Morgenstern's Forgotten Contribution: A Stab to the Heart of Modern Economics

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Abstract

In contrast to physics, there is no estimate of statistical error within economics inspite of Oskar Morgenstern's book *On the Accuracy of Economic Observation*. The problem of error in economic observations is still a widely neglected problem. The various sources of error that come into play in the social sciences suggest that the error in economic observations is substantial. As the error might be substantial, this paper argues that the usefulness of econometrics becomes questionable.

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In his classic book *On the Accuracy of Economic Observation*, Oskar Morgenstern deals with a common, yet widely neglected problem with which economic historians are faced, namely the quality of economic data. Morgenstern´s "study aims at examining the conditions governing the accuracy of planned quantitative economic observations and, more widely, of economic statistics" (1963: 3). Thus, his work does not deal with economic information that stems from qualitative research approaches such as participant observations, interviews and questionnaires. The problem of the quality of (quantitative) economic data or economic statistics has not been addressed or solved until the present day despite a striking call to attention by the co-founder of game theory.

The accuracy of economic data is a problem for all of economics. For the economic historian, the quality of economic data is of utmost importance, since false data or belief in inaccurate data can lead the economic historian to faulty interpretations of the past. For the policy maker the accuracy of data is important as policy makers base their decisions on economic data with far-reaching consequences for the whole economy.

Likewise, Morgenstern's insights are relevant for orthodox economics since the

economics profession has been dominated by mathematical formalism since the 1950s. While there has been an increase in the variety of economic theories, the development on the methodological front has been leaning towards homogeneity (Dow 2007). The methodological monism in orthodox economics is manifested by a mathematical formalism. The mathematical approach to economics is affected by Morgenstern´s arguments as it makes sense to perform computations and solve a system of mathematical equations only if one has reliable data. Morgenstern illustrates this in the following example:

> "The equations
>
> x - y = 1
>
> x - 1.00001y = 0
>
> have the solution x = 100001, y = 100000, while the almost identical equations
>
> x - y = 1
>
> x - 0.999999y = 0 [sic]
>
> have the solution x = - 99999, y = -100000.The coefficients in the two sets of equations differ by at most two units in the *fifth* decimal place, yet the solutions differ by 200,000" (1963: 109).[1]

[1] Morgenstern took this example from W.E. Milne (1949: 30-31). For mathematical correctness the second set of equations must be:

x - y = 1

Morgenstern's sample equations show the significance of a small error in the observation. Yet, in more complex equations with extensive mathematical operations the extent of error due to unreliable data may increase (or, depending on the equation, the errors may cancel out).

The quality of economic data is at least as important for econometrics as it is for mathematics. Defined as "a combination of economics, mathematics, and statistics,"[2] econometrics is a mainstream approach to economic science and the interpretation of economic data is central to its methodology: One formulates a model, gathers data, and then estimates the model with this data, comparing the theoretical solutions with the observed data via hypothesis testing. Finally, one interprets the results.[3] Obviously, the economic data plays a crucial role in this procedure since it serves the econometrician in arriving at theoretical solutions by confirming or falsifying the models. If the accuracy of the economic data is not known, then the suitability of the data for this kind of procedure

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$x - 0.99999y = 0,$

leading to the solution $x = -99999$ and $y = -100000$.

[2] See for this definition and alternative definitions Tintner (1953: 31-32).

[3] The econometrical concept of the standard error refers to a problem different from the accuracy of economic data. The standard error measures the standard deviation of the sampling distribution associated with the estimation method. The data of the sampling distribution is assumed to be the true data!

is also not known. In such a case, the econometrician may likely find a spurious relationship.

A Morgensternian critique of econometrics is different from other critiques that focus on econometrics as practiced by prominent economists. Edward Leamer (1983) in an influential article stated that econometric analysis is not taken seriously due to the amount of "data mining" and "number crunching". Econometricians make implicit assumptions about the distribution of errors, the functional form and the variables in the model. According to Leamer statistical interference is based on opinions and whims. In a similar way, Deirdre McCloskey and Steven Ziliak (2008) criticize the procedure of econometricians and the abuse of significance testing. Too often statistical significance is confused with real world significance. Morgenstern´s critique is, however, on a different level. The critique of econometric practices and techniques does not deal with the accuracy of the underlying data but takes it as given. Morgenstern more fundamentally questions the accuracy of economic data and, consequently, the very basis for econometrics.

It is indeed surprising to note how much the problem of accuracy in economic data has been neglected. This is not so in the physical sciences (Preston and Dietz 1991).[4] There

[4] Preston and Dietz (1991) in their book *The Art of Experimental Physics* dedicate one chapter to "Error Analysis." On page seven we find the statement that: "A measurement alone, without a quantitative statement as to the uncertainty involved, is of limited usefulness. It is therefore essential that any course in basic laboratory technique include [sic] a discussion of the nature of the uncertainty in individual

the error of observation is always explicitly mentioned. Yet in economics there is simply no error estimate.[5] This means that we do not know the accuracy of the economic data presented to us. This is even more troubling when we consider that in social or economic data there are more possible sources of error than in the physical sciences. We therefore face the question of why the problem of accuracy of economic data is rarely mentioned or passed over in silence in economics, while in the physical sciences this problem is widely acknowledged.

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measurements and the manner in which uncertainties in two or more measurements are propagated to determine the uncertainty in the quantity or law being investigated. Such uncertainties are called experimental errors and their analysis is called error analysis."

In econometrics textbooks, we usually search in vain for a discussion of error analysis of the data. See for example, Ramanthan (1998), Amemiya (1994) or Kelejian/Oates (1981). An exception is Gujarati (1995: 26-27), where less than two pages out of an 838 pages are dedicated to the problem of accuracy of economic data. Gujarati makes no case for a quantitative statement of the error.

[5] For example, the U.S. GDP for the second quarter of 2006, seasonally adjusted, is stated as $ 13209.7 billion, implying a tremendous accuracy of 0.1 billion, with no error estimate being provided. (Federal Reserve Bank of St. Louis 2006a).

Similarly, the not seasonally adjusted consumer prices with index 1982-84 = 100 is reported to be 203. 5 on the July, 1st 2006 (Federal Reserve Bank of St. Louis 2006b). We find the statement that the "cumulative nonsampling error can be much greater than the sampling error" (Bureau of Labor Statistics 1997). Again we are not provided with an error estimate.

Likewise, Lawrence Summers (1981: 609), states that the sum of uncertainty in measuring unemployment is never reported by the Bureau of Labor Statistics.

I

Sources of Errors in Economic Statistics

Oskar Morgenstern names several sources of error that influence the accuracy of economic observation. One is a lack of designed experiments.[6] The observations are not produced by the user of an experiment, as in the natural sciences, but rather, statistics are simply a byproduct of business and government activities. There is a complete lack of incentive to provide accurate information for government statistics and economic researchers on the part of companies, because to do so would require a costly and burdensome process. Companies simply lack incentives to spend much time to fill out accurately the demanded forms.

In addition to the lack of accurately designed collection of data, there is a related problem also absent in the physical sciences – namely, the possibility of the hiding of information or outright lying. Companies have strong incentives to hide information or lie in order to mislead their competitors about their competitive strategy or strength. Sometimes companies manipulate profits in order to pay out fewer dividends. Individuals and companies also have an incentive to mislead tax authorities and the government in general in order to seek subsidies or avoid taxation. By amplifying their problems they might receive more subsidies. By tax evasion or tax avoidance they increase returns for owners. Even though the incentive to mislead tax authorities is reduced by penalties for

[6] Regarding this, also see Darnell and Evans (1990: 13).

tax evasion, we cannot know the extent of misleading information and the real data. Income tax returns for countries such as Spain, Italy or Greece do not resemble closely the underlying income patterns of these countries. Nevertheless, as Machlup points out, ”it is on the basis of tax returns that important and elusive problems, such as the validity of the ´Pareto distribution´ … explaining the inequality of personal incomes, are minutely studied” (1963: 19). Apparently, the real income patterns may indicate a different conclusion than the official one. Thus, relying on inaccurate data may lead to erroneous conclusions and flawed theories.

Likewise, governments themselves have an incentive to falsify statistics, thereby improving their economic record. Doing so improves the ruling party's chances of staying in power. The falsification of economic statistics can also improve the likelihood of receiving some kind of foreign aid or foreign recognition. A recent example involves the Greek government, whose officials falsified the report on the Greek budget deficit in order to gain entrance into the European monetary union.[7]

Another potential source of error consists in the inadequate training of those who observe economic data. Whereas in the physical sciences the observers are the scientists conducting the experiment, the observers of economic data are often not trained at all. A lack of training can lead to error in data collection. For instance, errors may stem from

[7] See BBC News (2009).

questionnaires. The conductor of the research does not normally conduct all the interviews. Instead, the interviews are likely conducted by different persons. As a result, the delivering of the questions, the setting up, the interpretation and the recording of the answers are additional sources of error. Friedrich August von Hayek (1948) sees an additional problem with economic data collection. The nature of facts in the social sciences is subjective. The "social facts" are interpreted by the human mind. Therefore, different individuals might give different answers when asked about the same historical event. It must be pointed out that the errors in mass observation do not necessarily cancel each other out. Frequently, such errors are cumulative.

An additional potential source for errors is the lack of clear definitions or classifications. These problems apply, for instance, in the classification of goods, types of employment, or classification of companies within industries.[8] Companies like General Electric operate in various industries, making it difficult to assign its revenues or profits to distinct industries.

More fundamentally, unlike observations within natural sciences, economic observations are unique and not reproducible. While a stone always reacts in the same way to certain stimuli human beings act differently in certain situations and can learn. Any human action is unique in its context of time and space. As there are no universally prevailing

[8] On this point, see also Leontief (1971: 6).

regularities in the social realm, scientific prediction of future actions based on past data is impossible (Mises 1957). In a similar way, Lawson (1997) and Bigo (2006) argue that society is an open and complex system. In an open system controlled experimentation is infeasible. In the open social realm there is a lack of event regularities, which makes events in the social realm unpredictable. If prediction is not possible, then the econometrics projects is irrelevant in the first place, no matter how accurate the data. Morgenstern´s insights address, however, econometricians on another level. Even if prediction would be possible in the social realm, the data used by econometricians may not be accurate enough and the lack of accuracy has been neglected so far.

The uniqueness of economic events has also implications for the accuracy of the observed data. With economic observations one deals with processes, which means that the very same event can be observed by several independent observers at different places or points of time, leading to discrepancies in their observations. The time element is another potential source of error because it takes time to conduct certain types of statistical research and in this time the observed phenomenon might change. An example is the counting of inventories for a certain period or a large population for a certain day. As people immigrate, migrate, emigrate, travel, die, and are born, it is difficult to get an exact number.

The only point where, according to Morgenstern, the natural sciences are worse off in

relation to the social sciences are errors resulting from the use of instruments.[9] This is so, because economic statisticians often do not use machines. For example, they do not have to measure a price by a machine, but can just observe a certain price paid on the market and already have a number at hand. However, in using machines to measure, natural scientists at least get their data immediately and probably more reliably as Wassily Leontief points out. Leontief also emphasizes some of the aforementioned advantages that the physicist holds versus the economist regarding observation of data:

> "The scientists have their machines while the economists are still waiting for their data. In our case not only must society be willing to provide millions of dollars required for maintenance of a vast statistical machine year after year, but a large number of citizens must be prepared to play, at least, a passive and occasionally even an active part in actual fact-finding operations. It is as if the electrons and protons had to be persuaded to cooperate with the physicist" (1971: 6).

While considering these problems with data collection, i.e., a lack of trained observers and a lack of clear definitions, it is important to note that advances in data collection have also occurred since the appearance of Morgenstern's book. By virtue of increased funding for research, data have probably become more accurate in past years. However, there are

[9] This minor advantage was emphasized by Joseph Schumpeter to justify the econometric method in the first volume of *Econometrica* (1933: 5-6) and is also quoted in one of the rare modern econometric text book, that raises the issue of the nature of economic data. See Mittelhammer, Judge and Miller (2000: 4-5).

some problems inherent in social science data collection that cannot be eliminated by pouring more money into statistical research.[10] One important point is that in most cases, the economist using the data is neither the originator nor the collector of the data. This is a possible source of error that cannot be eliminated. In addition, the incentive to lie remains, even in a surveillance state that threatens such misinformation with harsh penalties. Thoughts remain free. Morgenstern (1963: 21) reports that statistical authorities in the Soviet Union had developed "lie-coefficients" in the 1930s to correct statistical reports of different regions. A third point that must be raised is that statistical research itself might influence the observed data.[11] Pouring more money into the economic research of some particular data will change the same data under research. In other words, the introduction of a new variable, i.e., increased funding or time spent on empirical research, might change other variables, i.e., those variables that are to be examined. For instance, when more economic resources are shifted from other areas of the economy towards the investigation of changes in the price level, this will change relative prices and probably the prices that enter the price index as well.

[10] Indeed, economists frequently have suggested or asked governments to increase spending in these areas. See Hendry (1980: 398) or Frisch (1946: 4). Also Haavelmo (1944: 5), claims that economic observations "could possibly be measured rather accurately" if there were only more time and more money.

[11] See for example, Popper (1961), Lucas (1983) or Hoppe (1983). Individuals can learn and will therefore adjust to experiments, as well as statistical and econometric research --hence, Lucas' critique of econometric policy evaluation.

II

The Illusion of Price Statistics

One of Morgenstern's examples of the questionable accuracy in which economic observations are presented is that of price statistics. Almost all possible sources of error mentioned above apply to price statistics: the desire to hide or lie about the true price, problems of classification or definition, and quality changes.

The history of the collection of price data is dominated by both advances and calls for more accurate data (Mills 1936). The collection of price data has become ever more sophisticated by expanding the observations and disaggregating the data. This has sometimes caused a revision of conclusions derived from price statistics. An interesting example is provided by Frederic S. Lee and Paul Downward (1999) who reassess Gardiner Means´ doctrine of administered prices. Lee and Downward show that the data supports Means´ claim that in the 1930s in the U.S. market prices declined relative to administered prices when demand declined and vice versa. However, expansion and disaggregation of price and production data shows weak to non-existent support for Means´ thesis that in an economic downturn the production of administered-price products would decrease stronger than the production of market-price products. We are, therefore, faced with one instance where the aggregation of data had lead to a thesis that later proved to be problematic. Inaccurate data may induce faulty conclusions.

In addition to the problems of aggregation, classification and grouping of goods, price statistics face additional difficulties. In reality a certain good has multiple prices. The price changes when the goods are sold in different units, at different times and different qualities. From this infinite number of possible prices only some are available. Sources of price quotations range from companies, boards of trade, trade associations, trade journals, labor unions and government institutions. Consequently, one product may have several price quotations available. Which price should be chosen and what about the infinite number of prices that is not available? There are also non-monetary components to prices, for instance the quality of service before, during, and after the sale, which might vary. These, however, are not taken into account by merely measuring the monetary price. These non-monetary components of prices are, of course, relevant for an econometrician who wants to test the hypothesis that changes in the money supply have an influence on prices. Moreover, there are not only different qualities; there are also significant quality changes even on a year basis. For example, the prices and quality of PCs change very quickly. The provision for these quality changes in the changes of price statistics necessarily remains somewhat arbitrary.

When observed prices enter the calculation of index numbers, further problems are created. For one thing, the method of calculation itself is arbitrary, since many methods of calculating averages or price indexes exist. They all lead to different results. Furthermore, the components and their (changing) weight in the index is arbitrary.

One might grant the difficulties to calculate accurate price indexes but reply that this would pose no problem for the econometrician. For example, one could argue, that an econometrician only wishes to test a hypothesis about the changes in the money supply and the behavior of a price index X calculated by the institution Y in the years W-Z. Yet, an economist normally is not interested in a price index X but he really wants to know, for instance, if prices are influenced by changes in the money supply. He "has in mind some 'true' variables that he would like to measure" (Haavelmo 1944: 7). For an econometrician who is interested in the relation of "true" variables, error estimates are vital.

Keeping all of these problems in mind, it is surprising that no error estimate of price level statistics is provided. Even more surprising is that economists and politicians take changes in price indexes up to 1/10 of one percent at face value, without questioning their validity.

III

The Pretension of National Income Statistics

Another of Morgenstern's examples is that of national income statistics. National income statistics are widely considered to be relevant for economic analysis. They supposedly reflect the success of the government and are used in econometric models. These statistics are also of international importance. Morgenstern notes that, shortly after World

War II, Japan and the United States "negotiated" the national income of Japan, because the national income influenced the size of economic help by the United States.

Morgenstern mentions several conceptual problems with national income statistics. The first involves the difficulty of the imputation of value. The problem lies in assigning a monetary value to goods and services produced. As Morgenstern states:

> "A classical illustration is that of persons living in houses they own themselves. If these same houses were owned by others, rent would have to be paid (in money, goods, or services), thereby swelling the national product. To avoid this, a value has to be imputed to owner-occupancy. This is, obviously, a tricky affair, with less certain results than finding out about rent payments made in money. These estimates are uncertain and many arbitrary decisions have to be made" (1963: 246).

A similar problem arises when domestic help, which involves money payments, is substituted by housewives' labor, which does not involve money payments. Changes in the amount and quality of leisure, as well as in amount and quality of voluntary labor (other than housewives') imply problems of the same sort.[12] A professional football player contributes to national income, while playing for leisure does not. Furthermore, money payments can be substituted as the bartering in an economy or the black market

[12] For the problem of the value of voluntary work and national income, see Fogel (1999: 7).

increases.[13]

A second problem in calculating national income statistics arises from the treatment of government services. They are not sold on the market. How should we account for them in the national income? The common practice is to account for them with factor costs. However, this seems arbitrary. The monetary cost of a service is not important as a measure of wealth production. Important, rather, is what people are willing to pay for a service on the free market. One could even make the case that government expenditures should instead be subtracted from national income, because the government withdraws resources from the productive private sector and uses them for its purposes.[14] As an example of the absurdity of adding government services positively into national income statistics, consider the case of a government that builds a bomber and a bomb and destroys a newly built house in its own country. In today's national income statistics, the costs of building the bomber and the bomb are added into the national income, as is the house.

Another inconsistency is mentioned by Rittershausen (1962). Increases in real estate or stock market prices are not included in national income statistics as they do not imply a change in production. Profits of companies, however, are included in national income

[13] Anderson, (1917), ch. 11, argues that the amount of barter in the economy is highly underestimated.

[14] Rothbard (2000: 253-256), develops the concept of Gross Private Product, which subtracts government receipts or expenditures (whichever is higher) from the GNP.

statistics, even though they may be to a large extent be caused by fluctuations in asset price markets.

Besides these conceptual problems, there are, as Morgenstern notes, three principal types of errors in constructing the statistics of national income. First, there are errors in the basic data that occur because they are a mere byproduct of other activities, because of classifications difficulties, lying, hiding of information, transmitting errors, etc. A second type of error results from the adjustment of the basic data to a conceptual framework, as the collected data is not directly suitable for use in national income statistics. A third type of error arises when gaps must be filled where basic data is not available, for example for a range of years or for industries where estimates are not known. Moreover, national income is not calculated by adding up physical goods like cows, cars or petroleum, but by adding up monetary sums. Consequently, we are dealing with prices, their collection and the problems mentioned in regard to price statistics.

With all these difficulties in mind, would it not be very important, not to mention more honest, to provide an error estimate for national income statistics? However, nothing is said about the degree of accuracy in the publications of the national income statistics. We have to rely on our own estimates about their accuracy. Or we must rely on the expertise of those who make these judgments.

Simon Kuznets, a pioneer in national income accounting, argues that *10 percent* is a reasonable average margin of error for national income estimates (Morgenstern 1963: 255). We cannot take this margin of error at face value but must take it as a subjective estimation. At least, however, Kuznets provides an error estimate. His estimate is the confession of a leading expert on national income statistics of his time that there is a wide margin of error in national income statistics. Considering this, it makes no sense to state the U.S. GDP of about $ 14000 billion with an accuracy of $0.1 billion! That is like having a yardstick and stating that a certain distance would be 433,3127 yards. It aspires to an accuracy that is impossible. However, many economists take national income statistics at face value and use them, for instance, to confirm or falsify econometric models of the business cycle. In the light of Morgenstern's analysis this procedure is highly questionable.

International comparisons of national income statistics are even more difficult to conduct due to different classifications, definitions, different hidden non-monetary incomes, interventions of the government into their respective price systems, and different measurements of inflation and deflation in the respective countries. From the difficulties of national income statistics, it also follows that growth rates too should not be taken at face value. Obviously, they are subject to the same errors as national income statistics, since they are based on them. And again, these errors do not necessarily cancel each other out. Furthermore, the choice of the base year introduces ambiguity and the base year estimate will contain error. The margin of error in the base year (again Kuznets suggests

an average error of 10 percent) has a significant influence on the growth rate.

It might be claimed, that growth rates would be somehow better than absolute national income statistics because there would always be the same bias in national income data. However, this is a daring and unproven assumption. Why would the possible sources of inaccuracy, i.e., the lying, hiding of information, the transmission error always produce the same bias? Why would the error always be in the same direction and to the same extent? Might not classification problems, changes in government activity, changes in the amount non-monetary transactions, the adjustment of data and the filling of gaps, lead to very different errors in different periods?

As national growth rates are already problematic, these problems only increase more so for international comparisons. Morgenstern concludes that one can only make qualitative judgments about growth over longer periods of time.

The consequences of inaccurate national income statistics have been important both for economists and policy makers. The falsification of national income statistics allowed Greece to enter the European Monetary Union in 2001 with far-reaching consequences. Based on the inaccurate statistics policy makers believed that Greece would maintain a sound fiscal policy. The recent sovereign debt crisis in Europe was triggered when Greece announced high deficits and acknowledged additional falsifications. The Euro

zone was at the verge of collapse. Inaccurate Greek statistics played its part in the drama.

Another instance of inaccurate statistics misleading economists is the alleged war time prosperity of the U.S. economy in the 1940s. Robert Higgs argues that inappropriate and inaccurate statistics misled historians and economists in their assessment of the war years: “It is difficult to understand how working harder, longer, more inconveniently and dangerously in return for a diminished flow of consumer goods comports with the description that ´economically speaking, Americans had never had it so good.´” (1992: 53)

Similarly, Richard K. Vedder and Lowell Gallaway (1991) maintain that inaccurate statistics may induce misinterpretations concerning the post war years in the United States. In 1946 real GNP declined by 19 percent, the largest single decrease of the century according to official statistics. Government data indicates a Great Depression in 1946 while conventional wisdom regards the transition from war to peace as relatively smooth or even prosperous. It is interesting to note that revisions of the data actually increased the size of the decline in real GNP. Revisions of data do not necessarily imply improvements.

A famous example of an economist who was misled in his analysis by government statistics is mathematical economist Paul Samuelson. As late as the 1989 edition of his text book Samuelson maintained that “The Soviet economy is proof that ... a socialist

command economy can function and even thrive." (Samuelson and Nordhaus 1989: 837) Samuelson predicted that the Soviet Union would finally catch up with the United States in per capita income. He based his prediction in part on a comparison of national income statistics of the Soviet Union and the United States. Even if we assume, for the sake of the argument, that scientific predictions in the social realm are possible, we see that deriving predictions from inaccurate data or basing a theory on such data is a method bound to fail.

IV

Implications for history and econometrics

The absence of error estimates and the potential of relatively high errors in data of the social sciences imply for the historian that he should not take the data at face value. He must be very careful in interpreting the data, keeping in mind the potential error. Sentences like: "In the following decade, consumer prices rose 11.7 percent" or "In the first war year, economic growth fell back to 0.3 percent" do not make much sense as they portray an accuracy the data does not contain. Writing: "In the following decade, the consumer price index X as calculated by institution Y rose 11,7 percent" and "In the first war year, GDP as calculated by institution Z increase 0,3 percent" would be a better formulation. However, this still might pretend an accuracy that is not there. Hence, data must be interpreted carefully, in a largely qualitative manner, as it should not be taken at face value.

Furthermore, Morgenstern's concerns imply another, unique critique for econometrics. This critique of econometrics is often neglected. Indeed, discussing this implicit critique would violate one of the good rules of econometrics, "namely that econometrics is something that should be done, rather than talked about" (Haavelmo 1958: 351). Morgenstern's implicit critique of econometrics sets in before the econometrician really gets started. It consists in the accuracy of economic observations. As the quality of economic data is doubtful, this raises the question of what is precisely the point in investing human energy and resources for developing ever more sophisticated statistical methods of testing hypothesis and estimation.[15] Expressing this concern, Christopher Worswick feels that econometricians are more interested in developing additional statistical tools than troubling with the quality of economic data: "They [some econometricians] are not, it seems to me, engaged in forging tools to arrange and measure actual facts so much as making a marvelous array of pretend-tools which would perform wonders if ever a set of facts should turn up in the right form" (Worswick 1971: 79).

Indeed, if we have to guess the error in economic data, it raises doubts about the suitability of the data for econometric testing. What is the point of constructing

[15] The poor quality of the data might be one explanation for Lawrence Summers' famous critique of econometrics, who wonders about the little impact econometric research has had, in relation to the resources spent on it: "Given the tremendous professional investment in econometric work, it is natural to ask why it has so little impact in either the short or long run" (1991: 133).

macroeconomic business cycle models including growth rates, price indexes, capital accumulation, population figures etc. and running it for different countries? Is this not futile considering that error estimates are not published and an expert like Simon Kuznets regards 10 percent error in GDP as realistic? One is reminded of Keynes sarcastic statement in his famous review of Jan Tinbergen's book, *Statistical Testing of Business-Cycles Theories,* emphasizing the futility of econometric research:

> No one could be more frank, more painstaking, more free from subjective bias or *parti pris* than Professor Tinbergen. There is no one, therefore, so far as human qualities go, whom it would be safer to trust with black magic. That there is anyone I would trust with it at the present stage, or that this brand of statistical alchemy is ripe to become a branch of science, I am not yet persuaded. But Newton, Boyle, and Locke all played with Alchemy. So let him continue (Keynes 1940: 156)

Keynes also speaks about "the frightful inadequacy of most of the statistics employed" (1939: 567).[16] Yet, Keynes´ main critique of Tinbergen´s method does not aim at the quality of statistics or data. His main critique of econometrics is more devastating. Keynes points out that one cannot assume economic variables to be constant and homogeneous through time. He, therefore, rejects the possibility of prediction through

[16] For Tinbergen's reply see Tinbergen (1940).

econometrics.[17] If Keynes is right, we do not even have to worry about the quality of economic data as used in econometrics.

Morgenstern's contribution, however, is slightly different from Keynes's or other critics of econometrics. Although he does not claim that econometrics is alchemy,[18] Morgenstern agrees on the inadequacy of economic statistics and attacks mainstream economic tools on a different level than Keynes. He asserts that the nature of economic observation makes it categorically different from physical observations and more error-bearing. It follows as an important implication for modern economics that the data in social science might not be good enough for that kind of research that econometrics engages in. Even if prediction in the social sciences based on econometrics would be possible, the quality of the available data may well be insufficient. Moreover, Morgenstern´s insights have important implications for economic historians, policy makers and journalists to not take economic data at face value.

V

[17] For a discussion of Keynes´ view on prediction and econometrics see Lawson (1985).

[18] On the question if econometrics is alchemy or science see Hendry (1980). For other critiques of econometrics see Phelps Brown, who states that "running regressions between time series is only likely to deceive" (1972: 6). Worswick argues that "[t]oo much of what goes on in economic and econometric theory is of little or no relevance to serious economic science" (1971: 83).

Why does the pretense of accuracy continue?

Considering the sources of error in economic data it would be more scientifically honest to provide error estimates, i.e. limits of accuracy, in economic statistics as it is done in physics. Another author beside Morgenstern that argues for such an error estimate is Heinrich von Rittershausen (1962: 545). Ritterhausen criticizes the pretense of accuracy when data on income statistics or the price level is provided with decimal points. One might wonder why these voices calling for error estimates have been neglected.

One reason why Morgenstern's contribution might have been widely neglected was probably because of the unfavorable reviews of his book in prestigious journals. Simpson (1951) in *The American Economic Review* and Carter (1951) in *The Economic Journal* are the only generally favorable reviews. These reviews are of the first 1950 edition of Morgenstern's book, published at a time when the econometric approach was on the rise. For negative reviews see Barna (1951) and (1965) in *Economica*, Clark (1952) in *Econometrica*, Ruggles (1964) in *The American Economic Review*, and Telser (1965) in *Econometrica*. Mainly published in journals championing the econometric approach, often these reviews criticize only minor and rhetorical points without grasping Morgenstern's central point and its implications for econometrics.

A more fundamental reason for the neglect of the error problem may be that the existence of important errors in economic data is an inconvenient truth for the modern economic

profession. Modern economics builds heavily on econometrics and, therefore, relies on the accuracy of economic data. There are several explanations for the extensions of mathematical and statistical research in economics, i.e. econometrics. James Surowiecki (2004) argues that the increased use of mathematics results from the "wisdom of crowds". Referees, journal editors, and members of hiring committees believe in the efficacy of econometrics. Clive Beed and Owen Kane (1991) indicate where this "belief" might stem from. Mathematical rigor can insulate against critiques from people without mathematical knowledge. Sophistication also diverts attention from more theoretical deficiencies and from the accuracy of economic data. Moreover, mathematics may be used to attain scientific respectability Katzner (2003). Attracted by the success of the natural sciences, economists may have adopted econometrical research to gain respectability. Daniel Sutter (2009) offers a reinforcing explanation for an excessive mathematization of economics. Academic research lacks a suitable medium of exchange because most of academic publications do not yield direct monetary revenues. Economists, in general, have nothing attractive to offer their colleagues from mathematical departments in exchange for mathematical input. Therefore, mathematical and statistical research cannot be outsourced from economics departments. Economic departments must hire mathematicians directly leading to a high level of sophistication in faculty and economics curriculum. Consequently, Surowiecki´s crowd becomes increasingly experts in mathematics and statistics.

For a profession heavily engaged in econometrical research the problem of the quality of

economic data is an inconvenient issue. The publication of possibly high error estimates could reveal the illusion of the accuracy of economic data. Econometric research relying on exact data would be severely challenged. This may explain why Morgenstern´s arguments have been ignored.

It is true that the publication of error estimates would just add another layer of subjective data. Therefore, it is essential to call the error estimate for what it is: an estimate and not an accurate measure. Another reason why error estimates are never given may be that there is no a precise way of calculating them. Yet, if the error estimate is provided with sufficient honesty and caution it would help to increase the quality of historic research based on economic data. The advantage of such an error estimate is that economic historians could continue with their research without creating an air of false accuracy. The error estimate would put their findings into perspective and reduce the chance of hasty and daring interpretations induced by an assumed accuracy of the data. An error estimate would also demand more cautious decisions of policy makers based upon the available data.

VI

Conclusion

In contrast to physics, there is still no estimate of statistical error within economics. Albeit subjective, error estimates would at least acknowledge the problem of faulty data and provide a caveat against too hasty conclusions. The various sources of error that come into play in the social sciences suggest that the error in economic observations is substantial. Classification problems, inadequate training of observers, filling of gaps, transmission errors, lying or hiding of information add up to a substantial source for errors. Especially, price and national income statistics are prone to substantial errors.

The accuracy of economic data is a widely neglected problem and should be taken into account by the economic profession. Economic statistics cannot be accepted at face value. This skepticism of the accuracy of economic data does not imply that one should ignore available statistics altogether. There is much to learn from analyzing available statistics. History teaches and illustrates. Yet, statistics have to be analyzed with the appropriate caution and with an awareness of potential errors. For instance, long term growth rates may give us certain insights about the evolution of a certain economy. They have to be interpreted with caution. Substantial errors become likely especially when comparing data internationally.

Pretending an accuracy that is unrealistic may lead us to erroneous conclusions. The consequences of Morgenstern´s insights are far-reaching. Based on faulty data, economic historians may misinterpret the past. Policy makers may make fateful decisions and econometricians develop flawed theories applying an inadequate methodology. In fact, Morgenstern's *On the Accuracy of Economic Observation* has an important implication

for modern econometrics. It shows that the solution of a system of economic mathematical equations or econometric models is, due to the quality of the data, problematic. In ignorance of the error in economic observation, econometric research seems to be vain. Thereby, Morgenstern´s critique of econometrics is different from other approaches that aim at arbitrary assumptions made by econometricians or the abuse of significance testing. Some economists regard econometrics as irrelevant as no scientific prediction in the field of human action and the social realm is possible. Morgenstern´s critique is complementary to the other approaches. Even if we assume, for the sake of the argument, that scientific prediction would be possible in the social realm, economic observations may not be accurate enough to provide econometricians with meaningful results.

The challenge for econometrics and modern economics posed by Morgenstern´s arguments may explain why these arguments have been neglected. Instead of investing resources in new econometric techniques and trying to squeeze more out of the existing data, the economics profession should invest these resources to improve the accuracy of data or to investigate the potential for error.

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