Are "Consistent Time Series Data Relating to Pakistan's Large-Scale Manufacturing Industries" Inconsistent: A Comment

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In the Spring 1976 issue, The Pakistan Development Review published an article by A. R. Kemal [2] on "Consistent Time Series Data Relating to Pakistan's Large-Scale Manufacturing Industries" (hereafter referred to as *Kemal I*). That article was followed by a second article [3] in the Winter 1976 issue of the same journal, entitled "Sectoral Growth Rates and Efficiency of Factor Use in Large-Scale Manufacturing Sector in West Pakistan" (hereafter referred to as *Kemal II*).

These two articles had very significant impact because they purport to present more realistic figures describing the development of Pakistan's large-scale manufacturing sector during the period 1959-1960 to 1969-1970. This was a period in which that sector grew rapidly and was subject to strong structural changes. Fresh data for the large-scale manufacturing sector during that critical period could therefore lead to a reinterpretation of Pakistan's economic history during the 1960's. The purpose of the two Kemal articles appears to have been to provide such a new statistical picture for large-scale manufacturing, and the study on which they were based was financed by the Planning Commission, Government of Pakistan.

Unfortunately, a careful reading of the articles shows that Kemale's figures in no way can be considered an improvement on other available data on the large-scale manufacturing sector in Pakistan. On the contrary, they are in fact grossly misleading. His data have already been used extensively for further analytical work within the Pakistan Institute of Development

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Economics (hereafter referred to as PIDE), and some of the studies have been or are on the point of being published. Since his figures as shown below do not stand scrutiny, any analysis based on his data will yield useless or even misleading conclusions.

Kemal I contains, firstly, a useful survey of existing data on large-scale manufacturing, and the author shows that the annual Census of Manufacturing Industries (CMI) suffers from one essential weakness, *viz.*, that the coverage is very weak, and that the under-coverage appears to vary greatly from year to year. This does, of course, reduce the value of the CMI for inter-temporal comparisons.

Secondly, Kemal points out that the definitions of certain variables have changed over time. Thus, for example, the CMI reported prior to 1962-1963 only the written-down values of the capital at the end of the year, and thereafter the value of the capital at the beginning of the year—somewhat confusingly referred to by Kemal as "gross value of capital". Similarly, upto 1959-1960 data for value added and gross output excluded indirect taxes, which have been included as from 1962-1963. He also points out that no census were taken in 1960-1961, 1961-1962 or in 1968-1969.

Thirdly, he calls attention to the fact that gross value added as reported in the CMI equals value of output less direct industrial costs (raw materials, fuel and electricity etc.), and that it therefore includes other purchased inputs like water, banking and insurance charges etc. He further points to the limited value of other data on the large-scale manufacturing sector, such as output data for certain products, and the quantum index of industrial production.

In short, Kemal skillfully puts forward a convincing case for making an attempt to produce better figures. However, the method which he has chosen to arrive at fresh estimates of some of the important series of data contained in the CMI, in our view is built on so many doubtful assumptions that it is bound to lead to even more misleading figures than the existing series of data for output, value added, employment wages, and fixed assets in large-scale manufacturing.

The key element in Kemal's method is his attempt to calculate better figures for the value of fixed assets in the 17 different groups of large-scale manufacturing industries for which data are presented in the CMI. He arrived at yearly figures for fixed assets by estimating the investment of each industry in preceding years. To arrive at the present value of past investments he applies depreciation rates allowed by Government, taking into account the effect of tax holidays on the actual rates of depreciation applied by the firms.

The weakest link in this method is the data on investments. Prior to 1962-1963 Kemal relied on "investment indices" based on the values of imported machinery; from 1963-1964 onwards he uses data published by the Planning Commission, and adds data on sanctioned investments, so as to include firms not covered by the Planning Commission's figures. (He apparently arbitrarily assumes that 70 percent of the sanctioned investment was in fact made.) Kemal himself points out that the Planning Commission's data are based on annual sample surveys conducted by the Central Statistical

Office, but offers no evidence for the assumption that these sample surveys should be considered more reliable than the CMI itself. Similarly, the implied assumption that there is a stable relationship between sanctioned and implemented investments, both over time, and between industries, is not examined, nor is the validity of the procedure of establishing investment indices for individual industries on the basis of data for machinery import. Finally, it should be pointed out that Kemal uses different methods for estimating investments for the years up to 1962-1963 and for the later years; his series for fixed assets are therefore *not* necessarily internally consistent over the entire period 1959-1960 to 1969-1970.

Kemal's assumptions as regards depreciation have significant consequences for his estimates of output, value added, industrial costs, employment and wages, other costs, and indirect taxes on the basis of his estimated series for fixed assets in each industry.[1] He assumes that the ratios between fixed assets and all these other items are the same as reported in CMI for the different years for which CMI is available. Thus, he implicitly assumes that the only reason why the CMI figures for fixed assets (in virtually all cases) are below his own figures is undercoverage, and that he therefore can "blow up" the CMI figures for employment, output etc., by the ratio between his own estimates of fixed assets, and those given in the CMI. This procedure is dubious for at least two reasons: First, it is highly doubtful that the figures for fixed assets reported by the respondents and presented in the CMI have been calculated in the same manner as Kemal's figures; Second, it is a well known fact that figures for fixed assets in manufacturing censuses all over the world are subject to serious errors, precisely because of valuation problems.

Furthermore, the method is only valid if the firms not covered by the CMI are similar to those actually covered in a number of essential ways:

—the distribution between sub-groups inside each major industrial group is the same;

—the capacity utilisation is the same;

—the amount of capital under installation and not yet in use is the same, in relation to total capital; and

—the age composition of fixed assets is the same; etc.

These doubts and objections suggests that his method may indeed have led Kemal to very questionable results. A quick review of Appendix tables 1 A to 1 Q in *Kemal I* confirms this, see Table 1 where we review changes in *employment* over time, as shown in *Kemal I* and (in brackets) new figures shown in *Kemal II*.[2]

[1] For our purpose it is unnecessary to discuss in detail Kemal's method of writing down the value of cost investment since it has been used consistently over time.

[2] A review of employment figures is particularly illustrative since they are not influenced by changes in prices. However, the figures for wages, gross value of product, industrial costs, other costs, indirect taxes and value added, defined in three different manners, also show corresponding fluctuations.

Table 1

Changes in Employment in Different Industry Groups in Pakistan During the Period 1959-1960 *to* 1969-1970

(1959-1960 = 100)

Year	Food	Beverages	Tobacco	Textiles	Clothing/ footwear
1959-1960	100	100	100	100	100
1960-1961	109	325	124	91 (102)	129 (103)
1961-1962	118	258	146	78 (104)	157 (106)
1962-1963	126	539	188	107	186 (110)
1963-1964	109	646	280	106	114
1964-1965	167	723	433	111	214
1965-1966	187	529	334 (412)	115	201
1966-1967	163	589	429	133	286
1967-1968	204	524	493	192	390
1968-1969	209	614	568	188	421
1969-1970	214	705	648	170	452

Year	Paper and prods.	Printing publish.	Leather & prods.	Rubber prods.	Chemicals & prods.
1959-1960	100	100	100	100	100
1960-1961	126	183 (122)	116	98	335 (154)
1961-1962	152	278 (143)	138	84	307 (164)
1962-1963	177	464 (165)	141	105 (94)	233 (173)
1963-1964	183	218	132	94 (105)	208
1964-1965	188	245	152	181 (112)	216
1965-1966	408 (271)	305	205	119	197
1966-1967	572 (353)	305	203	154	174
1967-1968	901 (436)	363	287	165	194
1968-1969	868 (519)	376	327	210	270
1969-1970	559	376	307	273	303

Continued—

Table 1—*Contd.*

Year	Non-met. min. ind.	Basic metals	Metal products	Non-elect. machinery	Electrical machinery
1959-1960	100	100	100	100	100
1960-1961	100 (100)	94	147 (125)	107 (100)	165
1961-1962	87 (101)	123	294 (149)	106 (100)	232
1962-1963	70 (101)	132	361 (173)	100	336
1963-1964	101	131	197	125	267
1964-1965	218	160	304	275	336
1965-1966	115 (228)	99	331	406	370
1966-1967	273	126	299	442	404
1967-1968	274	191	351	518	457
1968-1969	194 (272)	175	331	559	411
1969-1970	145 (253)	171	317	563	348

Year	Transport equipment	Miscellaneous industries
1959-1960	100	100
1960-1961	107	88
1961-1962	101	68
1962-1963	100	48
1963-1964	180 (104)	100
1964-1965	109	82
1965-1966	155	67
1966-1967	144	76
1967-1968	217	99
1968-1969	227	87
1969-1970	229	74

Source: ***Kemal I***, appendix tables 1A to 1Q. Figures in brackets are from ***Kemal II***, appendix tables 1-a to 1-p.

The employment figures as presented in the table, show unlikely large and some times very surprising jumps from one year to another. It is particularly disturbing that from time to time employment is shown to fall by 40 percent or more between two years. In some few cases for industries which employ relatively few people, the starting up of one large factory will, of course, lead to a sharp increase in employment, but such situations are few. Moreover, they do not explain the reported drastic falls in employment. As mentioned in the footnote, these very large changes over short periods of time occur for the other figures in the time series also.

Before his second article was published Kemal was aware of this criticism against his first article. He therefore reviewed some of his figures and undertook certain modifications, *viz.*, the figures shown in brackets in Table 1. The new figures eliminate some, but not all, of the most glaring cases of unexplicable year to year movements. However, Kemal has not explained how he arrived at these new figures, and as far as I can see, the very basis of all his figures, *viz.*, the figures for fixed assets, has not been revised between *Kemal I* and *Kemal II*. He has therefore altered the ratios between fixed assets on the one hand, and employment, wages, gross output etc., on the other, but he has not explained how he did this. It is in itself doubtful whether it is at all permissible to adjust those ratios which represent the very core of Kemal's method. But if it is done, the changes must at least be documented, and justified on the basis of a thorough examination of the figures in the Census of Manufacturing Industries. If this, in fact, has been done, *all* the figures in the CMI should have been scrutinized and not only those which led to apparently meaningless figures for employment etc.

To conclude, the method used in *Kemal I* to obtain "consistent time series" is highly dubious, even internally inconsistent. The published results are themselves a clear demonstration of how bad the method is.

Kemal I had the limited purpose to present consistent time series of a number of key data for manufacturing industries. However, all value figures were expressed in current prices, and did not lend themselves easily for further analysis. In *Kemal II* the author presented the results of two sets of calculations : recalculated estimates of investments and depreciation to arrive at "corrected replacement costs"; and time series expressed in constant prices by applying price indices for individual industries.

The recalculated estimates for fixed assets at corrected replacement cost are essential for Kemal's estimates of capital-output and capital-labour ratios. While these no longer correspond to the ratios obtained from the CMI, they might conceivably represent improvements over the original data. Unfortunately, however, also in this case the method used cantains many potential sources of error, particular the price indices used for different types of capital goods. It would seem necessary, therefore, before reliance is placed on Kemal's new series of "corrected replacement costs", to subject both

Kemal's methods and details of calculation to further scrutiny. This is not done by Kemal himself and also falls outside the scope of this note.

We shall, however, seriously question Kemal's method of deflating the current price figures for output and value added at market prices and at factor costs. As a basis for his calculations he has used indices for *output* prices. While these indices in principle can only be applied to data on output at market prices, he has used them for data expressed in factor costs as well; he has even used them for value added data! On the latter point he states flatly: "Because of the non-availability of price indices for a large number of inputs, it was not possible to construct value added deflators" (*Kemal II*). But, of course, if it is not possible to construct value added deflators, then it is also not possible to arrive at value added in constant prices or at constant factor cost. The ratio of value added to output typically does not remain constant over time. The changes that do take place, may be caused by changes within the industry itself (*e.g.*, the manufacturing of more processed or higher quality products on the basis of the same raw material input will tend to increase the ratio value added to output, and the same will be the case if purchased components for assembly operations are replaced by components produced within the industry); they may also result from different rates of price changes for output and inputs. It would seem to be highly inappropriate to estimate value added at constant prices (or at factor costs) without using separate deflators for output and input. Indeed, for most industries it is no more difficult to construct some kind of price index for inputs than for outputs.

Kemal's method of "deflating" value added leads to very poor results for most, if not all, industry groups, probably also for the total. If we added up the figures in Appendix tables 1-a to 1-p in *Kemal II*, we get results as shown in Table 2.

Table 2 shows that both at constant prices and at constant factor cost, value added increased considerably faster than gross output. At constant prices value added in percent of output rose from 23.7 in 1959-1960 to 33.8 in 1969-1970—at constant factor cost the corresponding figures are 22.8 and 28.2 percent. Neither of the two sets can be used with any confidence. The first set of figures are strongly influenced by rising indirect taxes; the second set has been derived by an inappropriate method of calculation which leaves quite open and unanswered the important question: Has the share of value added at "constant factor cost" risen because manufacturing industries make better use of their inputs, or is this increase merely, or mainly, a result of favourable price developments (*i.e.*, prices of output increasing more rapidly than those of inputs)?

In his second article, Kemal himself shows such confidence in his own figures that he without further questioning draws the conclusion that growth rates as reported in a recent article by Guisinger [1] are too low. Kemal's figures give a growth rate of gross value added at constant prices of 13.5 percent for the six-year period 1963-1964 to 1969-1970 against Guisinger's figure of 9 percent for the seven-year period 1963-1964 to 1970-1971. Kemal's "estimates" imply that the growth of gross value of manufacturing output at constant prices has been 114 percent in the course of six years (or 143 percent

Table 2

Changes from 1959-1960 *to* 1969-1970 *According to Kemal II*

(Value figures Rs. thousand)

All industries, total	1959-1960	1969-1970	Compound annual rate of growth
Employment, numbers	401,710	805,671	7.21
Gross value of product at constant prices of 1959-1960	5,842,403	17,806,362	11.79
Gross value of product at constant factor cost of 1959-1960.	5,775,277	16,418,204	11.01
Gross value added at constant prices of 1959-1960.	1,384,766	6,019,752	15.83
Gross value added at constant factor cost of 1959-1960.	1,317,370	4,627,332	13.39

Source: *Kemal II*, appendix tables 1-a to 1-p. Note that the growth rates shown in this table differ slightly from those in table 7 of *Kemal II:* Gross value added at constant prices 15.83 against 15.71 in *Kemal II*, gross value added at constant factor cost 13.39 against 13.38 in *Kemal II*. The reason may be misprints in the appendix tables which lead to wrong totals (or mistakes in calculations behind table 7). Note also that implied indirect taxes in 1959-1960 amount to Rs. 67,126,000 on the basis of gross output against Rs. 67,396,000 on the basis of the figures for on the basis of gross output against Rs. 67,396,000 on the basis of the figures for value added. A similar discrepancy is found for 1969-1970 as well: Rs. 1,388,158,000 on the basis of gross value of product, Rs, 1,392,420,000 on the basis of gross value added. This again suggests misprints or miscalculations.

for seven years if the rate of growth had continued for another year) against 83 percent growth during seven years according to Guisinger. Results so strikingly different from those of another piece of research should have cautioned Kemal to review his methods, check his calculations and evaluated his results.

Similarly, attention should be drawn to the estimates for employment. Kemal's estimates imply that employment in large-scale manufacturing more than doubled between 1959-1960 and 1969-1970, and that the absolute increase in number of jobs was about 400,000.[3] The un-adjusted CMI-data show an increase of about 110,000 for the same period. If Kemal's "estimates" were

[3]Kemal does not report totals for all manufacturing industries in any of his articles himself.

right, large-scale manufacturing did contribute far more to employment creation in Pakistan in the 1960s than usually assumed. Unfortunately, Kemal's figures do not pass the test of scrutiny and give no basis for the conclusion that previous estimates are far too low.

Kemal could have checked the validity of his figures in several ways, but did not do so. Firstly, it is possible to compare the data for output at constant prices with fairly reliable data on total production (for products subject to indirect taxation). Such a comparison shows the following results for the ten-year period 1959-1960 to 1969-1970:

Kemal shows that output of the *tobacco* industry at constant factor costs rose by 431 percent; cigarette production increased by 174 percent during the same period. According to Kemal the *taxtile* industry increased its output by 155 percent; output of cotton textiles (which still dominate textile production in Pakistan) rose by 58 percent during the same period. Kemal's figures for output in the *pulp, paper and paper products* industry showed an increased by 651 percent; output of board (which is the principal product in that industry) rose by 173 percent. For the *non-metallic minerals* industry Kemal's data shown an output increase of 114 percent only, while cement production (which constitute the bulk of the output in that industry) rose by 171 percent; in this case, however, Kemal shows an increase of 102 percent during the first five years of the period, while cement production only rose by 69 percent, but an increase of only 6 percent during the second half of the period when the output of cement rose by 60 percent! All the examples show a wide gap between Kemal's estimates for the period as a whole, and data available on output in some important industries. The cement example also shows that Kemal's time series are completely inconsistent with pendent data for major outputs.

Secondly, Kemal could have compared data on collection of excise duties and sales taxes on locally manufactured products with his figures for indirect taxes. This comparison shows following results:

(Rs. mill.)

	1959-1960	1964-1965	1969-1970
Kemal's figures	(67.4)	684.8	1,702.4
Date from public accounts	358.9	638.6	1,197.8

It is unclear how Kemal obtained his figures for 1959-1960 (they are not available in the CMI 1959-1960), but the total implied in the Appendix tables of *Kemal II* is obviously too low.[4] The figures for 1964-1965 and 1969-1970 may, however, have been established on a comparable basis. Kemal's figures show that indirect tax payments by large-scale manufacturing industries rose by 149 percent during these 5 years-data from Government accounts snow merely an increase of 86 percent during the same period.

[4]In fact, a closer look into Kemal's figures reveals that the "gross value...at constant prices" in appendix tables 1-a to 1-p in *Kemal II* for 1959-1960 are *not* estimates of output and value added *including* indirect taxes as one is led to believe, but something quite different. In appendix table 1C, *Kemal I*, we find for the Tobacco industry: Value added as defined by the CMI (*viz.* before deduction of "other costs") 64,586. This same figure is presented in table 1-b in *Kemal-II* as "gross value added at constant prices of 1959-1960" which for later years is value added including indirect taxes! Obviously, therefore, Kemal has not made any estimate of indirect taxes in 1959-1960, and the figure of Rs. 67.4 million presented, in the table above appears to be completely meaningless. Since Kemal's 1959-1960 figure at "constant 1959-1960 prices" is not estimated on the same basis as for later years, the time series is not even formally consistent.

CONCLUSIONS

It is impossible to draw any other conclusion from the exercise reported above than to totally reject the figures presented in *Kemal I* and *II* as a basis for analysis of the evolution of Pakistan's large-scale manufacturing industries. Kemal's intentions have been the very best, but his articles demonstrate, unfortunately, lack of judgment and insight into statistical and industrial realities. It is very regrettable that his apparently competent presentation of findings have lead so many other researchers to use his data for further analysis.

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