



The Effect of Government Size and Intelligence Quotient (IQ) on Life Satisfaction in Iran

Mehdi Fadaee^{1*}, Mansour Jahanbakhsh²

¹ PhD and Assistant Professor of Economics, Payame Noor University, Iran.

² PhD student of Public Administration, Faculty of Humanities, Azad University of Isfahan, Iran.

*Corresponding Author

Abstract: Recent studies have indicated that psychological factors like cognitive ability have a significant role in experiential modeling of life satisfaction. Additionally, government size has a significant effect on life satisfaction index (LSI) in Iran. This study examined the effect of IQ, government size, and government inequality on life satisfaction in Iran from 2002 to 2016 using Johansen method. The results showed that government size had a negative and significant effect on LSI; i.e., if the government size increased by one percent, assuming the other factors being constant, LSI decreased by 0.002%. Additionally, the results showed that IQ had a positive and significant effect on LSI; that is, if IQ increased by one percent, assuming that other factors were constant, LSI increased by 89.9%. In other words, with an increase in IQ, life satisfaction increased in Iran. Gini coefficient had a negative and significant effect on LSI; i.e., if Gini coefficient increased by one percent, assuming the other factors being constant, LSI decreased by 0.025%. In other words, with an increase in Gini coefficient and the inequality of income, life satisfaction decreased in the country.

Keywords: IQ, Government size, Life satisfaction, Gini coefficient, Iran

JEL Classification: C01, H53, I30.

INTRODUCTION

Over the past decades, the improvement in living standards has allowed the scientists to review the significance of guiding economic growth policies. Since living in societies has a positive relationship with income and life satisfaction, life satisfaction increases over time, because the average income increases over decades (Easterlin, 1974). Moreover, examining more studies has shown that the phenomenon “Money does not buy happiness” exists in developed and low-income countries (Di Tella & MacCulloch, 2008). They argue that produced economic wealth due to the reduction in resources, environment destruction, and increase in income inequality within the community, leads to a decline in health. Thus, the main literature on subjective well-being (SWB) has expanded. However, a scholarly research that is still in its infancy, is the relationship between government activities and life satisfaction.

Intelligence, education and knowledge expand human perspectives, enable him to understand the needs of tolerance norms, deprive him from following the teachings of extremism and increase his capacity to choose rational choices (Lipset, 1960). Thus, precise controlling (sociopolitical) may prevent the malicious use of bureaucrats and lead to increased productivity and people's happiness (Bjørnskov, Dreher and Fischer, 2007). Hence, in countries with high IQ, public policy is more consistent with voter preferences. It is important to

clarify that there is an evidence that smart voters tend to select leaders with cognitive abilities of about 20 IQ points higher than their general voters. As efficient government depends on a public that can process complex information and participate actively in politics, one can predict that the public's effect on life satisfaction depends on the level of national intelligence. Moreover, the studies have shown that this information is, on average, related to the ruling elites, the economic success, and ethical standards in the priorities of government (Simonton, 2006). For instance, the governments of countries with higher IQs tend to allocate less resource to military spending, usually approve environmental agreements, are more likely to invest in healthcare and give more importance to minority people's share (Obidkinova, Nazarov, Salahodjaev, 2016). This study examined the effect of IQ and government size on life satisfaction in Iran during 2002-2016.

The main hypotheses are as follows:

1. The government size has a positive and significant effect on life satisfaction in Iran.
2. IQ has a positive and significant effect on life satisfaction in Iran.

Secondary hypotheses:

1. Gini coefficient has a negative and significant effect on life satisfaction in Iran.
2. Inflation rate has a significant negative effect on life satisfaction in Iran.

Theoretical basics and literature review

There have no studies conducted in Iran on the government size and life satisfaction. In the field of foreign studies, some studies have reported a negative or weak relationship between government size and SWB, whereas some others have shown that government size increases life satisfaction.

These studies are due to a continuous debate between neoclassical standard economic theory and public choice theory. The neoclassical theory believes that the public sector eliminates the market failure through the production of important public goods and the legal framework without having an efficient or functional economy (Blankart, 2003). On the contrary, public-choice theory argues that officials, executives and bureaucrats as well as politicians tend to use their own personal benefits. Thus, the major public sector may create excessive budget and excessive interference in the economy and adjust it. In addition, in order to re-select the bureaucrats, they may search the inappropriate resources, search for populism, and meet the interests of lobby groups, thereby reducing the national level of the SWB.

In the meantime, a separate part of literature in psychology states that intellectual capital is a significant part of economic development (Lynn & Vanhanen, 2012), and has direct positive consequences on life satisfaction (Veenhoven & Choi, 2012). For instance, Kanazawa (2014) reported that general intelligence in childhood is positively related to a stable life in happiness. In a similar method, using data from 81 countries and 50 US states, Nikolaev and Salahodjaev (2016) showed that intelligence leads to more equal distribution in society. In addition, at the macro level, social intelligence helps economic growth (Ram, 2007), the quality of state institutions (Kanyama, 2014), good governance, environmental protection (Obydenkova, Nazarov, & Salahodjaev, 2016) and the wealth of nations (Rindermann, Kodila-Tedika, & Christainsen, 2015).

Nonetheless, the intermediary role of intelligence is another factor in the relationship between intelligence and SWB, not examined mostly by the existing studies. For instance, extensive studies have indicated that the countries with higher IQs are connected with efficient bureaucracy and a low level of corruption (Potrafke, 2012). However, other researchers have confirmed significant relationship between these variables and SWB. Thus, the effect of bureaucracy on the health of citizens may vary according to the levels of cognitive ability of countries. Moreover, there may be a strong interdependence between the size and efficiency of bureaucracy and national intelligence. For instance, the ruling elites in cognitive societies could preserve political rights and civil liberties and strengthen the relative power of ordinary citizens (Rinderman et al., 2015). In turn, more intelligent people, actively involved in political processes, are more likely to prevent ruling elites from expropriating resources for personal gain on the other, not benefiting from wealth creation for the benefit of

the community. Intelligent voters control fraudulent bureaucrats and inadequateness and force them to evenly distribute wealth in the community.

As Bjorenskov et al. (2007) have stated, "it creates a more effective government, less taxpayer money is lost, and thus exchange of taxes and public spending become more efficient according to the citizens". Thus, it is assumed that the effect of government size on SWB depends on the positive effect of the public sector, the degree of political accountability, and the competition and civil participation of citizens, created by the levels of national intelligence.

The government size in Iran economy varies widely according to different definitions. The central government, the general government and the public provided three different definitions and sizes that differ from the role of government in the Iranian economy. In Iran, the size of the general government includes municipalities and social and insurance organizations, besides the central government institutions because of the incapacity of the province's income and expenditure system. The centralization policies implemented for long in the country, and the reporting and statistical weaknesses, the difference of the size of the central government is not much different from that of the centralized government. However, given the size of the volume of state-owned government activities done through corporations, banks, state-owned corporations and non-governmental public institutions, the size of the public differs dramatically from the size of the central government and the general government. Moreover, the size of the public sector in Iran in international comparisons differs significantly from the size of the public sector of other countries. Furthermore, given the statistical weakness, there is little information on the quantity and quality of the expenditure of public non-governmental organizations. In the present report, besides providing criteria for the size of the government at three levels of central government, the public administration, and the public sector, a measure of government intervention in the economy through legislation and, in other words, non-budgetary interventions of the state in the economy has been provided (Afshartous & Preston 2011).

There are two general perspectives about the effect of government size on economic growth among economists. According to a group of economists, the size of a larger government may reduce economic growth due to inefficiencies in the nature of the government. Another group considers a significant role for the government in the process of economic growth. According to the recent view, the government has a significant role in eliminating the conflicts between social and private interests. The government presents public goods such as transportation, communication and infrastructure, and has the necessary authority to remove or regulate negative externalities. Thus, the bigger government may accelerate economic growth.

The results of empirical studies confirmed both of the rival views. For example, Gemel, Landar, Saunders, Falwi and Gimel, Barroff Roemer, Alexander, Easterly and Robllo, Gosse, Tanin, Foster, and Henreksono and Amir Khalkhali have concluded that the government has a damaging effect on economic growth. Among them, people like Barrow (1991) concluded that this result in a possible non-linear relationship between government size and economic growth, whereas other studies such as Robinson, Ram, Gersman, Helms and Hatton, Levine and Rinell, Caras and Ghali have concluded that the government accelerates economic growth.

In the study by Gupta, government consumption in developed countries has a negative relationship with economic growth and in developing countries, it has a positive relationship with economic growth. Divarjan et al. reached an opposite conclusion. Gerber and Tullock estimated the different equations for different groups of countries and concluded that government consumption in Asian countries is positively correlated with economic growth, whereas this relationship is negative for other countries.

Gopna concluded that the effect of government consumption on economic growth depends on how government defines its consumption. Lin concluded that the government size in developing countries in the short term has a positive effect on economic growth, whereas this relationship is not in the medium term. Finally, Karmandi, Mighouri and Agil et al. concluded no significant relationship between government size and economic growth. The results of studies in Iranian economy on the effect of government expenditure on economic growth have resulted in different results. Gholizadeh (2004) reviewed efficient government size based on the general

government budget during 1959-2001. The results of that study showed that government expenditure is of the most important variables affecting economic growth in the country, and the efficient government size ranges from 23.1 to 23.7%. Asali (2004) stated that the relationship between the growth of national income and current expenditures in the state budget in the proposed conditions in the model reduces investment, production and demand for labor. Nili and Moslehi (2006) showed that the government size in the general budget (ministries and state institutions) as well as the government size in the field of enterprises (corporations, banks and state-owned corporations) separately in terms of two reverse U curves is related with economic growth. Non-budget interventions have a direct effect on growth. This study showed the lack of optimal budget and non-budget activities in Iran's economy.

Using Iranian time series data, we experimentally examined the relationship between state intervention, intelligence and life satisfaction in Iran. Examining the effect of government intelligence and size on life satisfaction significantly helps the social sciences. Here, the paper examined the relationship between government and SWB influenced by an average level of intelligence across the country. Our proxy for intelligence, the national average IQ was from the study by Lynn and Vanhanen (2012). To measure the government size, the government's final consumption expenditure as one percentage of Gross Domestic Product (GDP) was used. Given the existing literature, it was expected that intelligence may have a direct and positive effect on SWB. Similarly, the increase in government size had a positive relationship with life satisfaction. Most importantly, the marginal effect of the legitimacy of government intervention in the economy showed that the level of national intelligence reduced the relationship between government size and life satisfaction.

Experimental model of the research and data

The tested hypothesis was whether the effect of government size on life satisfaction changes with the level of intelligence or not. The dependent and independent variables have been shown in the table below.

Table 1: definition of variables

Variable Type	English name	Persian name
The dependent variable	<i>ls</i>	Lie satisfaction
independent variable	<i>gs</i>	Government size
independent variable	<i>gdp</i>	GDP
independent variable	<i>gini</i>	Gini coefficient
independent variable	<i>iq</i>	IQ

Our measurement of life satisfaction was from the World Report of Happiness by Helliwell, Layard, and Sachs (2015). Life satisfaction in this study was measured by answering the question of the Cantril's ladder question: Please imagine a ladder, with steps from 0 to 10 at the top of the page. The top of the ladder showed you the best possible life, and the bottom showed the worst life. At what stage of the ladder do you personally feel you are now? Their studies were based on about 3000 respondents in each of more than 150 countries.

As an index of measuring government size, the public utility cost benchmark to GDP was utilized. Government general expenditure (formerly public consumption) includes all current government expenditures for purchasing goods and services (including compensation). Moreover, this includes the highest costs of defense and national security. In order to reduce the effect of economic cycles, the average consumption of government in 2010-2015 was considered. In our study for Iran, higher values showed a larger public sector in Iran. East Timor had the largest state size, whereas Zambia had the smallest.

Our important variable was intelligence determined by the national IQ. The data was collected from Lin and Vananen (2012). In the first study by Lin and Venanen (2002), specific studies have been conducted in each country where intelligence tests have been used. According to the results of these studies, they estimated the

national IQ 81 for Iran. In later studies, Lin and Wannanen (2012) collected intelligence estimates for 192 countries. In Table 1, we clustered the member countries with the mean index of cognitive abilities and observed that life satisfaction increased with an increase in IQ. We introduced GDP per capita as a symbol of economic development and inserted a control variable with a positive relationship with intelligence (Meisenberg, 2012) and life satisfaction (Kacapyr, 2008). Moreover, per capita GDP was related to improved living standards, higher wages and technological advances. This can serve as a catch-all variable. We used Gini coefficient index to control the effect of income inequality. Gini index measures the distribution of income (or, in some cases, consumption expenditure) among individuals or households in the economy among the deviation from an equal distribution.

Overall, we estimated the following model with the above variables:

$$LS = \alpha_0 + \alpha_1GS + \alpha_2IQ + \alpha_3(IQ * GS) + \alpha_4GDP + \alpha_5GINI$$

Here, LS shows life satisfaction, GS government size, IQ intelligence, GDP Gross Domestic Product for interaction levels for government size and intelligence, economic development, and GINI income inequality.

- **Estimating the results**

- ✓ **Determination of the stagnation degree of the variables**

There are many methods to evaluate model estimation in econometrics. There are ordinary least squares (OLS), Johansen, autoregressive distributed lag (ARDL) methods and so on for testing which one to use, single root test should be performed. If the variables be resilient, the least squares method can be used, but if they be not resilient, methods other than OLS, such as Johansen or ARDL should be used. If all of them be resilient degree one, Johansen may be used, and if some be degree one and others degree zero, ARDL test could be used.

Prior to estimating the model, to determine the estimated coefficients of the model, one has to determine the resilience of the variables. In the present study, the resilience test of the model variables was performed using Augmented Dickey-Fuller (ADF) test. In doing so, for each of the variables, the unit root test of ADF was performed at the variable level from the normal state, with the extrinsic variables of the cross-section and without the time process. Eviews software has provided the possibility to select the number of optimal interruptions to eliminate consecutive solids in the waste, so that by applying a maximum user-interruption interval, Eviews software determines the number of interruptions with the help of the Akaike, Schwarz-Bayesian, and Hannan–Quinn criteria. In the current study, the maximum length of the lag applied to determine the optimal lag length was 4, and the criterion for determining the length of lag was Schwarz-Bayesian criterion. Stagnancy test was performed for determining the first time difference values of the time series model variables. The results of this test are given for all variables of the model in Tables (2) and (3) for the data level and their first order difference, respectively.

Table 2: ADF test results on the level of variables

Variable	The model with y-intercept and no trend		The model with y-intercept and trend	
	ADF statistic	Critical value	ADF statistic	Critical value
<i>ls</i>	-0.21	2.92	-0.85	-3.51
<i>gs</i>	-0.11	2.92	-1.52	-3.51
<i>gdp</i>	-1.11	2.92	-2.21	-3.51
<i>gini</i>	-0.35	2.92	-1.32	-3.51
<i>iq</i>	-0.75	2.92	-2.05	-3.51

Source: Research findings

According to Table (2), it could be concluded that all data were not at resilient level, as the absolute magnitude of ADF statistic was smaller than the critical values. Thus, the null hypothesis of non-stagnation was not rejected. Therefore, the data were not stagnant. In other words, they were not I (0) and it should be checked whether it was I (1) or not. In doing so, one should use first-order difference data.

Table 3: ADF test results on the first-order difference of variables

Variable	The model with y-intercept and no trend		The model with y-intercept and trend	
	ADF statistic	Critical value	ADF statistic	Critical value
<i>ls</i>	-4.51	2.92	-5.85	-3.51
<i>gs</i>	-4.22	2.92	-7.75	-3.51
<i>gdp</i>	-8.52	2.92	-6.85	-3.51
<i>gini</i>	-6.84	2.92	-8.98	-3.51
<i>iq</i>	-6.42	2.92	-5.65	-3.51

Source: Research findings

Through repeating ADF test for the first difference, it was determined that these variables were made stagnant after one time of differentiation, and the null hypothesis, stating the difference having unit root of the data difference and non-stagnation was rejected, and the alternative hypothesis stating stagnation was confirmed at 95% confidence level. Thus, these variables were stagnant of the first order I (1).

The result of the stagnation test was that all the variables were stagnant of first order I (1).

As all variables were I (1), one could not use OLS method to estimate relationships. Thus, according to econometric models, one can use Johansen-Juselius model to examine the model's estimation and the co-integration between variables.

✓ **Johansen-Juselius test**

The previous section showed that all variables were first order stationary at 95% confidence. Therefore, as all variables were I (1), Johansen-Juselius method can be used to examine the co-integration (long-term relationship) of the variables.

In the co-integration test, maximum Johansen-Juselius likelihood, in addition to testing the coexistence of co-integration between the variables, it tests the number of long-run relationships (r), if they exist. As this stage, the optimal number of interruptions should be determined in VAR model based on the number of interruptions, λ_{Trace} test statistic or the maximum eigenvalue λ_{max} test statistic can be used to determine co-integration vectors.

Using Eviews software based on Schwarz-Bayesian criteria - and for the case where cross-section is limited and there is no trend - the optimal lag interval for software selection using this criterion was selected.¹

In order to decide on the cointegration vector pattern and the short-run error correction model, it was needed to consider different models for the inclusion of cross-section of the variables and trend. In practice, the lack of cross-section and trend in the short-term and long-term functions, as well as the time trend in the short-term pattern in the long-run relationship, is less likely. Here, according to the initial equation,² the pattern of cross-section was limited and lacked the trend. The necessity of entering definite variables (cross-section) in the pattern has been tested together with the determination of the number of co-integration vectors to decide on the choice of one of Johansen's patterns (Johansen's equation has four patterns) (Andersen and Dalgaard, 2013).

The summary of the results for 95% confidence level is summarized in Tables (4) and (5).

¹Eviews software selects this optimal lag internally and considers it in the model's estimation.

²The main equation of the second chapter should be estimated.

Table 4: Quantities of λ_{Trace} test statistic for determining the number of co-integration vectors

Null hypothesis	Eigenvalue	λ_{Trace} statistic	5% critical value	Probability
Zero co-integration vector	0.89	155.6	95.7	0.00
At least 1 co-integration vector	0.62	80.7	69.8	0.00
At least 2 co-integration vector	0.48	48.3	47.8	0.04
At least 3 co-integration vector	0.30	20.2	29.7	0.12
At least 4 co-integration vector	0.25	10.3	15.4	0.25

Source: Research findings

Table 5: The quantities of λ_{max} test statistic for determining the number of co-integration vectors

Null hypothesis	Eigenvalue	λ_{Trace} statistic	5% critical value	Probability
Zero co-integration vector	0.89	74.04	40.07	0.00
At least 1 co-integration vector	0.62	32.4	33.8	0.07
At least 2 co-integration vectors	0.48	22.05	27.5	0.21
At least 3 co-integration vectors	0.30	15.8	21.1	0.23
At least 4 co-integration vectors	0.25	9.79	14.2	0.22

Source: Research findings

According to the trace test, the result of the λ_{Trace} test was 155.6, which was rejected by the critical value of 5%; i.e., 95.7, and the null hypothesis of no co-integration vector was rejected and the alternative hypothesis, more than one co-integration vector, was accepted. In the second step, λ_{Trace} test statistic 80.7 was obtained, which was more than the critical value 5%; i.e., 69.8, and again the null hypothesis, at least one co-integration vector, was rejected. In the third step, λ_{Trace} test statistic 48.3 was obtained, which was more than the critical value 5%; i.e., 47.8, and again the null hypothesis, at least two co-integration vector, was rejected. In the fourth step, λ_{Trace} test statistic 20.2 was obtained, which was less than the critical value 5%; i.e., 29.7, and the null hypothesis was not rejected-thus there would be exactly three co-integration vectors. Now, if this operation was repeated for a test and the maximum eigenvalue, then one co-integration vector could be obtained.

Now, using Eviews software and Johansen method, these three co-integration vectors were estimated. According to the result obtained, selecting the following relation as the final function was confirmed.

Table 6: The results of the long-term normalized relationship of Johansen-Juselius

Variables	LS	GS	IQ	IQ * GS	GDP	GINI
Normal coefficients	1	-0.002	0.89	0.26	0.40	-0.025
Standard error	-	0.0002	0.057	0.016	0.17	0.009

Source: Research findings

According to the above equation, the final model has been corrected as follows:

$$LS = -0/002GS + 0/89IQ + 0/26(IQ * GS) + 0/40GDP - 0/025GINI$$

According to Johansen co-integration equation, all variables of the model were statistically significant according to the standard error (shown in the third row) and the coefficients of the variables.

The size of government size variable was negative and equal to 0.022, showing that the government size had a negative and significant effect on the LSI; i.e., if the size of the government increased by one percent,

assuming that other factors were constant, LSI decreased by 0.002%. In other words, the increase in government size and interference of economic affairs, life satisfaction in the country decreased, which was due to rents in the public sector.

The sign of IQ variable was positive and equal to 0.89, showing that IQ had a positive and significant effect on LSI: if IQ increased by one percent, assuming that other factors were constant, LSI increased by 0.89%. In other words, with an increase in IQ, life satisfaction increased in the country, as well.

The sign of the national production variable was positive and equal to 0.40, showing that national production had a positive and significant effect on LSI: if the national production increased by 1%, assuming that other factors were constant, LSI increased by 40%. In other words, with an increase in national production, the level of life satisfaction increased in the country.

The sign of Gini coefficient was negative and equal to 0.025, showing that Gini coefficient had a negative and significant effect on LSI: if Gini coefficient increased by 1%, assuming that other factors were constant, LSI decreased by 0.025%. In other words, with an increase in Gini coefficient and income inequality, life satisfaction decreased in the country.

Conclusions and suggestions

No studies have been conducted in Iran on the government size and life satisfaction. In the field of foreign studies, some studies have reported a negative or weak relationship between government size and SWB, whereas some others have shown that government size increases life satisfaction.

The study examined the effect of IQ, government size, and state inequality on life satisfaction in Iran over the period from 2002 to 2016 using Johansen method.

The results showed that government size had a negative and significant effect on LSI; i.e., if the government size increased by one percent, assuming the other factors being constant, LSI decreased by 0.002%. Additionally, the results showed that IQ had a positive and significant effect on LSI; that is, if IQ increased by one percent, assuming that other factors were constant, LSI increased by 89.9%. In other words, with an increase in IQ, life satisfaction increased in Iran. Gini coefficient had a negative and significant effect on LSI; i.e., if Gini coefficient increased by one percent, assuming the other factors being constant, LSI decreased by 0.025%. In other words, with an increase in Gini coefficient and the inequality of income, life satisfaction decreased in the country.

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