In 1990, the United Nations Development Programme (UNDP) published its first annual Human Development Report (HDR) challenging the widely spread idea of economic growth as the main causal factor of development. While UNDP acknowledges economic growth's contributions of to a country's development, its HDR developed instead the Human Development Index (HDI) offering a more comprehensive approach to development.

Pointing to the experience of some OPEC nations, Mahbub Ul Haq, creator of the HDI and author of the HDR from 1990 to 1995, theorized that their vast oil windfalls could not be translated into real development because these countries lacked human capital[1]. Indeed, the HDI places a much stronger emphasis on the quality of human life by doing away with the traditional economic approach to development and embracing the idea that people, and not just money, are both the means and the end of economic development[2].

Among OPEC countries, however, Kuwait proved to be an exception having amassed large amounts of oil wealth while consistently achieving one of the highest HDI in the Arab World. Kuwait also had the distinction of holding the highest HDI in the Arab World from 2001 to 2009[3]. Ul Haq, who acknowledged the above irregularity, explained that Kuwait was successful because it was able to convert its temporary oil gains into permanent income such as human capital[4]. While Kuwait has since maintained its high HDI, its rank has been steadily declining since 2010.

[1] Ul Haq, Mahbub. 1999. Reflections on Human Development. New Delhi: Oxford University Press.
[2] Thomas, Hervé R. 2003. Linking Economic Growth with Human Development: The Case of Kuwait. The Ohio Sate University
[3] Faraj, Ahmad. 2009. Kuwait ranks top among Arab states in human development -- UNDP report. Kuwait News Agency.
[4] Supranote 1

Using time series analysis methods with applications in macroeconomics, this paper proposes to investigate the source of that decline by analyzing both Kuwaiti government budget revenues and expenditures to see how they impact the HDI.

METHODOLOGY

The HDI is a composite index measuring achievement in the following key human development dimensions namely,

- ***Health***: This measure assesses whether country nationals live a long and healthy life using life expectancy at birth data.

- ***Education***: This index determines the country nationals' capabilities in terms of knowledge. This data includes the mean of years of schooling for adults aged 25 years and beyond as well as expected years of schooling for children of school entering age.

- ***Standard of Living***: This looks at whether the country's nationals have a decent standard of living using gross national income per capita[5].

Government budget expenditures in health and education used as proxies for government investments in the capabilities and well-being of its people. Because Kuwaiti government revenues rely heavily on oil production, the paper also uses oil-related data to zero in on key factors affecting the HDI.

[5] United Nations Development Programme. 2015. Human Development Index (HDI). http://hdr.undp.org

This paper's annual time series data come from the World Bank's World Development Indicators, the United Nations Development Programme's Human Development Report, and the Kuwait Central Statistical Office's Annual Statistical Abstract. Appendix A, at the end of the paper, provides a summary table of these figures.

Theoretical Model

This paper will estimate the following two models to investigate the source of Kuwait's HDI decline:

- *Model 1* will test the relationship between Kuwait's government budget expenditures in two of the three dimensions of the human development index and key factors affecting major sources of government revenues, particularly Kuwait's volume of oil exports, oil prices, and the exchange rate, as follows:

$log\ HnE = \beta_0 + \beta_1 logER_t + \beta_2 logOP_t + \beta_3 logVOE_t + \varepsilon_i$, where

HnE	Government expenditures in the health and education sectors
ER	Exchange rate
OP	Oil prices
VOE	Volume of oil exports
t	time trend
ε	error term

- *Model 2* will test the relationship between Kuwait's government budget expenditures in two of the three dimensions of the human development index and actual government revenues and the exchange rate as follows:

$log\ HnE = \beta_0 + \beta_1 logER_t + \beta_2 logOR_t + \varepsilon_i$, where

HnE Government expenditures in the health and education sectors

ER Exchange Rate

OR Oil rents used as a proxy for oil revenues[6]

t time trend

ε error term

The paper borrows techniques from the Dickey Fuller and the Augmented Dickey Fuller tests to evaluate the variables of models 1 and 2 for stationarity and determine the order of integration of the individual data series[7]. The results of both tests are reported in appendices B for both model 1's and model 2's variables.

Prior to estimating the models using a vector autoregression, the paper also performs Johansen's Cointegration Test to capture potential linear interdependencies among the time series of the models' proposed variables, determine how they affect each other intertemporally, and in turn Kuwait's HDI. Appendices C and D provide the results of the cointegration test for models 1 and 2 respectively. Appendices E and F provide the vector autoregression results.

[6] Computed using the difference between the value of crude oil production at world prices and total costs of production.
[7] Edun, Adebisi. 2012. A Vector Autoregressive Analysis of Oil and Exchange Rate in Nigeria: A Case of Dutch Disease. British Journal of Arts and Social Sciences

ANALYSIS

Using time series data for Kuwait's social, economic, and financial variables from 1995 to 2014, the paper uses the following types of macroeconometric methods to estimate the two above-mentioned models:

Unit Root Test

$$Model\ 1: \log HnE = \beta_0 + \beta_1 logER_t + \beta_2 logOP_t + \beta_3 logVOE_t + \varepsilon_i$$

Both the Dickey-Fuller and the augmented Dickey-Fuller tests reject the null hypothesis of a unit root at all common significance levels for the variables HnE, ER, OP, and VOE, thereby showing these variables to be stationary.

$$Model\ 2: \log HnE = \beta_0 + \beta_1 logER_t + \beta_2 logOR_t + \varepsilon_i$$

Both the Dickey-Fuller and the augmented Dickey-Fuller tests reject the null hypothesis of a unit root at all common significance levels for the variables HnE, ER, and OR, thereby showing these variables to be stationary.

Johansen Tests for Cointegration

The Johansen Tests for Cointegration rejects the null hypothesis of zero cointegrating vectors at all common significance levels for all of the variables. They identify at least three cointegrating vectors for model 1 and two cointegrating vectors for model 2.

Vector Autoregression

Because at least two coefficients in both models appear to have a common trend, the paper estimates a four-variable vector error correction model (VecM) for model 1 and a three-variable VecM for model 2 following lag-oder selection diagnostics as described below[8]:

Model 1

a_0 is a vector of intercept terms with A_1 through A_k as a 4 X 4 matrix of coefficients as shown below[9]:

$$\begin{Bmatrix} HnE_t \\ ER_t \\ OP_t \\ VOE_t \end{Bmatrix} = a_0 + A_1 \begin{Bmatrix} HnE_{t-1} \\ ER_{t-1} \\ OP_{t-1} \\ VOE_{t-1} \end{Bmatrix} + \ldots + A_t \begin{Bmatrix} HnE_{t-k} \\ ER_{t-k} \\ OP_{t-k} \\ VOE_{t-k} \end{Bmatrix} + \begin{Bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \\ \varepsilon_{4,t} \end{Bmatrix}$$

Lag-order selection diagnostics showed that the likelihood ratio test and the Akaike's information criterion recommend the use of four lags to estimate model 1's VAR as shown in Appendix E.

Model 1's four-variable VecM estimation, provided below, revealed:

$$log\ HnE = -18.54 - 1.66 log ER_t - 0.71 log OP_t - 0.16 log VOE_t$$

(2.21) (0.14) (0.46)

[8] Schenck, David. 2016. Vector Autoregressions in Stata. The Stata Blog
[9] This paper uses the log value of all the coefficients.

Inverse relationships between Kuwait's government budget expenditures in two of the three dimensions of the human development index and key factors affecting major sources of government revenues which, in this model, include Kuwait's volume of oil exports, oil prices, and the exchange rate. However, only the coefficient on the log of oil prices is statistically significant.

Model 2

a_0 is a vector of intercept terms with A_1 through A_k as a 3 X 3 matrix of coefficients as shown below:

$$\begin{Bmatrix} HnE_t \\ ER_t \\ ER_t \end{Bmatrix} = a_0 + A_1 \begin{Bmatrix} HnE_{t-1} \\ ER_{t-1} \\ ER_{t-1} \end{Bmatrix} + \ldots + A_t \begin{Bmatrix} HnE_{t-k} \\ ER_{t-k} \\ ER_{t-k} \end{Bmatrix} + \begin{Bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \end{Bmatrix}$$

Lag-order selection diagnostics showed that the likelihood ratio test and the Akaike's information criterion recommend the use of four lags to estimate model 2's VAR as shown in Appendix F.

Model 2's three-variable VecM estimation, provided below, revealed:

$$log\ HnE = -9.67 - 4.49 logER_t - 7.46 logOR_t$$

(0.13) (0.28)

Inverse relationships exist between Kuwait's government budget expenditures in two of the three dimensions of the human development index, the exchange rate, and factors that affect actual

government revenues. Both of the coefficients on the log of exchange rate and oil rents are statistically significant.

In summary, this paper used time series analysis methods with applications in macroeconomics to show that Kuwait's government budget expenditures in two of the three dimensions of the HDI do respond to movements in government revenues with most of the dynamic interactions taking place in the long-run.

However, the proposed variables above simplify and only capture part of the determinants of the human development index as well as other various factors influencing it. Indeed, inequality among Kuwaiti nationals and residents, the level of empowerment it affords its people, along with its investments in other sectors are necessary to obtain a more comprehensive understanding of the factors driving the country's human development.

Given that the HDR has only been in existence for 25 years, additional time series data as well as a fuller picture of Kuwait's level of human development may be needed to better understand the decline of its HDI rankings over the last five years. Meanwhile, the information and analysis presented in the above paper may offer insights into how a country's government budget revenues and expenditures impact its human development goals.

APPENDIX A

Kuwait's Socioeconomic Data[10]

Year	Gross Domestic Product	Health Expenditures	Education Expenditures	Health & Education Expenditures (as a % of GDP)	HDI[11]	Average World Oil Price	Volume of Oil Exports	Exchange Rate	Oil Rents	Oil Revenues[12]
1995	27191689008	1012690010	1655588661	9.81	0.821	17.06	435251000	0.30	10849809040	12210666667
1996	31493987642	1091356219	1833667335	9.29	0.836	20.45	447997000	0.30	13222027269	14202500000
1997	30354434553	1121439279	1758417409	9.49	0.844	19.12	413872000	0.30	12285093724	13569166667
1998	25941929462	1151062192	1591763078	10.57	0.848	12.72	434281000	0.30	7806121208	8574000000
1999	30121879435	1104499451	1795396129	9.63	0.833	17.70	346020000	0.30	10189887090	11211200000
2000	37711864407	946349336	2303621073	8.62	0.836	28.31	444007000	0.31	18309835714	18048000000
2001	34890772742	1259418913	2100417607	9.63	0.818	24.41	453455000	0.31	14986213376	14714064516
2002	38137545245	1359164109	2226456071	9.40	0.813	25.00	357423000	0.30	13731220017	14348933333
2003	47875838926	1545937850	2818104027	9.12	0.820	28.85	453091000	0.30	19547351726	18860000000
2004	59440108585	1638033096	3024610791	7.84	0.838	38.30	521787000	0.29	28490857755	27075827586
2005	80797945205	1921333106	3536773973	6.76	0.844	54.43	785041933	0.29	46093387280	42733103448
2006	101550654721	2287167248	3589260400	5.79	0.871	65.39	629014000	0.29	57245624549	53229482759
2007	114641097818	2445139931	4052480300	5.67	0.891	72.71	588648000	0.28	61463314654	59646357143
2008	147395833333	2846919494	5044602200	5.35		97.66	636345000	0.27	87846904638	82540925926
2009	105899930507	4098874909	3677463900	7.34	0.916	61.86	492168000	0.29	44322495052	46346896552
2010	115419050942	3185176959	3951803900	6.18	0.771	79.63	482563000	0.29	59024753237	56973379310
2011	154027536232	4030304367	5206303300	6.00	0.760	110.95	663557000	0.28	90238615859	96150178571
2012	174070025009	4477110879	5957867300	5.99	0.815	111.96	755378000	0.28	100393921457	108744464286
2013	174161495063	4458581471	5978570400	5.99	0.790	108.84	747078000	0.28	95581689600	108647214286
2014	163612438510	4977693193	5689779700	6.52	0.814	98.94	728085000	0.29	86778850522	92820137931

[10] Kuwait's financial figures are in current U.S. Dollars.
[11] The United Nations Development Programme produced a 2007/2008 Human Development Report first published in 2007.
[12] Kuwait's Annual Statistical Abstract did not include oil revenue and volume data for 2005. Oil revenue data from the 2006 Kuwait Economic and Financial Review of the Economic Research Department of the National Bank of Kuwait was used to compute Kuwait's volume of oil exports for 2005.