An Evaluation of Effective Prosperity Measure: A Case of Wellbeing Index

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ABSTRACT

Wellbeing as a reflection of prosperity has been considered the most desirable real outcome of all human efforts however usually measured through gross domestic output of the economy that has been losing its credibility over the time. The purpose of this paper is to evaluate wellbeing measured through economic, social and institutional aspects by considering the methodological context of Legatum Prosperity Index (LPI) augmented by assigning weights based on Maslow's theory of human needs. In addition, Minsky financial instability hypothesis allowed evaluating the sustainability of economic behavior across the selected aspects. Considering the data related to economic quality, business, education, health, financial security and environment, a comparative analysis has been made to judge the level of prosperity engrossed by these dimensions. Annual data related to Pakistan from 1960 to 2016 has been examined for about hundred indicators reflecting these dimensions after reducing them into 22 exogenous and four endogenous variables through index-transformation by employing Two Stage Least Squares (TSLS) regression technique. The major findings reveal that wellbeing measured through index is more successful to represent the prosperity scenario in case of Pakistan, further it ascertains that social and institutional dimensions are vital complement for wellbeing in addition to economic dimension which cannot uniquely be relied upon for sustainable prosperity.

KEY WORDS: Two Stage Least Squares (IV) Estimation; Legatum Prosperity Index; Measurement of National Income; Social and Institutional Aspects; Minsky's Instability Hypothesis; Maslow' need theory; Wellbeing.

JEL CLASSIFICATION: C36; C43; E01; E02; E32; E71; I31

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1. INTRODUCTION

The term '*happiness*' is interpreted in two philosophical meanings, first referred it as 'value' viz. wellbeing or flourishing while the other one pure psychological akin to 'depression'. The former sense receives main focus in contemporary literature on wellbeing (Haybron, 2011). Since wellbeing effectively elaborate 'what is good for a person' however based on the principle of 'utilitarianism' in moral philosophy needs to be maximized, which is possible only if we explore the components of wellbeing that may be found in relevant theories. Three theories are mainly discussed in literature: (i) 'hedonist theory' referring 'balancing pleasure and pains'; (ii) 'desire theory' relates satisfaction of desires by making choices through 'utility function' and; (iii) 'objective list theory' mentions reflective judgement or intuitions based constituents of items that may cause advancement in wellbeing (Crisp, 2017). It is assumed historically that economic prosperity is the source of happiness however research conducted in the developed countries over the process of development depicts a different picture because of the observation that accelerated ill-being accompanied the rising economic development (Huppert, 2010). Now the emerging vision of prosperity is '*one in which it is possible for human being to flourish, to achieve greater social cohesion, to find higher level of well-being and yet still to reduce their material impact on the environment*' because the components of prosperity and the factors influences the subjective well-being have been found coinciding to each other (Jackson, 2009, pp.35-36)]. Wellbeing may be considered as the ultimate source of happiness and prosperity:

$$\text{Happiness} = f(\text{Prosperity}), \quad \text{where} \quad \text{Prosperity} = f(\text{Wellbeing})$$

Prosperity may better be reflected via wellbeing and its respective components including social, economic and institutional dimensions. Some developed countries have initiated efforts to replace 'GDP' as a measure of wellbeing with somewhat more reflective and effective indicator(s) either 'wellbeing index' like Legatum Prosperity index, happiness index etc., or a group of indicators such as W3 (Giesselmann et al.,2013). The major issue is with poor and developing countries that consist of 40% population below even poverty line (Ortiz and Cummins, 2011) and as a whole 87% of the whole world[2] where availability of income to fulfill their basic needs and amenities of life is too low, hence rise in GDP even with highly skewed distribution genuinely reflects the improvement in the levels of wellbeing. In contrast, in the developed and high income countries meaning of wellbeing or prosperity has moved beyond whatever manifests through GDP. Thus the priorities diverge across developed and developing nations consequently redefining the indicator of prosperity is a primary concern of developed country's policy choice but yet an inconspicuous element in policy design of the developing world as well. Nevertheless providing the original feeling of prosperity is equally challenging in developing countries like Pakistan where such economic indicators like GNI, GDP, Per capita Income are intentionally manipulated for getting political benefits therefore this is the high time to develop or evaluate the emerging indicators of wellbeing and prosperity, so that a true state of economic affairs may be reported and resource allocation can be rectified accordingly. It is reported that in the United Kingdom a parliamentary group related to wellbeing economics has already been established to challenge the GDP as an indicator of national success and replace it by new measure of social progress (Huppert, 2010, p. 1275).

New measure may actually be considered as an effective reflection of prosperity consequently it will allow to reallocate the resources with higher efficiency by reducing concentration of resources from those sectors already achieved a critical level of development towards those far behind comparatively,

[2] As indicated in world development indicator map: http://data.worldbank.org/products/wdi-maps

the prime beneficiaries would mainly be developing countries although developed world is working hard to explore such effective tool to ensure socio-economic justice.

Actually the most important task of this measurement tool should be to achieve and ensure balance amongst all human dimensions to bring about cohesiveness, coordination and even it should include not only the redistribution of resources across various sections of life but the right to use them across generations over time as well. Consequently the mission to reduce poverty in current generation and transferring more safe and resourceful world towards coming generations should be accomplished effectively.

2. THEORATICAL FRAMEWORK AND REVIEW OF EMPIRICAL LITERATURE

Happiness and prosperity are not merely the growth in economic resources as Jeremy Bentham identifies that actions contain highest values are those which maximize the happiness for maximum number of people. Whereas challenging situation has been emerged regarding GDP or per capita income as an estimate of wellbeing because international research on happiness incorporates psychological and sociological aspects besides purely economics context. As various studies have concluded that these factors are the essential components of happiness scenario: personality and genetics; demographic; health and education; economic and work; social life with community relationships and; safety with security (Brown, 2012).

2.1 Prosperity and its Measurement: The emerging credibility deficit in GDP

The issue of measuring welfare has been formally raised in a conference entitled 'Beyond GDP' conducted during 2007 a joint venture of European Commission, the club of Rome, the World Wide Fund and the OECD. Consequently in 2008, Stiglitz commission referred eight dimensions of wellbeing (Radermacher, 2010):

i. Material living standards included income, consumption and wealth
ii. Health
iii. Education
iv. Personal activities and work
v. Political voice and governance
vi. Social connections and relationships
vii. Environment includes both present and future conditions
viii. Insecurity includes both economic and physical

Radermacher (2010) also indicates two risk factors (a) modeling the alternative measures in the absence of data restricts the possible range of indicators and their objectiveness; and (b) choosing the composite indicators out of many requires consensus that ultimately converges again towards a single indicator just like GDP. Some of the 'trade-offs' need to be considered as 'complements' such as relationship between economic expansion and environmental protection. Aggregates may not even be needed because unique tool may not genuinely measure every aspect of life equally well. Further, as development passes through various phases and there is essential need to identify the weights[3] of each sector at a given point of time frame with reference to each stage of development for a comprehensive indicator of wellbeing which can sustain over time and across generations.

According to the founder of Vermont-based organization Donella Meadows:

[3] Importance and contribution of different sectors even varies across countries that are following the same development phase.

'*if you define the goal of society as GDP, that society will do its best to produce* (highest value of) *GDP. It will not produce welfare, equity, justice or efficiency unless you define a goal and regularly measure and report the state of welfare, equity, justice or efficiency*'[4]

In an effort to create awareness regarding new measures of progress, Costana *et al*. (2009) reviewed the historical perspective that why and how GDP has evolved as mostly referred measure of progress in human wellbeing. To eliminate the economic instability after World War II, GDP remained the best tool for the justification of US policies. Later acknowledged by Bretton Woods Conference, IMF and World Bank employed it as a primary measure of economic wellbeing. The most confronting argument is that the gross domestic or national product calculates only '*volume of marketed economic activities*' whether occurred because of destruction or production of destructive items irrelevant of any change in human wellbeing. As evident in the words of President Robert F. Kennedy, '*…it measures everything, in short, except that which makes life worthwhile…except why we are proud that we are Americans'* (Costana *et al*. 2009, p.07). The most relevant deceptions GDP measure may include:

a) It records only monetary value of exchange of goods and service within a specific economy
b) It captures '*marketed activities'* irrespective of the life line of wellbeing bonded through human, natural and social jell that ensures the prosperity within communities.
c) An effort to achieve highest levels of GDP, as quickly as possible, accelerates the depletion of natural resources much more than the rate they renew themselves through natural cycles.
d) It can lead economic wellbeing of a person or society up to a 'threshold level' only as onwards rise in GDP will generate the benefits less than the cost in terms of extreme skewness in income distribution, lost both leisure and portion of natural capital[5]
e) It fails to recognize the escalating gap between rich and poor within a community.
f) GNP is not only considered the poor measure of welfare but also the poor measure of even national income (Daly and Cobb, 1994, p.69)

The possible resolutions include:

i) Corrected GDP measure: index of Sustainable Economic Welfare or now known as Genuine Progress Indicator (Daly & Cobb, 1994) ; Green GDP (Rauch & Chi, 2010) and ; Genuine Savings (Everett & Wilks, 1999)
ii) Indexes without GDP: Ecological footprint (Wackernagel and Rees, 1996); subjective wellbeing (Diener and Suh, 1999) and; Gross National Happiness introduced by King of Bhutan (Costanza et al. 2009).
iii) Composite indexes with GDP: Human Development Index by United Nations Development program in 1990; Living Planet Index by World Wide Fund for Nature in 1998; Happy Planet Index by New Economics Foundation during 2006 (Costanza et al., 2009).
iv) Non-indexed set of variables: National Income Satellite Account; Calvert-Henderson Quality of Life Indicators and; Millennium Development Goals and Indicators (Costanza et al., 2009).

It has been obvious that improvement in quality of (good) life ensures the prosperity in contrast to only rise in pure materialistic wellbeing reflected by GNI, GDP, GNP or per capita income growth. Historically concept of 'good life' was introduced by Plato by referring the quality of life criterion and

[4] https://www.theguardian.com/sustainable-business/2014/sep/23/genuine-progress-indicator-gdp-gpi-vermont-maryland retrieved on August 06, 2017.
[5] Empirically proved by Max-Neef 1995; Talberth, Cobb et al. 2007 cited in Costanza (2009), p.9

his student Aristotle by focusing on happiness. The World Health Organization (WHO) illustrates that the quality of life is

'an individual perception of their position in life in the context of the culture and value system in which they live and in relation to their goals, expectations, values and concerns incorporating physical health, psychological state, level of independence, social relations, personal beliefs and their relationship to salient feature of the environment. Quality of life refers to the subjective evaluation which is embedded in cultural, social and environmental context' (Susniene and Jurkauskas, 2009, pp.58-59).

2.2 Index Construction

2.2.1 Legatum Prosperity Index (LPI)

The 'pursuit of virtue' is the main theme of Legatum Prosperity apparatus where institutional setup ensures discipline however any benefit or damage caused as an outcome of their operations directly depends upon the level of virtue or vice of their leadership respectively. As mentioned by Foundation (2016, p.4-5):

'when the economy and society operate within a virtuous, high trust, service-oriented moral framework, then resources flow efficiently to the most productive people and places, for the benefit of the many. When virtue is weak and a sense of stewardship is absent, wealth is redirected by and towards the governing elite and their crony capitalist friends, leaving fewer resources available for essential investments in either economic growth or social capital'.

To determine the prosperity levels and corresponding factors Legatum Prosperity Index was introduced by Legatum Institute established in 2009 after the de-merger of 'Sovereign Global' a legacy of Edward F. Chandler commenced from 1903. The mission was to "*to generate and allocate the capital and ideas that help people live more prosperous lives*"[6]. It helps to re-define the mechanism used to quantify the wellbeing, prosperity and progress in human life, by incorporating human aspects beyond mere overall or per capita GDP growth. The pillars of prosperity considered by Legatum Institute Foundation (LIF) include:

a) Social Aspects: *health; safety and security; social capital; education and ; environment*
b) Economic Aspects: *economic quality and; business environment*
c) Institutional Aspects: *personal freedom: infrastructure and; governance*

Now the well-being and its macro pillars[7] can be transformed into functional form by assuming that improvements in each one leads to raise the level of well-being as well

Well-being = f *(Social aspects, Economic aspects, Institutional aspects)*

Further segregation of the respective contents of each macro pillar into micro component to observe their respective interdependence and importance (details are further elaborated in table 1), may be categorizes as:

[6] The Legatum Foundation invests to eradicate Neglected Tropical Diseases through the ***END Fund***, abolish modern slavery through the ***Freedom Fund*** and help out-of-school children get back to class through the *Luminos Fund*. This institute expresses its mission by investing in entrepreneurship, the engine of growth and development, through its support of the Legatum Center at MIT, the Demeter Entrepreneurs Support Network, and the Centre for Entrepreneurs. The firm also invests in transforming society by shaping policies and ideas through the Legatum Institute in London.[retrieved through company's own website www.legatum.com 18th May 2017]

[7] Since all variable are measured in form of index hence to differentiate them in terms of their level of application these are referred in terms of 'macro-dimension' and 'micro-dimension' for convenience in this study

Social Aspects = f *(health, safety and security, social capital, education, environment)*
Economic Aspects = f *(economic quality, business environment)*
Institutional Aspects = f *(personal freedom, governance, infrastructure)*

2.2.2 Maslow's Theory of Human Needs

Since wellbeing or prosperity has strong dependence on human needs that may better be comprehended by Maslow's basic needs logical framework. Maslow has identified five major set of need including: (i) the psychological needs; (ii) the safety needs; (iii) the belongingness and love needs; (iv) the esteem needs and; (v) the need for self-actualization with (a) Cognitive need (the desire to know and understand); (b) Aesthetic needs and; (c) Transcendence (helping others to self-actualize) believing that human wants are perpetual in nature and on average each member of society may be partially satisfied or partially unsatisfied with respect to all wants. However, any advancement across hierarchical needs would influence such level of satisfaction (Maslow, 1943, 1970).

TABLE 1: Classification of Variable Set and their Relationship with Maslow's Theory

Importance and Satisfaction of Need Items* (Micro-Framework)	Variables of the Study Transformed into Indices (Macro-Framework)
1. The ability to provide food, clothing and shelter for you and your significant others	API; VAI
2. The opportunity to be financially independent	MONI; LCERI; DSI; IMFDI; EFI
3. The ability to ensure a safe home environment for you and your significant others	GNII; TTI
4. The opportunity to be in a safe working environment	BOPI; ENPI; VOLI
5. The ability to feel loved by your significant others	PFI
6. The opportunity to feel part of a team/group/society	FRI; GSI; HSSI
7. The ability to achieve a sense of accomplishment	EDUI
8. The opportunity to achieve personal satisfaction	ISI
9. The opportunity to contribute to society	RDI; DLFI
10. The capacity to inspire members of society	ICTI; ESI

*9*First column is sourced by "Dillman (2000); Freitas and Leonard (2011); Maslow (1954) cited in Puangyoykeaw and Nishide (2014, p.98)" whereas second columns is linked by the authors.*

Some studies in psychology have evaluated the Maslow's theory like Barling (1977, p.107) who has found some overlapping in hierarchy of five basic needs. Even Maslow considered his own work as asking questions for exploring new area of research rather providing final answers (Brown, 2012, p.42). To match the indexes within the context of Maslow's theory (see table 1) a connection has been developed using individual level importance and satisfaction of the needs items by visualizing their respective macro context. Since such variable-alignment-procedure is purely based on our own micro-macro correlation framework nothing is claimed as the final verdict rather open for further probing and discussion.

2.2.3 Minsky Financial Instability Hypothesis

The elements of economic security and stability has been incorporated through the theoretical framework of Minsky's financial stability hypothesis presented in 1975 focusing the issues of market vulnerability that emerge at the time of boom in these words '*a fundamental characteristics of our economy is that the financial system swings between robustness and fragility and these swings are an integral part of the process that generates business cycles*' (Prestowitz, 2010, pp.153-154).

As prolong prosperity phases induce accelerated investments in riskier assets that act as a catalyst to provoke the reverse outcomes. It has further been observed that if good outcomes perpetually occurred in the past, the financial institutions incline towards riskier projects based on their optimistic expectations and began considering 'risk-return' relationship moving towards low-risk with high-return scenario (Battacharya, 2011). Since the perpetuity of good realizations in financial investments enhances the confidence of credit suppliers as their belief on the system gets strengthened and they become

more willing to increase the supply of investment funds at lower rate. Whereas investors already invested in those projects where risk maintains sufficiently close to lower bound, intentionally move their additional supplies of funds towards relatively riskier business where the size of such funds depends upon the spans and frequency of good realizations i.e., more and more risky projects initiated with lower and lower borrowing rates. However, Fischer argument[8] that over indebtedness leads towards deflation and consequent liquidation of collateralized debt may set in as an outcome. (Battacharya, 2011). Minsky considered that growing debt level is the responsible factor behind rising fragility in the economic system. Since, 'carry trade' occurs when speculative and ponzy finance firms[9] borrow at low short terms rates but lend it to high long term rates. It happened in Asian financial crises where financial institutions borrowed from low interest offering countries and invested in high interest offering countries. Two factors were considered relevant that may cause the financial instability especially for cross border investments. First, interest rate risk – a rise in interest rates in countries from where loan was made – and second, the exchange rate exposure – appreciation of hard currency[10] in which loan was taken (Wolfson, 2002, p.396), therefore:

Economic Fragility = f (*foreign interest rates risk, exchange rate exposure, stock of debt*)

Further debt-deflation process sets in when interest rates start rising in countries from where borrowings have been made, causes pressure on sales to liquidate the investments swiftly that leads the prices fall down and exaggerate the real value of debt commitments, ensuing default and capital outflows, exchange rates depreciate as more hard money is needed for servicing this debt, further squeezing the prices and aggregate demand allowing expansion in real values of debt and loan default. However, two possible obstruction may resist this process: (a) intervention by big (State) bank as a lender of last resort however effective only if the bank is capable to repay loans in international currency because usually the bank has the capacity to prove lender of last resort in case of local currency but probably not in case of international currency; and (b) big government by raising the aggregate demand with elevated government expenditures. Minsky theory within a global context reveals that financial fragility is the emerging outcome of funds ability to cross national borders for the purpose of investment made in local market that promotes exchange rate exposures and global interest rate speculation including carry trade. Subsequently a rising trend in foreign interest rates and loss of local currency that needs to be converted back into international money with maturity of investment drive the financial system at the brink of crises. It confirms that contagion may activate even without any "unusual" event (Wolfson, 2002, p. 397).

We may conclude that those studies which analyze the relationship between income and wellbeing have found effect of extra income on wellbeing asymptotically[11] small and concluded that personal and social factors caused much more influenced on wellbeing compare to economic factors, as in the past less attention was made to quantify utility to engross the gains of national income growth on the wellbeing that in future may become possible through more refined measures of life satisfaction especially when it is becoming evident that happiness increases the productivity of people (Streimikiene & Grundey, 2009).

[8] because of variety of externalities such as fire sales, bank run, network, frozen markets and the externality arises due to failure of investors to incorporate impact of their decisions on borrowing rates

[9] Speculative *finance* : when firms have to refinance some of their short term liabilities; *Ponzy finance* : when firms have to borrow to meet current interest payments [(Wolfson, 2002) p. 394]

[10] Relatively strong and more valuable currency like US dollar

[11] Share of proportional effect on wellbeing by the same amount of income growth decreases successively and replaces by the contribution made through other social and personal factors

TABLE 2: CORRESPONDING INDICES OF LEGATUM PROSPERITY INDEX FOR MASLOW'S PERSPECTIVE

	LEGATUM PROSPERITY INDEX BASED DIMENSION OF PROSPERITY		MASLOW'S PERSPECTIVE	INDEX NAME	Weights* (α_w)
WELBEING INDEX (WBI)	ECONOMIC ASPECTS INDEX (EAI)	Economic Quality	Biological and Psychological needs	AGRICULTURAL PRODUCTION INDEX	API=5
			Biological and Psychological needs	MONETARY INDEX	MONI=2
			Self-Actualization	VALUE ADDED INDX	VAI=5
			Biological and Psychological needs	GROSS NATIONAL INCOME INDEX	GNII=3
		Business Environment	Self-Actualization	INVESTMENT SAVINGS INDEX	ISI=5
			Esteem Needs	BALANCE OF PAYMENT INDEX	BOPI=3
			Safety Needs	PUBLIC FINANCE INDEX	PFI=3
			Self-Actualization: Transcendence	FOREIGN RESOURCE INDEX	FRI=4
			Safety Needs	EXCHNAG RATE INDEX	LCERI=2
		Personal Freedom	Self-Actualization	DEBT SERVICING INDEX	DSI=1
	INSTITUTIONAL ASPECT INDEX (IAI)	Personal Freedom	Self-Actualization	RESEARCH and DEVELOPMENT INDEX	RDI=5
		Governance	Esteem Needs	IMF DEPENDENCE INDEX	IMFDI=1
		Governance	Safety Needs	GOVERNANCE SUPPORT INDEX	GSI=3
		Infrastructure	Self-Actualization: Cognitive Needs	INFORMATION and COMMUNICATION TECHNOLOGY INDEX	ICTI=5
			Self-Actualization: Cognitive Needs	ENERGY and POWER INDEX	ENPI=5
			Self-Actualization: Aesthetic Needs	TRANSPORT and TRAVEL INDEX	TTI=5
	SOCIAL ASPECTS INDEX (SAI)	Education	Self-Actualization: Cognitive Needs	EDUCATION INDEX	EDUI=5
		Environment	Self-Actualization: Aesthetic Needs	ENVIRONMENTAL SACRIFICE INDEX	ESI=4
		Social Capital	Belongingness and Love	DEMOGRAPHIC and LABOR FORCE INDEX	(A)DLFI=4
		Health	Biological and Psychological needs	HEALTH SUPPORT SYSTEM INDEX	(A)HSSI=4
		Safety and Security	Safety Needs	VOLITILITY (INSTABILITY) INDEX	VOLI=1
	Minsky's approach			ECONOMIC FRAGILITY INDEX	EFI[¥]

*Arbitrarily allocated weights based on their respective role in wellbeing under normative approach: 5=High; 3=Moderate and 1=Low
[¥] Index used as an exogenous variable in each model to capture Minsky's effect

3. METHODOLOGY: MODEL DESIGN AND ESTIMATION

3.0 Data, Variables and Measurement of Indices

In order to construct a specific prosperity index by using approach followed by Legatum Prosperity Index, this study has incorporated the available data sets from the world development indicators provided by the World Bank. More or less standardized variables have been used to construct various indices related to different dimensions of wellbeing and prosperity in human life. Mainly focused dimensions include social, economic and intuitional aspects with the aim to comprehend all possible indicators of respective dimension and to reduce the total number of possibly interactive variables to develop such a model that can easily be interpreted by avoiding the complexity of large number of variable. Statistically principal component or factor analysis can directly generate factors and their corresponding scores may directly be used as an index as well. However, theoretical underpinning used to collect data related to the selected variable by the World Bank necessitates that we should classify the data in different categories and then use all associated variables to develop an index of that category. Nevertheless principal component analysis has been employed to ensure that the each index developed theoretically should have statistical support as well but unluckily factors generated at initial stage pose these limitations:

a) A given factor has loaded those variables which are divergent in nature and fails to be the part of relevant dimension according our normative and theory based classification with maximum loading.
b) As initial few factors always loaded with maximum number of variables and consequently may cause skewness across possible dimensions reflected by these factors. This couldn't fulfill our purpose of getting proper representation of each dimension.

An effort has been made to align the variables in each index according to the distribution of variables mention in the world development indicators classification although there is some overlapping in the classified data but not influenced in our case because of deliberate selection of variables. Only those variables have been engaged which contained a reasonable annual series of data mainly started from 1960 to 2016 with exception to both governance index and values of Legatum Prosperity Index. Moving average time series is used to impute missing values in some cases. The indices in various sub-dimensions have been developed to include all possible context of human wellbeing by including possibly all relevant variables subject to the availability of reasonable set of data. The major limitation is the sample biasness towards economic perspective because of already matured standardization of variables and data collection procedures compared to other dimensions where such developments have not been initiated since long. These possible sub-dimensions in form of indices help to develop a model determining the factors accelerating prosperity in Pakistan. Further, a comparison has been made to evaluate the changes happening in these indices with gross domestic product (GDP) and LPI. Initially a graphical comparison (see figure 1) allows evaluating and choosing the valid strategy as a measure of prosperity or wellbeing[12].

Methodology employed by Legatum prosperity index was the major source of guidance while choosing the set of dimension and respective variables. Furthermore, Moslow's theory helped us to connect the need hierarchy as a reflection to true source of human prosperity with the components of Legatum Prosperity Index that have been captured through matrix of various indexes mostly based on objective measures of human dimensions at gross level (Table 2). However, no obvious evidence could be retrieved from literature regarding appropriateness and true correspondence of each variable selected in this study with Maslow's needs hierarchy for example 'education' was corresponded with '*self-actualization'* in Hagerty (1999, p.253) whereas same 'education' was considered an '*esteem needs*' within growth needs category in Noltemeyer *et al.* (2012, p.1862).

Therefore, all variables in our study in the form of various indices have been linked with eight hierarchy-of-needs by considering the theme presented in Maslow's theory (Table 1). As a pioneering work, this study provides a platform and opens the window for the future researchers to re-evaluate these associations as well.

3.1 Issues Related to Handling Data and the Indexes

In most of the cases imputation was performed based on up to 7-years moving averages however Simple averages were also used when concerned variables was expected to grow consistently for variables like number of physicians, fixed telephone subscriptions in the beginning of the series. Further, construction of indices needs proper allocation of weights to the respective variables contained by a particular index so that its importance both in logical and normative sense shouldn't compromise. Based on the arguments and evaluation made by Decancq and Lugo (2009) no specific weighing system can be relied upon uniquely.

3.2 Construction of Indexes as the Representative Variables

Prosperity or wellbeing may be reflected by various dimensions which usually use diversified scales of measurements viz. income in money terms, health in years, education as enrollment and energy consumption in kilowatt etc., hence index system may be considered the best choice to aggregate these multiple measurement based components. Since the large number of variables (more than 100) have

[12] A graphical comparison is made since 2007 onwards only because LPI has been launched from that point of time onwards.

been employed in this study and developing more effective model for wellbeing requires a small set of representative variables. All possible relevant variables have been selected to construct a weighted average index assuming that each one is effective representative of its own constituents.

Let V_n is the vector of 'n' variables need to construct an index 'C_{it}' representing the 'i' th dimension of prosperity at a given point of time:

$$C_{it} = \left[\left(\sum_{n=1}^{k} \alpha V_n \right) \Big/ k \right]_{it} \qquad for \quad V = {}^{X_t}/_{X_0}$$

Where,
X= value of a given variable
k= total number of variables included in the index (let $n = 1,2, \dots, k$)
α= weight assigned to each variable in the index (assumes that α = 1 equal weight[13]: considering each variable equally important for the micro-dimension index development)
i= micro-dimensions of indices with total m=21 ($i = 1,2, \dots, m$)
t= sampled period of time from 1960 to 2016 ($t = 1,2, \dots, T$; $t = 0$ for base period year=2000)

The construction of representative indices allows us not only to reduce the large number of variables into the set of limited but manageable constructs that further lead to develop the composite indexes for each dimension of wellbeing and prosperity as identified in the model. At this stage we are employing those constructs already developed in the form of indices but weighted by the product of their respective share in summation across time and across section with the same base to generate dimension-indices. Consequently, a composite Dimensional index 'D_{jt}' has been evolved by using these twenty-one micro-dimensions in the form of three macro-dimensions indices referring as social, institutional and economic aspects indices[14].

$$D_{jt} = \sum_{i=1}^{m} (\alpha_i . \alpha_t)\ C_{it}$$

$$with \quad \alpha_i = \frac{\sum_{i=1}^{m} V_i}{\sum_{i=1}^{m} \sum_{t=1}^{T} V_{it}} \quad for\ cross-sectional\ weights$$

$$and \qquad \alpha_t = \frac{\sum_{t=1}^{T} V_t}{\sum_{i=1}^{m} \sum_{t=1}^{T} V_{it}} \quad for\ time\ series\ weights$$

The wellbeing index 'WBI' has been constructed by using same micro-dimensions based indices by assigning weights (α_w) arbitrarily from 1 – 5 conforming the importance from lowest to highest within the context of prosperity by following the normative approach (see table 2 for weights).

[13] Mostly applied in research as '*Osberg and Sharp(2002); Lugo(2007); Nilsson (2007); and Maasoumi and Lugo (2008)*' cited in Decancq and Lugo (2009), pp.34-35

[14] In estimation D_j replaces with each representative dimension i.e., *SAI* for social dimension; *EAI* for Economic dimension and *IAI* for Institutional dimension

$$WBI_t = \sum_{t=1}^{T}\sum_{i=1}^{m}\left[(\alpha_w.\alpha_t)V_i \Big/ \sum_{i=1}^{m} i\alpha_w\right]$$

3.3 Measurement of Economic Fragility Index (EFI) and Volatility Index (VOLI)

To incorporate Minsky financial instability hypothesis based on the logic that more stability will ensure economic security and ultimately cause higher level of prosperity. Economic fragility has been measured via risk exposure due to variation in interest rates, exchange rate and stock of liabilities. Various techniques are available to materialize such instable behavior including (i) standard deviation (SD) of the growth rate of variable; (ii) SD of the residual of an econometric regression; (iii) SD of the cycle isolated by a statistical filters (like Hodrick and Prescott or Baxter and King Filter) along with (iv) conditional variance based (GARCH) models. However, GARCH models have been found more appropriate in case of measuring risk or uncertainty elements in the high frequency data like financial series recorded daily or monthly basis whereas all other techniques are suitable to capture the variability of any given series based on low frequency data available in case of most macroeconomic variables usually recorded on annual basis (Cariolle, 2012, pp. 9-10, 15). Here, third technique was considered more appropriate due to annual data to obtain volatility series where Hodrick and Prescott (1981, 1997) filter is used to disentangle the cyclical component of the given index then logarithmic transformation of the variance of that cyclical components allowed to generate variance series of corresponding volatility variables.

3.4 Prosperity Index Equations

Wellbeing depends upon various aspects of human life including housing; health; education and knowledge; social interaction; and psychological conditions as mentioned by Martinetti (2000, p.224). The detailed elements have been specified by Dolan et al. (2008) under the context of subjective wellbeing mainly include income; personal characteristics; socially developed characteristics; the work and activities a person is engaged in; Attitudes and beliefs towards life; relationships; wider economics, social and political environment (Dolan, Peasgood and White, 2008). Therefore, by considering previous studies most of the empirical work has supported the three broad aspects of human prosperity as categorized by pillars of prosperity in case of Legatum prosperity index. The resultant system of equations may be given as:

$$WBI_t = \beta_0 + \beta_1 SAI_t + \beta_2 EAI_t + \beta_3 IAI_t + \beta_4 EFI_t + \beta_4 WBI_{t-1} + U_t \quad \ldots\ldots 1$$

$$SAI_t = \gamma_0 + \gamma_1 EDUI_t + \gamma_2 ESI_t + \gamma_3 ADLFI_t + \gamma_4 AHSSI_t + \gamma_5 VOLI_t + \gamma_6 SAI_{t-1} + \gamma_7 EAI_t + \gamma_8 IAI_t + \gamma_9 WBI_t + \gamma_{10} EFI_t + \epsilon_t \quad \ldots\ldots 2$$

$$EAI_t = \theta_0 + \theta_1 API_t + \theta_2 MONI_t + \theta_3 VAI_t + \theta_4 GNII_t + \theta_5 ISI_t + \theta_6 BOPI_t + \theta_7 PFI_t + \theta_8 FRI_t + \theta_9 LCERI_t + \theta_{10} DSI_t + \theta_{11} EAI_{t-1} + \theta_{12} SAI_t + \theta_{13} IAI_t + \theta_{14} WBI_t + \theta_{15} EFI_t + \varepsilon_t \quad \ldots\ldots 3$$

$$IAI_t = \pi_0 + \pi_1 RDI_t + \pi_2 IMFDI_t + \pi_3 ICTI_t + \pi_4 ENPI_t + \pi_5 TTI_t + \pi_6 GSI_t + \pi_7 IAI_{t-1} + \pi_8 SAI_t + \pi_9 EAI_t + \pi_{10} WBI_t + \pi_{11} EFI_t + \mu_t \quad \ldots\ldots 4$$

$$WBI_t = \sigma_0 + \sigma_1 MV_t + \sigma_2 WBI_{t-1} + \vartheta_t \quad \ldots\ldots 5$$

Where all exogenous and four endogenous variables are elaborated in table 2 (with further details regarding measurements in table A1 in annexure). However in equation 5, *MV* represents matrix of volatility of indexed-variables. $\beta_s, \gamma_s, \theta_s, \pi_s, \sigma_s$ are the parameters, t and *t-1* are referring current and lagged values over the sampled period, $U_t, \varepsilon_t, \epsilon_t, \mu_t, \vartheta_t$ are error terms of each respective model. This system of equations consists of four endogenous variables with many exogenously determined explanatory variables that can be solved through four equations.

4 ESTIMATION: SIMALTANEOUS EQUATION MODELS

Since the assumption of ordinary least square (OLS) regression that error terms should be uncorrelated with explanatory variables violates because our models consist of both predetermined and jointly determined variables. Further, system of equations has been found over-identified based on the order and rank conditions of the matrices. The four endogenous variables (let G) need to be determined through four equations where G – 1 = 3 is found less than the total number of excluded variables (M) in case of all four equations as reflected by the rows and columns consisting no-all-zero elements. It suggests that Instrumental Variable (IV) method or two stage least square (TSLS) regression may be the more suitable technique to avoid simultaneity bias and obtaining consistent estimates (Asteriou, 2006, pp.234-237 and Maddala, 2002, pp.346-348).

TABLE 3: Regression Results for Well Being Index

Well Being Index (Dependent)		**Models 1.1**	**Model 1.2**	**Model 1.3**
Explanatory Variables		**(OLS)**	**(TSLS)**	**(TSLS) (INSTABILITY)**
Social Aspects (SAI)		0.550176***	0.391698***	1.552752***
Economic Aspects (EAI)		0.023851***	0.065159***	-0.150399
Institutional Aspects (IAI)		0.003150***	0.003545***	-0.801316***
Economic Fragility as a ratio of Economic Aspect (EFI/EAI)		-14.75385***	-3.341672***	---
Constant		78.16704***	72.70717***	13.36550***
Adj R^2		0.662086	0.728250	0.578619
F - Stat		23.53237***	24.34977***	23.38839***
DW Stat		1.554036	2.138129	2.436516
Prob (J – Stat)			0.139240	0.565208
Durbin-Wu-Hausman Endogeneity test	Cragg-Donald F-stat:		5.584539	0.646318
	Prob(Difference in J-stats)		0.3611	0.0094
Prob (Jarque-Bera)		0.002087	0.877547	0.111990
Breusch-Godfrey Serial Correlation LM Test:	Prob (F – stat) Prob (Obs*R-squared)	0.9781 0.8964	 0.3510	 0.2036
Heteroskedasticity Test: Breusch-Pagan-Godfrey	Prob (F – stat) Prob (Obs*R-Squared)	0.0478 0.0517	0.1642 0.1573	0.1376 0.1322
Wald F - Stat		75.90562***	906.3950***	4300.133***
Ramsey (RESET) Misspecification Test (fitted terms = 4)	Prob (F-statistic) Prob (Likelihood ratio)	0.1186 0.0647	0.9239	0.9549
Chow Breakpoint Test (t=2000)	Prob (F-statistic)	0.0479	0.4309	0.0741
Instruments used (28): EFI ADLFI AHSSI API MONI FRI BOPI PFI DSI RDI IMFDI ICTI ENPI TTI ADLFI(-1) AHSSI(-1) API(-1) MONI(-1) FRI(-1) BOPI(-1) PFI(-1) DSI(-1) RDI(-1) IMFDI(-1) ICTI(-1) ENPI(-1) TTI(-1)				

Further, in model 1, both OLS and TSLS estimation techniques are used to examine the consistency of coefficient values as suggested by Gujarati (2004, p. 777) if values of R-square is large at first stage of TSLS regression the results will approximate to OLS outcome because estimates of dependent variable ($\hat{Y}$) will approach to actual values (Y) however, in case of over-identified equation results produced by OLS cannot be relied upon without confirmation via TSLS.

Various post estimation test are performed to obtain the most suitable models. Such as F – statistic allowed us to ensure the relevance of instruments with the condition that if F > 10 instruments are not weak but relevant to obtain unbiased estimates with TSLS (Stock and Watson, 2002, p.481). Along with Durbin Watson statistic, Breusch-Godfrey Serial Correlation LM test with null hypothesis of no serial correlation and Breusch-Pagan-Godfrey for homoscedastic residuals are used. Since in case of over-identified models, all instruments need to be exogenous that is verified through J-statistic and Durbin-Wu-Hausman test having the same hypothesis. To accommodate any potential structural change after September 11, 2001 in the variables chow breakpoint test is applied as well based on the year 2000. Normality of residual is estimated as usual by using Jarque-Bera stats.

5 RESULTS: INTERPRETATION AND ANALYSIS

5.1 A Comparison between Gross National Income Index and Legatum Prosperity Index

Initially a graphical comparison has been made for available data series for both indices ignoring the magnitudes, the growth pattern of LPI and GNII resembles each other but without matching peaks and troughs. The actual scenario reveals with percentage changes where prosperity index starts moving in opposite of GNII after 2011 onwards, clearly indicates loss of prosperity even both the growth rate of GDP and per capita income consistently accelerate. This finding is highly consistent with the observation made by Social Policy and Development Centre (SPDC) where evidence suggests that absolute poverty in Pakistan has raised from 2010-11 onwards measured through Household Integrated Economic Survey 2015-16 with the conclusion '…Because traditional poverty measures neglect several important dimensions of household welfare' (Jamal, 2017, p.12).

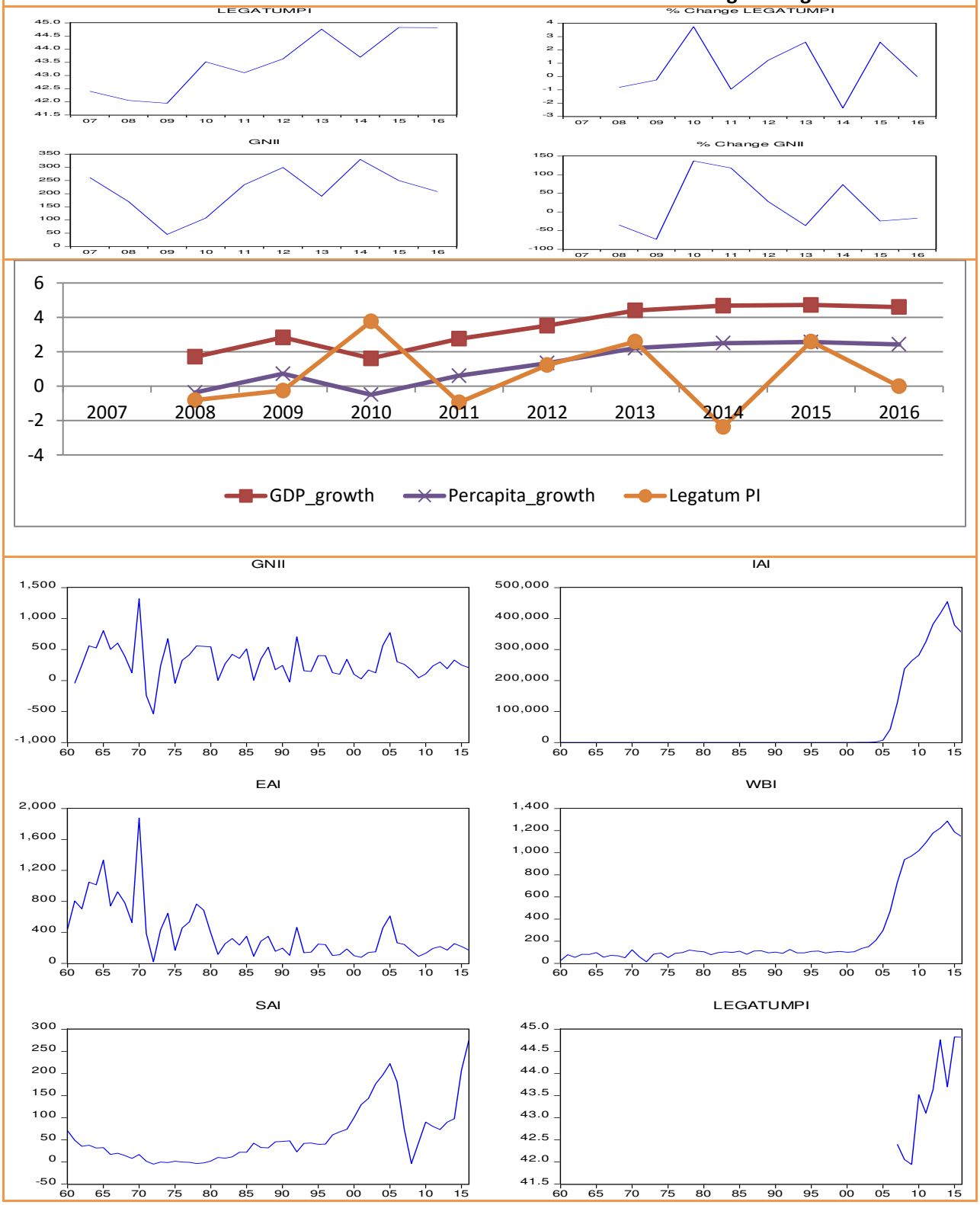
5.2 Prosperity measured through Wellbeing

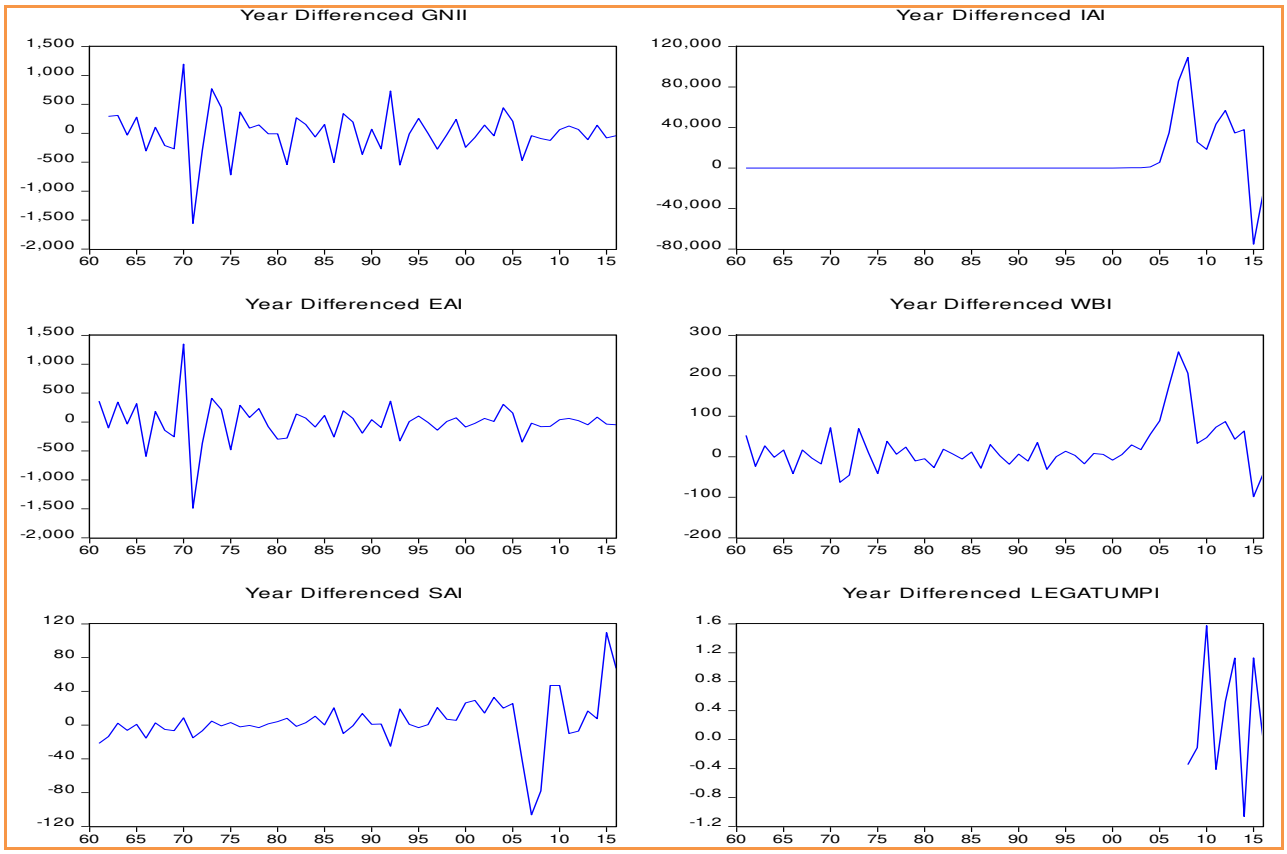
It is obvious from table 3 that all three components of wellbeing are highly significant where social aspect contributes largely as compared to economic and institutional aspects in the construction of wellbeing index. In response of one unit rise in a given index value, wellbeing index advances up to 0.39 unit with improvement in social indicators, 0.065 units because of economic indicators and only 0.004 with improvements in institutional scenarios. Economic fragility index as a ratio of economic aspects reveals that economic fragility depends upon economic situation of the country because the maximum loss in wellbeing index will occur up to 3.342 units if risk exposure increases without any improvement in economic conditions but it will be lower in case economy grows successfully. Comparing with OLS the estimates of parameters measured through TSLS found consistent.

5.3 Measurement of Various Dimensions of Wellbeing

Three more equations of the system are used to evaluate significance of the contribution made by micro-dimensions components constituting the respective macro-dimension. Since the components assigned to each macro-dimension have theoretical and normative underpinning but value judgement is hitherto challengeable. Therefore regression analysis is considered helpful to determine the importance of each micro-component for the development of macro-dimension indexes. Based on equation 2, 3 and 4 simultaneous equations models have been estimated and mentioned in table 4. Using two stages least squares (TSLS) regression for the selected variables in form of index-transformation provided rigorous support for successful aggregation of sampled variables.

FIGURE 1: Legatum Prosperity Index and Gross National Income Index for the Period of 2007 to 2016





First limitation is the stationarity of data where half of the variables are stationary at level and other half at first difference. However this limitation may not cause any problem to the validity of estimates in case of TSLS estimation as suggested by Hsiao (1997, p.395). In all these three models most of the post estimation tests have been employed to obtain the good-fit models although with marginal exceptions these models successfully fulfill the criterion.

In model 2, both education index and demographic and labor force index have significant contribution with large magnitudes of weights i.e., 1.9 and 3.8 respectively. However the cost of excessively large environmental damage has curbed it with weight up to 3.5 units. Further, the contribution of health support system and volatility as a reflection of financial and economic security remains insignificant. It means in Pakistan policy formulation for social structure has major orientation towards schooling, population structure, employment and environmental factors while the provision for health support systems and mechanism for stability in establishing an effective social stature fail to get any significant attention.

The results obtained through Model 3 mostly variables are found significant where agricultural production and public finance have contributed with proportionally large magnitude of weights i.e., 2.084 and 1.21 units respectively. However, monetary and balance of payment indices fail to contribute significantly to establish the economic aspect index. Probably monetary index effect may become significant if nominal variables are converted into real one before estimation, whereas balance of payment index already consists of many other indices such as export (import) value and volume indices if replaced with original values may become significant because theoretically both indices are essential

component of economic dimension. With some caution it may be considered as the responsible factor behind the problem of misspecification in this model as well.

TABLE 4: Regression Results for Endogenous Variables

Explanatory Variables		UNIT ROOT TEST	Models 2	Model 3	Model 4
			Dependent Variables		
			Social Aspects	Economic Aspects	Institutional Aspects
Constant			-245.6505	-597.5334***	-28.55582
Education index	EDUI	I(1)	1.910843*		
Environmental Sacrifice Index	ESI	I(1)	-3.461229***		
Demographic and Labor Force Index	DLFI	I(0)**	3.773354**		
(Adjusted) Health Support Index	AHSSI	I(1)	0.153624		
Volatility Index	VOLI	I(0)*	-0.019522		
Agricultural Production Index	API			2.084263*	
Monetary Index	MONI	I(0)*		0.301198	
Value Added Index	VAI	I(0)**		0.532393***	
Gross National Income Index	GNII	I(0)**		0.442316***	
Investment and Savings Index	ISI	I(0)**		0.233943**	
Balance of Payment Index	BOPI	I(1)		0.037528	
Public Finance Index	PFI	I(1)		1.208738*	
Foreign Resource Index	FRI	I(1)		0.461160***	
Local Currency Exchange Rate Index	LCERI	I(0)**		0.761388***	
Debt Servicing Index	DSI	I(0)**		0.318903**	
Research and Development Index	RDI	I(1)			0.023702*
IMF Dependency Index	IMFDI	I(0)*			0.064721*
Information and Communication Technologies Index	ICTI	I(0)**			-0.000213***
Energy and Power Index	ENPI	I(1)			0.027741
Travel and Transport Index	TTI	I(0)**			0.004743**
Governance Support Index	GSI	I(1)			------
Economic Fragility	EFI	I(1)	0.015234	0.048859***	0.000277
Social Aspects (SAI)	SAI	I(1)	0.757532***(Lag)	0.274652	---
Economic Aspects (EAI)	EAI	I(0)**	-0.006128	0.027531(Lag)	---
(Log) Institutional Aspects (IAI)	IAI	I(1)	-0.000900***	0.000266	----
Wellbeing Index	WBI	I(1)	0.340713***	-0.109968	4.401927***(log)
Adj R^2			0.929630	0.984662	0.981998
F - Stat			46.93886***	172.6400***	313.4203***
DW Stat			1.756539	2.035470	1.767833
Prob (J – Stat)			0.186582	0.457872	0.119722
Durbin-Wu-Hausman Endogeneity test	Prob(Difference in J-stats)		0.6351	0.1787	0.0181
Prob (Jarque-Bera)			0.931074	0.298822	0.509202
Breusch-Godfrey Serial Correlation LM Test:	Prob (Obs*R-squared)		0.1084	0.4073	0.4003
Heteroskedasticity Test: Breusch-Pagan-Godfrey	Prob (F – stat) Prob (Obs*R-Squared)		0.2681 0.2540	0.5819 0.5042	0.5037 0.4613
Stability (Chow Breakpoint) Test (t=2000)	Prob (F – Stat)		0.0000	0.1424	0.0000
Ramsey (RESET) Misspecification Test	Prob (F-statistic)		0.3490	0.0000	0.3116

Significance at 1%, 5% and 10% mentioned as ***, ** and * respectively
Instruments for each equation include explanatory variables with their respective lags of the same equation and explanatory variables of other equations
Augmented Dickey-Fuller Test is used for testing unit root where series integrated at level is represented by **I(0)** and integrated at first differenced by **I(1)**

For model 4, various specifications have been employed with and without including governance index because if included, the results of estimation become unstable and more sensitive to technical specification[15]. All variables except energy and power index have significantly contributed in the development of Institutional index. The information and communication technologies with negative sign causes a loss in institutional index perhaps because it is measured through number of fix phone and mobile cellular subscription that have grown extravagantly during first decade of twentieth century evident from structural break after year 2000. Proportional weights of each component is very small, the highest weights is 0.065 units belongs to IMF dependency index. It shows that the component selected for institutional index construction are, although contribute significantly but, found poor representatives and need to be replaced with more effective ones.

Since economic fragility index is found significant both in case of economic aspect index and wellbeing index may be due to these reasons: (i) Minsky's hypothesis confirms the instability in wellbeing that may arrive via economic aspects index; and/or (ii) measurement bias may exist because no representative from social or institutional dimension is considered for the construction of economic fragility index. To address later issue or to verify former equation 5 has been tested and results are mentioned as model 1.3 in tables 3 where both social and institutional aspect index instability significantly influence the stability of wellbeing index former has created more instability with higher weight of 1.55 units while later helps to decrease instability in wellbeing index with 0.80 units but no influence comes from instability in economic aspects index.

6. FINDINGS, CONCLUSION AND SUGGESTION

The objective of this study is to evaluate Prosperity Index based on Legatum Institute as an effective measure of wellbeing or prosperity by comparing it with standardized but uniquely referred Gross National Income (identically refers as GDP, GNP, GNE or per-capita income). Since, the idea of calculating prosperity through various real indicators as suggested by Legatum institute is very recent innovation that requires an in-depth probing to have detailed grasp over the concept with exploring its validity and application through collecting empirical evidences. Here, an effort has been made to connect the ideas of Maslow's need hierarchy as a broad framework to ensure the relevance of selected components in developing the Prosperity Index. Further considering the 'sustainability' as a most common contemporary phenomenon Minsky's instability hypothesis has been engaged as well however its relevance is extended beyond financial instability by incorporating the volatilities of all concerned indicators in various forms. The main findings may include:

First, Prosperity Index may be assumed a effective indicator of prosperity because it covers broad prospects of life in contrast to GNI, GDP or per capita income frameworks where pace to measure the wellbeing of a particular economy have been fading away and subsequently need replacement with better substitute at the earliest.

Second, all three main dimension referred by prosperity index are crucial for wellbeing however their relative importance may vary, as in case of Pakistan, social aspects attain six time higher prominence than economic aspects that however surpass the institutional aspects, reflecting the need to increase focus and resources allocation primarily in social context for improvement in prosperity.

[15] As it leads to reduce the sample size statistically small i.e., n = 21 < 30

Third, social dimension refers education; population and its composition; employment and labor force; and the substantial environmental sacrifices as areas of major concern where policy maker must focus to build better social stature.

Fourth, distinct areas of concern within economic dimension are agricultural production and public finance however monetary and balance of payment related indicators should not the pivot for policy design because of their insignificant role as compared to other economic indicators.

Fifth, measuring the institutional dimension has been proved an exhaustive exercise perhaps due to non-availability of appropriate indicators such as one of the effective indicator is 'governance' that cannot help to make good model due to short of data, while others remain significant but prove poor representatives. Nevertheless, a good-fit models is found where most of the variables significantly contribute to develop institutional index but with very small magnitudes and large vulnerability against small adjustments in the model specifications. There is need to explore better representative of institutional aspects as well so that institutional structure becomes capable to provide consistent data sets by introducing pro-institutional policies and more reflective indicators.

Sixth, Minsky's instability hypothesis is found substantial in economic dimension from where it finds the route to consume the large proportion of wellbeing. It helps to perceive a self-propelling fragility within the systems of economic dimension that poses a potential threat of crisis which may trigger any time even without any obvious external shock and lead to a significant loss of wellbeing too. It is observed that stability of wellbeing is largely dependent on stable social and institutional dimensions in such a way that any social instability and unrest will make it worse but changes in institutional aspects will mitigate the loss in stability of wellbeing. Hence improvement in social and institutional aspects with stability is anticipated for long run and sustainable rise in wellbeing.

It is concluded that Prosperity Index may be considered as a valid source of wellbeing assessment because it refers those dimensions which are fundamental for individual or national wellbeing. It allows tapering off the dependence on GDP measures. It successfully takes into account the human need hierarchy framed by Maslow theory within the context of wellbeing. It also helps to recognize the element of instability as discovered by Minsky in as much detail as needed to take concentrated remedial measures without wasting resources in cosmetics actions. Last but not the least, for Pakistan, its evaluation and outcomes has successfully highlighted those deficiencies which are genuinely the part of our system with the same intensity and relevance as revealed through wellbeing Index constructed within the context of Legatum Prosperity Index.

In a nutshell, the evidence has been established to substantiate the validity of Prosperity Index as an effective tool for the measurement of prosperity and wellbeing within the context of Pakistan. However, even without potential for replacement of GNI at least such index will provide an opportunity to evaluate the prosperity progress through three major dimensions of life, which may help to improve decision making process in case to assure effective wellbeing. Presently, prosperity is reported with the changes in GDP, GNI or per capita income where such indices would either validate these changes otherwise deviation in outcomes may emphasize to devise policies and resource allocation with caution, because essential aspects of prosperity must not be compromised as the cost of improved economic outcomes.

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ANEXURE

TABLE A1: DESCRIPTION OF INDICES AND THEIR CORRESPONDING VARIABLES

Index Name		Variables and Measurements
TTI	TRANSPORT and TRAVEL INDEX	Air transport, registered carrier departures worldwide Net Travel Services (% of commercial service export - imports) Net Transport Services (% of commercial service export - imports)
RDI	RESEARCH and DEVELOPMENT INDEX	Trademark applications, direct resident Trademark applications, direct nonresident Patent applications, residents Charges for the use of intellectual property, payments (BoP, current US$)
IMFDI	IMF DEPENDENCE INDEX	IMF purchases (DIS, current US$) Use of IMF credit (DOD, current US$)
DSI	DEBT SERVICING INDEX	Undisbursed external debt, total (UND, current US$) Total debt service (% of exports of goods, services and primary income) External debt stocks (% of exports of goods, services and primary income) Commercial banks and other lending (PPG + PNG) (NFL, current US$)
BOPI	BALANCE OF PAYMENT INDEX	Export value index (2000 = 100) Export volume index (2000 = 100) Import value index (2000 = 100) Import volume index (2000 = 100) Net barter terms of trade index (2000 = 100) Current account balance (BoP, current US$) Net financial account (BoP, current US$) Net FinancialOutflows=NFAcc-CurAccBal
ICTI	INFORMATION and COMMUNICATION TECHNOLOGY INDEX	Fixed telephone subscriptions (per 100 people) Mobile cellular subscriptions (per 100 people)
EDUI	EDUCATION INDEX	Primary education, teachers School enrollment, primary (% gross) Pupil-teacher ratio, primary School enrollment, tertiary (gross), gender parity index (GPI) School enrollment, secondary (gross), gender parity index (GPI) Government expenditure on education, total (% of GDP)
PFI	PUBLIC FINANCE INDEX	Taxes on income, profits and capital gains (% of revenue) Taxes on international trade (% of revenue) Taxes on goods and services (% of revenue) Domestic credit provided by financial sector (% of GDP)
MONI	MONETARY INDEX	Inflation, consumer prices (annual %) Consumer price index (2010 = 100) Broad money growth (annual %) Price level ratio of PPP conversion factor (GDP) to market exchange rate Inflation, GDP deflator (annual %) Gross national expenditure deflator (base year varies by country)
ESI	ENVIRONMENTAL SACRIFICE INDEX	Total greenhouse gas emissions (kt of CO2 equivalent) CO2 emissions (metric tons per capita) CO2 intensity (kg per kg of oil equivalent energy use)
ENPI	ENERGY and POWER INDEX	Energy intensity level of primary energy (MJ/$2011 PPP GDP) Energy use (kg of oil equivalent per capita) Electric power consumption (kWh per capita) Combustible renewables and waste (% of total energy) Fossil fuel energy consumption (% of total) Alternative and nuclear energy (% of total energy use) Energy imports, net (% of energy use) Renewable energy consumption (% of total final energy consumption) Renewable electricity output (% of total electricity output) Access to electricity (% of population)
FRI	FOREIGN RESOURCE INDEX	Net foreign assets (current LCU) Total reserves (% of total external debt) Personal remittances, received (% of GDP) Portfolio equity, net inflows (BoP, current US$) Foreign direct investment, net inflows (BoP, current US$) Personal remittances, paid (current US$)
VOLI	STABILITY INDEX	Volatility of All above stated indices
EFI	ECONOMIC FRAGILITY INDEX	Exchange rate exposure (annual % change in exchange rate volatility) Interest rate exposure (annual % change in interest rate volatility) Stock of external debt (% of GNI)

Index Name		Variables and Measurements
API	AGRICULTURAL PRODUCTION INDEX	Livestock production index (2004-2006 = 100) Food production index (2004-2006 = 100) Crop production index (2004-2006 = 100) Forest area (% of land area) Arable land (% of land area) Agricultural land (% of land area) Agricultural machinery, tractors per 100 sq. km of arable land Total fisheries production (metric tons) Aquaculture production (metric tons) Cereal yield (kg per hectare)
ISI	INVESTMENT SAVINGS INDEX	Gross Non_domestic savings (% of GDP) Gross domestic savings (% of GDP) Total natural resources rents (% of GDP) Stocks traded, total value (% of GDP) Market capitalization of listed domestic companies (% of GDP) Adjusted net national income (annual % growth) Adjusted savings: net national savings (% of GNI) Gross capital formation (% of GDP) Gross capital formation (annual % growth)
ADLFI	(ADJUSTED) DEMOGRAPHIC and LABOR FORCE INDEX	Population density (people per sq. km of land area) Urban population (% of total) Population growth (annual %) *Age dependency ratio, young (% of working-age population)** *Unemployment, total (% of total labor force) (national estimate)** Labor force participation rate, total (% of total population ages 15+) (national estimate) Employment in services (% of total employment) Employment in industry (% of total employment) Employment to population ratio, 15+, total (%) (national estimate) Employment in agriculture (% of total employment)
VAI	VALUE ADDED INDX	Industry, value added (% of GDP) Industry, value added (annual % growth) Manufacturing, value added (% of GDP) Manufacturing, value added (annual % growth) Agriculture, value added (% of GDP) Agriculture, value added (annual % growth) Services, etc., value added (% of GDP) Services, etc., value added (annual % growth) Agriculture value added per worker (constant 2010 US$)
AHSSI	(ADUSTED) HEALTH SUPPORT SYSTEM INDEX	Immunization, measles (% of children ages 12-23 months) Immunization, DPT (% of children ages 12-23 months) Improved water source (% of population with access) Birth rate, crude (per 100 people) Physicians (per 100 people) *Prevalence of anemia among children (% of children under 5)** *Mortality rate, adult, male (per 100 male adults)** *Mortality rate, adult, female (per 100 female adults)** *Mortality rate, under-5 (per 100 live births)**
LCERI	LOCAL CURRENCY EXCHANGE RATE INDEX	Real effective exchange rate index (2010 = 100) Official exchange rate (LCU per US$, period average)
GNII	GROSS NATIONAL INCOME INDEX	GNI per capita growth (annual %) GNI growth (annual %) GDP per capita growth (annual %) GDP growth (annual %) Gross national expenditure (annual %) Final consumption expenditure, etc. (annual % growth) Household final consumption expenditure, etc. (annual % growth) General government final consumption expenditure (annual % growth)
GSI	GOVERNANCE SUPPORT INDEX	Control of Corruption: Estimate Government Effectiveness: Estimate Political Stability and Absence of Violence/Terrorism: Estimate Regulatory Quality: Estimate Rule of Law: Estimate Voice and Accountability: Estimate

Covariance Analysis: Ordinary

Date: 11/11/18 Time: 17:49

Sample: 1960 2016

Included observations: 57

Pairwise samples (pairwise missing deletion)

Correlation

Probability

	GNII	IAI	EAI	WBI	SAI
GNII	1.000000				
IAI	-0.129407	1.000000			
	0.3418	-----			
EAI	**0.731820**	-0.262365	1.000000		
	0.0000	0.0487	-----		
WBI	-0.096358	***0.983349***	***-0.271862***	1.000000	
	0.4799	***0.0000***	***0.0408***	-----	
SAI	-0.029492	0.395254	-0.246035	***0.453618***	1.000000
	0.8292	0.0023	0.0651	***0.0004***	-----

Covariance Analysis: Ordinary

Date: 11/11/18 Time: 18:02

Sample: 2007 2016

Included observations: 10

Balanced sample (listwise missing value deletion)

Correlation

Probability

	IAI	EAI	SAI	LEGATUMPI
IAI	1.000000			
EAI	0.211773	1.000000		
	0.5570	-----		
SAI	0.376641	0.186203	1.000000	
	0.2834	0.6065	-----	
LEGATUMPI	**0.723292**	0.270512	**0.789849**	1.000000
	0.0181	0.4497	**0.0066**	-----