027	-2.940	0.05	1(0)
LPH	×	×	-1.537	-3.527	0.05	I(1)
DLPH	×	-	-5.283	-2.940	0.05	1(0)
LCA	×	×	-2.751	-3.527	0.05	1(1)
DLCA	×	-	-3.903	-2.940	0.05	I(0)
LLF	×	×	-3.239	-3.527	0.05	I(1)
DLLF	×	-	-3.256	-2.940	0.05	1(0)

Source: Researcher calculations

Table 2. The quantity results of estimation of dynamic short-term model

Explanatory variables	Estimated coefficients	t-statistics value	(prob)
LGDP(-1)	0.4504	6.108	0.000
LGE	-0.0669	-1.191	0.242
LGE(-1)	-0.1361	-2.594	0.014
LPE	0.0719	3.048	0.005
LGH	0.0265	0.579	0.566
LGH(-1)	0.0750	1.790	0.083
LPH	-0.0052	-0.202	0.840
LCA	0.2127	6.226	0.000
LLF	0.2945	2.759	0.010
C	2.139	2.509	0.017
$D.W = 1.954$	$F(9,32) = 558.201(0.000)$		$\overline{R}^2 = 0.9$

Source: Research calculations

Table 3. The results of dynamic model problem tests

Test	LM Test		F Test	
	χ^2 Statistics	(prob)	F Statistics	(prob)
Auto-correlation	0.0015	0.969	0.0011	0.973
Functional form	3.181	0.074	2.545	0.121
Normality	0.760	0.684	Not Applicable	-
Hetroscedasticity variance	0.6622	0.416	0.640	0.428

Source: Research calculations

The results of estimation of long-term model coefficients are shown in Table (5). The results showed that elasticity of GDP compared to General education expenditure (GE) at error level 5% was significant and negative. Thus, government education expenditures in long-term had negative effect on economic growth. This is expected based on the structure of education system of Iran and the lack of systematic relationship with market and needs of the society and production sector.

Table 4. The results of co-integration test between the variables of the study

Critical quantity of Banerjee, Dolado, and Mestre at significance level 25%	Critical quantity of Banerjee, Dolado, and Mestre at significance level 10%	Critical quantity of Banerjee, Dolado, and Mestre at significance level 5%	Critical quantity of Banerjee, Dolado, and Mestre at significance level 1%	Calculated t statistics	N
-2.99	-3.82	-4.46	-5.53	-7.45	25
-3.18	-3.82	-4.43	-5.04	-7.45	50

Source: Researcher calculations

Table 5. The quantity results of estimation of model in long-term

Explanatory variables	Estimated coefficients	t-statistics value	(prob)
LGE	-0.3692	-2.949	0.006
LPE	0.1309	3.316	0.002
LGH	0.1847	2.017	0.052
LPH	-0.0094	-0.2033	0.840
LCA	0.3860	8.6095	0.000
LLF	0.5358	2.755	0.010
C	3.893	2.717	0.011

Source: Researcher calculations

The study of other results showed that at error level 5%, elasticity of GDP to private sector education expenditure (PE), elasticity of GDP to general health expenditure variable (GH), elasticity of GDP to physical capital inventory variable (CA), elasticity of GDP to labor force variable (LF) were positively significant but elasticity of GDP to private sector health expenditures (PH) was not significant.

To study the short-term relations between state and private sector expenditures on education and health, the quantity results of estimation of error correction model are presented in Table (6).

The results showed that the relationship between health expenditures of private and state sectors and general education expenditures at error level 5% is not significant but the relation between private education expenditures, capital and labor force was not significant. As error correction coefficient showed adjustment speed, it is expected that in each period about 55% of non-equilibrium is adjusted.

Table 6. The quantity results of estimation of error correction model

Explanatory variables	Estimated coefficients	t-statistics value	(prob)
DLGH	-0.0668	-1.191	0.242
DLPE	0.0719	3.0481	0.004
DLGH	0.0265	0.5796	0.566
DLPH	-0.00516	-0.2030	0.840
DLCA	0.2121	6.2266	0.000
DLLF	0.2945	2.7592	0.009
DC	2.1397	2.5099	0.017
ECM(-1)	-0.549	-7.4534	0.000
$D.W$=1.95	$F(7,34)=17/66(0.000)$		$\overline{R}^2=0.73$

Source: Researcher calculations

Discussion and Conclusion

In the present study, the effect of private and state educational and health care expenditures on economic growth of Iran during 1965-2011 by ARDL method was investigated. The results showed that the effect of state education expenditures on economic growth is negative. It is not expected that previous trend of state

education expenditures have significant effect on economic growth. However, the effect of private education expenditures on economic growth of Iran was positively significant. Indeed, educational expenditures of private sector were in line with the economic activities of the market. In addition, the results showed that the effect of state health expenditures on economic growth was positive and significant while the effect of economic expenditures was negative but it was not significant statistically. It seems that private sector health on health activities of government compared to education activities of government was more successful to develop the economic growth in Iran. It is recommended that instead of the emphasis of government on quantity increase of educational expenditures and the increase of the number of learners, the quality level and the increase of relationship between education and specialization of the periods with the need of manufacturing and services sectors were emphasized and educational expenditures of the state were demand-oriented. Regarding the positive role of government in health, it is recommended that government continued his support role in health field in the society as the past and via making the rules and supporting the social security, besides improving the access quality to health services in city and village, develop these activities.

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