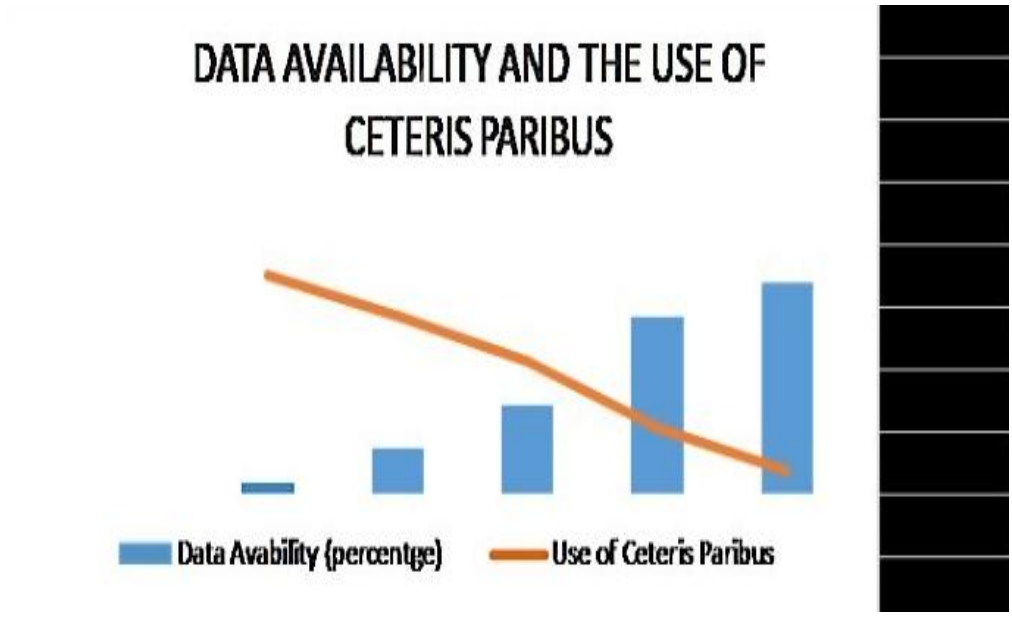
CPS 35 - Economic Measurement and Productivity

EXPLORING NEW METRICS
FOR A CHANGED AND CHANGING NATIONAL
AND GLOBAL REALITY

…Exploding and minimizing the inhibiting cop out of *ceteris paribus*

By

Lancelot A. Busby



Lancelot Busby is a Caribbean Statistician with vast experience that derives from his service in the Government of Trinidad and Tobago and an even longer period of service to the United Nations during which time he gained intimate knowledge of the working of the Statistical Offices of the region while continuing research into methodologies in force at the time. He has contributed to the literature and efforts of some Caribbean governments to modernize their statistical systems. Substantially retired, he continues to analyze developments and review of statistics.

6 October 2025

ABSTRACT OF PAPER

This paper reviews the attempts over the post-World War II years commencing roughly from the Bretton Woods activity to measure primarily economic growth and subsequently some notion of development across the countries of the world. It takes it point of departure from two papers – one written by Sir Ian Diamond and another a relatively long time ago and Published in Pardee Papers. Both papers acknowledge the desirability and inevitability of evolved systems of data identification, collection, storage, analysis and communication that can change the organization of statistics and the configuration of the relevant collection and treatment organizations. The paper does not propose an action-ready solution to any lacuna in statistical methodology but proffers a number of considerations that may be looked at in proposing the statistical architecture for the future.

The author acknowledges the pioneering efforts of the early philosophers, mathematicians and statisticians who established the metrics of an approach to understand the growth and fall in the wealth of nations in a situation of limited data and computing power. Their successors who came into a world of advanced computing capabilities have been able to extend the boundaries of their study to include qualitative factors that although perceived by early thinkers, could not be included in the reckoning at that time because of the difficulty posed by the computing capability of the day, anemic by today's standards.

The student of the early decades of the twenty-first century can refine the classic equations and derive more refined estimates through the identification, separation and quantification of some variables hitherto included in the *ceteris paribus* cage. The work on the national accounts remains basically valid but continues to be an economic accounting measure while the world is becoming increasingly interested in assessing human development and measures of social cohesion. The recent entry of Big Data promises to change the manner, cost and time taken to collect and process data.

The paper observes the change in life styles and the family structure generally and posits that some of those changes may render non-applicable a number of definitions accepted in the past such as the definition of household and the unit of enquiry in social and demographic surveys. The definition and widespread understanding of the concept of population within a national entity is questioned.

The paper identifies a number of challenges to international comparability which remain essentially economics- and money-based and have not been able to reflect international disparities. The paper suggests that an attempt be made to view the phenomena of growth and development through a multi-dimensional lens. Such analysis may be able to explore the applicability of flow dynamics to better understand the other relationships governing the outcomes of official and natural stimuli to the assessment of the economic and social outcomes as purportedly and inadequately measured by the assumption of *ceteris paribus*. The paper suggests that the models of the National Oceanic and Atmospheric Administration (NOAA) could be visited and discussed with that organization for possible adaptability to the dynamic economic and social outcomes of today. This approach can be facilitated by the use of Big Data where available. Some time is spent in the discussion of Big Data and its use in deriving a number of estimates that may be more accurate than the estimates that involve the assumption of *ceteris paribus.*

Keywords:

Data, availability, evolved systems, ceteris paribus, Big Data, modernization, community, planning, forecasting, granularity, international comparability, temporal comparability

About this paper - Background

This paper was inspired by a review of statistics written by Sir Ian Diamond, Head of the Office for National Statistics (ONS) in Great Britain and presented as a speech to the Royal Society on **The Future of Economic Statistics**[1], as well as a paper entitled **"Beyond GDP: The Need for New Measures of Progress"**[2], written by Robert Costanza, Maureen Hart, Stephen Posner and John Talberth. Both papers review the state of statistics in light of the changing times and are receptive to a change in the approach and content of data collected. This imparts a somewhat futuristic view to the discipline. The authors of the paper entitled "Beyond GDP" share a similar view and suggest that there may be models of natural events that can be visited to provide estimates and graphical representations that may be preferable to the two-dimensional approach to analysis and graphical presentation that is used at present.

A quick review of the two papers referred to

The Future of Economic Statistics paper raises a question as to the meaning of Britain's economic statistics and what is the ONS trying to measure. The author acknowledges the observation of Kuznets and Stone that the statistics developed in the 1940s and for some time thereafter did not purport to do so because of the lack of pertinent data and the limited computing power available at that time to accomplish the task. The paper observes the present and increasing availability of granular data that are assisting in developing quality of life data. It traces the development of official statistics that were produced in answer to the need for such data at that time. In similar manner the increased granularity facilitated the production of much needed COVID 19 pandemic data for decision-making. The COVID experience proved that necessity was the mother of invention as several useful data series came into being in short order. The author makes the point that:

> *"Transforming economic statistics doesn't just involve overhauling outdated surveys. It also means automating functions and more innovative use of data.*
>
> *It also means making greater use of administrative and commercial data and fewer and smaller surveys – resulting in more accurate statistics and a lower burden on business."*

The author makes the case for the intensified production of small (local) area data so as to shed more light on life as it is in communities – something that national level statistics did not do well.

---

1 **The future of economic statistics**
Ian Diamond, Grant Fitzner, Richard Heys, Michael Keoghan, Darren Morgan
Author Notes
Journal of the Royal Statistical Society Series A: Statistics in Society, Volume 187, Issue 1, January 2024, Pages 1–2, https://doi.org/10.1093/jrsssa/qnad072
Published: 30 May 2023

2 **"Beyond GDP: The Need for New Measures of Progress** written by Robert Costanza, Maureen Hart, Stephen Posner and John Talberth, and published in the Pardee Papers/No. 4 /January 2009

The attempts to improve data quality, timeliness and relevance are addressed in the paper. **The paper points to modernization as involving not merely automation but also devising new ways of data acquisition and handling.** The future would see great improvement in the elaboration of the GDP estimates to take on board or in some way treat with contemporary issues germane to GDP that are not now easily brought into the reckoning. It may be that development will be better defined and measured through the imaginative use of computing power. The paper describes what a future successful National Statistical Institute should look like. It is the description of the dream of modernization. The writer does not hazard a guess as to how supportive of such modernization several governments are likely to be.

The way forward as seen by the authors is an enabled projection of the assessments as done and presented graphically and otherwise analytically today. It hints at the need for the discussion of a new conceptualization of the reality that we are trying to measure.

The Pardee paper on **"Beyond GDP: The Need for New Measures of Progress"**

The following is a quote from the cover page of the paper entitled **"Beyond GDP: The Need for New Measures of Progress"**

> *The Pardee Papers in this series explore current and future challenges by anticipating the pathways to human progress, human development and human well-being. This series includes papers on a wide range of topics, with a special emphasis on interdisciplinary perspectives and a development orientation. Series Editor: Professor Adil Najam.*

This synopsis of the Pardee paper is drawn substantially from its abstract whose main points are presented here. Whereas the paper centers on GDP and deals comprehensively with the need for new measures of progress, it calls for better indicators of well-being in nations around the world with metrics far more incisive than any interpretation of GDP can provide. The paper suggests the desirability of measuring community capital – natural, social, community and built – *"in an attempt to measure the extent to which development is using up the principle of community capital rather than living off its interest.*[3] The paper acknowledges that much work is being done on the development of new indicators that are particularly useful for community planning but would like to see a move away from the misuse of GDP as representing development. The paper strongly recommends an immediate, aggressive and ongoing campaign to change the indicators that decision makers are using to guide policies and evaluate progress. It calls for the creation of indicators that promote sustainable development such as the improvement in the quality of human life while living **within the carrying capacity of the supporting ecosystems**. This would seem to suggest the development of indicators of life at every level of society including the local level, arising from philosophical discussions. The findings should inform development strategies that would make meaningful progress among important sub- groups of the "population".

This paper extends the call for a review of the largely two-dimensional approach to analysis that is generally adopted. Following the Pardee group's leaning towards the future, the Pardee

[3] Quote from the abstract of the paper referenced in this review.

group in collaboration with a proposed design team, may wish to entertain conjecture as to what analysis could look like in the future and move towards the realization of that vision.

Observation concerning both papers synopsized

Although neither of the papers discounts the value of the GDP estimate, they point to the desirability of identifying new metrics to describe the main issues of interest in the contemporary world. It is the view of the author of the present paper that some or all of the new metrics identified serve to put the GDP measure into perspective in the set of phenomena to be measured. Indeed, the new metrics may very well turn out to be determinants of GDP and with further investigation may emerge as useful measures predictive of GDP.

Introduction and objective of this paper

A retrospective and a Prospective view

A retrospective view

Changing realities of life over the history of the world have led to changes of civilizations as necessity and discovery have engendered changes in knowledge and its application towards the improvement in the quality of life. The progress from the Ice Age through the Stone Age, the Iron Age and all of the subsequent Ages and Revolutions has generally led to changes in the quality of life from a situation of bare existence to the attainment of self-actualization to use a description from Maslow's pyramid[4]. The move from the nomadic way of life to more stable human settlements and their upgrades to villages, towns and cities has to a large extent been the offshoot of a changed *modus vivendi* and heightened aspirations and expectations of life. Side by side with these developments in human settlements, there still exist societies that are nomadic. One major shift in human behaviour has been the move from the barter economy to the invention and use of money or some form of it as a medium of exchange and a store of wealth.

A prospective view

The future is unknowable as per Adam Grant[5]

Grant summarizes our attempts to predict the future in the following words:

This paper acknowledges this small excerpt from Grant but recommends a fuller reading of his writing outside the requirements of the present paper.

This paper may be seen as the reflections of a statistician who has spent the greater part of his life and energies attempting to measure a number of economic and social realities that affect or are affected by the circumstances in which we live.

[4] A Theory of Human Motivation, Abraham Maslow, 1943

[5] Adam Grant is an organizational psychologist, best-selling author, professor at Wharton Business School.

The author is most appreciative of the pioneering efforts of the early philosophers, mathematicians and statisticians who in the first half of the last century established the metrics of an approach to understand the growth and fall in the wealth of nations. In an age that was not blessed with the type of computing power that the ordinary ten-year-old school child possesses in 2025 these pioneers did the best that their pooled knowledge, expertise and computational abilities could produce to explain the concept of national economic growth, later to be modified to include social growth and texture. Their successors who came into a world of advanced computing capabilities have been able to extend the boundaries of their study to include qualitative factors that although perceived by early thinkers, could not be included in the reckoning at that time because of the lack of relevant data and the difficulty posed by the computing capability of the day, anemic by today's standards. The effects of those variables, recognized but in earlier times not measurable, were placed for expediency into the *ceteris paribus* cage so that the scientific method could produce a result.

Objective

The objective is in agreement with the two papers referenced and synopsized at the beginning of this presentation. A number of key points made in the papers are worthy of repetition to guide the focus of the paper. The main takeaways from those papers are:

- *"Transforming economic statistics doesn't just involve overhauling outdated surveys. It also means automating functions and more innovative use of data.*
- *Making greater use of administrative and commercial data and fewer and smaller surveys – resulting in more accurate statistics and a lower burden on business."*
- *Better indicators of well-being in nations around the world with metrics far more incisive than any interpretation of GDP can provide*
  The desirability of measuring community capital – natural, social, community and built – "in an attempt to measure the extent to which development is using up the principle of community capital rather than living off its interest.
- *The creation of indicators that promote sustainable development such as the improvement in the quality of human life while living* ***within the carrying capacity of the supporting ecosystems****.*
- *The call for a review of the largely two-dimensional approach to analysis that is generally adopted.*

Both papers cite the need to amplify the functions that have guided estimates and decision making for too many years. Greater availability of data and greater processing power are cited as the enablers of this necessary change. The use of more and more detailed data would effectively reduce the magnitude of *ceteris paribus*. The achievement of change requires new knowledge and skills and is often disruptive of previously accepted realities, many of which have been perceived as a result of insufficient information at the time of formulation of the theory. The process of breakthrough in statistical methodology involves overcoming of the obstacle of data unavailability – a change that is not always easily achieved.

Persistent effort and adaptation will produce breaks in the time series of familiar measures as new knowledge is gained and as paradigm shifts give way to new measures that are more relevant to the contemporary landscape.

The recommendations for change as appear throughout the present paper are in no way intended to minimize the efforts of our predecessors. They underline the need for the lifting of our ability to make more accurate forward estimates of GDP and other essential statistics.

The takeaways from the two referenced papers form a useful platform for discussing the topic as they encourage the presentation of the discussion with a minimum of repetition of arguments earlier made in the paper. At the end of the takeaways other observations germane to the arguments in the present paper are made.

Take away #1

"Transforming economic statistics doesn't just involve overhauling outdated surveys. It also means automating functions and more innovative use of data.

Producing more of the same tables that have been produced for years past their usefulness does not find favour with a number of analysts of the evolution of statistics, especially official statistics. Progress in the field involves the compilation of new and analytical tables that shed light on new phenomena. This activity leads to the questioning of basic definitions and statistical units of enquiry that have been used for years with great cost attached to data collection through field inquiries. Today, because of the emergence and increased importance of special groups in the general public, the monitoring of the welfare of the individuals in these groups constitutes a census. The recent data collection and analysis of COVID patients constituted a census along with its analysis. Data collection in this case was made through the administrative process and did not incur field data collection costs.

Ceteris paribus and "*post hoc*" thinking

The term "*ceteris paribus*" is a Latin ablative absolute that means" with all the rest being equal". It is explained in economics as "other things being equal or constant". It is a construct that helps the developer of a model to produce a conclusion albeit a partial and conditional one. A key example of this is the formulation of the functions of supply and demand where in addition to the relatively easily identifiable influences on demand and supply, there is a recognition that other considerations influence the quantity demanded or supplied. The problem at the time of the formulation of the referenced functions was their measurability. These variables that cannot be measured easily or could not be measured easily at the time of the formulation of those schedules were lumped into a cage called "*ceteris paribus*". This effectively nullified their influence on the measure. That was a long time ago when data were not as easily obtained as they are today. The result is that those variables, some of which can be measured today, remained locked in *the cet. par.* cage.

The foregoing assertion is backed by more elaborate research as done by Herman J, Biere and Norman R Swanson in their research work entitled "**The econometric consequences of the *ceteris paribus* condition in economic theory**"[6]. The demand and supply functions that are taught are considered by the authors to be partial. In this work the authors examine the econometric consequences of the *ceteris paribus* assumption. The actual difference between the assumption and the real world reality results in the simple and traditionally taught supply and demand functions being at variance with more data-enriched estimates that seek to measure the same phenomenon. Whereas assumptions of rationality and peer influence are assumed in the simple rationalization, greater information and data availability reveal the importance of these variables to maximally useful estimates based on those functions. In fact, the authors present the less than plausible scenario of a "Robinson Crusoe" type economy where "a single rational economic agent decides how much of his crop of potatoes he should eat, how much he should plant for next year's harvest, and how long he should work in the fields, in order to maximize his life-time utility. The analysis of this `partial' theory is justified, explicitly or implicitly, by the *ceteris paribus* assumption which does not yield satisfactory macroeconomic estimates.

It is clear that the earlier economists were aware of the difference between correlation and causation. The difficulty is that in economic analysis as is conducted today it is very easy to convey the impression that because of a certain policy enactment such as a change in the price of a commodity a desired (and predictable) result took place. The assumption of *ceteris paribus* by stating (dangerously) that all other variables remained equal, makes this association between price and effect on demand (for example) almost obvious. However, if more information were available, it could be discovered that a factor or factors other than price might also have contributed to the effect. For example, marketing and packaging are powerful persuaders of effective demand. If one disregards the effect of these variables or continues to hold them as not being important enough to affect the price/quantity axes, the continued relegation of marketing and packaging to *ceteris paribus* may in fact be hiding valuable information from the planner.

The example of the design of the Retail Price Index comes to mind as being rooted in *ceteris paribus* as it tries to hold constant the indicator items used for pricing over time. It seeks to hold the comparator item and its quality constant over time, effectively assuming that the item currently being measured is the same as it was at the base period or date, or even still exists at the present time. The pricing methodology goes to great lengths to hold quality constant over time, even in the case of new technologies and materials being used in their production, so as to measure the pure price change. The TOS (temporarily out of stock) and POS (permanently out of stock) time and quality filibusters are a weak attempt to persuade that *ceteris paribus* will be vindicated by the re-emergence of the exact base item in 3 months' time before conceding that the item is POS (permanently out of stock). Even after it is conceded that the comparator item no longer exists there is the attempt to choose a successor item based on its price and observed similarity of price increase over a period in the past that would allow the new item to fit smoothly into the calculation without creating a major disruption in the price relatives. This methodology, intentionally or otherwise keeps the *ceteris paribus* cage locked as it does not allow the effect on

[6] **The Econometric Consequences of the *Ceteris paribus* Condition in Economic Theory**. April 2000; Journal of Econometrics 95(2):223-253. 95(2):

demand of a functional and actual replacement item to surface. The assumption of *ceteris paribus* is an example of a description made by Robert Thouless[7] as resulting from simplistic conclusions made at high levels in society especially attributing results to prior events that may not necessarily have been the determinants of the results.

Post hoc thinking

Post hoc thinking is the shortened form for the statement "**Post hoc ergo propter hoc**" (After this, therefore on account of this).

A very succinct explanation of the term "post hoc" is presented in Wikipedia [8]. The explanation is as follows:

> ***"post hoc** is a logical fallacy in which one event seems to be the cause of a later event because it occurred earlier. **Post hoc** is a particularly tempting error because correlation sometimes appears to suggest causality".*

It is possible that the tendency to drift towards "*post hoc*" thinking may have been due to the relative difficulty of identifying and quantifying the behaviour of a number of related variables and the promotion of expected results after that process. This could be categorized as a data deficiency problem at best. Today's data availability is much greater than in earlier times, reducing the need for the assumption that all other variables remain unchanged. Liberto[9] cites the Austrian School of Economics as believing that "*ceteris assumptions have been taken too far for transforming economics from a useful, logical social science into a series of math problems*".

It may be possible to add a number of factors in our functions such as the demand function and the drivers of response to policy changes that affect prices, taxes such as consumption taxes and other budget impositions. The extent of research done within the relatively recent past may have provided insights into what determines a particular response to a stimulus that is external to the free market forces that govern the price system and the demand function. It may be dangerous to think that demand response is totally rational and solely due to a price change. This danger was fully understood, hence the proviso that the conclusion would be correct if the assumption of *"other things being equal"* was made. However, other things were never equal. Maybe the size of the *cet. par.* cage can with new knowledge be made a bit smaller than it had been in the past. The reduction of the size of the cage would have been the result of the broadening and deepening of research into the psychology and sociology of individual and public response to changing external factors, for example an increase in the price of a given commodity. It may well be that demand for a certain commodity in country X may have changed as a result of national events and

[7]Robert Thouless was a psychologist. He was Head of the Department of Psychology in Glasgow until 1938. He specialized in logic, rationality and the study of responses to the paranormal.

[8] Post hoc ergo propter hoc - Wikipedia
https://en.wikipedia.org › wiki › Post_hoc_ergo_propter hoc

[9] "What does *Ceteris paribus* Mean in Economics?", Daniel Liberto, June 28, 2024.

new tendencies in country A. Investigation will give some indication of the plausibility of that prior assertion.

The Bretton Woods meetings of the 1940s were well-intentioned in their vision of a world free from war and hunger and having more points of comparison rather than contrast between countries regardless of the state of their standard of living, culture or wealth, according to western standards. The international comparability measures proposed and pursued generally resulted in an assessment of wealth and economic growth in favour of the countries with the highest GDP. International comparability as yielded by GDP can therefore be considered to be value laden and of applicability only to those countries that espouse the measure. Discussions on the wealth of nations did not comprehensively describe the Asian situation, later to be described by Gunnar Myrdal[10]. When these two different living circumstances are juxtaposed, the achievement of the goal of increasing income equality across nations appears more elusive than had been formerly hoped for by some casual analysts.

The belief of the Austrian School of Economics that "*ceteris assumptions have been taken too far for transforming economics from a useful, logical social science into a series of math problems*" is worthy of note. The shift toward a series of math problems may have taken some of the dynamism out of the social science approach to economics where human reaction and the rationality/irrationality of response would have carried a heavier weight in the discussion.

Take away #2

Making greater use of administrative and commercial data and fewer and smaller surveys – resulting in more accurate statistics and a lower burden on business."

Diamond in his paper discourages the perpetuation of the same statistical tables even though their usefulness and relevance have been eclipsed by changed situations. The author makes the point that:

> *"Transforming economic statistics doesn't just involve overhauling outdated surveys. It also means automating functions and more innovative use of data.*
>
> *It also means making greater use of administrative and commercial data and fewer and smaller surveys – resulting in more accurate statistics and a lower burden on business."*

Nearly seventy years after the path-breaking essays and research into the wealth of nations and the establishment of equations that would yield estimates from contributory statistics that were then available, the student of the early decades of the twenty-first century can refine the classic equations and derive more refined estimates using the wealth of data not necessarily collected by government but also by the private sector. This new addition to the stock of data available can with imagination overhaul probabilistic sampling and arrive at what may be a more accurate estimate of the phenomenon being measured. Big Data can therefore overhaul outdated, time consuming and costly surveys. The production of what is up to the present referred to as "official statistics"

[10] Asian Drama: An Inquiry into the Poverty of Nations, published in 1968.

can become a joint venture between government and the private sector, yielding a more relevant set of data. A number of definitions accepted in the past may come up for reconsideration as our statisticians and sociologists continue their refining of the present views of the contemporary economic and social realities that affect our assessment of conditions in nations across the globe.

Some traditional reference points for measurement that should be re-thought

Government agencies or other public bodies such as international organizations publish some statistics as a public good as they are useful to a number of interest groups. These data include economic and social data, development data, living conditions, health, education and data on the environment. These data continue to be useful to the business and research community. They provide an overview of the social, demographic and economic structure of the society while facilitating comparisons between countries and regions. They continue to be published today by government agencies as products of administrative processes. While these indicators continue to be relevant there are others that can be derived through less expensive means than traditional household surveys that provide a result with a time significant lag.

Big Data and the production of relevant contemporary statistics by both Government and the Private Sector

This paper assumes general familiarity with the origins of Big Data through the use of telecommunications and more intensive use of technology to capture, process and analyze high volume and high velocity data in a manner not seen as feasible in earlier years. The efforts of the Statistical Commission in the establishment of the UN Committee of Experts on Big Data and Data Science for Official Statistics (UN-CEBD) whose mandate and aim are to provide a strategic vision, direction and coordination for a global programme on Big Data for official statistics are noted.

The greater ease of collection of data through the Big Data modality promises to reduce the Government bill for data acquisition and procurement of data on a timely basis. The following contemporary situations argue the case for revisions in several basic definitions that have guided data collection in the past:

- The need for government to research smaller groups of people and smaller geographical groupings in order to investigate emerging local phenomena;
- The need for the private sector to research groups of people important to it for gaining further insights into commercial viability and demand behavior

In the above two examples, estimates of supply and demand or the state of affairs do not consider *ceteris paribus.* That is a significant improvement towards producing a forward estimate.

Granularity for granularity's sake? Or what?

Granularity is described as the very detailed nature of data collected about any population. The collection and compilation of granular data with no immediate and constructive use of it serves no purpose but to satisfy curiosity of a few researchers who may have access to it. The end situation of granularity is the identification of the characteristics of every element in a population. The production of granular data should be the beginning point of efforts to plan for the improved human condition in the communities primarily and by summation of local areas, to the nation as a whole. Whereas greater granularity of data is desirable in order to gain a full appreciation of the differential impact of external stimuli on identifiable subgroups of the people living in a given geographical location, the planning apparatus cannot escape the need to cater for all segments of the society as far as possible at a level of detail below the level of the element so as to understand the issues and aspirations of the different sub strata of the society. This becomes more feasible as computing power in the hands of the research community has become more widely available. With this capability, planning would progress from being growth-oriented as measured by GDP, to quality of life considerations such as would relate to Maslow and Sen[11] that may as a byproduct result in a sustained or even increased growth rate of GDP. The ability to identify small subsets of a population by any thematic or issue commonality will eliminate the error in probabilistic sampling. In addition, the access to more detailed data is greater in a more "developed" country than in one that does not measure up. This widens the divide between the quantum and quality of data in two sets of countries of differing degrees of data wealth and frustrates "catching up" on the part of the relatively data-poor countries with the successive revisions to more sophisticated elaborations of methodologies such as produced by the revisions of the United Nations System of National Accounts. The table that follows shows the successive revisions to the SNA, each revision calling for more data. The inability of several developing countries to keep abreast of the revisions is therefore explained by their adherence in many cases to previous revisions.

[11] See the work of Amartya Sen and others concerning the quality of life.

Table 1

Time line of the adoption of the successive SNA revisions

Year	Version of SNA implemented
1947	The origins of the SNA trace back to the 1947 Report of the Sub-Committee on National Income Statistics of the League of Nations Committee of Statistical Experts under the leadership of Richard Stone. *At its first session in 1947, the United Nations Statistical Commission (UNSC) emphasized the need for international statistical standards for the compilation and updating of comparable statistics in support of a large array of policy needs.* *In view of the emphasis on international statistical standards throughout the history of the Commission, the following national accounts standards were produced:*
1953	The 1953 SNA was published under the auspices of the UNSC. It consisted of a set of six standard accounts and a set of 12 standard tables presenting detail and alternative classifications of the flows in the economy. The concepts and definitions of the accounts were widely applicable for most countries, including developing countries. Two slightly modified editions of the 1953 SNA were published.
1960	The first revision in 1960 reflected comments on country experience in the implementation of the 1953 SNA.
1964	The second revision in 1964 improved consistency with the International Monetary Fund's Balance of Payments Manual.
1968	The 1968 SNA extended the scope of the national accounts substantially by; adding input-output accounts and balance sheets; giving more attention to estimates at constant prices; and making a comprehensive effort to bring the SNA and the Material Product System (MPS) closer together.
1993	The 1993 SNA represents a major advance in national accounting and embodies the result of harmonizing the SNA and other international statistical standards more completely than in previous versions.
2008	The 2008 SNA, which is an update of the 1993 SNA, addresses issues brought about by changes in the economic environment, advances in methodological research and the needs of users.

Another shift that has influenced life on the planet has been the emergence of the Information Age which has become a major contributor to the increase of information as a real fifth factor of production and a determinant of decision-making. The emergence of widely available personal computing power has resulted in greater analytic power to throw light on the main economic and social variables. There may be now, however, a bit of a mismatch between the computing power available to the Public Sector and the granularity of the information at present being collected largely by the Private Sector to analyze and adequately discern the direction and extent of economic and social development, including some of the measures traditionally computed within the Government Sector. The change in this relationship may lead to some adjustment in the use of the term “Official Statistics”.

Recognition has been made of the need to measure other areas of human development that would enhance the assessment of growth and development in an economy and society. The Millennium Development Goals, the Sustainable Development Goals, Indices of Happiness and Human Development are examples of the recognition of the need to extend the frontier of our data gathering and find a way of arriving at some overall assessment of development.

The foregoing discussion signals the inadequacy of GDP as an indicator of development. In fact, from the outset of the work on the development of the National Accounts as early as the 1930s and 40s, it was cautioned that GDP should not be considered to be a measure of economic or social well-being. The purpose of the GDP measure was to indicate how fast the economy was growing. This measure was an effort to measure growth in the reconstruction of economies in the aftermath of the Second World War. The interpretation of growth in the estimate of GDP may have been erroneously associated with development which concept is much wider than growth. The relatively new areas of research such as an assessment of happiness, safety, the breaking of gender barriers and other "new" areas of concern hold the possibility of more intensified use of computing power and analysis than the earlier methodologies used in the traditional official statistics that were not easily facilitated by distributed computing power among the economic and social research groups.

The methodologies used in the computation of Index numbers since the 1950s where at best expediency might have trumped strict statistical theory in order to arrive at a result using pre-desktop computer hardware come to mind. A good example of this is the use of the arithmetic mean to arrive at an average "price" of an item selected for comparison over time. Firstly, the figure collected is usually not a price but a unit rate as the selling price of most items for retail sale are usually dependent on weight or some indirect notion of weight and/or quality. In other words, the "price" measurement should make the distinction between a "salad" tomato and a "cooking" tomato which is much smaller than its "salad" relative. This makes the "price" a unit rate. Secondly, since the early pricing methodology did not have the benefit of computers at the point of computation of the index, a simple arithmetic mean of the number of "prices" was taken to arrive at an average price that would go forward in the computation of price relatives. This methodology was employed as a matter of expediency in the face of the difficulty of computing geometric means for three or four unit-rate quotations for four hundred or more items within time constraints for producing the index. Thirdly, index numbers tend for the most part to be backward-looking in time as particularly in the case of the Laspeyres Index, comparison is made between a present (price) and the price of that same item at an earlier date called the comparison base. There is need to re-think the need to compare the price of an item today with the price of the same item at an earlier date. In fact, the item purchased today is not exactly the same as that produced a number of years before for reasons of changes in input materials, production process or other product determinants. Everything changes over time, including items measured for price change in a retail price index, or consumer price index, for example. The rationale and usefulness of the constructs and interpretation of the Laspeyres and Paasche index numbers should be discussed in the context of their analytical value in making intertemporal and spatial comparisons.

Greater processing power has moved much of data processing and analysis away from the large calculating machines and mainframe computers to the desktop or laptop of the statistician who can now process more granular data and thereby introduce more variables into an equation than was possible in the early years of the establishment of economic theory. This new development has made it possible to reduce the size of the *ceteris paribus* cage that has for long prevented more minute analysis. Of great interest and importance is the reduction of the "*cet. par."* restriction. The increased granularity of data collected has led to significant advances in analysis in fields such

as medicine, social sciences and all areas of study hitherto not adequately served by imprecise or proxy data. For example, if one were to construct some type of index number of the price of certain medical services, it would almost certainly be a Laspeyres Index as the price relative of the service being measured in the current period would have to be made against a service with a comparator base in a previous period. The meaningfulness of such a "price relative" can be challenged.

Earlier civilizations fashioned tools to achieve a desired objective. Bows and arrows were fashioned to hunt and kill animals for their meat and pelts. Those "primitive" tools were later replaced as the instruments of choice by guns and other more sophisticated methods of tracking and killing the prey. In similar manner, our changing views on what constitutes development require the development of new measures to assess progress along the lines desired. We have made strides in our conceptualization of what is desirable and these goals have been articulated in several fora but we continue to do the metrology using the assumptions and tools of a number of generations long gone by. Attempts to achieve this new objective have been put forward by several commentators and there has been movement towards a general adoption of the newly articulated goals but the measurement tools have tended to remain relatively unchanged.

The improved ability to collect data and the use of improved computer processing have made it possible to change our focus from the macro view to the local level. This would allow the analysis of growth and development to people at geographic levels that may not previously have been identified in the estimate. The macro approach to the measurement of economic growth and social development as interpreted by per capita representation of GDP and other macro indicators of health and distribution of well-being would not have reflected growth or development in certain parts of the country. Whereas we used to see the forest with our older perception instruments, we can now see the trees that comprise the forest, along with the biodiversity that sustains and supports the existence of the forest. We cannot continue to plan on the basis of the blurred view of the forest that now constrains us. We now have at our command much more detailed information, some of which explains the dynamics of the very forest which we can now describe in more minute terms and introduce more detail in our planning, such as the preservation of habitats and the sustainable tapping of the resources of the forest.

In similar manner to the example of the forest, the set of people living in one recognized geographical space was and continues to be referred to as "the population". That reference is similar to the view of the forest and not of the trees as within that disparate larger group there may exist several subsets that should be considered when planning for the "forest". One may give thought to referring to the "**sub-populations**" of a country, for example. The push-back to the suggested use of the word "populations" would be the original referral to subjects for observation that have basic similarities. Although they have existed, special interest groups and sub-cultures apparently did not have as loud a voice or as great and effective a claim to be considered in the design for economic and social planning and development as they are today. One might argue that the increased voice of sub-populations and special interest groups is the result of social development which can in turn affect economic development.

The need to re-define "Development", "Household" and the Unit of Enquiry in social surveys

The push in the direction to understand the meaning of **development** has been initiated at the global level, but the concept should start with the fundamental building blocks of society. The centrality of the individual in the determination of development should be clearly articulated and made known to the populace. This statement presumes that the concept of development now includes to a significant extent human development in addition to economic development, or perhaps better stated, economic growth in addition to human development. The task of arriving at one measure (number) that would describe development in a country that would include growth would not be an easy one. It may be possible but should require a line of thought and a type of questionnaire that examines psychological reactions to and evaluations of contemporary events in addition to the money-based indicators as yielded by GDP.

The fundamental building block of a society has long been recognized to have been the **household**. Changes in lifestyles have made, in the opinion of the writer, the household no longer an apt unit of enquiry if the current definition of household is to be retained. It may be that the household characteristic of sharing at least one common meal per day no longer holds, thus effectively making the definition of "household" no longer relevant to the use to which that definition is still being put.

What then should be the **unit of enquiry**? According to the present definition of household, one would most probably find that today there are fewer households in any given geographical location today than existed in the past because it is probably the case that persons living in a dwelling unit do not share one meal per day with other occupants of that dwelling unit. The identification of an alternate unit of enquiry may be made possible if one shifts to a combination of registrar data in combination with Big Data as the source of a number of social and demographic survey type data. The result would be a more cost-effective data source. It would also signal the partnering between Government and the Private Sector as most of the Big Data are owned by this Sector. This situation highlights the need for a re-consideration of the need to re-examine our thinking on the basic elements of society. The local community may well emerge as the new unit of enquiry.

What is people development?

Much of the discussion on people development addresses the workplace and is therefore micro in its focus. Ryan Carruthers (April 11, 2022) in his discussion of people development expresses the following view:

> **"*People development is about helping employees develop the capacities the organization needs to succeed. We break down 8 examples of ways you can close skill gaps and accelerate employee development."*[12]**

[12] **Ryan Carruthers (April 11, 2022) "The Evolution of Learning and Development"**
Exploring the future of Learning and Development by examining its roots.

People development is the process by which human resource departments equip employees with the skills, knowledge, and attitudes they need to reach business goals. People development is often used interchangeably with employee development which is about helping employees advance up in the organization. In contrast, people development is more so about closing skills gaps in the organization.

When Bradford Morse of the United Nations Development Programme made the statement that "**Development is People**" his platform was a national one as opposed to the firm. This concept has been taken on board and is more evident than before in the work programmes of many agencies.

David Korten, former regional advisor to the US Agency for International Development (USAID) conceived of a people-centered development strategy as including the values of justice, sustainability, and inclusiveness. In 1984, that thinking was relatively new, especially since the action plans of many governments and International Agencies thought otherwise. According to Korten, the prevailing growth-focused development strategy is unsustainable and inequitable. He called for **transformations of our institutions, technology, values, and behavior, "consistent with our ecological and social realities**". This proposal has serious implications to the accustomed viewing of international comparability and the assessment of development in some societies that because of their ecology and culture cannot in reality be compared with economics-driven countries.

The concept of people-centered development gathered currency in the final decade of the 1900s. Among the platforms that gave support to the new thinking were the following:

- The Human Development Report in 1990
- Earth Summit in 1992
- International Conference on Population and Development (ICPD) in 1994
- Summit for Social Development of 1995
- The Human Development Index (HDI) of the United Nations Development Program (UNDP)
- The Millennium Development Goals Report of the United Nations
- The Sustainable Development Goals.

The United Nations System of National Accounts has made some accommodation to include considerations of the impact of economic growth on people. Similar "add-ons" have been made to other studies such as the ECLAC Natural Disaster Damage Assessment as it was called in its earlier days. Today it is known as Post Disaster Needs Assessment (PDNA). The Millennium Development Goals and its more recent replacement by the Sustainable Development Goals are more incisive in their examination of people development. In these two initiatives, progress has been made to recognize and attempt to measure the impact on people.

Main aspects of People-centered development

An attempt to synthesize the many descriptions of people-centered development yields the following:

> ***People-centered development is an approach to the securing of a "better" life. To this extent the focus should be primarily on local communities with contributions to a national and geographically dispersed reality providing throughout the local communities increased self-reliance, social justice and participatory decision-making.***

The preceding explanations of the concept of people-centered development seem to agree that people-centered development is necessary for sustained economic growth with a measure of equity. Whereas economic growth may be necessary for sustained development, it might not be sufficient nor does it have to be the lead condition that would result in sustainable development. The UNDP's Human Development Report in 1990, presents an attempt to assess countries' level of development as measured by the Human Development Index (HDI). The two different assessments, namely the **growth-oriented approach** and **the people-centered approach** - continue to run on parallel tracks with no convergence to produce an integrated assessment of development. The names of some organizations continue to reveal a leaning towards economics as opposed to all-round development. Such organizations continue to refine the United Nations System of National Accounts while attempting to explore some social and environmental factors that influence development in its wider sense.

To recall the Diamond et al. statement about the production of new data when such new data were needed, the enabling of people-centered development requires the conceptualization of people-centered development and the development of new datasets to address the concept.

International comparability has always been problematic regardless of what phenomenon is being compared internationally. The datasets that form the building blocks of the systems of accounting in the more developed countries are not all available in the less developed countries for any of a number of reasons, including the following:

- Budgetary resources and the nature of the accounting and data collection practices in those countries. This results in an inability to conform with the supply of data that would be a one-to-one match with the schema advocated as the international standard
- Varying cultural norms and belief systems between countries, as is the case in some Asian countries
- The possibility of compiling regional accounts for some countries while impossible for others
- Varying national resource endowments to compile GDP or its political/philosophical counterproposal in the case of countries that are of a different philosophical stance to the measurement of economic activity
- The benefit of attempts to harmonize statistics internationally

- The stark reality of the information divide when attempting to include new issues into the GDP calculation such as green accounting and the contribution of women to economic activity

Versioning should at some stage give way to a complete redesign of a system that generally rejects the cop out of *ceteris paribus* and produces updated demand and supply functions based on the wealth of information that is now available and the increased capability of data processing. This would allow analyses to move beyond the two-dimensionality that to a great extent persists in our estimates. A new system would allow comparability at different levels of focus in accordance with the abilities of the less data endowed countries to make a meaningful contribution. A concluding remark on international comparison and versioning, especially the continuing revisions of the SNA, brings to mind the comment by Albert Einstein:

"The thinking that has brought us to this stage cannot take us beyond it"

That statement at caption here was made primarily about rocketry but has equal relevance to the ongoing versioning that we witness. What is needed is a new design of a measuring system with the capability of analyzing many realities and a new fuel for driving that new system to greater heights and analytic capabilities. The new system will not necessarily produce one all-encompassing macro estimate but should substantially reduce mention of "*ceteris paribus*".

Takeaway #3

Better indicators of well-being in nations around the world with metrics far more incisive than any interpretation of GDP can provide

Well-being[13] for whom?

Estimates of GDP are used consistently to convey the impression of better well-being of the population of any given country in the situation of rising GDP. The GDP per capita figure often quoted to give the impression that the man or woman in the street is a beneficiary of the increased per capita product is not necessarily true as the GDP per capita figure is merely a division of the Gross Product by the number of people comprising the population. It is well known that income is not distributed equally over the population.

Demands have been made over the years for the national accounting to include other considerations that impact the wealth and well-being of a nation. The series of successive increments to the data requirements for the system of national accounting to address issues that may be better addressed by agencies substantively responsible for those matters should be reconsidered when a complete re-design of the existing system is planned. In many cases the data requirements for the revised version cannot be met by the less developed countries which then are left behind to adhere as well as they can to the older versions. A major objective behind the national accounting estimates and some social attributes has been to facilitate international comparisons. Attempts have been made

[13] Well-being has been defined as the combination of feeling good and functioning well. It encompasses the experience of positive emotions such as happiness and contentment as well as the development of one's potential or self-actualization.

to include such health and some ecological considerations in the accounting and to put a money value to their measurement so that they can fall into the calculation of the GDP figure. This approach is seen as posing some difficulties in the metrology when computing a national GDP. The problem of comparability across countries of varying geographical, geo-location and data human resource endowments make meaningful international comparability a challenge.

The foregoing discussion on international comparability is premised on the following assumptions:

- The ability of the governments to perceive some usefulness in international comparability
- The ability to call forth the production of more disaggregated data to be fed into a capable computational system and
- The political will to bring about those prerequisites to an enriched national dataset

The proposal of the Pardee Papers called for the creation of indicators that measure sustainable development such as those that describe and measure the quality of human life while living within the carrying capacity of the supporting ecosystems. The question is how would such indicators fall in line with international comparability? Should they? How would we weight the imponderables such as happiness, belief systems, low or high crime rates and low chronic disease rates in low income countries as against the opposite situation of similar realities in the more developed countries? How would one rank a country with a high level of GDP but which has a high level of crime against another country with a much lower GDP level while being seen as a low-crime and safe country?

Takeaway #4

The creation of indicators that promote sustainable development such as the improvement in the quality of human life while living within the carrying capacity of the supporting ecosystems.

One acknowledges the thrust of the Millennium Development Goals and the later defined Sustainable Development Goals as being moves in the direction as advocated in the Pardee Papers. In planning for relevant metrics to describe a contemporary reality, a design team should go beyond the Sustainable Development Goals and present a discussion draft of what should be measured, for what purpose and by which countries, with the full participation of all countries concerned in the drafting of the proposal. Newly designed data systems will suggest how the data will be collected, updated and used for analytical purposes.

In many countries in-depth analysis of the data from the Census of Population is not given priority as a source of information to inform planning at the community level as planning tends to be done at the level of Central Government. This tends at times to leave several communities outside the benefit of the plan. If there is a commitment and a mechanism for effective planning at the community level, for example, community and other small geographical area vulnerabilities can be addressed with a view to sustaining and improving the quality of life in areas outside the major population and commercial centers. The data analyzed at the local level can inform the

establishment of local public facilities that would reduce the pressure on a few central facilities while improving life in the local areas.

What are we measuring and why?

We observe that there is a development problem and set out to correct it. The objective may be to grow the economy and/or to produce greater equality in the distribution of income, or any of a host of other objectives. These are no doubt in keeping with a philosophy or view of the world as the planner would like to see it. From the foregoing history of discussion on growth and development, as presented in this text, it seems clear that the attempt is to measure both growth and development. The latter concept, that of development, is more difficult to measure, as happiness, feelings of security and accomplishment are not capable of direct measurement in themselves. The task will be to find an adequate number and quality of indicators to these abstractions and to arrive at conclusions from the responses. A more direct manner of collecting the data would be to ask directly if the respondent feels happy, secure, well-treated or otherwise. If the responses are genuine the researcher can justify the response by invoking the Cartesian dictum "*Je pense donc je suis*"[14]. The identification of indicators of development would involve the incorporation of knowledge and expertise normally outside the skill set of the statistician. Appropriate steps should be taken to work with the professionals who can assist in this area.

In the context of the current world situation, one may wish to examine the benefits of measuring growth and the inadequacies of so doing. One may also wish to examine sustainable development and its costs and benefits when viewed against economic growth. The new paradigm that should guide a new planning thrust should take as its point of departure a people orientation such as to some extent attempted by Maslow's hierarchy of needs. A major reality not conveyed by the chart is that progress from one hierarchical state to another is not necessarily linear and consecutive.

Fig. 1 – Maslow's hierarchy of needs[15]

[14] Rene Descartes (1596 - 1650) **What is Descartes' theory?**
The essence of this theory can be summed up as follows : the intellect alone is not capable of forming judgments. It has only ideas to which the will must then give or refuse its assent. (Researched on Web Chat GPT).

[15]Wikipedia
https://en.wikipedia.org › wiki

The appeal of Maslow is that it addresses what may in fact be the cry of a large segment of the national population for aspirations that are not being achieved because of different interests of other more powerful and privileged groups.

If we are in fact trying to measure growth and development, it should be clear that we must look to different metrics to assess those different goals. The casting of categorical values into a numerical form to facilitate a calculation may not hold the answers to the linking of the growth aspects to the development consideration. This should not be attempted. To design one index number that would describe a country's growth and development would in the final analysis be perpetuating the idea of the nexus between the two measures. Any index number that is a composite of growth and development would almost certainly because of its weighting diagram and melding of the two different components of the assessment, leave the richer countries at the top of the measure and perpetuate the belief that a high GDP is *ipso facto* an indicator of a developed society. The use of the *per capita* GDP figure to indicate a measure of national development should give way to a description of indicators of well-being at levels below the national geographic level as analysis at that macro level means very little. The Pardee Papers of circa 2009[16] discuss the inadequacy of the GDP figure to measure welfare. The GDP was never intended to do that. This point has already been made in the present paper. What is surprising is that there has not appeared a great research response to the challenge of crafting a set of measures that would describe growth and development in a cohesive manner while avoiding the bias towards GDP.

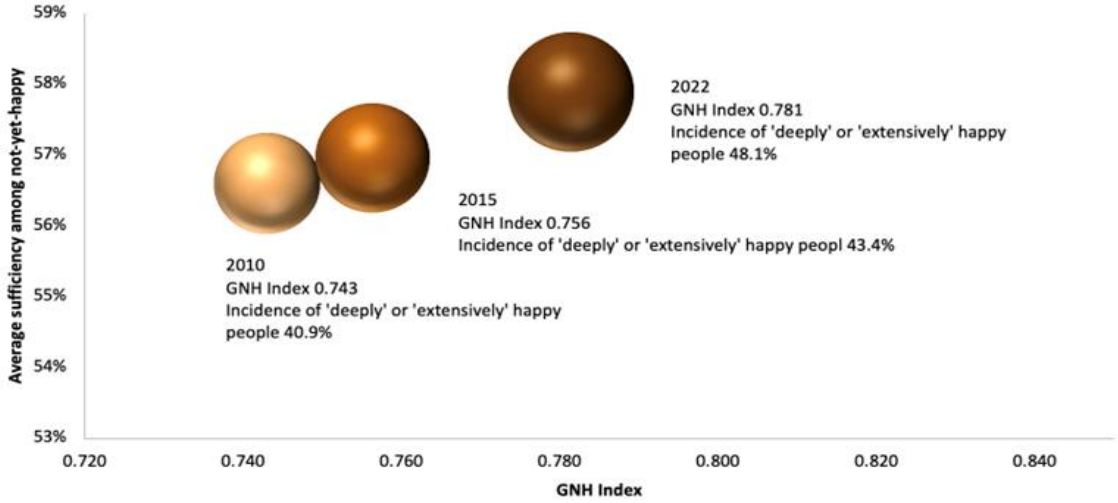
> *Some work has been done on a Happiness (GNH) Index for Bhutan whose King believed that Gross National Happiness was more important than Gross Domestic Product. The GNH Index attempts to present a holistic reflection of the general wellbeing of the Bhutanese Population rather than a subjective psychological ranking of happiness alone as it includes areas of concern such as living standards, health and education and less traditional aspects of culture , community vitality and psychological wellbeing[17]. This initiative does not seem to have gained traction among the major proponents of the measurement of national wealth internationally. Despite Bhutan's apparent satisfaction with its assessment, its international rating of well-being has remained at about the 97th country in the internationally recognized ranking. It is possible that the ranking of countries in terms of development is value laden in favour of GDP accounting.*

[16] See Bibliography at the end of this paper.
[17] See **Beyond GDP: The Need for New Measures of Progress** the Pardee Papers/No. 4 / January 2009

Fig 2 National GNH Index and share of happy people, 2010 - 2022

GNH 2022

Figure 16: *National GNH Index and share of happy people, 2010–22*[21]



In an earlier part of this paper that addressed the meaning of development, the point was made that it would be difficult to describe growth and development by one index number. The perception and evolution of any given reality will differ when that reality is examined through lenses different from those of national accounting. One should contemplate the foregoing statement in the context of the achievement of world governance and international comparability. The fact is that there are large areas and situations of non-comparability and there should perhaps not be an attempt to force a justification for comparability when in fact there is none. This would be akin to an attempt to genetically modify an orange until it can be described as a kind of apple, all for the sake of a comparison that does not produce a solution to the existing condition of either of the two fruits. Comparison between countries for the sake of comparison does nothing to either of the countries being compared.

Takeaway #5
The call for a review of the largely two-dimensional approach to analysis that is generally adopted

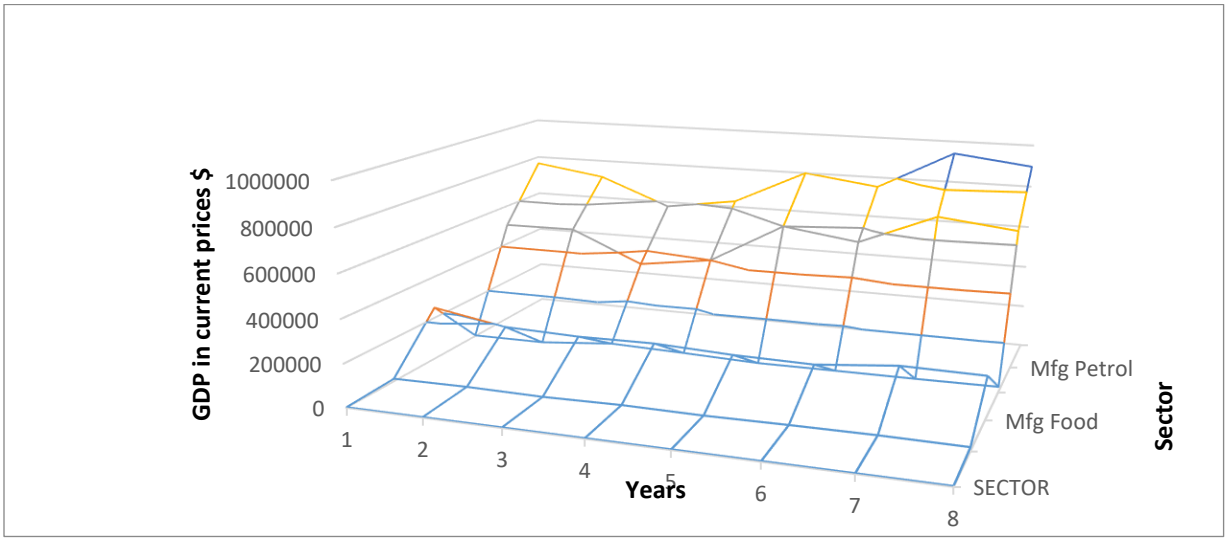
We try to measure the GDP of a country in two dimensions, for example, we measure a macroeconomic effect against an external stimulus and conclude that the stimulus caused the result. The same thought process is used in demand and supply analysis and is used to indicate an "equilibrium level of effective demand that is "good enough" for our official planning mechanisms, without realizing that people are complex and multidimensional in their thinking and certainly not always rational. This may be one of the greatest defects of the *ceteris paribus* assumption. It most probably stemmed from a lack of data, but that was a long time ago. Our

knowledge of human behavior has improved substantially and our provision for the human response should not now be confined to assumptions of rationality. Some commentators believe that the accounts as presented do not show an adequate picture of the impact of growth in income throughout the economy and society. Today's measurement tools are capable of providing more in-depth and intricate analysis of the impact of official planning in the society. Analysts should find a way to capture the flow that everyday transactions produce.

If economic activity is a flow, how should our measurement of it be approached?

A rejoinder to the above caption is that social activity is also a flow. A flow cannot be measured adequately on an annual basis to convey any idea of its dynamism. A flow should be capable of continuous measurement. A flow is dynamic and changes from moment to moment to reflect not only the quantum of the flow variable but also the rate of increase or depletion of that variable. It may in addition be influenced by environmental conditions that may in the case of the ocean be to some extent be predictable as is the situation with the predicting of wave height in weather forecasting. In the case of a simple step-up to a three-dimensional depiction of the sectoral analysis of GDP, for example, the graphical output would take the form of a surface which will present a clearer picture of the performance of the sectors as against the total GDP. The graph begins to look like the surface of the ocean. Greater periodicity (more frequency) and inter-sectoral comparison in reporting economic activity will give rise to a clearer understanding of some of the behaviours influencing movement of the economic performance, allowing for a more minute study of seasonality or response to other stimuli.

Figure 3 A simple visualization of a 3-dimensional chart



The above chart is very rudimentary but may be developed as far as the idea can be pursued or could be used to show the magnitude of a given sector *vis- a- vis* another or other sectors as far as the graph can be designed. The idea would be to represent the measurement of economic activity as a surface akin to the surface of a body of water that responds to winds and tides. The use of some graphics that are at present available in our contemporary spreadsheets can be used within their limitations to show inter- and intra-sectoral relationships or even sectoral performance over time. More frequent assessment and readjustment of forecasts and graphic three-dimensional presentation should present a view of sectoral surges and ebbs in the economy and society for the better understanding of their implications to movements in GDP and sectoral production levels. The result should be a view of surges similar to wave movements. This will represent an advance over the idea of an annually presented surface which is just one step beyond the 2-dimensional presentation of the last 70 years. It may still be considered to be a presentation of comparative statistics but will bring the analysis closer to capturing and presenting the dynamics that underlie the movement in the national aggregates.

Big Data and Artificial Intelligence

The role of Big Data and Artificial Intelligence with assistance from supplementary data collection activity is crucial to the improvement of the macro estimates that are being discussed. Indeed, the increased availability of more current and disaggregated data such as those generated by Big Data can be used to provide forward estimates of GDP rather than *ex-post facto* estimates that appear months after the date of reference as represented by the late estimates. Of interest is the work done on the Spanish economy in the production of forward estimates of GDP in a paper entitled "A factor analysis for the Spanish economy" by Angel Cuevas and Enrique M. Quills in 2011. This approach attempts to confront the dynamic nature of everyday transactions that impact the estimate of GDP and merits the attention of a special group of experts to propose an approach along the lines of the paper that can be adapted and used in the derivation of estimates on a more internationally accepted basis. A necessary precondition to the effective use of the Big Data/Artificial Intelligence axis would be the expansion of the supply and demand functions to take out of the ceteris paribus cage a number of factors that can now be measured and bear significant correlation to major components of GDP.

The work of NOAA in the prediction and forward estimation of the impact of atmospheric and oceanic events is still being researched for some measure of applicability to the more analytic and real time approach to GDP estimation.

The suggestion of consulting NOAA was included in this text before changes in its official status were made. Ideas reside in people so it is possible to make an attempt to benefit from the expertise of those who can transfer such specialized knowledge. **The decision to go forward with the NOAA idea will be a matter for the International Statistical Institute and its collaborating agencies if they so desire.**

Whereas this paper does not present a formulation of a model that addresses the suggested new approach to measurement, it acknowledges that it would benefit from the input of experts in fluid dynamics in the event that their forecasting ability may be linked with significant correlates or

determinants that can be identified inside the current *ceteris paribus* cage. To this extent, the expertise of the National Oceanic and Atmospheric Administration (NOAA)[18]may provide insights into the development of a model for measuring such flows as are being proposed here, if the data available for the proposed purpose are available.

The suggested approach will use an information source much wider and immediate (Big Data) than was available seventy years ago, possibly resulting in assessments of major social and economic assessments becoming available with a periodicity more frequent than one year or at best on a predictive basis. It will also require the development of different data collection instruments. A major departure from the current *ex post facto* estimate of GDP would be a methodology that is more dynamic (relatively less static) and is not an exercise in comparative statics with a time lag that can vary from (say) two months to five or six months after the accounting period.

The Big Data route will be in accord with the view that the transformation of economic statistics – taken by this author to include GDP estimates – will make greater use of administrative and commercial data and result in more accurate statistics and a lower response burden on business to the data requests of the Statistical agencies. Worthy of note is the fact that Big Data cannot eliminate the underlying proviso of ceteris paribus since assessments and decisions based on Big Data are not based on total knowledge of all of the influencers of supply and demand.

Economic activity and industry categorization

GDP can be viewed as providing an accounting assessment rather than an indication of the behavior of economic activity and economic growth when measured from time to time, for instance, annually. The level of GDP will depend on the productive capability of the geographical entity that is being measured. This is usually determined by size in terms of land area or by population and/or its attributes. Temporal comparisons within a country are more meaningful than comparisons across countries. Inter-country comparison is meaningful only if the **rate of change** in GDP is measured, and then meaningful to a very limited extent. The more recent push toward the production of regional accounts within a country introduces a data divide between countries based on their ability to disaggregate the estimates by region within national boundaries.

Variability in political and philosophical stance concerning production and product results in variability of the national estimates, making international comparison a bit more challenging. Harmonization across nations is more likely to have maximum validity if data elements based on common concepts are being compared.

The above discussion is not meant to minimize the work that has been done and continues to enrich the preparation of the GDP estimates. Such work should now be appraised against generally greater availability of data at elemental levels.

[18] National Oceanic and Atmospheric Administration
1401 Constitution Avenue NW, Room 5128
Washington, DC 20230

What is the purpose of versions or Revisions that are produced from time to time?

Versioning allows developers to introduce enhancements, fix issues, and add new functionalities over time. Versions also help users keep track of changes and updates, ensuring they have access to the latest improvements and security patches.

The problem with revisions is that they hold as immutable the line of thinking that has guided measurement in the past. This is akin to versioning in the context of applying a patch to satisfice when a given flaw in the execution of a program is detected. This is exemplified by fixing a "bug" in computer programming code. The result is what has in the past been referred to as "spaghetti programming" or code and which is merely a "quick fix" and is not a more complete look at the programming and view of the solution that gave way to the bug in the first case. What would be preferable would be a complete re-assessment of the job and the creation of a new routine to produce an improved solution. The existing information divide between the developed countries and those at varying stages of development may prompt a revision of the use of one metric for growth and development that may not be easily achieved by the less data opulent countries.

A direct comment about the several versions of the SNA to patch areas of weakness or to bring on board new issues of relevance to national income accounting points to a degree of product orientation This can be described as the continuation of the same product and production paradigm over time. This is opposed to process orientation in which the producer organization seeks to improve the product for increased relevance, timeliness of delivery and quality of the metrology as relates n this case to the production of statistics. The concern with international comparability may be another indication of product orientation as opposed to a complete re-think of a measuring system that will incorporate improvements in data availability and data collection methods. Such a "fresh start "will reduce the size of the *ceteris paribus* cage and yield a more easily understood aim of the measure to provide not a point estimate of a figure of national wealth but rather an indication of what that wealth scenario is likely to be.

IS CRIME A PHENOMENON THAT CAN AND SHOULD BE MEASURED?

Crime is an individual act but is also a social phenomenon embedded in any given society. The recognition of crime is conditioned by societal norms, values, inequalities, and interactions. The adherence to these societal norms and inequalities suggests compliance with the law while deviance from set societal norms, even for genuinely perceived means of survival among some strata of society, are recognized to be criminal behavior. Crime impacts economic growth and social development and should be measured and can studied with a view to its reduction.

It is possible to use indirect means to quantify the effect of crime on society. At the same time as measuring the effects of crime on the economy, the planning mechanism should examine the manner in which society in its quest for development and growth may be contributing to the emergence and growth of crime. To what extent is society moving towards agglomeration of production establishments to the detriment of small business? Is there some mechanism that would seek to reserve a space in which the small and medium scale enterprises can operate without the

fear of being encircled by larger firms and driven out of the market? The sectoral analysis of our GDP and its correlation to crime may be able to throw light on these questions through questions that seek to find out why instead of how much. These questions can be answered through psycho-social research, much of which no doubt exists but in a domain not functionally related to economics. The proverbial "big fish" continue to eat the sardines, forcing the latter to adopt a different *modus vivendi* which may be viewed as anti-social or criminal activity. Our interest should not stop at the production of the national accounts. That may be important for satisfying some conditions that are necessary to secure external financing, but resources should be put towards the investigation of how social inequalities can contribute to a violent and crime-ridden society which in turn exerts a negative effect on national economic wealth and personal and property security nationally. The results of appropriate investigation will release the assumed inertia of the contribution of crime from the *ceteris paribus* cage.

This paper wishes to see a refinement of the statement that inequalities contribute to a violent and crime-ridden society. The tipping point is perhaps not the inequality – there will always be inequality- but the seemingly official acceptance of the irresistible tendency towards **increased** inequality in the distribution of income across the various income groups. The solution to this problem should be a matter of stated, understood and enacted policy.

At present our data permit the observation of social inequalities from the use of household data collected in population censuses or household surveys. A similar analysis of the measurement of consumer price changes by income level by the national statistical office may be barely possible to compile and publish within the constraints of deadlines that would make the analysis time-relevant. It is now nearer to being done after examination of relevant Big Data and the definition of income groups. The result may not be on the same narrow level of examination of generally static indicators but may produce results useful to planning and monitoring progress of households or communities at various income levels. If Big Data used in conjunction with modern survey instruments such as psychological surveys and focus group generated data to predict and assess future economic and social activity, the result may prove to be more illuminating and simple to understand than the GDP figures produced by the latest version of the SNA recommendations. Such an approach should yield a better assessment than statistics emanating from household surveys whose samples are based on probabilistic samples that are justified in the final analysis by *ceteris paribus* assumptions.

OFFICIAL STATISTICS

The United Nations[19] describes rather than defines official statistics in the following manner:

> ***Official statistics provide an indispensable element in the information system of a democratic society, serving the government, the economy and the public with data about the economic, demographic, social and environmental situation. To***

[19] Fundamental Principles of Official Statistics (A/RES/68/261 from 29 January 2014)".

> ***this end, official statistics that meet the test of practical utility are to be compiled and made available on an impartial basis by official statistical agencies to honor citizens' entitlement to public information.***

The text that follows is attributed to Wikipedia. It is actually more of a definition of the UN text as found in its document entitled "Fundamental Principles of Official Statistics (A/RES/68/261 from 29 January 2014)".

> ***Official statistics are statistics published by government agencies or other public bodies such as international organizations as a public good. They provide quantitative or qualitative information on all major areas of citizens' lives, such as economic and social development, living conditions, health, education, and the environment.***

The point is made in both texts that official statistics are produced and published as a public good by governments.

Big Data and Artificial Intelligence have shown themselves as being capable of producing some data in their novel approach to data collection that can be added to the grid of what is considered to be official statistics. The identity problem to the incorporation of Big Data outputs into official statistics should be studied and perhaps the name "official statistics" can be altered to include the possible Big Data contribution to the datasets. The partnership that can be struck between Government and the Private Sector which is by far the more significant owner of Big Data can redound to the benefit of the nation.

This paper suggests that new metrics should be able to inform decision making by government officials and to an increasing extent private sector actors in a shared research relationship that changes the name and possibly the scope of "official statistics". The priority should be in the national interest through the release of a wider dataset of statistics as a public good.

THE NEED FOR MORE VISUALISATION

Anthropologists, (quantitative) historians, and sociologists have proposed a variety of explanations for the collapse of civilizations involving causative factors such as environmental change, depletion of resources, unsustainable complexity, invasion, disease, decay of social cohesion, rising inequality leading to rebellion or revolution. This final act of dissolution resonates with Maslow's top of the pyramid that represents self-actualization and reduced social cohesion. Social cohesion can be described as the "glue" that bonds society together, essential for achieving peace, democracy, development and resilience. This "glue" is made up of four key components:

- 1) Social Relationships,
- 2) Connectedness,
- 3) Orientation towards the common good and
- 4) Equality.

An assessment of the components listed immediately above could lead to the consideration of what constitutes the depth of the economy and society. This will not be discussed in the present paper but can be discussed and explored in follow-up plans for expanding the knowledge set. Somewhere in our expanded datasets there should exist the capability of tracking social cohesion and examining its effect on the mood or happiness of the populace. Gini coefficients may provide some indication of the extent of social cohesion but what is needed is a more direct feedback from the sub-populations that perceive the existence or not of social cohesion. Their perception of happiness is the reality.

It may be possible to use some tools of data analysis to represent graphically the state of social cohesion and to present the possible future of this phenomenon. Estimates derived from direct enquiry promise to recognize this variable and essentially free it from the *ceteris paribus* assumption.

ASSESSING GROWTH AND DEVELOPMENT

NEW METRICS TO BE CONSIDERED

The current analysis of GDP does little to measure progress at the local level in that it does not provide a measure of the effect of economic level at the small geographic level, i.e. the village or community level. This means that the stating of the *per capita* GDP of a country does not indicate the group of persons to which that figure relates. It is merely an arithmetic calculation with the national population figure being the denominator. No indication of the distribution of the fruits of economic growth over the geographic locations that make up the country is given. Today there is a felt and heard desire to make such information available. In addition to the economics,

- There is the desire to convey information on aspects of development such as can be indicated by the level of happiness of the people on an area basis.
- The equality of police and legal protection of residents by different areas and other demographic filters will indicate a degree of movement up or down a happiness or feeling of safety scale on a local area basis.
- Discussion among interest groups may highlight more issues of development that can now be analyzed through new data and enquiries and through new databases that are now being created.
- There are available examples of the kind of questionnaires that are being utilized to collect this type of data.

The investigation of the social and economic reality of life at the community level lends the promise of raising the contribution of those areas to the nation's GDP. Community studies will reveal possibilities of supporting informal activities that at present languish for want of recognition of their worth by those who are macro-centric in their view of growth. Studies can produce a list of projects at local level that can be supported by the central government or by a group of venture capitalists.

The above observations and suggestions are in no way intended to be a criticism of the data collected traditionally but should serve to encourage a more insightful understanding of our

complex economies and societies. The reference to Sir Ian Diamond's reference to the new COVID 19 statistics cements the fact that new measurement must be relevant and must be related to change. The idea of the sanctity of long data series, especially those of the Laspeyres and Paasche kinds is now seen as having less value to solve contemporary management problems as contrasted to the years when the tide of change facing our economies and societies was not as swift as it is today. The COVID 19 example demonstrates the production of new data sets immediately to confront a life-critical actuality that arose. So too must the required constant environmental scanning identify breaking change and set up data gathering mechanisms to identify, understand and monitor the new reality. The *ceteris paribus* proviso will now be much reduced as a result of more data availability.

THE CHALLENGE

The challenge is to adopt predictive models for assessing the direction and magnitude of change in economic and social activity, in the same way as models have been built to predict the path of hurricanes and storms. The technology at present available makes possible more insightful measurement of the economic and social variables - which are flows – in a manner other than the traditional two-dimensional presentation of graphs. This new presentation will continue to show a degree of two-dimensionality but may be able to introduce a third or fourth dimension in the assessment. More exhaustive data sets can provide interesting growth determinants at sectoral and sub-sectoral levels for more research by those who are so inclined. As in the case of the analysis and prediction of the development of storms and hurricanes, more than one model may be proposed, depending on the insights that different research groups may bring to the study.

One model may be with specific reference to Small Island Developing States (SIDS) while a variant may address the so-called countries of the North. This paper gives no greater detail but leaves the filling out of the details to emerge from meetings of multidisciplinary groups as they examine the possibility of adding other metrics and graphical representation to more granular datasets. This will require more intense use of data that are available today but which was not available a decade ago as well as new data to be obtained from direct data collection or access to administrative or other data collected by other acceptable means.

Another model, in attempting to observe the dynamics of development, may wish to borrow from the modelling of sea-level rise and examine the feasibility of aligning the determinants of sea-level rise to economic activity, for example. For instance, it may be possible to assess the negative effect on society of economic growth that is destructive of the natural resources of a region or of the fabric of a society through the introduction of a different *modus vivendi* in a given local area.

The two referenced models will require more datasets and the access to Big Data, some or most of which are not now in the possession of the Government Sector. Access to Big Data will require some negotiation with the owners of those datasets. Indeed, wide access to Big Data may change the configuration of the National Statistical Office and lead to the revision of a number of methodologies that have remained largely untouched for many years. An expert group may wish to examine the effect of new Big Data on the assumptions and methodologies of statistical

estimates that have been employed over the past seventy years and make recommendations for paradigm shifts.

The group may wish to examine the extent to which the sampling and query of establishments is as crucial to the striking of sector estimates as is the case up to the present time. Could access to Big Data solve some of the contemporary challenges of data collection and periodicity of estimates once the conditions of access to Big Data are agreed? The design of the Big Datasets will determine the need for more intense investigation in small and less affluent communities. This may inform of reactions at that level of society and perhaps improve the accuracy of the range of variables still assumed to be inert to the demand and supply considerations involved in the renovated functions. New data availability resulting from cost-effective small area data collection and analysis will reduce the recourse to assumptions of other things being equal.

The challenge as signaled in the above text would of necessity involve the coopting of knowledgeable experts in several areas whose work may be able to assist in the creation of a new approach to statistics. This paper does not purport to identify all of the types of expertise to be drawn on but would suggest that several critical personality types as presented in the Myers-Briggs Type Inventory (MBTI)[20] be included in the product design groups. A listing of the 16 types of personality is provided in the end notes to this paper for ease of reference[i]. Such a list will emerge from further discussion if a decision is made to take the suggestions of this paper forward.

SUGGESTED WAY FORWARD TO THE REDUCTION OF THE SIZE OF *CETERIS PARIBUS*

The assumption of *ceteris paribus* is an admission of the lack of knowledge of the behavior of other variables that may impact the estimate being attempted. That was the situation seventy years ago but the data situation is vastly different today. The contemporary enriched data set can reduce the lack of knowledge of other effects on the variable being studied, making the assumption of other things being equal less impactful on the quality of the estimate today. The enriched datasets will move the statistical estimates to informed **predictions** with a margin of error in time for the figures to be used for strategic planning.

On the question of planning, the emphasis should be on development at the local (small) area level within the context of a more representative conceptualization and assessment of development. This should be recognized as strategic planning with less emphasis on international comparability on the grounds of rigid measures that may not be relevant to some societies. Can small countries such as atolls facing terminal sea-level rise, with no industry or major marketable economic activity be compared meaningfully with countries of the North?

The Pardee Papers explore current and future challenges by anticipating the pathways to human progress, human development and human well-being. This series includes papers on a wide range

[20] *The Myers-Briggs Type Indicator (MBTI) is a self-report personality assessment that categorizes individuals into one of 16 distinct personality types based on their preferences in four dichotomies: Extraversion (E) vs. Introversion (I), Sensing (S) vs. Intuition (N), Thinking (T) vs. Feeling (F), and Judging (J) vs. Perceiving (P). Developed by Isabel Myers and Katharine Briggs, it's based on Carl Jung's theory of psychological types and helps people understand their motivations, strengths, and how they interact with the world.* – Chat GPT

of topics, with a special emphasis on interdisciplinary perspectives and a development orientation. The most potent suggestion is that interdisciplinary perspectives should be entertained in an attempt to understand the multi-dimensionality of reaction to economic and social policy stimuli that cannot adequately be understood let alone be described by a two-dimensional chart.

Transformation of our institutions, technology, values, and behavior, "consistent with our ecological and social realities"

This proposal has serious implications to the accustomed viewing of the preferred type of society that is being preferred over the present. A changed political stance of government and its follow-up changes in philosophy may give rise to changed concepts and definitions that may drift away from the present "norms" that are now observed and which form the basis of international engagement, comparability and the assessment of development. A changed view of national priorities can lead to institutional changes which may see the creation of new ministries and the eclipse of some that have ceased to be as critical as before under the new thinking. These functions may well be subsumed in the work programs of other entities.

Some countries and societies that because of their ecology and culture cannot in reality be compared with economics-driven countries

How do we treat with these countries? Is international comparability the most important desideratum that should drive international politics or economic analysis, or could harmony across nations be achieved by another paradigm? In arriving at new measurement approaches, the modality of communication of the new measures should be the result of two-way communication between the countries and the international agencies. Top-down communication of "fait accompli" new measures should be avoided. Sen[21] aptly describes the world as having unprecedented wealth while

> ***"… millions of people living in the Third World are still unfree. Even if they are not technically slaves, they are denied elementary freedoms and remain imprisoned in one way or another by economic poverty, social deprivation, political tyranny or cultural authoritarianism…".***

It would be difficult to paraphrase Sen's thoughts on the matter in a manner that does justice to his words. The reference to his words can be found in the footnote below[22].

---

[21] Development as Freedom
Amartya Sen
Political Science, Economics

[22] In **Development as Freedom** Amartya Sen explains how in a world of unprecedented increase in overall opulence millions of people living in the Third World are still unfree. Even if they are not technically slaves, they are denied elementary freedoms and remain imprisoned in one way or another by economic poverty, social deprivation, political tyranny or cultural authoritarianism. The main purpose of development is to spread freedom and its 'thousand charms' to the unfree citizens. Freedom, Sen persuasively argues, is at once the ultimate goal of social and economic arrangements and the most efficient means of realizing general welfare. Social institutions like markets, political parties, legislatures, the judiciary, and the media contribute to development by enhancing individual freedom and are in turn sustained by social values. Values, institutions, development, and freedom are all closely interrelated, and Sen links them together in an elegant analytical framework. By asking 'What is the relation between our collective economic wealth and our individual ability to live as we would like?' and by incorporating individual freedom as a social commitment into his analysis Sen allows economics once again, as it did in the time of Adam Smith, to address the social basis of individual well-being and freedom.

Possibilities of working with the remnant of NOAA on the production of a predictive capability to the GDP and other estimates

NOAA provides a description of its forecast process that confronts the dynamic nature of the phenomena that it studies, measures and reports on. The ISI authorities may wish to advance this suggestion by meeting with NOAA and establishing a measure of collaboration between statisticians and NOAA experts to develop a new set of indicators, correlations and levels of influence on both the time-honoured measures as well as perhaps more pertinent indicators of contemporary issues.

The National Weather Service (NWS) produces forecasts for various weather elements, including rainfall, snowstorms, severe weather, hurricanes, and ocean waves. Hydrologists focus on water flow in lakes, streams, and rivers, while climate forecasters analyze long-term temperature and precipitation patterns. Their forecast processes involve a review of current conditions using radar, satellite data, and other instruments. Forecasters create an analysis (graphical representation of current conditions) and use numerical models, statistical tools, and their expertise to predict how conditions will change. Since different models may yield varying results, forecasters determine the most reliable or probable approach.

Uncertainty is a key factor in forecasting due to the complex nature of the earth-atmosphere system. Human judgment remains crucial in interpreting models, communicating uncertainty, and conveying worst-case scenarios. NWS staff collaborate with public safety officials to provide forecast advice, helping communities make informed decisions regarding weather, water, and climate impacts.

In much the same approach to NOAA's methodology towards the production of forward estimates (forecasts) in which real world variables are constantly tracked, an economic growth and social development successor to another version of the national accounts can perhaps discuss the mechanisms of the change over time in preference to a stand-alone approach to the update of the last GDP figure.

The way forward is for organizations like the International Statistical Institute to progress from a position of commentary to one of action by fostering the development of action that would result in a minimized invocation of the *ceteris paribus* assumption.

Final thoughts on *ceteris paribus*

Our measurements will always contain an element of *ceteris paribus* but with the availability of more data and advanced data extraction and analytic tools, the size of its cage should in the future be appreciably reduced. It is uncertain what the future of predictive statistics and analysis will be as Big Data, Neural Networks and Artificial Intelligence combine to form a substantial *post ceteris paribus* future.

Bibliography

The future of economic statistics: Ian Diamond, Grant Fitzner, Richard Heys, Michael Keoghan, Darren Morgan

Journal of the Royal Statistical Society Series A: Statistics in Society, Volume 187, Issue 1, January 2024, Pages 1–2, https://doi.org/10.1093/jrsssa/qnad072

Beyond GDP: The Need for New Measures of Progress: Robert Costanza, Maureen Hart, Stephen Posner and John Talberth, and published in the Pardee Papers/No. 4 /January 2009

A Theory of Human Motivation, Abraham Maslow, 1943

"The Future Is Unknowable", Adam Grant online article.

The Econometric Consequences of the *Ceteris paribus* Condition in Economic Theory. April 2000; Journal of Econometrics 95(2):223-253. 95(2)

What does *Ceteris paribus* Mean in Economics?", Daniel Liberto, June 28, 2024.

Asian Drama: An Inquiry into the Poverty of Nations, Gunnar Myrdal**,** published in 1968.

The Evolution of Learning and Development, Ryan Carruthers, April 2022

Exploring the future of Learning and Development by examining its roots.

Fundamental Principles of Official Statistics (A/RES/68/261), 29 January 2014

Development as Freedom, written by **Amartya Sen**, the Indian economist and Nobel Prize laureate and first published in 1999.

The sixteen types in the Myers-Briggs Type Inventory