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The Suggestive Power of Numbers. Some Remarks on the Problem of the Accuracy of Quantitative Indi- cators in Comparative Historical Research

*Florian Waldow**

Abstract: The article discusses certain problems encountered when using quantitative data in comparative historical research. My main argument is that in many studies, the degree of accuracy of historical quantitative data and the degree to which the data actually represent what they are supposed to, i.e. if they are reliable indicators, is not taken into account adequately, thus leading to often unacknowledged distortions in the results. The discussion of statistical methods and results tends to disassociate itself from the question of whether it is at all possible to collect the relevant data in a reliable way, while at the same time the presumed status of quantitative data as "hard", "neutral" facts is upheld. The problem is systematically aggravated when these "hard facts" are used in comparative studies. The argument is exemplified with the help of historical data on Swedish public educational expenses.

1. Introduction

The following paper will deal with certain problems encountered when using quantitative data in historical social research. My main argument is that in many studies, the degree of accuracy of historical quantitative data is not adequately taken into account. Also, the degree to which data actually represent what they are supposed to, i.e. if they can really function as reliable indicators, is often not taken into consideration properly. These problems often lead to unacknowledged distortions in the results. The discussion of statistical methods

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and results tends to disassociate itself from the question of whether it is at all possible to collect the relevant data in a reliable way, while at the same time the presumed status of quantitative data as "hard" facts and "neutral" evidence is upheld. The problem is systematically aggravated when these "hard facts" are used in comparative studies.

I will first give a brief historical sketch of the emergence of quantifying thinking to show to which extent our conceptualisation of the social world is constructed through quantifying categories, resulting in the high degree of legitimacy quantifying methods enjoy in most subjects of social and natural science. I will then exemplify my main argument with the help of an example drawn from the field of historical economics of education. The argument concludes with some remarks on the necessity of rethinking the way in which we view quantitative source material.

In many European countries, in the 18th century people started getting interested in collecting quantitative data on various aspects of the conditions of social life.¹ This marked a major shift in the dominant conceptualisation of the world, part of which was the rise of statistics. In the beginning, this term was used to denote the "phenomena of particular interest of a country or a people" (*Staatsmerkwürdigkeiten eines Landes oder Volkes*).² This included, but was by no means synonymous with quantitative information about these "phenomena of particular interest". From the late 18th century on through the 19th and 20th centuries, the meaning of the term was gradually narrowed and shifted towards the meaning it has today.³ In most countries, the compilation of quantitative data started with the work of interested amateurs, who published their data in specialised journals. Soon the state followed their example: special bureaucracies for counting and measuring a wide range of observable facts connected to the geographical, demographic, economic, and social conditions of life in the various European countries were formed. There were certain national differences in the particular kinds of data the various bureaucracies collected, de-

¹ On the emergence of quantifying thinking see e.g. Ian Hacking, *The Taming of Chance* (Cambridge: Cambridge University Press, 1990). Somewhat in contrast to Hacking, who sees the 18th century as the starting point of official systematic data gathering, Peter Burke stresses the element of continuity in governments' systematic efforts to collect information about their people. C.f. Burke, *A Social History of Knowledge. From Gutenberg to Diderot* (Cambridge: Polity, 2000), p. 118-138.

² Definition by Gottfried Achenwall, one of the founding fathers of German university statistics.

³ For a long time, the old meaning of statistics still resonated in the term. Take for example the subtitle of a comprehensive handbook on a wide variety of aspects of Swedish society, economy, geography and history edited by the famous Swedish statistician Gustav Sundbärg, *Sveriges land och folk. Historisk-statistisk handbok* (Stockholm: Norstedt, 1901). This handbook contains some quantitative information, but it mainly consists of descriptions in the form of written texts. An English version, also edited by Sundbärg, was published in 1904 under the title *Sweden. Its people and its industry. Historical and statistical handbook* (Stockholm: government printing office, 1904).

mography often figuring prominently in early official statistics.⁴ Sweden, for example, was the first country to compile comprehensive population statistics for the whole country (starting in 1749).⁵ The sheer amount of data collected and published by the various statistical offices of the European nations was overwhelming, particularly from the second quarter of the 19th century on. This "avalanche of printed numbers", as the sociologist Ian Hacking has called it, was at the same time an expression of and a powerful driving force for a fundamental change within the dominant conceptualisation of the world: increasingly, the world was perceived in quantitative and quantifying terms.

Particularly in the early times of data collection, when the field was still dominated by individual private amateurs, data were often assembled for the sake of collection. Later, particularly after the compilation of statistics by official bureaucracies designed for that purpose had come under way, more utilitarian motives gained importance. The "avalanche of printed numbers" is part of the process of the rationalisation of state power, the shaping of modern, efficient bureaucracies and the formation of modern nation states. The evidence collected about the population through statistical measurement and counting thus also served the administration as a means of increasing control over the population and to make the exercise of power more efficient and pervasive. In any case, the nature of political discourse and of the exercise of state power was fundamentally transformed by quantification and numerization.⁶

Because of the very fact that arguments framed in quantitative terms are nearly ubiquitous in the discourse that shapes the social world we live in today, we are often not aware of the fundamental break the rise of quantification constituted. In order to recognise the specific explanatory value of a quantitative measure - such as e.g. a population's average life expectancy, which does not say anything about single individuals but only about statistical distributions -, the acceptance of a whole range of mental abstractions and assumptions is necessary. To us, these assumptions often seem so self-evident that we are not aware of them any longer, and the categorisation of the world in countable and measurable categories is not only a characteristic of the world of science, but has repercussions for everyday life: it "has affected not only the ways in which we conceive of a society, but also the ways in which we describe our neighbour,"⁷ and of course our own self-definitions.

⁴ This may have been due on the one hand to the importance mercantilism attributed to a strong population for the development of the economy and on the other hand on the requirements of maintaining a large standing army.

⁵ C.f. e.g. *Från folkbrist till en åldrande befolkning. Glimtar ur en unik befolkningsstatistik under 250 år. Fakta inför 2000-talet*, ed. by Statistiska Centralbyrån (Stockholm: SCB, 1999).

⁶ C.f. Nikolas Rose's fascinating account of the emergence of official statistics and their functions within modern nation states (in Rose, *Powers of Freedom. Reframing Political Thought* (Cambridge: Cambridge University Press, 1999), p.197-232.

⁷ Hacking, *Taming of Chance*, p. 3.

In the field of science and scholarly pursuits, the quantification revolution has transformed almost any aspect of the whole field. Even before the collection of official statistics had come fully under way, measuring and counting achieved a position at the core of the natural sciences.⁸ But in the social sciences and the humanities, too, the rise of quantification made itself felt even in areas that at first sight do not seem to have anything to do with quantification. Many phenomena that we today consider important parts of our social environment in a sense only came into existence through their quantitative measurement. In other cases, quantification fundamentally changed the meaning of concepts. For example, B. Seebohm Rowntree's famous (quantifying!) study of poverty in the English town of York changed our concept of poverty, introducing a fixed poverty line and thus making poverty a measurable phenomenon.⁹ Marx was a diligent reader of the official statistical materials of his time, and his view of modern society as a class society and his choice of categories used to describe this society cannot be conceived without the background of contemporary statistical material and the (quantifying) categories used in this material. The list of examples of how the choice of statistical categories designed for quantifying social and natural phenomena has fundamentally reshaped our conceptualisation of the world could be endlessly continued.

In some branches of modern science, quantification, i.e. measuring, counting, and the application of statistical methods to the evidence, has become the main defining characteristic of the scientific way of handling evidence and constructing explanations. This holds true not only for the natural sciences but also for many branches of the social sciences, most pronouncedly probably in the case of economics and to a certain degree also political science. But also within fields such as comparative education, quantification has enjoyed and still enjoys a high degree of legitimacy. Think for example about Noah and Eckstein's "classic" from the 1960s, a decade that was particularly quantification-minded, *Toward a Science of Comparative Education*.¹⁰ For Noah and Eckstein, what they call the "scientific method", i.e. scientific enquiry based on the analysis of quantitative data, is the route comparative education should take in the future. Noah and Eckstein's book is a good example for a positivist approach that considers quantitative data as "hard" facts that in some way give a "neutral"¹¹ picture of empirical reality, in this way being more objective and

⁸ C.f. A.C. Crombie, *Styles of Scientific Thinking in the European Tradition. The history of argument and explanation especially in the mathematical and biomedical sciences and arts*, 3 vols (London: Duckworth, 1994), vol 1, p. 520-529.

⁹ C.f. Rowntree's seminal work *Poverty. A Study of Town Life* (London: Macmillan, 1901). On efforts to make poverty measurable c.f. Pete Alcock, *Understanding Poverty*, (Basingstoke etc.: Macmillan, 1997), p.67-84 and p. 114-129.

¹⁰ Harold J. Noah & Max A. Eckstein, *Toward a Science of Comparative Education* (London: Macmillan, 1969).

¹¹ C.f. Noah and Eckstein's contention that "Only the data are neutral". Noah & Eckstein, *Toward a Science*, p. 99.

thus superior to the "soft" facts gained e.g. through the hermeneutic interpretation of texts.¹²

The enormous amount of data compiled by the official statistical offices over the last 200 years, although not assembled for that purpose in the first place, provides a wealth of source material for social historians. This body of evidence allows access to certain aspects of the social reality of the past that cannot be approached through other types of sources. Through the spread of modern, powerful personal computers and statistics programme packages, the use of quantitative historical data has reached a new dimension: complicated mathematical operations that in former times would have required the use of very expensive computing equipment today can be processed comparatively easily on almost any personal computer. The increased availability of these tools can easily lead to the use of statistical methods without proper knowledge of the way they operate, and quite frequently investigations arrive at results that are problematic from the viewpoint of statistical methodology. This problem, however, is widely recognised; there is no introductory handbook to statistics that does not contain a warning against the use of methods that are not justified in the particular research context.¹³

Another problem that is discussed far less frequently and that is often tacitly ignored in concrete empirical studies is posed by the structural restrictions placed upon the explanatory potential of empirical quantifying studies by the reliability and accuracy of the available source material. Put differently: the degree of accuracy of the data and the extent to which indicators really represent what they are supposed to is often not adequately taken into account. The form the evidence usually takes in source material such as official statistics, i.e. numbers, is sometimes misleading in that it suggests a degree of accuracy and exactness the evidence does not really possess. Of course the degree of accuracy varies greatly, and the fact that it is often not very high should not lead us to the conclusion that the data cannot be used at all. Yet, these structural problems should always be taken into account both when choosing and applying the methodology for the analysis of the data and when evaluating the results.

Thus, I would like to put forward the thesis that - despite the ubiquity of quantifying patterns of thinking - we have not yet developed a sufficient analytical distance to the type of information that is presented in the apparently "pure" and unequivocal form of numbers. With written texts, we are used to

¹² In some research contexts, the scientific reduction of the meaning of "empirical research" and the concentration on the type of empirical evidence that is countable has considerably impoverished the epistemic potential of the social sciences. C.f. e.g. Wolfgang Bonß, *Die Einübung des Tatsachenblicks. Zur Struktur und Veränderung empirischer Sozialforschung* (Frankfurt/M.: Suhrkamp, 1982), especially p. 44.

¹³ C.f. e.g. Konrad H. Jarausch & Kenneth A. Hardy, *Quantitative Methods for Historians. A Guide to Research, Data, and Statistics* (Chapel Hill & London: University of North Carolina Press, 1991), p. 22.

looking at our source material with a much more critical attitude concerning its empirical content; with quantitative data, this is not the case to the same extent.

I was confronted with problems of this type when working on a project designed to study the development of public educational expenditure in Sweden in a historical and comparative perspective. Using an example taken from this project, I now want to turn to these problems of measurement and representativity one invariably encounters in quantifying historical social research.

2. The case of Sweden

Figure 1 shows the development of public educational expenditure in Sweden from 1860 to 1895. The time series comprises expenditure on primary schools, secondary schools, certain technical and vocational schools¹⁴, universities, and certain other types of educational institutions financed totally or partially by the state¹⁵ and the municipalities. The data were partly compiled by me from the original sources (i.e. the official Swedish revenue and expenditure accounts)¹⁶ and partly taken from an existing data handbook published in the series of the *Historiska nationalräkenskaper för Sverige* (Swedish historical national accounts) that is in turn based on official statistics.¹⁷ The data are presented in the form of a time series.¹⁸ Time series studies are one of the most common types of investigations in quantifying historical social research. Data on public expenditure on education are widely used in economics of education as a quantifiable indicator for the size and consequently the growth of educational systems.¹⁹ The rise of human capital theory has particularly increased interest in

¹⁴ Under this heading I have subsumed a quite diverse group of schools: technical schools, medical schools (including schools for dentists, veterinarians, midwives, and apothecaries), schools for forestry, agriculture and mining, the school for the sports and gymnastics school, and the academies of music and arts. In the case of some of these schools, the full public expenditure could not be calculated from the official expenditure and revenue accounts due to unclear budgeting.

¹⁵ Military schools were not included in the data.

¹⁶ *Kapital-konto till riks-hufvud-boken*. Stockholm (various years).

¹⁷ Olle Krantz, *Historiska nationalräkenskaper för Sverige 7: Offentlig verksamhet 1800-1980* (Lund: Ekonomisk-historiska föreningen, 1987).

¹⁸ The data are not deflated. As the deflation of data on public expenses (particularly time series data) always poses a large number of methodical problems and as due to the gold standard inflation was almost non-existent in the period under study (c.f. Lennart Jörberg, *A history of prices in Sweden, 1732-1914* (Lund: CWK Gleerup, 1972); also Lennart Schön, *From war economy to state debt policy* (Stockholm: Riksgäldskontoret, 1989), p. 36), this seems justifiable.

¹⁹ Due to (among other things) screening effects and difficulties in measuring productivity growth in the educational system, educational expenditure is only a very insufficient and approximate indicator for the growth of educational systems. C.f. Steven Klees, "The Economics of Education: Is That All There Is?" in *Comparative Education Review* 35 (1991),

measuring educational expenditure, as the latter can be used as an input indicator for human capital.²⁰ Investigations using time series of educational expenditure may for example try to discover and quantify connections and relations between the growth of the educational system on the one hand and the economic system on the other in the development of different countries. Some recent investigations for example have found an anticyclical relationship between the growth rate of the educational system and the economic system for various European countries for the time before World War II.²¹ Many of the methods used in the study of time series, for example spectral analysis, were originally developed in the natural sciences.²² They are mathematically very sophisticated and need a sufficient series of exact data to produce reliable results. Often, the goal of the economic analysis of time series is to analytically isolate one part of the time series that is assumed to grow according to a regular fashion. This can then be explained theoretically from another part of the growth that is supposed to be governed by "random" forces. My time series was constructed according to the most common procedure, i.e. the available official statistics on public educational expenditure in the various sectors were aggregated.

A first look at the time series unaided by statistical methods already gives some information on the developmental pattern: in the period under study, the growth of educational expenses seems to have been rather linear. In a figure covering a longer time span, it would be possible to see that from the late 1890s on, growth seems to accelerate.

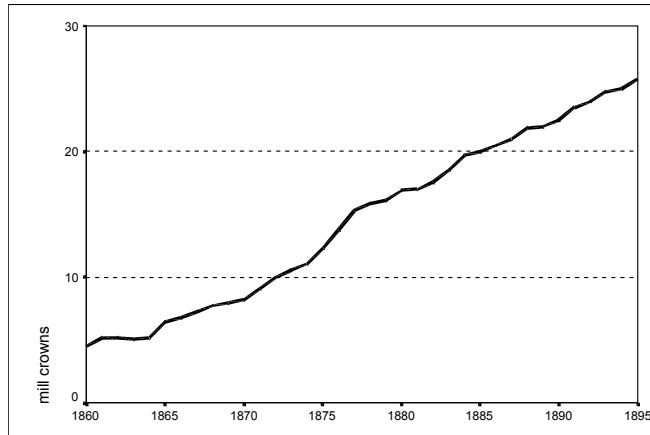
p. 721-734, particularly p. 722-729; Heinz-Werner Hetmeier. "Bildungsausgaben im Vergleich", in *Zeitschrift für Pädagogik* 46 (2000), p. 19-38, p. 28f.

²⁰ However, the traditional repertoire of methods and the canon of theoretical assumptions on which mainstream economics of education are based – including using educational expenditure as an indicator for the growth of educational systems – are increasingly coming under attack; c.f. e.g. Steven J. Klees, "The Economics of Education," p. 721-734. For the purposes of this paper, these problems cannot be discussed in more detail.

²¹ C.f. e.g. Claude Diebolt, *Education et croissance économique. Le cas de l'Allemagne aux XIXème et XXème siècles* (Paris: l'Harmattan, 1995); Claude Diebolt, "Deutsche und französische Bildungsausgaben im 19. Jahrhundert im Vergleich," in *Comparativ* 2 (1996), p. 72-84; Claude Diebolt, "Government Expenditure on Education and Economic Cycles in the Nineteenth and Twentieth Centuries. The Case of Spain with Special Reference to France and Germany," in *Historical Social Research - Historische Sozialforschung* 24 (1999), p. 3-31.

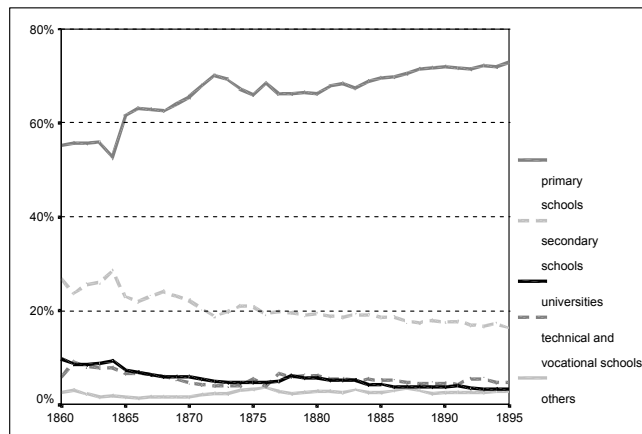
²² On spectral analysis and its use on historical economic time series, c.f. Rainer Metz, "Ansätze, Begriffe und Verfahren der Analyse ökonomischer Zeitreihen", in *Historical Social Research - Historische Sozialforschung* 13, vol 3 (1988), p. 23-103.

Figure 1: total public expenditure on education (state and municipalities) 1860-1895



As argued above, public expenditure on education is a fairly highly aggregated measure that is made up from a number of separate measures, i.e. the expenditure on the various parts of the educational system. Growth rates within the various sectors can vary considerably over time; a seemingly "smooth" rise of total expenditure can be the sum of very diverse development paths in the various parts that together constitute the total. Figure 2 shows the distribution of total public expenditure on education over the various sectors of the educational system from 1860-1895:

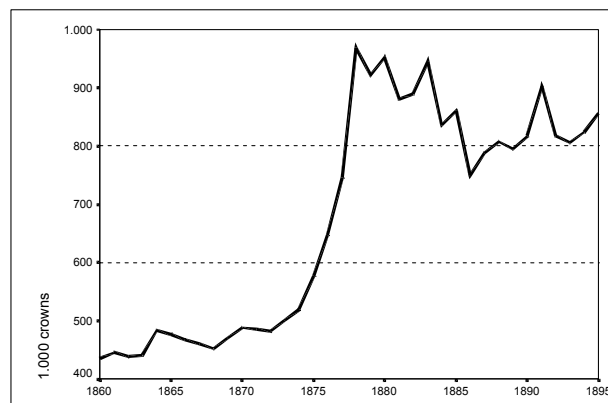
Figure 2: structure of public expenditure on education 1860-1895



The dominance of the share of primary schooling is immediately striking, rising from about 55 % in 1860 to 73 % in 1895. Secondary schooling undergoes a slow decline from about 27 % in 1860 to about 16 % in 1895. Universities and technical and vocational schools lie on a similar quantitative level, both below 10 % during the whole period under investigation. In the beginning, the universities' share is slightly higher than that of the technical and vocational schools. Around 1880, however, the universities are "overtaken" by the technical and vocational schools. In 1860, expenditure on the universities accounts for just below 10 % of total public expenditure on education. This declines to just above 3 % towards the end of the investigated period.

In the following, I will focus on expenditure on the universities.²³ We will see that the information available from the official revenue and expenditure accounts gives only a very distorted picture of the real financial conditions and the real quantitative growth processes in university expenditures. As the time series for total public expenditure on education is just the aggregate of the time series for the various sectors of the educational system, the accuracy of the data for the educational system as a whole is called into question (to say nothing of the function of these data as an indicator for the growth of the educational system). Figure 3 shows the development of university expenditure paid directly from the state budget:

Figure 3: university expenditure directly from state budget 1860-1895

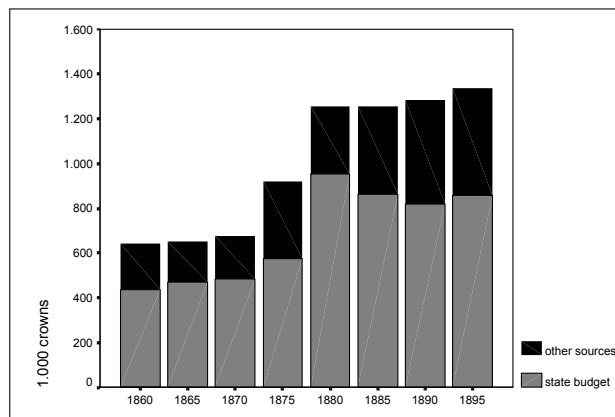


²³ Only the old Swedish universities of Uppsala and Lund are included in my data. The *högskolor* of Stockholm (founded 1877) and Göteborg (founded 1891), which in the first years of their existence had very few students and were financed by endowments and municipal grants, were not included.

We can discern a slow increase up to the middle of the 1870s, then a sharp increase until about 1880, after that a stagnation or even decline.²⁴ These are the data that were incorporated in the time series for total public expenditure on education. If one focuses only on these data, a researcher is bound to conclude that the universities' financial situation was worsening towards the end of the century.

For some of the years, however, data are available on total university expenditure,²⁵ i.e. data covering not only the amount of money paid directly from the state budget, but also the financial means coming from other sources such as endowments. If we include these data, the picture changes significantly. Data from Widell are available only for every fifth year; this is the reason why I do not present the data in the form of a continuous line as in figure 3:

Figure 4: source of university expenditure 1860-1895 - a.



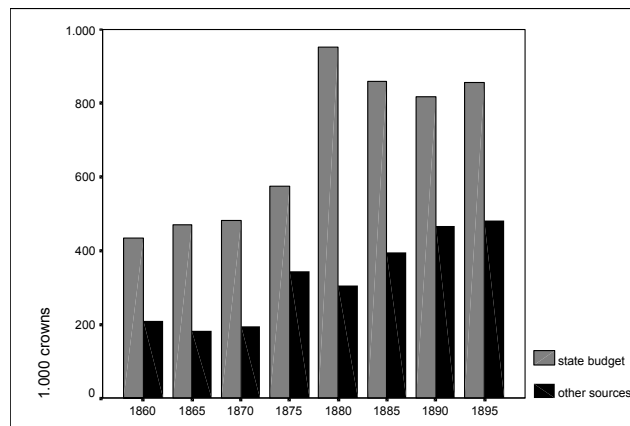
We can see that, if we include sources of finance other than the state budget, there is no decline in university expenditure after 1880 but, on the contrary, an increase. Admittedly, the increase of total university expenditure after 1880 is much weaker than the increase in the decade from 1870-1880; still, figure 4 shows a development that differs considerably from the picture shown in figure

²⁴ Speaking of a decline despite the fact that educational expenses stay roughly on the same level seems justified, as the general trend of nearly all curves of educational expenses in the different sectors shows an underlying trend of comparatively strong growth.

²⁵ C.f. Ludvig Widell, *Sveriges Finanser under senare hälften af 1800-talet. Ett försök till en allmän svensk finansstatistik* (Lund: Möller, 1900).

3. If we make a direct comparison of the part of university finances that was paid directly from the state budget and of the part coming from other sources, we can see even more clearly how the changes in the amount of money coming directly from the state budget to a certain extent are offset by the money coming from other sources:

Figure 5: sources of university expenditure 1860-1895 - b.



We can see compensation effects quite clearly. The increase in the money coming directly from the state 1855-1860 is evened out by a decrease in the share coming from other sources. Even more clearly we can see how the decrease of the amount of money coming from the state budget from 1880 on is compensated by an increase in the amount of money coming from other sources. The degree to which it was possible to make use of 'other sources' was probably mainly determined by the fluctuations of the returns from the universities' endowments through the rise and fall grain prices.²⁶

At first sight, these observations do not seem to be very exciting. It is a well known fact that the Swedish universities possessed endowments (albeit much smaller than the old English universities or the American universities) that provided a certain income beside the money coming from the state budget. Also, the compensation of financial shortages caused by a decline in the amount of money coming from the state budget through money coming from other sources seems to be a quite simple mechanism. The fact remains, however, that although facts such as these often are known to historians of educa-

²⁶ For the organization of the finances of Lund university c.f. Jörgen Weibull, *Lunds universitets historia IV. 1868-1968* (Lund: CWK Gleerup, 1968), passim; Krister Gierow, *Lunds universitets historia III. 1790-1867* (Lund: CWK Gleerup, 1971), particularly p. 25-84; Karin Helmer, "Lund universitets jordegendomar under 300 ar", in *Ale. Historisk tidskrift för Skaneland*, No. 1 (1989), p. 17-26.

tion, they tend to be ignored by economists of education that are exclusively concerned with quantitative investigation.²⁷ We only get a (more) accurate picture of university expenditure (and consequently, of the quantitative development of this part of the educational system, assuming that educational expenditure can function as an indicator for educational growth) if we include these sources of finance in our calculations. Using only the state budget and other official statistics as a source for educational expenditure, as is usually done in economics of education, will give a very distorted picture of total university expenditure. And the problem is not limited to the universities: all parts of the educational system as shown in figure 2 provide similar problems of data collection. The technical and vocational schools, too, had other sources of income beside the state budget. It is difficult to estimate the exact of money coming from these sources, but taking into account only some sketchy information that is easily available the error incurred by not including other sources of finance is on a similar scale as in the case of the universities.²⁸ The secondary schools, too, possessed other sources of income than the state budget, such as endowments and tuition fees. Primary schools usually did not possess endowments and did not collect tuition fees, but part of the salaries of the teachers were paid in kind, which again leads to enormous problems when trying to calculate public expenditure on primary schools.²⁹

3. Conclusion

Of course, the data collected in the usual way from official statistics are of some empirical interest.³⁰ In the case of most countries of continental Europe,

²⁷ Steven Klees has pointed to the remarkable degree to which many practitioners of mainstream economics and economics of education tend to ignore criticism of their methods and theoretical assumptions. C.f. Steven J. Klees, "The Economics of Education," p. 721-734, p. 729-733.

²⁸ Widell presents some data on the financing of technical and vocational schools for the years 1850 and 1897 which show the large extent to which some of these schools were financed by external sources; c.f. Widell, *Sveriges Finanser*, p. 146-149. Widell does not include all technical and vocational schools that I included in my calculations, so his data on these schools are not directly comparable with my data as presented in figure 1 and figure 2.

²⁹ In the data handbook from which expenditure on primary schools was taken, an estimation of payments in kind was included in the data. By necessity, however, this estimation remains very vague and is laden with a whole range of methodological problems. C.f. Krantz, *Offentlig verksamhet*, p. 91.

³⁰ The interest of historical official statistics lies not exclusively on the quantitative level. The production of official statistics often sheds an interesting light on the way the state constitutes itself and how it defines its domain; changes in the production of official statistics thus often point to changes in the dominant concept of the state and what its tasks should be. Peter Burke sees e.g. the emergence of official statistics on the demographic development in the 18th century in conjunction with the growing size of European standing armies; c.f. Burke, *Social History*, p.135.

they cover a large part of total expenditure on education. However, as we have seen, they are not suited to function as an indicator for the quantitative development of the educational system as a whole in a historical perspective even in Sweden, i.e. a small, highly centralised country with an educational sector that is overwhelmingly public,³¹ a well-functioning bureaucracy and official statistics renowned for their accuracy. Conditions become even worse in the case of educational systems with a large non-public or semi-public sector, e.g. many Southern European countries or Great Britain, where a large part of the educational system was (and continues to be) run privately or by the church. Due to the fact that historical source material on the non-public sector of the educational system tends to be scarce and scattered to different archives, it often is very difficult to collect the data for this part of the educational system. In the countries that possess a large non-public sector, time series of the development of public expenditure on education are even less representative for the development of the system as a whole. In the case of many countries (e.g. Spain) it is not even possible to arrive at a rough estimate of the proportion of the educational system that was non-public. In order to take these structural properties into account at least in an approximative way (to say nothing of the application of sophisticated mathematical methods to these data), it is necessary to possess detailed knowledge about how the structure of the particular educational system that is studied. All time series of public expenditure on education misrepresent the development of the system as a whole in a certain way and, what is perhaps even more important, they all misrepresent the development of the system as a whole in a *different* way, depending on the particular build-up and the particular pattern of financing of the educational system studied. This means that the problem is aggravated in comparative studies. Due to the differences in the systemic pattern of different systems of education, public expenditure on education in one country in most cases cannot be treated as the functional equivalent of public expenditure on education in another. In this light, Claude Diebolt's assertion that for an international comparison of the educational expenses of different countries it is important to use standardised definitions³² perhaps needs to be specified more clearly: When comparing data from different systems of education, standardising the definitions must not remain on the level of mere *names*. Only collecting the data according to standardised "labels" (e.g. "only public expenditure" etc.) is more a sign of a methodological fetish than of methodological rigour. Instead, standardising the definitions will usually have to mean identifying *functional equivalents* and comparing them.³³

³¹ This is true even for the 19th century, though to a somewhat lesser extent than for the present.

³² E.g. Claude Diebolt, "Deutsche und französische Bildungsausgaben im 19. Jahrhundert," p. 76.

³³ The need to compare functional, not nominal equivalents of course also applies to qualitative comparisons. See e.g. Heinz-Gerhard Haupt & Jürgen Kocka, "Historischer Vergleich: Methoden, Aufgaben, Probleme" in *Geschichte und Vergleich. Ansätze und Ergebnisse in-*

Thus, a situation is very well imaginable where the best course to take in a comparative study would be e.g. to include the private educational sector in one country (e.g. a country with a large non-secular sector) and to leave it out in another (e.g. if it is very difficult to obtain the data), depending on the particular systemic pattern of the educational systems studied.³⁴ This means that quantitative comparative studies have to be done with particular sensitivity for qualitative systemic differences between the countries that are studied. In most cases, researchers focusing exclusively on the quantitative side will run a great risk of arriving at seriously flawed results.

I do not want to create the impression that I am denying the value of quantifying studies in historical social research entirely, as the more extreme proponents of the linguistic and culturalistic turn sometimes do. But I do think it is necessary to assume a more critical attitude towards the kind of data that are available to us and to subject our quantitative data to the same critical standards we usually apply to source material that takes the form of written texts. Quantitative research methods still possess great potential and are a powerful research tool that can be used to access parts of social reality that cannot be studied in other ways. However, we need an awareness not only of the potential, but also of the limitations both of our methods and our data. It is not sufficient to critically examine the methods used and the explanatory potential of the results of quantitative studies from a mathematical-statistical point of view; it is also necessary to take into account the degree of accuracy and the epistemological status of the data more thoroughly than is often done. In order to do this, we need an intimate knowledge of the structure of the studied phenomena. It is through such a reconstructed relationship to our sources that we can avoid the imperative of more and more sophisticated methods and achieve a firmer empirical rooting of our research. In an article first published in the beginning of the 1970s, François Furet predicted that the rise of quantitative methods within historiography would make researchers aware of the "constructed" nature of all evidence and thus lead to an increased theoretical awareness and a loss of "epistemological naïveté".³⁵ Unfortunately, Furet's prediction has not come

International vergleichender Geschichtsschreibung, ed. by Haupt & Kocka (Frankfurt & New York: Campus, 1996), p. 9-45. Functional equivalents can of course be identical with nominal equivalents in certain cases, depending on the studied phenomena and on the research question. Also, it should be noted that with the change of educational systems over time, relations of functional equivalence, too, change.

³⁴ C.f. also Heinz-Werner Hetmeier's remarks on the difficulties connected to the compilation of the OECD educational statistics. Hetmeier "Bildungsausgaben im Vergleich", p. 19-38, p. 24, and Jean-Claude Eicher's remarks on the comparability of international data on educational expenses in Eicher, "International Educational Expenditures," in *International Encyclopedia of economics of education*, 2nd edition, ed. by Martin Carnoy (Oxford: Pergamon, 1995), p. 443-450, p. 444.

³⁵ François Furet, "Die quantitative Geschichte und die Konstruktion der geschichtlichen Tatsache," in *Seminar: Geschichte und Theorie. Umriss einer Historik*, hg. von Hans Michael Baumgartner und Jörn Rüsen (Frankfurt: Suhrkamp, 1982), p. 97-117, p. 103.

true. One could even argue that the rise of quantitative methods has had effects contrary to those expected by Furet. As has been said above, the question of whether it is at all possible to construct the relevant indicators in a reliable way often is not treated with the necessary thoroughness, particularly in economic research contexts. At the same time, the presumed status of quantitative data as "hard" and "neutral" facts is upheld; the "apparent facticity of the figure obscures the complex technical work that is required to *produce* objectivity."³⁶ Thus, despite the fact that we have been surrounded by a quantified world for a long time now, we still often regard the empirical content of evidence that takes the form of numbers in a much more naive fashion than the empirical content of evidence that has the form of a written text. Numerical data are no more "neutral", no more objective than other types of evidence and have to be viewed with a critical, realistic attitude, a fact we have yet to become fully aware of.

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³⁶ Rose, *Powers of Freedom*, p. 208.

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