Information Management and Business Review
Vol. 3, No. 2, pp. 63-67, Aug 2011 (ISSN 2220-3796)

GDP and Economic Well-being: New Evidence from Selected Developed Countries

*Ahmad Jafari Samimi, Kaveh Derakhshani Darabi
University of Mazandaran, Babolsar, Iran
*jafarisa@umz.ac.ir

Abstract: GDP per capita often used in judgment about countries economic well-being, but any judgment based on it ignores some issues, therefore argues that a better index of economic well-being is IEWB (Index of Economic Well-being). Stevenson and Wolfers (2008), and Osberg and Sharpe (2001), mentioned that there is a positive relationship between GDP per capita and IEWB .in this paper we study a causal relationship between them; to this purpose we use the data of selected high income countries during 1980-2007.Finding shows that GDP is granger causal of IEWB except Norway that there aren't any causal relationship between GDP and IEWB.

Keywords: *Causal Relationship, Co integration, Granger Causality, Index of Economic Well-Being (IEWB)*

1. Introduction

The goal of economic policy is providing good situation for human life. For years growth and GDP per capita was the measurement of good economic condition, but in recent years some have begun to argue against this idea. They argue that GDP is a measure of the aggregate marketed income of a society, and also primarily measures of adjusted average annual "income" flows. Although those now alive are clearly caring about the level of their own consumption, they also care (in varying degrees) about the well-being of future generations. Furthermore, although trends in average income are important, individuals are justifiably concerned about the trends in Gross Domestic Product and Economic Well-Being that are shares in the prosperity, and the degree to which their personal economic future is secure. So a complete measurement for judge about economic situation should consist of four below components. The four components or dimensions of economic well-being are, therefore:

- Effective per capita consumption flows includes consumption of marketed goods and services, and effective per capita flows of household production, leisure and other unmarketed goods and services.
- Net societal accumulation of stocks of productive resources includes net accumulation of tangible capital, housing stocks and consumer durables, net changes in the value of natural resources stocks; environmental costs, and net change in level of foreign indebtedness; ideally also includes net accumulation of human capital, social capital, and research and development (R&D) investment
- Income distribution (poverty and inequality) includes the intensity of poverty (incidence and depth) and the inequality of income.
- Economic insecurity economic security from job loss and unemployment, illness, family breakup, poverty in old age (Osberg, 1985).

Another argues is from Easterlin paradox (Easterlin, 1974); which suggests that there is no link between the level of economic development of a society and the overall happiness of its members. In several papers Richard Easterlin has examined the relationship between happiness and GDP both across countries and within individual countries through time. In both types of analysis he finds little significant evidence of a linkage between aggregate income and average happiness (Stevenson and Wolfers, 2008). Therefore Osberg (1985), introduce the Index of Economic Well-Being (IEWB), as a new measurement to judgment about economic situation. This index is consisting of four components that explained above. Osberg & Sharpe (2001), and Stevenson & Wolfers (2008), mentioned that there is a positive relationship between GDP per capita and IEWB. In this paper we study a causal relationship between them. In section 2 comes empirical studies about the IEWB, in section 3 discussed about methodology and present data, and in section 4 comes results, and in section 5 comes Conclusion and Recommendation of the study.

2. Empirical Studies

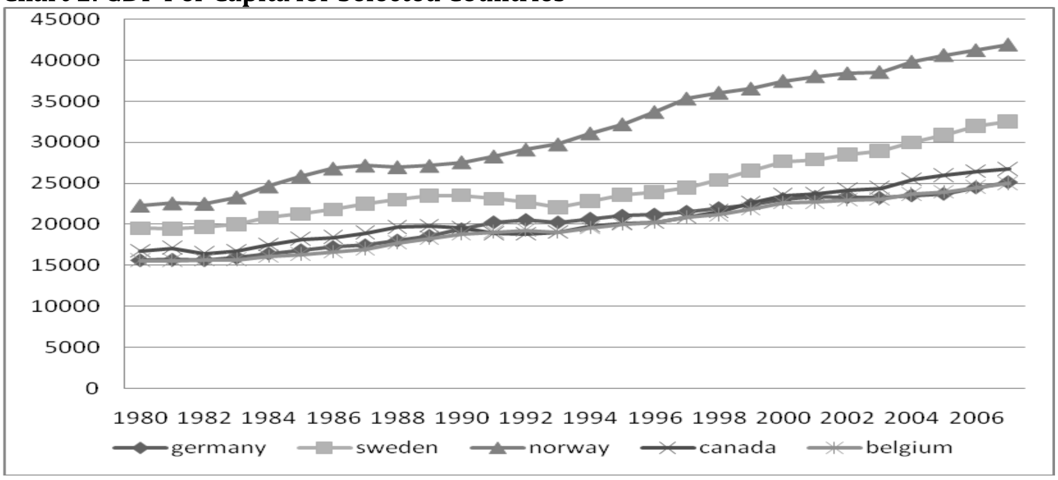
Studies about IEWB started with osberg (1985) who provides an Index of Economic well being for Canada. Again Osberg and Sharpe (1998; 2000; 2009), provide an index of economic well being for

Canada, and in (1999), provide an index of economic well-being for Canadian province and US; and in (2000a; 2002; 2009a), provide an index of economic well being for selected OECD countries. They in the (2003), provide an index of labour market well-being (ILMW) for 16 OECD countries during 1980-2001. Hayo and Seifert (2003), analyses subjective economic well-being in several Eastern European countries from 1991 to 1995. And Hosseini (2007), provide an index of economic well being (IEWB) for IRAN according the data during of 1989-2004. Stevenson and Wolfers (2008), in a study to examine Easterlin paradox among selected country find that there is a positive linkage between subjective economic well-being and GDP per capita. Hosseini and Samimi (2009), provide an index of economic well being (IEWB) for Iran according the data during of 1989-2006.

3. Data and Methodology

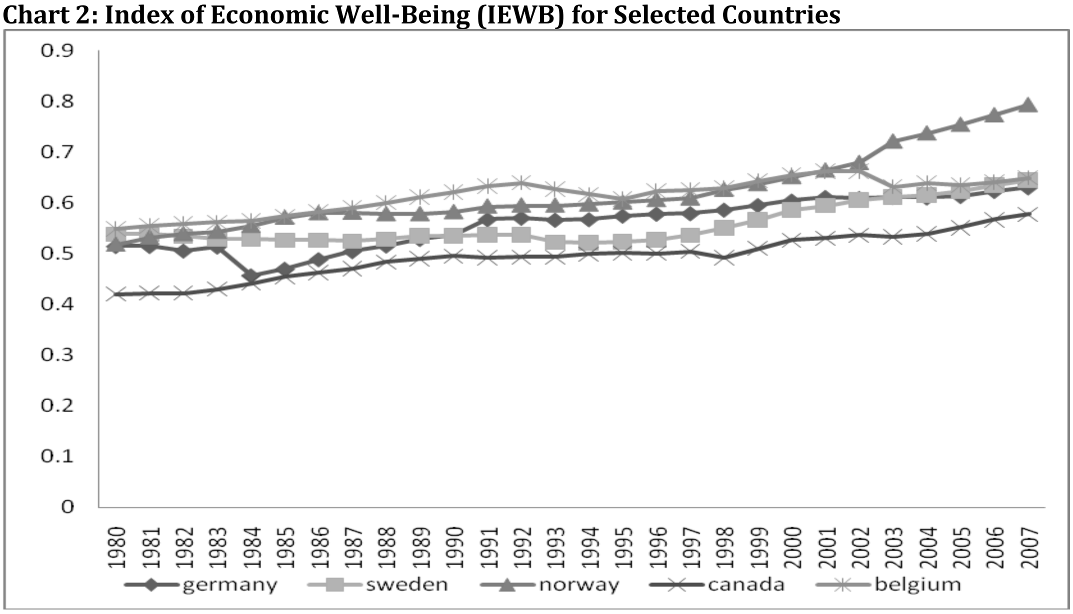
These articles discuses about causal relationship between GDP per capita (chart (1)), and IEWB (chart (2)) during 1980-2007 in selected developed countries include Belgium, Canada, Germany, Norway and Sweden. Data for IEWB obtained from Osberg and Sharp (2009a), and The GDP per capita data is in terms of USA dollars constant 2000 obtained from World Development Indicators (WDI, 2010). To study causality we use granger causality approach.

Chart 1: GDP Per Capita for Selected Countries



Source: World Development Indicator (WDI) (2010)

Chart 2: Index of Economic Well-Being (IEWB) for Selected Countries



Source: Osberg and Sharpe (2009a)

According to the Granger's approach, a variable y is caused by a variable x if y can be predicted better from past values of both y and x than from past values of y alone. For a simple bivariate model, we can test if x is Granger-causing y by estimating equation number (1), and then test the null hypothesis in equation number (2) by using the standard Wald test (Granger, 1969).

$$y_t = \mu + \sum_{j=1}^{p} \gamma_{11_j} y_{t-1} + \sum_{j=1}^{p} \gamma_{12_j} x_{t-j} + u_t \qquad (1)$$

$$H_0: \quad \gamma_{12_j} = 0 \quad for\ j = 1, \dots, p \qquad (2)$$

$$H_1: \quad \gamma_{12_j} \neq 0 \quad for\ at\ least\ one\ j$$

Where μ is a constant and u_t is a white noise process. Variable x is said to Granger-cause variable y if we reject the H_0 in equation (2), where γ_{12} is the vector of the coefficients of the lagged values of the variable x. Similarly, we can test if y causes x by replacing y for x and vise versa in equation number (1).

The assumptions of the classical regression model require that both x_t and y_t be stationary and that errors have a zero mean and finite variance. In the presence of nonstationary variables, the results of regression may shows a significant relationship between the variables when in fact relationship is evidence of contemporaneous correlation rather than meaningful causal relations. Thus, before conducting causality tests, variables must be found to be stationary individually or, if both are nonstationary, they must be co integrated (Samimi, 1996).

4. Results

To test for unit roots in variables, we use the Augmented Dickey Fuller (ADF) test. Since it has been shown that ADF tests are sensitive to lag lengths (Campbell & Perron, 1991), we determine the optimal lag length by using Schwarz Information Criterion (SIC). Results of ADF unit root test reported in table (1). Results show that series for all the countries are non-stationary in level but become stationary in first difference or second differencing.

Table 1: Augmented Dickey Fuller (ADF) Unit Root Test

Country	Variables	p value level	p value first difference	p value Second difference
Belgium	GDP	0.9919	0.0011	-
	IEWB	0.4263	0.006	-
Canada	GDP	0.9526	0.024	-
	IEWB	0.9587	0.0056	-
Germany	GDP	0.9599	0.013	-
	IEWB	0.9119	0.0011	-
Norway	GDP	0.8487	0.0602	0.0003
	IEWB	1.000	0.0943	0.0000
Sweden	GDP	0.8565	0.0936	0.0005
	IEWB	0.9770	0.2730	0.0000

Source: Authors Calculations

Because the variables are nonstationary in their levels, the next step is to test for co integration. A set of variables is said to be co integrated if a linear combination of them is stationary. If x_t is I(d) and y_t is I(d), a regression is run, such as:

$$y_t = \beta\, x_t + \varepsilon_t \qquad (4)$$

If the residuals, ε_t are I(0), then x_t and y_t are co integrated. We use Johansen's (1988) approach, which allows us to estimate and test for the presence of multiple co integration relationships. Johansen test can be expressed as:

$$\Delta y_t = \mu_y + \alpha_y ECT_{t-1} + \sum_{k=1}^{p} \beta_{yx,k}\, \Delta x_{t-k} + \sum_{k=1}^{p} \beta_{yy,k}\, \Delta y_{t-k} + \sum_{k=1}^{p} \beta_{yz,k}\, \Delta z_{t-k} + \varepsilon_{yt} \qquad (5)$$

$$\Delta x_t = \mu_x + \alpha_x ECT_{t-1} + \sum_{k=1}^{p} \beta_{xx,k}\, \Delta x_{t-k} + \sum_{k=1}^{p} \beta_{xy,k}\, \Delta y_{t-k} + \sum_{k=1}^{p} \beta_{xz,k}\, \Delta z_{t-k} + \varepsilon_{xt} \qquad (6)$$

$$\Delta z_t = \mu_z + \alpha_z ECT_{t-1} + \sum_{k=1}^{p} \beta_{zx,k}\, \Delta x_{t-k} + \sum_{k=1}^{p} \beta_{zy,k}\, \Delta y_{t-k} + \sum_{k=1}^{p} \beta_{zz,k}\, \Delta z_{t-k} + \varepsilon_{zt} \qquad (7)$$

Where ECT_{t-1} is the error correction term lagged one period, z is a third endogenous variable that in this article we don't have, and $\beta_{ij,k}$ describes the effect of *k* the lagged value of variable *j* on the current value of variable *i* and ε_{it} are manually uncorrelated white noise residuals(Abu-Bader & Abu-Qarn,2003). Granger causality from variable j to variable i in the presence of co integration is evaluated by testing the null hypothesis that ($\beta_{ij,k}$=α_i $= 0$), for all k in the equation where *i* is the dependent variable, using the standard Wald test. At least one variable in equations (5)–(7) should move to bring the relation back into equilibrium if there is a true economic relation, and therefore one of the coefficients of the error correction terms has to be significantly different from zero (Granger, 1988).

To determine the number of co integrating equations, the Johansen maximum likelihood method provides two different likelihood ratio tests; one is based on the trace statistic and other is based on the maximum Eigen value (Mozumder and Marathe, 2007). We use the trace statistic to test for cointegration. Cointegration implies that causality exists between the two series but it does not indicate the direction of the causal relationship. Results of cointegration test reported in table 2. Results shows that series for any country are cointegrate and have long run equilibrium.

Table 2: Results of Johanson Cointegration Test

Country	Hypothesis no. of cointegration equation(r)	Eigen value	Trace statistic	5 % Critical value
Belgium	None (r=0)	0.660078	27.48043	15.49471
	At most (r≤1)	0.019977	0.504489	3.841466
Canada	None (r=0)	0.509351	17.09055	15.49471
	At most (r≤1)	8.06E-05	0.001934	3.841466
Germany	None (r=0)	0.780536	39.45299	15.49471
	At most (r≤1)	0.119536	3.055353	3.841466
Norway	None (r=0)	0.871695	48.79601	15.49471
	At most (r≤1)	0.151812	3.622366	3.841466
Sweden	None (r=0)	0.557427	19.61770	15.49471
	At most (r≤1)	0.002252	0.054113	3.841466

Source: Authors Calculations

Based on ADF test in table 1 series are nonstationary therefore for causality test we must first do cointegration test, to this purpose we use Johanson cointegration test. Results of cointegration test shows in table (2).results shows that series for each country are cointegrate. Therefore we can do cointegration test. Results of Granger cointegration test shows in table (3). Results show that hypothesis of *GDP does not Granger Cause IEWB,* reject for four country (at level of 5 percent significance), but don't reject for Norway even at 30% significance level, and hypothesis of *IEWB does not Granger Cause GDP,* don't reject for selected countries.

Table 3: Results of Granger Causality Test

country	Lags	Null Hypothesis	F-Statistic	Prob.
Belgium	3	GDP does not Granger Cause IEWB	13.8008	0.00006
		IEWB does not Granger Cause GDP	0.66506	0.5843
Canada	2	GDP does not Granger Cause IEWB	3.58663	0.0457
		IEWB does not Granger Cause GDP	1.19137	0.3235
Germany	2	GDP does not Granger Cause IEWB	7.59702	0.0033
		IEWB does not Granger Cause GDP	0.23325	0.7940
Norway	2	GDP does not Granger Cause IEWB	0.61564	0.5498
		IEWB does not Granger Cause GDP	0.32919	0.7231
Sweden	2	GDP does not Granger Cause IEWB	5.26107	0.0141
		IEWB does not Granger Cause GDP	1.25793	0.3048

Source: Authors Calculations

5. Conclusions and Recommendations

According to result for studying countries except Norway, GDP per capita is the granger causal of IEWB and it mean that is a cause of good situation in whole of economic. With Increase in GDP per capita, economic activity, employment, income, saving, investment and family security improve, and this means a good situation in economic and human life. According to results, GDP per capita as yet can be use as a measurement in judgment about good situation and economic well-being.

References

Abu-Badar, S. & Abu-Qarn, A. (2003). Government Expenditures, Military Spending and Economic Growth: Causality Evidence from Egypt, Israel, and Syria. *Journal of Policy Modeling*, 25,567-583.

Campbell, J., Y. & Perron, P. (1991). Pitfalls and Opportunities: What Macroeconomists Should Know about Unit Roots? NBER Technical Working Paper, 100.

Dickey, D. A. & Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association*, 74,427–431.

Easterlin, R. A. (1974). Will raising the incomes of all increase the happiness of all? *Journal of Economic Behavior and Organization,* 27 (1), 35– 47.

Granger, C. W. J. (1969). Investigating Causal Relations by Econometric Models: Cross Spectral Methods. Econometrica, 37(3), 424–438.

Granger, C. W. J. (1988). Some Recent Developments in a Concept of Causality. *Journal of Econometrics*, 39(1/2), 199–211.

Hayo, B. & Seifert, W. (2003). Subjective Economic Well-being in Eastern Europe. *Journal of Economic Psychology*, 24, 329-348.

Hosseini, M. R. (2007). Analysis of Economic Wellbeing Trend in Iran by Composite Index (1989-2004). Islamic Azad University.

Hosseini, M. R. & Samimi, J. A. (2009). A Composite Measurement of Economic Well-being in Iran. *Journal of Applied Science Research*, 5(10), 1732-1340.

Samimi, J. A. (1996). Study of Causal Relationship Between Fix Capital Formation and Economic Growth in Iran an Empirical Analysis. *Humanities Science of Alzahra University*, 17, 28-131.

Johansen, S. (1988). Statistical Analysis of Cointegration Vectors. *Journal of Economic Dynamics and Contro*l, 12(2/3), 231–254.

Mozumder, P. & Marathe, A. (2007). Causality Relationship between Electricity Consumption and GDP in Bangladesh. *Energy Policy*, 35, 395-402.

Osberg, L. (1985). The Measurement of Economic Well-Being Approaches To Economic Well-Being. Research Studies of the MacDonald Commission, (Toronto: University of Toronto Press), 26.

Osberg, L. & Sharpe, A. (1998). An Index of Economic Well-Being for Canada. Human Resources Development Canada, Research Paper, (posted at www.csls.ca).

Osberg, L. & Sharpe, A. (1999). An Index of Economic Well-being for Canada and the United States. Paper Presented to the Annual Meeting of the American Economic Association, New York, January 3-5, (posted at www.csls.ca).

Osberg, L. & Sharpe, A. (2000). An Index of Economic Well-being for the Canadian Provinces. Centre for the Study of Living Standards, CSLS Research Report, (posted at www.csls.ca).

Osberg, L. & Sharpe, A. (2000a). An Index of Economic Well-being for OECD Countries. Paper Presented to the Annual Meeting of the American Economic Association, Boston, Mass. January 5-7.

Osberg, L. & Sharpe, A. (2001). Comparisons of Trends in GDP and Economic Well-being - the Impact of Social Capital. The Contribution of Human and Social Capital to Sustained Economic Growth and Well-Being, (Ottawa: HDRC), (Proceedings of an OECD/HRDC conference, Quebec, March 19-21).

Osberg, L. & Sharpe, A. (2002). An Index of Economic Well-being for OECD Countries. Review of Income and Wealth, 48(3), 291-316.

Osberg, L. & Sharpe, A. (2003). An Index of labour market Well-being for OECD Countries. CSLS Research Report, Centre for the Study of Living Standards, (posted at www.csls.ca).

Osberg, L. & Sharpe, A. (2009). New Estimates of the Index of Economic Wellbeing for Canada and the Provinces, 1981-2008. CSLS Research Report, Centre for the Study of Living Standards, (posted at www.csls.ca).

Osberg, L. & Sharpe, A. (2009a). New Estimates of the Index of Economic Wellbeing for Selected OECD Countries, 1980-2007. Centre for the Study of Living Standards, CSLS Research Report, (posted at www.csls.ca).

Stevenson, B. & Wolfers, J. (2008). Economic Growth and Subjective Well-being: Reassessing the Easterlin Paradox. NBER Working Paper Series, Number 14284.

World Bank, (2010).Word Development Indicators (WDI) (2010). Available Online athttp://databank.worldbank.org/ddp/home.do (accessed August 2010).