

## **An exploration of the challenges of measuring value**

**Qualifications:** Wedzerai S Musvoto obtained a BCom degree in Accountancy in 1999 from the University of the Witwatersrand. He went on to complete a Bachelor of Accountancy honours degree in 2000, as well as a Master of Commerce degree in finance (financial management) in 2002 at the University of Pretoria. Wedzerai went on to successfully complete professional Chartered Accountancy examinations of the Association of Chartered Certified Accountants (ACCA) in England in 2001 and the Chartered Institute of Management Accountants (CIMA) in England in 2005. He completed his Articles of Clerkship in Leeds, West Yorkshire, England. Wedzerai also completed a Doctor of Commerce (DCom) degree in finance (financial management) at the University of Pretoria in 2008. His doctoral thesis was titled: *Applying the representational theory of measurement to accounting*.

After pursuing a Bachelor's degree in Mathematics and Computer Science, Wedzerai became affiliated with The Institute and Faculty of *Actuaries* (IFoA) in England. He is pursuing the actuarial specialisation in Life Insurance and Investment and Finance.

**Research and supervision:** Wedzerai has successfully promoted seven (7) doctoral students to completion. Another six (6) doctoral students are expected to graduate in 2020. He has delivered more than 30 master's students and has also successfully supervised more than 60 honours students to completion. Wedzerai has published more than 30 articles in peer-reviewed journals and in accredited international conference proceedings. His research interests are in the applications of the theory of measurement in finance and related disciplines.

### **Career**

Wedzerai's career has spanned three continents. He has had both academic and corporate work experience in Europe, Africa and the Oceania. He is also a visiting professor at national and international universities. He is currently collaborating with international universities on various research projects in accounting and finance. He is also a corporate consultant in South Africa.

### **Awards and recognition:**

During his career, Wedzerai has received several academic honours. These are listed below as follows:

In 2009, he was awarded membership of the Golden Key International Honours Society

In 2009, he was awarded University of Pretoria SRC honorary academic colours

In 2010, he was awarded a certificate of recognition for research by the Faculty of Economic and Management Sciences at the North-West University's Vaal Campus.

In 2011, he was awarded the researcher of the year award by the Faculty of Economic and Management Sciences at the North-West University's Vaal Campus.

Wedzerai has received four best paper awards at international conferences:

- Best paper award for the paper titled: *Rethinking the going concern assumption as a precondition for accounting measurement* at the International Business & Economics conference, Maui, Hawaii, USA, 3-5 January 2011
- Best paper award for the paper titled: *The accounting concept of measurement and the thin line between representational measurement theory and the classical theory of measurement* at the International Business & Economics conference, New Orleans, Louisiana, USA, 14-16 March 2011
- Best paper award for the paper titled: *The role of probability bi-classification in accounting and finance random variable representations* at the 2011 Barcelona European Academic Conference, June 6-9, 2011
- Best paper award for the paper titled: *Measuring the costs or values of the elements of the financial statements: An empirical challenge* at the 2011 Barcelona European Academic Conference, June 6-9, 2011

## **Introduction**

A warm welcome to you all; colleagues, friends, students and family members to this inaugural lecture titled: "An exploration of the challenges of measuring value". It was during my doctoral studies that I became fascinated with the causes of financial crises and corporate collapses around the world. It was baffling to me that money is present at one moment and literally disappears into thin air at another. Why is it that something is valuable at one point in time and is worthless at another? Why are there different prices for identical commodities? What is the relationship between value and money? Is money really a measure of value? Why do economic disasters occur despite all the assurances given by finance experts? Why are we failing to predict economic disasters? In an attempt to answer all these questions, I discovered that all these problems are hinged on our treatment of only one phenomenon: that is "value".

This lecture debunks the myth that the value of a commodity is currently measurable. Years of study have culminated in the conclusion that the "value" phenomenon is probably the single most important phenomenon in one's financial life. This lecture explains how value evolves within the subjective personal space and transcends influencing economies on a global scale. It further explains the mistakes, misconceptions and a con surrounding value measurement. My position is that value is currently an elusive phenomenon that is beyond our current measurement capabilities. The objective is not to destroy confidence in current economic systems, but rather to plant the seeds of an evolutionary process that may result in the development of new and better ways of understanding value.

## **The value measurement disciplines**

The questions on value measurement are mainly directed towards the disciplines of finance, economics and accounting. These disciplines are so intertwined that their basic building blocks are in most instances interchangeable. In particular, economics and accounting variables form the basis on which the principles of finance are built. It is mainly the perception of value measurement in these disciplines that gives the general impression that value is currently being measured. The basic definitions of these discipline imply

that they are in the business of measuring value. For example, according to the IASB (2018), accounting is a measurement discipline. The IASB (2018) goes on to say that one of the conditions of an element of the financial statements to be recognised is if it has a value that can be measured reliably. In addition to this the definition of econometrics, which is a branch of economics, suggests that economics is a value-measuring discipline. According to Moosa (2017), econometrics is a term formulated from two Greek words: *Oikonomia* (administration or economics) and *metron* (measure) (Moosa, 2017). This literary translates to economic measurement. This usually involves the provision of the quantitative estimates of the values of goods and services in an economy. Brigham, Ehrhardt and Fox (2016) argue that the role of finance is to measure and manage the values of assets and liabilities of a business. If these three disciplines are true measurement disciplines, then they should be able to predict precisely when an economic crisis is going to happen as well as major corporate collapses and price commodities. However, the problem is that, so far, we have not managed to predict precisely any financial crisis or even the value or price of a single commodity. The question then is: Are we measuring value? If not; what is it we are measuring?

### **The definition of value**

The first port of call is to know what value is. Once we know what it is, then we can talk about its measurement. Sabine (1987) has likened value to beauty. He believes that, just like beauty, it is in the eyes of the beholder. It means then that both value and beauty lie in the mind of an individual. McLean (2006) considers value to be a subjective concept. He argues that it is relative to an individual. The accounting discipline has not even bothered to define value. In some instances, the IASB (2019) uses value and cost interchangeably. Just like in economics, it defines value as the price or cost of a commodity. If this were the case, then why do we have different prices for an identical commodity? Which price then is truly the value? In finance, Brigham, Ehrhardt and Fox (2016) consider the value of something as present value of all future cash flows associated with it. It appears that the overriding theme is that we do not have consensus on the precise definition of value. If value is like beauty, it would be interesting to see how this trinity of value measurement disciplines are measuring value (beauty).

### **The applicable principles of measurement**

The next port of call after defining value was to find the applicable principles of measurement. We established that the principles of the representational theory of measurement are used to establish measurement in both natural and social sciences. The representational theory of measurement was developed by Scott and Suppes in 1958. It follows therefore that if the claim that financial disciplines are measurement disciplines is true, then their so-called measurements should be in harmony with the principles of the representational theory of measurement. Luce and Narens (1994) outlined the principles of the representational theory of measurement as follows:

*1) "A qualitative situation is specified by a (usually ordered) relational structure  $X$  consisting of a domain  $X$ , of infinitely many relations of  $X$  and infinitely many special elements of  $X$ . These relations, subsets, and elements are called the attributes of  $X$ . Measurement axioms are then stated in terms of the attributes of  $X$ . These axioms are intended to be true statements about  $X$  for some empirical identification and are intended to capture important empirical properties of  $X$ , usually ones that prove useful in constructing measurements of its domain,  $X$ ."*

It means that it is important to give a description of the characteristics or qualities of an object that you want to measure. That is, one has to know and understand the qualities and characteristics they want to measure. It is also important to specify the relationships among the specified qualities that are intended

to be true statements about a particular attribute of the object. The specified characteristics and attributes must be empirically identifiable. That is to say, it must be an objective process that can be used to establish the identity of each of the specified qualities.

2) *“The representational theory requires that the primitives of  $X$  be given an empirical identification. In particular, if  $R$  is an  $n$ -ary primitive relation on  $X$ , then it is required that the truth or falsity of  $R(x_1 \dots x_n)$ , for any particular choice of the  $n$ -tuples  $x_i$ , be empirically decidable.”*

This means that we must be able to establish the identity of each of the attributes or characteristics/qualities through an objective process. Furthermore, it must be possible to decide the truth or falsity of any statement about the object through an objective process.

3) *“As much as possible, measurement axioms, stated in terms of the empirically identified primitives, should be empirically testable”*

Principle 3 says that “if a statement is said in terms of the specified attributes then it should be possible to objectively test whether it is true or false. That is, since the characteristics of an object can be objectively tested then a statement expressed in terms of the same characteristics should also be empirically testable.”

4) *“Measurement of  $S$  is said to take place if and only if the following two theorems can be shown: (Existence Theorem).  $S(x)$  is non-empty for each  $x$  that satisfies the measurement axioms. (Uniqueness Theorem). An explicit description is provided about how the elements of  $S(x)$  relate to one another. In practice this description usually consists of specifying a group of functions  $G$  for each  $x$  in  $S(x)$ .  $S(x) = \{g^*x : g \text{ is in } G\}$ , where  $*$  denotes function composition.”*

Rule 4 argues that the purported characteristics or qualities of the object must truly exist for measurement to take place. They should not be a myth. It should be possible to objectively prove that the said qualities actually exist. A process of how the qualities or characteristics of the object have been measured should be specified. For example, if a person’s height is specified in meters, then we should be able to show how we arrived at that specific height in terms of the metre rule. This height is only unique if it does not change depending on the context. It follows that a measurement is unique once a scale of measurement is specified. Once a scale of measurement is specified, it should be possible to convert the measurement to other scales of measurement and achieve equivalent results. A measurement is unique if it is invariant.

5) *“The representational theory of measurement identifies empirical significance with meaningfulness. The concept of meaningfulness with respect to  $S(X)$  is easily extended to numerical statements involving measurements of elements of the domain: meaningful statements are those whose truth-value is unaffected by the particular representation in  $S(x)$  used to measure  $X$ .”*

Rule 5 embodies the meaning of statements. A meaningful statement is one whose truth does not change depending on how we represent the underlying characteristic or quality. That is to say, the height of a person should not change because we have represented it in meters or in centimetres or in inches. A person should not be taller when their height is expressed in meters than when it is expressed in centimetres. If that were the case, the statements about the height of a person would be meaningless.

This means that a proposition that is empirical or a statement that is factual, that uses algebraic or numerical quantities, is meaningful empirically if and only if what it purports to represent remains the

same when it is subjected to the appropriate transformations of the algebraic or numerical quantities involved. For example, the truth of statements about the height of a man should not be affected by the fact that it is expressed in metres or in inches. In other words, a measurement is meaningful if it is clear what statements may be made about the measure that preserves the true meaning of the measure. Therefore, it may be concluded from this that we can only know what statements to say about the measurement once a scale of measurement is specified.

### **A scale of measurement gives meaning to statements**

If we look closely at principle 4 and principle 5 of the representational measurement theory, we can easily infer that they actually refer to the existence of a scale. This simply means that we need to know the units of measurement. Once we know the units of measurement, we can understand the meaning of a measure. According to Boyce, Meadow and Kraft (1994), information has meaning if and only if there is a scale to measure it. That is, once a scale is known, then we know what a measure means. The height of a person has meaning once we know whether it is in centimetres, meters or inches or any other form of representation. The specification of a number alone in the representation of height without accompanying units does not convey much information. That is to say, without specified units of measurement, it becomes very difficult to attach meaning to the specified numbers.

Within the context of the representational theory of measurement, Narens (2002:746) describes meaning in measurement as "...the only meaningful forms of measurement are equivalent to the representational theory; i.e., each meaningful set of measuring functions on a qualitative domain **A** has a characterization as a set of structure preserving mappings from a qualitative structure with domain **A** into a purely mathematical structure."

This suggests an in-tandem development of the informational view of measurement with the representational form of measurement theory. It is also inferable that these two perspectives may be viewed as forming the basis for the study of qualitative aspects of measurement information. The implications of this view on social scientific disciplines are that all numerical assignments must be in harmony with the principles of representation for the (numerals) information to be useful. Advocates of this approach consider meaningfulness to be absolute. That is, a statement is either meaningful or it is not. As Townsend and Ashby (1984:394) put it: "As is perhaps obvious, meaningfulness is an all or none concept". Thus, a statement cannot be almost meaningful". In measurement, it is clear that information is restricted to provably meaningful statements. It follows that measurement does not proceed by making statements that are inevitably in error or by formulations that are expected to be incorrect and then trying to do better.

In the representational measurement theory, the meaning of information is connected to the type of scale used in the measurement process. The concept of a scale views the meaningfulness of statements about data for different scales as preserved under permissible transformations. That is to say, each scale permits certain mathematical or statistical operations to be performed on the data. According to Luce *et al.* (1990), the essence of meaningfulness is embodied in the description of scale type and permissible statistics. This means that the soul of meaningfulness is personified by the description of the type of scale used and the statistics permissible on the scale. The tying of the concept of meaningfulness to the concept of a scale began with Stevens' (1946) theory of scales of measurement. He presented the hierarchy of data scales based on the invariance of their meaning under different classes of transformations, namely; nominal, ordinal, interval and ratio scales. Invariance of meaning simply means that the meaning should not change under certain specified conditions. According to Stevens' (1946) theory of scales, scales that preserve meaning under a wide variety of transformations convey less

information than those whose meaning is preserved by only a restricted class of transformations. For example, using the description of ordinal scale measurement given by Luce *et al.* (1971), deductions of expressions of the representation and uniqueness theorems on ordinal scale measurements are made to show that the structure of these scales can only be preserved under monotonic transformations. This deduction is given below:

To show an expression of the representation theorem, assume that a scale,  $b$ , is used to assign real numbers in a set of real numbers  $N$  to the elements of a set,  $S$ , of observed phenomena and it is required that the numbers be assigned so that for all  $k$  and  $m$  in  $S$ ,  $b(k) > b(m)$  if and only if  $k$  is preferred to  $m$ . Therefore, it follows from this that,

$$S \xrightarrow{b} N \text{ such that; } k > m \iff b(k) > b(m), \text{ for all } k, m \text{ that are elements of } S$$

This expression shows the process of measurement in which an empirical relational structure  $S$  is represented by a numerical relational structure  $N$ . The relation  $k > m$  in  $S$  is preserved by the transformation (scale  $b$ ) that mapped it onto  $N$ . The representation of the relation  $k > m$  in  $S$  is given by  $b(k) > b(m)$  in  $N$ . This shows ordinal scale measurement.

When drawing inferences from measurement information, it is necessary to understand the type of inferences that may be drawn. The inferences drawn should preserve the structure of the empirical relational system represented by the ordinal mapping. Stevens (1951:25) used the term permissible statistics to describe the type of statistical analyses that preserve the ordinality of the mapping shown above. Therefore, the expression of the uniqueness theorem for an ordinal scale measurement is proved if there is a transformation  $f$  that is permissible for an ordinal scale if and only if:

$$b(k) > b(m) \implies f[b(k)] > f[b(m)]$$

This analysis indicates that ordinal scale data is invariant under all transformations that preserve order. According to Stevens (1951), the ordinal scale has a structure of what is called an isotonic or order preserving group. He asserts that this group is very large and includes all monotonic increasing functions, i.e. functions that never decrease and therefore do not have maxima. This reasoning reveals that the positive values on an ordinal scale may be replaced by their square or their logarithm or to perform a linear transformation, adding a constant or multiplying by another constant.

Similar arguments can also be developed for the interval scale. In order to develop an expression for the uniqueness theorem for the interval scale, the order ( $>$ ) operator is replaced by the difference ( $-$ ) operator. It follows that a transformation  $f$  is permissible for interval scale values if and only if there is a constant  $c$  such that:  $b(k) - b(m) = c \{f[b(k)] - f[b(m)]\}$ . It follows that linear transformations in which the same constant is added to each value or the multiplication of each value by a constant are permissible for interval scales (Stevens, 1951). Consequently, the statistics that are permissible in addition to those on the ordinal scale are the mean, standard deviation, order correlation and product moment correlation.

With respect to the ratio scale, Luce *et al.* (1971:10) assert that the ratio scale preserves relative ratios. This indicates that ratio scales have a defined zero point that may not be changed. Consequently, it is possible to multiply ratio scale data by a constant, but logs may not be taken nor may a constant be added. Therefore, to develop an expression for the uniqueness theorem for the ratio scale, it follows from this that the permissible transformations on the ratio scale satisfy:  $b(k) / b(m) = c \{f[b(k)] / f[b(m)]\}$  for some constant  $c$ . The statistics that are permissible on a ratio scale in addition to those of the nominal, ordinal and the interval scale are the geometric mean, coefficient of variation and decibel transformations. Therefore, ratio scales have the same properties as natural numbers. This suggests that monetary units also have the same properties as the natural numbers. In the paragraph above, all kinds of statistical

analyses that can be carried out on ratio scale measurements were listed. It follows that all kinds of statistical analyses may be carried out on measures of monetary units. Nominal scales are at the bottom of the hierarchy. They do not require numerical assignments, but rather unique identifiers. It follows from this that they are invariant under transformations that preserve the relationship between the identifiers and the objects they represent. Therefore, it is permissible to perform on the values, operations that do not combine or confuse identifiers. It implies nothing more than identity and difference.

### **Mistakes and misconceptions or a con art?**

The obvious mistake in accounting, economics and finance disciplines is that they are defined as measurement disciplines. This is apparent since we are unable to define value precisely in violation of the principles of the representational theory of measurement. Therefore if we do not know what we are measuring, then it means that all information relating to 'value measurement' within these three disciplines is false. Some may suggest that we remove the word 'measurement' from the definitions. Unfortunately, the removal of the word 'measurement' will not solve the problem. The definitional mistake has had ripple effects for decades on the development of most concepts within the disciplines and interdisciplinary. That is, research and policies based on economics, finance and accounting's 'so-called measurement' data have been misleading for decades. For example, in a study by Abdel-Magid (1979:355), he portrays a firm belief in accounting measurement when he says:

"The property subject to measurement in an exchange transaction is exchange value, which is measured by the monetary numerosity at the time of exchange. At the time of exchange, the equality of ratios can be verified by an empirical operation."

The fact that a certain amount of money has been paid for a commodity does not necessarily mean that it reflects its value. We do not know what value is. Consequently, we do not know what we are paying for. This money is only paid within a particular context. Another individual might have a completely different idea of how much money may be paid for the same commodity. If the prices are different for the same commodity, does it mean that value changes depending on the context? This clearly violates the existence and uniqueness theorem of representational measurement.

Some of the major problems in econometrics relate to the data used. The data used may be time-series, cross-sectional or pooled data. Time-series data represent repeated observations of a variable in subsequent time periods. Cross-sectional data represent a set of observations of some variable at one specific point in time over several agents (countries, companies, markets, consumers and so on). A pooled dataset comprises both time series and cross-sectional data. According to Moosa (2017), economists use accounting data representing recorded transactions and activities. Economists have no control over this data. This data is believed to be data measured on a ratio scale. However, in actual fact, this is data relating to an unknown variable referred to as 'value'. The International Accounting Standards Board has, as recently as 2019, stated that an element of the financial statements can only be recognised if it has a cost or value that can be measured reliably. This gives the impression that all recorded accounting transactions have values that have been measured reliably. However, there is no precise definition of value. Consequently, a reliable measure of value is impossible to get. It also follows that value is a pre-theoretic variable. The use of such data is misleading when it is used to guide policies.

The use of mathematics in financial disciplines has been rather excessive. In particular, the use of quantitative models in economics and finance has been very misleading. These models have failed to predict even a single global economic crisis. According to Moosa (2017), quantitative models have in actual fact contributed to the advent of most of the recent global financial crises. He argues that these models are divorced from reality and this has led to the adoption of wrong policies on the part of regulating

authorities and finance institutions. The data used in these models come from accounting data. This data are based on the assumption that value is measurable. These models assume that value as a variable is constant through time. That is value is viewed in such a way that the future and the past assume the same role. The models remain invariant when we shift from one observer to the other. However, these perceptions cannot be true given that value is a pre-theoretic variable. Furthermore, since it is a result of human perception, it is a conscious variable. It is therefore adaptive. Consequently, it would constantly change with the passage of time. It is therefore unrealistic to perceive value in the same mould as a classical Newtonian particle. The Newtonian particle is passive and un-adaptive. The past and the future assume the same role.

Studies on exchange rate economics illustrate how bad economic forecasting is (Moosa, 2017). He argues that, in precise disciplines such as physics, it is possible to predict precisely when a falling object will hit the ground, but we cannot predict with reasonable confidence whether a currency will appreciate or depreciate on the announcement of unemployment data. Economics is not a science within the context of natural sciences. We can certainly appreciate the desire to elevate it to the level of natural sciences, but we believe this has been motivated by some sort of inferiority complex (Ritholtz, 2009). It was the need to compete with natural science in the last century that led to this inferiority complex. Given the fluid nature of the value representations on the extensive scale, economic data are usually prone to manipulation. It is often used to prove certain conditions depending on the allegiances of the economist. In actual fact econometrics is a con job.

### **Value is currently not measurable**

If my findings are to be believed, then the claims to value measurement are currently not true. That is, at least if we are using the principles of the representational theory of measurement as the basis. Initially, value as an attribute fails to satisfy the precise definition needed. We simply have no precise definition of value. It must also have an empirical identification. Currently, it is like beauty – each person has their own perspective. There is a claim that value is measurable on a ratio scale. This is also false.

There is, however, some measurement that is at least taking place in financial sciences. The units of money are currently measured on a ratio scale. The measurement of units of money is currently being confused with the measurement of units of value. It is important to note that the measurement of intervals of monetary units is a ratio scale, but this does not mean that the monetary amount as a measure of the value is also a ratio scale. Units of money have an empirical identification while value is subjective. The ratio character of monetary unit measurement is based on the numerical representation of monetary intervals so that the value associated with the concatenation of adjacent intervals is the sum of values associated with those intervals. That is to say, monetary units can be represented on a number line. In simple terms, we can count how much money we have even on our fingers or using a numbering system that we know.

In actual fact, at the present moment, the concatenation of adjacent intervals of monetary units has, as far as is known, nothing empirically to do with the value of a commodity. In other words, we are saying units of money have a standard scale of measurement. That is, we can measure them in rands, dollars, pounds or whatever currency you may wish to represent. However, there is no agreement relating units of money to the value of a commodity.

If there is no reason to incorporate the monetary units into an empirical structure of the value of a commodity, then there is nothing empirical about the representation of the value of a commodity that limits which monotonic transformations of monetary units can be used as indices of its value. Therefore, we have the persistence of financial crises. This is the reason why not even a single econometric, finance,



actuarial or accounting model has been able to predict any financial phenomenon based on value accurately.

Consequently, we may also conclude that the belief that value can be represented numerically is pre-theoretic. There is an extensive theory for monetary unit measurements leading to ratio scale representations, indicating that monetary units can be represented by natural numbers. No comparable structure exists for the measurement of the values of commodities. A ratio scale exists for monetary units, but there is no independent theory for the measurement of the value of a commodity, other than the pre-theoretic conjecture that the value of a commodity is a monotonic function of monetary units.

### **A new perspective on value**

In my opinion, we need to change a number of things. I propose that we need an evolutionary process not a revolutionary process. Firstly, we need a change of perspective. As the clever Albert Einstein said: "We cannot solve a problem from the same consciousness that created it". The main source of our problems in financial sciences is the overuse use of mathematics and statistics. Mathematical and statistical methods offer a kind of certainty that is only appropriate in natural sciences. We therefore need to rethink our position within our discipline not from the mathematical and statistical point of view, but from our position as a social science. In natural sciences, factors can be isolated and cause and effect can be established. However, in social sciences, human behaviour is too complex to have a successful isolation of the relevant factors. When we only use deterministic models in financial sciences, we unconsciously create two realms that might be perceived as forever separate and incongruous. That is, the realm that belongs to the physical world and the other that belongs to the internal world of perceptions. Deterministic models allow us to look at value from the world of physical phenomena. From this perspective, we only observe an exchange transaction in which money and commodities would have been exchanged. As a result, we believe that the money that has been exchanged must be a measure of the value of a commodity.

However, there is another realm, which is the internal world of perceptions. In this world, one has an experience of value that ultimately leads to the execution of an exchange transaction. The experience of value is a state of being. It is indescribable. It is in the realm of direct experience. We may use money or other symbols to represent this state, but they are not the state itself. The execution of the exchange transaction is usually what accompanies the state of value experience, but we cannot describe the state itself. Moreover, the value experience depends on the individual perceptions within a particular context at a specific point in time. In this light, we believe that value is the function of an individual's perceptions within a particular context at a specific point in time.

Therefore, if value is an adaptive variable, then an understanding of an individual value experience does not lead to an understanding of all value experiences in the whole economic system. This suggests that an economic system is a non-linear dynamical system. Looking at value this way allows for insights into heterogeneous agents, phase transitions and emergent behaviour. In short this is a complex adaptive system.

### **Marketing the University**

- I am a consultant in the South African gambling industry
- I am a consultant at national and international universities on curriculum design and programme assessment
- I am a visiting professor at national and international universities

- Collaborations with international universities
- Through publications in peer reviewed journals and accredited conferences proceedings
- Supervision of postgraduate students

### Way forward

- A continued multi-disciplinary approach to solving measurement problems in the financial sciences
- Continued mentorship of students

### Conclusion

This value phenomenon clearly influences both our personal and economic lives. Years of studying this phenomenon have culminated in the conclusion that the phenomenon of value is probably the single most important phenomenon in one's personal and economic life. The discussion demonstrates that most economic problems are as a result of a combination of the misconception of empirical issues, mistakes and con artistries surrounding value measurement. The position taken is that the prevailing belief that value has so far been measurable is probably the greatest single misconception in the economic history of mankind.

### References

- Abdel-Magid, M.F. 1979. Towards a better understanding of the role of measurement in Accounting. *The Accounting Review*, April: 346-357.
- Ritholtz, B. 2009 *The Hubris of Economics*, *EconoMonitor*, 4 November
- Moosa, I.A. 2017 *Econometrics as a con Art*, Edward Elgar
- Luce, R.D., Krantz, D.H., Suppes, P. & Tversk, A. 1971. *Foundations of Measurement*, (Vol. 1) Additive and Polynomial representations, New York: Academic Press.
- Stevens, S.S. 1946. On the theory of scales of measurement, *Science*, 103: 667-680.
- Stevens, S.S. 1951. *Mathematics, Measurement and psychophysics*, in (Ed), *Handbook of Experimental Psychology*, New York: Wiley.
- Luce, R.D., Krantz, D.H., Suppes, P. & Tversk, A. 1990. *Foundations of Measurement*, (Vol. 3) Representations, axiomatization, and invariance, New York: Academic Press.
- Townsend, J.T. & Ashby, F.G. (1984). *Measurement Scales and Statistics: The Misconception Misconceived*, *Psychological Bulletin*, 96(2):394-401.
- Narens, L. 2002. A meaningful justification for the representational Theory of Measurement, *Journal of Mathematical Psychology*, 46: 746-768.
- Boyce, B.R., Meadow, C.T. & Kraft, D.H. 1994. *Measurement in information science*, Academic press limited.
- Scott, D. & Suppes, P. 1958. Foundational Aspects of Theories of Measurement', *Journal of Symbolic Logic*, (23):113-128.
- Brigham E.F., Erhardt M.C. & Fox, R. 2016. *Financial Management Theory and Practice*. Europe, Middle East, Africa Edition. Cengage Learning ISBN-978-1-4737-2960-5.
- International Accounting Standards Board (IASB), (2018) *International Financial Reporting Standards (IFRS) 2018*. Including International Accounting Standards (IAS) and interpretations as at 30 November 2018. Vol 1A & Vol 1B, London

McLean, R. 2006. New Concepts in Measuring Value, in (Ed), Einstein in the Boardroom, John Wiley & Sons, Inc.

Luce, R.D. & Narens, L. 1994. Fifteen Problems Concerning the Representational Theory of Measurement. Available, [http:// www. Imbs.uci.edu / personnel / Luce / 1994/ Luce & Narens\\_Book % 20 Chapter \\_1994.pdf](http://www.imbs.uci.edu/personnel/Luce/1994/Luce%20&%20Narens_Book%20Chapter_1994.pdf), Accessed 2006/10/10.