Innovative Statistics to Improve Our Notion of Reality

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Official statisticians should develop relevant new variables, systems and presentations and must increase their flexibility, creativity, courage and entrepreneurship

This article:

a. analyses why current official statistics do not describe modern societies' progress as well as they did fifty years ago
b. identifies new information needs stemming from fundamental changes in our societies
c. uncovers an inherent tendency to conservatism in both the statistical system and its customers
d. concludes that GDP growth sends misleading signals about the progress of developed economies and that mainstream economic theory and policy turn a blind eye to this problem
e. recommends new statistical information needed to describe the realities of the present day
f. recommends a more innovative attitude in official statistics.

Key words: Statistical policy; innovation; national accounts; social statistics.

1. Introduction

What statistics do we need? To what purpose? In history, statistics were needed for an estimate of how many soldiers could be conscripted into military service, or what amount of taxes could be collected. Later more figures were needed like: the availability of essential commodities, the cost of living of the poor, the labour force, the execution of the penal code, causes of death. Over the past fifty years, the need for statistics has broadened to many aspects of social and economic life including, more recently, the physical

environment. The central questions used to be: "how many?" or "how much?" Before asking these questions, there was *a priori* knowledge about what had to be quantified. Decision makers knew what was going on; what they needed was quantification.

Nowadays, our societies have grown more heterogeneous, dynamic and complex. Our *a priori* knowledge has become fragmented and is outdated more quickly; developments in society have become less predictable. If we ask statisticians only to quantify the phenomena we know, the statistics will describe only fragments of the relevant developments and they will fail to describe unknown new developments. Therefore, in addition to questions of "how many?" or "how much?" we want to ask "what is going on?" What new relevant phenomena are emerging? What interdependencies play a role? Which processes are driving the changes in society?

Is it sensible to ask official statistics these new questions? The answer depends on two issues: (1) are there others who are in a better position to find answers to these new questions and (2) are official statistical institutes capable of finding those answers?

Concerning the first issue, social scientists and economists can be asked. However, why should their *a priori* knowledge not be fragmented or outdated?[2] If they are to observe society open-mindedly in order to find answers, one of their essential vehicles is. . . statistics. So, they will turn to official statistics to help answer these questions. We could also ask commercial organisations or nongovernmental organisations (ngo's) the new questions. Are they not together producing an information overload that feeds our wish for authoritative and undisputed data? Moreover, can we expect them to give unbiased answers? It is difficult to find occupations or institutions where open-mindedly looking at what is going on in society is so essential a core value as it is with official statistics. We expect official statisticians to be unbiased, cultivating an undistorted view on reality, not one predetermined by any special interest or by any outdated or disputed theory.

Concerning the second issue, a source of genuinely unbiased information and core values of impartiality and independence are of the utmost worth. Official statisticians have a treasury of basic data that can be explored and their broad experience in estimation and presentation is a powerful tool. Would it not be a waste of publicly-financed knowledge if we did not ask official statistics the new questions?

The article analyses why contemporary official statistics do not describe the progress of contemporary societies as well as they did fifty years ago. It identifies new information needs stemming from fundamental changes in our societies. It demonstrates that to meet these new needs, new statistical analyses and more flexibility in innovating statistical work programmes are required as well as the courage to explore daring concepts and to initiate controversial debates on how to give an unbiased statistical description of what is going on in society.

2. The Problem

This section's first subsection briefly describes the problems raised in the article. It uses terms like "reality," "statistical simulation," "virtuality," "relevance," and "progress."

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[2] It is true that much room for heterodoxy exists in the economic and social sciences. But at the level of individual scientists or scientific organisations orthodoxy dominates in the dedication to a special doctrine. Contemporary mainstream economics, which dominates current policymaking, is a clear example.

These terms play an essential role throughout the article. Therefore, the second subsection briefly explains the terminology.

2.1. Description of the Problem

Half a century ago, official statistics in developed countries captured their society's "progress" better than today. In most of these countries the statistical output has increased considerably since then and the quality of the output has also improved in many ways. New variables have been added, measurement techniques improved, publications have become more timely and more detailed. Nevertheless, we observe a growing awareness that essential social and economic developments are not really covered. There is a growing feeling that the progress of society as measured, e.g., in statistics showing continuing economic growth, does not reflect the real progress (or, some might argue, the regress) of our societies. So, the first problem in this article is to answer this question: Are official statistics monitoring a "reality" that has become too virtual and, if so, why has that happened?

The analysis must be rather comprehensive. For a consideration of the development of official statistics its context must be taken into account. Firstly, today's societies differ in many respects from those of fifty years ago. Therefore current statistics need to describe new realities. Secondly, perceptions of reality have changed. Both observations pose a challenge to existing statistics, which describe reality according to traditional perceptions. And so, the development of economic statistics must be analysed alongside the development of economics and economic policies. But a similar question comes up when one considers economics and economic policies: are they no longer so effective in addressing the essential economic developments? Are they based on a reality, which has become too virtual? How does the use of available statistics contribute to that virtualisation?

Another problem raised in this article is how to create and maintain a process of developing official statistics that adequately monitor reality. What innovations should be made to the statistical work programme in such a way that it continues monitoring the most essential elements in social and economic development? And which elements are most essential today? This article will illustrate how new developments emerge in such a way that the very content of "relevant reality" changes. The implication is that monitoring reality is a dynamic process that requires statistics to permanently keep up with reality.

If current official statistics do not adequately monitor today's reality, there is urgent work to do. The mission of official statistics requires statisticians to monitor the most relevant developments, including the development of new statistics to monitor new realities. Moreover, if official statistics continues to present information that does inadequately monitor today's reality, this information will, sooner or later, be considered misleading.

What work is most urgent? The article will present concrete proposals for new statistics or statistical systems. These new statistics are considered essential for monitoring today's reality. In addition, suggestions will be presented concerning statistical techniques to bring more flexibility in innovating statistical work programmes. Finally, a strategy will be sketched for permanently keeping up with reality.

2.2. *Terminology for Analysing the Problem*

If we accept the idea that our knowledge of the world is incomplete, the implication is that our view of reality is not necessarily coincident with the truth. "Reality" is a representation of the true world, a construction determined by available knowledge and instruments for observation. In this sense, reality is the product of a process of simulation. For instance, what we observe using our eyes is simulated by our brain before it enters our consciousness, and then is simulated further as far as our interpretation determines our view. Needless to say, the simulation process starts long before our observation when we observe indirectly, e.g., through media like television and newspapers, or through statistics.

Statisticians should recognise this concept of reality. While statistical information is used as a description of reality, the producers of the information are aware of the fact that the figures are determined by the concepts adopted and the methods applied. By adopting other concepts, or by applying other methods, the statistician would produce other figures and, consequently, present another simulation of reality.

This concept of reality implies that reality is inevitably "virtual" because it is the product of simulation. Being less strict, one can speak of a reality that is more or less virtual. This will prove to be useful when discussing the development of reality, its perception and its statistical simulation.

Reality may change in two ways. The true world is changing and our simulation processes evolve as well. Good statisticians try to separate the effects of changes in the statistical process from their description of changes in reality, but they do not always succeed. It is very important to ask whether the relevant developments in reality are portrayed by the statistical simulation in a way that the user recognises as the relevant description. That, indeed, is the central problem in the article. If the relevant developments in reality are decreasingly reflected in the statistical information, we will speak of statistics simulating a reality that is increasingly virtual. We will speak of "too virtual a reality" if the statistical information becomes an unacceptable or misleading simulation of reality.

A development in reality may be perceived as relevant. This implies that the development itself is perceived and that it is felt as being relevant. Like all perceptions, this perception is personal. You may call it subjective if you think subjects to be autonomous. But as far as human beings are influenced (manipulated) by media or other simulators of reality, subjectivity will be replaced by collective (manipulated) perception and judgement.

Humans can perceive a development (simulate its reality) and judge its relevance. They can also feel that the development can be characterised as "progress." They will consider the development as progress if, in their perception, the development brings reality closer to an ideal (or utopia) and they will consider it as regress if that distance is increased. In a society consisting of autonomous individuals, "progress" can have as many meanings as there are individuals. But if society consists of a limited number of groups of individuals who share common ideals and perceptions, the number of meanings of "progress" is limited. A further limitation may come from the media and other simulators of reality, which influence perceptions as well as ideals.

This article will argue that official statistics, being a simulator of reality, must play a role in (initiating) debates about questions like: what (new) developments are "relevant" to our notion of reality and what developments are relevant to our notion of "progress?" The article presents some of the relevant developments in reality, which are poorly reflected in official statistics or which are not reflected at all. Which developments are relevant? And how can we identify these developments? The article will offer concrete and specific answers to these questions.

3. Origins of the Problem

The problem that official statistics are now less relevant to measuring a modern society's "progress" than they were fifty years ago has at least five origins. Four arise from basic developments in modern societies during the past fifty years. The fifth concerns the usual limitations of the mission of official statistics.

3.1. Heterogeneity

Modern societies are more heterogeneous now than they were fifty years ago. Consider a discriminating variable like the level of education. Fifty years ago, the group of people with less than secondary education included roughly 90% of the total population; nowadays, the population is widely dispersed over different levels of education. In European societies ethnic heterogeneity has increased considerably. At the same time a strong cultural trend of individualisation has become visible, giving rise to more heterogeneous lifestyles.

Increasing heterogeneity has also become visible in modern economies. The variety of goods and services produced and available to citizens has increased substantially, as has the range of production processes. A comparison of our consumer basket to that of our grandparents may persuade the doubtful.

In traditional statistical presentations the population is aggregated into a limited number of groups, broken down by classifying variables like age, gender, marital status, occupation, etc. The rationale of this procedure is that those groups can be considered relatively homogeneous, which means that "the average member" of the group has much in common with the vast majority of the real members. Increasing heterogeneity implies that these kinds of statistics will tend to describe a reality that is increasingly virtual: "the average member" is less and less like the real individuals in the group.

The relevant statistical implication of this is that aggregates have become less useful. That means statistical presentations must be more detailed and so their production becomes more expensive (requiring e.g., bigger sample surveys) in order to describe the more heterogeneous populations. More fundamentally, social structures are increasingly blurred and the focus of attention shifts from the statistical description of the population to the description of the differences within the population.

3.2. Dynamics

New commodities, new technologies as well as new topics emerge quicker than fifty years ago. In the course of a modern life, people more often change their living circumstances,

like marital or cohabitation status, labour market status or occupation. More years of education, higher incomes, more information and the cultural trend of individualisation have enabled and have challenged people to live their lives in their own way. In many respects modern societies have become increasingly dynamic.

The statistical implication of increasing dynamics is that static or comparatively static descriptions become less meaningful. It not only means that statistical descriptions must become more timely and more frequent. It also means that the focus of attention must shift from structures to processes and from cross-sectional to longitudinal information.

Traditional statistical presentations focus on aggregates (totals, averages) or, more seldom, distributions for a reference period. An important special case are time series, which compare aggregates over time. Time series are often interpreted as a description of what happened to the individuals in a population. But a change (over time) in an aggregate may have two causes: (1) changes (over time) in the elements of the population and (2) changes in the composition of the population (entry and exit of elements). If the changes in the aggregate are dominated by the first cause, they are likely to represent the real changes in the elements of the population. But if the second cause is dominant, the time series does not represent that reality. Therefore, increasing dynamics may lead to time series displaying a reality which is increasingly virtual. Section 5 will present concrete examples.

However, there is a more fundamental implication. When societies become more dynamic, individuals more often change positions, enterprises and other institutions more frequently change business etc., and these processes at the micro level become the more dominant force behind societal developments. The implication is that statistical descriptions of developments in reality must include information on the micro processes in question. Without analysing and summarising longitudinal microdata, official statistics describe an increasingly virtual reality and fail to describe the most relevant realities.

3.3. *Complexity*

To say that modern societies are more complex now than fifty years ago seems an understatement. Complexity increased considerably from those same trends that caused increasing dynamics and heterogeneity. But it has also grown because of other trends, like globalisation, a growing awareness of interdependencies and long-term bottlenecks concerning environmental problems, information overload, etc. Our knowledge of society appears to be more fragmented and developments have become increasingly unpredictable.

Describing a complex phenomenon is difficult. There are at least four issues for statistics:

- the methodology of statistical observation and estimation is challenged by the complexity of the phenomena
- the methodology of statistical presentation is challenged, because complex statistical information is not easily understood and, for that reason, can turn out to be used less
- as the general knowledge of society has become more fragmented, which in itself challenges official statistical institutes, these institutes are increasingly vulnerable if

they fail to fill the growing gaps in information, because in the long run existing statistics will run a higher risk of being considered one-sided or misleading
- as societal developments have become increasingly unpredictable, drawing up long-term statistical work programmes has become less adequate, which challenges the strategy of statistical institutions.

These themes will be elaborated in the following sections. For now, we may conclude that current statistics describe an increasingly virtual reality, and do so by definition, because reality has become more complex.

3.4. *Affluence*

Since the origin of statistics on national income and related variables, welfare economics has produced arguments as to why GDP does not correctly measure economic welfare. A complete list of these arguments would be very long. It would include theoretical arguments like. the fundamental impossibility of comparing, and thus of aggregating, personal utility, or the ignorance of the consumers' surplus, which occurs because of the law of diminishing marginal utility. The list would also sum up a long series of conceptual arguments like the exclusion of major elements of welfare like products of unpaid work or nonproduced (but nowadays scarce) goods like a healthy and sustainable physical environment as well as the inclusion of "costs" like the labour costs on account of employees. Finally the list would include empirical arguments.

Most arguments are as old as GDP itself, but their overwhelming impact has emerged gradually from empirical work during the last 30 years. International comparisons show that above a per capita GDP of €15,000 happiness does not increase with GDP (Layard 2005, p. 34). Some research in the U.S.A. even suggests that welfare or happiness decreases while income grows. Schor concluded that middle-class Americans at the end of the 20th century were feeling increasingly poor while their real income and consumption had increased unprecedently (Schor 1998, pp. 11–20). Easterlin finds that Americans would be happier if they would spend less time on earning money and more on family life and health (Easterlin 2001, p. 11182), which implies a lower GDP to cause more happiness. Veenhoven does not find that negative trend in happiness during the last 50 years. But according to his research the trend in average happiness is only very slightly positive in the U.S.A., not positive in Japan and slightly positive in the EU (Veenhoven 2007, p. 19). Comparing these trends to the tripling or quadrupling of GDP and consumption during the second half of the last century leads him to the conclusion that "Economic growth is not likely to add much to happiness" (Veenhoven 2007, p. 25). Layard summarised his broad survey and analysis of available evidence in his bestselling book *Happiness*, convincingly leading to the conclusion that in developed economies substantial GDP growth does not lead to a substantial increase in happiness (Layard 2005, Chapters 3–4).

In spite of all this theory and evidence, the volume of GDP growth is the dominant indicator of economic progress worldwide, not least in countries with a large GDP. In Western European countries, policymakers urge citizens to spend more time on earning money in order to speed up or maintain GDP growth. What explains this behaviour?

GDP growth has favourable effects in the short run, especially for policymakers. It reduces unemployment and it solves problems in government budgets. And it is the central variable in the system of National Accounts, which authoritatively describes the part of the economic process directly connected with the use of money. And money is an important incentive, also in the process of policymaking. But, can we expect these arguments to sufficiently explain policymakers' focus on GDP as the dominant indicator of economic progress?

There is an underlying reason why policymakers and their economic advisors keep focusing on GDP growth. A plausible hypothesis is that these policymakers hold a view on reality, which is distorted by existing statistics and by traditional (mainstream) economics. They work with the data they have at their disposal (GDP) and not with concepts that are not yet statistically operational (welfare). The available statistics describe the virtual reality of ongoing growth and that is a welcome message for policymakers and their audiences. That message also suggests that mainstream economics is right in predicting welfare maximisation if rational economic subjects are operating in free markets. In this way, GDP growth describes a virtual reality in perfect harmony with the claims of mainstream economic policy.

This hypothesis will be analysed at several places in this article. For now, we may conclude that the emergence of affluence (a high level of per capita GDP) caused GDP growth to describe an increasingly virtual reality. Unlike 50 years ago, it does not indicate the economic welfare of citizens of developed countries.

3.5.   *The Mission of Official Statistics*

The past 50 years have seen a lot of new developments in modern societies and official statistics has addressed many of them, often adequately. Instead of summing up these complete or partial successes, the article will concentrate on the origins of the problem mentioned. Among recent and relevant developments, the concern for environmental problems has a prominent place. Official statistical institutes have created a range of authoritative environmental statistics and systems designed for analysing the relations between economic and environmental developments.[3] Can this be considered a success? The answer could be "yes" if the ambition of official statistics is limited to producing the basic data, leaving the estimation of broader concepts like welfare or progress to the users of statistics. But if official statistics are to assist users in forming a view of welfare or progress, by striking a balance between GDP growth and environmental degradation, the answer is "no, not a complete success." If GDP grows and, at the same time, the environment deteriorates, nothing can be concluded about changes in true economic welfare. In order to produce an indication of growth of economic welfare, the statistician must strike a balance between GDP growth and environmental deterioration, for instance by applying a concept like a green GDP.

A similar point can be made about income inequality, unemployment, social protection, and so on. Welfare economics has clearly demonstrated that nothing can be concluded

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[3] This concerns e.g., the NAMEA (National Accounting Matrix including Environmental Accounts) or Hybrid Flow Accounts as they are called in a UN Handbook (UN 2003, pp. 129 ff).

concerning aggregate economic welfare if, for instance, average income increases while inequality increases at the same time. Should official statistics leave "striking the balance" to the users?

Per capita growth of GDP has remained the most important indicator of welfare in mainstream economic policies. Substantial GDP growth is commonly presented as economic "progress" and even an annual growth of GDP of one per cent (or lower) is considered deterioration; a decline is, today, perceived as a disaster. About 35 years ago, the growing awareness of a threatening environmental deterioration, including a depletion of natural resources (e.g., fossile fuels), gave rise to a wave of criticism concerning the concept of GDP as well as the emphasis placed on it. Now a new wave is on its way, rooted in environmental as well as socio-economic arguments. If this wave becomes a tsunami, how safe are official statisticians behind the footnotes in their textbooks, which state that GDP is not a correct measure of welfare? After decades of presenting these statistics to an audience that interprets them as welfare and "progress," official statistics may run the risk of being considered misleading. If official statisticians leave "striking the balance" outside the boundary of their mission, sooner or later they may be considered inadequate.

The article comes back to this point in Subsection 6.3, and arguments concerning the mission of official statistics will also be considered in Section 9. For now, we may conclude that excluding "striking the balance" from the mission of official statistics is one of the sources of the problems in monitoring "progress."

4. Why Statisticians Are Lagging Behind

The preceding section explained that "keeping up with reality" has become increasingly difficult. If that were the only reason why statisticians are lagging behind, one should expect at least as much pioneering work going on in statistical institutions as 50 years ago. But, in contrast to the years of the birth of National Accounts and social survey statistics, current statistical research seems less concerned with major conceptual innovation. ICT made statistical production processes more efficient and sometimes more flexible, but statistical work programmes do not show enough flexibility and innovation to keep pace with reality.

The reasons why official statistics lag behind stem from the basics of the statistical system. Not only does the system inherently tend to conservatism but, moreover, the conservatism is contagious.

4.1. A Law of Inherent Conservatism in Official Statistics

A "law of inherent conservatism" operates in advanced statistical work programme design. This subsection will briefly discuss the mechanisms behind this law. These mechanisms stem from the mission of official statistics, from characteristics of the statistical production process, from the process of deciding statistical work programmes and from the existence of similar laws in science and in the development of policies.

The mission of official statistics is to provide the society with undisputed information. The statistics must be impartial and authoritative so that all actors, including those with

opposite interests, can agree on using them. Statistical institutions have to guard the authority of their statistics. Therefore they will be reluctant to emphasise the shortcomings or to develop competing (conflicting) information. The authority of a set of statistics grows with the duration of its use. This encourages official statistical institutes to maintain existing statistics, and thus to be conservative in developing substitutes.

Producing new statistics of sufficient quality often requires high costs and a considerable period of preparation. Changing the work programme is costly. As most statistics are used in the form of rather long time series, the stimulus to be conservative is strong.[4]

With strong "internal" stimuli to be conservative, external stimuli to be innovative in drawing up work programs would be a helpful counterbalance. But the dominant external stimuli are conservative too. The "clients" of statistical institutes are the users of existing statistics and these clients are more involved in deciding statistical work programmes than potential clients of the still nonexistent statistics. The demand for more details, improved timeliness or higher frequencies of existing statistics is often more concretely, professionally and authoritatively substantiated than the demand for completely new statistics where the basic concepts have not yet been made operational.

External stimuli to conservatism become even stronger as soon as statistics are directly applied in administrative processes. In the European Union the system of National Accounts, with all its concepts and definitions, is carried into law (EU 1996) as the figures directly determine huge money flows and major policy issues. It should be clear that conceptual innovation will be hampered by the increased complexity of decision making and the involvement of parties concerned in administrative processes.[5] This illustrates how the success of a set of statistics leads to its inflexibility.

In modern societies, where an important function of official statistics is to reduce uncertainty and to lower transaction costs, the inclination to statistical conservatism seems to be "natural." This inclination is intensified by structural tendencies to conservatism in other sectors of these societies. From epistemology it is well-known that the scientific world is conservative. New paradigms are confronted with strong opposition and often face a long struggle, needing completely convincing victories over ruling paradigms before being accepted. This conservatism stems from the scientist's learning process as well as from established interests and institutions (including scientific periodicals and textbooks). The dominant actors in the scientific world have built their reputations by demonstrating their knowledge according to the ruling paradigm. Similar mechanisms are at work in the world of the development of governmental policies.[6]

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[4] In Subsection 8.1 this process is more concretely illustrated.

[5] The article assumes official statistics to be independent, and able to develop statistical concepts free from political pressures. But it is clear that it cannot ignore the law or an administrative use of statistics by powerful institutions. The author is well aware of the fact that the independence of official statistics is challenged in many countries and by some international organisations. Section 8 suggests a way out.

[6] This is sometimes in contrast to the hectic world of day-to-day politics, where the media increasingly ask for quick responses to hypes. This world may be considered less relevant to statistical work programmes because it uses statistics merely ad hoc.

4.2. Why Statistical Conservatism Is Contagious (and Why Official Statistics Itself Must Produce the Antidote)

The conservatism of science, policy development and official statistics are mutually stimulating. On the one hand the decision-making process of statistical programming, sketched in Subsection 5.1, serves as an illustration. On the other hand, the very character of statistical information plays an intriguing role, especially through its concepts.

When a new set of statistics is developed, a lot of conceptual work has to be done. If relevant scientific concepts are available, they will be adopted as a valid point of departure. These scientific concepts, reflecting the ruling paradigm of the age, are often not directly operational in a statistical process because they are too abstract to exactly describe what can be observed or they need translation before they can be applied in the process of statistical observation. Therefore statistical concepts have to be developed in great detail.

Once the new set of statistics is produced and used, users explicitly or implicitly accept the statistical concepts. As long as they use these statistics as a source of knowledge, their view of reality will be coloured by these concepts. They see the developments that the statistical concepts permit them to see, but they do not see what these concepts conceal. If the statistics are their only vehicle to monitor the relevant reality, they will not observe those developments in reality that could be described only by applying other concepts.[7] Consequently, their view of reality will give no cause for advocating new statistical concepts. That is why statistical conservatism, especially concerning concepts, can be considered contagious.

Especially in the world of economic and social sciences and policies, statistics are a dominant vehicle to monitor reality. For that reason the contagious nature of statistical conservatism is especially important in these sectors and, thus, in the vast majority of official statistics. Subsection 4.3 presents a concrete illustration focusing on the elementary economic concepts of welfare, production and consumption.

To adequately keep up with reality, therefore, official statistics cannot rely on the stimuli received from its users. The more authoritative a statistic, the less innovative the feedback. But who else will stimulate innovative statistical work programmes?

An essential competence of official statisticians is being unbiased, cultivating an undistorted view on reality and having an eye open for all developments that could be relevant. It is difficult to find occupations or institutions where open-mindedly looking at what is going on in society is so important a core competence as it is in official statistics. It enables the statistician to be among the first to discover new developments that ask for new statistical descriptions. A rational society will expect the statistician to do so, because they look to him or her to produce unbiased descriptions of reality. This logically implies that the statistician is responsible for keeping up with reality. The statistician should be the first person to show the user of his or her statistics the relevant blind spots, why filling information gaps is important and how this can be done. The statistician has to convince the satisfied user that he or she should in fact be unsatisfied. The statistician must become a statistical entrepreneur.

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[7] Examples are given in Section 5.

Sections 8 and 9 will suggest strategies to manage the inherent conservatism and to develop entrepreneurship.

4.3.   *Contagious Conservatism in Statistical Concepts: An Example*

Theoretical economics uses abstract concepts. It defines welfare as a state of mind that results from economic actions. More precisely, welfare is the satisfaction of needs through the use of scarce means, which can be employed alternatively. This concept is far more abstract than the statistical concept of GDP. Other examples of abstract economic concepts in theoretical economics are "consumption" and "production."[8] The theoretical definition of consumption is "an activity which directly leads to satisfaction (of needs)." In the process of production, labour is a sacrifice because it requires time and energy, which otherwise could have been devoted to consumption. As in the case of welfare, the essential criterion is the state of mind of the economic subject. The distinction between consumer and productive activities is made in the subject's mind: satisfaction or sacrifice?

Applied economics (e.g., macro-economics, labour economics, monetary economics, and marketing) needs concepts that define phenomena, which can be concretely identified. Therefore welfare has no place in applied economics. Consumption and labour are defined in applied economics as concrete activities, not as states of mind. In macro-economics and labour economics, labour is defined as activities that yield income. In macro-economics and marketing, consumption is defined as the purchase of goods and services by households.

Economic statistics are based on the statistical observation of concrete phenomena. This implies that statistics, like applied economics, does not define its concepts according to the state of mind of economic subjects. Its concepts address observable activities or transactions. In practice, statistical definitions are extremely concrete and detailed; they have to operationalise the concepts of (applied) economics. Thus, economic statistics does two things for applied economics: it defines more precisely and it provides the quantification.

Statistical data are very important for applied economists. The data describe the relevant reality for economists and in order to understand the data economists study the statistical concepts. Many economists learn the basic concepts of the National Accounts during their schooling and empirical economists study these concepts in greater detail. The concepts have become an authoritative foundation of their view on reality. This is why Subsection 4.2 of this article speaks of contagious conservatism. Statistical concepts not only follow science, they operationalise scientific concepts and then, after the statistics have become indispensable in research, science internalises the statistical concepts.

The implications are very important. As in economic theory, in statistics labour is considered a sacrifice to be compensated by receiving income and consumption is considered a source of welfare. But the agreement of theory and statistics is deceiving. If people enjoy their jobs as a source of dignity or pride or even pleasure, their labour is not

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[8] The definitions are based on Metha, who presented an elegant elaboration of these concepts (Metha 1962, pp. 69–74).

just a sacrifice but also yields direct satisfaction of some of their needs (e.g., a need for developing their faculties or a need for feeling a sense of purpose). Economic theory implies that this satisfaction is a component of welfare. If households have to pay for travelling to their workplaces, economic statistics treats the payments as consumption. But it is clear that these payments represent a sacrifice: not serving direct satisfaction of needs but serving labour. So the operationalisation of abstract theoretical concepts into concrete statistical concepts has two consequences. First, essential features of the theoretical concepts are lost. For example, satisfaction in work vanishes from sight as a component of welfare and costs of labour (e.g., commuting) on account of consumers appear as a source of welfare. Second, as statistics measuring the theoretical concepts are not available, users of available statistics interpret the statistical concepts as a representation of the theoretical concepts. GDP and consumption are interpreted as a representation of welfare.

The virtual reality of statistics dominates our view of economic progress. It is relatively easy for official statistics to combat this misinterpretation. At least two things could be done. First, in the main National Accounts aggregates elements of GDP or consumption, which represent costs rather than direct sources of welfare should be displayed separately. Inevitable arbitrary judgements can be processed in alternative variants, provoking users to take part in the conceptual discussion. Second, elements of welfare that are not included in consumption (e.g., satisfaction in work) can be identified, measured (starting with survey measurement of elements of wellbeing) and presented in a context of economic growth and welfare. In this way, an antidote against contagious conservatism could be developed, stimulating conceptual debate on the basis of statistical data of alternative concepts.

5. Inadvertent Deformation of Reality

This section illustrates how traditional statistics, presenting time series of aggregates, simulate a reality that wrong-foots its users.

5.1. How Aggregation Distorts Our View of Growth (and of Progress)

Let us take a look at current discussions about the pros and cons of GDP growth in developed economies. Those against growth argue that, on the one hand, growth does not bring benefits because above a GDP of €15,000 per capita, GDP growth does not increase welfare (see Subsection 3.4) and, on the other hand, growth is bad because it harms the environment. Arguments pro growth include that people's behaviour shows that they want growth (but see Subsection 6.2) and that growth generates technological innovation, which solves environmental problems. The first pro argument stems from clear evidence and fits into Western cultural paradigms, which since the Renaissance and Enlightenment have pressed for discovery and progress. It is striking to note that, although the argument addresses human behaviour, its conclusion is formulated at the macro level (GDP). The idea that individual people want growth is projected, apparently unthinkingly, on the aggregate level. This kind of reasoning seems to happen often.

Imagine a society where per capita real GDP (and consumption) growth is zero, the active labour force forms a constant proportion of the population, people do paid work for

40 years of their lives and tax rates are constant. Are these working people deprived of (real) income growth? The answer, of course, is "no" if they start their careers with a lower than average income. As an illustration we assume a simple model. All workers start with 60% of average income and then increase their income every year by 2.5%. After 28 years they have doubled their income and then it remains constant during the last 12 years before their retirement. This model fits exactly with the condition of zero GDP growth per capita. There are many alternatives. If you like, you can increase the period of income growth by assuming a lower than 60% of average income starting point or a slower rate of growth than 2.5% a year. For example, starters could earn 70% of average income and see their income growing by 2% yearly until it doubles after 35 years. Assuming less homogeneity and more complex career lines, a broad range of outcomes are possible.

The conclusion from this simple model is that zero aggregate growth is compatible with an annual income growth of over 2% for individuals during the major part of their working lives. This illustrates why individual behaviour showing that people want growth cannot simply be projected on to the aggregate level. But such projections are very common,[9] which illustrates how our thinking is distorted by the virtual reality of aggregates and how we are in need of longitudinal statistics, describing the reality of individual experiences, to restore our view of reality.

It is tempting to explore the problem more broadly. What is growth at the micro level? Is it simply "more of the same" consumption according to the National Accounts? Let us look at the course of life of Western people, ignoring for a moment the complicating dynamics of divorce and the formation of new multiperson households, childlessness, unemployment, sabbaticals, etc. In the course of their lives, most people leave their parental home to form a one- or two-person household; they have children and these children become more expensive; after the children have become financially independent more of the parents' budget is available for luxury; after retirement income is lower and, assuming healthcare insurance, the propensity to consume decreases as people grow old. Many people will leave a substantial inheritance and their heirs will often receive that after their children have become financially independent, when their incomes already allow more luxury.

This economic sketch of a "standard" course of life illustrates two things. Firstly, consumption varies substantially over the course of life. This reality stays veiled in aggregate consumption according to the National Accounts. Secondly, even if personal income does not increase after midlife, many people become more affluent when their children become financially independent. This "progress" at the individual level is not reflected in standard aggregates. A disaggregation of the population into generations in a Social Accounting Matrix would be helpful. That would also produce information about economic problems of population ageing. But only longitudinal statistics, although more complex, will describe the reality of human beings. And only that can prevent us from drawing wrong conclusions from the virtual reality of aggregates.

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[9] Another example is that it is often argued that growth is a prerequisite for technological progress. It is reasonable to assume e.g., that growth of individual successful firms or industry groups stimulates technological progress. In other words: dynamics is the relevant factor. But this does not imply that growth on the macro level is a prerequisite. This undermines the first pro argument in the first paragraph of Subsection 5.1.

5.2. *How Static Statistics Distort Our View*

Among socio-economic statistics, those on poverty occupy a prominent place. Usually a "poverty line" (the level of yearly income below which people are considered to be poor) is defined and the number of individuals below that line is counted. This aggregate can be broken down, e.g., by age, gender, type of household, type and level of income, immigrants by country of origin. Time series show the number of poor people in consecutive years. What reality do they suggest?

Time series of numbers of poor people (as a percentage of the total population) usually show gradual changes, e.g., going up during years of economic recession by not more than one percentage point a year, and going down in other years by even smaller percentages. Disaggregations may show some trends, e.g., a gradual decrease in the percentage of poor among the elderly or a decreasing proportion of youngsters among the poor. Certainly, this is interesting information that will attract the attention of media and policymakers who will focus on the pros and cons of policies to influence trends. The data and the interpretation suggest that the overall picture changes slowly and that it can be influenced effectively by policy measures like an extra 0.3% increase of social security benefits for certain groups or a slight increase in income tax thresholds for others. But is that the really relevant reality?

The analysis of a longitudinal database of household income microdata will lead to statistics describing a far more dynamic reality. It may show that in year t only 10% of the poor (those having an income below the poverty line) were also poor in each of the preceding eight years and that 70% had such an income fewer than half of these years.[10] One might choose to define people as "genuinely poor" in year t if, and only if, they were poor in the years t-3 up to and including t. But in this case only one third of the "poor" would be defined as "genuinely poor." The rationale behind such a definition is that consumption patterns (and thus poverty) depend mainly on long-term income, not on yearly income. These longitudinal data suggest a poverty problem of quite another proportion than that which was suggested by the time series of the preceding paragraph. It shows essential heterogeneity in those aggregates and it reveals considerable poverty dynamics (entry and exit in poverty); both phenomena may suggest that the policy measures mentioned earlier have only limited relevance. It enables one to focus on the "genuinely poor" and on narrowly defined groups of poor people who are most vulnerable because the probability that they will stay "poor" is high.

This example can easily be generalised to income statistics. Successive cross-subsections of income distributions show relatively stable data. But an analysis of longitudinal microdata reveals that considerable changes in yearly income are widespread and that these changes mainly stem from social dynamics, e.g., marriage (cohabitation), divorce, retirement, becoming unemployed or employed, and change of job. Only a small proportion of income changes stem from changing wage rates, changing levels of social security benefits or changes in taxation. Again, the essential point is that traditional statistics fail to show the relevant dynamics. They present static snapshots instead of dynamic movies of the processes.

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[10] The data, mentioned in this subsection are derived from a publication by Dutch official statistics which unfortunately is only available in Dutch (SCP/CBS 2005).

The snapshots show relatively stable income distributions. But these stable distributions are interpreted as a stable reality. And in a stable reality, relatively small general changes in wage rates, benefit levels or tax rates are thought to be the main causes of changes in income. However, in a dynamic reality, where many individuals have considerable income changes, social dynamics and individual careers appear to be the dominant force behind income variability. It is this reality that is experienced at the micro level or, in other words, it is this reality that is relevant to citizens as well as their policymakers.

It is reasonable to assume that this can be generalised to many other social statistics, e.g., statistics on participation or exclusion, safety or victimisation, labour and use of time, social security and even aspects of health. That leads to the following conclusion.

In traditional societies, social structures were relatively stable, social mobility was relatively low and people's life courses were relatively uniform. This allowed statisticians to aggregate the population into a limited number of fairly homogeneous groups, applying classifying variables like age, gender, marital status, occupation, and income. Differences within the groups were relatively small or exceptional, and the average group member had much in common with the vast majority of the members of his or her group. Differences between the groups were much bigger. And so it was possible to describe society adequately using aggregate data on groups. It was reasonable to describe the course of life of individuals by a disaggregation of group data by age.

In modern societies, groups are more heterogeneous. Differences between groups do not overshadow differences within groups. Courses of life are less uniform and show more "existential changes" than in traditional societies, causing a more dynamic pattern of entry and exit in groups. If a modern society is described by traditional statistics, it will emerge as a predominantly traditional society, because most heterogeneity and dynamics are hidden and stay that way and the time series of aggregates suggest relative stability. This will wrong-foot policymakers and other users of statistics. The statistics may be technically perfect, but they show too virtual a reality in the sense explained in Subsection 2.2.

Heterogeneity requires statistical analyses of microdata; dynamics need longitudinal data. A relevant statistical description of modern societies requires statistical analyses of longitudinal microdata. This challenges official statisticians in two ways:

- they must acquire microdata, develop the skills of linking them at the microlevel (variables from different sources as well as data for different periods, thus producing rich records of longitudinal data at the micro level) and the skills of their analyses and estimation. Subsection 8.1 elaborates on this.
- they must develop skills in presenting longitudinal data and other results of these analyses so that they are digestible to users.

The latter challenge is easily underestimated. Experience shows that policymakers who endorse the longitudinal information (on income dynamics) presented to them as an eye-opener do not go on to use it because its presentation is complicated. Statisticians should develop a better combination of creativity and professionalism (statistical as well as subject matter knowledge). Statistical output should be much more than just figures, traditional graphics and explanations of concepts. It should comprise professional presentations of knowledge, illustrated with illuminating moving images. Subsection 8.3 elaborates on presentation.

6.   Complex Reality Threatens Simple Measures and Theories

This section illustrates how the increasing complexity of modern societies challenges the simplicity of our measures and theories.

6.1.   *Complexity and the Measurement of Inflation*

Like statistics on the population and on labour, those on inflation and growth are in the premier league of official statistics. As a rule, the CPI (consumer price index) is interpreted as a cost of living index, which implies that price ratios between commodities are considered to reflect marginal utilities, in agreement with current (neoclassical) mainstream economics. This assumption about price ratios also lays the foundation of the current use of price statistics in the deflation of economic aggregates like GDP and household consumption. Subsection 6.2 analyses how the economic theory behind the measurement of inflation and growth is challenged by increasing complexity. The present subsection goes into the fundamental problem of the measurement of price (and volume) changes in complex and dynamic markets.

Thirteen years ago the Boskin report to the U.S. Senate Finance Committee (Boskin et al. 1996) shocked the world of official statistics. The Boskin Commission's report had not been initiated by official statisticians; it had been prompted by the FED and commissioned by the Senate in tough discussions, demonstrating distrust in official statistics. The outcome of the research, a 1.1% upward bias in the U.S. CPI, did not overly surprise policymakers. The U.S. Bureau of Labour Statistics (BLS), the producer of the U.S. CPI, accepted important recommendations by the Boskin Commission, criticised a few others and intensified research to remedy the bias. Official statisticians in some other countries reacted defensively, in line with their inherent conservatism as pointed out in Subsection 4.1. They suggested that their CPI's suffered less from the problems uncovered by Boskin. But the main problem, i.e., how to deal with quality changes and new goods, was not easier to solve in other developed economies and its complexity has, if anything, increased.

What is the core problem? If an item in period $t + 1$ is identical to that in t, the price difference between $t + 1$ and t can be considered a pure price change. But if the quality of the item changed between t and $t + 1$, the price difference must be split into two components – one reflecting the change in quality, the other the pure price change. And if the item no longer exists, because a new item was substituted for it, the price difference between the old and the new item must be split in the same way. In both cases, determining the pure price change is difficult. In some cases methods like hedonic estimation can be applied with some success but very often there is no alternative to rough judgements or to ignoring the problem by assuming that the quality differences between t and $t + 1$ are irrelevant. The problem is biggest in dynamic markets, for complex goods and heterogeneous services. To concretely imagine these problems, one may reflect for a moment on how to measure the price changes of computers (think of the very frequent changes in a broad range of technical specifications, including completely new applications), medical care (how much more this year does your general practitioner produce during a consulting hour than he or she did ten years ago?) or legal advice (how would you define quantity or volume differences and pure price changes between

successive years?). These kinds of problems amounted to a bias of 0.6% a year in the U.S. CPI according to the Boskin report, indicating that statisticians tend to ignore quality improvements or underestimate their magnitudes. This amounted to more than half of the total bias (0.6 out of 1.1%); the rest (0.5%) was a bit easier to combat, e.g., by rebasing the CPI more frequently.

Is a CPI bias of 0.6% acceptable? A professional statistician tends to consider any bias unacceptable; in the trade-off between (random) inaccuracy and biasedness he or she accepts the first rather than the second. However, especially in the case of the CPI this professional attitude requires a bit of courage because in many countries external parties with special interests are looking closely at the methods applied. The introduction of a new method which – although better than the old one – is vulnerable to criticism may be resisted by parties who prefer the outcomes of the old method. This strengthens the inherent conservatism of official (price) statistics. On the other hand, the tenths of percentage points of the CPI are very much in the public eye; when inflation rises 0.1 percentage point more than expected, share prices react and government budgets suffer substantially. Therefore it is illogical that a bias of 0.6% should be acceptable. Because public confidence in official price statistics is a top priority, official statistics in many countries should invest in solving this problem before renewed distrust emerges.

The problem increases as markets become more dynamic, goods become more complex and services get a growing share of the basket. It is likely that the bias in our price and volume statistics was much less 50 years ago than 13 years ago. The methodology of price and volume measurement has certainly improved during the last 50 years. But during the first four decades this improvement did not keep pace with the increasing measurement problems. Is today's bias smaller than the bias ten years ago? Problems of complexity and dynamics have increased further, but did official statisticians increase the rate of their improvements? It is recommended that official statistics itself should take the initiative to evaluate the progress of price statistics over the past decade, taking into account (and estimating) the further increased measurement problems. That will be less risky than waiting for another external initiative stemming from mistrust.

6.2.   *Complexity, Consumer Sovereignty and Mainstream Economics*

Subsection 6.1 mentions that the dominant interpretations of price and volume statistics imply that price ratios are assumed to reflect relative marginal utilities. This is perfectly in agreement with mainstream economics. Focusing on consumption, the underlying assumptions in mainstream economics are that consumers act autonomously and rationally and have complete information about the market. If markets are free and competitive, the sovereign consumers steer the supply side to produce the basket of goods that maximises consumers' utility (if we abstract from the complications of aggregation over heterogeneous consumers). How realistic is this model in a world of complex goods and dynamic markets?

If goods or services are complex, it is unrealistic to assume that consumers have complete information and act autonomously. The consumer of medical or legal services is faced with a "market", which is far from transparent and the consumer feels highly dependent on the supplier. The case of technologically complex goods is not all that different, especially if technical specifications change rapidly or product-lifecycles are

short. It is fair to conclude that for important items in the consumer basket the assumptions of mainstream economics are unrealistic. Have they become increasingly unrealistic? On the one hand, complexity and dynamics have increased considerably during the last 50 years, as have the marketing activity and information overload. On the other hand, has market transparency increased as well? Are today's consumers more competent in the management of information than consumers 50 years ago?

During the last 50 years market information has been influenced by media and marketing. Media play a more important role in our lives than before television became dominant; news and commercial messages have become more penetrating and reach us in much larger quantities. Brands are marketed as representations of lifestyles or "meaning" (Klein 2005). The media introduced the elite in our living-rooms and many of us wish to follow the newest trends set by them as shown in marketing messages.[11] So the marketing messages have become more effective in stimulating irrationality, rather than creating transparency.

As disposable incomes in modern economies have grown far above subsistence levels and shopping has become a favourite pastime, a growing part of consumers' budgets is spent on impulse purchases. At the same time, spending has become an increasingly competitive activity; "keeping up with the Joneses" has become keeping up with high earners (Schor 1998, pp. 8–11). This suggests that consumer behaviour has become less rational,[12] and so less in agreement with mainstream economics.

Barber states that marketing activities are increasingly addressed to children (Barber 2007, p. 13) and he analyses "how markets corrupt children." In a well-researched book, Schor analyses the present marketing culture that makes children "believe they are what they own" (Schor 2004). Children have become major marketing targets, not only because they have substantial amounts of money to spend but also because they influence much of their parents' purchasing. Against this background, Schor describes how children are systematically and successfully manipulated through commercial messages. This is quite another world than that of the sovereign consumers in mainstream economics.

How autonomous is today's' consumer? Amid dynamic markets with their complex goods and services, and overloaded with irrational messages and less motivated to behave rationally, the consumer is liable to manipulation. And so the supply side invests huge amounts in marketing. The mainstream economic model, assuming autonomous consumers with exogenous preferences, has become too unrealistic.[13] Galbraith put it more radically: "Belief in a market economy in which the consumer is sovereign is one of our most pervasive forms of fraud." (Galbraith 2004, p. 26).

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[11] Julie Cresswell writes: "If consumers believe that a certain star or singer might actually use the product, sales can take off." And she cites the branding strategist Eli Portnoy: "The reality is people want a piece of something they can't be. They live vicariously through the products and services that those celebrities are tied to. Years from now, our descendants may look at us and say, 'God, these were the most gullible people who ever lived.'" (Cresswell 2008).

[12] A more elaborate analysis in marketing theory concludes that only in exceptional markets are the conditions for rational consumer behaviour fulfilled (see Poiesz 2004). Shermer, an evolutionary economist summarises evidence from neuroeconomics and behavioural economics illustrating that shopping choices are emotional reactions, not rational decisions, and that the human mind is sensitive to tweaking by cultures and institutions, thus by advertising (Shermer 2008, pp. 112, 190).

[13] An interesting synopsis of how modern marketing contradicts the basic mainstream economic assumptions is given in Hamilton (2004, Chapter 3).

A more realistic economic theory must abandon, or at least considerably relax, the assumptions of autonomous and rational consumers with exogenous preferences. It must accept the reality of economic power on the supply side – the power to manipulate consumers' preferences.[14] Hopefully, this more realistic economic theory will produce guidance on the development of economic statistics describing a more complete reality. Unfortunately, there is little reason to hope that this more realistic economic theory will replace present mainstream economics at short notice, because the latter is still deeply rooted in Academia[15] and in current economic policymaking. But official statistics should not remain inactive. A relevant contribution could be the publication of statistical data on the costs of marketing, including advertising, modern sales promotion, remodelling,[16] and so on. Official statistics should demonstrate the courage to present these data as indicators of the supply side's economic power and of the manipulation of consumers' preferences.

6.3.   GDP Growth and Welfare

There is good reason to assume that official statistics underestimate the growth of the volumes of GDP and consumption in recent decades, because of the positive bias in price statistics, mentioned in Subsection 6.1, leading to a negative bias in deflated values. This underestimation explains at least part of the so-called "productivity slowdown," which created a mystery that mainstream economics failed to unravel. On the other hand, in developed economies substantial GDP and consumption growth – as measured by official statistics – did not lead to a substantial growth of welfare, as pointed out in Subsection 3.4. This anomaly is the more striking if real growth was higher than measured. But most striking is that this anomaly did not enter the consciousness of mainstream economic policymakers.

The core problem, already mentioned in Subsection 3.5, is that official statistics have presented GDP and related statistics to an audience, which interprets these data as dominant indicators of economic progress. Half a century ago this was justifiable, although theoretically incorrect, but nowadays it creates too virtual a reality. Of course, official statisticians cannot be held responsible for every improper interpretation of their data. But society may expect official statistics to initiate debate on so prominent a misinterpretation, and to do its utmost to provide society with more adequate measures of economic welfare.[17] With today's knowledge, we can conclude that official statistics did too little too

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[14] The original paper (Van Tuinen 2007), of which this article is a shortened and updated version, elaborated a bit further on a new paradigm to replace mainstream economics. Within a year, I hope to publish an article exclusively devoted to that new theory and policy. A draft is available on request (Email: tuinvink@xs4all.nl).

[15] It might be useful to take stock of the data needs of behavioural economics and evolutionary economics.

[16] Remodelling of durables does two things, especially in a context of competitive spending. It adds to the utility of new buyers who prefer the newest model whilst at the same time it decreases the utility of all former buyers. Therefore frequent remodelling is a marketing strategy. From the viewpoint of welfare, GDP counts the pluses but ignores the minuses.

[17] Official statistics should try to do this even if the improper interpretation seems to be based upon a dominant ideology, supported by mainstream economics. This is why Galbraith wrote: "The more than minimal fraud is in measuring social progress all but exclusively by the volume of producer influenced production, the increase in the GDP" (Galbraith 2004, p. 28). Or why Schor wrote: "One problem with the national discourse is its focus on market exchanges, not quality of life, or social health. Gross domestic product is the god to which we pray" (Schor 1998, p. 21).

late. That creates an obligation to develop an adequate strategy to neutralise this contagious conservatism.

Let us start by recalling a selection of the suggestions in earlier parts of this article:

- display separately those elements, included in consumption, which represent costs rather than direct sources of welfare (e.g., costs of commuting); suggested in Subsection 4.3
- select and measure elements of economic welfare not included in consumption (e.g., satisfaction in work); suggested in Subsection 4.3
- develop longitudinal statistics on the dynamics of income changes, as an antidote to the misleading virtual reality of aggregate data; suggested in Subsections 5.1 and 5.2
- publish data on marketing expenditure as an indication of the supply side's economic power and the manipulation of consumers' preferences; suggested in Subsection 6.2.

The first two suggestions should lead to statistical presentations, which stimulate the conceptual debate on growth and welfare and the shortcomings of the concepts of the National Accounts. The last two suggestions should expose misleading interpretations of GDP and consumption as indicators of economic progress.

One other suggestion is added. In Subsection 3.5 the problem of "striking the balance" is illustrated by referring to changes in the environment or in income inequality. A "green GDP" is an example of striking the balance between production growth as reflected in GDP and changes in the availability of environmental functions. A green GDP requires an economic valuation of these changes; it supplements the produced sources of welfare (GDP) with a category of nonproduced sources (environmental functions), which have become scarce and have acquired an economic value (being zero only in the case of "free goods" that are abundantly available). A theoretically sound concept of a green GDP, compatible with mainstream economics, has been developed by Hueting (Verbruggen et al. 2001). This "Sustainable National Income" (SNI) is an estimate of the maximum production level at which, with the technology of the year of reporting, vital environmental functions will remain available for future generations. The changes over time in the gap between GDP and SNI give information about whether society is approaching or drifting further away from environmental sustainability. In the Netherlands the gap increased in the period 1990–2000 by about €10 billion (MNP 2006), being 2% of GDP. Estimates of SNI, which arrive at about 50% of GDP, are regularly carried out in cooperation with Statistics Netherlands, which takes no responsibility for the published results. The reasons for not publishing SNI as a regular product of official statistics include:

- the estimation requires very strong assumptions in the application of a general equilibrium model, which are dictated by the requirement of attaining a sustainable burdening of the environment (such as by greenhouse gases)
- the sustainable burden estimates – the so-called sustainability standards – are disputable and official statistics obviously cannot take responsibility for them.

But the involvement of official statistics in developing and estimating the SNI is a recommended element in the above-mentioned strategy.

In principle, there are as many ways of "striking the balance" as there are sources of welfare besides GDP. If we could strike all of these balances, a comprehensive indicator

of welfare might come in sight. Unfortunately, not all concepts are as sound as SNI. One may hope that the recent wave of research on the sources of happiness (see Sub-section 7.2) will advance the development of those concepts and their measurement. However, happiness is a broader concept than welfare because it includes noneconomic elements. In an integrated system of statistics of happiness and its determinants, the concept of progress will be defined broader than welfare. If that research is successful, "striking the balance" between GDP and other sources of welfare change may become redundant.

As will be explained in Subsection 7.2, we cannot expect that the SNI-project will become redundant; it is difficult to see how happiness research would be able to tackle the multidimensional environmental problem in the same way as it tackles income, unemployment, job insecurity, satisfaction in work, health, and so on.

7.   What Information Systems?

In a strictly economic analysis, it is obvious that the concept of progress boils down to welfare. But why should policymakers[18] confine themselves to economic progress? In a broader assessment of progress, evidence-based policymaking requires a combination of economic and noneconomic indicators. This section explores the requirements concerning the statistical evidence.

7.1.   Indicators or Integrated Systems?

This subsection concentrates on different kinds of statistics – indicators, frameworks of indicators and integrated systems. An indicator is a time series of a variable, usually a target variable for a certain policy. In a framework of indicators a set of variables is selected and relations between these variables are specified conceptually, but not quantified. In an integrated system these relations are quantified.

In a complex society, many target variables exist. In creating indicator systems, it turns out that a limited number of variables has to be selected from a long list. The selection process implies judgements of relative relevance and its result may be disputed sooner or later. As the indicators are time series, it is assumed that selected items will keep their prominent place on the societal agenda over time. In an increasingly dynamic and unpredictable society, this is uncertain. When the indicator shows a change for the worse, policymakers may want to take action. But, because the indicator is an isolated variable not connected to other variables, the information it offers will be of limited help in deciding what action to take. The policymaker will need more information about the causes of the undesired development and its relations to variables he or she can directly influence (policy instruments) before deciding what to do. Furthermore, the policymaker will want to be sure that the action will not cause some unintended consequence elsewhere, which will appear as regress in other indicators (competing policy goals). This information is not available in a set of indicators where mutual relations are not quantified.

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[18] The word "policymakers" includes agents of government as well as agents of semi-governmental or independent organisations, and ngo's and commercial organisations taking decisions with a significant effect on society.

This rather pessimistic description of how indicators work in the policymaking process[19] is not meant to conclude that the indicator approach has to be avoided. Often, there is no good alternative available in the short run. But for evidence-based decision-making in modern societies, the development of systems of isolated indicators can only be considered a first step. The two core problems are (1) that the inevitable selection of a limited set of indicators yields a fragmented picture and (2) that the lack of connection between the indicators reduces the function of the indicator to "signal only." The only flexibility in the system is to change the selection of indicators, but that introduces discontinuity.

Frameworks of indicators specify conceptual relations between the indicators. Because these relations are not quantified, they offer little remedy for the "signal only" functionality. But the framework may stimulate a balanced selection of indicators because it will be based on some coherent vision. A further step, based on such a vision, is the development of composite indicators. These are combinations of separate indicators, each indicating an aspect of some broad concern (e.g., social wellbeing), into a weighted average that indicates some total (e.g., total social wellbeing). The weights result from (disputable) judgement. I am not aware of any serious and systematic use of composite indicators by decision makers (others than those who produce the data).[20]

The selection of indicators as well as the choice of their weights in composite indicators requires judgement and that judgement can be disputed. Official statisticians are not well-placed to make these choices on their own authority. Consequently, the authority of the indicators will depend on the authority and consistency of the parties involved in the selection process. In modern societies, where many relevant developments emerge unforeseen and politics is less and less synonymous with authority, this may be a disadvantage.

The practice of economic research and policymaking has shown that integrated systems, like the National Accounts and various demographic and socio-economic[21] systems, are in many respects superior to indicators. Their main features are that they describe the whole process, not just a fragmented picture, and that they quantify relations between the variables in the system, which means that their variables are not "signal only." Thus they offer solutions to the two core problems in the indicator approach. And they are more flexible. If the user wants to look at some new variable, it is often possible to rearrange the basic data in the integrated system so that the variable can be derived, even creating a time series back in time. The National Accounts have illustrated that such systems can

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[19] See Van Tuinen (1995) for a more elaborate discussion of indicators versus integrated systems, including concrete examples of policymaking using indicators.

[20] One special category of indicator frameworks are those presentation tools, which combine separate indicators to present a bird's eye view of a complex development. A successful example is the Business Cycle Tracer (BCT). The BCT combines 15 short-term economic indicators in a presentation, which enables you to assess the stage of the business cycle at a glance (Van Ruth et al. 2005). This kind of indicator framework differs from the frameworks mentioned in this article. It is not a policy-related selection of target variables or a weighted combination, which defines the composite variable (e.g., total social wellbeing). It is instead an analytical selection of variables, which all indicate the same phenomenon (e.g., the business cycle). Could that be one reason why they are more successful than the above-mentioned composite indicators?

[21] For the strengths of integrated socio-economic systems, see Van Tuinen, Altena, and Imbens (1994) concentrating on labour and education, and Van der Laan and Van Tuinen (1997) concentrating on income.

become very authoritative, last for decades, and serve a great variety of policymaking and research purposes.

There is an intriguing difference between the relationship indicators have to policymaking and that which integrated systems have. Usually, indicators are selected target variables of policymaking. They directly address items on the societal (or political) agenda and thus have to follow changes on the agenda. That makes them vulnerable to the vagaries in the process of policymaking in modern societies. Integrated systems are designed to describe complete processes. Variables in these systems are defined according to the logic of the particular system. They can be items on the societal agenda (but other variables can be policy instruments), but if they are deleted from that agenda, they do not lose their function in the system. So they are less vulnerable. Are they also less relevant? The system of National Accounts has shown that durable relevance is not necessarily connected directly to target variables of special policies (items on the agenda) but to more general information needs (durable demands behind the agenda). Quite often, new items were placed on the agenda because information from the National Accounts stimulated policymaking to do so. The superior statistics are not agenda following, but agenda setting.

What is the main challenge to official statistics? It is to serve decision makers by producing indicators of good quality on (durable) items on their agendas. But even more challenging is to develop systems which produce statistics satisfying durable information needs shaping present and future agendas. Evidence-based decision-making, facing competing policy goals and complex interdependencies, needs flexible integrated statistical information systems.

Two strategies in the future development of integrated statistical systems are especially relevant. The first is the development of integrated systems connected to the National Accounts. In this article several projects have been mentioned or recommended: NAMEA (3.5, Footnote 3), generational dimension in social accounting matrix (5.1), SNI (6.3), and integrated demographic and socio-economic systems (this subsection). New variables recommended in the article, like costs (rather than sources of welfare) included in GDP (4.3) and marketing expenditure (6.2), should be estimated as (functional) specifications of National Accounting variables. The main strength of this strategy lies in the authority[22] of the National Accounts and related systems and the richness of the information on interrelations between phenomena. The main weakness is that it is a system of aggregates, presenting static or comparatively static information.[23] Another weakness is that the system has lost much of its flexibility, as was pointed out in Subsection 4.1. That flexibility should be revived.[24]

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[22] It is assumed that the authority of the system, threatened by sending misleading signals about economic progress, will be maintained by applying the recommendations of this article.

[23] A minor weakness, in comparison with (frameworks of) indicators, is that they do not integrate qualitative information like that on consumer or producer confidence.

[24] In the take-off of the last revision of the System of National Accounts, proposals were made to increase flexibility in the SNA (Van Bochove and van Tuinen 1986).

The second strategy is the development of integrated systems of dynamic information on the basis of statistical analyses of databases of longitudinal microdata. This strategy is indispensable because official statistics has to describe the relevant realities of heterogeneous, dynamic and complex societies. A promising development is sketched in Subsection 7.2.

7.2.   *Towards an Integrated System of Indicators of Happiness*

Richard Layard has performed an extremely relevant analysis of recent research about the determinants of human happiness (Layard 2005). He mentions that neuroscience ascertains that subjects are capable of giving valid information about their feelings of happiness, contrary to the postulates of behaviourism, which so deeply influenced economics. Mainstream economics, influenced by behaviourism, turns a blind eye to happiness and economic welfare and concentrates on observable behaviour; consumers' preferences are supposed to be "revealed" by their behaviours. That is why mainstream economics cannot accept the fact that consumption has increased without an increase in welfare and sticks to the virtual reality of its propositions. Therefore the position taken by Layard could be an essential step towards a new ruling paradigm in economics.[25] However, his analysis of happiness goes beyond a purely economic analysis of welfare. It confirms that scientific creativity may be stimulated by crossing borderlines.

Layard distinguishes seven main determinants of happiness: family relations, financial situation, work, social environment, health, personal freedom and philosophy of life. He summarises research on affluent economies. The financial situation appears to be relatively unimportant: if income decreases by one third, happiness decreases by 0.2 on a ten-point scale. More important are family relations (divorce decreases happiness by 0.5), work and health (unemployment decreases happiness by 0.6 as does deteriorating self-reported health by one point on a five-point scale). Even job insecurity, statistics showing increasing unemployment, having never been married, the quality of government, or belief in God have more substantial effects on happiness than a one third decrease in income (Layard 2005, p. 64). Of course, Layard's suggestions to economic policymakers differ from those of mainstream economics. In his book, Layard does not explicitly present suggestions for statistical policies. But what recommendations regarding official statistics could be derived?

Official statistics should produce longitudinal microdatabases[26] including survey data on happiness, satisfaction in work etc. The records should contain a good deal

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[25] The new paradigm should, unlike mainstream economics, explicitly pay attention to the psychological category "welfare," theoretically defined in Subsection 4.3, as well as to the manipulation of preferences as suggested in Subsection 6.2.

[26] For the reader who is interested in how to build these microdatabases I can, for reasons of space, but offer a few hints. The best longitudinal microdata are generated by linking microdata from "administrative" registers (see Subsection 8.1), as panel surveys suffer from selective dropout (see also Van Tuinen 1995). But it will be necessary to further enrich the microdata by linking survey data on variables not included in registers. Survey data on subjective variables (happiness, subjective health, insecurity and so on.), which are available in social surveys in many countries, are indispensable. There is a rapidly growing literature on the validity of survey data on happiness (summarised in e.g., Layard 2005; Van Hoorn 2008; Veenhoven 2008).

of information on the facts in the history of the subject's life, and include subjective data on health, insecurity (e.g., about the job, the social environment) and so on. Multivariate analyses should investigate what aspects affect happiness, and produce information as mentioned in the preceding paragraph. This, together with the more straightforward indicators of happiness itself, would constitute a framework of subjective indicators on the seven main determinants of happiness. This should be supplemented with a framework of objective indicators on those determinants, e.g., the incidence of divorce, work, unemployment and so on. Will these frameworks suffer from the disadvantages of indicator frameworks, mentioned in Subsection 7.1?

The first of the two core problems of frameworks of indicators is the disputable selection of indicators. In the above system, however, this selection can be done empirically: those elements are selected which turn out to substantially influence happiness. The second core problem is that the relations between the indicators and policy instruments are not quantified. But in the above framework, the multivariate analysis provides essential quantification. It provides information on the quantitative effect on happiness of factors described by the objective indicators. If policymakers want to influence these factors, they have an indication of the effect of each on happiness. In addition, official statistics should apply (or develop) integrated systems in which the relations between the objective indicators are quantified, so that the policymaker can be provided with a more complete picture of the effects of his or her policies. Imagine how such a system could inform society, for instance when policymakers wish to create more flexibility in labour markets. Evidence would be available on the positive effects on happiness caused by the expected decrease in unemployment, as well as on the negative effects on happiness from an increase in job insecurity directly created by those policies.

To predict that this highly integrated system of happiness indicators can develop into a system as authoritative as (during the past 50 years) the National Accounts would be a speculation. But there are good prospects and official statistics should not miss the opportunity.

On one point this system will not succeed. That concerns "striking the balance" between income (growth) and (deterioration of) the physical environment. It seems highly improbable that survey interviewing can produce the relevant information with the exception of information on how happiness is affected by *publicity* about environmental deterioration. The physical environment has many different dimensions; effects of environmental changes may manifest themselves in the future, indirectly or without people understanding the cause. It is unlikely that valid survey questions on the effects of environmental issues on happiness can be developed. Moreover, multivariate analysis will fail also because all individuals – or the vast majority – are subject to the same environmental changes at the same moment. For these reasons, it is unlikely that the physical environment will become an operational element, which can be added as number eight to the seven determinants of happiness in Layard's system. That is why in Subsection 6.3 the estimation of the SNI is recommended as a sound concept for "striking the balance" through economic valuation. It is unrealistic to expect direct valuation of environmental functions in terms of happiness to become feasible.

8. How to Increase Flexibility?

A flexible statistical system is a prerequisite for permanently keeping up with reality. Flexibility is relevant to existing statistics, the development of new statistics, drawing up statistical work programs, and presenting statistical information.

Flexibility in existing statistics concerns all adaptations, which do not change the basic concepts of the output. This includes major adaptations of observation techniques, estimation methods, and frequency and minor adaptations of output specifications. These forms of optimisation and adjustment to evolving realities are important types of statistical innovation and their flexibility is enhanced by modern ICT, statistical professionalism and organisational flexibility in statistical institutes. A lot of research in official statistical institutes belongs to this category. If the disruptive effect on time series caused by these changes is carefully isolated, they will be helpful. Maintaining this type of flexibility is hardly subject to the law of inherent or contagious conservatism in statistics.

New statistics may be needed when reality changes more fundamentally, e.g., in cases of emerging new phenomena, blurring social structures or changing processes in society. In the identification of the need for new statistics, two stages are relevant: (1) the identification of developments in reality, leading to new information needs, and (2) the assessment of the feasibility of satisfying these needs by statistical information. These stages are included in the drawing up of statistical work programs and will be discussed in Subsection 8.2. Here, all elements of the law of inherent conservatism are effective, including the contagious workings. In the development of new statistics, discussed in Subsection 8.1, only one element of this law is at work.

Flexibility in presentation concerns the heterogeneity of the group of potential users of official statistics as well as the increased complexity of the statistical description of reality. It refers to the Statistics, Knowledge, Policy chain as well as to the broadening of the clientele of official statistics in modern "information societies." This will be briefly discussed in Subsection 8.3.

8.1. Flexibility in the Development of New Statistics

The traditional process of developing a new large-scale survey starts with an often rather detailed specification of the output. In the next stage, the focus shifts to the survey process, how to create a process that yields valid data and that is efficient for both respondents and statisticians. This leads to the development of completely specified questionnaires, including experiments to validate questionnaires and processes. The first large-scale survey follows. If all goes to plan, that first survey leads to a publication of acceptable results within six months or so.

This first publication often comes years after the development started with the lag depending on the complexity of the statistics, the length of the survey period and the number of parties involved in the development, and so on. The production period can be shortened by creating well documented modular systems for computer assisted surveying, especially if the surveys are being held continuously. Introducing new variables in current surveys can be organized more quickly. But even then a substantial preparation period will be required in order to avoid invalid or otherwise "dirty" information or to prevent disruption to the current survey process, especially in the case of brand new variables.

After the first publication, not all the information needs are satisfied. Many users need time series because they are more interested in changes over time than in the levels of estimates. The use of time series for the estimation of regressions or other models requires rather long series. Hence, users who want to analyse the relevant changes in society, including their interdependencies, will often have to wait many years for the information they need.

In a society that has grown more complex and more dynamic, a quick response to new information needs has become increasingly important. If these needs could be satisfied by estimations based on already available raw data, quick responses would be feasible. If the raw data is available for a series of years, users needing new time series could be served promptly. Official statistical institutes should develop strategies to shift the focus of the statistical production processes from a unique production line for each category of statistical output to a flexible use of all available raw data in the production of statistical output, including unforeseen statistics. Important elements of such strategies are:

i.   collect as much microdata as you can get (and manage); give priority to register data because that is relatively cheap and because it covers complete populations
ii. store the data centrally in such a way that easy access is guaranteed, but keep it simple; standardise the documentation and harmonise the units so that the data can be linked at the micro level
iii. let your organisation develop from a collection of unique production lines to separate units for data capture and for analysis and publication; have all captured data made available in the central storage.

This strategy will lead to an increasing number of occasions where completely new statistical information, including time series back in time, can be produced out of existing stocks of raw data. The stock of microdata can be used to quickly develop longitudinal information.

The culture of statistical work shifts from the cultivation of the special characteristics of existing statistics, dedicated to maximal satisfaction of determined information needs, to the quick production of statistical information, which can satisfy urgent needs to a reasonable degree, using all available data. The culture of data capture shifts from special data, preferably directly surveyed by the statistical institute, even if in small samples, to available register data, preferably concerning all units of the population in order to fill the records with a maximum of information through microdata linking. The culture of the estimation process shifts from the analysis of sampling errors to the subject matter oriented analysis of nonsampling errors.

The availability of register data to official statistical institutes differs strongly between countries. But there is a general trend of lowering barriers, stimulated by the developments in modern ICT, improved techniques of data protection and spreading practices of microdata linking for a range of purposes, including the reduction of administrative burdens. Official statistical institutes, being specialists in data protection, must find ways to energetically overcome still existing barriers. International organisations can support them. The strongest argument they have is the fact that statistics, by its very nature, is not about identifying individuals, so that privacy issues are not at stake as in other uses of

register data. This argument turned out to be decisive in the eyes of the Dutch data protection authority.

Shifting to quickly produce statistical information that satisfies urgent needs to a reasonable degree, using only available data, implies adopting elements from the culture of statistical work in the compilation of integrated systems like the National Accounts. The strategy, summarised above in Points i – iii, will considerably increase the flexibility of those systems. And it enables the quick production of small ad hoc systems of integrated information, including longitudinal information, that satisfy new information needs outside the scope of existing statistical systems.

8.2. *Flexibility in Innovating Statistical Work Programmes*

Subsection 4.2 concluded that official statistics must become more entrepreneurial to mitigate conservatism. Statisticians must widen their outlook from existing clients to potential users and must open-mindedly observe developments in reality, which up to now have been beyond their reach. This implies that they have to become more outward-looking and more proactive. Is this easy?

The workings of the law on inherent and contagious conservatism are very strong. Moreover, much of these workings must not be disrupted, because that could lead to a decrease in the authority of official statistics. A general policy asking the average statistician to become more distant to the existing statistics he or she is responsible for, will be dangerous and, very likely, ineffective. A more effective and less risky strategy is to develop stimuli to innovative programming through separate activities that do not directly interfere with the existing statistics.

The most important activity is strategic research, and a statistical institute should permanently devote not too small a part (2%?) of its budget to this. The research could be organised as a bundle of projects, each for a limited period; after that period the budget is moved to new strategic projects. Because the top of the institute is responsible for its strategy, the top decides on which projects are selected (not the authority that decides the statistical work program). International cooperation in the planning and execution of projects will considerably increase the effectiveness of the strategic research. Cooperation with Academia and other researchers on a national scale may stimulate and accelerate the research and help tackle contagious conservatism.

In the selection of strategic research projects, top priority is given to discovering new concepts, needed to fill major gaps in the description of relevant realities. The research starts with the identification of trends that determine potential information needs and it may end with presenting a prototype of the statistical information that could be developed. This can be illustrated with a few concrete examples, suggested elsewhere in the article:

- which dynamic processes are shaping the development of society and what statistical information can describe them? Projects could tackle labour, income and poverty, care, social exclusion, social capital; productivity, globalisation, manipulation of preferences

- which developments with (potential) users of statistics (including policy, business, economic and social sciences, citizens) need new statistical information or new tools for presentation?
- towards comprehensive information about the development of happiness and its relation to essential developments in society, recommended in Subsection 7.2
- towards the SNI for "striking the balance" between GDP growth and environmental deterioration, recommended in Subsection 6.3.

8.3. *Flexibility in Presentation*

In modern societies information plays an essential role for policymakers, other decision makers, scientists and citizens. Many actors produce information leading to information overload and hectic publicity. Official statistics must stand out by its undisputed information available to everybody. This article's analysis implies two challenges to the presentation of statistical information: (1) how to present statistical simulations of an increasingly complex reality; (2) how to present the information to an increasingly heterogeneous (potential) clientele. Ignoring other elements of statistical dissemination policies, this subsection will concentrate on flexibility as an element of a strategy to meet these challenges.

Every description of reality implies a reduction of its complexity, and statistical simulations are no exception. As reality grows more complex, more statistical simulations of the same reality may be considered relevant. If, at the same time, the potential clientele of these statistics grows more heterogeneous, it is probable that more different statistical presentations of the same reality will be relevant. Therefore flexibility in the presentation of statistical information must increase. This concerns the content of the presentation as well as the dissemination policy.

Subsection 5.2 concluded that the challenge of presenting longitudinal information, which is so essential to our view of modern reality, is easily underestimated. And it added that statistical output has to move from a simple use of figures, traditional graphics and explanations of concepts to professional presentations of knowledge, illustrated with moving images. This conclusion had policymakers in mind; they are not only important users of statistical information, but disseminators as well. Statistical information is the more useful for them if they can use it in addressing citizens. One of the elementary implications is that statistical presentations must not be unnecessarily highbrow, a lesson successfully learnt during the last few decades in the relations between official statistics and the press.

Longitudinal statistics are not unique in being difficult to present. Also other new sets of statistics, recommended in this article in order to neutralise misleading signals sent by GDP, will require a careful presentation in a context of scientific subject matter and statistical knowledge. Official statistical institutes should consider appointing spokespeople for broad areas (socio-demographic, socio-economic, macro-economic, and business) who combine a high-level knowledge with the gift of convincingly presenting complex information in simple words and images.

One of the prerequisites of effective presentation is the ability to adopt the point of view of the audience. Therefore the management of official statistical institutes should stimulate

its professionals to be outward-looking and to ask the questions about reality, which are relevant to (potential) users. Strengthening the "Statistics, Knowledge, Policy chain" requires:

- looking for the relevant blind spots in what potential users know about reality, as recommended earlier in this article, as well as seeking support for filling these gaps in knowledge. This challenges the communication skills of subject matter specialists as well as spokespeople and (top) management itself
- providing users with tools they can use in presentations to their audiences.

An encouraging perspective emerges from developments in statistical websites, where users are able to compile statistical information according to their special needs. As the interactive and flexible tools become more user friendly, the heterogeneous statistical clientele will be more effectively served. That is especially the case when it comes to the users who are not represented by institutions with a direct influence on the statistical work program. To improve the statistical service to these less powerful users is an important task for official statistics in modern democracies.

9.   A Dilemma Concerning the Mission of Official Statistics

Official statistical institutes have to provide society with undisputed information. That is why they avoid publishing statistics of low quality. Relatively inaccurate statistical information is only published if a consensus exists that the information is by far the best available and it may be accompanied by some sensitivity analysis. In most countries, official statistical institutes do not publish forecasts or statistical analyses based on disputable assumptions. Statistical information that "strikes the balance" between GDP growth and e.g., environmental deterioration is not produced because it requires disputable, or even controversial, assumptions.

Subsection 4.1 argued that guarding the authority of statistics leads to avoiding disputes about existing statistics and to a reluctance to develop competing or conflicting statistics. There is wisdom in the conservatism of the official statistical system. It is said that "trust comes on foot and goes on horseback" and guarding the trust in official statistics is a prime task. Confidence in official statistics depends on confidence in the institute that produces the statistics. At the same time, confidence in the institute depends on confidence in its statistics. If the production of official statistics is centralised, the central statistical institute has many opportunities to demonstrate its impartiality, professionalism, relevance and authority, all of which could raise the level of confidence. But if one of its statistics runs into problems, the whole system is at risk. Let us call the set of risks mentioned in this section up to now, Risk A.

On the other hand, the preceding sections have illustrated another risk: the risk that traditional statistics, having been authoritative for decades, are considered misleading because it appears that the reality they correctly describe is too virtual. This is Risk B. In an increasingly complex society, that risk necessarily increases because information on a growing number of processes is reduced (or neglected) while the traditional statistics are maintained. An effective management of this risk will lead statistical institutes to

- introduce new statistics to neutralise the one-sidedness of current statistics by describing other aspects of the same reality
- develop statistics presenting a more complete and thus more complex picture of reality, so that the described reality runs a lower risk of, sooner or later, being considered too virtual.

Both strategies may produce information that will be considered competing or even conflicting with traditional statistics. And the second strategy may lead to more disputable statistics, e.g., when "striking the balance" between different phenomena. In other words, both strategies increase Risk A. The second strategy abates Risk B more fundamentally, but it also may further increase Risk A.

How manoeuvre between Scylla and Charibdis? Mapping the risks will help, permanently being on the look-out is indispensable and a good stratagem (e.g., sending a scout incognito) will increase courage. And for the last element, the image of the statistical institute is essential.

If the statistical institute is respected only for its regular production of authoritative statistics, the dilemma is serious. But if the institute is also respected for its scientific research, it has more latitude. The development of alternative statistics can be introduced in a context of experimental scientific research in order to lower Risk A. Discussions about their strengths and weaknesses can be started in an academic context with the same result. This enables statistical institutes to introduce alternative statistics gradually and to gain support for them before putting the authority of existing statistics at risk.

If the statistical institute is also respected for its innovative attitude, it has even more latitude. The alternative statistics can be introduced with more self-confidence. This enables statisticians to act more entrepreneurially and to communicate more convincingly with users about the strengths and weaknesses of existing and alternative statistics. Because the public expects the institute to innovate – and appreciates its ability to discover new developments in reality requiring new statistical descriptions – Risk A can be managed more easily. The introduction in the statistical work program, of new information that is more open to dispute than the traditional statistics will not immediately challenge confidence in the institute. It will not, therefore, put the authority of all other statistics at risk.

This leads to the conclusion that official statistics, in order to increase its ability to "keep up with reality," must develop the scientific attitude, creativity, courage and external communication skills, needed to create a high-quality innovative organisation. This includes challenging categories of users entangled in virtual realities by showing them blind spots in their views of reality. It may include initiating controversial debates about the current interpretation of GDP growth and unrealistic elements in mainstream economics. In the long run, these disputes are needed for keeping official statistics undisputed.

10. Recommendations

This article's recommendations are summarised under three headings: statistical information, statistical policies, and the context of official statistics. Numbers between brackets refer to places in the article where the main arguments are set out.

10.1.   Recommendations Regarding Statistical Information

- Because modern societies are heterogeneous and dynamic, develop statistical information describing the dynamic processes at the micro level (5.1, 5.2). Develop integrated systems of dynamic information based on the analysis of longitudinal microdata (7.2, 8.1, 8.2)
- Because GDP is a misleading indicator of economic progress in developed societies, develop integrated statistical information on happiness, including sources of economic welfare not included in GDP or consumption (7.2); stimulate debate on the interpretation of GDP growth by publishing data on costs (rather than sources of welfare) included in GDP or consumption (4.3); initiate and get actively involved in the development of estimates of Sustainable National Income (7.1)
- Publish data on marketing expenditure as an indication of economic power and the manipulation of consumers' preferences and stimulate debate on the unrealistic premises of mainstream economics (6.2)
- Enrich the National Accounts with integrated socio-demographic and socio-economic information (7.1) and with a generational breakdown of the social accounting matrix (5.1)

10.2.   Recommendations for Statistical Policy

- Create an outward-looking culture in statistical institutes so that future statistics answer the relevant questions about reality (8.2, 8.3)
- Develop the scientific attitudes, creativity, courage and external communication skills, needed to create a high-quality innovative organisation; challenge categories of users entangled in virtual realities by showing them blind spots in their view of reality; initiate debate on the current interpretation of GDP growth and unrealistic elements in mainstream economics (9)
- Earmark 2 percent of the total budget of official statistics for strategic research projects (8.2)
- Increase the flexibility of the statistical production process by creating longitudinal databases of integrated microdata, available for the production of unforeseen statistical information (8.1)
- Initiate an evaluation of the last decade's progress in price statistics against the background of the further increased measurement problems (6.1)
- Develop the skills and tools needed to present complex information in a context of subject matter knowledge as well as to flexibly serve a more heterogeneous clientele (8.3)

10.3.   Recommendations for the Context of Official Statistics

- Supporters should stimulate official statistics to develop and actively demonstrate vigilance over new developments in reality, which require new statistical information or which increase the virtuality of existing information (1, 4.2, 9)

- Economists should abandon or considerably relax the most unrealistic assumptions of mainstream economics, concerning the autonomous and rational behaviour of consumers with exogenous preferences, and develop a new theory in which the manipulation of preferences plays a realistic role (6.2).

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