Journal of Money and Economy
Vol. 9, No.1 Winter 2014

Decomposition of Quality Growth in the I.R. of Iran during 1971-2013

Bastanzad, Hossein [¯] and
Valipour Pasha, Mohammad[¯¯]

Received: 2/11/2015 Approved: 5/24/2015

Abstract

Quality Growth Index (QGI) is affected by two sets of combined-structural and social indicators. Structural indicator contributes to achieve the main target of sound-sustainable-competitive output growth. By the way, the sound output growth should enhance social-public services and living standards. Although QGIs are weightedly computed based on different scenarios, the trend of the QGIs and coefficient of variation of the QGIs indicate the robustness of results. The correlation among QGI and social sub-components highlights a positive relationship between QGI and school enrolment, per capita income and public spending on education and health. The result of co-integration model indicates that higher government size and devaluation of local currency have evidently exacerbated QGI. Meanwhile, openness and inflation underscore the positive long-run impact over QGI.

[¯] Economist, Money and Foreign Exchange Department, Monetary and Banking Research Institute of the Central Bank of Iran. E-mail: hbastanzad@gmail.com
[¯¯] Economist, Banking Department, Monetary and Banking Research Institute of the Central Bank of Iran. E-mail: Pashaptl@gmail.com

Vector error correction equation outlines that about 84 percent of a short-term shock to the co-integrating vector will be absorbed in the first period. In this context, the impulse response of the QGI to the exchange rate and government size shocks are diminishingly and negatively permanent while the response of the QGI to the openness shock is significantly and positively permanent.

Keywords: *Quality of growth, structural indicators, social indicators*

JEL Classification*: O40, O55, I10, I20, I32*

1. Introduction

Quality growth which is evidently influenced by the social and structural components could be gradually improved by the sound policy arrangement and macroeconomic stability. Structural components are able to enhance growth quality through different channels including through diversification of output, convergence to the global economy, strengthening of growth as well as growth stability and solidarity. In this context, social indicators should also improve while the output is getting better. Life expectancy, income inequality and public spending on education and health which are positively recognized as prudent-growth externalities should experimentally be enhanced to achieve the main target of sound growth quality. Living standards, infant mortality and school enrollment are the other social indicators which are expected to influence at the same time. External sustainability along with price stability is also crucial to succeed the social targets. Anyway, the growth should be basically accompanied by a better social spillover and solid structural fundamentals.

Long-run sustainable growth is basically expected to enhance targeted public services and social indicators (Todaro 1994). In this regard, although Thomas et al. (2000) highlighted the increasing importance of improving governance, managing risks, sustaining natural resources and investing over public service as crucial steps to build up growth quality, there are also a group of academic-comprehensive literature over the requirements of sustainable growth based on solid fundamentals (Dollar et al., 2013). In this study, the quality of growth is historically considered based on two groups of social and fundamental sub-components. Meanwhile, the impact of macroeconomic-performance indicators over the quality growth index is technically examined for four decades.

The remainder of the paper is structured as follows: The next section introduces an overview over literature. The technical approaches and macro indicators which are applied to calculate growth quality are discussed in the third section. The data reference and period of study is explained in the fourth section. The calculation results and concluding remarks are given in the last two sections.

2. Literature Review

Sustainable-noninflationary growth is the main goal in the macroeconomic environment which is affected by the fundamental indicators including output stability, solidarity, diversification, strengthening as well as competitiveness. Social indicators which are presumably expected to be influenced by the output growth should be also driven by the sound income distribution, life expectancy, job opportunities as well as higher ratio of public health and education expenditures to GDP (Gable 2012, Schultz 1999). In this regard, two sets of the fundamental and social indicators have statically-weightedly contributed to explain quality of growth. Meanwhile, demand decomposition, sectoral total factor productivity (TFP), engine of growth should also be brad-based to enhance growth quality resiliency against cyclical-temporary growth (Papageorgiou and Spatafora, 2012). Thus, different aspects of growth quality are materialized into a composite indicator which is noted Quality Growth Index (QGI). An inclusive QGI should be necessarily based on reliable structural-achievements and social-oriented goals. In this regard, although sustainable-competitive-noninflationary growth has a crucial role to improve social development, it does not necessarily lead to poverty alleviation and income equality. Studies have historically indicated that prudent macroeconomic policy, efficient institutional capacity, and targeted social spending along with growth stability could contribute together to reduce unemployment, inequality and poverty (Dollar et al., 2013, Stern, et al., 2014). Ultimately, sound output

growth and QGI should be gradually associated with the better social welfare and living standards as it was evidently observed in Sub-Saharan Africa (Martinez and Mlachila 2013).

Although two sets of social and fundamental indicators technically contribut to compute QGI, there is also periodical interrelationship between social and fundamental composite indicators given the fact that the QGI is a multidimensional phenomenon (Bills and Peter, 2000). Moreover, macroeconomic condition influences QGI through price and financial stability, government size, competitiveness as well as governance which are examined in the study (Mlachila, et al., 2014).

Macroeconomic stability is also considered as a key feature to preserve growth sustainability through an Extreme Stability Growth Model for developing economies which recognizes the effective impact of composite index (inflation, budget deficit, and real exchange rate) on the output growth while highlighting the role of well governance, global integration, and higher investment returns as well [Sirimaneetham, Vatcharin, Temple & R. W. Jonathan, (2009)]. In the same study, Gerry, Christopher J., Lee, Jong- Kyu & M. Mickiewicz, Tomasz, (2008) underscore that output growth is significantly influenced by the business climate, governance and institutional efficiency in the transitional economies. Macroeconomic instability is also attributed to inflation, real exchange rate depreciation, deviation in the terms of trade and the ratio of budget deficit to the GDP in the economy of Iran (Khalili and Ramzanpour, 2001). The relationship between output growth, investment and investment return is evidently affected by the economic stability which would be simultaneously hampered by the policy inconsistencies in the economy of Iran during 1963-2000 (Gorji and Madani, 2003). Macroeconomic instability shrivels human development and consequently economic growth in the selected Asian countries which should be wisely pondered by the economic authorities (Sameti, Behnoud, 2012).

3. Approach and Indicators

The quality of growth index is technically calculated by two sets of geometrical weighted-average of social and fundamental composite indicators. In this context, both social and fundamental composite indicators are also computed by the arithmetical average of their subcomponents. Given the fact that, every single subcomponent is measured with different scales, they should be statistically harmonized to be comparable. The technical approaches which are applied to unify the scale of subcomponents are comprised normalization, principal component and Min-Max. The QGI is experimentally influenced by the macroeconomic-state variables which are statistically applied via Vector Auto-regression (VAR) model.

A. Fundamental indicators of the QGI

Growth Sustainability as an indicator of output growth quality is expected to improve living standards via higher per capita GDP and an enhancement of job opportunities which alleviates poverty as well [Dollar and Kraay, (2002); Dollar et al. (2013)]. In this context, a sound output growth interactively enhances the human capital as an accelerator constituent which also streamlines the persistent growth of GDP in the long run trajectory [Behrman et al. (1999); Ames et al. (2001); Guillaumont and Kpodar, (2006)]. Diversification of products along with export expansion enriches output growth resilience against contingent cyclical shocks. Henceforth, the competitive economies which augment openness evidently experience higher total factor productivity as well as lower growth vitalities and consequently growth sustainability [Papageorgiou and Spatafora, (2012)].

To compute a composite-fundamental indicator which positively influence QGI, the average of five state variables is calculated to explain the output growth stance, including stability, strength, diversification, competitiveness, and solidarity of growth which are respectively measured by the inverse of coefficient of variation, per capita income, Herfindahl-

Hirschman Index (HHI) of the sectoral value added[1], ratio of net external demand to GDP as well as ratio of machinery investment to GDP. The QGI is also affected by the composite-social indicator which is experimentally computed through the arithmetic-average of life expectancy, income inequality and the share of public health and education spending in GDP which are key vehicles to improve living standards and reduce poverty.

Descriptively, growth stability is statistically computed by the ratio of mean to the standard deviation of GDP growth (inverse of the coefficient of variation for output growth). The higher ratio indicates more stability in the growth period which might improve panic and social indicators. Strengthening of the output growth is usually highlighted by the per capita GDP which should be calculated based on purchasing power parity approach (PPP) for the economies with high volatility of nominal exchange rate. However, growth strengthening is an important course to reduce poverty in the medium and long term while enhancing QGI. Growth diversification is also an indicator to explain the sound QGI which is technically computed by the HHI method. Higher amount of the HHI outlines centralization (concentration) of the value added in specific sectors. In this context, engine of growth should be experimentally diversified to enhance the growth quality resiliency against contingent cyclical shocks while maintaining the long-run growth stability. Open economies are influenced by the spillover from the global trade and international financial transactions. Hence, they benefit from lower external demand distortions than domestic ones. Export led growth economies have evidently reached more stable growth which is underscored by the ratio of net external demand to the output as an indicator to explain outward orientation of growth. Meanwhile, external orientation of growth should usually enhance productivity owing to the competitive

1. Another experimental proxy is the HHI of sectoral export basket; given the fact that export diversification is strongly correlated with output diversification (Papageorgiou & Spatafora, 2012).

business environment, global knowledge transformation, easy access to the world financial resources as well as modern-competitive technology (Diao et al., 2006). Ultimately, growth solidarity which is mathematically measured by the ratio of machinery investment to GDP is a key indicator to explain QGI and potential production capacity.

B. Social indicators of the QGI

Sustainable prudent economic growth empirically improves social indicators including decent educational opportunities, health care services, income distribution and life expectancy which totally develop human capital building [Schultz, (1999)].

Sound output growth is basically expected to influence social-welfare indicators and living standards in different income groups. Hence, there are a set of social indicators which are weightedly contributed together to build QGI including life expectancy, Gini Coefficient, school enrolment, infant mortality as well as ratio of public health and education expenditure to GDP. They have obviously outlined the share of human capital and living standard in the sustainable-economic growth. In other words, sound social indicators are keys to achieve the target of better QGI. Education and health expenditure contribute together to enhance living standards through improving life expectancy, reducing infant mortality and ameliorating human capital.

C. How to compute QGI

The QGI is theoretically explained by two sets of composite indices which express structural and social impact of sustainable prudent output growth. Given the fact that the social and structural variables are measured by different metrics, the Min-Max approach as a parametric method is statistically utilized to integrate the individual effect of variables [Mlachila, et al. (2014); Klugman et al. (2011)] although the disadvantage of other parametric methods are articulately discussed in the following section.

There are three main methodologies to calculate QGI including principal components, normalization and Min-Max method which are totally contributed to construct one index:

-Principal Component Analysis

Principal component analysis is a statistical approach that uses an orthogonal transformation to convert a group of variables which are possibly correlated to a set of values. The new set of values should statistically be linearly uncorrelated variables which are called principal components. The number of principal components is at most equal to the number of original variables. The first principal component has the largest possible variance, and the next components in turn have the highest possible variance under the constraint which are orthogonal (i.e., uncorrelated with) to the preceding components. The principal components are orthogonal because they are the eigenvectors of the covariance matrix, which is symmetric. Given the fact that, the social and structural variables which are applied to construct QGI are in different units (scales) and PCA[1] is sensitive to the relative scaling of the original variables, the PCA is not used in the study. The transformation process of different series might also cause missing information which leads to an overshadow-economic elaboration[2]. Thus, the alternative approaches should be technically reconsidered to compute an efficient-inclusive-composite indicator for specifying the QGI.

- Normalization and MIN-MAX Approaches

The variables which are statically underwritten to compute social and structural composite-indicators are obviously measured in different metrics so they should be standardized by the Z-score. Z-score is calculated by the ratio of subtraction every single variable from its mean to standard deviation.

1. Principal Component Analysis
2. The PCA is not considered as any sort of distribution for the given variables.

In this regard, Z statistic is a centered-reduced normal distribution with zero mean and unit standard deviation in case the variable is normally distributed. Given the fact that, all the variables have been statistically converted to the same metrics by normalization, they can be applied arithmetically or geometrically to compute single-composite indicators. To adjust the impact of outlier variables on the Z-score distribution, the outlier variables could be selectively smoothed or the alternative methodology -Min-Max approach- can be replaced mainly because of the big number of outliers. Min-Max approach converts the eight structural and social variables in comparable indicators from 0 to 1 while the deviations also smooth significantly. Thus, structural and social composite-indicators are consequently calculated by the geometrical average of converted-explanatory variables.

$$z = \frac{(x-\mu)}{\delta} \quad (1)$$

$$D = \frac{(x-x_{min})}{(x_{max}-x_{min})} \quad (2)$$

Although social-set variables are experimentally influenced by the structural-set variables, both sets would contemporaneously contribute to compute composite-weighted indicator for QGI via geometrical average approach. The relative importance of social and structural-composite indicators in the QGI is technically defined based on different scenarios to examine QGI robustness. By the way, the causality and endogeneity between structural and social indicators should also be tested to characterize the impact of structural development on social stance.

$$QGI = \sqrt[j]{STI^{\alpha}.SOI^{\beta}} \quad j = \alpha + \beta \quad (3)$$

j=2 if α=β=1; j=4 if α=3, β=1; j=8 if α=5, β=3 (4)

QGI is evidently affected by different macroeconomic-state variables including foreign exchange rate as a nominal anchor which reflects inflation expectation and financial stability condition; headline inflation as a key variable which influences financial flows between real and financial sectors (Tobin 1969); openness as an indicator which outlines macroeconomic competitiveness and integrity with the global economy; government size also as an indicator to monitor macroeconomic efficiency and private sector-led growth; and finally, contract intensive money as an indicator of well-governance which highlights security of the property rights to proceed the private sector contracts. The relationship between QGI and the state-variables is statistically estimated by VAR approach. The impulse response and variance decomposition are also examined to highlight the impact of explanatory variables on the QGI deviations.

4. Data

The annual data which are applied in the paper are from 1971 to 2013. They are also drawn on from the data bank of the Central Bank of Iran Economic Time Series and World Bank Development Indicators Database. To characterize the impact of short-term fluctuations of explanatory variables over the relationship of social and structural indicators, the information is also basically categorized in five different periods.

Chart 1: Growth quality composite-indicaor by episode

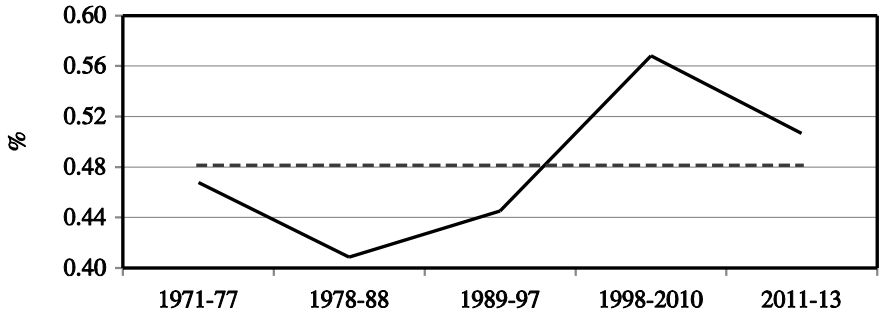


Chart 2: Social, structural and growth quality composite-indicaor by episode

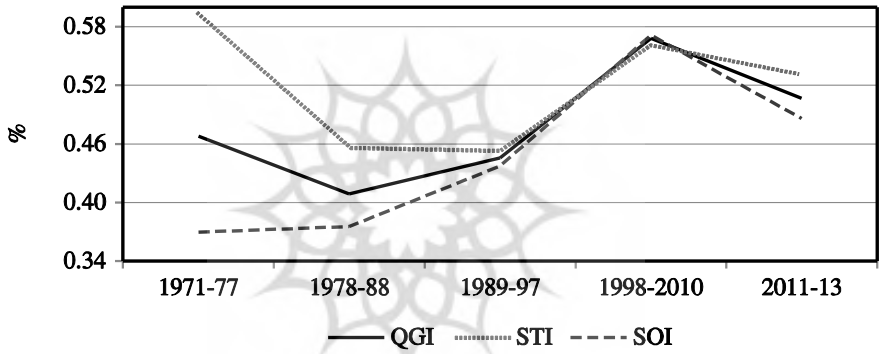


Chart 3: Growth quality composite-indicaor by episode with different weights

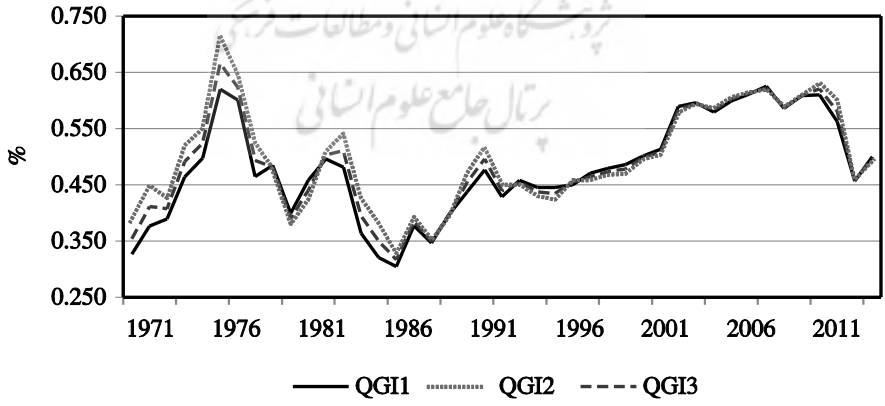
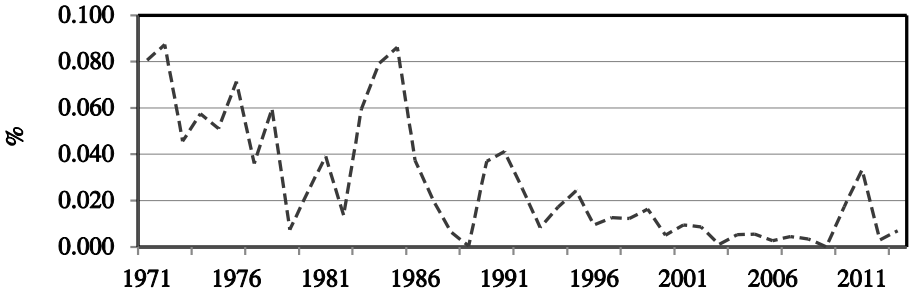


Chart 4: Coefficient of variation of the growth quality composite-indicators



5. Results

A. The QGI quality

The QGI fluctuated smoothly over the past four decades as it was statically scored the least and the most amount at about 0.31 and 0.63 in 1986 and 2007 respectively. Meanwhile, the QGI have gradually improved and passed the average of the whole period in the recent episodes although it had significantly declined during the eight-year Iran-Iraq war during 1981-88 (Chart 1). The deviation of the QGI obviously originates from the fluctuations of social and structural composite-indicators in different episodes whereas the fluctuation gap between two composite-indicators has been continuously narrowed in recent periods (Chart 2). In this context, the average amount of coefficient of variation for social and structural indicators is respectively small at about 0.24 and 0.19 unit which underlines low fluctuations of both indicators. Meanwhile, the share of social and structural indicators in explaining QGI deviations were so close -at about 48 and 52 percent- which along with small amount of coefficient of variation underscores the reasons behind the low fluctuation of QGI.

To examine the robustness of the QGI, different weights were applied to

calculate the geometrical average of both social and structural indicators including (0.5, 0.5), (0.25, 0.75) and (0.375, 0.625) which highlights the growth strong robustness (Chart 3). The trend of coefficient of variation for different amounts of the QGI has been evidently narrowed which reiterates the robustness of the QGI (Chart 4). It also indicates a stable-smooth trend of the explanatory variables which contributes to compute social and structural indicators, especially over the past 20 years.

B. Living Standard and QGI

Living standard is experimentally expected to be influenced by the QGI although social indicators affect a sound QGI too. The correlation between QGI and social development implies the positive-light correlation between QGI, per capita income, school enrolment and public health and education spending, while the correlation coefficient of income inequality reflects an insignificant-negative sign. In other words, the QGI improvement has not historically led to a better income distribution (Gini coefficient) in Iran, mainly because of the high-permanent inflation and its positive-wealth effect on the high income groups (table 1).

Table 1: Correlation coefficients among QGI and social sub-components

	Per capita income	Gini-coefficient	School enrollment	Health and education spending
QGI	0.76	-0.13	0.83	0.45

C. Specification Model for the QGI

Macroeconomic stance affects the QGI via some main macroeconomic variables which are statistically examined by the VAR approach. The explanatory variables are respectively defined as follows: Inflation, nominal exchange rate, openness, ratio of government expenditure to GDP, as well as

contract intensive money. Although quality of bureaucracy and corruption control indicators should be theoretically applied as two supplementary-explanatory variables to contain rent-seeking activities and enhance growth quality, lack of adequate time series data causes to replace contract intensive money as an alternative variable for sound governance into the basic model. The relationship between explanatory variables and QGI is statistically estimated by the VAR approach in order to explain the lagged-impacts of the variables on the QGI as well as to address endogeneity challenge. In other words, the QGI is linearly estimated based on its own lagged values and current and past amount of other explanatory variables, while the estimated equations have uncorrelated error terms.

The VAR approach prepares an exclusive, comprehensive, reliable and multi objective toolkit for data processing through description, forecasting, deduction, and policy analysis. In this context, several steps have been technically taken to examine the model. First; the test of unit root to outline the order of integration for every single variable, second; the co-integration and granger-causality tests to highlight the number of co-integrated vectors and the ability of the whole variables to explain the QGI changes, third; the optimum lags and correlogram of error term to determine the number of optimum lags by the Wald test as well as the serial correlation of the error term in the estimated vector, finally; Impulse response and variance decomposition to track the impact of a shock over QGI in a specific episode and characterize every single variable on the QGI deviations respectively.

D. Outcomes

The unit root test underscores that the logarithm of all variables is non-stationary in level which becomes stationary of order 1 after first difference (Table 2).

Table 2: Critical Value of Unit Root Test

	LQGI	LCPI	LGOVS	LEXR	LCIM	LOPEN
I(0)	-2.41	-2.07	-2.26	-2.13	-2.35	-2.19
I(1)	-6.08	-3.24	-6.64	-3.93	-7.99	-4.91

T-statistic critical value 90%: -3.198

The co-integration test indicates a single linear co-integrated vector with one optimum lag. In this context, Granger causality test also confirms the joint effectiveness of the most explanatory variables on the QGI. The statistics of causality effect of contract intensive money on QGI and the impact of the joint variables over contract intensive money are rejected statistically while the sign of the coefficient and its statistic in the co-integration model were respectively meaningless and insignificant. The output of co-integrating equation is estimated as follows:

(5)

$$LQGI = -0.55 - \underset{(2.39)}{0.12} * LEXR + \underset{(2.72)}{0.12} * LCPI + \underset{(4.62)}{0.26} * LOPEN - \underset{(1.88)}{0.17} * LGOVS$$

As it was experimentally expected, devaluation of local currency as a nominal anchor which highlights financial stability has a negative long-run impact on the QGI. Government size has reversely influenced total factor productivity and QGI. In this regard, openness as an indicator which monitors competitiveness and convergence to the global economy has positively enhanced growth stability in the long-term through stability of demand. Inflation was unexpectedly-positively correlated with the QGI mainly because of the inflationary environment in the economy of Iran as the average inflation and its coefficient of variation were about 18.7 and 0.5 over the past four decades, thus, output growth was historically accompanied with the long-run inflation. High inflation (above the long run mean) has evidently contracted output growth and consequently distorted QGI.

(6)

$$D(LQGI) = -0.007 - 0.11 * D\big(LEXR(-1)\big) + 0.17 * D\big(LCPI(-1)\big)$$

$$-0.22a * D\big(LOPEN(-1)\big) + 0.29 * D\big(LGOVS(-1)\big) - 0.84 * ECM$$

Vector error correction equation indicates that about 84 percent of a short-term shock to the co-integrating equation will be statically absorbed within the first period. Meanwhile, the impulse response of the QGI to the exchange rate and government size shocks are diminishingly and negatively permanent while the response of the QGI to the openness' shock is significantly and positively permanent. In this regard, inflation has an insignificant impact over QGI during the episode. Variance decomposition of the QGI underscores the share of every single variable on the QGI's distortions, as openness by 45%, QGI by 23%, government size by 18% and nominal exchange rate by 11% have influenced respectively the QGI deviations after 10 periods.

6. Conclusion

Quality of growth is affected by two sets of composite-structural and social indicators. Structural indicator is arithmetically computed based on the growth characters including stability, diversification, strengthening, competitiveness, solidarity which contribute to achieve the target of sound-sustainable-competitive output growth. Meanwhile, the sound output growth should also enhance social-public services and living standards through reducing infant mortality, increasing school enrolment, growing public health and education spending, improving life expectancy and income equality. Both social and structural-composite indicators are calculated by the average of structural growth characters and social stance sub-components. Moreover, QGI is computed via the geometrical-weighted

average of social and structural indicators. Although QGIs are weightedly computed based on different scenarios, the trend of QGIs and coefficient of variation of QGIs indicate the robustness of results. In this context, the QGI's deviation is influenced by the social and structural-composite indicators at about 48 and 52 percent respectively.

The correlation among QGI and social sub-components highlights a positive relationship between QGI and school enrolment, per capita income and public spending on education and health while the correlation of income equality is negative.

QGI is experimentally influenced by the macroeconomic variables including inflation, nominal exchange rate, openness, contract intensive money as well as government size which are examined by the VAR method. The result of co-integration model indicates that higher government size and devaluation of local currency have evidently exacerbated QGI, mainly because of the negative impact on total factor productivity, inflation expectation and cost push inflation which consequently contract QGI. In this regard, the coefficient and statistic of contract intensive money were statistically meaningless and insignificant. Moreover, openness and inflation underscore the positive long-run impact over QGI due to historical inflationary environment of the economy of Iran and the impact of the external trade over competitiveness and sustainable output growth.

Vector error correction equation outlines that about 84 percent of a short-term shock to the co-integrating vector will be absorbed in the first period. Meanwhile, the impulse response of the QGI to the exchange rate and government size shocks are diminishingly and negatively permanent while the response of QGI to the openness' shock is significantly and positively permanent. In this regard, inflation has a insignificant impact over QGI during the episode.

Reference

Alonso-Carrera, J., (2010). "Growth, Sectoral Composition, and the Evolution of Income Levels," *Journal of Economic Dynamics & Control*, 34, No.12, pp. 2440-2460.

Ames, B., W. Brown, S. Devarajan, and A. Izquierdo, (2001). "Macroeconomic Policy and Poverty Reduction," *International Monetary Fund and World Bank*.

Berg, A., J. Ostry, and J. Zettelmeyer, (2008). "What Makes Growth Sustained?" *IMF Working Paper* 08/59 (Washington: International Monetary Fund).

Bils, M., and K. Peter, (2000). "Does Schooling Cause Growth?" *American Economic Review*, Vol. 90, pp. 1160–1183.

Burnside, C., and D. Dollar, (2000). "Aid, Policies, and Growth," *American Economic Review*, Vol. 90, No. 4, pp. 847–68.

Commission on Growth and Development, (2008), "Growth Report: Strategies for Sustained Growth and Inclusive Development" (Washington: *World Bank*).

Diao, X., J. Rattsø, and H. E. Stokke, (2006). "Learning by Exporting and Structural Change: A Ramsey Growth Model of Thailand", *Journal of Policy Modeling*, Vol. 28, pp. 293–306.

Dollar, D., T. Kleineberg, and A. Kraay, (2013). "Growth is Still Good for the Poor," World Bank Policy Research *Working Paper* No. 6568 (Washington: World Bank).

Duttagupta, R., and M. Mlachila, (2008). "What is Really Good for Long-Term Growth? Lessons from a Binary Classification Tree (BCT) Approach" *IMF Working Paper* 08/263 (Washington: International Monetary Fund).

Gerry, Christopher J., Lee, Jong- Kyu & M. Mickiewicz, Tomasz, (2008)." Macro-Economic Stability, Governance and Growth: Empirical Lesson from the Post-Communist Transition", UCL SSEES Centre for the Study of Economic and Social Change in Europe, Economics *Working Paper* No. 89, April.

Gorji, Ebrahim and Madani, Shima (2003), "The Evaluation of Economic Stability on the Economic Growth of Iran: Simultaneous Equation System Method", Seasonal Journal of Trade Research, No. 28, Page 1-24.

Guillaumont Jeanneney, S. and R. Kpodar, (2006). "Financial Development, Financial Instability and Poverty," CERDI *Working Paper* #E. 2006.7. 32

Hausmann, R., L. Pritchett, and D. Rodrik, (2005). "Growth Accelerations," *Journal of Economic Growth*, 10, No. 4, pp. 303–29.

Khalili Araghi, Mansoor and Ramezanpour, Esmaeel (2001). "The Importance of Stability in the Macroeconomic Environment", *Journal of Economic Research*, spring and summer, pp. 1-28.

Klugman, J., F. Rodriguez, F. and H.J. Choi, (2011). "The HDI 2010: New Controversies, Old Critiques", *Human Development Research Paper* 1. UNDP—HDRO, New York. http://hdr.undp.org/en/reports/global/hdr2011/ papers/ HDRP201101.pdf.

Loayza, N., and C.E. Raddatz, (2010). "The Composition of Growth Matters for Poverty Alleviation," *Journal of Development Economics*, 93, No. 1, pp. 137–51.

Mlachila, M., R. Tapsoba, and S.J.A Tapsoba, (2014). "A Quality of Growth Index for Developing Countries: A Proposal", *IMF Working Paper* 14/172 (Washington: international Monetary Fund).

Martinez, M., and M. Mlachila, (2013). "The Quality of the Recent High-Growth Episode in Sub-Saharan Africa," *IMF Working Paper* 13/53 (Washington: International Monetary Fund).

Papageorgiou, C., and N. Spatafora, (2012). "Economic Diversification in LICs: Stylized Facts and Macroeconomic Implications", *IMF Staff Discussion Note* No. SDN/12/13 (Washington: International Monetary Fund).

Sameti, Majid, and Behnood, Marjan, (2012), "The Impact of Economic Instability on Human Development: Selected Asian Countries", *Rah-e-Andisheh Journal of Economic Research*, Episode 2, No. 5, Spring, page 53-68.

Schultz, P., (1999). "Health and Schooling Investments in Africa", *Journal of Economic Perspectives*, Vol. 13, No. 3, pp. 67–88.

Sirimaneetham, Vatcharin, Temple & R. W. Jonathan, (2009). "Macroeconomic Stability and the Distribution of Growth Rates", *World Bank Econ Rev*, Vol. 23, No. 3, PP. 443-479

Stern, S., A. Wares, S. Orzell, and P. O'Sullivan, (2014). "Social progress Index 2014 Methodological Report," *The Social Progress Imperative*.

Turnovsky, S. J., and P. Chattopadhyday, (2003). "Volatility and Growth in Developing Economies: Some Numerical Results and Empirical Evidence", *Journal of International Economics*, 59, No. 2: 267–395.

Appendix (A):

Vector Error Correction Estimates
Date: 11/02/14 Time: 16:18
Sample (adjusted): 1973- 2013
Included observations: 41 after adjustments
Standard errors in ( ) & t-statistics in [ ]

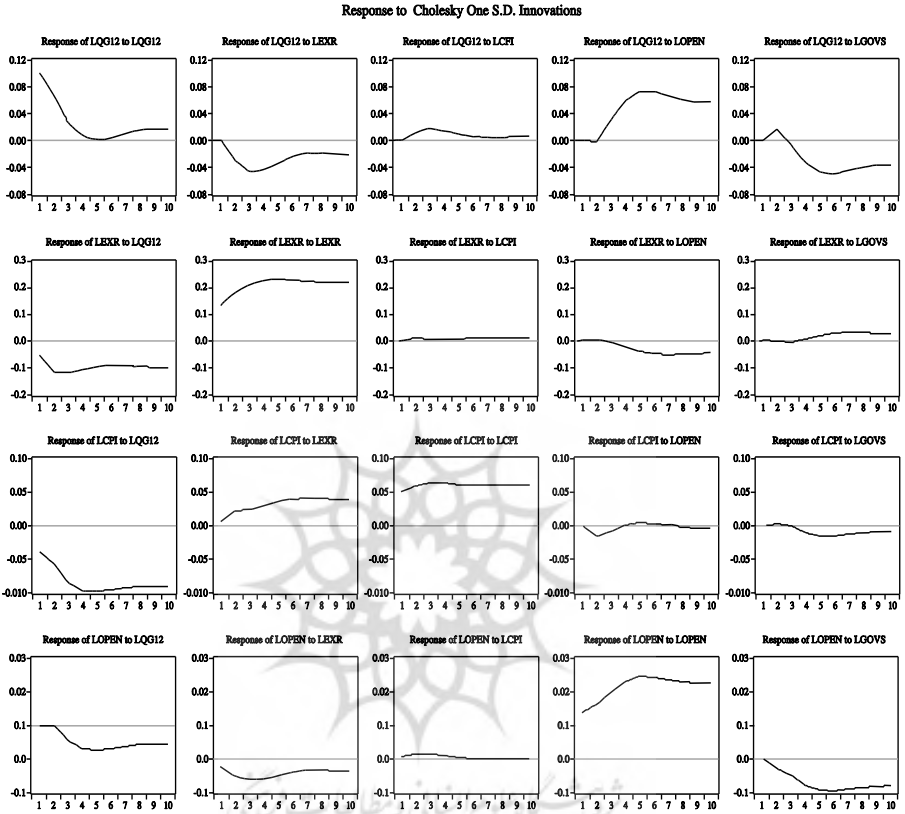
Co-integrating Eq.	Co-int. Eq1
LQGI2(-1)	1.000000
LEXR(-1)	0.120948
	(0.05060)
	[2.39005]
LCPI(-1)	-0.121209
	(0.04445)
	[-2.72689]
LOPEN(-1)	-0.263659
	(0.05703)
	[-4.62352]
LGOVS(-1)	0.170023
	(0.09051)
	[1.87856]
C	0.547917

Error Correction:	D(LQGI2)	D(LEXR)	D(LCPI)	D(LOPEN)	D(LGOVS)
CointEq1	-0.839579	0.113970	-0.272153	-0.880581	-0.296353
	(0.19121)	(0.28148)	(0.12747)	(0.33461)	(0.22281)
	[-4.39093]	[0.40489]	[-2.13512]	[-2.63165]	[-1.33006]
D(LQGI2(-1))	0.475160	-0.401139	0.316255	0.629423	0.075988
	(0.19133)	(0.28166)	(0.12754)	(0.33482)	(0.22295)
	[2.48352]	[-1.42421]	[2.47959]	[1.87990]	[0.34083]
D(LEXR(-1))	-0.115049	0.322786	0.116345	-0.073454	-0.236161
	(0.11674)	(0.17185)	(0.07782)	(0.20429)	(0.13603)
	[-0.98554]	[1.87827]	[1.49505]	[-0.35956]	[-1.73608]

D(LCPI(-1))	0.172520	0.140022	0.132585	-0.087588	0.141022
	(0.23540)	(0.34654)	(0.15692)	(0.41194)	(0.27430)
	[0.73289]	[0.40406]	[0.84490]	[-0.21262]	[0.51411]
D(LOPEN(-1))	-0.215273	0.018145	-0.171886	-0.088429	0.042284
	(0.12512)	(0.18420)	(0.08341)	(0.21897)	(0.14581)
	[-1.72048]	[0.09850]	[-2.06069]	[-0.40385]	[0.29000]
D(LGOVS(-1))	0.292670	-0.049808	0.070072	-0.095556	-0.117908
	(0.13741)	(0.20228)	(0.09160)	(0.24046)	(0.16012)
	[2.12992]	[-0.24623]	[0.76497]	[-0.39738]	[-0.73637]
C	-0.007439	0.081322	0.133883	0.016897	-0.012030
	(0.04002)	(0.05891)	(0.02668)	(0.07003)	(0.04663)
	[-0.18590]	[1.38046]	[5.01887]	[0.24130]	[-0.25799]
R-squared	0.443597	0.286823	0.307087	0.223212	0.169017
Adj. R-squared	0.345409	0.160968	0.184808	0.086131	0.022373
Sum sq. resids	0.336248	0.728719	0.149428	1.029755	0.456587
S.E. equation	0.099447	0.146400	0.066294	0.174031	0.115884
F-statistic	4.517805	2.278997	2.511369	1.628327	1.152566
Log likelihood	40.29483	24.43933	56.92100	17.35066	34.02324
Akaike AIC	-1.624138	-0.850699	-2.435171	-0.504910	-1.318207
Schwarz SC	-1.331577	-0.558138	-2.142610	-0.212349	-1.025646
Mean dependent	0.002280	0.149653	0.173302	-0.003100	-0.019852
S.D. dependent	0.122915	0.159827	0.073426	0.182048	0.117202

Determinant resid. Co-variance (dif. adj.)	1.21E-10
Determinant resid. Co-variance	4.74E-11
Log likelihood	196.4527
Akaike information criterion	-7.631839
Schwarz criterion	-5.960061

Appendix (B):


Response to Cholesky One S.D. Innovations
Response of LQG12 to LQG12
Response of LQG12 to LEXR
Response of LQG12 to LCPI
Response of LQG12 to LOPEN
Response of LQG12 to LGOVS
Response of LEXR to LQG12
Response of LEXR to LEXR
Response of LEXR to LCPI
Response of LEXR to LOPEN
Response of LEXR to LGOVS
Response of LCPI to LQG12
Response of LCPI to LEXR
Response of LCPI to LCPI
Response of LCPI to LOPEN
Response of LCPI to LGOVS
Response of LOPEN to LQG12
Response of LOPEN to LEXR
Response of LOPEN to LCPI
Response of LOPEN to LOPEN
Response of LOPEN to LGOVS

Appendix (C):

Variance Decomposition of LQG12						
Period	**S.E.**	**LQG12**	**LEXR**	**LCPI**	**LOPEN**	**LGOVS**
1	0.099447	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.124560	91.65471	5.340087	1.118939	0.007578	1.878682
3	0.140484	75.52174	14.96279	2.709184	5.084355	1.721928
4	0.162622	56.49805	17.99261	2.867273	17.25176	5.390307
5	0.187070	42.69603	16.54079	2.428240	28.10628	10.22865
6	0.208176	34.52005	14.59850	2.045361	35.05372	13.78238
7	0.224917	29.87820	13.23790	1.804567	39.19489	15.88445
8	0.237708	27.09317	12.41657	1.662391	41.78019	17.04768
9	0.249061	25.15011	11.92208	1.579740	43.58703	17.73104
10	0.259745	23.54052	11.68921	1.528507	45.02898	18.21278
Variance Decomposition of LEXR						
Period	**S.E.**	**LQG12**	**LEXR**	**LCPI**	**LOPEN**	**LGOVS**
1	0.146400	17.84960	82.15040	0.000000	0.000000	0.000000
2	0.259616	26.12578	73.78762	0.066344	0.002438	0.017817
3	0.354396	25.59948	74.24956	0.052387	0.059670	0.038898
4	0.433797	23.46960	76.07814	0.040888	0.373570	0.037809
5	0.501233	21.57.60	77.32079	0.040652	0.920854	0.147102
6	0.559722	20.24193	77.88079	0.050793	1.500933	0.325546
7	0.611655	19.44617	78.03895	0.066786	1.958899	0.489194
8	0.658912	19.02356	78.03591	0.082660	2.258694	0.599181
9	0.702857	18.80716	77.99975	0.094902	2.437313	0.660872
10	0.744326	18.67699	77.98054	0.103118	2.545654	0.693703

Variance Decomposition of LCPI						
Period	**S.E.**	**LQG12**	**LEXR**	**LCPI**	**LOPEN**	**LGOVS**
1	0.066294	36. 80972	1.736503	61.45378	0.000000	0.000000
2	0.109656	41.00998	5.258805	51.94473	1.725398	0.061090
3	0.155630	50.71660	5.170065	42.95141	1.129607	0.032318
4	0.196613	56.03175	5.466262	37.50830	0.717757	0.275925
5	0.231623	58.39378	6.305334	34.13952	0.570811	0.590551
6	0.261443	59.34872	7.262926	32.15972	0.471276	0.757362
7	0.287270	59.67087	8.091433	31.04962	0.391208	0.796874
8	0.310380	59.76397	8.695287	30.42634	0.338573	0.775834
9	0.331705	59.81583	9.091429	30.04777	0.305205	0.739761
10	0.351792	59.88998	9.344660	29.77772	0.279609	0.708035
Variance Decomposition of LOPEN						
Period	**S.E.**	**LQG12**	**LEXR**	**LCPI**	**LOPEN**	**LGOVS**
1	0.174031	31.94946	2.380623	0.239801	65.43012	0.000000
2	0.265427	27.50239	4.671912	0.328144	66.39018	1.107371
3	0.345044	18.77205	6.152631	0.374336	72.11790	2.583080
4	0.427404	12.73320	5.990189	0.307712	76.01100	4.957898
5	0.503800	9.428090	5.205716	0.228906	78.18644	6.950845
6	0.569630	7.670155	4.506357	0.179110	79.45884	8.185539
7	0.625502	6.737355	4.013967	0.148658	80.25491	8.845113
8	0.674064	6.218333	3.692421	0.128010	80.79161	9.169628
9	0.717995	5.878828	3.488041	0.113082	81.18412	9.335930
10	0.759152	5.606638	3.354414	0.101874	81.49285	9.444224
Cholesky Ordering: LQG12 LEXR LCPI LOPEN LGOVS						