

The Index of Sustainable Economic Welfare for Pakistan

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ABSTRACT

The Index of Sustainable Economic Welfare (ISEW) proposed by Daly and Cobb in 1989 provides an in-depth and comprehensive analysis of effects of economic growth on human wellbeing as well as for the sustainability of wellbeing. In this paper, we estimated the ISEW for Pakistan and highlight those factors that affecting wellbeing negatively. Findings of the study reveal that, in long run, there is a disconnect between economic growth and human wellbeing. In case of Pakistan, key contributing factors that affects human wellbeing negatively include income inequality, deteriorating international investment position, rapid depletion of natural resources and negative environment effects of economic activities. It is recommended to develop inclusive, sustainable and people centric policies with more focus on human wellbeing instead of absolute economic growth.

Key words: Economic wellbeing, sustainability, threshold hypothesis, ISEW

Mathematics subject classification: 91F99, 62P12, 62P20

Journal of Economic Literature (JEL) classification: Q510, Q560

1. INTRODUCTION

One of the key responsibility of states and governments is to ensure the current as well as future wellbeing of the people (Frey and Gallus 2013). Among the wellbeing policies, economic wellbeing remained at central position during last many decades. It was largely believed that economic growth can lead to the wellbeing of the people, as with the availability of more resources, problem of scarcity will be resolved. Consequently, access to the wealth and material resources will be increased and wellbeing objective will be achieved. In this context, GDP was considered as one of the key measure of economic wellbeing and GDP growth remained central among government policies (Ravallion and Chen 1997).

Although, GDP growth is extensively referred as an indicator of economic wellbeing by the practitioners, it is also widely criticized in this context by ecological as well as social economists (Nordhaus and Tobin 1973, Cobb and Cobb 1994, Kenny 2005, Perrings 2006, Brennan 2008, Stiglitz, Sen et al. 2010).

Plenty of literature is available highlighting the drawbacks of GDP or other related indicators for not adequately capturing the human wellbeing due to two broad issues. First is about the measurement issues i.e. several aspects of wellbeing have not been covered in GDP related indicators. Second question is more fundamental and is about the longer-term relationship of growth and human wellbeing (Max-Neef 1995).

Exclusion of non-market activities like unpaid work, child care and other voluntary services and exclusion of leisure activities are few of the critiques (Waring and Steinem 1988, Bruyn-Hundt 1996, Roy 2012). In addition, GDP or related indicators do not consider inequalities among the society. If at any time, inequality among people increase, it will affect well-being of people negatively but GDP cannot reflect it (Fesseau, Bellamy et al. 2009). It was evident from several studies that, in absence of proper policy frame-work for economic inclusion, growth normally brings more benefits for rich community (Kuznets 1955). Further, economic activities, specifically industrial production leave hazardous impacts on environment but GDP is unable to incorporate such effects on environment (Nordhaus and Tobin 1973, Boopathi and Rameshkumar 2011, Koirala, Li et al. 2011). Another limitation of GDP measures is that such indicators measures only flow of production/services not stock. So, consumption of non-renewable natural resources such as use of oil reserves contribute positively to the GDP. However, there is trade-off between current and future wellbeing, as extensive consumption of such resources increases current wellbeing at the cost of future wellbeing. Such effects cannot be captured through GDP based measures (Almudí and Sanchez 2009, Ranjan 2009, Stiglitz, Sen et al. 2010).

In addition to the above-mentioned measurement related issues with GDP, social economist also raised a question about longer term relationship between growth and wellbeing. Max-Neef (1995) showed that economic growth can increase the wellbeing to a certain level, called threshold point, after that growth may lead to the reduction in wellbeing. This theory was largely supported by the empirical evidences from developed as well as developing countries (Diefenbacher 1994, Rosenberg and Oegema 1995, Jackson, Marks et al. 1997, Stockhammer, Hochreiter et al. 1997, Guenno and Tiezzi 1998, Osberg and Sharpe 1998, Castaneda 1999). Following to this, Lawn and Clarke (2010) presented contracting threshold hypothesis and showed that, as global economy is expending, there is a contraction over the time in the threshold level of wellbeing. It was reflected from their analysis that countries which started their journey on growth path earlier, took more time to reach to the threshold level with higher per capita GDP and higher wellbeing level. The late comer countries on growth path are reaching to the threshold point at quite low level of wellbeing. So poorer and late comer countries can never enjoy the wellbeing level, as enjoyed by wealthier nations.

The economic growth in Pakistan remained volatile historically and exhibits several ups and downs. Several spikes were observed during 1965 (10.4%), 1970 (11.4%), 1980 (10.2%) and 2005 (7.7%). Similarly, economy grew at very low rates during 1971 (0.5%), 1972 (0.8%), 1993 (1.8%) and 2010 (1.6%). Since last five years, a steady growth was observed and currently economy is growing at the rate of 5.7% annually (World Bank 2017). However, how this economic growth is affecting the wellbeing

of a common person, specially the poor ones, remains a question among policy makers and researchers.

This paper is an attempt to measure the economic wellbeing of Pakistan using Index of Sustainable Economic Welfare (ISEW) developed by Daly, Cobb et al. (1989). Paper is structured in two major sections. In section-2, a brief overview of available wellbeing indices and rational for the choice of ISEW is provided. In section-3, computational details as well as findings are presented. Paper is summarized with some key recommendations and way forward.

2. Approaches to measure the economic wellbeing

Approaches as well as measurement criteria for economic wellbeing indices is different from GDP measurement, as more people centric approach is required for wellbeing indices (Posner and Costanza 2011). In literature, plenty of alternate approaches have been proposed to measure the wellbeing as well as sustainability of economic welfare. Broadly, we can categorize these indices into two major groups based on computational criteria, i.e. composite indices and monetary valuation indices. Best example of first category is Human Development Index, which is based upon a set of outcome level well-being indicators. Along with HDI, several similar indices were proposed in the literature and several comprehensive surveys of such indices were carried out (Sharpe 1999, Stiglitz, Sen et al. 2010). Though, composite index approach is quite famous among social scientists due to ease in calculation as well as understanding. The monetary approach is famous among economists as well as policy makers due to several reasons. First, monetary valuation provides all values in common unit of measurement (i.e. LCU or dollar) which makes it comparable to the GDP and related standard indicators. Relative strengths/weaknesses of different dimensions of wellbeing can also compared in monetary indices in a better way due to common unit. Most of composite indices are measured on arbitrary scale and their relative contribution to the main index is either identified by the researcher subjectively, sometime through some statistical criteria (e.g. PCA) or equal weights are assigned. Compared to this approach, monetary valuation provides robust way of comparison among wellbeing dimensions/sub-indices. Mostly, composite indices are based upon output or outcome level indicators and provide results of economic policies. Monetary valuation indices also consider input level indicators (like government spending on health and education), which align them with policy decisions. Indices based upon monetary valuation method incorporate both positive and negative contributors to the wellbeing, so can provide a critical insight into the conflicting sphere between economy, society and ecology (Brennan 2008).

The monetary valuation approach for wellbeing indices was first proposed by Nordhaus and Tobin (1973) in their "Measure of Economic Welfare (MEW)" index, which can be considered as a common ancestor in this domain. On the footprints of Nordhaus and Tobin (1973), several other attempts were made including Index of Sustainable Economic Welfare (ISEW), Genuine Progress Index, Green GDP and Sustainable Net Benefits Index (SNBI). Although, subsequent indices tried to enrich the Nordhaus and Tobin's approach, they deviated from preceding index significantly in methodology. MEW didn't

account for impact of climate change in final index, these indices cover climate related issues using CO₂ emission, ozone layer depletion and other similar indicators. In addition, inclusion of natural resource depletion, international investment position and net capital growth into the index make it more comprehensive and relevant. Nordhaus and Tobin (1973) made several adjustments to the consumption series without any reference to the theory. Subsequent indices specifically ISEW aligned the proposed changes with economic theory, which make these indices more dependable.

One of the major critique on monetary valuation-based indices including MEW and ISEW was the lack of theoretical foundations (Guenno and Tiezzi 1998, Neumayer 1999). However, proponent of ISEW showed that ISEW and related indices have sufficient theoretical explanation, rather some methodological short coming, specifically related to data availability still underpinning the argument. Few relevant economic theories include “economics of community”, “entropic net psychic income” and “threshold hypothesis” (Brennan 2008).

3. Index of Sustainable Economic Welfare (ISEW) for Pakistan

3.1. Methodology and data

Following the footprints of Nordhaus and Tobin (1973), computation of ISEW starts with personal consumption expenditure. Rational of using household expenditure instead of GDP is obvious as material wellbeing is more closely related with income and consumption (Stiglitz, Sen et al. 2010), production can expand while income or consumption decrease or vice versa. In addition, household consumption expenditure is further adjusted to income inequality, using Gini index. So, at any time, if income or consumption level of richer people increases, it will elevate the average consumption level. However, ISEW will incorporate the negative effects of increased inequality on the general wellbeing of community.

The index includes other components of uncanceled benefits into the adjusted consumption expenditure including services from consumer durable, non-paid work and services from public expenditures. Now, at this stage, data limitation affected the accuracy of the index. Alike from GDP measure, where very well-defined criteria are in place to collect the data, ISEW related indicators need to be included in national accounts and nation-wide surveys to ensure the availability of complete data series. In national accounts, rent of house is imputed for house owners. In a similar way, other imputation can be done, including imputation for the value of education and health services, leisure time and non-market activity.

To estimate the monetary value of domestic or household work, two different approaches namely opportunity-cost method and replacement-cost methods can be opted. For opportunity-cost valuation, we need to estimate the number of hours spent by the household members in domestic work, and what household member can earn if he/she opted to spend the similar time in some market job. For replacement-cost valuation, we need to estimate the value of domestic work, i.e. what cost needed to be paid if same services were taken from market (Antonopoulos and Hirway 2010, Dong and An 2015).

Both methods were applied in different contexts in previous studies. In the context of Pakistan, we used former approach mainly due to the availability of data. Total number of household member who remained involved in domestic work were obtained from WDI data set and Labor Force Participation Surveys. Time use surveys, both national wide, and at sub-national level were helpful to estimate the number of hours spent in domestic work separately for rural and urban areas, as well as for fully employed and un-employed women. By combining these series, we were able to get the total number of hours spent in domestic work. This was multiplied separately with the urban and rural women's wage rate series to get the monetary value of domestic work using replacement cost method. Arshad (2008) estimated difference among rural and urban wage rates in Pakistan and was used for the valuation purpose.

Monetary valuation of leisure activities is a bit more debatable as compared to domestic work, as replacement cost method cannot be applied for that purpose. In addition, differentiation between, active vs. passive leisure is also an issue, and there is no consensus, how to estimate the value of passive leisure. In case of Pakistan, availability of data remains a central issue, as nation-wide Time Use Survey was conducted only once, in 2007, which provides cross-sectional (not time series) statistics for the time spent in leisure activities. Therefore, we dropped monetary value of leisure from our estimation.

Next component is to include the non-defensive public expenditure into the index. Guenno and Tiezzi (1998) showed that half of the government spending on education and health can be considered as a non-defensive expenditure and can be included in ISEW. Further to this, model also includes net international investment position and net capital growth. Former series was obtained from State Bank of Pakistan and later from World Bank dataset.

Along with the uncanceled benefits, a series of uncanceled costs occurred due to economic activity need to be subtracted from the index. As recommended by the ISEW proponents, cost of commuting, cost of car accidents, cost of noise pollution, water pollution and air pollution, cost climate change (e.g. Ozon layer depletion etc.), losses of farmland as well as depletion of non-renewable natural resources need to be imputed and subtracted from the index. For the ISEW for Pakistan, we need to drop three indicators mainly due to unavailability of data sets. These include cost of commuting, cost of noise pollution and losses of farmland. A brief overview of imputation criteria for rest of the series is given below.

To assess the monetary value of traffic accidents, data was obtained from multiple sources including Pakistan Bureau of Statistics, UN Asia Pacific Report on traffic accidents and World Road Statistics by International Road Federation. There were still some missing values, so model was estimated for missing value. Automated model selection procedures recommended quadratic model for the data. Estimated series from the quadratic model was used for final analysis. Cost of road accident was calculated for three segments, cost of life loss, cost of injury and cost of vehicle repair. For cost of life loss, average deaths per accidents were used to estimate the number of total losses. Monetary value was estimated using per capita GDP. For cost of vehicle repair, average cost estimated by Kazmi and

Zubair (2014) was used as a starting point and was extrapolated/interpolated for remaining years using inflation rate. On average, per accident, 1.11 cars were crashed/damaged.

To impute the value of cost of water pollution, Disability Adjusted Life Years (DALY) method was used. DALY method was initially developed in early 90s to assess the disease burden. It became increasingly popular among public health practitioners and was widely referred by WHO and other institutions. DALY calculations are based upon the losses of years due to early mortality or morbidity due to any specific disease. For the current analysis, DALY method is used to estimate the life losses, both in term of mortality or morbidity due to water borne diseases. Analysis remained constrained on children under five, as prevalence of water borne diseases remains higher among children and as disease prevalence data was available only for children. Child mortality rates due to water borne diseases were extracted from UNICEF database and were used to estimate the total number of deaths due to such diseases. Average life of corresponding year is used as expected loss due to water pollution. GDP per capita of the same year is used to impute the monetary value of the life losses. Similar to this, imputed value of morbidity was estimated on the basis of average number of days for the spell of one disease and monetary value was estimated using per day per capita GDP. There were several missing values in the series which were estimated using regression model. Data patterns recommended linear decreasing trend and estimated values were replaced with missing values.

To impute the losses due to air pollution, damages due to carbon dioxide (CO₂) emission were used. World Bank released the estimated value of damages due to CO₂ emissions, estimates were based upon the criteria proposed by Lange, Wodon et al. (2018), and used US \$30 per ton of CO₂ as an imputed value of damage.

Cost of Ozon layer depletion is also used as one of the indicator to assess the negative impacts of growth on climate. Social cost of emissions of carbon is calculated by several authors and WB use \$30 per metric ton, as mentioned in above paragraph. However, social cost of other greenhouse gases, specifically, Chlorofluorocarbons (CFCs) was not estimated. However, relative impact of other greenhouse gases can be estimated using "Global Warming Potential" (GWP) estimation. Global Warming Protentional (GWP) values provide a relative value of how much heat a greenhouse gas can traps as compared to CO₂. In case of CFCs, value was 3800 as estimated on second assessment report. This value is used in current analysis. CFCs were the prime cause of Ozon layer depletion and used of these gases remained highest during the era from 70s to early current century. With the advancement of technology, use of CFCs is reduced.

For natural resource depletion, data is obtained from WDI. All estimations were based upon criteria proposed by Jarvis, Lange et al. (2011). Below table briefly summarized the data used for current analysis.

Table 1: Details of indicators, estimation methodology and data sources for ISEW estimation for Pakistan

Theme	Indicator	Estimation methodology	Data source	Contribution
Basis of index	Private consumption expenditure		WDI	
Income inequality	GINI		WDI	
Adjusted base	Adjusted consumption expenditure			A/B
Non-defensive expenditures	Value of domestic labour	Opportunity-cost methods	WDI, National account, surveys	+
	Public health expenditures		WDI/National accounts	+
	Public education expenditure		WDI/National accounts	+
Private defensive expenditure	Cost of commuting	Dropped		—
	Cost of car accidents	Econometric model for missing value DALY method for life losses	Pakistan Bureau of Statistics, UN Report on traffic accidents and International Road Federation	—
Environmental damage	Cost of noise pollution	Dropped		—
	Cost of water pollution	Econometric model for missing value, DALY method for life losses	UNICEF, WDI, Health Surveys	—
	Cost of air pollution	Lange, Wodon et. al (2008) World Bank calculation	WDI	—
	Cost of climate change	Imputation using Global Warming Potential (GWP)	WDI	—
Loss in natural capital	Loss of farmland	Dropped		—
	Depletion of non-renewable resources	Jarvis, Lange et al. (2011)	WDI	—
Investment position	Change in international investment position		State Bank of Pakistan	+
Net human capital	Net capital growth		WDI	+

3.2. Results

This section will briefly summarize the findings of ISEW analysis for Pakistan and will provide a brief comparison with other countries. All findings presented in this section are converted from current price valuation to constant US\$ for the base of 2010.

The overall analysis revealed that GDP and ISEW are not aligned with each other in long run, thus findings support the Max-Neef (1995) hypothesis that wellbeing is not correlated with economic growth in long run. Starting from 1972, where difference between ISWE and GDP was minimal, both series showed some increment. Though, ISEW grew at significantly lower rate, but still both series were showing some improvement. After 1984, GDP series continued to rise, however a sharp decrease in ISEW was observed. This decreasing trend continued, with minor fluctuation till 1998, where ISEW remained at lowest level.

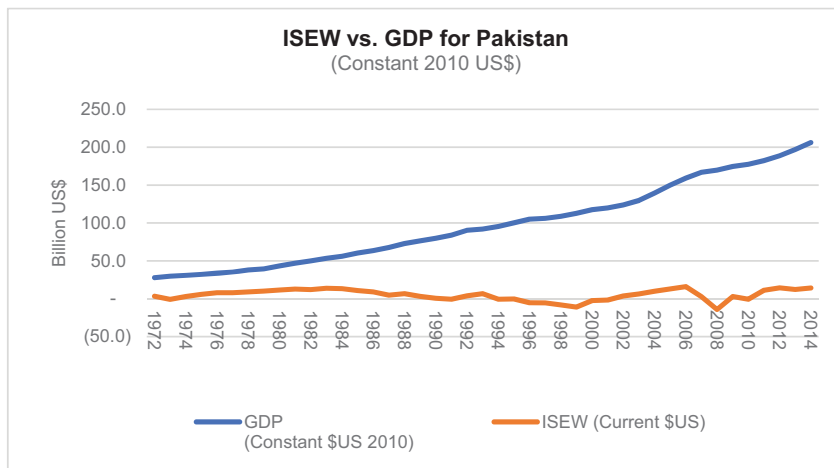


Figure 1. Index of Sustainable Economic Welfare and GDP of Pakistan

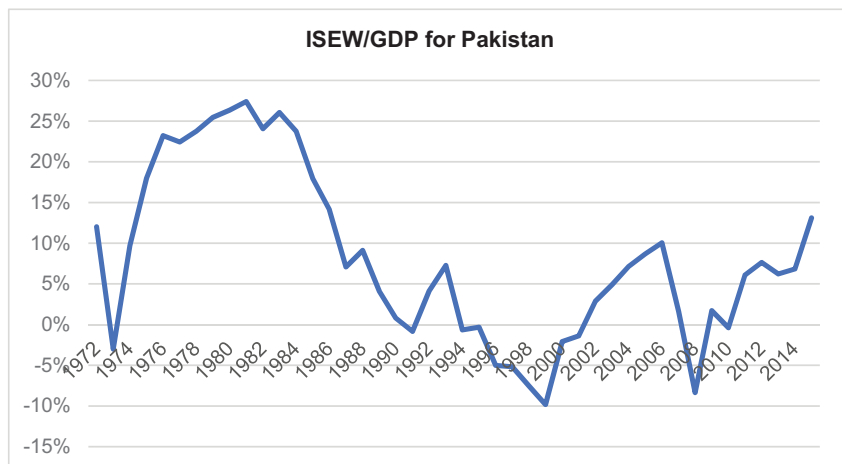


Figure 2. Ratio of Index of Sustainable Economic Welfare to GDP of Pakistan

After 1998, some major fluctuations were observed during the period of 1998 to 2010. After 2010, a steady improvement is observed. Overall, ISEW and GDP doesn't seem to be correlated with each other, and with the passage of time, gap between ISEW and GDP is increasing.

If we compare the findings from Pakistan with the global ISEW trends, it appeared that the gap between ISEW and GDP is much wider in Pakistan as compared to other countries. GDP to ISEW ratio increased from 8.32 to 14.1 for Pakistan from 1972 to 2004, whereas during same period, global GDP to ISEW ratio changed from 1.51 to 2.571 (Kubiszewski, Costanza et al. 2013). So, discrepancy between GDP and ISEW was much higher in Pakistan as compared to other world in 1972 and remained at much higher level even after 32 years. However, in Pakistan, fluctuation in ISEW after 1998 and steady growth after 2009 is a slightly different behavior while comparing with other countries and world's ISEW.

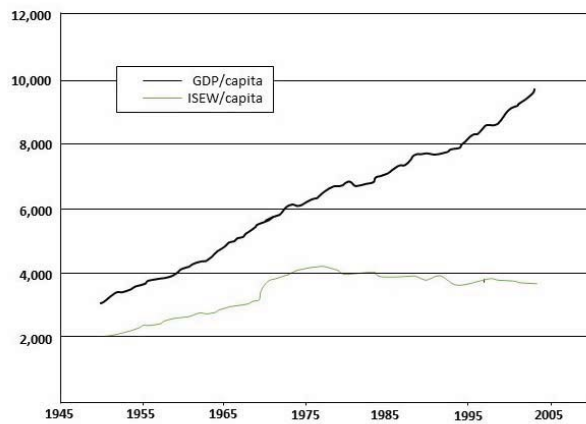


Figure 3. Global GDP per capita and ISEW per capita

3.2.1 Sensitivity analysis:

To further investigate the reasons of variation in Pakistani ISEW, sensitivity analysis is carried out. Sensitivity analysis not only explains the reasons of deviation of ISEW from GDP trend but also highlights the factors that caused fluctuations after 1998 era.

¹ Kubiszewski, Costanza et al. (2013) estimated global per capita index by aggregating data from 17 countries for which GPI or ISEW has been estimated. Discrepancies due to incomplete data were adjusted through comparison with global GDP per capita data.

First sensitivity analysis is carried out for income inequality. As presented in graph 5, income inequality appeared as a one of the key factors that deviates the ISEW from GDP. If we subtract the Gini from ISEW calculations, ISEW will shift upward, with more ascending trend and with less deviation from GDP series. Negative relationship of income inequality with wellbeing is well understood and most of the economist as well as social scientists highlighted inequality as one of the key factor of dissatisfaction with life (Dyner and Ravina 2007, Oishi, Kesebir et al. 2011, Okulicz-Kozaryn 2015).

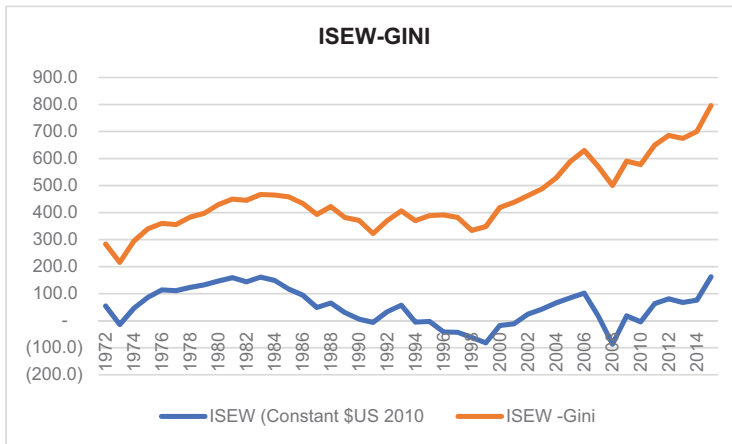


Figure 4. Sensitivity analysis for income inequality

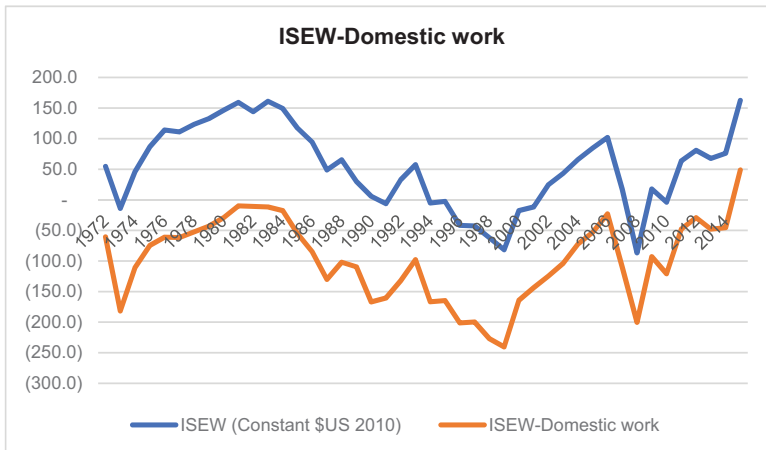


Figure 5. Sensitivity analysis for domestic work

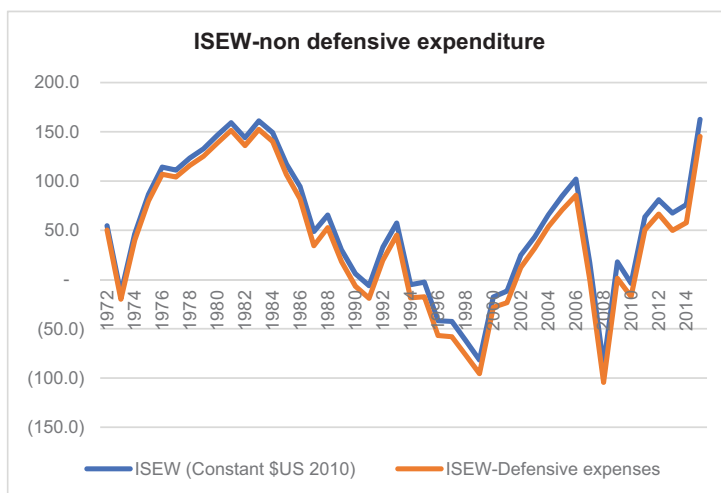


Figure 6. Sensitivity analysis for defensive expenditures

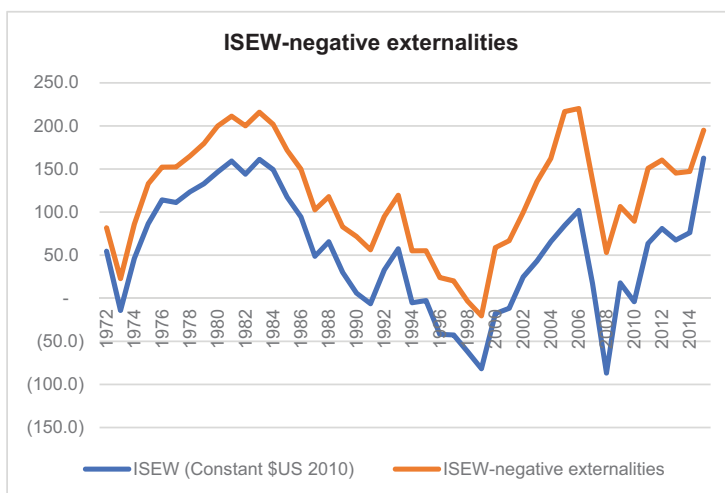


Figure 7. Sensitivity analysis for negative externalities of economic growth

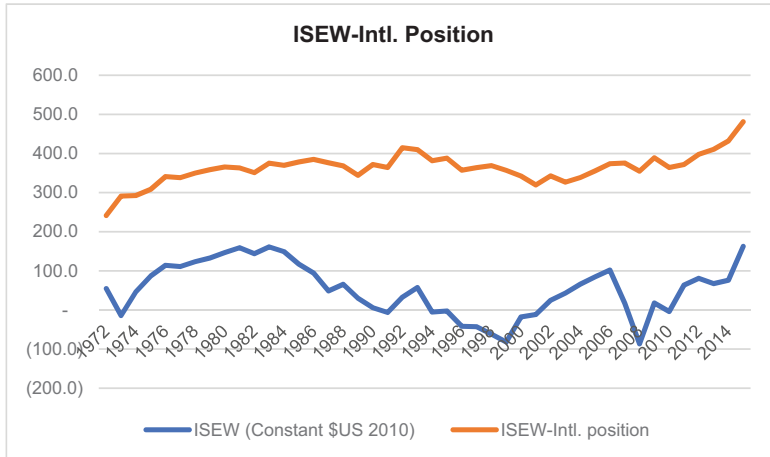


Figure 8. Sensitivity analysis for Net International Investment Position

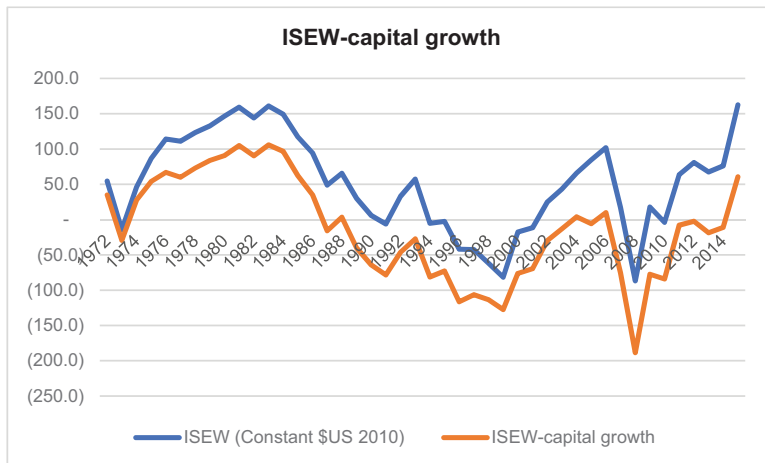


Figure 9. Sensitivity analysis for capital growth

Value of domestic work have significant effect on ISEW, as in absence of it, ISEW will be shifted downward. Although, there is no notable change in the shape of graph, highlighting that fluctuations in ISEW trend are not caused by this variable. Non-defensive expenditure including expenditures on health and education have negligible impact on overall index.

Negative outcomes of growth process showed substantial negative impact on the index. Negative externalities include cost of traffic accidents, cost of water and air pollution, damages due to carbon dioxide emission, ozone layer depletion and depletion of non-renewable resources. Impact of such negative externalities was relatively less in initial years but increased with the passage of time. As presented in graph 8, difference between two lines is at highest level during 2008. Slight improvement

is observed after 2008. After 2000, government of Pakistan started relying more on fossils fuels for power production, as well as, transportation and industry sectors were shifted to natural gas instead of other energy sources, which caused swift depletion of available energy resources in the country. Swift depletion of non-renewable resources can increase the growth for current year however, this is harmful for the economy in a longer run for the sustainability of development and growth. This is the cost that will be paid by the future generations. Other than this, cost of water and air pollution also left significant effects in the index overall. However, monetary cost was reportedly on descending pattern after 1990, whereas cost of air pollution depicted increasing trend up till 2000, after that relatively smooth trend was observed. Cost of ozone layer depletion portrayed normal behavior with gradual increase from 1978, achieved highest level in 1994 and then gradually decreased. After 2014, cost of ozone layer depletion is almost negligible.

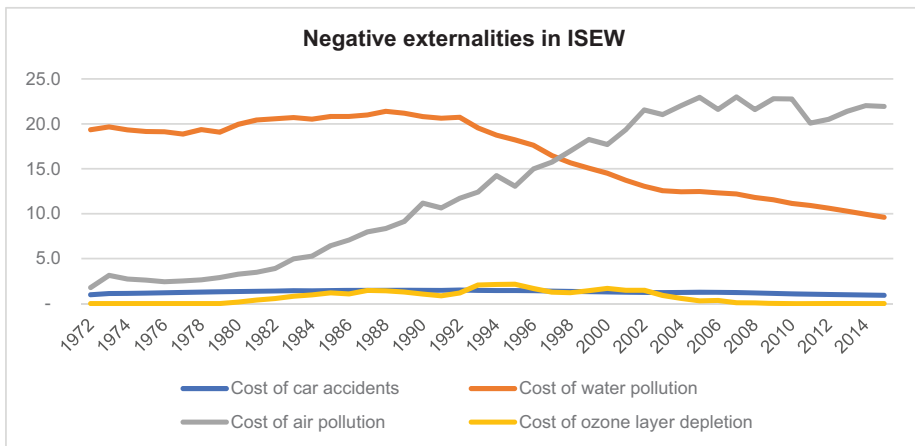


Figure 10. Negative externalities of economic growth included in ISEW

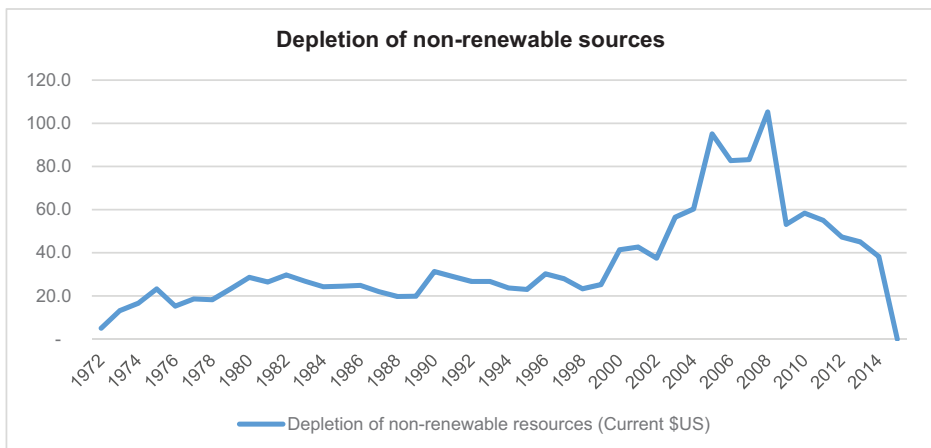


Figure 11. Depletion of non-renewable resources included in ISEW

Another important indicator which have significant contribution in shaping the ISEW in Pakistan is net international investment position. In current analysis, NIIP not only caused the deviation of index of GDP but also explains the fluctuation in ISEW trend after 1998. Although, international investment position remained negative for whole study period, lowest value was observed during the year of 2008 when aggregate NIIP value was (USD 7.2 billion), around 43% of the whole GDP of Pakistan.

Net capital growth contributed positively to the index. Though accumulated value of growth was not much higher in initial year, it was increased gradually and reached to five times higher level after 40 years. Net capital growth has minor impact on the shape of ISEW.

4. DISCUSSION AND CONCLUSION

In summary, analysis of ISEW for Pakistan highlighted the disconnect between GDP growth and ISEW. Findings are in favor of threshold hypothesis and highlighted that absolute growth may have some positive effects on people's wellbeing in short run. However, in long run, a strong relationship cannot be established. Findings of analysis also highlighted the key contributing factors that plays significant role shaping the ISEW for Pakistan. On top of the list, income inequalities in Pakistani society left most significant negative impact on economic wellbeing. Following to this, rapid depletion of non-renewable resources and deteriorating international investment position also posed a threat to the sustainability of economic wellbeing. Other than this, negative effects of economic growth including effects of water, air and noise pollution also played significant negative role in this regard.

The ISEW for Pakistan also highlighted the deficiencies in traditional economic measures, specifically growth-related policies. It appears from the analysis that policy makers should consider the key factor affecting the welfare negatively including policies to reduce the income inequality, use of non-renewable resources in more sustainable manner and to improve the investment position of the country, with less reliance on external assistance and foreign debt.

It is also appeared from the analysis that lack of data on critical indicators is one the limiting factor for such analysis. It is, therefore recommended to include key indicators requires for the analysis in national surveys.

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