

Using Numbers to Persuade: Hidden Rhetoric of Statistics

Sıdıka Başçı and Nadia Hassan[®]

Yildirim Beyazıt University and International Islamic University Islamabad

Received: 03.04.2020 Accepted: 06.04.2020 Published: 30.04.2020
doi: 10.33818/ier.747554

ABSTRACT

Philosophy of current knowledge distinguishes facts from values. It maintains that facts are objective, indisputable, universally verifiable and do not require to persuade. Since rhetoric is persuasion it is assumed to be deceptive and overlook reality. Therefore, statistics in its current form disregards rhetoric and emphasizes only numbers. It ignores meanings and interpretation of numbers that involve subjectivity and value judgements. In real world, numbers and values are entangled in a way that it becomes impossible to avoid subjectivity. So, it is used with an appearance of objectivity. We illustrate how apparently objective statistics conceal subjective choices.

Most of real-world experiences cannot be reduced to numbers, but scientific approach compels us to measure everything. In the attempt to measure the unmeasurables like trust, intelligence and wealth etc. it is inevitable to make subjective choices. There is no objective way to reduce multiple measures into one. In the field of economics values are involved even in seemingly indisputable numbers like GDP. It is value laden for the choice of factors, weights and their signs. Making comparisons on such measures without awareness have harmful implications for policy development. Moreover, it is also desirable to understand hidden values to avoid deception.

Key words: *Data Interpretation, Wealth of Nations, Gross Domestic Product*
JEL Classifications: C81, C82, A20, B23

1. DECLINE OF RHETORIC IN THE 20th CENTURY

From Ancient Greece to the late 19th century, rhetoric played a central role in Western education in training orators, lawyers, counsellors, historians, statesmen, and poets. Aristotle named the three fundamental pillars of persuasion as logos, pathos, and ethos. The story of how the rise of the philosophy of logical positivism transformed rhetoric from a respected art to a contemptible form of trickery and deceit is both extremely important, and largely unknown and unfamiliar. This story is too complex to be described in detail here, but we will provide a brief sketch, because it is central to our topic in this essay. Rhetoric remains just as necessary today as it was

[®] Sıdıka Başçı, Assoc. Prof., Ankara Yıldırım Beyazıt University, Turkey and EISTI, Cergy, France (email: sidika.basci@gmail.com).

Nadia Hassan, International Islamic University, Islamabad, Pakistan (email: nadia.hassan.economist@gmail.com).

This paper had been presented during Economic Research Association (ERA) – Yıldırım Beyazıt University (YBU) Programme of 2016-2017 Econometrics Seminars, Ankara, Turkey and 3rd International Conference on New Trends in Econometrics and Finance (ICNTEF'17), Helsinki, Finland. We thank to the participants for their contributions.

in the ancient times. However, open use of rhetoric has been prohibited by positivism, and so today concealed forms of rhetoric are in common use. One of most effective and powerful among modern forms of rhetoric is the use of statistics to conceal the ancient methods for persuasion. How this is done is the main topic of our essay, but we will start with a brief discussion the philosophy of logical positivism, and how it led to the concealment of rhetoric under the facade of numbers which appear to be objective.

A key element in rejection of rhetoric was the rise of the fact/value distinction, promoted strongly by logical positivism. In Reuben (1996, p. 2) this change is written as follows:

“In the late nineteenth century intellectuals assumed that truth had spiritual, moral, and cognitive dimensions. By 1930, however, intellectuals had abandoned this broad conception of truth. They embraced, instead, a view of knowledge that drew a sharp distinction between "facts" and "values." They associated cognitive truth with empirically verified knowledge and maintained that by this standard, moral values could not be validated as "true." In the nomenclature of the twentieth century, only "science" constituted true knowledge”.

Once the positivist idea that knowledge consisted purely of facts and logic became dominant¹, persuasion became unnecessary. Anyone who knew the facts and applied logic would automatically come to the same conclusion. Ethos refers to the credibility of the speaker, but this is unnecessary when we are dealing with objective facts, universally observable and verifiable by all. Pathos refers to emotional appeal, which is unnecessary if the speaker can establish his case using cold hard fact and logical arguments. Of the three pillars of rhetoric, Logos became the only acceptable form, which the other two fell into disrepute. “Empty” rhetoric characterizes speakers who establish credibility, and appeal to emotions of audience, to persuade them of dubious propositions not supported by facts and logic. Logical positivism asserted that human knowledge consisted only of propositions which could be established using facts and logic, and were universal and objective truths, equally valid for all, and devoid of subjective judgments which could vary across people.

Elimination of rhetoric from the syllabus, and resultant loss of understanding of rhetoric has caused a serious deterioration in the form and quality of intellectual discourse. Every seeker of knowledge believes that he/she has arrived at the unique and indisputable truth, which should instantly convince all rational people. The need to establish credibility, to appeal to emotions, to build a case using the arts of rhetorical persuasion, is disdained, as the "facts speak for themselves." Huge amounts of puzzlement and anger result when what appears to be an immediately obvious fact to the writer/speaker fails to convince the audience.

The foundations of statistics were constructed on the basis of positivist philosophy in the early twentieth century. Great emphasis was put on facts – represented by the numbers. Rhetoric (and values), represented by how the numbers are to be interpreted, was de-emphasized. This led to a tremendous rise in the importance of numbers, as the only means to get to objective truths, cleansed of subjectivity, personal biases, and values. As the popular saying goes, “you can’t argue with the numbers”.

To understand the role of rhetoric in the twentieth century, we have to learn to think at two levels. One is the grand level of the philosophers, who are engaged in a deep and difficult conversation about the nature of human knowledge. One of the central concerns in this

¹ See Zaman (2019) for details.

discussion has been the question of how do we learn about aspects of the world which we cannot observe – things like atoms, electrons, gravity, angels and God? This conversation casts its shadows on the world of ordinary mortals, who are affected by these grand ideas to a far greater extent than they realize. Lord Keynes (1936, p. 383) expresses this insight as: *“the ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed, the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist.”*

The high-level conversation among the philosophers is summarized very briefly by Putnam (2002). He describes the origins of the idea that there is a distinction between facts and values, and how definitions of the two terms, as understood by philosophers, have evolved over the course of centuries. To understand these ideas in depth would require several years of philosophical training. Nonetheless, the disputed and controversial conclusion of convoluted and complex philosophical discussions, that facts and values are sharply separated, has come to be accepted as obvious and commonsense by the general public. The phrase “Just give me the facts” expresses approval of facts, and the disdain for opinions and emotions that characterize the positivist attitudes towards knowledge. The facts and logic (logos) of rhetoric are held in high esteem, while ethos and pathos are rejected as sources of information and knowledge. In the next section, we provide a low-brow discussion of the fact/value distinction; that is, we will discuss how the grand conversation among the philosophers has shaped the minds of the general public.

2. COLLAPSE OF THE FACT/VALUE DICHOTOMY

Even though our goal is to explain how apparently objective looking statistics conceal arbitrary and subjective judgments, the path we take requires a detour through “epistemology”, or the theory of knowledge. Instead of the deep discussion provided by Putnam (2002), we will take a shortcut, and look at how these philosophical debates and controversies about have shaped the way that social sciences in general, and statistics in particular, have conceived of the relationship between the numbers we analyzed and the real world that generates these numbers. The wide gap between the philosophers and other intellectuals can be seen clearly in their respective views regarding logical positivism. One of the lifetime advocates of logical positivism, A.J. Ayer (2012), said about the philosophy that “it was all wrong”. Another sympathizer and proponent, Fraasen (1980, p. 2), opens his book “The Scientific Image”, intended to provide a new defense of the basic ideas of empiricism and logical positivism, says that this philosophy had a “spectacular crash”:

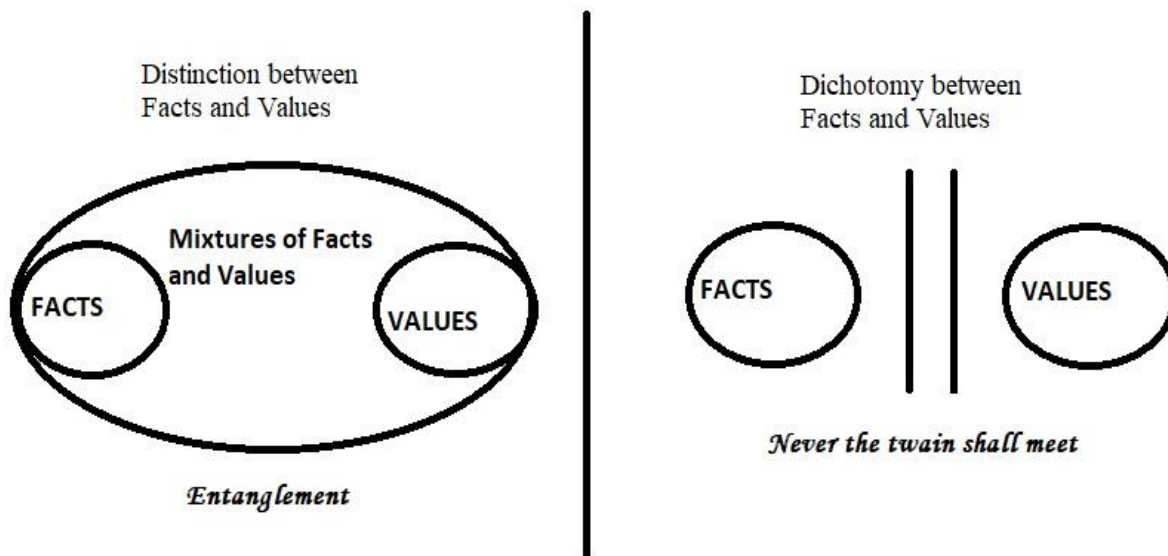
“Today, however, no one can adhere to any of these philosophical positions to any large extent. Logical positivism, especially, even if one is quite charitable about what counts as a development rather than a change of position, had a rather spectacular crash. So, let us forget these labels which never do more than impose a momentary order on the shifting sands of philosophical fortune and let us see what problems are faced by an aspirant empiricist today.”

Despite clear acknowledgements of its failure, typical non-philosophers neither understand the evolution of positivism under pressures created by scientific discoveries, nor understand the reasons for its eventual abandonment. Nonetheless, a recent survey by Hands (2007) finds that economists continue to believe in the central tenets of “shadow” logical positivism. As argued in Zaman (2012), the foundations of econometrics are solidly built and logical positivist

principles. After the collapse of positivism, it became essential to re-examine these foundations, and re-build the discipline on a different set of fundamental principles. This revolution still remains to be carried out. Some aspects of the change required are discussed in Simpson's Paradox, also published in this issue. This article deals with a more elementary aspect, namely the relation between the data we use and the realities of the external world that these numbers are supposed to measure. But first, we must look at how the fact/value dichotomy is viewed in the general, non-philosophical public. It is useful to note that we are exposing the popular understanding of the philosophy, occasionally referred to as shadow logical positivism, to differentiate from the more sophisticated philosophical versions.

It is easily understood that there are “facts”: (**F**) the number of students who took the SAT in the USA in 2019 was 2,220,087. It is also true that there are values, like the “golden rule”: (**V**) do unto others as you would have them do unto you. There is indeed a sharp separation between these two statements; **F** is objective and can be verified by any independent observer – all would come to the same conclusion. **V** is subjective and different people can have different opinions about whether or not it is true or false. Furthermore, there is no way to establish whether or not **V** is true; there is no method for checking values against objective empirical realities in the world around us, to see if it is true or false. The key argument that Putnam (2002) makes is that this distinction exists and is valid, but it is not a dichotomy. To be more explicit, it is not true that all statements can be classified into one of these two categories. Facts and values both exist, but the vast majority of propositions we deal with in our lives and in our knowledge, disciplines cannot be classified as being either a fact or a value.

Figure 2.1: Fact and Values: Distinction vs Dichotomy



Putnam (2002) argues that wrong conclusions have been drawn because a distinction has been inflated into a dichotomy. Treating the distinction between facts and values as a dichotomy leads to disastrous results. Once we show that something is not a “fact” – that is, it does not have any direct translation to an observable aspect of external reality – then we are forced to conclude that it must be a “value”, and hence not part of reliable human knowledge. As Putnam (2002) has shown, in most of the knowledge that we use to conduct our daily lives, facts and values are “inextricably entangled”. All our lives we are faced with major decisions like “which college should I go to?”, “which person should I marry?”, “which job should I apply for?”. For making such decisions, it would be useful to have an objective ranking over the choices that we have. However, as we will show later in this paper, objective rankings are not possible when

there are multiple dimensions involved. For example, if one college has a strong math department, while the other has a strong English department, then choice among the two will have to be based on my personal preferences regarding the balance between the two skills I would like to acquire. However, this subjective decision is not PURELY a value judgment. There are many facts we take into consideration in arriving at such decisions. Contrary to the conception that economics is purely positive – based purely on facts – while values are used by policy makers, the facts presented to the policy makers are created via a mixture of facts, and subjective decisions regarding how to weight the different facts, in order to combine them into a single number.

Just as individual decisions are based on mixtures of facts and value, so collective choices by communities are based on mixtures of facts and values. Every nation has a large amount of wealth in terms of land, water, infrastructure, as well as skilled human beings capable of learning and producing objects. Each nation faces choices in terms of where to spend energies to achieve best results in the future. In making these choices about how much to invest in factories, how much in education, and so on, we must make subjective judgements. There is no way to avoid making value judgments when decisions require choosing over multidimensional characteristics. The positivist point of view, almost universally advocated by economists and econometricians, is that we can separate the objective and the subjective. The econometricians should present purely objective facts to the policy makers, while the policy makers use their subjective values to make decisions. Our goal in this paper is to show that this separation cannot be done. The “facts” we present to policy makers require us to make arbitrary choices. It is impossible to do otherwise, because reducing multidimensional characteristics to a single number always involves making subjective decisions regarding the relative weights of the different dimensions. At the same time, it is impossible to directly present the complete and unadulterated purely objective data, because this would be incomprehensible in raw format. Any procedure for “reducing” masses of data to a small and manageable set of numbers to guide policy requires subjective decisions. Thus, nearly all of the numbers currently in use by statisticians and econometricians are mixtures of facts and values, and it is impossible to avoid doing this mixing.

In the remainder of the paper, we move from abstract philosophical consideration to practical illustrations, to show how numbers we routinely use and regard as objective, conceal value judgments. Those who are aware of how these values are built into the manufacture of statistics can use this knowledge to deceive people. They can bake in their own value judgments into the statistics which they manufacture, while maintaining an appearance of objectivity that is automatically created by the use of quantitative data. This may be reason why by far the most popular book on statistics, with more than 1.5 million copies sold, is the time-revered classic by Huff (1993) called “How to Lie with Statistics”.

3. MERGING MULTIPLE INDICATORS INTO ONE

The vast majority of our life experience is built upon knowledge which cannot be reduced to numbers and facts. Our hopes, dreams, struggles, sacrifices, what we live for, and what we are ready to die for – none of these things can be quantified. However, as we have discussed, logical positivists said that what cannot be observed by our senses cannot be part of a scientific theory. As a result of this false idea, later disproven by philosophers, the attempt was made to measure everything – numbers were assigned to intelligence, trust, integrity, corruption, preferences, etc. – even though a long-standing tradition, as well as common intuition, tells us that these things are qualitative, and not measurable. Scientific progress was deeply and dramatically

influenced by what Zaman (2019) has called Lord Kelvin's (1889) blunder: “*When you can **measure** what you are speaking about, and express it in numbers, you know something about it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind*” (p. 80). This mindset creates the need to assign numbers and attempt to measure the unmeasurable. The harms that this has caused has been discussed in Zaman (2015) and Rahim and Zaman (2009).

In this paper, we would like to focus on just one aspect of this attempt to measure what cannot be measured. The idea that we can take multiple measures of performance and reduce them to a single number is known as the index number problem. Very few people realize that this is inherently impossible – all such attempts must inevitably involve making subjective decisions regarding how the different measures should be combined. What is most often done in practice is that subjective decisions hidden in choice of measures, and associated weights are justified as objective. Because of this illusion of objectivity created by standard practice, most people are unaware that there are no objective solutions to the index number problem.

Impossibility of Combining Indicators: There is no *objective* way to combine two or more measures of performance to come up with a single number which measures of overall performance.

We will explain and illustrate by a few examples. We start with a familiar case where scores from two exams must be merged to create a single score for the course grade. Suppose that instructor Orhan has four students who received the following scores on the midterm and final in the course:

Table 3.1: Class Scores for Midterm and Final Examination

<i>Student</i>	<i>Midterm</i>	<i>Final</i>
<i>Anil</i>	50	100
<i>Bera</i>	100	50
<i>Javed</i>	80	80
<i>Dawood</i>	65	90

The teacher has interacted with all four students throughout the semester and has got a good idea of their capabilities, over and above what scores on the exams show. Suppose he thinks that Anil is the best among the four, and would like the classroom grades to reflect this opinion. As long as weight given to the Final is greater than 60%, Anil will have the highest score. On the other hand, he may know that Bera is a brilliant student who just had a bad day on the Final. Weights of more than 60% for the midterm would make Bera the top student. Equal weights would make Javed come out on top. A slight increase in weights for the final (45% MT, 65% Fin) would make Dawood the best student. So, depending on the subjective decision of the teacher, he can choose weights to make any one of the four the top student. Furthermore, by assigning weights and calculating the score, the subjective opinion will look like an objective and impartial decision. The teacher could give apparently objective reasons for any choice of weights, by referring to the subjective factors of the length, difficulty, and scope of coverage of the exams as reasons for his weights.

Which one of the four is the best student? What surprises most students is that there is no objective answer to this question. As a mathematical theorem, it is impossible to summarize the information contained in two numbers by one number. Two dimensions cannot be reduced to one. Whenever we carry out such a reduction, we lose half of the information contained in two

numbers. When there are multiple indicators, we lose even more information. Because there is no objective answer, the choice must be made on subjective grounds. This subjective element was the topic of rhetoric – the persuasive tactics used to argue that the final should carry more weight, or that the midterm should carry more weight, or even that some factor not considered, like attendance, should be taken into account. However, the philosophy of positivism teaches us that subjective judgments and personal opinions are of no value, and only the ‘facts’ should be considered. As a result, the subjective process of assigning weights, and choosing factors, must be concealed under an appearance of objectivity. This is the “hidden rhetoric” of statistics. Unlike pre-positivist rhetoric, this form is deadly because the unsuspecting victim only sees the numbers, and is told that you cannot argue with the facts. He does not even get to see the subjective elements which have gone into the manufacturing of these numbers. Before proceeding to our main topic of GDP, we give one more important and common example of how statistics is used to create a false impression of objectivity in the context of rankings of universities.

The process of calculating the final score for the exam also illustrates the “entanglement” of facts and values. Even though it is impossible to do so objectively, at the end of the course we are required to come up with a final course grade. Any set of weights we use favors some students, and goes against the interests of others. So, all weights carry values, whether or not we are aware of them. A critic might say that we can separate the facts and the values by looking at the separate scores as objective, and the final score as the imposition of the teacher’s subjective judgments regarding the relative importance of the two numbers (or the relative merits of the four students). However, this does not really separate facts from values for two reasons. First, the teacher has to choose the factors that he uses to evaluate students. If he is not satisfied with results from adding the two scores – he thinks that the final scores do not reflect the merits of the students – he can take into account other factors, like homeworks, projects, attendance, etc. He can even create an additional assignment or project for this purpose. Secondly, if we look more closely at the score of the midterm (or the final), it is also the total score on answers to an exam. Each individual answer has been graded subjectively, and the total is (or can be) a weighted average of scores on different questions of the exam. The questions themselves have been chosen subjectively. Subjectivity is built into the process of evaluation, and cannot be removed from it.

Table 3.2: Universities’ Scores on Three Criteria of Ranking

	A	B	C
<i>Chicago</i>	500	80%	10%
<i>Stanford</i>	1000	95%	5%
<i>Penn State</i>	100	90%	50%

An important (and surprising) implication of the impossibility of objectively combining multiple indicators is that it is impossible to objectively rank products which have multiple dimensions of performance. This point is made very clearly, accurately, and forcefully by Gladwell (2011). We consider only one of his examples to illustrate. The interested reader is strongly encouraged to read the original article. We consider popular methods for coming up with a single number to rank universities. This is done by making numerical judgments according to several criteria and then combining them using subjectively chosen weights. As a specific example, suppose that Criterion A is Financial Resources available to the university per student, indicated by money spent on faculty salaries, libraries, and other academic infrastructure. Criterion B is the percentage of admitted students who graduate. Criterion C is

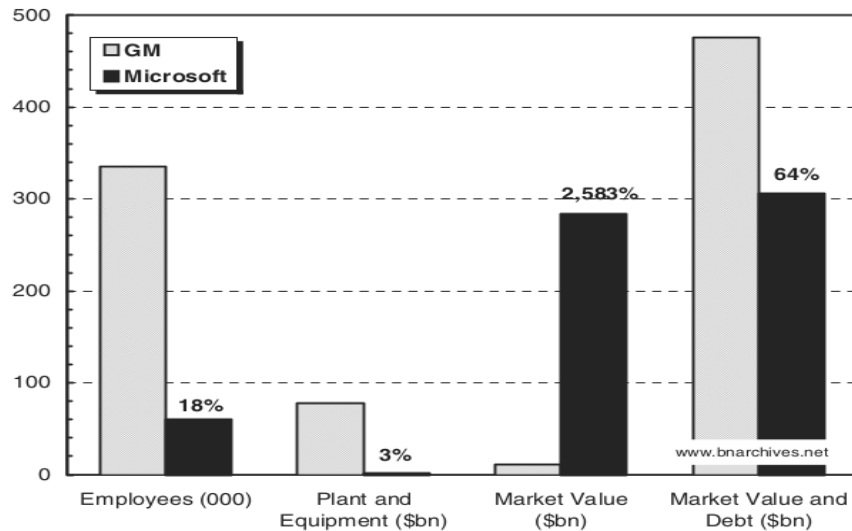
selectivity (the percentage of applicants who are admitted from total number of applicants). Hypothetical numbers for the three criteria are given in Table 3.2.

Which of the three universities is the “best”? Gladwell (2011) says that the question does not make sense, and it cannot be answered. The numbers and names used for illustration here are hypothetical. Chicago is a private university which charges high fees and has a relatively easy admissions policy. It encourages fierce competition among students and selects the survivors, leading to a high dropout ratio. It invests substantial financial resources on faculty salaries and institutional overheads, providing high quality facilities and charging high fees. Stanford is an exclusive elitist university, where only a few students who are cream of the cream are admitted. The university is well equipped financially, and invests a huge amount on faculty and academic resources. Because all applicants are extremely good, nearly all complete their studies. Penn State is a large public sector university which aims to provide education to the masses. It has an easy enrollment policy, and helps and encourages all students to graduate, resulting in a low dropout rate. It invests less in resources to make education affordable for the masses, and has a high student/faculty ratio for this reason. Each of the universities has a different goal, and when evaluated with respect to its own goals, each of them is the best of the three. By choosing different weights for the different criteria, we can make the combined index come out to favor any one of the three universities as the best. There is no objective way to choose weights. In fact, it could be argued that each of the factors can be considered a virtue or a defect – it can receive negative or positive score – depending on our subjective point of view. The standard rankings assign a positive weight to financial resources, evaluating a university as higher ranking if it spends more. However, this factor is negatively correlated with affordability, which may be much more important to students, and would result in a reversal of the ranking by this factor. Similarly, there is an argument that we should try to carry along and educate all students so that high dropout rates are bad. However, we could also argue that rigorous competition leads to selection of the best students, and poor students are eliminated, resulting in the best graduates. Selectivity is good for the students who get in, but bad for the ones excluded by the process. How much weight to give each factor, which factors to consider, and whether the factor is considered as a plus or a minus, all of these are subjective decisions.

Similarly, there is no objective way to rank the wealth. It depends on how we define wealth and which dimensions to include. Nitzan and Bichler (2009) argues that Microsoft has more wealth than General Motors (GM) because it has a higher market value than GM.

But when we observe other dimensions, such as the number of employees and plant and equipment, GM is far ahead Microsoft. If we define wealth as possession of material resources GM ranks at top. But if wealth is the market value that is commodified by Intellectual Property Rights (IPR), Microsoft is the best. We can think of Microsoft highly capable of converting its IPRs into income and, there is no requirement to observe its physical resource position.

When evaluation is carried out in multiple dimensions, the choice of dimensions, weights attached to them, and whether they count as positive or negative factors are all subjective choices. However, because of the positivist philosophy of knowledge which is the basis of modern statistics, this subjectivity is concealed, so as to create an appearance of objectivity. In the rest of this article, we explore this subjectivity in the context of one of the most important and widespread measures of economic performance, namely the GDP per capita.

Figure 3.2: Wealth of Microsoft versus General Motors, 2005

Source: Nitzan and Bichler (2009, p. 173)

4. VALUES OF A MARKET SOCIETY

Under the influence of positivism, economists reject values as being just opinions, and only accept “facts” as knowledge. Unfortunately, discussions of economics necessarily involve values. We are trying to evaluate wealth, prosperity, progress, and other value-laden characteristics of a nation. This dilemma is resolved by disguising values in the shape of facts. The most objective appearing facts are those embodied in cold, hard, and seemingly indisputable, numbers. Among economists, the most important of these facts is the GDP, which measures the Wealth of Nations. In fact, GDP is an index number, constructed by subjective choice of factors to be measured, and weights to be assigned to them. In this section, we discuss how the GDP embodies the values Cassiers and Thiry (2012) of a market society.

From the sixteenth to the eighteenth century, the values of European societies were radically transformed by a complex combination of forces. Traditional social values, originating from Christianity, can be roughly summarized as follows:

1. Community: All members are part of a common body, striving together for common goals.
2. Social Responsibility: All members must take care of each other.
3. Duties: Duty to society takes precedence over individual rights.

The transition to a market society led to a new creed (Tawney, 1926), described as: “*The Industrial Revolution was merely the beginning of a revolution as extreme and radical as ever inflamed the minds of sectarians, but the new creed was utterly materialistic and believed that all human problems could be resolved given an unlimited amount of material commodities*” (Polanyi, 1944, p. 40). He has explained, a central characteristic of market society is the creation of three artificial commodities: money, labor, and land. Labor is the stuff of human lives, and it is widely accepted that our lives cannot be bought or sold for money. But market societies require labor markets, where human lives are bought and sold. Similarly, land is our habitat, and the natural relationship is to protect, preserve, enhance, enrich our environment, known metaphorically as “Mother Earth”. However, market societies convert land and natural

resources into saleable commodities. Finally, money is a third commodity which gets value from our social consensus as a means of artificially storing market values across time. The creation of these commodities leads to a set of values which are antithetical to traditional values. Operation of a labor market, where lives are for sale, requires reducing or removing social responsibility and increase of individualism, so that the threat of hunger forces people to work. When human lives are bought and sold, community ties automatically weaken. Market societies create individualism and hedonism, where pleasure is derived from possession and consumption of material goods, instead of social relationships. For a brief summary of Polanyi's arguments, see Zaman (2013) GDP as a measure of wealth captures the values of a market society. Conceptually at least, the GDP aims to measure the total market value of the final products which are purchased by consumers. Intermediate goods, purchased by firms as inputs towards production of final consumer goods, are not counted. This expresses perfectly that values embedded in a market society. Only goods and services which are traded on the marketplace are given value. Services done out of love, or social responsibility, do not have any value. This excludes the vast majority of what matters in traditional societies – the most valuable things are the ones which are not available for sale. Furthermore, environmental resources, forest, lakes, plants and animals – these are no value, until they are traded on the market. The Amazon forest, millions of the year in the making, and irreproducible at any price, is evaluated in the GDP by the price of the furniture made by cutting down the trees for timber.

Statistics are the eyes of the state. Things are measured when they matter, and what is measured comes to matter. Throughout the world, policy and political decisions are guided by the numbers produced by the statistics department. The GDP is value laden in terms of the choices it makes as the factors which are included, the factors which are excluded, and the weights assigned to the factors. The factors which are included differ in radical ways from those valued by traditional societies:

1. Wasteful, ostentatious, and luxurious, products are included, and valued at their sale prices. These products, such as Alligator skin briefcases for \$20,000, would be regarded as being of negative value to society in a traditional society.
2. Basic needs – food, housing, health, education – for the poor, are valued very low, because the poor cannot afford to pay much for these services. All traditional societies would value the provision of these needs very highly, instead of at market value.
3. Intangibles, such as community, social services and support provided by family and friends, are not sold in the market, and hence excluded from the GDP.
4. Environment, natural resources, plant and animal species, and all the wonders of the planet that make our lives worth living, are assigned zero weights in the GDP measure.

The damage done by the use of GDP as a measure of wealth is deadly because it is hidden. Modern rhetoric is especially effective because it uses numbers to persuade, without any mention of the values that went into the manufacture of these numbers. The devastating effects of market values promoted by GDP are only now becoming apparent. We list some of these harmful consequences below:

1. Loss of Meaning in Lives: When the value of lives is measured in money, making money becomes the goal of life. This is an inherently meaningless activity, as money is only useful as a means to pursuit of higher goals. The Quran teaches us that human lives are

infinitely precious, and cannot be evaluated in monetary terms. This message is aligned with the capabilities approach to development, which aims to enable human beings to develop their unique capabilities, and lead rich and fulfilling lives.

2. **Destruction of community and societies:** The fabric of human lives is woven from our social relationships. However, a market society values human lives only for what they can produce and sell on the marketplace. This leads to destruction of communities, and loss of happiness, due to the illusion that happiness can be created by material possessions.
3. **Environmental Collapse:** When natural resources are sold, the GDP records an increase, because the cost of depletion and destruction of environment is not taken into account. As many authors have noted, if we take these costs into account, the enormous growth recorded in the last century would be converted into an enormous loss. This is because the value of what has been produced is very small compared to the value of what has been destroyed in order to produce these goods. The strong drive for making short-term monetary gains by destroying planetary resources have led to the looming climate catastrophe.

If the market values embodied in the GDP were open, and available for discussion, most human beings would disagree with the idea that these represent useful goals to strive for. But because they are concealed behind the rhetoric of objectivity, nearly all nations in the world emphasize the goal of increasing GDP growth, and governments rise and fall according to their ability to achieve growth targets. One of the reasons for this blind obsession with the wrong numbers, which embody anti-social values, is the specialization and fragmentation of knowledge that characterizes our times. Specialization leads to the separation of theory and practice. Statisticians specialize in manipulating the numbers, without knowledge of the real-world origins of these numbers. It is the field specialist who understands the meaning of these numbers and uses the results from the statistical analysis. The statistician is supposed to do an objective analysis based purely on the numbers. Massively wrong analysis and policies result when everyone is doing his small piece of work, and no one has a global perspective.

5. COMPARING WEALTH ACROSS COUNTRIES

Countries compete with each other on the GDP numbers, without any awareness of the values which are embodied in such competitions. Such comparisons are fraught with many difficulties. We illustrate the difficulties which arise when we try to compare GDP across nations. To begin with, let us examine the GDP data measured in Local Currency Units (LCU) for the countries India, Pakistan, Malaysia, Bangladesh, China and Ireland from the World Development Indicator (WDI) data set of the World Bank² which is presented in Table 5.3. Firstly, look at the column for the year 1970. The largest GDP is the one for Malaysia which is 13.10 trillion MYR (Malaysian Ringgit). On the other hand, Ireland has the smallest GDP which is 2.26 billion IEP (Irish Pounds). On this basis, can one say that in 1970 Malaysia had the largest wealth and Ireland had the smallest wealth? Obviously not: the numbers are not comparable since they are measured in LCU. The currency units are not comparable across countries. We must learn how to translate one local currency unit into another, in order to be able to compare countries according to GDP measured in LCU.

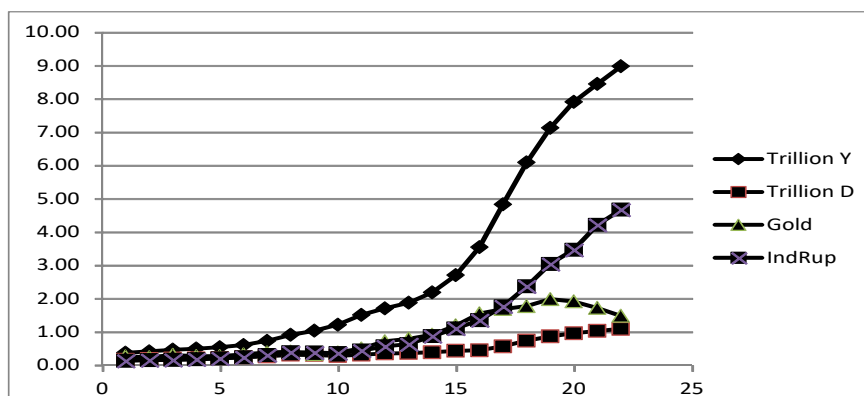
² The WDI (2015) data set, has 246 countries including grouping of countries, like Africa, Middle East, LDCs, OPEC and so on.

Table 5.3: GDP Current Measured in Local Currency Units (LCU), 1970-2010

Country	LCU	1970	1980	1990	2000	2010
<i>India</i>	Trillion INR	0.48	1.50	5.86	21.70	78.00
<i>Pakistan</i>	Trillion PKR	0.05	0.24	0.86	3.83	14.80
<i>Malaysia</i>	Trillion MYR	13.10	54.30	119.00	356.00	795.00
<i>Bangladesh</i>	Trillion BNT	0.04	0.28	1.00	2.37	6.94
<i>China</i>	Trillian CNY	0.23	0.46	1.87	9.92	40.20
<i>Ireland</i>	Billion IEP	2.26	13.00	36.70	106.00	156.00

Source: WDI (2015)

At first glance, this does not seem like a difficult problem. Why not use the exchange rate between the two currencies? Deeper thinking about this reveals great difficulties. First, the exchange rate is determined by international trade, exports, imports, balance of payments, and Central Bank policies. For these reasons, it can fluctuate substantially. These fluctuations do not relate to the domestic wealth of the countries. For example, going from 2018 to 2019, the dollar appreciated strongly against the rupee going from PKR 100/USD to PKR 150/USD. Measured in dollar terms, the GNP of Pakistan declined by a rather large amount. However, while this change made imports expensive, it boosted exports, and strengthened import substituting industries in the domestic economy. It makes no sense to consider this change as a reduction in the domestic wealth of Pakistan, because resources within Pakistan were not affected by the change in the exchange rates. Yet, unless we standardize the wealth by using common units of measurement, by converting to dollars, how can we compare the wealth of Pakistan with the wealth of any other country?

Figure 5.3: Chinese GDP in Yuan, Dollar, Gold and Indian Rupees

Source: WDI (2015).

To compare wealth across countries, we cannot use the LCU – local currency units – because these are arbitrary and unrelated to each other. Yet, any common unit of measurement we use introduces arbitrary subjective biases into the picture, while giving an appearance of objectivity. Different types of benchmarks can be used to convert an LCU into a common unit for cross-country comparisons. However, we can use this arbitrariness to get any desired conclusions, since there are no objective methods to make such comparisons. To illustrate this, we consider a graph of the Chinese GDP for 25 periods based on WDI data. The top curve in Figure 5.3 is Chinese GDP in trillions of Yuan. The other curves are conversions to Dollars, gold and Indian

Rupees. As can be seen from the Figure 5.3, each curve shows a different pattern of growth in Chinese GDP.

Which of these four curves represent the objective “true” picture of the growth of the Chinese economy? None of the numbers (not even the LCU picture, as we will show later) is objective truth. In fact, objective truth does not exist in this situation, and the subjective choices we make create the facts via manufactured numbers. If the subjectivity and arbitrariness is openly acknowledged, these numbers may be of some use for different purposes. The real-world context and goals must be specified, and the statistical analysis must be adapted to suit the real-world purpose. Again, this shows the impossibility of separating the statistical analysis from the real-world context. The appearance of objectivity created by numbers allows experts to deceive the public. Someone who wants to portray the growth of China in a bad light could use the Dollar based curve, which shows the least growth. Someone who uses gold valuation of Yen could argue that the GDP of China has gone down in terms of its gold value in the recent past. Those who are not aware of the arbitrary choices made in creating such comparison could easily be deceived by this modern rhetoric based on apparently objective numbers.

6. PURCHASING POWER PARITY

Statisticians who are aware of the serious problems which arise in cross-country comparisons of GDP have come up with a device to reduce them. In making cross-country comparisons, it makes a lot of sense to consider how much a dollar can buy in the USA, and compare that with what a Rupee can buy in Pakistan. It seems like a more reliable method than using exchange rates or other benchmarks, the deficiencies of which were discussed in the previous section. Here the idea is firstly to determine a typical bundle of goods and price the bundle both in Indian Rupees and in US Dollars. Those two costs should be considered as equivalent because that shows a match between purchasing power of Indian Rupees and purchasing power of US Dollars.

As an artificial example, let a typical bundle of goods be the rental price of housing for an average person, price of food, price of clothing and basket of goods which consumers would buy. The first thing to be done is to calculate the costs both in Indian Rupees and US Dollars. Suppose that they are 20,000 Indian Rupees and 1,000 US Dollars respectively. This in PPP approach means that 20,000 Indian Rupees is equivalent to 1,000 US Dollars. This can be very different from official exchange rate. For example, let the official exchange rate between Indian Rupees and US Dollars be 50 to 1, that is, 50,000 Indian Rupees is equivalent to 1,000 USA Dollars.

On the surface, the PPP appears to be a good solution to the problem of cross-country comparisons. However, when we probe deeper, we find that many subjective decisions must be made to arrive at a practical implementation of the idea, and the outcome of comparison depends on these decisions. A central point is that there is no “typical bundle” of goods which is the same across the world. A typical bundle of goods for a consumer in India is radically different from a typical bundle of goods for a consumer in USA. Even when the goods are the same, a “house” in USA is very different from a “house” in India. However, the numbers which seems perfectly accurate, objective and precise, do not reveal these difficulties. We can bias comparisons by choosing the bundles differently. For example, suppose we choose handicrafts, and organic vegetables grown by primitive and non-commercial methods, and the like, for the consumer bundle. These items are cheaply available in India, but very expensive in the USA. Using this for the consumer basket would create a bias in favor of India. Similarly choosing a

basket of goods cheaply available in USA but very expensive in India would create the reverse bias. While this is easily understood, what most economists fail to understand is that there is no objective solution to the problem. There is no “unbiased” bundle of goods, which will lead us to an objective comparison of the real value of the LCU in both countries. Like all multidimensional issues, reductions to a single number always involve subjective choices, whether open or concealed.

Contrary to current methodology of hiding values, how can we openly and explicitly consider the subjective choice of factors and weights? Then, one must ask the question of the PURPOSE of the comparison. For each purpose, a different set of factors and weights would be appropriate. One such purpose, is stated by Hicks (1940, p. 106): “*a long line of economists ... have sought in the Social Income an index of economic welfare, of the wealth of nations*”. Actually, this statement contains two purposes – economic welfare, and wealth of nations – which are conceptually different. Let us first consider the extent to which GDP measures economic welfare, or prosperity, of nations. Here the Easterlin (1995) Paradox shows quite clearly that “happiness” felt by people is largely unaffected by GDP growth over time. Also, there is no systematic relationship between GDP and social welfare across cross sections. Subsequent research has found that deeper explanations for this paradox lie in the fact the human welfare is based on character, attitude towards life, and social connections. These factors are ignored in the GDP, in fact the GDP is grounded in economic theories which falsely suggest that consumption of goods and services is the sole source of human happiness – a position which can be described as the “Coca-Cola Theory of Happiness”³.

A second purpose for measuring wealth, explicitly considered by Adam Smith (1776), relates to the power countries exercise in the international arena. Wealth provides capabilities for financing military expenditure, unfortunately an essential aspect of global power today. However, if wealth is used to compare the relative power of the two countries in the international arena, then emphasis would be placed on rather different factors, and weights would be rather different from those used for Purchasing Power. Suppose, for example, that we only look at finance for Army, Navy, and Air Force. We can add up all three, or use other sets of weights to assess power, but all such schemes are arbitrary. The question of which country is, objectively, the most powerful, cannot be answered. For example, if one country has a huge army while the other has a bigger navy, then one is more powerful on land and the other on the sea. Depending on circumstances, and terrain of struggle, either one could come out on top.

The purpose of making comparison affects radically choice of factors and weights, which is a surprise to those used to thinking of statistics as neutral, objective, and value-free. See Castles and Henderson (2005) for a discussion of the many controversies in the area of comparing GDP across nations, and the policy implications of the use of different kinds of weights and factors. However, note that, like all economists, they believe that value-neutral statistics can be found, and used as a basis of value-laden decisions. This idea, that we can separate the facts and values, is the fundamental misconception at the methodological foundations of modern economics, econometrics and statistics. Because it goes so deeply against the grain of positivist methodology that we have all absorbed, it is worth re-iterating:

Impossibility: It is impossible to make objective comparisons when multiple factors are under consideration. Choice of factors, weights, and signs (positive or negative), are all necessarily subjective.

³ See Zaman (2018) for details.

As a consequence, it is impossible to make objective cross-country comparisons of GDP. This is in conflict with the positivist mindset, which leads us to believe that there is an objective truth, and that we CAN find the right collection of factors and weights which will reveal the truth. For example, Castle and Henderson (2005) argue that Environmentalists are using the “wrong” set of factors and weights, and they aim to provide greater objectivity. They do not realize that objectivity is an impossible goal. All we can do is put forth our values as being better in comparison to other values; this is exactly the art of rhetoric and persuasion. Environmentalists use weights which emphasize the costs of climate change, so as to create political pressure to take action. Industrialists propose another set of weights which gives more emphasis to the market, in order to allow growth and profits at expense of the environment. Both sets of weights are subjective choices, and there are no objective choices available. Numbers create an illusion of objectivity and hide the real conflict over values represented by these numbers.

To articulate this more clearly, suppose we were charged with the task of making a cross country comparison which would show Pakistan to be ahead of USA. We would look for factors where Pakistan leads USA and give them greater weight. Easterlin’s Paradox has established firmly that measures of happiness across countries do not correlate with GDP. We would therefore argue that instead of comparing material goods directly, we should be measuring the social welfare, or happiness levels, produced by the consumption of these goods. Studies of happiness show that the structure of the family is one of the key sources of life-happiness. Children raised by single-parents suffer from a large range of problems, documented in numerous research studies. If we give weight to dimensions of social welfare which come from family and community, and consider statistics related to crime, suicide, alcoholism, loneliness, we could easily show that Pakistanis are “richer” than Americans, if wealth is defined appropriately to include social lives.

It is important to clarify that we are not arguing that there is no truth, and everything is subjective. Rather, truth is complex, multidimensional, and qualitative, and it cannot be reduced to one number. We cannot assign a single number to a country as a measure of its “wealth” and thereby make it possible to compare the lives of millions living in country with millions of lives in another. When we attempt to reduce complex, multidimensional phenomena to one number, there is an enormous loss of information. Decisions as to what information is important, and what can be ignored are always subjective. In the past, rhetoric was used to emphasize importance of one set of values, and to criticize other values in use by other groups. Now, all this rhetoric is concealed within choices of factors and weights, allowing some groups to impose their values on others, under the cover of objectivity of numbers.

7. COMPARISONS ACROSS TIME

In comparisons across countries, we face the difficulty that the concept of “wealth” has varied across societies, and changed with time. The “average basket” of goods varies for each country, because different societies have different preferences and values. We cannot compare apples and oranges. It seems that these problems would be reduced if we considered a single society across time. The concept of wealth, and the average bundle of goods would remain relatively stable, at least across short periods of time. We will now discuss difficulties which arise when we consider growth across time, comparing GDP across the years for a single country.

Turning back to Table 1, we can see that all of the GDP values are increasing as time goes on for all of the countries in the Table. Does this mean that GDP has been growing in all of these countries? Well, may be “no” since the values in the Table are in local currency units. The increase may be due to increase in prices or it may be due to increase in quantities. Therefore, without knowing which increase is dominant, one cannot be sure whether GDP really increased or not.

To see how deceptive just looking at the numbers can be, the case for Turkey for the years 1978 – 1988 is useful. The country experienced very high inflation over this period of time. Table 7.4 summarizes the information.

Table 7.4: Inflation (CPI) and Growth of Turkey (1978–1988)

<i>Year</i>	GDP (LCU) (Billion TL)	Growth (%)	Inflation (%)
<i>1978</i>	1.58	2	50
<i>1979</i>	2.78	-1	76
<i>1980</i>	5.23	-2	88
<i>1981</i>	7.90	5	51
<i>1982</i>	10.50	4	33
<i>1983</i>	13.90	5	33
<i>1984</i>	22.00	7	58
<i>1985</i>	35.10	4	60
<i>1986</i>	51.10	7	46
<i>1987</i>	74.70	9	46
<i>1988</i>	129.00	2	73

Source: WDI (2015)

Second column in the table is GDP in current LCU, that is Turkish Lira. GDP in 1978 was 1.58 billion TL and it was 129 billion TL in 1988 which is close to 100 times growth but actually the growth over the period was not that high. Most of the growth was due to inflation, as shown by the numbers in the last column. After deducting the inflation, the growth rates are actually quite low. So, it is clear that direct comparisons of GDP in current LCU are false and misleading. The table provides the “official” statistics, as recorded in the World Bank WDI Data set. It separates the growth in LCU into two parts. One part is the rise in prices, or inflation, while the other part is the growth of the “real” GDP, which measures wealth according to official statistical accounts. How objective is the official method, as a way of measuring real GDP, and thereby enabling us to compare the wealth of Turkey over time? We will examine the subjective values hidden in the way these numbers have been manufactured.

7.1. External and Internal Critiques of the GDP

From one year to the next, the GDP changes in many different ways. The quantities of the goods produced is increased, technological changes make the quality go up, the prices also increase, new products are introduced, some products become obsolete. Can we wrap up all of these changes and summarize them by ONE number? The simple answer is NO – this is impossible. Over time changes take place, and these can be characterized qualitatively. Using old fashioned rhetoric, a writer arguing that Turkey is making progress and experiencing growth would talk about how we have more and better roads, we have more educational institutions of higher quality, we are manufacturing high quality products, and exporting them, and similarly describe the many dimensions of change taking place in positive ways. An opponent who want to argue

in the opposite direction might say that real wealth consists of friends, family, and social relationships. As the people of Turkey get more and more engaged in production of artificial goods which make no genuine contribution to our lives, we are losing our traditional values which enriched our family and social lives. Instead of learning to be human beings, our education is turning us into human resources, to be used just like machinery is used, as inputs to the production process. So, Turkey is becoming poorer, when wealth is properly understood in terms of what makes us genuinely happy, enriches our lives, and develops our human capabilities.

In the modern rhetoric, all of this discussion and debate about values is buried and concealed beneath the apparently objective official statistics. Which factors should be chosen as measures of wealth? This is not under discussion; it is automatically assumed that all products produced and sold as final consumer goods are the wealth of the nation. Once we recognize the value-based nature of this choice, there are two types of criticism which we can make of this choice of factors. The first is an internal criticism, which accepts the idea that wealth should be defined in terms of material resources, but says that we are missing essential aspects of this material wealth because they are not sold in the marketplace. Among these, the informal education, and character building, done by families, as well as social services provided by friends and relatives are extremely important. As more and more people start working in order to create wealth which is measured by the GDP, there is dramatic reduction in the non-market transactions which produce wealth, as well as in the informal economy. It is not clear whether there is a gain or a loss from this process. In particular, human capital wealth (Manuelli & Seshadri, 2014), intellectual capital (Ruiz, Navarro, & Peña, 2011) and intelligence (Lynn, Vanhanen, & Stuart, 2002; Hunt & Wittmann, 2008) add enormously to productive capacities, so that it is an essential aspect of material. In fact, according to World Bank report (Hamilton, et al., 2006) on the wealth of nations, this part is more important than the natural resources, which used to be far more significant in earlier times.

An external critique of the idea is on values of the products (Smith, 2012), it rejects the idea that only markets produce wealth (Edvinsson & Stenfel, 1999). It also rejects the idea that the market price is a good measure of the social value of the product. A lot of goods produced on the market are luxuries, wasteful, or useless products, which actually reduce wealth. Similarly, human capabilities are extraordinary and unique, and cannot be priced in the market. For the purposes of this article, it is sufficient to highlight that choosing market goods as the only factor to be counted as wealth, and choosing market prices as the measure of wealth, introduces market-values, substantially in conflict with traditional values, into the measure. At the same time, an appearance of objectivity is created by the numbers.

7.2. Adjusting for Inflation

Ignoring both external and internal critique, and accepting the idea that wealth is only measured by goods produced in the market, and evaluated at market prices, does not solve our problems, in terms of making comparisons of wealth across time. The problem is the same one that we have discussed earlier. There are multiple goods, and multiple price changes, and we must summarize all the thousands of changes in the quantities of production into one number, and similarly summarize all the price changes by one number. Because the newspapers report on inflation and on real GDP growth, the public has the impression that this is objectively possible to do. The reality is that there are many different ways to summarize, and every choice among these is necessarily subjective and incorporates value judgments. Let us consider the problem of measuring inflation in greater depth. Note that once we have a measure of the increase in

prices, we can automatically divide the nominal growth of GDP in LCU into two parts, one due to price increase, while the remaining growth is due to real GDP growth.

As we have already discussed, there are thousands of goods, and thousands of prices changes. We illustrate the problems which arise in merging multiple indicators into one. Table 3 present as artificial example. Four products are considered in the example. These are wheat, rice, corn and lentils. In year 2000, 300 units of wheat, 100 units of rice, 100 units of corn and 250 units of lentils have been produced. The market prices for these products in year 2000 are 10, 30, 50 and 25, respectively. In 2010, wheat production decreased from 300 units to 100 units and lentils production decreased from 250 units to 60 units. On the other hand, rice production increased from 100 units to 300 units and corn production increased from 100 units to 400 units. The prices of the products changed from 10 to 50, from 30 to 35, from 50 to 40 and from 25 to 75, respectively. Given these prices, Table 3 reports the inflation rates for each product at the last column. They are 400, 16.7, -20 and 200 for wheat, rice, corn and lentils, respectively. In fact, at this point, one could argue that prices are not the same throughout the year. They can fluctuate from day to day or from month to month. So, some sort of averaging is required but this complication is ignored to simplify the discussion.

Table 7.5: Commodities and Prices in a Hypothetical Economy

<i>Product</i>	Quantity (2000)	Quantity (2010)	Price (2000)	Price (2010)	Inflation (%)
<i>Wheat</i>	300	100	10	50	400
<i>Rice</i>	100	300	30	35	16.7
<i>Corn</i>	100	400	50	40	-20
<i>Lentils</i>	250	60	25	75	200

Now the question is whether the GDP of the country increased or decreased moving from year 2000 to year 2010. Just by looking at the quantities one cannot give the answer. Corn and rice production increased but wheat and lentils production decreased. The standard solution to this problem is to value the products at the market prices. While the value of the year 2000 production with 2000 prices is 17,250, the value of the year 2010 production with 2010 prices is 36,000. So, measured in LCU, the GDP has doubled. The problem is to separate this increase into a price component (inflation) and a quantity component (real GDP). Let us look at how we can try to do this.

Table 7.6: Analysis of Laspeyres and Paasche Index Numbers of Hypothetical Economy

<i>Index</i>	2000	2010
<i>Laspeyres</i>	100	240
<i>Paasche</i>	100	114
<i>Inflation (%)</i>	140	14

We have four rates of inflation, one for each of the four goods – (W: 400%, R: 16.7%, C: -20%, L: 200%). Which of these four factors should be chosen, and what weights should we attach to each factor? This is the standard problem with reducing multiple factors into one. Here we have a very homogenous problem where are four items are food items, which makes it much easier than problems which arise when we are trying to combine an enormous range of diverse goods into one number. But even this extremely simple problem does not have a simple, objective solution, such that all impartial observers would agree on it. It is generally agreed that the weights which are attached to the four price increases should be the quantities of the goods

which were produced. But these quantities also changed from the base year 2000 to 2010. If we use the weights (W:300, R:100, C:100, L:250) from the base year, this is called the Laspayres index, and it comes out to 140%. This is because high weights are given to W and L and lower weights to R and C. Since W and L have high inflation rates of 400% and 200%, the weighted average comes out quite high. On the other hand, the Paasche Index takes the weights for the current year, or 2010. The 2010 weights of (W:100, R:300, C:400, L:60) give a lot of weight to the low inflation good R and C which have low inflation rates of 16.7 and -20%. This gives us a Paasche inflation index of only 14%, which is 10 times less than the Laspayres Index of 140%.

Even this very simple example brings the question of which inflation rate should be used. 14% or 140%? There is no answer to this question. But both are “facts”. Going on with the artificial example, we saw the market value of output, which could be GDP, increased from 17,250 to 36,000. That is a 108% increase. If inflation is 14% as calculated by using Paasche index, then there is 94% growth rate. On the other hand, if we use Laspayres index for calculations, then inflation is 140% and growth is -32%. Which figure is correct? There is no answer to this question. To see how this reflects values, suppose that the majority of the public is poor, and eats only wheat and lentils, while a minority is rich and eats rice and corn. Then the Laspayres index better reflects the interests of the poor, who see an average 300% inflation in their food prices. The Paasche index better reflects the interest of the rich, who actually see a decline in their food bills. Every index reflects values which are built into the choices of factors and weights. These choices are arbitrary, and cannot be made objectively. Sensible ways to choose require understanding the goals – WHY are we trying to measure inflation? Without clear thinking about the values involved in constructing the inflation index, and deeper knowledge of the structure of the economy, we cannot find good measures of inflation. However, for most real-world purposes, we will find that multiple measures of inflation would be needed. For example, we could classify the population into quintiles by income, and then consider five different inflation rates, one for each segment of the population. Pragmatically, we cannot consider thousands of numbers at any one time, and for purposes of getting the big picture, it is essential to reduce multiple factors into a small number. However, we must be aware of the distortions which are introduced in this process, and not be deceived by the apparent objectivity of numbers.

7.3. Adjusting for Population

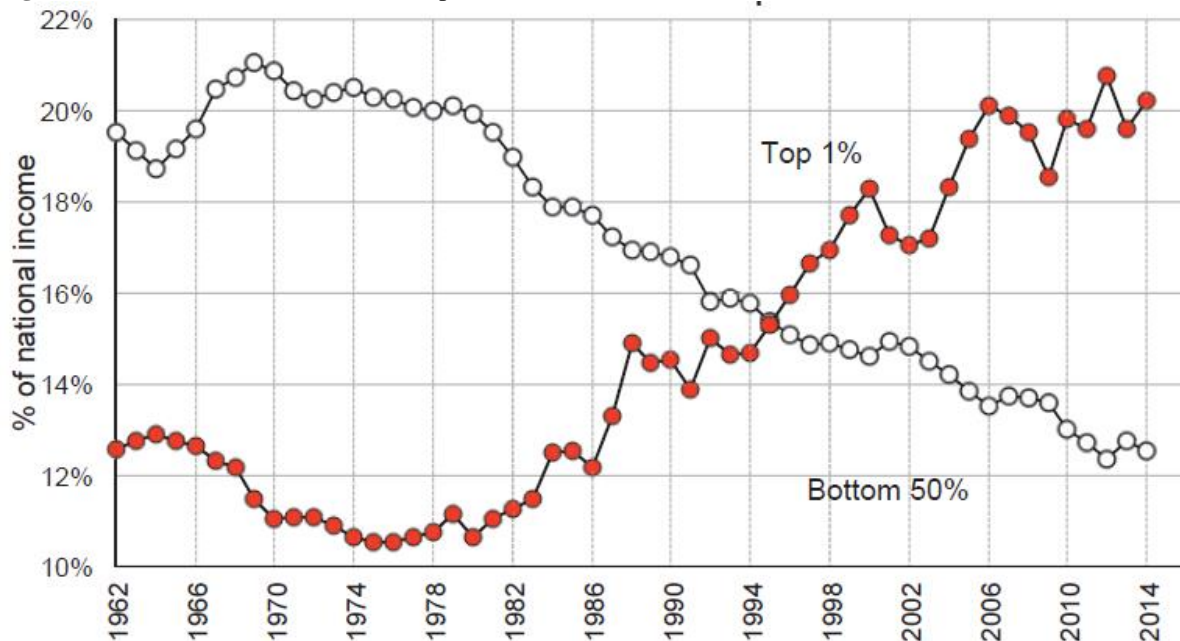
As we consider changes in GDP across time, it is essential to consider that the population also increases across time, and so this factor must be taken into consideration, in measuring and comparing wealth of a given nation across time. The standard method for making this adjustment is to divide total GDP by the total population to get GDP/Capita. Even though this is accepted by all, and by far the most widely used measure of wealth of nations, it suffers from serious conceptual defects. Major shortcomings of this measure, and the damage caused by failing to measure extremely important dimensions of growth, are covered in Fitoussi, Sen, and Stiglitz (2010) in “Mismeasuring our lives: Why GDP doesn’t add up”. Here we look only at a few elementary problems, as an internal critique, which accepts the idea of using market goods and market prices, as the sole factors to be considered towards wealth.

On a real data set based on a survey of household incomes and expenditure, the income of 1 man was recorded at PKR 1,000,000, while the other 100 or so people in the same village had incomes between 2000 and 12,000. Obviously, there is one rich landlord, and many peasants. The GDP per capita of the village would be around 16,000 but this number is grossly deceptive. It is substantially higher than the incomes of all of the peasants, and nowhere close to the income

of the landlord. The median income would probably be around 6000 and the mode would be lower, say 4000. Both of these would provide a better representative number for the wealth of 99% of the population of the village. Even if we were to choose one number, that one number could be chosen better, if the goal is to get an idea of the amount of wealth that most people have.

The fundamental problem is that one number cannot capture the data contained in the million different numbers that represent the income of millions of people. At the same time, it is humanly impossible for us to consider all the million numbers separately; some data reduction must be done to get a big picture of what is happening. A reasonable compromise could be to consider different groups in the society and consider them separately. A simple way to do that would be divide the people into income quintiles, and compute the GDP per capita for each quintile separately. That way we would use five numbers instead of one to summarize the data and get a much clearer picture of what is happening to the wealth different segments of the society. Five numbers, one for each quintile, would give us a much better picture of inequality, as opposed to the GDP per capita, which conceals it completely. As an example of the kind of information we may be able to get, consider the following graph of the income of the bottom 50%, as compared with the top 1% for the USA.

Figure 7.4: Pre-Tax Income shares of Top 1% vs Bottom 50%, US, 1962-2014



Source: Piketty, Saez and Zucman (2018)

Figure 7.4 shows clearly that even though the economy has been growing over the past few decades, the fruits of growth have gone to the top 1%, while the shares of the bottom 50% have been declining, and the absolute values of real incomes have been stagnant. The values hidden in the widespread use of GDP per capita, and the difficulty of getting income distribution statistics reflect the power, interests, and values of the rich and powerful, while giving an impression of objectivity.

8. CONCLUSIONS

Some phenomena are genuinely qualitative and cannot be measured in numbers. I cannot measure how much you love me by measuring the pressure per square inch exerted on my rib

cage when we hug each other. But even when what we are trying to measure can be reduced to numbers, complex phenomena are multidimensional, and require several numbers to capture their different dimensions. There is no objective way to reduce a collection of numbers to a single number without loss of information. Which information to keep, and which to throw away, while summarizing data, always requires subjective decisions. Use of “standard” procedures to make such decisions – such as using the average income or GDP per capita – does not create objectivity. It merely hides subjective decisions and value judgments.

REFERENCES

- Ayer, A. J. (2012). *Language, truth and logic (Vol. 1)*. Retrieved March 11, 2020, from Courier Corporation: <http://www.math.chalmers.se/~ulfp/Review/langtruthlogic.pdf>.
- Cassiers, I. and G. Thiry (2012). Alternative Indicators to GDP: Values behind Numbers. Adjusted Net Savings in Question. *Applied Research in Quality of Life*.
- Castles, I. and D. Henderson (2005). International Comparisons of GDP: Issues of Theory and Practice. *World Economics*, 6(1), 55 – 66.
- Easterlin, R. A. (1995). Will raising the incomes of all increase the happiness of all? *Journal of Economic Behavior and Organization*, 27 (1), 35-47.
- Edvinsson, L. and C. Stenfel (1999). Intellectual capital of nations—for future wealth creation. *Journal of Human Resource Costing & Accounting*, 4 (1), 21-33.
- Fraasen, B. C. (1980). *The Scientific Image*. Oxford University Press.
- Gladwell, M. (2011). The Order of Things. *The New Yorker*, 87 (1), 68-75.
- Hamilton, K., G. Ruta, K. Bolt, A. Markandya, S. Pedroso-Galinato, P. Silva, . . . L. Tajibaeva (2006). *Where is the Wealth of Nations? Measuring Capital for the 21st Century*. World Bank. Retrieved from <http://hdl.handle.net/10986/7505>.
- Hands, D. (2007). *The Future of Economics*. Retrieved March 11, 2020, from <https://ssrn.com/abstract=1076818> or <http://dx.doi.org/10.2139/ssrn.1076818>.
- Hicks, J. R. (1940). The Valuation of the Social Income. *Economica*, 7 (26), 105-12.
- Huff, D. (1993). *How to Lie with Statistics*. W. W. Norton & Company Inc.
- Hunt, E. and W. Wittmann (2008). National intelligence and national prosperity. *Intelligence*, 36 (1), 1-9.
- Kelvin, L. (1889). Electrical Units of Measurement. In W. Thomson, *Popular Lectures and Addresses* (Vol. 1, pp. 73-136). Cambridge University Press.
- Keynes, J. M. (1936). Chapter 24. In *The General Theory of Employment, Interest and Money* (p. 383). Palgrave Macmillan.

- Lynn, R., T. Vanhanen and M. Stuart (2002). *IQ and the wealth of nations*. Greenwood Publishing Group.
- Manuelli, R. E. and A. Seshadri (2014). Human capital and the wealth of nations. *American economic review*, 104 (9), 2736-62.
- Nitzan, J., and S. Bichler (2009). Capitalization: Fiction, mirror or distortion? In *Capital as Power: A study of order and creorder* (pp. 167-182). Routledge.
- Piketty, T., S. Emmanuel and G. Zucman. (2018). Distributional national accounts: methods and estimates for the United States. *The Quarterly Journal of Economics*, 133 (2), 553-609.
- Polanyi, K. (1944). *The Great Transformation: The Political and Economic Origins of Our Times*. Retrieved March 11, 2020, from https://inctpped.ie.ufrj.br/spiderweb/pdf_4/Great_Transformation.pdf.
- Putnam, H. (2002). *The Collapse of the Fact/Value Dichotomy and Other Essays*. Harvard University Press.
- Reuben, J. A. (1996). *The Making of the Modern University: Intellectual Transformation and the Marginalization of Morality*. Chicago: University of Chicago Press.
- Ruiz, V. R., J. L. Navarro and D. N. Peña (2011). Relationship between gross domestic product (GDP) and hidden wealth over the period 2000-2008: An international study. *Electronic Journal of Knowledge Management*, 9 (3), 259-270.
- Smith, A. (1776). *An inquiry into the nature and causes of the wealth of nations* (The Glasgow edition of the Works and Correspondence of Adam Smith ed., Vol. 2). (R. Campbell, A. S. Skinner, and W. B. Todd, Eds.) New York: Oxford University Press. Retrieved from https://www.ibiblio.org/ml/libri/s/SmithA_WealthNations_p.pdf.
- Smith, J. (2012). The GDP Illusion: Value added versus value capture. *Monthly Review*, 64 (3), 86-102.
- Stiglitz, J. E., A. Sen and J.-P. Fitoussi (2010). *Mismeasuring Our Lives: Why GDP Doesn't Add Up*. New York: The New Press. Retrieved from <http://www.stiglitzsen-fitoussi.fr/en/index.htm>.
- Tawney, R. H. (1926). *Religion and the Rise of Capitalism*. London: John Murray.
- WDI. (2015). *World Development Indicators*. Retrieved from Worldbank: <https://databank.worldbank.org/source/world-development-indicators>.
- Zaman, A. (2012). Methodological Mistakes and Econometric Consequences. *International Econometric Review*, 4 (2), 99-122.
- Zaman, A. (2013). *Summary of the Great Transformation by Polanyi*. Retrieved March 11, 2020, from WEA Pedagogy Blog: <https://weapedagogy.wordpress.com/2013/08/28/summary-of-the-great-transformation-by-polanyi/>.

Zaman, A. (2015). Deification of science and its disastrous. *International Journal for Pluralism in Economics Education*, 6 (2), 181-197.

Zaman, A. (2018). *The Coca-Cola Theory of Happiness*. Retrieved from WEA Pedagogy Blog: <https://weapedagogy.wordpress.com/2018/03/27/the-coca-cola-theory-of-happiness/>.

Zaman, A. (2019). *Kelvin's Blunder: Measure Everything*. Retrieved from An Islamic WorldView: <https://azprojects.wordpress.com/2019/08/13/kelvins-blunder-measure-everything/>.

Zaman, A. (2019). *The Emergence of Logical Positivism*. Retrieved from WEA Pedagogy Blog: <https://weapedagogy.wordpress.com/2019/05/11/the-emergence-of-logical-positivism/>.

Zaman, A. and F. Rahim (2009). Corruption: Measuring Unmeasurable. *Humanomics*, 25 (2), 117-126.