

## A Composite Measurement of Economic Well-being in Iran

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**Abstract:** The objective of this paper is to apply an index of economic well being (IEWB) for Iran and to compare trends in Gross Domestic Product (GDP). IEWB was developed by the centre for the study of living standards (CSLS) in 1998. It covering consumption, wealth, income distribution and economic security is a suitable composite index measuring well-being at both partial and comprehensive levels. In this paper IEWB as well as its trend have been measured for 1989-2006 in Iran. In order to estimate the trend of total IEWB, we have used a uniform weight (i.e. 0.25) for all four dimensions and biased to dimensions. The results show trend in IEWB similar to trend in per capita GDP except to 1991 and 2002. However, growth in IEWB was less than growth in per capita GDP. Some events like a high inflation changes or inequality have created difference between IEWB trend and per capita GDP. Also, the larger the relative weight given to the economic security, the closer would be IEWB and GDP per capita trends.

**Key words:** Economic Welfare; Index of Economic Well-Being (IEWB); Economic Security; Income Distribution; GDP; Iran.

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### INTRODUCTION

Per capita gross domestic product (GDP) increased approximately by 76 percent over the 1989-2006. Per capita GDP is concentrated on consumption and ignores other effective dimensions of economic well-being. GDP is a measure of the aggregate market income of a society which does not reveal the saving rates. Also, incomes are uncertain and unequally distributed. Hence, a better estimate of well-being of society should consider the following variables:

1. Current effective per capita consumption flows;
2. Net societal accumulation of stocks of productive resources;
3. Income distribution;
4. Economic security;

In 1998 the Centre for the Study of Living Standards (CSLS) in Canada developed the Index of Economic Well-being (IEWB) based on the above four components of economic well-being. In other words IEWB covering consumption, wealth, income distribution and economic security is a suitable composite index measuring well-being at both partial and comprehensive levels. The detailed four components of economic well-being are:

1. Effective per capita consumption flows, including consumption of marketed goods and services; government services; effective per capita flows of household production; leisure; household size; and changes in life span.
2. Net societal accumulation of stocks of productive resources, including net accumulation of tangible capital, housing stocks, net changes in the value of natural resources stocks, environmental costs, net changes in the level of foreign indebtedness, accumulation of human capital, and the stock of R&D investment.
3. Income distribution, including the intensity of poverty and the inequality of income.
4. Economic security from job loss and unemployment, illness, family breakup, inflation, and poverty in old age.

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The index of economic well-being has been applied to measurement of economic well-being trend in different countries around the World. For example Canada (1998), OECD countries (2000), Canada & United States (2001), Selected OECD countries (2003), and the framework has also been applied to the development of an Index of Labor Market Well-being (ILMW) for Canada, United States and OECD countries by Osberg and Sharpe. Hosseini & Samimi (2009) have applied IEWB for to measure economic wellbeing trend in Iran from 1989 to 2004.

Following the above discussion, the purpose of the present paper is to measure economic well-being trend in Iran using IEWB during 1989-2006. Selection of variables in each dimension depends on the availability of data in Iran. In order to aggregate variables and well-being dimensions we have normalized data using the first year of the first Iranian development plan (i.e. 1989) as the base year (Hosseini, 2007). Also, in order to estimate the trend of total IEWB we have used a uniform weight (i.e. 0.25) for all four dimensions and biased to dimensions. Figure 1 is a schematic representation of the four components of the economic well-being and sub-components in Iran.

## **2. Average Consumption Flows:**

The easiest part of current consumption to measure is purchased consumer goods and services. Data on aggregate real personal consumption in constant prices are available from the national accounts, kept by virtually every country in the world. Population estimates, to calculate per capita personal consumption from the total consumption estimates from the national accounts, are also kept by most countries.

A more accurate measure of effective consumption flows, however, would include, in addition to measured consumption, adjustments for leisure, household size, regrettables, the underground economy, unpaid work, positional goods and life expectancy.

As shown in the mathematical form up, total per capita consumption is defined average private in addition to governmental consumption. In this paper, average private consumption is adjusted to changing household economies of scale and life expectancy (Hosseini, 2009). We adjust per capita private consumption flows in each year upward by the percentage increase in life expectancy relative to the base year (1989). The "LIS" equivalence scale (i.e. the square root of family size) has been applied to average family income to construct an index of equivalent family income (1989= 100), which is used to adjust private consumption per capita (Osberg, 1985).

There are reasons to believe that having a long life is an important component of economic wellbeing. Presumably people care about both how much they consume per year, and how many years they get to consume it.

Life expectancy has increased significantly in 1989-2006 (from 62.9 in 1989 to 72 in 2006). Also, Changes in average household size has decreased from 5.14 in 1989 to 4.03 in 2006. Data on life expectancy are taken from the Management and Planning Organization and private and public consumption data are collected from the Central Bank of Iran.

As shown in table 1, between 1989 and 2006 increase in real per capita total consumption was about 65 percent. Figure 1 shows the trend of total consumption.

## **3. Wealth:**

If individuals alive today care about the well-being of future generations, measurement of trends in current well-being should include consideration of changes in the well-being of generations yet unborn. This consideration of future generations can also be justified on the grounds that a concept of "society" should include both present and future generations. The well-being of future generations depends on their inheritance of real productive assets, broadly conceived to include natural and human resources as well as physical capital stock (Osberg, 1998).

The physical capital stock includes fixed capital stock of agriculture, oil, industries and other sectors, R&D stock, foreign investment and indebtedness, environmental costs(CO2 emissions) and capital human stock (Osberg, 1999).

Data for the net fixed capital stock, expressed in constant prices of national currency units, have been taken from the management and planning organization in Iran for during (1989-2006) (Osberg, 2000a). Between 1989 and 2006, the increase in the fixed capital stock, on per capita basis, was 62 percent (Table 2).

In an era of rapid technological change, the stock of R&D capital is valued at expenditure on research and development can be accumulated, and a depreciation rate of 20 percent on the declining balance is assumed (Osberg, 2002b) (Table 2).

This paper estimated investment in human capital stock based on the using cost per year of train and education investment at all of levels (primary, secondary and post secondary).

Changes in the level of air and water pollution could be considered an important aspect of the wealth accumulation. Probably CO<sub>2</sub> emissions are the best of indicator for increased emissions greenhouse gases. Fortunately, data are available on these emissions and it is possible to estimate the cost of these emissions. Since global warming affects all countries, we estimate world total cost of emissions and allocate these costs on the base of a country share of world GDP (Salzman, 2003). These costs can then be subtracted from the stock of wealth to obtain an environmentally adjusted stock of wealth. We have estimated the social costs of CO<sub>2</sub> emissions at \$20 U.S per ton in 1990 (Sharpe, 1999). Data have been changed to current money by fixed exchange rate. Between 1989 and 2006, it increased about 900 percent (Table 2).

Increase in the level of net foreign indebtedness is reduced economic wellbeing within a given country. Estimates of the net position, expressed in U.S dollars for some years and current money of Iran in other years, are published in the central bank yearbook of Iran. These data have been changed to current money and deflated by the GDP deflator and adjusted for population to obtain real per capita net foreign indebtedness. Per capita net internal investment, too, like to measure per capita net foreign indebtedness obtained from available data.

As the estimates of all variable in wealth dimension, the R&D capital, net foreign debt, and environmental degradation are expressed in value terms, we aggregate and present on a per capita basis. Net foreign debt per capita is a negative entry, while the social costs of CO<sub>2</sub> emissions are subtracted from the stocks of wealth. In table 2, estimates for the six components of the wealth stock and index of total real per capita wealth is shown. Over the 1989-2006 index of total real per capita wealth is increased about 56 percent.

#### **4. Income Distribution:**

The more equal society is likely to generate more aggregate utility, because an additional unit of income means less to a millionaire than to a pauper, economists tend to agree that "diminishing marginal utility" is a reasonable assumption. The idea that "Social Welfare" depends, in general, on both average income and the inequality of incomes has a long tradition in welfare economics. In order to, index of IEWB is attained to both measure of inequality and poverty intensity. However, in measuring the level of social welfare, the exact relative weight to be assigned to changes in average incomes, compared to changes in inequality, can not be specified by economic theory (Shateri, 2007).

In this study we use the index of Greer, Torboc and Foster (G.T.F index) on poverty intensity and Gini coefficient on measure of inequality. The overall index of equality is a weighted average of the indices of poverty intensity and the Gini coefficient. Thus, it is important that considered the allocation relative weight to be assigned to changes in two cases. In this study we allocate weight of 0.75 on measure poverty intensity and weight of 0.25 on GINI coefficient (Smith, 2003). In order to reflect the convention that increases are desirable, first, the overall index of equality is multiplied by -1, then added to 2. Table 3 shows the indices of G.T.F, Gini and overall Index of inequality.

As shown table 3, overall index of equality is increased about 43 percent over the 1989-2004.

#### **5. Security:**

If individuals knew their own economic futures with certainty, their welfare would depend only on their actual incomes over their lifetimes, since there would be no reason to feel anxiety about the future. However, if the human situation is one of "living in present, anticipating the future", then uncertainty about what the future holds will decrease the current economic well-being of risk averse individuals. Although people try to avoid risk through social and private insurance, such mechanisms do not completely eliminate economic anxieties, which have to be considered a subtraction from well-being. Osberg (1998) has argued that economic insecurity is, in a general sense, "the anxiety produced by a lack of economic safety – i.e. by an inability to obtain protection against subjectively significant potential economic losses." Ideally, one would measure trends in economic security with data which included (for example) the percentage of the population who have credible guarantees of employment continuity and the adequacy of personal savings to support consumption during illness, unemployment, inflation and single parent. However, such data are not widely available.

In this paper, we construct measures of the percentage change over time in economic risks associated with unemployment, illness, divorce rate and inflation rate. Since data for the poverty of old age was not available, the risk with old age ignored. The risk of an economic loss associated with the event is modeled as a conditional probability, which itself is the product of a number of underlying probabilities. We weight the prevalence of economic risks by the proportion of the population that it affects.

We have taken the multiplied percentage of unemployed who claim regular unemployment insurance to employment/population rate as a proxy for the risk of unemployment, the share of private medical care expenses in consumption costs as risk of illness, divorce rate for risk with poverty of single parent families, the changes of inflation rate as risk of inflation.

The four risks discussed above have been aggregated into an index of economic security using as aggregation weights the relative importance of the four groups in the population:

- \*For unemployment, the proportion of the active population in the total population.
  - \*For illness, the proportion of the population at risk of illness, which is 1 00percent.
  - \*For single parent poverty, the number of households of the total population as a proxy.
  - \*For inflation, the proportion of the population covered by fixed wage in the total population.
- The above proportions have been normalized for all years to one (Table 4).

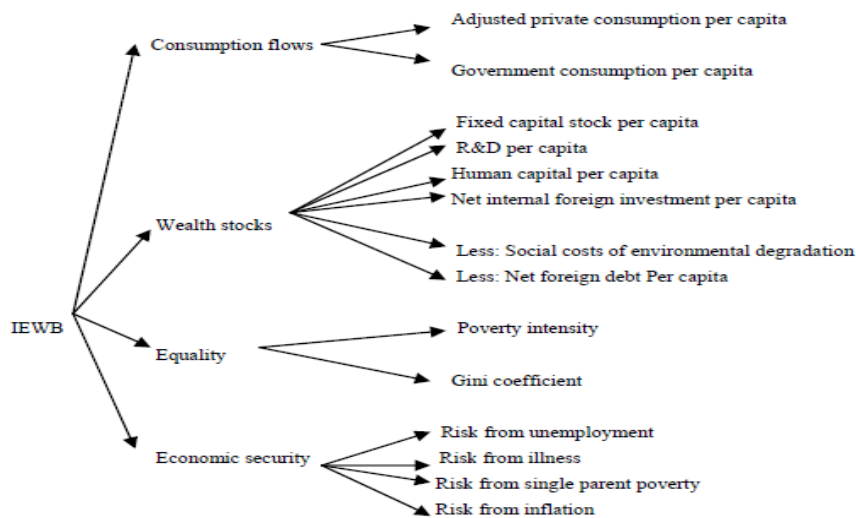
As shown figure 4, index of economic security is increased about 79 percent in three development plan in Iran, at least as measured by the variable covered. The growth rate of economic security is higher to other dimensions.

Trends in any index are determined by choice of variables that are included in the index, the trends in those variables, and the weights these variables receive. However, the four components have experienced different trends over 1989-2006 in Iran. Economic security and consumption have grown strongly, While, in stocks of wealth and equality of incomes especially have been weaker (Figure5). Since the four main dimensions are separately identified, it is easy to conduct sensitivity analyses of the impact on perceived overall trends of different weighting of these dimensions.

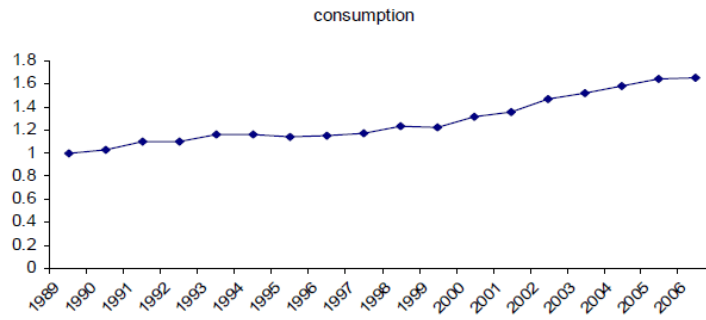
**6. Estimates of the Overall Index of IEWB:**

To combine these four dimensions into a single index it is necessary to specify relative weights for each component. Since the four main dimensions are separately identified, it is easy to conduct sensitivity analyses of the impact on perceived overall trends of different weighting of these dimensions. For discussion purposes, we have used a uniform weighted (i.e. 0.25) table for each of the four dimensions and also used to biased tables toward consumption and economic security. Table 6 shows the changes in index of economic well-being by four weight table. Figure 6 present both a "standard" weighting, which assigns equal weight to each component, and "consumption-oriented", "economic security" alternatives, which are much more heavily weighted to average consumption or economic security .7 and has much less weight on other dimension 0.1.

In figure 7, we compare trends in the "standard" and "alternative" indices with trends in per capita GDP. In Iran, per capita GDP increased approximately by 76 percent over the 1989-2006, but our "standard" and "oriented consumption" indices is much flatter, showing a total increase about of 62 percent over the period. Oriented economic security index is increased about 75 percent and closer to per capita GDP. IEWB shows a large deterioration in 1991 and 2002. In 1991 and 2002 inflation and inequality respectively have changed about 48 and 11 percent. Thus, some events like a high changes inflation or inequality have created difference between trend IEWB and per capita GDP

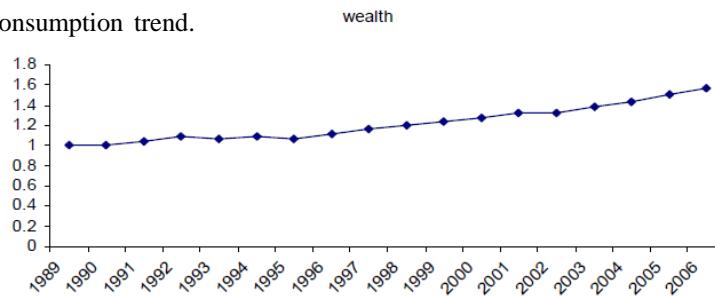


**Fig. 1:** Weighing tree for the IEWB.



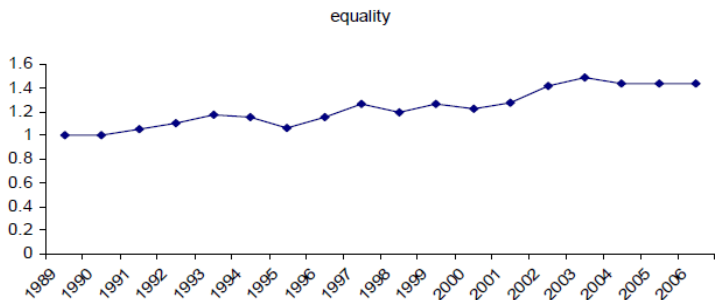
Index 1989 = 1.00

**Fig. 1:** Index of total consumption trend.



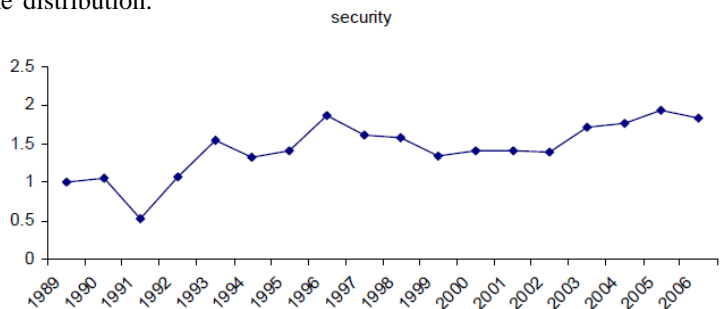
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**Fig. 2:** Index of total wealth.



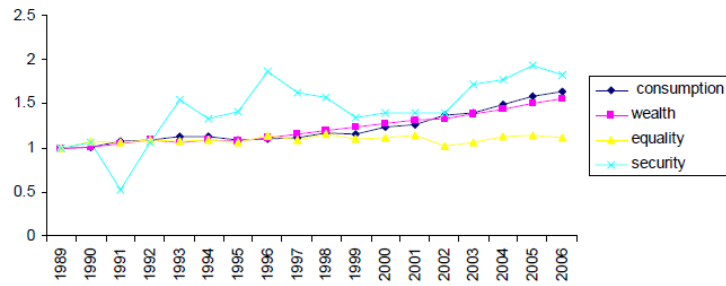
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**Fig. 3:** Index of income distribution.



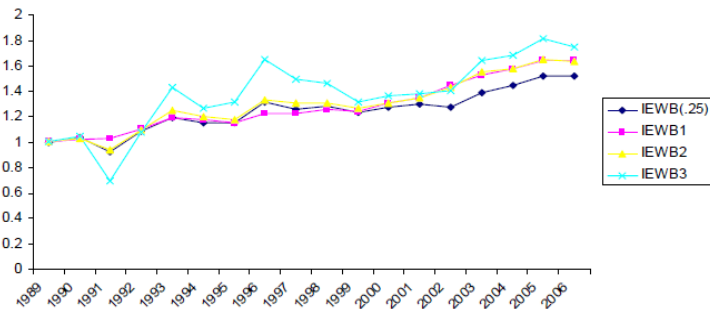
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**Fig. 4:** Index of economic security.



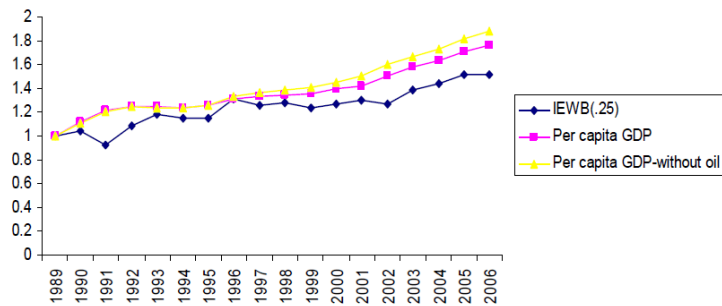
Index 1989 = 1.00

Fig. 5: Dimensions of the index of economic well-being.



Source: Table 6.

Fig. 6: Trends in indices of economic well-being.



Index 1989 = 1.00

Fig. 7: Trends in IEWB and per capita income.

Table1: Private Consumption in Iran 1989-2006.

Year	Private consumption (A) Millionrial rial	Index of life expectancy (B)	Index of the square root of family size (C)	Governmental consumption (D) Million rial	Adjusted pri.cons. E = (A*B*C) Million rial	Total cons. F=E+D	Index of totalcons.
1989	2.04	1	1	.58	2.04	2.63	1
1990	2.06	1.02	.99	.59	2.1	2.7	1.02
1991	2.20	1.02	1.00	.62	2.27	2.9	1.1
1992	2.25	1.03	.98	.60	2.30	2.91	1.11
1993	2.27	1.04	.98	.71	2.35	3.06	1.16
1994	2.27	1.05	.98	.71	2.4	3.07	1.17
1995	2.20	1.06	.98	.68	2.31	2.99	1.14
1996	2.24	1.10	.97	.66	2.39	3.05	1.16
1997	2.3	1.10	.97	.62	2.46	3.09	1.17
1998	2.42	1.10	.97	.64	2.6	3.24	1.23
1999	2.46	1.10	.96	.59	2.63	3.23	1.22

**Table 1:** Continue.

2000	2.6	1.11	.96	.65	2.80	3.46	1.31
2001	2.67	1.12	.96	.66	2.90	3.57	1.35
2002	2.93	1.12	.96	.66	3.21	3.87	1.47
2003	3.04	1.13	.96	.65	3.34	4.00	1.52
2004	3.27	1.13	.94	.72	3.52	4.18	1.59
2005	3.44	1.14	.92	.76	3.62	4.34	1.65
2006	3.55	1.14	.89	.71	3.6	4.36	1.65

Sources: Data for total private and government consumption are from statistics of central bank of Iran. Data for life expectancy are from annual reports of management and planning organization in Iran. Data for family size are from Iran statistics centre.

**Table 2:** Wealth in Iran 1989-2006 (millions Rials).

Year	Fixed capital per capita	Expenditure on R&D percapita	Foreign investment percapita	Foreign debt per capita	Social costs of CO2 emissions	Humancapital stock per capita	Index of total real per capita wealth
1989	14.81	.006	-.00015	.0195	.0089	.008	1
1990	14.93	.015	-.00239	.0291	.0080	.016	1.007
1991	15.49	.023	0	.0353	.0072	.020	1.046
1992	16.08	.030	0	.0321	.0057	.022	1.087
1993	16.47	.044	0	.680	.1170	.028	1.063
1994	16.65	.050	.00012	.490	.0890	.024	1.090
1995	16.75	.051	.00072	.935	.0601	.019	1.069
1996	17.08	.053	.00088	.575	.0505	.019	1.116
1997	17.51	.059	.00152	.348	.0425	.017	1.161
1998	17.97	.070	.00057	.336	.0350	.012	1.194
1999	18.52	.084	.00069	.204	.0282	.011	1.242
2000	18.99	.089	.00067	.137	.0255	.014	1.278
2001	19.60	.097	.00093	.110	.0234	.012	1.322
2002	20.34	.113	.03224	.737	.0996	.014	1.328
2003	21.24	.127	.02513	.887	.0906	.017	1.379
2004	22.21	.135	.02347	1.083	.0896	.017	1.432
2005	23.22	.135	.02347	1.038	.0896	.017	1.504
2006	23.95	.135	.02347	.905	.0896	.017	1.562

Source: Data for all of above variables are from annual reports of management and planning organization in Iran.

**Table 3.:** Income distribution.

Year	Gini coefficient	Poverty intensity	Index of Gini coefficient (1989=1) (A)	Index of G.T.F (1989 = 1) (B)	Overall index of inequality C = -1*(.25*A+.75*B)	Overall index of equality D = C+2
1989	.40	9.9	1	1	-1	1
1990	.39	9.9	.96	1	-.99	1
1991	.39	9.2	.97	.9	-.94	1.05
1992	.38	8.7	.94	.8	-.89	1.10
1993	.39	7.6	.97	.7	-.82	1.17
1994	.39	7.9	.97	.7	-.84	1.15
1995	.40	9.0	.99	.9	-.93	1.06
1996	.39	8.1	.95	.8	-.85	1.14
1997	.40	6.5	.98	.6	-.73	1.26
1998	.39	7.4	.96	.7	-.80	1.19
1999	.40	6.4	.97	.6	-.73	1.26
2000	.39	7.0	.97	.7	-.77	1.22
2001	.39	6.4	.97	.6	-.72	1.27
2002	.41	4.2	1.02	.4	-.57	1.42
2003	.41	3.4	1.01	.3	-.51	1.48
2004	.40	4.2	.97	.4	-.56	1.43
2005	.4	4.2	.98	.4	-.56	1.43
2006	.4	4.2	.98	.4	-.56	1.44

Source: Data for Gini coefficient is from statistics central bank of Iran. Data for poverty intensity is from Shatory (2007).

**Table 4:** Economic security.

Year	Unemployment risk index	Illness risk index	Single parent index	Inflation risk index	Total economic security index
1989	1	1	1	1	1
1990	1.6	.9	.98	1.21	1.05
1991	1.9	.8	1.01	-3.26	.52
1992	2.4	.9	1.24	-.44	1.06
1993	3.9	1.24	1.40	.15	1.54
1994	3.9	1.16	1.39	-1.34	1.32
1995	4.4	1.07	1.44	-1.01	1.40
1996	4.9	1.17	1.61	1.33	1.86

**Table 4:** Continue.

1997	3.8	1.22	1.59	.63	1.62
1998	3.9	1.24	1.50	-.11	1.57
1999	2.7	1.17	1.71	-.27	1.34
2000	2.6	1.15	1.23	.93	1.40
2001	3.1	1.14	1.17	.23	1.40
2002	4.1	1.09	1.03	-.96	1.39
2003	4.9	1.19	.98	.03	1.72
2004	5.1	1.19	.89	.06	1.76
2005	5.7	1.19	.73	.79	1.93
2006	5.8	1.19	.51	-.36	1.83

Source: Data for unemployment risk index is from macroeconomic office of management and organization (1989-1998), Operation 25 years reports of Republic Islamic of Iran (1999-2004). Data for illness risk index and inflation risk index are from www.cbi.ir. Data for single parent index are from statistics centre of Iran.

**Table 5:** Dimensions of the index of economic well-being.

year	consumption	wealth	equality(GINI&G.F.T)	security
1989	1	1	1	1
1990	1.024347615	1.00781	1.004822587	1.0595081
1991	1.098909716	1.04622	1.05539791	0.5283731
1992	1.105400382	1.08707	1.107234767	1.0665441
1993	1.162156459	1.06367	1.177029027	1.5490404
1994	1.165953835	1.09044	1.157199913	1.3253758
1995	1.136947808	1.0691	1.064927193	1.4053819
1996	1.156698253	1.11668	1.149753874	1.8650623
1997	1.172565524	1.16199	1.261906988	1.6207523
1998	1.229269985	1.19468	1.19492573	1.574893
1999	1.224781258	1.24204	1.265465458	1.3447113
2000	1.3 12907501	1.2788	1.220760921	1.403953
2001	1.352901392	1.32231	1.273453323	1.4044632
2002	1.469640393	1.32854	1.422550368	1.3996062
2003	1.51983072	1.37986	1.485898594	1.7214562
2004	1.585064104	1.43241	1.433197847	1.7693642
2005	1.648778304	1.50388	1.434020346	1.9348419
2006	1.65363244	1.56247	1.439292108	1.8319595

**Table 6:** Overall Well-being index.

year	IEWB(.25)	IEWB1	IEWB2	IEWB3
1989	1	1	1	1
1990	1.024123006	1.024	1.0266	1.0454
1991	0.932225225	1.032	0.9401	0.6899
1992	1.091561527	1.1	1.0943	1.0766
1993	1.237973939	1.192	1.2527	1.4246
1994	1.184742219	1.173	1.1961	1.2691
1995	1.169088471	1.15	1.1793	1.3109
1996	1.322049826	1.223	1.3281	1.6479
1997	1.304303393	1.225	1.3059	1.4942
1998	1.298443037	1.257	1.3036	1.4643
1999	1.269248647	1.243	1.2667	1.3145
2000	1.304105602	1.309	1.3092	1.364
2001	1.338281918	1.347	1.3429	1.378
2002	1.405085221	1.444	1.4262	1.4018
2003	1.52676028	1.523	1.5478	1.6436
2004	1.555008588	1.573	1.5779	1.6836
2005	1.630379877	1.641	1.6521	1.8131
2006	1.621839636	1.641	1.6355	1.7479

IEWB(.25)=.25\*consumption+.25\*wealth+.25\*equality+.25\*economic security.

IEWB1=.7\*consumption+. 1 \*wealth+. 1 \*equality+. 1 \*economic security.

IEWB2=.4\*consumption+. 1\*wealth+.25\*equality+.25\*economic security.

IEWB3=. 1 \*consumption+. 1 \*wealth+. 1 \*equality+.7\*economic security.

**Conclusion:**

Per capita GDP measures effective consumption poorly and it ignores the other dimensions that affect wellbeing. Thus, in this paper we have applied a composite index of economic wellbeing (IEWB) based on four dimensions of economic wellbeing, consumption, wealth, income distribution and economic security in Iran. We have used a uniformed weight table for each of dimensions and the three biased to dimensions.



The results show trend in IEWB similar to trend in per capita GDP except to 1991 and 2002. Some events like a high changes inflation or inequality have created difference between trend IEWB and per capita GDP. However, we found that per capita GDP trend will overestimate the IEWB. To use different weights for dimensions did not change importance to trend of IEWB over than real per capita GDP. But, the larger the relative weight given to the economic security, the closer would be IEWB and per capita GDP trends. Also, Economic security and consumption have increased strongly, while stocks of wealth and equality of incomes especially have shown a weaker performance. Thus, economic security and consumption are important dimensions wellbeing in Iran.

**Appendix: Mathematical formula of IEWB:**

The mathematical formula for the overall index follows:  $IEWB = a_1 \{[C+G]\} + a_2 \{[K+R\&D-D-ED+FDI+HC]\} + a_3 \{[(b)LIM+(1-b)G]\} + a_4 \{[(c)U+(d)I+(e)S+(f)P]\}$

Where; IEWB=index of economic well-being

C = Per capita private consumption (adjusted to life expectancy and family size)

G = Per capita government consumption

K = Per capita capital stocks

R&D = Per capita research and development stocks

D = Per capita foreign indebtedness

ED = Environmental costs that issues to CO<sub>2</sub>

FDI = Net internal foreign investment

HC = Per capita human labor stocks

LIM = Intensity of poverty (Foster, Greer & Torboke index)

G = Inequality index (Gini coefficient)

U = Security from the risk imposed by unemployment

I = Risk to financial security from illness

S = Risk from single parenthood poverty

P= Risk from inflation and c, d, e and f are the normalized proportion in immediate risk of unemployment, illness, single parenthood poverty and inflation, respectively.

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