Economic Diversification in Bahrain

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ABSTRACT

The study aims at analyzing the effect of economic diversification on economic growth in Bahrain for the period (1980-2014). For this purpose, many indicators were developed using The Herfindahl-Hirschman index and five variables: Real gross domestic product (GDP), exports, imports, government revenues and fixed capital formation. Results reveal a weak diversification in the Bahraini's economy besides a positive effect of diversification on the economic growth in Bahrain. In fact, no significant relationship between Herfindahl index and the growth of real GDP.

Keywords: Economic Diversification, Economic Growth, Herfindahl-Hirschman index
JEL Classifications: L25, O47

1. INTRODUCTION

Whether it is developed or developing country, it always seeks for maintaining real economic growth as an essential step for a sustainable development. Income per capita is considered as an important indicator for development level and welfare which seems has a divergence trend between developed and developing countries. The existing of such gap is caused by weak production systems, old and inefficient production methodologies.

Most of the developing countries tend to export raw materials which witnessed a big decline recently. It is worth to refer to the important role of exports in accelerating economic growth especially if was not limited in few traditional items. So, it is very obvious that developing countries must diversify their exports and concentrate more on industrial exports rather than raw materials to benefit more from trade and maintain sustainable real economic growth and development.

Comparing to gulf countries, Bahrain is less dependent on oil sector to feed revenues as it already has less oil resources. Therefore, starting from the seventies Bahrain tried to diversify the economy through investing in the industrial sector and increased the contribution of non-oil sector gradually. According to Bahrain economic development board, non-oil sector generated 80.7% of Bahrain's real gross domestic product (GDP) in 2016. This study

comes to examine the level of economic diversification in Bahrain and to investigate the relationship between real economic growth and diversification.

For this purpose, the study will estimate Herfindahl index over the period (1980-2014) and compare it to real GDP growth to examine the relationship between them. The aims of this study are really consistent with the Bahrain Vision 2030 which focuses on diversify income sources and change the current economic model to a solid and competitive one that depend less on oil sector.

2. THEORETICAL BACKGROUND

A diversified economy is an economy that has a structural transformation and variety revenue resources to enforce economies with the ability for sustainable growth and development. This diversification and expansion creates more stability, security and reliability that developing countries need instead of the strong reliance on the production of primary goods that are often unstable and keep fluctuating.

The need for diversification is most urgent in gulf countries, including Bahrain, which face an expiration of oil reserves in the near future. However, the need for diversification is not only connected to the oil reserves quantities, but also to high population

growth, a large number of young labor market entrants and rising unemployment among young nationals (Sturm et al., 2008).

Bahrain has established itself as a financial hub for the Gulf region and for the Arab world, particularly in Islamic banking. Tourism, in particular, of regional origin, transport and related services are other areas in which the country is well established. Bahrain is also home to a significant producer of aluminum.

Hesse (2008) concludes that export diversification can lead to higher growth and that this effect is potentially nonlinear with developing countries benefiting from diversifying their exports in contrast to the most advanced countries that perform better with export specialization. Mudenda and Choga (2014) also examined the role of export diversification on economic growth in South Africa using annual time series data for the period (1980-2010). Results show that export diversification and trade openness affect economic growth positively.

Esu and Udonwa (2015) examined the effect of diversifying the economy in Nigeria using time series data for the period (1980-2011). Results reveal that Nigeria could achieve sustained gains through diversifying the economy, encouraging large-scale industrialization of the non-oil sector of the economy, emphasizing deepening technology in every trade and investment discourse, sustaining the recent improvements in the agricultural sub-sector, amongst other factors. On the other hand, Ramcharan (2006) studied the effect of diversification on financial development and reveals that there is a significant positive relationship. Besides, the study noticed that economic concentration is accompanied with low economic and financial development in developing countries.

Gozgor and Can (2016) tests the impacts of Theil index, the extensive margin, and the intensive margin on the real GDP per capita in 158 countries by applying the system-GMM estimations, and reveals that the product diversification of exports affect the real GDP per capita positively in low income countries.

To find the causes that make GDP more fluctuated in poor countries comparing to developing ones, Korean and Tenreyro (2007) found that poor countries have a high degree of economic concentration and weak efforts for diversification.

Referring to the link between diversification and economic growth, there are two visions that illustrate it. First, the Ricardian comparative advantage which focuses on role of specialization (low economic diversification) in economic growth (Dornbush et al., 1977). Second, the empirical studies that show a negative relationship between economic concentration and economic growth.

After reviewing previous studied, diversification is very important to economic growth for the following reasons:
1. Increase the productivity of human capital and financial development.
2. Diversify investment opportunities and reduce the risks.
3. Expand and develop the production structure and reduce the harms of reliance on limited products.
4. Enhance trade volume and reduce the risks of exporting limited goods that are vulnerable to prices fluctuations.
5. Strength the relationships between the economy productive sectors and reduce the fluctuations in GDP levels year after year which increase the added value.
6. Create variety jobs and reduce unemployment.
7. Enhance sustainable economic growth and so sustainable development.

3. MEASURING ECONOMIC DIVERSIFICATION

There are many statistical indicators to measure diversification. These indicators may vary according to the measuring efficiency and the purpose of measuring. Some indicators measures the dispersion, others measure the concentration or diversification.

Herfindahl-Hirschman is considered as the most popular indicator which is going to be used in this study. This indicator depends on measuring market shares of the firms within the industry and it range from zero (full diversification) to one (no diversification). Herfindahl-Hirschman was used widely in eighties by department of justice in USA to measure monopoly level in an industry and was used also by United Nation Conference on Trade and Development to measure the level of exports diversification. Herfindahl-Hirschman index take the following formula (Lapteacru, 2012):

$$H = \frac{\sqrt{\sum_{i=1}^{N}\left(\frac{Xi}{X}\right)^2} - \sqrt{\frac{1}{N}}}{1 - \sqrt{\frac{1}{N}}} \tag{1}$$

Where (N) is the number of economic activities, (X_i/X) is the market share of each firm.

A large value of H refers to a weak economy with limited economic activities and sectors which mean that the economy is vulnerable to high risks.

Other indicators for diversification are the GDP, exports, imports, actual revenues of the government, fixed capital formulation, labor force…etc.

4. METHODOLOGY

4.1. Data
The study is going to use time series data for the following variables: GDP, exports, imports, government revenues and fixed capital formulation. The data cover the period (1980-2014) and will be retrieved from Central Informatics Organization and ministry of finance in Bahrain.

4.2. Diversification in GDP
To measure the diversification in production, the study computed Herfindahl index for GDP over the period (1980-2014). Figure 1 illustrates the trend of Herfindahl index which

declines at about (0.8%) annually and this is indicating poor increasing levels in economic diversification from (0.18) in 1980 to (0.12) in 2014.

4.3. Diversification in Exports

Diversification in GDP is important but not sufficient because diversification in exports is also significant. The role of exports in diversification is bigger for gulf countries that depend heavily on oil exports. Following Figure 2 shows a decline in Herfindahl index of about (1.7%) on average annually which means an increase in diversification from (0.87) in 1980 to (0.41) in 2014.

4.3. Diversification in Imports

Globalization has really a significant effect on trade where countries import goods and services that not produced or not enough domestically. Imports are another indicator for diversification that shows a small increase in diversification where

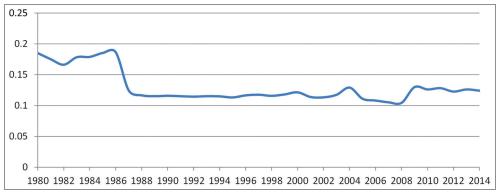Herfindahl index decreased from (0.52) in 1980 to (0.39) in 2014 as Figure 3 shows.

4.4. Diversification in Government Revenues

Economic diversification is often accompanied with an increase in non-oil government revenues to total revenues. Results show a small decline in Herfindahl index from (0.59) in 1980 to only (0.50) in 1999 but then it continues to increase till 2014 which refer to more dependence on oil revenues to finance the expenditures (Figure 4).

4.5. Diversification in Fixed Capital Accumulation

Fixed capital accumulation is an important indicator for economic diversification because it shows specifications and the development in investment. Herfindahl index decreased by (0.2%) on average annually, from (0.51) in 1980 to (0.46) in 2014 referring to the existing of simple diversification (Figure 5).
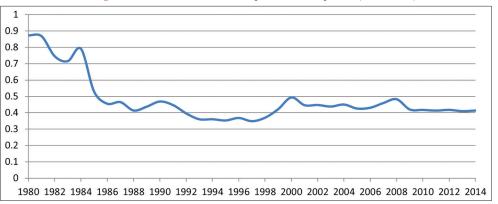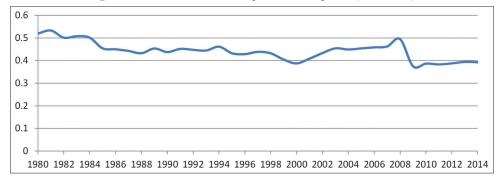
Figure 1: Herfindahl index for gross domestic product over the period (1980-2014)

Figure 2: Herfindahl index for exports over the period (1980-2014)

Figure 3: Herfindahl index for imports over the period (1980-2014)

4.6. Composite Indicator of Economic Diversification

Economic diversification is not only limited in income diversification but it also should include diversification in the structure of exports, imports and employment as well. Therefore, this study is going to employ a comprehensive process to measure economic diversification accurately.
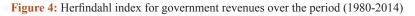
The study computed the average of the previous indicators for the period (1980-2014) and the results are illustrated in Figure 6.
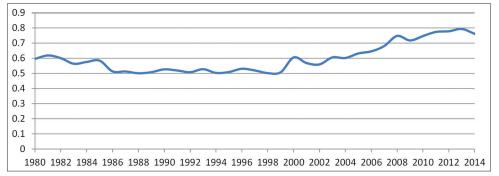
The estimation for the composite indicator reveals a reduction from (0.537) in 1980 to (0.457) in 2014 with around (0.08) point. The annual reduction was (0.4%) which refers to a tiny increase in economic diversification in Bahrain.

4.7. Is There a Link between Diversification and Economic Growth?

The study expects a positive relationship between diversification and economic growth. Literature provided researchers with two common models for economic growth: Solow model (Solow, 1957), (Solow, 1956) and Romer model (Romer, 1986). This study will use Solow model which indicates that growth is not affected by actions taken by policy makers but by external variables like technology and the divergence from stability.

Romer model is not suitable for the current study and for Bahrain specifically because it depends heavily on oil revenues not on high technology and high quality of education as Romer model indicates. Referring to previous studies (Al-Khatib, 2011; Al-
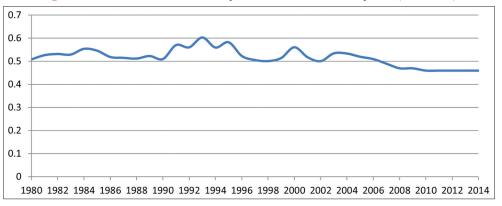
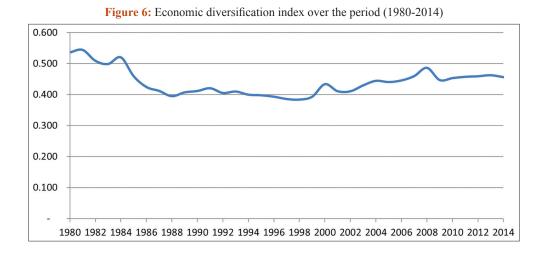**Figure 4:** Herfindahl index for government revenues over the period (1980-2014)

Figure 5: Herfindahl index for fixed capital accumulation over the period (1980-2014)

Figure 6: Economic diversification index over the period (1980-2014)

Khatib, 2014; Keller and Nabli, 2002), there are limited effect of technology development on growth in gulf countries because they import technology and high quality workers besides the low expending on research and development.

The study will use the expanded neoclassical production function (Barro and Sala-I-Martin, 2004):

$$Y = f(L,K) \qquad (2)$$

Where Y is the real GDP, L is for labor and K for capital.

To study the effect of diversification on economic growth, equation (1) will be expanded to include oil production in real prices (Y_0) as follows:

$$Y = f(L,K,Y_0) \qquad (3)$$

$$Y_t = A\, L_t^{\alpha 1}\, K_t^{\alpha 2}\, Y_{0t}^{\alpha 3} \qquad (4)$$

By transforming equation (3) to linear form:

$$\text{Ln } Y_t = \alpha_0 + \alpha_1 \text{Ln}L_t + \alpha_2 \text{Ln}K_t + \alpha_3 \text{Ln}Y_{0t} \qquad (5)$$

$$\dot{Y} = \alpha_0 + \alpha_1 L + \alpha_2 K + \alpha_3 Y_0 \qquad (6)$$

Where the dot refer to the growth rate.

$$\dot{Y}_t = \alpha_0 + \alpha_1 \dot{L}_t + \alpha_2 \dot{K}_t + \alpha_3 \dot{Y}_{ot} + \alpha_4 H_t + \varepsilon_t \qquad (7)$$

Where H is the variable of diversification (Herfindahl index) and ε is the error term. It is expected that the increase in L, K and Y_0 will positively affect the economic growth, while the decrease in Herfindahl index (increase in diversification) will increase the economic growth.

The study has tested stationarity using Augmented Dickey Fuller (ADF) test. It is worth to mention that the integration properties of the variables are investigated by conducting ADF test. Table 1 reports the results which suggest the rejection of the unit root null hypothesis for all variables at the first difference, which implies that variables are integrated of order one, I(1).

When the explanatory variables are very highly correlated with each other (correlation coefficients either very close to 1 or to −1) then the problem of multicollinearity occurs (Asteriou and Hall, 2007). Multicollinearity can be tested using variance inflation factors (VIF), if it is equal to 1 there is no multicollinearity among factors, but if the VIF is >1, the predictors may be moderately correlated. A VIF between 5 and 10 indicates high correlation that may be problematic (Table 2).

The results above show that the VIF for the variables are above 1 but still <5, which indicates a weak correlation but not enough to be overly concerned about.

Autocorrelation is most likely to occur in a time-series framework. When data are ordered in chronological order, the error in one period may affect the error in the next (or other) time period(s).

Table 1: ADF unit root test

Variable	T-statistic	Prob.	Stationarity
Y	−4.456	0.000	Stationary at first difference (1%)
L	−3.717	0.003	Stationary at first difference (1%)
K	−4.051	0.005	Stationary at first difference (1%)
Y_0	−6.368	0.000	Stationary at first difference (1%)
H	−5.733	0.000	Stationary at first difference (1%)

Source: Calculated values using Eviews 8. ADF: Augmented Dickey Fuller

Table 2: Multicollinearity test (VIF)

Variable	VIF	Results
L	1.527	Stationary at first difference (1%)
K	1.564	Stationary at first difference (1%)
Y_0	2.057	Stationary at first difference (1%)
H	2.112	Stationary at first difference (1%)

Source: Calculated values using Eviews 8. VIF: Variance inflation factors

Table 3: Analysis results

Variables	Coefficient	t-statistics	P
C	0.168	2.092	0.049
L	0.027	0.142	0.903
K	0.119	2.322	0.027
Y_0	0.130	2.467	0.019
H	−0.276	−1.367	0.182
R^2	0.548		
Adjusted R^2	0.449		
F-statistic	4.546		
P (F-statistic)	0.003		

Source: Calculated values using Eviews 8

Autocorrelation may occur because of omitted variables, misspecification of the model or systematic errors in measurement (Asteriou and Hall, 2007).

The Breusch–Godfrey lagrange multiplier test (LM) is a test for autocorrelation in the errors in a regression model. It makes use of the residuals from the model being considered in a regression analysis, and a test statistic is derived from these. Result of LM test was (0.151) which reject the existing of autocorrelation problem.

The study also checked for hetroskedasticity problem using Breusch-Pagan-Godfrey test and refuses the existing of hetroskedasticity.

Results reveal a positive effect of labor, capital and oil production on economic growth in Bahrain (Table 3). On the other hand, there is a negative relationship between Herfindahl index (economic diversification) and economic growth which is consistent with (Hvidt, 2013). In other words, economic diversification achieved weak results in Bahrain due to the wide range of subsidized goods (fuel) besides grants for Bahraini individuals which are not related to their productivity or efficiency.

5. CONCLUSION

Diversification becomes an economic priority for Bahrain bearing in mind the heavy reliance on oil and near depletion of its black gold reserves. So, it is very obvious that Bahrain must diversify their exports and concentrate more on industrial exports rather than

raw materials to benefit more from trade and maintain sustainable real economic growth and development.

For this purpose, the study estimated Herfindahl index over the period (1980-2014) and compare it to real GDP growth to examine the effect of economic diversification on economic growth using annually time series data.

The results show a negative relationship between Herfindahl index (economic diversification) and economic growth. In other words, economic diversification achieved weak results in Bahrain due to the wide range of subsidized goods (fuel) besides grants for Bahraini individuals which are not related to their productivity or efficiency.

The study recommends making more efforts to diversify non-oil exports, attract more investments with high and heavy technology, and reduce the volume of grants and subsidized goods.

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