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Italian Industrial Production, 1861-1913: A Statistical Reconstruction
B. The Extractive Industries

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B. THE EXTRACTIVE INDUSTRIES

B01. Introduction

B01.01 The output data and estimates

In the 1911 *Censimento demografico* and *Censimento industriale* the extractive industries are covered by *categoria* 2, divided into three *classi* that correspond respectively to mining (2.1), quarrying (2.2), and a residual covering sea salt, peat, and mineral water (2.3). In the aggregate, the industry seems defined almost exactly as in the *ISIC*; in particular, in both classifications the industry includes both extraction proper and whatever further processing the extracted material undergoes before being shipped.

For present purposes the extractive industries are divided into two groups: on the one hand, mining, broadly defined to include the first and third of the census *classi*, and, on the other, quarrying alone. This division reflects the nature of the output data provided, for both groups, by the Corpo delle miniere. Mining was of course that body's first concern, and the corresponding output data are unusually complete and of high quality. A few unorthodox products were monitored annually only from near the middle of the period at hand, and mineral water remained always beyond the scope of their reports (save as the joint product of some other operation); but these are limited exceptions, and the industry is here covered by 27 product-specific series.

For the Corpo delle miniere, quarrying was a secondary concern, and the quarrying data are almost a mirror image of the mining data. Only the production of (Carrara) marble was monitored closely enough to permit the reconstruction of the corresponding product-specific output series. Comprehensive output data for all quarry products (or for the corresponding kiln products) were collected only for 1865, 1890, and 1901. These are very detailed; but this entire output is here collapsed to distinguish only three kiln materials, marble, and a broad residual, and the annual series rely heavily on indirect estimates based on construction movements.

B01.02 The employment data and value added estimates

The estimates of value added in 1911 are here typically derived from the product-specific data provided by the Corpo delle miniere; the relatively aggregated census figures serve only to confirm the coverage of the *Rivista mineraria*. Exceptionally, two alternative estimates of value added are here provided (for almost every product: there are exceptions to the exception, returned to below). The first estimate is conceptually correct, the second is consistent with the conventions of the national accounts.

Conventionally, value added in extractive activity is identified with the difference between the value of the goods produced and the value of purchases from other industries (*IRIS*, pp. 1, 52 ff.). This simply repeats the language used for other industries as well; but because extractive activity is *sui generis* this usual formula produces an unusual measure. The problem turns once again on the identity of the results of activity whose value is to be measured, and stems from the pervasiveness of vertical integration; but unlike those discussed in section A03.01 above it exists even in a hypothetical world of perfect competition, zero taxes or subsidies, and perfect knowledge.

Consider the valuation of a typical extractive activity, the mining of an ore. In the first place, the conventional measure normally overstates the value of the results of extractive activity because it does not deduct the scarcity rent accruing to the owner of the material that is being extracted. That rent is not a payment for services (activity), but the value of the principal goods consumed by the production process of the industry that transforms material in the

ground into material out of the ground. The transportation industries similarly produce goods at the point of delivery, and consume goods at the point of origin; their value added excludes the value of the latter, just as the value added of any manufacturing industry excludes the value of the raw materials it consumes. The value of these inputs is excluded from value added, and thus from gross (domestic or national) product, whether they are currently produced or not: in the former case, to avoid double-counting intermediate production; in the latter, because the reduction of inventories is not current production at all but disinvestment. If inventories of materials in the ground are to be treated like all other inventories -- if the production of extractive industries is to be measured on the same net basis as that of other industries -- the value of the reserves consumed by current production must be excluded from the value added of the extractive industries.

In the second place, otherwise identical ores are not equally accessible: the effort (activity) required for extraction, and the consumption of ancillary materials (such as purchased fuel or power), are both greater, the less accessible the ore. With the usual measure, which deducts only purchased ancillary materials, a *higher* value added is attributed to the more accessible ores; at the limit, where the ore is so accessible that extraction proper is moot (as in the utilization of once worthless tailings), value added must be considered equal either to zero or to the full value of the product. For a given the value of the extracted ore, on the other hand, the value of the material in the ground is higher, the more accessible it is; as extraction costs decline the value of extractive activity and the properly measured value of its results (the value of the extracted ore less the value it had in the ground) both decline, and if extraction proper is moot the corresponding value added is in any case negligible.

In the third place, extracted materials form the industry's typical output but not its only output. Underground extraction in particular requires much preparatory or "overhead" activity (tunneling, draining, and so on) whose immediate product is not extracted ore but only an improvement in the accessibility, and therefore of the value, of the ore still in the ground. The value of such production is part of the current value added by the extractive industry; but it is not so counted on the usual definition of that measure.

In sum, the current value added by the extractive industries cannot be properly measured as the value of the results of extractive activity without the price and quantity information with which to compute the value of the reserves destroyed by extraction and the increase in value of other given reserves at given output prices. Because the raw materials and outputs of the industry are themselves unusual, the usual value measure of the results of activity -- the value of produced goods less that of purchased inputs -- is here inappropriate. On the other hand, the industry's use of the services of labor and capital goods is perfectly ordinary; and the usual value measure of activity as such is accordingly a perfectly appropriate measure of value added.

Correct (or, less provocatively, "industrial") value added in extractive activities is accordingly estimated as the return to labor (using the employment data) and to the capital invested in plant and equipment (approximated by the data on installed horsepower); conventional ("national-income") "value added" is estimated from the value of sales, deducting an allowance for fuel and other purchased materials (again estimated from the data on installed horsepower). This second measure normally exceeds the first, at times by considerable amounts; it can fall short of it where much activity was devoted to preparatory operations, or where, because of imperfect knowledge, the extracted material turned out to be worth less than expected.

In a few exceptional cases the conventional measure is in fact correct. This is the case, trivially, when the good in question is a transformed product obtained from separately counted ore: it is a normal industrial good, more or less arbitrarily considered a product of the extractive industry group rather than a manufacturing product. The conventional measure is also correct

for those few, anomalous extractive activities that draw on renewable resources rather than on a finite, exhaustible stock: the extraction for example of sea salt (where the scarcity rent is zero), or of mineral waters (where the scarcity rent is the rental value of the land, analogous to that in agriculture).

B01.03 Output and real value added

The output of the extractive industries is here measured only by the tonnage of marketable minerals obtained in the current period. These output series are unusually poor indices of real value added: from year to year, from mine to mine, from batch to batch, a ton of any given mineral can accompany vastly different accomplishments in developing or working the mine, or in processing the yield; even with given prices and technology, the average levels of primary inputs per unit of recorded output are subject to unpredictable and possibly severe fluctuations.

In addition to this general unreliability as an index of short-term changes, the present output index of real value added will tend to understate the relative growth of the extractive industries as the margin of production shifts over time to progressively less accessible materials. This problem is of course particularly severe in the case of mines that become "exhausted" toward the end of the period in question: the calculation of unit value added at 1911 prices on the basis of actual labor and capital needs per ton of output at that time -- near the end of the mine's economic life -- would seriously overestimate real value added per unit of output during the operation's most productive years. In such cases, it seems preferable to estimate value added on the basis of the primary input needs per unit of output appropriate to that earlier period: while the estimate of the operation's total value added in 1911 errs by default, that error is far smaller than the error by excess in earlier years that is thereby avoided.

B02. Mining

B02.01 Introduction

The mining industry is here defined to include census *classi* 2.1 (mining proper) and 2.3 (the extraction of sea salt, peat, and mineral water).

Mining proper (*classe* 2.1) includes prospecting, preparing the mine, hewing and extracting the mine run, separating and dressing the ore. The complexity of the production processes and the terseness of the census legends blur the line dividing mining from manufacturing; the former is here held to include sizing, concentrating, and roasting, but exclude leaching, liquating, or reducing. An exception is made to include in mining the production of commercial sulfur by liquating or grinding sulfur ore, as in recent Italian practice (*Reddito nazionale*, p. 77; the *ISIC* in practice does the same, as it includes such activity in mining if it is performed in conjunction with extraction). Other mining (*classe* 2.3) explicitly excludes the further processing of sea salt, and (unlike later Italian classifications) the bottling of mineral waters, but presumably includes the drying of peat.

The information provided by the Corpo delle miniere exhaustively covered census category 2.1, here represented by separate series for iron ore, copper ore, lead ore, zinc ore, silver ore, gold ore, manganese ore, antimony ore, mercury ore, pyrite, solid mineral fuel, sulfur ore, ground sulfur ore, fused sulfur, rock salt, brine salt, crude oil, natural gas, asphalt rock, boric acid, graphite, alunite, bauxite, and (together) nickel, tin and arsenic ores. A separate sulfur ore series is included both to improve the aggregate real value added time series (by taking account of changing ore/fused sulfur ratios) and to facilitate recalculation on a narrower definition of mining (that would exclude the processing of sulfur ore); the last series groups minor ores extracted too erratically to warrant separate consideration. The coverage of census category 2.3 is less complete. The Corpo delle miniere provided increasingly detailed data on the output of peat and of sea salt, also represented here by separate series; the residual time series, for the extraction of mineral water, is crudely estimated from other sources.

The mining data are unusually rich, but still highly imperfect, and the present series are only rarely straightforward transcriptions of those in the sources. Admittedly, nothing is done to remove the most fundamental weakness in the measure of real output, calculated only as the weight of the ore produced; but at least the existing ore output series are improved in a variety of ways.

With most processing reducing useless weight, at times by an order of magnitude, variations in the definition of output can easily dominate the figures; the most useful (if still unsatisfactory) modifications of the data are accordingly directed at standardizing the good that is being measured. On the other hand, the occasional output figures for mixed ores are here distributed over their main components, even though the mixed ores were often relatively poor: the superior alternative of compiling a separate mixed ores series is here blocked by a basic lack of information, as mixed ores were at times distributed over other ores, and not separately recorded, even in the sources (e.g., *Rivista mineraria 1896*, p. 202).

Again, chronological standardization is approached by recalculating, on an approximate calendar-year basis, the lagged July-through-June figures reported in particular for Sardinia (in 1865-1914, so that the 1864 data cover a single semester; e.g., *Statistica mineraria*, p. XVIII, *Notizie minerarie*, pp. 337 ff., *Rivista mineraria 1883*, p. 168, *1913*, p. 116) and the public iron mines on Elba; for the reasons noted below (B02.02), these are here taken to be lagged only through 1908, and to refer to the calendar year from 1909 on. The *Rivista mineraria 1877*, p. 163 and *1878*, p. 173 actually refer all the Firenze district figures to a lagged twelvemonth, but these indications appear only in the national summary, and may reflect an inappropriate generalization from the Elban reports; furthermore, the two volumes in question were published

in such quick succession that the second assertion can only be considered a repetition, rather than a confirmation, of the first; and there appears to be no similar statement for mainland Firenze district products in the *Notizie minerarie*, the *Rivista mineraria 1879* ff., or even the early *Statistica mineraria*, despite the lack of any intervening figures systematically low enough (like the 1864 Sardinian figures) to be transitional one-semester data. The non-Elban Firenze district data are accordingly treated here simply as calendar-year figures, as in the later compilations by the Corpo delle miniere (compare *Rivista mineraria 1877*, pp. 158-163, *1878*, pp. 164-171, and *Notizie minerarie*, pp. 276-309).

In the absence of information on the value of ore reserves (and in the changes in that value with depletion on the one hand, and with improved access to the ores on the other), industrial value added cannot be computed by suitably transforming gross sales, but must instead be estimated on the basis of reported factor use. The available 1911 labor force and factor employment data are compared in Table B.01; the *Censimento industriale* clearly includes the bulk of sulfur mining not in 2.13 but in ω.21, where it is combined with further processing, and for similar reasons probably also includes in ω.21 part of the extraction of a number of the minor products (boric acid, salt, alunite, etc.) otherwise counted in 2.15. The corresponding *Rivista mineraria* figures are obtained by aggregating over the appropriate products (using the 1911 data even for Sardinia, as the comparable census figures refer to early June); with the easily corrigible exception of bauxite, included by the census office in category 2.12 but considered a quarry product by the Corpo delle miniere, these figures appear to cover the whole mining sector (plus, as documented below, some processing that is not part of mining at all).

In view of their particularly high quality, the Corpo delle miniere data are here selected over their less usefully disaggregated census counterparts as the primary basis for the value added estimates documented below. The blue-collar worker and horsepower figures actually used are accordingly those of the 1911 *Rivista mineraria*, with the reported Sardinian figures replaced by the corresponding estimates, and with the men and machines listed as prospecting for more than one ore distributed over the products in question; white-collar employment is instead estimated as the fraction of total blue-collar employment implied for each product category by the data in the *Censimento industriale.*

With the exceptions noted in passing, annual blue-collar labor costs are estimated at the rate of 850 lire per adult male in productive mines, and half that for other workers (women, youths, men prospecting and in unproductive mines); these figures are based on a standard daily wage of 3 lire per man and 1.5 lire per woman or youth (not unrepresentative of the wage levels reported in the *Annuario 1912*, pp. 225-226), and a working year of 280 days in productive mines and half that in prospecting or unproductive mines (not incompatible with the available contemporary information, limited to 1909 figures covering only prospecting and unproductive mines in the Bologna district and all mines in Sardinia, *Rivista mineraria 1909*, pp. 13, 238). White-collar labor costs assume the standard annual salary of 2,000 lire per person.

The capital bill, finally, is estimated very tentatively from the horsepower data. Detailed American figures are available for producing mines, quarries, and wells (*U.S. 13th Census XI*, pp. 334-335). Taking the reported aggregate value of products less all reported expenses of operation and development (which includes royalties and rent of mines), except for half the reported rent of offices and other sundry expenses, one obtains a capital cost per horsepower of $47.3; the same calculation doubling reported royalties and rent of mines (as if owner-exploited reserves were half the total rather than zero) lowers that estimate to $33.4. The comparable ratio of capital costs (value added less wages and salaries) to unduplicated horsepower in the manufacture of cement and lime works out to $48 (*U.S. 13th Census VIII*, pp. 508, 513), some 20% above the average of the preceding estimates. As estimated below (C02.05), the equivalent

Italian figure for cement and hydraulic lime comes to 623 lire per horsepower. The allowance selected here for the mining industry accordingly equals 500 lire per horsepower.

The cost of fuel (and ancillary materials) is also estimated from the reported horsepower figures, allowing 350 lire per non-hydraulic horsepower. The *Rivista mineraria 1895*, p. 57 reports the consumption of coal for a broad spectrum of industries in the Caltanissetta district. Excluding the generation of steam used to liquate sulfur ore, coal consumption came to 12,872 tons for 1,496 horsepower, or 8.6 tons of coal per horsepower; at the standard allowance of 43 lire per ton of coal, fuel costs would come to some 370 lire per horsepower. In 1911, one ton of coal per thousand horsepower-hours seems a reasonable figure; with the above consumption levels it implies virtually round-the-clock operation, suggesting that specific fuel consumption was perceptibly higher in 1895 than in 1911. The *Rivista mineraria 1911*, p. 20, in turn reports the out-of-pocket power costs incurred in sulfur mining, again in the Caltanissetta district. In pumping, which was the major and presumably more representative activity, the horsepower figures come to 1,565 installed, of which 1,141 in use, at a cost of .451 million lire, or 288 lire per installed horsepower and 396 lire per horsepower in use. The Corpo delle miniere appear normally to report installed horsepower, but judging from the census (horsepower-in-use) and *Rivista mineraria* figures in Table B.01 the share of unused horsepower was in this case unusually high. The figure selected here accordingly seems consistent both with the data for 1895 and those for 1911, allowing also for the cost of ancillary materials.

The surplus earned in 1911 is approximated by deducting both value added and the estimated cost of fuel (and sundry materials) from gross sales. To allow the calculation of conventional measures of gross domestic product, the sum of value added and surplus is also calculated; it is of course equivalent to gross sales, less the typically small allowance for fuel and other purchased materials. In a small handful of cases, as noted, the conventional measure is conceptually correct, and a single value added estimate serves both to measure the industry and to construct the national accounts.

B02.02 Iron ore

Table B.02 documents the derivation of the estimates of iron ore output, including the occasional output of manganiferous iron ore separately listed in the sources. Cols. 1 and 2 transcribe the totals reported in the sources themselves (also *Sommario*, p. 121); in 1881 and 1882 col. 2 includes the 5,000 tons of low-grade ore excluded from the reported totals in each of those years (*Rivista mineraria 1881*, p. 165, *1882*, p. 113). Col. 2 indicates zero output in 1904: the corresponding *Sommario* series indicates 4,785 tons of output in that year, but the source of this figure could not be traced. No output was in fact recorded for 1904 in the national or Firenze district reports in the *Rivista mineraria 1904* (pp. XVII, XXI, 182-183), or for that matter in the time series in the subsequent *Annuario 1905/07*, p. 434 (where the correct figure could have appeared, had the Corpo delle miniere discovered an omission in the primary source).

Col. 3 transcribes the reported output of the public Elban mines, including small amounts of separately counted manganiferous ore in 1907 and 1908. These amounts are set equal to 874 tons in 1907 (as indicated in the national report, which revises the quantities and values indicated in the district report: *Rivista mineraria 1907*, pp. XXI, 204-205, 227), and 812 in 1908 (as indicated in the district report; the national report repeats the district aggregate quantity and value, and the discrepancy on the Elban component seems a mere mistranscription: *Rivista mineraria 1908*, pp. XXIII, 166-167).

The figures reported for the public Elban mines appear to be on a lagged July-to-June basis from 1861 on, even if the indications to that effect are not systematic (e.g., *Notizie minerarie*, p. 174, *Rivista mineraria 1893*, p. 85, *1905*, p. 196, *1906*, p. 221, *1908*, p. 194;

compare the references in the *Rivista mineraria 1904*, p. 205, *1907*, p. 228). From 1909, the references are only to the current calendar year (e.g., *Rivista mineraria 1909*, p. 194, *1910*, p. 65); and at least in 1911 they must clearly be taken literally, as the reduction in output due to the suspension of work from July 7 to November 7, 1911 (*Rivista mineraria 1911*, p. 73) shows up in the figure reported for 1911 and not, as it would if the totals were still lagged six months, in the total reported for 1912. Assuming that there was a single change-over, rather than a series of back-and-forth changes, in the reference accounting period, and further assuming that an explicit reference to a lagged twelvemonth cannot be dismissed, the aggregates must refer to a lagged twelvemonth at least through 1908; the changeover is here assumed to have occurred with the report for 1909, the first by C. De Castro after a run by P. Toso.

The Elban estimates in col. 4 are accordingly obtained, from 1861 to 1907, as a simple average of the corresponding figures in col. 3 for the same year and the immediately succeeding year; from 1909 on, col. 4 simply repeats col. 3. On the above assumptions, the data actually contain no information for the second semester of 1908. Taking half the annual figures in col. 3 for 1908 (presumably 1907-08) and 1909, production is taken to have equaled 230,953 tons in the first semester of 1908, and 234,579.5 tons in the first semester of 1909; the estimated total for calendar 1908 assumes an intermediate figure of 232,766 tons in the second semester of the year.

Col. 5 transcribes the reported output of the Sardinian mines. As noted, these clearly refer in 1861-63 to a full calendar year, in 1864 to the first half of the year, and from 1865 on to a lagged twelvemonth from July through June. The estimates in col. 6 repeat the data for 1861-63; in 1864, they sum the 1864 figure to half that for 1865; and from 1865 on they are again simple averages of the reported figures for the same year and the immediately succeeding years. These simple estimates are again approximate: in Sardinian iron mining there were seasonal suspensions of production that appear to have affected the second semester of the year more than the first (*Rivista mineraria 1883*, p. 205, *1884*, p. 188), but the attendant distortion seems minor.

The elementary series are not otherwise transformed, and output remains as heterogeneous as in the original reports. Some Milano district ores were counted when already roasted -- probably throughout the period, though only V. Zoppetti, author of the 1877-1892 reports, appears to have bothered to mention it, and even then often ambiguously (e.g., *Notizie minerarie*, p. 337). The ores from the State-owned mines on Elba were counted in the condition in which they were sold (some washed, some apparently not), and the reported 1913 and 1914 totals include conspicuous amounts (51,425 and 96,870 tons, respectively) reclaimed from old tailings (e.g., *Rivista mineraria 1914*, pp. 86-87); these are not excluded from the present estimates, on the grounds that the unit value added in concentrating low-grade tailings was most probably close to that in obtaining ordinary ore from Elba's easily worked open-air pits.

The aggregate estimates in col. 7 are the sum of cols. 1, 2, 4 and 6, minus the sum of cols. 3 and 5. In 1883, exceptionally, the resulting total is reduced by 100 tons, to allow for an apparent error in the total in col. 1. The district-specific figures sum to 203,482 tons rather than 203,582, and in each district report the output and value figures appear consistent (either because the district totals correspond to the sum of multiple province-specific figures, or because the ratio of the value figures to the output figures corresponds to a plausible 2- or 3-digit unit value (11.5 lire per ton in the Napoli district, 13.0 in the Iglesias district); and the national value figures are the sum of the district-specific figures, suggesting that the latter do not in fact omit any output.

The estimate of industrial value added in 1911 is based on the blue-collar labor and horsepower figures reported for the iron and manganiferous iron mines, plus half those prospecting for iron and pyrite or iron and copper, and one quarter of those prospecting in the

Firenze district for unspecified "mixed ores" (assumed to cover iron, copper, mercury, and pyrite); the Sardinian figures for 1911 are replaced by half the sum of those reported for 1911 and 1912. The totals so obtained equal 2,064.5 adult males in productive mines, and 407 other blue-collar workers, plus 136 horsepower, none of it hydraulic. The number of white-collar workers is estimated as 8.9% of the blue-collar total, or 220 persons. Of the above blue-collar workers, 1,609 adult males and 42 others were in the province of Livorno; to reflect the four-month strike, these are counted as two-thirds of the corresponding full-time equivalent. The wage bill accordingly allows 850 lire for (455.5 + (2/3)1609) workers, and 425 lire for (365 + (2/3)42) workers, for a total of 1.466 million lire; estimated salaries (.440 million lire) and capital costs (.068 million lire) bring the value added estimate to 1.974 million lire, against an output of 381.882 tons, or 5.169 lire per ton.

Fuel costs are estimated at .048 million lire, raising processing costs to 2.022 million lire. Averaging the 1911 and 1912 Sardinian figures, total sales equal 6.830 million lire, for a surplus of 4.808 million lire; conventional value added (industrial value added and surplus together) thus equaled 6.782 million lire, or 17.759 lire per ton. Surplus thus equaled some 70% of sales (net of fuel costs); part of it appears to have been captured by the Elban labor force, which received unusually high wages (*Annuario 1912*, p. 225). One may further note that average labor productivities in iron and manganiferous iron ore were quite similar when both were produced in quantity (e.g., *Rivista mineraria 1899*, pp. LXIV-LXV, or *Annuario 1911*, p. 126); the relatively low productivity in manganiferous iron mines in 1911 (e.g., *Annuario 1912*, p. 119) reflects the curtailment of operations in that year.

B02.03 Copper ore

The copper ore series is derived in Table B.03. Col. 1 transcribes the aggregate figures reported by the Corpo delle miniere.

Col. 2 refers to the further quantities of ore separately reported by the Corpo delle miniere. The first component of col. 2 refers to the reported output of the Montecatini mine in the Firenze district in 1861-65; it is included here because in those years the reported aggregate entirely excludes that district (*Notizie minerarie*, pp. 280-281). The second component of col. 2 refers to the occasional small quantities of gray or nickeliferous copper ore, separately recorded in the sources. These equal 180 tons in 1900, 370 tons in 1901, 10 tons in 1905, and 3 tons in 1906 (e.g., *Rivista mineraria 1901*, p. XXVII); all but the first are included in the copper ore series in the *Sommario* (p. 122). The third, residual component of col. 2 refers to the copper ore included in the reported totals for mixed lead, zinc, and copper ores. These amounts are calculated as a third of the reported total, with two exceptions: first, the 1882 mixed ore total excludes altogether the 1,418 tons attributed to the Iglesias district by the national report, as the district report appears to have already included that output in the lead and zinc figures (as did both the district and national reports in previous years; *Rivista mineraria 1882*, pp. XXX-XXXI, 171-172, 191-192); second, the 50 tons from the Caltanissetta district in 1884 and 1885 are broken down, as in the district report, into 37 tons of lead ore, 8 tons of zinc ore, and 5 tons of copper ore (e.g., *Rivista mineraria 1884*, p. 53).

Col. 3 transcribes the Sardinian figures. In 1884-87, col. 3 includes the estimated copper-ore share of reported mixed ores. The district report lists 1,200 tons of copper ore in 1884, but these were in fact mixed ores, and so counted in the national aggregate; only a third of that figure is included here. Col. 4 presents the calendar-year estimates of Sardinian production, obtained once again by shifting col. 3 six months backwards from mid-1864 on.

Col. 5 transcribes the reported production of the Vicenza district in 1861-1894. With the minor exceptions noted below, those figures refer to the output of the cupriferous pyrite mine at Agordo (Belluno). In the space of a few years, *circa* 1890, that mine severed its old ties

to the metalmaking industry and shifted its sales to sulfuric acid plants; the Corpo delle miniere, adapting even more abruptly, counted that output as copper ore through 1894, and as pyrite from 1895 (compare *Rivista mineraria 1894*, pp. XVI, XVIII, and *1895*, pp. XVI-XVII). As this pyrite was a uniquely poor source of copper, quite different from the ores produced elsewhere, homogeneous copper ore and pyrite series seem best reconstructed by transferring Agordo pyrite from the former to the latter in 1861-1894.

Col. 6 is a compendium of the residual corrections. The first component of col. 6 refers to the Vicenza district output of copper ore proper in 1862-65. In those years, according to the *Notizie minerarie*, p. 281, there were two active copper mines in the district (Agordo and another); the *Statistica mineraria*, p. 4, disaggregates the total produced in 1865, assigning 84 tons to the minor mine. The corresponding output in the earlier years is estimated at 128 tons in 1862, 546 tons in 1863, and 460 tons in 1864. Since copper metal prices were then apparently stable (*Sommario*, pp. 188, 195), these figures are calculated on the assumption that in each of those years the district aggregate quantities and values reported by the *Notizie minerarie* are the sum of Agordo output worth an estimated 12.2 lire per ton (as in 1866), and the other mine's output worth an estimated 393.8 lire per ton (as implied by the output figures for 1865 in the *Statistica mineraria*, the aggregate value in the *Notizie minerarie*, and the assumed unit value of Agordo's product).

The second component of col. 6 refers to the output of the Firenze district omitted by col. 1 in 1861-65, and not recovered (as the output of the Montecatini mine) in col. 2. It equals a constant 2,450 tons p.a. (estimated from the 1866 data for the province of Grosseto, plus an allowance of 65 tons for the other mine in the province of Pisa; *Statistica mineraria*, p. 4 and *Notizie minerarie*, p. 341).

The third component of col. 6 also refers to the Firenze district. In 1880-86, the reported aggregate includes the weight not of the low grade (*terza qualità*) ore mined in that district, but of its yield in matte (e.g., *Rivista mineraria 1880*, p. 108); the present estimates do the opposite. The ore tonnage figures are successively 2,156, 810, 640, 2,384, 5,458, 4,911, and 7,768, the matte tonnage figures successively 42, 38, 38, 81, 125, 140, and 142; their differences year by year appear in col. 6. This correction removes a spurious increase in 1887 (*Rivista mineraria 1887*, p. 89); but it may introduce one in 1880. One can be confident that the earlier figures do not include matte instead of ore, as there are no indications to that effect, and the same individual (A. Fabri) produced the reports from 1878; on the other hand, if low grade ore had then been extracted but not processed, the district reports may well have ignored it altogether (as they did in the case of antimony ore, *Rivista mineraria 1881*, p. 165).

The estimates of aggregate output in col. 7 are the sum of cols. 1, 2, 4 and 6, minus the sum of cols. 3 and 5.

The estimate of industrial value added in 1911 is based on the reported blue-collar labor and horsepower in copper or grey copper (fahlerz) mining or prospecting, plus half those in prospecting for iron and copper, one-third those in prospecting for copper, lead, and zinc, or copper, lead, zinc, and other metals, and one-quarter those in prospecting for unspecified "mixed ores" in the Firenze district; the reported Sardinian figures for 1911 are again replaced by the average of those reported for 1911 and 1912. The corresponding totals equal 745 adult male blue-collar workers in productive mines and 358 other blue-collar workers--whence an estimated 98 white-collar workers (8.9% of the blue-collar total--and 1,047 horsepower, of which 872 non-hydraulic. With the standard coefficients specified above total industrial value added works out to 1.505 million lire, or 22.023 lire per ton; adding fuel costs (.305 million lire) total extraction costs equal 1.810 million lire. Since (with the recalculated Sardinian figures) gross sales then equaled just 1.245 million lire, these estimates imply a total cost well in excess of the value of output, at least in 1911; on the other hand, they do allow a significant positive

surplus in more prosperous years (e.g., 1907, when a peak 168,000 tons were mined and sold at over 30 lire each). In 1911, the surplus works out to -.565 million lire; conventional value added (industrial value added and surplus together), comes to .940 million lire, or 13.756 lire per ton.

B02.04 Lead and zinc ores

The lead ore and zinc ore output estimates are presented in Tables B.04 and B.05.

In Table B.04, col. 1 transcribes the aggregate output of lead ore reported by the Corpo delle miniere. The series differs from its counterpart in the *Sommario* by the exclusion from the lead ore total of mixed lead and zinc ores in 1895 (784 tons) and 1896 (160 tons; compare *Rivista mineraria 1899*, pp. LXVIII, CII, and *Sommario*, pp. 13, 121).

Table B.04, col. 2 refers to the estimated lead-ore component of reported mixed ores. These figures are calculated as one third of the mixed lead, zinc, and copper ore data (with the exceptions in 1884 and 1885 noted in the preceding section, and also reflected in Table B.03, col. 2), plus one half of the mixed lead and zinc ore figures.

Table B.04, col. 3 refers to the ore output reported for Sardinia, and, through 1908, for the public Elban mines; the latter account only for very small amounts in 1907 and 1908 (respectively 318 and 88 tons, against 190 tons in 1909: e.g., *Rivista mineraria 1907*, p. 205). In 1884-87 col. 3 includes the estimated Sardinian component of the national totals in col. 2, for lead ores in the reported mixed ores; in 1882 it further includes the 279 tons of output (from prospecting operations, and estimated by the Corpo delle miniere) noted in the national report but excluded from the district-report total (*Rivista mineraria 1882*, p. XXXI).

A further correction concerns the reported Sardinian production of work lead (*piombo d'opera*) from 1884 to 1891, transcribed in Table B.04, col. 4. That intermediate product was then counted with the ore (e.g., *Rivista mineraria 1884*, p. XXIII); in 1887 and 1889 (*Rivista mineraria 1887*, p. XXIX, *1889*, p. CV) the national summary indicates that the ore total excludes the corresponding ore input (figures for which may be found in the district summary, e.g., *Rivista mineraria 1884*, p. 190). Such annotation was far from systematic, and the only evidence on the lead figures themselves is flimsy and contradictory (in 1889, for instance, the value of the work lead in the district summary excluded the value of its ore input; *Rivista mineraria 1889*, pp. 181, 216). The best guide to the lead figures thus appears to be the analogy to the antimony figures in these same district reports: the latter raise identical problems, but on a scale such that a simple comparison of the data on ore produced and ore processed provides virtual certainty that the former included the latter in the 1884-86 reports, but not in the succeeding ones (while no antimony ore was processed in 1887-88, it seems more reasonable to assume that accounting methods changed once, in 1887, than three times, back and forth, between 1887 and 1889). The July-through-June Sardinian ore figures in col. 3 are thus turned into a more homogeneous series by the addition of the ore-consumption figures in the 1887-90 reports, plus a 3-ton estimate for 1891 (actually 1890-91: col. 5).

Table B.04, col. 6 presents the calendar-year estimates of Sardinian (and in 1906-08, Elban) output; these are obtained by shifting six months backward, from mid-1864 on (exactly as was done to the corresponding iron-ore figures in Table B.02), the sum of cols. 3 and 5. A further 70 tons are allowed for the Elban output in the second semester of 1908.

The national lead-ore output estimates in Table B.04, col. 7 are obtained as the sum of cols. 1, 2, and 6, less the sum of cols. 3 and 4.

In Table B.05, col. 1 transcribes the aggregate output of zinc ore reported by the Corpo delle miniere. The series differs from its counterpart in the *Sommario* in 1866, when the *Sommario* figure incorporates a 3,000-ton typographical error, and again in 1875, when col. 1 adds one ton to the *Notizie minerarie* and *Sommario* figure, to coincide with the sum of the

district figures in the earlier source (see *Notizie minerarie*, pp. 282-283, *Rivista mineraria 1899*, pp. LXVIII, CII, and *Sommario*, pp. 13, 122).

Table B.05, col. 2 refers to the estimated zinc-ore component of reported mixed ores. These figures are again calculated as one third of the mixed lead, zinc, and copper ore data (with the noted exceptions in 1884 and 1885), plus one half of the mixed lead and zinc ore figures; they are of course identical to the corresponding estimates for lead (save in 1884 and 1885: Table B.04, col. 2).

Table B.05, col. 3 refers to the ore output reported for Sardinia; in 1877 col. 3 indicates 81,668 tons rather than the reported 81,698 tons, as the former figure is consistent both with the national total in col. 1 and, within the district figures, with the ratio of gross value to unit value. In 1884-87 these figures include the estimated Sardinian component of the national totals in col. 2, for zinc ores in the reported mixed ores; in 1882 they further includes the 1,004 tons of output (from prospecting operations, and estimated by the Corpo delle miniere) noted in the national report but excluded from the district-report total (*Rivista mineraria 1882*, p. XXXI).

The zinc-ore output estimates are not heir to further complications. The Sardinian figures in col. 3 are again shifted six months backward, from mid-1864 on, to obtain the calendar-year estimates in col. 4. The national estimates in col. 5 are then obtained as the sum of cols. 1 and 2, minus col. 3, plus col. 4.

The lead and zinc ore data are not otherwise improved. The statistical handling of washing-works may have varied, particularly in Sardinia; but the available information is far from clear (e.g., *Rivista mineraria 1884*, pp. 162-163, 171 ff.). While the Iglesias calamine is referred to as calcined only from 1900 (compare *Rivista mineraria 1899*, p. 196 and *1900*, p. 202), the change appears to be only in the label; the bulk of the ore was apparently always so treated and recorded (*Notizie minerarie*, pp. 343, 348; this is also the implication of the calculation in the *Rivista mineraria 1900*, p. 218). From 1891, the Vicenza district reports indicate that the figures for lead and zinc ores mined in the province of Belluno refer to concentrated ores. The concentrate, obtained from very poor ores, appears similar to the product sold at other times or in other places (compare, e.g., *Notizie minerarie*, p. 348, *Rivista mineraria 1894*, pp. XVII, 294, *1909*, p. 465, and *1911*, p. XX); there is no reason to believe that the series would be less heterogeneous if these reported data were replaced by estimates of their unconcentrated counterparts. The weakest time series, indeed, may be that for calamine mined in the Milano district. There is some evidence that the product was measured alternately before and after calcining (e.g., *Notizie minerarie*, pp. 283, 343, *Rivista mineraria 1880*, p. 226, *1883*, p. 228, *1887*, p. 186, *1895*, p. 215); but the path of unit values and the statements in the reports rarely point to the same interpretation. There does appear to have been a switch from calcined to not calcined in 1889 (compare *Rivista mineraria 1888*, pp. 227, 259, and *1889*, p. 233); allowing for the cost of calcining, the change in unit values suggests a weight drop of no more than 15%. With the district's output running normally between 10,000 and 20,000 tons p. a., the error introduced by such spurious discontinuities should thus be no more than a fairly tolerable 2,000 tons.

The estimate of industrial value added in 1911 is based on the blue-collar labor and horsepower reported in 1911 and 1912 *Rivista mineraria* for the mines producing lead, zinc, or both; they further include all the employment in unproductive mines or prospecting operations listed under lead, zinc, and lead and zinc, half that under lead and silver, and two-thirds that under lead, zinc, and copper, lead, zinc, copper, etc., and pyrite, blende, and galena.

The corresponding totals equal 13,139 adult male blue-collar workers in productive mines and 2,136 other blue-collar workers, whence an estimated 718 white-collar workers (4.7% of the blue-collar total), and 7,314 horsepower, of which 7,039 non-hydraulic. With the standard coefficients specified above (in preference to the lower wages actually paid in Sardinia,

Annuario 1912, p. 226), total industrial value added works out to 17.169 million lire; adding fuel costs (2.464 million lire), total extraction costs equal 19.633 million lire, against sales of 23.708 million lire (7.113 million for lead ore, and 16.595 for zinc ore). On the assumption that these jointly mined ores were extracted at similar unit costs, this industrial value added is here distributed over these two ores in proportion to their physical output, for a common figure of 93.495 lire per ton, and totals of 3.753 million lire for lead ore and 13.416 million lire for zinc ore. Fuel costs are allocated on a similar per-ton basis, or .539 million lire to lead ore and 1.925 million lire to zinc ore; total extraction costs come to 4.292 million lire for lead ore, leaving a surplus of 2.821 million lire, and 15.341 million lire for zinc ore, leaving a surplus of 1.254 million lire.

Conventional value added equals industrial value added plus surplus (sales less estimated fuel costs), or 163.752 lire per ton of lead ore, and 102.237 lire per ton of zinc ore.

B02.05 Silver, gold, and manganese ores

The silver, gold, and manganese ore output estimates are presented together in Table B.06.

Cols. 1 and 2 refer to silver ore. Silver ore was mined from 1870, and only in Sardinia; the present output estimates (col. 2) are thus the reported aggregate figures (col. 1) shifted half a year backward.

Col. 3 refers to gold ore, which was extracted only in the Torino district (very small quantities of gold nuggets seem to have been obtained elsewhere, as the by-product of other operations, but these are here ignored; see *Rivista mineraria 1878*, pp. 168, 173). Unlike its counterpart in the *Sommario* (p. 122), the present series for reported output includes the 5,206 tons of ore obtained in 1904 from a prospecting operation (*Rivista mineraria 1904*, p. XXI). As in all Torino district series, the same figure (presumably a quinquennial average) is repeated from 1866 to 1870; the concomitant error does not appear to be significant. Output seems to have always been recorded in unconcentrated ore (of varying richness), except in 1912 and 1913, when 106 tons (out of 2,366) and 247 tons (out of 2,047), respectively, were in fact concentrated ore. The present figures for those years replace the concentrated-ore data by an estimate of their equivalent in unconcentrated ore -- 1,378 and 3,211 tons, respectively, that is, 13 times as much. This ratio is suggested by the indication that (in 1912) the richness of the concentrate was between 11 and 15 times that of the ore extracted in the immediately preceding years (*Rivista mineraria 1910*, p. XXII, *1911*, p. XX, *1912*, p. XXIV, and *1913*, p. XXX).

Cols. 4 - 7 refer to manganese ore. Col. 4 transcribes the aggregate output reported by the Corpo delle miniere; it corresponds to the series in the sources, with the addition of the 400 tons obtained in the Genoa district in 1878 (*Notizie minerarie*, p. 340). Col. 5 refers to the ore output reported for Sardinia; the public Elban mines also produced very small amounts in 1909-11 (respectively 560, 46, and 348 tons: e.g., *Rivista mineraria 1911*, p. XVIII), but for the reasons noted above these are presumed to refer to calendar years. Col. 6 presents the estimates of calendar-year Sardinian output, obtained by shifting col. 5 six months backward. Col. 7 present the estimates of aggregate output, obtained as col. 4, minus col. 5, plus col. 6.

In the case of silver ore, the blue-collar labor and horsepower reported in the 1911 and 1912 *Rivista mineraria* for silver mining (plus half the miners prospecting for lead and silver) yield estimates for 1911 equal to just 52 adult male blue-collar workers in productive mines, 13 other blue-collar workers, and, from these, 3 white-collar workers (4.7% of the blue-collar total); no power appears to have been in use. Industrial value added coincides with total labor costs, and (with the usual coefficients) equals just .056 million lire. Output was also very low, however, and value added per ton comes to no less than 2,150 lire. These figures reflect the near exhaustion of the mine; in earlier years, when silver mining was relatively active, average

productivities appear to have been some 3.5 times their 1911 level of 400 kg. per blue-collar worker. To avoid a major overestimate of the importance of silver mining when it mattered at all, it seems best to scale down the unit value added estimate to a level appropriate to that period; a figure of 615 lire appears to be a reasonable estimate of industrial value added at 1911 prices for each ton of ore, as accessible as it was in the 1880s and 1890s. In absolute terms, the tail-end (1870-76, 1903-12) error so generated is small enough to be ignored; the 1911 underestimate is a mere 40,000 lire.

In calendar 1911, output was worth, on average, 2,057 lire per ton; but that figure too appears unusually high, and for time-series purposes conventional value added per ton is set equal to 1,000 lire. The resulting surplus equals 385 lire per ton, or .010 million lire.

In the case of gold ore, the 1911 *Rivista mineraria* indicates 37 adult male blue-collar workers in productive mines and 221 other blue-collar workers, suggesting a further 23 white-collar workers (8.9% of the blue-collar total), with 99 horsepower, of which 97 non-hydraulic. With the usual coefficients industrial value added is estimated at 0.221 million lire, or 106.250 lire per ton extracted. Fuel costs appear minor (.034 million lire), and other ancillary costs may have been more significant (e.g., for explosives to blast the hard rock, *Rivista mineraria 1905*, p. 417); but even ignoring these, sales (.083 million lire) clearly cover but a fraction of expenses. This reflects the preponderance of prospecting operations over the exploitation of known reserves; the situation was not atypical, and the gold mining industry appears to have been chronically unprofitable (*Rivista mineraria 1906*, p. 439).

Conventional value added is here calculated simply as sales less fuel costs, or .049 million lire, equivalent to 23.558 lire per ton; the surplus is negative (-.172 million lire).

In the case of manganese ore, finally, the data in the 1911 and 1912 *Rivita mineraria* yield estimated totals equal to 120 adult male blue-collar workers in productive mines and 27 other blue-collar workers, suggesting a further 13 white-collar workers (8.9% of the blue-collar total), with no horsepower. With the usual coefficients industrial value added is estimated at 0.139 million lire, or 42.547 lire per ton extracted. Sales work out to the somewhat lower figure of .108 million lire, or 33.058 lire per ton; this last figure is used as the estimate of conventional value added. The surplus is again negative (-.031 million lire).

B02.06 Antimony ore

The antimony ore estimates are derived in Table B.07. The reported aggregate output figures are transcribed in col. 1; they are plagued by a multitude of problems, and the reestimation of the output series is accordingly complex.

Despite their obvious weakness as cyclical indicators, the early figures no doubt accurately convey the fundamental unimportance of antimony extraction at the time, and are therefore accepted without modification. Of far greater concern is the erratic treatment of intermediate products in the 1880s and 1890s. The national reports indicate that these were included in the aggregate in 1884-1892 (col. 2); the only further notes tell of the exclusion of the corresponding Iglesias district ore input in 1889 and 1890 (*Rivista mineraria 1889*, pp. XCVIII, CV, *1890*, p. LXXXVI). From the evidence in the district reports, however, a proper interpretation of the reported aggregate is considerably more involved than that; and it seems best to recalculate national ore production district by district.

The Caltanissetta district series in col. 3 reproduces the data entering the reported aggregate, with three exceptions. The district figure is said to refer to crudum (liquated sulfide) not only in 1886 (30 tons) but in 1894 (6 tons) as well; the 1895 figure (12 tons) appears to be analogous to the preceding year's, as these two figures alone share authorship by E. Camerana and a uniquely high unit value (*Rivista mineraria 1886*, pp. 59, 63, *1894*, pp. 33, 42, *1895*, p. 47). In the present series, these three figures are accordingly replaced by corresponding ore

tonnages: the 1886 estimate is based on the yield reported for 1887, the 1894 figure is taken from that year's report, and the 1895 estimate repeats the previous year's yield (*Rivista mineraria 1887*, p. 54, *1894*, p. 42).

The Firenze district data entering the aggregate series include three components: ore, crudum obtained at the Rosia mine, and sulfide obtained at the Ponte a Rosaio foundry as a by-product of regulus production. Through 1883 and from 1899, as well as in 1888-89, output consisted of ore alone, and the reported data can be accepted as they are. In 1884-87, on the other hand, the reported aggregate includes ore (120, 228, 100, and 260 tons, respectively), and Rosia crudum (200, 50, 75, and 37 tons, respectively; e.g., *Rivista mineraria 1885*, p. 98), the latter good being almost certainly reported in lieu of the ore liquated; in the absence of any indication of yields in the Firenze district, the 1884-87 ore output estimates allow 3.5 tons of ore per ton of Rosia crudum, in addition to the tonnage of unprocessed ore. From De Ferrari's first report in 1890 through 1898, secondly, the output data do not distinguish between ore and Rosia crudum; the present estimates simply triple those reported sums (161, 151, 167, 147, 133, 142, 143, 144, and 147 tons, respectively), except that the 1894 figure is multiplied by 3.5 because all the "ore and sulfide' produced that year is elsewhere said to be crudum (*Rivista mineraria 1894*, pp. 111, 127). In 1886, 1890, and 1891, thirdly, the reported aggregate includes small amounts of Ponte a Rosaio sulfide (22, 25, and 21 tons, respectively). This sulfide, obtained from both Tuscan and Sardinian raw materials, was added to the mine products for lack of a more suitable statistical home (*Rivista mineraria 1886*, pp. 83, 94, *1890*, pp. 205, 303, *1891*, pp. 96, 116); since the ore consumed was no doubt counted elsewhere, these small sulfide tonnages are here simply excluded from the ore output estimates. In 1899, finally, a new processing technique gave economic value to previously worthless poor ores (*Rivista mineraria 1899*, p. 175); in earlier years, the figures may well exclude the output of these cheap ores (this is explicitly indicated in the *Rivista mineraria 1881*, p. 165). On the other hand, the extraction of worthless material is a constant feature of mining operations; the output data are as noted poor indices of real value added because they neglect that tonnage, as they neglect the depth from which the product is brought to the surface. The problem is endemic, and there seems little point to attempting a further improvement to these particular figures.

Cols. 5 - 8 refer to the Iglesias district. Cols. 5 and 6 disaggregate the reported district aggregate, separating the ore reported as such from the crudum and oxide yield included in the aggregate, in lieu of the corresponding liquated ore, between 1884 and 1892. Fortunately, the quantity of ore liquated was also usually recorded in the district report's chronicle. These figures are transcribed in col. 7; those for 1886 and 1892 are estimates, based on geometric interpolations of the average yield (including that implied for 1893 by the 411 tons of crudum and oxide obtained in that year, but not included in the district aggregate). A comparison of these foundry input figures to the corresponding ore output data indicates that the latter include the former until 1886 and from 1893, but not in the interim (explicit confirmation may be found in the *Rivista mineraria 1884*, p. 188, *1895*, p. 151, and *1896* ff.; the *1903* issue, p. 222, notes that that year's foundry input included a stock of ore left over from previous years). A homogeneous ore output series (not reproduced in Table B.07) is thus reconstructed by adding to the reported ore output data (col. 5) the foundry input figures (col. 7) for 1887-92; since this series (like all its components) is on the Sardinian July-to-June basis, it is then shifted, in the usual way, to yield the corresponding calendar-year output estimates transcribed in col. 8.

The national ore output estimates in col. 9 are obtained by adding the small output of the Torino district (40 tons in 1899 and 15 tons in 1900) to the corrected figures for the Caltanissetta, Firenze, and Iglesias districts in cols. 3, 4, and 8.

With the usual transformations, the data in the *Rivista mineraria* yield employment estimates for 1911 equal to 244 adult male blue-collar workers in productive mines and 114

other blue-collar workers, suggesting a further 32 white-collar workers (8.9% of the blue-collar total), again with no horsepower. Exceptionally, all blue-collar workers are attributed here a wage of 425 lire per annum, for an industrial value added of .216 million lire, or an even 100 lire per ton; the general assumption of a short working year is justified by the gross sales figure of just .097 million lire. The usual assumptions and coefficients would raise the value added estimate to over thrice that -- more than could reasonably be attributed to the gap between the standard wage entering the estimate and the lower Sardinian wage (*Annuario 1912*, p. 226, *1913*, p. 267) or to optimistic expectations (e.g., about the richness of the ore, rather lower in 1911 than in neighboring years, according to the annual data in the *Rivista mineraria*). The present estimate of industrial value added is still twice the value of gross sales, but only two-thirds that implied by the usual full-time wage for adult males in productive mines. While the great differences in the quality of antimony ore extracted at different times or different places guarantees conspicuous errors whatever the single coefficient may be, the present estimate should approximate the historical average better than a figure half again as high.

The sales figure of .097 million lire, or 44.907 lire per ton, is again used as the estimate of conventional value added; the surplus is again negative (-.119 million lire).

B02.07 Mercury ore and pyrite

The mercury ore and pyrite output estimates are presented together in Table B.08.

Mercury was mined throughout the period at hand in the Firenze district, and until 1880 in the Vicenza district. As the overwhelming bulk of the ore's weight is lost in processing, metal is produced at the ore supply source, and the Corpo delle miniere long counted the metal as a mine product. Mercury metal data thus form complete series, here transcribed in cols. 1 and 3, while the mercury ore series in the sources (e.g., *Sommario*, p. 121) begins in 1893. In addition, the *Statistica mineraria* (p. 6) and the first two issues of the *Rivista mineraria* (*1877*, p. 160, *1878*, p. 167) report ore production in the Firenze district in 1866, the Vicenza district in 1865, and in both in 1876 and 1877; and the 1880 Vicenza district report mentioned the ore output as no metal was obtained from it (*Rivista mineraria 1880*, pp. 323, 325).

The missing ore output figures are here estimated, separately for each district, by interpolating the available data on the basis of metal production. The Firenze district ore series in col. 2 thus includes the data for 1866, 1876, 1877, and 1893; the ore/metal ratio underlying the other estimates is a constant before 1866, and a geometric interpolation of neighboring benchmarks (1866 and 1876; 1877 and 1893) in the other years (1867-75; 1878-92). The Vicenza district ore series in col. 4 similarly includes the data for 1865, 1876, 1877, and 1880; the ore/metal ratio underlying the other estimates is a constant before 1865 and after 1877, and a geometric interpolation of the 1865 and 1876 benchmarks in 1866-75.

These estimates should be fairly representative of longer-term developments; but the variability of the ore/metal ratio in the years when both products were measured suggests that they are poor indices of short-term fluctuations. The underlying variation appears to have been in the richness of the ores (recorded from 1904 in the Firenze district or national reports; also *Rivista mineraria 1900*, p. 171); it was in any case in actual yields, rather than in inventories (note the near identity of ore production and consumption data in the Firenze district reports, *Rivista mineraria 1901* ff.). The (inverse) relationship of ore-metal quantity and price relatives in 1876-77 and 1893-1913 is very close: but information on ore prices in other years does not seem to be available, and no use can here be made of this empirical regularity.

The present estimates of aggregate pyrite output are transcribed in col. 8; they differ on two counts from their counterparts in the sources, transcribed in col. 6 (compare *Sommario*, p. 124). The minor correction is the inclusion of 600 tons mined in the Torino district in 1909 and excluded from the reported aggregate because of their inaccessibility at the time (*Rivista*

mineraria 1909, p. 433); the major correction is the inclusion of Agordo pyrite through 1894, as well as from 1895. The figures included here are those excluded from the copper ore output estimates derived above (Table B.03); the 1863-64 estimates may incorporate a severe downward error (far beyond any excessive allowance of the copper mines active in the Vicenza district), as the combination of low output and high unit value may in fact reflect a temporary change in the measuring procedure (e.g., from counting crude ore to counting concentrated ore).

In 1911, counting one-fourth of the men and machines prospecting in the Firenze district for unspecified "mixed ores", the extraction of mercury ores appears to have employed 949 adult male blue-collar workers in productive mines and 79 other blue-collar workers, suggesting a further 91 white-collar workers (8.9% of the blue-collar total), and 359 horsepower, none hydraulic. The usual coefficients yield an industrial value added in mercury mines in 1911 of 1.203 million lire, or 12.300 lire per ton of ore. These estimates are just one-fourth of the corresponding gross values (4.665 million lire, or 47.698 lire per ton); allowing for estimated fuel costs (.126 million lire), that year's surplus works out to 3.336 million lire.

Conventional value added in mercury mining is here calculated simply as sales less fuel costs, or 4.539 million lire, equivalent to 46.410 lire per ton.

In 1911 pyrite mining appears to have employed 2,085 adult male blue-collar workers in productive mines and 152 other blue-collar workers, suggesting a further 199 white-collar workers (8.9% of the blue-collar total), and 818 horsepower, of which 573 non-hydraulic; these include those prospecting for arsenopyrite, half of those in prospecting for iron ore and pyrite, one-third of those in prospecting for pyrite, blende and galena, and one-fourth of those in prospecting for unspecified "mixed ores" in the Firenze district. With the usual coefficients, industrial value added comes to 2.644 million lire, or 15.998 lire per ton. The usual assumptions about unit fuel costs and annual utilization yield a fuel bill of .131 million lire, and the gross sales of 3.141 million lire allow a surplus of .366 million lire.

Conventional value added in pyrite mining is again calculated simply as sales less fuel costs, or 3.010 million lire, equivalent to 18.212 lire per ton.

B02.08 Solid mineral fuel

The solid mineral fuel extracted in Italy consisted mostly of lignite; small quantities of anthracite and bituminous schist were produced as well (e.g., *Notizie minerarie*, p. 355, *Rivista mineraria 1911*, p. XXII). The present output estimates are presented in Table B.09.

Col. 1 transcribes the reported aggregate output; it is identical to the corresponding series in the *Sommario*, p. 123, save in 1883, 1908 and 1913. In 1883, the *Sommario* series incorporates an apparent 300-ton error in 1883 that appears also in the *Rivista mineraria 1899*, p. LXXIV; the total reported here and in the *Rivista mineraria 1883*, p. XLIX, corresponds to the sum of the local figures. In 1908, the *Sommario* series reports a figure that for unexplained reasons differs by 780 tons from the total reported by the Corpo delle miniere, which is again consistent with the local figures, and was reproduced, unchanged, in the *Annuario* (e.g., *1911*, p. 125, *1913*, p. 162). In 1913, the *Sommario* series appears to exclude 2 tons of ichthyolithic schist.

The present aggregate estimates in col. 7 depart from the reported totals in col. 1 on three grounds. In the first place, the present figures count output that was simply omitted from the published totals. The relevant series, in col. 2, includes five subsets, referring respectively to 1861-65, 1866, 1873-79, 1884, and 1886 ff. The 1861-65 figures are intended as corrections to the Firenze district series (*Notizie minerarie*, p. 294). This series counts 4-5,000 tons of output p. a. (from two mines) through 1863, but only a few hundred tons in 1864 (one mine) and 1865 (two mines); in 1866, reported output jumps to 14,163 tons (from four mines), only to drop back to 10,165 tons (three mines) in 1867. In contrast, the *Relazioni minerarie* (p. 181) report that

Tatti alone produced 1,551 tons (in all) between 1858 and 1864, 3,757 tons in 1864-65, 4,420 tons in 1865-66, and 4,103 tons in 1866-67; the present correction (obtained by shifting these figures to a calendar-year basis) assumes that the district series excludes Tatti through 1865, but is otherwise complete. The 1866 district figure certainly seems comprehensive: it aggregates the relevant elements in the *Statistica mineraria*, p. 10 (6,000 tons from one mine -- presumably Valdarno -- in the province of Arezzo, and 7,763 tons from two mines -- presumably Tatti and Ribolla -- in that of Grosseto), with the addition of a fourth, small operation (400 tons, possibly from Pomarance, near Pisa; *Relazioni minerarie*, pp. 159 ff.). With the exception of the addition of Tatti in 1866, moreover, the reported output movements from 1865 to 1867 are not implausible: the indication that Tatti alone was regularly exploited ("*coltivata*"; *Relazioni minerarie*, p. 181) in the province of Grosseto suggests that Ribolla's 1866 output (perhaps 3,500 tons, to 4,250 from Tatti) may have been a unique event; the balance of the increase in 1866 could be traced to the start-up of Valdarno ("*in questi ultimi tempi*"; *Relazioni minerarie*, p. 164), and of the decline in 1867 to Tatti's own loss of a major outlet (ibid., p. 182).

In 1866, col. 2 includes the 400 tons obtained from a prospecting operation in Umbria, reported in the *Statistica mineraria*, pp. 10-11, but not in the *Notizie minerarie*, pp. 294-295. The former also reports, and the latter also ignores, a further two tons obtained in 1865 in Emilia and the Marches, presumably again from prospeting operations; these are ignored here as well.

In 1873-79 col. 2 simply reproduces the yield of Firenze district prospecting operations, reported in the *Notizie minerarie* (pp. 294-295). The 1884 figure refers to the output of the Spoleto and Terni mines in the Roma district, reported too late to be included in that year's account (*Rivista mineraria 1890*, p. 659). The later elements of col. 2, finally, refer to the output of screened lignite (*trito*) in the Roma district in 1886-98, 1900-1910, and 1913. All these *trito* figures are reported in the sources (*Rivista mineraria 1890*, p. 659, and subsequent Roma district reports), with the exception of those for 1892 and 1894; these are here estimated as, respectively, 8.341% and 7.558% of the Roma district output of large-size lignite, against comparable ratios of 9.436% in 1891, 7.373% in 1893, and 7.748% in 1895. The *trito* produced in the Roma district in 1899, 1911, and 1912 -- and also that of the Firenze district, apparently without exception -- is already included in the reported aggregate (*Rivista mineraria 1898*, pp. 274, 294, *1899*, pp. 286, 303, *1911*, pp. XXII, 146, and *1912*, pp. XXVI, 143; also, e.g., *1887*, p. 95).

The second correction to col. 1 appears in cols. 3 - 4; it restores the neglected weight (lost in drying) of the moist lignite obtained in the Firenze district. While early indications are somewhat fragmentary, the early data appear to count the weight actually extracted; but in various times and places (the provinces of Arezzo, in part in 1888, and from 1891; Firenze, from 1900; and Siena, in 1902) output appears to have been recorded at the lighter weight (and perhaps at the time) at which it was sold. From 1895, the district reports separately record both the dried weight entering the aggregate and the corresponding moist weight extracted; except for 1900, 1901, and 1912, the former are exactly the total output reported for these provinces (e.g., *Rivista mineraria 1895*, pp. 115, 135, *1911*, pp. XXII, 80; also *1884*, p. 111, *1888*, p. 116, *1891*, p. 115). The figures in col. 3 are the dried lignite component of the Arezzo total in 1888, the (partly dried) Arezzo province totals in 1891-94, and the separately recorded totals for partly dried lignite in the Firenze district as a whole from 1895 (identical to the Arezzo province totals alone through 1899); the figures in col. 4 are the moist-weight equivalents, as reported from 1895, and as estimated before that. The 1891 estimate embodies the Arezzo province information in the *Rivista mineraria 1890*, p. 206, and *1891*, pp. 97, 115: the output of the main mine (Castelnuovo) is set at 143,696 tons (12,000 tons, as indicated, below the previous year's output, against a partly dried-weight output of 106,956 tons); the residual 45,080 tons from

other mines (up from 28,500) is kept unchanged, on the presumption that the (probably less easily financed) smaller mines did not wait for their output to dry before they sold it. The 1892-94 estimates are the reported partly dried weight scaled up by 24%, as implied by the independent figures in both 1891 and 1895. The 1888 estimate is instead the reported dried-weight figure (all of it dried lignite, out of a reported provincial output of 198,603 tons), scaled up by 50%.

Finally, and as usual, the reported 1864-1914 Sardinian figures (col. 5) are shifted half a year backward, from mid-1864 on, to approximate a calendar-year basis (col. 6); the island's output was sufficiently small and steady that this reestimation rarely alters even the second digit of the aggregate.

In 1911 these mines appears to have employed 3,077 adult male blue-collar workers in productive mines and 305 other blue-collar workers, suggesting a further 152 white-collar workers (4.5% of the blue-collar total), and 1,716 horsepower, of which 649 electric and 1,507 steam. With the usual coefficients, industrial value added comes to 3.907 million lire, or 5.804 lire per ton. The fuel bill is here estimated at .227 million lire by applying the usual coefficient to the mines' electric horsepower only, on the presumption that the corresponding value-of-output figure (5.035 million lire) is net of the value of fuel extracted but consumed at the mine rather than sold. The estimated surplus accordingly equals .901 million lire.

Conventional value added in the extraction of solid mineral fuel is again calculated simply as sales less fuel costs, or 4.808 million lire, equivalent to 7.143 lire per ton.

B02.09 Sulfur

The output estimates for the sulfur-mining industry are presented in Table B.10. As noted in section B02.01 above, the industry is here defined very broadly, and includes the initial transformation of the ore; the measures of production are thus the output of sulfur ore, and of its yield in ground sulfur ore or in liquated (fused) sulfur.

As in the case of mercury, the ore-pull on the processing industry was such that both the latter products were obtained where the ore was extracted, and the Corpo delle miniere long measured these rather than the output of the ore itself. The sources thus include a complete "crude sulfur" (*zolfo greggio*) series, here transcribed in col. 1; neither the 1899 *Rivista mineraria* nor the *Sommario* (which reproduced these under the heading "sulfur in cakes" (*zolfo in pani*) points out the heterogeneity of the series, as these figures include ground sulfur ore, as well as (fused) sulfur in cakes, only through 1894 (compare, e.g., *Notizie minerarie*, pp. 296-297, *Rivista mineraria 1894*, p. XVIII, *1895*, p. XXV, and *1899*, p. LXXVI, and *Sommario*, p. 124) and exclude the fused sulfur obtained from subterranean fires only in 1895-1904 (compare, e.g., *Rivista mineraria 1904*, pp. XXIX and 46, and *1905*, p. XXVII and 43). This series also excludes the comparatively trivial quantities obtained from cupriferous pyrite at the Agordo copper works (about 100 tons p. a. in 1861-65, declining to zero by the early 1890s: *Relazioni minerarie*, p. 128, *Rivista mineraria 1886*, p. 293, *1892*, p. 275). The 1911 total also excludes 510 tons of fused sulfur from subterranean fires, out of 2,048 tons reported by the Caltanissetta district; but there appears to have been a reason for doing so, even if the explanation was omitted (*Rivista mineraria 1911*, pp. XXXVIII, LIX, and 17), and that correction is accepted here as well.

Col. 2 presents the output series for ground sulfur ore. It incorporates the Corpo delle miniere ground sulfur ore data for 1878 and the years from 1888; the other figures are estimates. The 1878 figure (national in scope, but with the province of Avellino the only producing center) is from the *Notizie minerarie*, p. 359; the 1888-96 data are Avellino figures from the contemporary Napoli district reports; the 1897-1913 data (again national totals, with output still exclusively from the Napoli district, and mostly from Avellino alone) are from the national

reports on the sulfur processing industry. In 1880-87, ground sulfur ore output is estimated as equal to the crude sulfur output of the province of Avellino (as quoted in the current Napoli district reports) less an allowance of 1,000 tons for that province's output of fused sulfur (as a crude interpolation of the 1878 figure of 800 tons, *Notizie minerarie*, p. 359, and the 1888 figure of 1,050 tons, *Rivista mineraria 1888*, p. 281). In 1879, it is estimated as the crude sulfur output of the Napoli district (*Notizie minerarie*, p. 296), less an allowance of 1,700 tons for that district's output of fused sulfur (estimated as the usual 1,000 tons for the province of Avellino, plus 700 tons for the province of Catanzaro, against 250 tons in 1878 and 1,500 tons in 1880; *Notizie minerarie*, p. 359 and *Rivista mineraria 1880*, p. 242). In 1861-77, it is set equal to the crude sulfur output of the Napoli district reported in the *Notizie minerarie* (p. 296; see also p. 297, n. 4).

The corrected fused sulfur output series is presented in col. 3. It is derived from the reported crude sulfur totals (col. 1) by deducting ground sulfur ore production (col. 2) in 1861-1894 and adding the reported fused sulfur obtained from subterranean fires in 1895-1904; these last quantities are successively 1,091, 728, 3,784, 3,954, 3,894, 5,347, 3,072, 2,065, 1,969 and 1,789 tons (e.g., *Rivista mineraria 1900*, p. XXXII). In addition, this corrected series includes the sulfur reclaimed in the Agordo copper works; the corresponding quantities equal the reported 106, 65, 53, 60, and 51 tons, respectively, in 1861-65, an estimated 40 tons p. a. in 1866-85, the reported 34, 21, 26, 25, 15, 4, and 2 tons, respectively, in 1886-92, and zero thereafter.

The Corpo delle miniere reported aggregate sulfur ore output data (including the sulfur extracted already fused as a result of subterranean fires) only from 1895; this series appears in the *Sommario*, p. 124, with a 30-ton error in 1900. A complete ore-output series is presented in col. 16. In 1895-1913 it simply reproduces the data provided by the Corpo delle miniere; in 1861-94 it is obtained as the sum of regional ore-output estimates that reflect the principal geographic and technological distinctions and incorporate the available information on the production of both ore and processed sulfur. These regional estimates are transcribed (with the reported regional figures for 1895) in cols. 10 - 15; the regional fused-sulfur output series through which they are largely obtained are themselves transcribed in cols. 4 - 9. The reclaimed sulfur obtained at Agordo is here ignored, as it was obtained from pyrite, considered separately above.

Sicily was far and away Italy's largest producer of sulfur. Col. 4 transcribes the early data on the island's output of crude sulfur, all of it fused; these include whatever fused sulfur was obtained from subterranean fires even in 1895. The corresponding ore series, transcribed in col. 10, is relatively sturdy: direct evidence on ore output is available in 1864, 1877-78, and from 1880, and the total yield (col. 4) is a good index of output in other years. In 1864 output is estimated as the volume of sulfur ore fused (*Statistica mineraria*, p. 46; the figures are not dated, but the yield is that listed for 1864 in the *Notizie minerarie*, p. 296), converted at the rate of 1.2 tons per cubic meter (*Notizie minerarie*, p. 358). The 1877 figure is a similar transformation of the reported volume fused (*Rivista minerarie 1878*, p. 173; by analogy to other years, the specific gravity is here again set at 1.2, against 1.22 in the source). In 1878 output is estimated as equal to the reported tonnage fused (*Notizie minerarie*, pp. 358-359; these tonnages were themselves obtained from unpublished volume figures, converted at 1.2 tons per cubic meter). From 1880, the Caltanissetta district reports contain ore output figures -- apparently in cubic meters, as labeled, in 1880 and 1882-83; in cubic meters, the label "tons" to the contrary, in 1881; in tons, though unlabeled, in 1884-85; and in tons, as labeled, from 1886. So interpreted (to avoid what would appear to be spurious jumps in the ore/fused sulfur ratio), and accordingly scaled up by 20% in 1880-83, these direct output data represent the bulk of col. 10. The remaining figures in that series (1861-63, 1865-76, and 1879) are interpolated on the

basis of the total yield (col. 4); the ore/fused sulfur ratio in 1861-63 is set equal to that obtained for 1864, while the ratios for 1865-76 and 1879 geometrically interpolate those obtained for 1864 and 1877 in the one case, and 1878 and 1880 in the other. The secular decline in this ratio from over 7.5 in the 1860s to 6.5-7.0 in the 1880s seems attributable, in the main, to the spread of Gill and steam kilns in lieu of the comparatively wasteful traditional *calcaroni*, which burned part of the sulfur to fuse the rest (as did the Gill kilns, but more efficiently); year-to-year fluctuations appear primarily due to changes in the mix of ore qualities, but may also reflect erratic accounting of sulfur fused by underground fires (although with only a few thousand tons at issue any discrepancy would remain well below one-half of one percent of the total) or a variety of lags, as the fusion process itself took one or two months in a *calcarone* (although the output of ore is generally identified with the input to the same year's output of fused sulfur, as if the reference calendar periods had been adjusted to allow for these lags; e.g., on all the above, *Rivista mineraria 1890*, pp. 100-101, *1892*, p. 58, *1893*, p. 39, *1899*, pp. CXXV, 95).

Ignoring lags, and slurring the distinction between ore produced and ore transformed, the ore production of the Continental mines is assumed to equal the sum of the weight of the ore ground and that of the ore fused. The weight of the ore ground is simply assumed to equal that of the yield in ground sulfur ore; the same figure is similarly quoted as both ore ground and ground ore in the *Rivista mineraria*, e.g., *1895*, p. LXI, 231. Before 1895, the weight of the ore fused is typically known only in 1865, from the *Statistica mineraria* (p. 46), and in 1878, from the *Notizie minerarie*, pp. 358-359.

Cols. 5 and 6, referred to the fused sulfur obtained in Emilia and the Marches, are in part derived together. From 1861 to 1879, the *Notizie minerarie*, p. 296, reports the Ancona district total; the local disaggregation of that total is available for 1865 (*Statistica mineraria*, p. 46) and 1878 (*Notizie minerarie*, p. 358). From 1880 to 1895, the regional figures are constructed from the provincial data in the *Rivista mineraria* (e.g., *1895*, p. 15). In 1861-64, 1866-77, and 1879 the regional fused-sulfur figures disaggregate the district total using regional shares that remain constant before 1865, and then linearly interpolate the benchmarks calculated for 1865, 1878, and 1880. The corresponding ore output estimates appear in cols. 11 and 12. These incorporate the ore-output (or ore-fused) data for 1865, 1878, and 1895 in the cited sources; in 1861-64, 1866-77, and 1879-94 the regional ore-output figures are obtained from the fused-sulfur output estimates in cols. 5 and 6 and an ore/fused sulfur ratio that remains constant before 1865, and then geometrically interpolates the benchmarks calculated for 1865, 1878, and 1895.

Col. 7 presents together the fused sulfur output of Tuscany and Latium, two regions that produced little and relatively sporadically. The figures in col. 7 refer to Tuscany alone in 1868-72, and to Latium alone in 1861-62 and from 1873. The data, from the same sources as above, are for the Firenze and Roma mining districts; they are attributed to the districts' home regions on the strength of the information for 1878 in the *Notizie minerarie*, pp. 333 (which locates the abandoned mine in Tuscany) and 359 (Roma). Col. 13 again refers to the two regions together; it allows a round 10 tons of ore per ton of fused sulfur, as obtained in the Roma district in 1897 and 1899, against 8.32 in 1878 and an oddly high 16.76 in 1895. In the Firenze district, production resumed in 1899 (*Rivista mineraria 1899*, p. 152); the average ore/fused sulfur ratio from 1899 to 1913 was 7.77, but a higher figure would seem appropriate for the earlier years.

The Napoli district figures cover both Campania and Calabria; production in the latter region began in 1878, and provincial data are available from 1880, so that the district aggregate needs to be disaggregated only in 1879 (*Notizie minerarie*, pp. 296-297, 333, 359; *Rivista mineraria 1880*, pp. XXXIX, 240, 242). Col. 8 presents the fused sulfur figures for Campania. As indicated above with reference to col. 2, these are the reported figures for 1878 and 1888-95; they are set at zero through 1877, and at 1,000 tons. p. a. in 1879-87. The corresponding ore-output figures for Campania are presented in col. 14; they sum the ground-ore tonnages in col. 2

and the ore-fused tonnages that correspond to the fused-sulfur output in col. 8. The latter figures equal the reported amount in 1878 (3,330 tons); in 1879-94 they allow 4.7 tons of ore per ton of fused sulfur, against 4.16 tons in 1878, and an average of 5.17 tons in 1895-1913.

Col. 9 presents the fused sulfur figures for Calabria. These are the reported figures for 1878 and 1880-95, and the 700 tons estimated above, with reference to col. 2, in 1879; the local data are taken to refer to fused sulfur, though the early sources are somewhat ambiguous (*Notizie minerarie*, p. 359; *Rivista mineraria 1880*, pp. XXXIX, 242). The corresponding ore-output figures are presented in col. 15. Ore output was not reported in 1878, and the earliest figure in the sources is that for 1895; the present figures for 1861-94 are obtained from the fused-sulfur amounts in col. 9, allowing 10.6 tons of ore per ton of fused sulfur (the average over the decade 1895-1904, against 13.5 in 1895 itself).

Value added in sulfur mining, as broadly defined above, is here separated into the value added in the extraction of sulfur ore (i.e., in sulfur mining, narrowly defined), in the grinding of sulfur ore, and in the fusion of sulfur ore. Each of these goods is here considered homogeneous; the error incurred by failing to distinguish the share of sulfur fused by underground fires in the output figures for sulfur ore (2,048 tons out of 2,682,766, in 1911) and fused sulfur (1,538 tons out of 414,161) may be considered negligible.

Value added in fusion is estimated from the value of the output and the value of the ore. An initial estimate is obtained for Sicily, as the Caltanissetta district report contains detailed data on processing costs, but the calculation is complicated both by Sicily's substandard wages and by various accounting conventions owed in part to the vertical integration of the industry (*Rivista mineraria 1911*, pp. XXIV, XXXVI-XXXVIII and 16-21).

The Sicilian value-of-output figure of 36.974 million lire that appears in the national report turns out to refer to the value of the sulfur on the sea-coast; the pit-head value of 29.674 million lire seems to have been obtained by deducting merchandising costs, and the corresponding value of the largely non-traded ore, 27.464 million lire, by deducting processing costs as well. The 7.300 million lire reported as merchandising costs include 5.498 million lire in transport and warehousing costs, and 1.802 million lire in contributions to the workers' insurance fund and to the producers' cartel (also in essence an insurance fund, as Sicily had lost its monopoly earlier in the century, when Louisiana came on stream); the latter seem more properly reckoned as production costs (part of the earnings of labor and capital), for a corrected pit-head value figure of 31.476 million lire.

The cost of processing the ore that yielded 377,328 tons of fused sulfur is recorded at 2.210 million lire, or 5.86 lire per ton, including 1.891 million lire in wages, or 585 lire per worker (for the year). The contribution to the workers' insurance fund, of .759 million lire, seems to apply to mining (where the recorded wage bill was 11.173 million lire) as well as to processing; the recorded wage bill is accordingly increased by .759/(1.891 + 11.173) = 5.8%, raising actual the wage bill in processing by .110 million lire, to 2.001 million lire. The contribution to the cartel, of 1.043 million lire, also seems to apply to mining as well as processing; it is here divided evenly between the two, for an estimated actual processing cost of (2.210 + .110 + .522) = 2.842 million lire. Using standard wages of 850 lire for the 3,044 adult males and 425 for the 187 other workers, however, the wage bill in processing equals 2.667 million lire; the work year was actually somewhat shorter than the norm, but that is here considered compensation for the attendant health hazards. At standard wage rates, therefore, the total processing cost rises by a further (2.667 − 2.001) = .666 million lire, to 3.508 million lire, or 9.30 lire per ton. In 1911, 32,603 tons of fused sulfur were obtained from steam kilns. The *Rivista mineraria 1895*, pp. 51, 57, reports that 3,395 tons of coal were then used in the steam kilns, which yielded 34,394 tons of sulfur; in 1911, allowing 3,000 tons of coal at 43 lire each, fuel costs work out to .129 million lire. Value added in fusion (in Sicily, at national prices) is

accordingly estimated at 3.379 million lire, or 8.96 lire per ton.

On the Continent, the major producers of fused sulfur were the northern regions in the Bologna district, and Calabria in the Napoli district. In the Bologna district, 26,741 tons of fused sulfur worth 2.567 million lire were obtained from (or at least in conjunction with) ore worth 2.309 million lire, implying a processing cost of some 9.65 lire per ton, comfortingly close to the corresponding Sicilian estimate of 9.30 lire per ton. In Calabria, the corresponding figures are 5,101 tons of fused sulfur worth .415 million lire and ore worth .391 million lire, for a processing cost of just 4.70 lire per ton, lower even than the uncorrected Sicilian figure of 5.86 lire per ton.

Overall, value added in the fusion of sulfur ore is here estimated at a round 9.0 lire per ton, for a total of 3.727 million lire. The unit figure corresponds closely to the weighted average of the Sicilian estimate of 8.96 lire per ton for its 91.5% share of the total, and an estimate of 9.30 lire per ton for the minor producers, obtained by applying to the estimated processing cost in the Bologna district the Sicilian ratio of value added to processing costs.

Value added in sulfur mining proper is estimated in the usual way. In 1911 that activity reportedly employed 17,393 adult male blue-collar workers in productive mines and 2,219 other blue-collar workers, plus 4,989 horsepower, of which 4,891 non-hydraulic. The number of white-collar workers is estimated at 1,412, or 7.2% of the blue-collar total, as suggested by the *Censimento industriale* figures for category 2.13 and ω.21 together. With the usual coefficients (again assuming that the short work year offset health hazards), industrial value added comes to 21.046 million lire, or 7.845 lire per ton extracted.

The corresponding estimate of fuel costs, again on the usual assumptions, comes to 1.712 million lire. To obtain conventional value added in sulfur mining, that figure is deducted from an estimated sales value obtained as the reported figure for the Continent (3.633 million lire) plus an estimated Sicilian figure calculated as the corrected value of the fused sulfur output (31.476 million lire) less corrected fusion costs (3.508 million lire); the resulting estimate equals 29.889 million lire, or 11.141 lire per ton. The corresponding surplus works out to 8.843 million lire.

Value added in the grinding of sulfur ore is also estimated from factor use, as the ore that was ground rather than fused was typically of superior quality (and, correspondingly, of unknown value). In Avellino, where 17,408 tons were produced (out of a national total of 17,561), the activity employed 52 adult males and 31 other blue-collar workers, and 374 horsepower. Allowing 6 white-collar workers (7.2% of the blue-collar total, as above), with the usual coefficients value added works out to .256 million lire, or 14.727 lire per ton; the implied national total equals .259 million lire.

B02.10 Rock salt, brine salt, crude oil, and natural gas

The rock salt, brine salt, crude oil, and natural gas series are presented together in Table B.11.

The present rock salt series in col. 1 simply transcribes the aggregate output figures reported by the Corpo delle miniere. No attempt is made to correct the data, even though the actual output of both producing districts (Caltanissetta and Napoli) is to some extent uncertain. The Sicilian figures repeat a single 9,000-ton estimate from 1861 through 1877 (*Notizie minerarie*, p. 298); but no index of short-term movements is available. The Continental data aggregate the variously processed goods produced by the enterprise rather than measure the unprocessed mining product (probably in all years, certainly in 1898-1909; e.g., *Rivista mineraria 1909*, p. 348); the weight loss in processing should not however be significant, and the quantity figures may be accepted as they are. From 1894 through 1897, the Napoli data are said to refer to fiscal, rather than calendar, years (e.g., *Rivista mineraria 1897*, p. 231); but (as

for continental Firenze district data, and unlike Elban and Sardinian reports) there is no evidence of any transition to, or away from, a fiscal year basis. The indication, or at least its ostensible chronological limits, may thus well be spurious, and any correction would be as likely to introduce heterogeneity as to remove it.

The present brine salt series in col. 2 is again simply transcribed from the sources. Like the rock salt series, it incorporates very weak early estimates, and also measures salt after part of it has been processed (*Notizie minerarie*, pp. 298-299). The *Rivista mineraria* explicitly acknowledged that basis, with processed salt accounting for some 10% of total output, only through 1894 (*Rivista mineraria 1880*, p. 108, *1894*, p. 110); but average values do not drop at that point (*Rivista mineraria 1899*, p. LXXVIII), so the practice presumably continued. In any event, the series should be reasonably homogeneous: salt processing does not appear to involve a significant weight loss, and only saturated brine was presumably extracted. Similarly, the magnitude of the jump in the Firenze district employment figures with the start of salt processing in 1873 suggests that the concomitant output increase was real, rather than due to double-counting of processed salt (*Notizie minerarie*, pp. 298-299).

The present crude oil series in col. 3 is that reported in the sources (*Sommario*, p. 124), with only minor corrections to remove some heterogeneity in the figures for the province of Chieti (part of the Ancona district through 1885, Bologna in 1886, and Roma from 1887). In 1885-87, the Chieti product (100, 50, and 20 tons, respectively) was counted refined rather than crude; those figures are here replaced by their equivalent in crude (354, 177, and 71 tons respectively), estimated as 3.54 times the reported refined weight (*Rivista mineraria 1886*, pp. 35, 37). In addition, the present figures are net of the Chieti oil obtained by liquating oil-bearing rock in 1882, 1892 and 1895-97 (44, 150, 38, 28, and 23 tons, respectively; e.g., *Rivista mineraria 1892*, p. 224, *1895*, p. 252); such oil is here considered an asphalt derivative.

The present natural gas series in col. 4 is also taken as reported in the sources (e.g, *Sommario*, p. 124), and considered complete: while statistics were not collected until 1893, output in earlier years was most probably small enough to be neglected (as suggested by the monotonic growth implied by the historical sketch in the *Rivista mineraria 1889*, p. 249; also *Rivista mineraria 1899*, pp. LXXXI, CIII, and *Notizie minerarie*, p. 35).

The value added estimates are less straightforward.

In the case of rock salt, the *Rivista mineraria 1911* (pp. XXIV-XXV) suggests that the Napoli district accounted for one-tenth of rock-salt output by quantity (4,853 tons out of 43,763), but over half by value (.468 million lire out of .786); and the Napoli value figure is most probably intended as a measure of production cost (*Rivista mineraria 1909*, p. 348). On the other hand, that cost figure far exceeds the levels suggested by the district's puny factor employment (189 *operai*, 55 horsepower); it may include interest on capitalized surplus, or a depletion allowance, or otherwise overstate the cost of extraction alone. Industrial value added is here estimated in the usual way, with an allowance for the share of the Napoli district employment that may have been engaged in processing rather than mining proper. The scope for error is fortunately small, as all but 20 men and 15 women are listed as working below ground (*all'interno*), and only 55 horsepower were employed. As a rough approximation, half these ambiguous figures are attributed to mining proper; the results are compatible with the Sicilian ratio of above-to-below-ground employment as well as with the closest figures on processing in the Napoli district (*Rivista mineraria 1909*, p. 348), and in any case reduce the relevant margin of error to paltry levels. On these assumptions, and with the share of white-collar workers appropriate to census category 2.15, rock salt extraction employed 284 adult male workers in productive mines, 28 other blue-collar workers, 22 white-collar workers, and 28 (non-hydraulic) horsepower. With the standard coefficients these yield an industrial value added of .311 million lire, or 7.113 lire per ton.

The corresponding conventional measure is even more difficult to pin down. It would correspond essentially to the indicated value of output if the Napoli district salt was somehow valued for its exceptional purity; as far as one can tell from as the product mix indicated for 1909, however, almost none was used for (special) industrial purposes. It would correspond instead to a fraction of that value, if the reported value is a "cost" figure bloated by a purchased licence to sell at State-monopoly prices: that part of "cost" and value would be in the nature of an indirect tax, and therefore (like the profits of the tobacco monopoly) excluded from value added even conventionally defined. On balance, it would seem reasonable to allow rock salt a small quality premium over the competitive price (cost) of sea salt; somewhat arbitrarily, conventional value added is here set at 9.0 lire per ton, for a total of .394 million lire. The estimated surplus equals .083 million lire.

The brine salt industry is nowhere explicitly listed by the *Censimento industriale*; it is here presumed to belong in the residual mining category (2.15). As the only salt-related processing explicitly listed in other categories are grinding (5.12) and refining (7.118), the mining product is here assumed to be common salt, rather than brine; the relevant value added thus includes that in evaporating, as well as extracting, the brine.

Since the brine itself was a renewable resource, value added includes the rent of the brine-yielding "land," and the conventional measure of value added is correct; but the reported market value (.696 million lire, or over 40 lire per ton) may again be distorted by the public monopoly. In the circumstances, value added seems best approximated by the hypothetical competitive price of sea salt, delivered inland; the figure is here estimated at 14 lire per ton, for a total of .242 million lire in the production of brine salt. An estimate of value added net of land rent is in turn obtained from the blue-collar employment and horsepower figures reported for the Firenze district only (*Rivista mineraria 1911*, pp. XXVI-XXVII; the Bologna district brine salt employment was not separately counted), taken as approximations to the appropriate national totals. On the one hand, they should be scaled up, to allow for the share (3.5%) of Italy's brine salt production obtained elsewhere; on the other hand, they should be reduced to allow for the salt processing the present definitions exclude from the mining sector. Judging from the analogous rock salt figures (as all brine salt workers were of course on the surface), these two biases appear to cancel to a negligible error. The figures used here are accordingly the reported 112 adult male blue-collar workers in productive mines, 58 other blue-collar workers, an estimated 12 white-collar workers (7.2% of the blue-collar total), and 105 (non-hydraulic) horsepower; with the usual coefficients the resulting total equals .196 million lire, or 11.4 lire per ton, suggesting that land rent accounted for about one fifth of value added.

In the case of crude oil and natural gas, finally, the blue-collar employment and horsepower figures in the 1911 *Rivista mineraria* (pp. XXVI-XXVII) refer to the joint production of these goods, and also, in the province of Parma, of some brine salt and mineral water. Adding those employed in prospecting (p. XVII), one obtains totals of 480 adult male blue-collar workers in productive operations, 100 other blue-collar workers, and 1,919 horsepower; of these, only the 89 steam and electric power presumably ran on purchased fuel or energy. The number of white-collar workers is estimated at 34 (5.9% of the blue-collar total), using the average of the ratios for census categories 2.14 (which includes natural gas) and 2.15 (which includes crude oil). With the usual coefficients, industrial value added totals 1.478 million lire; allowing .034 million lire (10% of value) for value added in mineral water and .008 million lire (13 lire per ton, including processing) for value added in Parma brine salt, the estimated value added in crude oil and natural gas reduces to 1.436 million lire. The *Rivista mineraria 1899* (pp. LXXXI, CIII) indicates that natural gas was usually valued at cost, rather than at the administered price some six times greater. The 1911 gas value figure implies a similar valuation; industrial value added in natural gas extraction is here accordingly estimated

at .418 million lire (the reported value of .384 million lire, plus .034 million lire for the industry's share of that year's prospecting labor and capital costs), or 46.336 lire per thousand cubic meters. The residual industrial value added attributable to crude oil is accordingly 1.018 million lire (70% of reported value), or 97.979 lire per ton.

For both crude oil and natural gas the conventional measures of value added are set equal to the market value, neglecting the small expenditure for purchased fuel and energy. The reason is that both seem to have been sold at a market price determined by that of freely available substitutes; in the case of natural gas the margin between the cost of production and the selling price may have taken the form of a monopoly profit or indirect tax, but in fact it simply captured the value of the consumed reserves themselves. In the case of crude oil, the market value is taken as the reported figure of 1.455 million lire, or 140.039 lire per ton, for a surplus of .437 million lire. In the case of natural gas, in the absence of more direct evidence than that provided in the *Rivista mineraria 1899*, the market value is set at 280 lire per thousand cubic meters, or approximately six times the cost of production, for a total of 2.526 million lire. The estimated surplus equals 2.108 million lire.

B02.11 Asphalt rock

The estimates for asphalt rock are presented in Table B.12.

The Corpo delle miniere never recorded the aggregate output of asphalt rock. Through 1889, the data record only the aggregate output of asphalt, mastic, and bitumen; the figures in col. 1 are the reported totals, except in 1877, when col. 1 transcribes the sum of the district output figures, each of which is consistent with the value data, rather than the reported total (7,744 tons), which is not (*Notizie minerarie*, pp. 302-303). The asphalt rock data available from 1890 (col. 2) exclude the rock liquated at the mine, its yield in bitumen (or oil, in 1892 and 1895-97) being recorded instead (e.g., *Rivista mineraria 1909*, pp. 389, 412; Table D.47, col. 9, and section D12.05). From 1890 to 1913, then, the present estimates of aggregate asphalt rock production (col. 6) are obtained as the sum of reported output (col. 2) and an allowance for excluded rock, estimated as 20 times the reported output of crude bitumen (and oil). This coefficient seems appropriate to bitumen for the bulk of this period, though it appears to have been rather higher in the 1880s (about 25) and perhaps in the early 1890s (*Rivista mineraria 1880*, p. 31, *1884*, p. 26, *1904*, p. 364); and it seems applicable to oil as well (judging from the experiments described in the *Rivista mineraria 1881*, pp. 43-46, and assuming that the "fluid bitumen" refined into light and heavy oils was in fact what was later referred to as oil).

In 1861-89, on the other hand, the critical consideration is the disaggregation of the reported sum of rock and derived products. The evidence, discussed in section D12.05 below, suggests that the Caltanissetta and Napoli district components of this aggregate actually referred to rock, as processing took place at some distance from the mine; that the reported output of the province of Chieti (in the Ancona district through 1885, Bologna in 1886, and Roma from 1887) consisted of rock, powder, mastic (with an admixture of refined bitumen), paving stones and tiles, and refined bitumen (sold as such); and that the small Roma district output (excluding Chieti, in 1887-89) consisted of mastic (without bitumen), except in 1889, when it consisted of bitumen only. The present asphalt rock output estimates for those years (col. 6) are accordingly obtained by replacing the Chieti province and (other) Roma district data (cols. 3, 4) by the estimated equivalent in rock; the input/output ratios are assumed to be product-specific but (for simplicity) constant over time. While the estimates so obtained are obviously weak, the available information would not appear to permit more solid ones; the employment data, in particular, are of little help, as the working year was short and variable (e.g., *Rivista mineraria 1882*, p. 97, *1889*, p. 90).

The Chieti rock output series (col. 5) includes the figures reported in the district

chronicle in 1882-84 (e.g., *Rivista mineraria 1884*, p. 26); in other years, they are estimated from the calculated disaggregation reported in Table D.47, cols. 2, 5, 8 (from 1876), 10 (excluding the 4 tons of Frosinone bitumen in 1889) and 11. In view of the weight losses that appear to have prevailed at this time (above, and section D12.5), the unit coefficients are estimated at 25 tons of rock per ton of refined bitumen, 1.25 tons of rock per ton of powder and paving stones or tiles, 2.5 tons of rock per ton of mastic (half of it for powder, and half for bitumen), and of course one ton per ton of rock shipped as such; the 1876 estimate includes the 11,497 tons of rock apparently excluded from the aggregates in Table B.12, cols. 1 and 3, and the 1888 estimate includes 80 tons of rock in lieu of the 4 tons of oil counted in Table D.47, col. 9. It may be noted that the asphalt rock estimates that would be obtained on this basis for 1882-84 (6,555, 18,755, and 27,400 tons, respectively, including oil-related allowances of 880 tons in 1882 and 720 tons in 1883) are close to the reported rock outputs in 1883 and 1884, but well below it in 1882, when much of the rock actually obtained appears to have been added to inventories or burnt for fuel (*Rivista mineraria 1882*, p. 29).

The (other) Roma district correction is of course much simpler; rock output is assumed to be a constant 1.25 times the reported amount (presumably of mastic, without bitumen) in 1861-88 (*Rivista mineraria 1890*, pp. 662, 668) and 25 times the reported amount (of refined bitumen) in 1889, for net increments of .25 and 24 times the reported amount in 1861-88 and 1889, respectively.

The estimate of industrial value added is similarly tentative. The relevant employment is estimated at 1,781 adult male blue-collar workers in productive mines, 106 other blue-collar workers, 136 white-collar workers (7.2% of the blue-collar total), and 25 horsepower (all non-hydraulic); these figures assume that one third of the 92 above-ground workers listed under *bitume greggio* were actually employed liquating the rock (for about half a year, yielding the value added in crude bitumen production estimated in section D12.05 below). The blue-collar wages (and the fuel bill) allow a working year in the mines that is two thirds the usual norm. On the otherwise usual assumptions, industrial value added works out to 1.326 million lire, or 6.660 lire per ton of rock asphalt extracted.

The surplus is calculated from a sales figure obtained as the total reported value of asphalt rock and crude bitumen (3.065 million lire) less the cost of obtaining bitumen from the rock estimated in section D12.05 below (.022 million lire, 75% value added and 25% fuel costs); deducting the fuel costs in extraction (.006 million lire), conventional value added is estimated at 3.037 million lire, or 15.254 lire per ton. The corresponding surplus equals 1.711 million lire.

B02.12 Boric acid

The series relating to boric acid appear in Table B.13, cols. 1 and 2.

Apart from trifling amounts occasionally obtained on the island of Vulcano (e.g., 1.5 tons in 1881, 2 tons in 1884; *Rivista mineraria 1881*, p. 113, *1884*, p. 55), all of Italy's boric acid was obtained from the boric vapors (*soffioni*) of the Tuscan Maremma. The Corpo delle miniere produced the aggregate output data transcribed in col. 1; these appear also in the *Sommario*, p. 125 (with a minor error in 1878). In fact, these figures seem to record actual production only from a relatively late date. The *Rivista mineraria 1893* (p. 73; see also *1894*, p. 110) is in fact the first to claim to report the actual output of (82%) boric acid. As the *Notizie minerarie* (p. 308) and the early Firenze district reports clearly indicate, the 1861-83 and 1886-87 "output" data are simply the boric acid export figures in the *Movimento commerciale*; the 1884 figure is the volume shipped from the producing center's railway station (over 1,000 tons above the export figure, as was much the case again in 1887, instead of a few hundred tons below it as in 1881-83 and 1886), and the 1885 figure, while not explicitly defined, is about 750

tons below exports and accompanied by some remarks on the reduction of inventories after their rise in the previous year (*Rivista mineraria 1885*, pp. 95, 98; also, e.g., *1886*, p. 84). The 1888-92 data, not explicitly identified with anything in particular, may be direct measures of output; but their significance is clouded by the processing of boric acid. The *Movimento commerciale* indicates that significant exports of borax replaced imports from 1886, while the beginning of production of both borax and refined boric acid (at the source of boric acid) was noted by the *Rivista mineraria 1888* (p. 118; contrast *1899* pp. LXXXIV, CIV). As borax output data are also available from 1890, and borax was considered a mining product until 1892, the low 1890-92 boric acid figures almost certainly measure output exclusive of that consumed to produce the salt (e.g., *Rivista mineraria 1890*, p. 205); but the statistical impact of borax production in 1888-89, like that of acid refining in 1888-92, can only be guessed at.

The reported figures for 1861-92 are here replaced by the radically smoothed estimates in col. 2. The salient feature of the 1893-1913 figures is their comparative lack of variation: while boric acid exports and the production of both borax and refined boric acid are quite volatile (e.g., all doubling or more from 1904 to 1905, only to drop by a sixth to a half from 1906 to 1907), boric acid production hardly ever changes by even so much as one-tenth from year to year, or twice that between any two years at all. Given the fixed plant, the nature of the production process -- bubbling the vapors through artificial lagoons, and evaporating the water with the heat of the vapors themselves -- appears to have afforded little scope either for expanding output or for saving costs by contracting; in the short run, output would thus have been kept steady at the level dictated by the capacity of the available installations, while fluctuations in sales were borne by inventories. With the industry's basic technology dating from generations earlier, one can expect this situation to have been as true before 1893 as after it; the early output figures provided by the Corpo delle miniere are accordingly replaced by longer-term trend values.

Working backward, output in 1881-92 appears to have been close to the present estimates of 2,900 tons p. a.: boric acid exports averaged about 2,550 tons, and borax output probably averaged some 600 tons (judging from the available net export and output data; see below, section D11.06), equivalent to another 350 or so tons of boric acid (of 82% concentration, and assuming the borax contained some 25% impurities, for an input/output ratio of .6; compare von Wagner, 1904, pp. 429, 430, 434). From 1880 to 1881, output is said to have dropped, as one of the 13 plants closed down (*Rivista mineraria 1881*, p. LX); but reported employment significantly increased (*Rivista mineraria 1899*, p. LXXXIV), so that the most prudent assumption is that output was in fact unchanged. As the numbers of both plants and employees were constant from 1877 through 1880, that estimated output of 2,900 tons is assumed to have obtained from 1877. A new plant opened in that year (*ibid*., and *Rivista mineraria 1877*, p. 95); assuming that it had a rather higher output than the prevailing average, output in 1876 is estimated at 2,600 tons. The *Statistica mineraria* (pp. 56-57) reports what appears to be an actual output estimate of 1,800 tons -- undated, but meant presumably for the mid-1860s, when 10 plants remained in operation even though exports collapsed (in the wake, presumably, of the U. S. Civil War). This figure is accordingly assumed to apply to 1861-68 (ignoring the rather higher 1867 "output" figure quoted in von Wagner, 1904, p. 428, which may actually refer to sales, covered in part by inventories accumulated in earlier years); following the export success achieved in 1868, two new plants opened in 1869, raising output presumably in something more than strict proportion, to perhaps 2,300 tons. From 1869 to 1876, the number of plants remained constant, but reported employment doubled; the present estimates for the intervening years interpolate the 1869 and 1876 estimates with rounded figures calculated as 2,000 tons plus 1.5 tons per reported worker. While clearly tentative, these early estimates do embody some information about medium-run movements; and the total amount

estimated produced in 1861-80 is virtually identical to the total amount reported exported (*Notizie minerarie*, p. 308).

The value added estimate is not subject to the usual distinction between "correct" and "conventional" measures, as the production of boric acid (like that of sea salt) did not involve the depletion of a finite stock. Fuel costs were negligible, as the *soffioni* themselves provided energy, and almost the entire value of output was payment for the services of labor, capital (for the fixed plant to capture the vapors), and the very particular land. The value of output in 1911 was reported at 380 lire per ton; allowing for minor items, value added is here set at 370 lire per ton, or .980 million lire in all.

The data suggest that employment included 433 adult male blue-collar workers in productive operations, another 9 blue-collar workers, 32 white-collar workers (7.2% of the blue-collar total), and 2 horsepower. With the usual coefficients the wage bill works out to .436 million lire; a little over as much again remains as the return to capital and land.

The allocation of this value added remains something of a problem: the census legends list boric acid as one of the products of the "other mines" in category 2.15, and there indicates that the acid's refining is included in category 7.118; the legend to the latter, however, includes both the extraction and the refining of boric acid. The counterpart to the *Rivista mineraria* definition may thus be at least partly in 7.118; but as the industry is clearly *sui generis*, and any dividing line between the primary producer and the producer of raw boric acid would be clearly arbitrary, it does not seem worth while to depart from the classification adopted by the Corpo delle miniere.

B02.13 Graphite, alunite, and bauxite

The graphite, alunite and bauxite series are transcribed in Table B.13, cols. 3 - 5. These simply reproduce the aggregate data published by the Corpo delle miniere (e.g., *Sommario*, pp. 121, 125); the only correction is to the alunite figure for 1873, where the sum of the local data yields 20 tons more than the reported total.

While the early graphite data especially do not seem very solid, the lack of further output information effectively inhibits any corrections. One notes the sparsity of independent estimates, as identical output, value, and employment entries are repeated in 1861-65, 1866-70, and 1879-80 (in 1884-86, the value or employment figures change from year to year, suggesting that the output estimate too was annually reconsidered; *Rivista mineraria 1899*, p. LXXXV). In the 1870s, in turn, the variation in output seems if anything excessive; but as the Torino district was then the sole source of graphite, a single individual compiled the series for the *Notizie minerarie* (p. 309), and one can only assume that that erratic sequence was meant as published. The 1876 output figure is simply that year's reported exports (*Rivista mineraria 1877*, p. 163); a comparison of output and exports in other years suggests that domestic consumption was indeed very small, but that inventory changes may have been considerable -- and while the estimated level of output corresponds to the reported employment figure (45 men, as in 1877), the latter may have itself been derived from the former. In 1881-86, and perhaps in 1872 and 1876-77, the reported values refer to ground graphite; the quantity figures were apparently meant to refer indifferently to output before or after grinding, as no allowance for weight losses entered the comparison of unit values of ground and unground graphite (e.g., *Rivista mineraria 1881*, p. LXIX, *1882*, p. 302; in 1897-1900, however, the Torino district output figures for both graphite and ground graphite, undistorted by production elsewhere, suggest a weight loss of about 10%; e.g., *Rivista mineraria 1897*, pp. 304, 306). The divergence between the paths of output and exports in the 1880s and 1890s is somewhat troublesome, but can be attributed to inventory accumulation in the early 1880s, and net decumulation especially in the early 1890s, when exports well exceeded output. Since much output in the early 1880s was illegal (e.g., *Rivista*

mineraria 1881, p. LXIX, *1899*, pp. LXXXV, CIV), production for the sake of possession rather than sales is not unlikely; in addition, domestic consumption (as a lubricant, and in paint; *Notizie minerarie*, p. 32) was unlikely to be very volatile, and the hypothesis of inventory growth is compatible with the attribution of the decline in output (*Rivista mineraria 1887*, p. LXXXV) to a lack of sales opportunities even though exports were growing slowly but relatively steadily. In any event, the same individual (A. Rovello) compiled the Torino district report from 1881 to 1895, so it is hard to attribute the output cycle to changes in the estimates' bias; and while the 1896 report (p. 306) suggests that underreporting might explain the excess of exports over output, its author (O. Foderà) had just arrived in the Torino district and was thus plausibly unfamiliar with the extent of inventory accumulation in earlier years.

The alunite series appears similarly weak, and not amenable to improvement, even though it refers to a single famous mine (Tolfa); one notes the repetition of identical output figures in 1872-73, 1885-87, and 1891-92, and again the possibility of occasional neglected weight losses (*Rivista mineraria 1899*, pp. LXXXIV, CIV). In 1876 and 1877, col. 4 repeats the original figures in the *Notizie minerarie*, p. 306; the *Rivista mineraria 1899*, p. LXXXIV, and thence the *Sommario*, p. 125, unaccountably reduce those figures by a single ton.

The bauxite figures also refer to a single mine (Lecce dei Marsi); but they seem relatively sturdy. They are obtained from the *Rivista mineraria* quarrying reports, discussed in chapter B03 below; the series is complete as it stands, as production actually began in 1905 (*Rivista mineraria 1905*, p. 365).

The value added estimates are equally straightforward. Graphite mining employed 336 adult male blue-collar workers in productive mines, 34 other blue-collar workers, an estimated 27 white-collar workers (7.2% of the blue-collar total), and no horsepower. With the usual coefficients industrial value added comes to .354 million lire, or 28.050 lire per ton. Conventional value added is identified directly with the reported value of .384 million lire, or 30.425 lire per ton. The resulting surplus is a puny .030 million lire.

In 1911, the alunite mine employed 70 adult male blue-collar workers to produce 6,100 tons; in 1887, a comparable amount was produced by 93 men in only 80 days (*Rivista mineraria 1887*, p. 264). Assuming a similarly short working year, the wage bill per blue-collar worker is here set at 240 lire; 2 full-time white-collar workers are also allowed for, yielding an estimate of industrial value added of .021 million lire, or 3.410 lire per ton. Conventional value added is again identified directly with the reported value of an even 14.0 lire per ton, or .085 million lire in all; the resulting surplus is again puny, just .064 million lire.

The bauxite mine employed 60 adult male blue-collar workers, plus an estimated 5 white-collar workers (8.9% of the blue-collar figure), and no horsepower. On the presumption that the bauxite mine was active for the normal 280 days, the estimate of industrial value added is based on the usual unit values. The resulting figure equals .061 million lire, or 10.720 lire per ton. Conventional value added is again identified with the reported value; the latter equals 11.20 lire per ton, for a total of .064 million lire (*Rivista mineraria 1911*, p. LXXXV), and a surplus of just .003 million lire. In fact, as the bauxite mine belonged to the processing (aluminum) company (e.g., *Rivista mineraria 1911*, p. 151), the bauxite was not actually traded; the reported value figure may thus simply be an accounting cost, and essentially confirm the (proper) value added estimate.

B02.14 Other metal ores

Other ores, extracted too erratically to warrant separate consideration, are grouped in Table B.14. The figures in cols. 1 - 5 refer to nickel, tin, arsenic, wolfram, and (undefined) mixed ores, respectively. The figures in col. 6 are the total of these reported for Sardinia; the figures refer to nickel in 1873-76 and 1899, and otherwise to arsenic (except for 25 and 16 tons

of wolfram in 1906 and 1907, respectively). The figures in col. 7 are the estimated calendar-year figures for Sardinia, estimated as usual by shifting col. 6 half a year backward; and those in col. 8 are the corresponding aggregate estimates (the sum of cols. 1 - 5, less col. 6, plus col. 7). This residual covers all the mining products reported by the Corpo delle miniere not already considered above, except for the celestite obtained in Sicily in 1880-84, better considered a quarry product, and the sulfates mined after the turn of the century (340 tons in 1903, 170 tons in 1904, 120 tons in 1905, 80 tons in 1908), worth under 10 lire per ton.

With prices and productivities varying over broad ranges, any single value added coefficient can only be approximate. An industrial value added of 100 lire per ton would seem to be appropriate: nickel productivity was of the order of 10 tons per (blue-collar) man year in the mid-1870s (before the mines were driven out of business by New Caledonian competition; *Annuario 1900*, p. 481); tin productivities were extremely erratic, but as ostensible overstaffing (e.g., through unusually short working years) is more likely than understaffing, the upper limit of close to 10 tons per man in 1913 appears to be the best estimate; and arsenic ore sold for close to 100 lire in 1910 (no employment figures are available, as the ore was extracted from lead and zinc mines). In 1911, this estimate allows a total industrial value added of .002 million lire, or just one-tenth the value of the (tin) ore produced in that year by 23 male and 15 female adult blue-collar workers; but even if these worked a full year, the error should be relatively small (perhaps .030 million lire, allowing for a suitable white-collar complement).

Conventional value added is also estimated at 100 lire per ton, on the assumption that these marginal operations earned negligible surplus.

B02.15 Sea salt

The sea-salt output series are presented in Table B.15.

Col. 1 transcribes the aggregate figures reported by the Corpo delle miniere; this series appears in the *Sommario*, p. 125 (with a 30-ton error in 1887, already present in the *Rivista mineraria 1899*, p. LXXIX). From 1861 to 1879 these figures are the sum of two separate series, one for the Sicilian, private works (col. 2), the other for the Sardinian and continental, State works (col. 3); the first is very crudely estimated, the second omits the Corneto works, near Rome, through 1869 (*Notizie minerarie*, pp. 300-301). The subsequent figures are from the *Rivista mineraria*, which provides increasingly disaggregated data.

The State-works series reconstructed from the *Rivista mineraria* suffers from a variety of defects. For a number of years, the figures presented by the Corpo delle miniere simply reproduced data obtained from the Direzione generale delle gabelle (e.g., *Rivista mineraria 1891*, p. XLIII). Through 1889, these figures refer to common salt alone; the subsequent totals sum over separate figures for common and processed (ground or adulterated) salt. The *Relazione gabelle* itself, however, makes clear that the common-salt output figures are gross of the amounts subsequently subjected to further processing (e.g., *Relazione gabelle 1884/1884-85*, pp. 67-68, 180-181, *1885-86*, pp. 193, 110); the reported totals accordingly double-count processed salt. More perniciously, the *Rivista mineraria* series is subtly distorted by the shift in the fiscal year from a calendar-year basis to a July-through-June basis. The *Relazione gabelle* clearly indicates that salt was collected in the high summer months: output from January through June was nil, and all the output for fiscal 1884-85, for example, was from calendar 1884 (*Relazione gabelle 1884/1884-85*, pp. 67, 304). In 1884-88, the detailed figures in the *Rivista mineraria* for year *t* are those for the fiscal year beginning in July *t*, and thus, correctly, for calendar year *t*. In 1890-92, the detailed figures in the *Rivista mineraria* for year *t* are instead those for the fiscal year ending in June *t*, and thus, in fact, for calendar year $t - 1$. In between, data for the same year appear two years in succession; this is masked in the aggregate by the fact that the repetition occurs at different times for different producers, and by the shift

from counting common salt only to counting common salt plus processed salt. Subsequently, the detailed figures in the *Rivista mineraria* often differ from those provided by the fiscal authorities themselves; the actual reference period for these is not clear, but if at some point they again refer to the current calendar year, one year must have been skipped altogether.

The present aggregate estimates are obtained as the sum of separate series for individual continental works, Sardinia, and Sicily. The estimates for the State works refer to common salt alone, and are reconstructed using the reports of the salt monopoly (the *Relazione sali*), available from 1887-88, and before that the reports of the fiscal authorities (the *Relazione gabelle*, or the *Annuario finanze*) as well as, and where possible in preference to, the reports of the Corpo delle miniere. The data for the fiscal year beginning in July *t* are here referred directly to calendar year *t*. These data are also imperfect; the most significant problems are tied to the farmed works, for which the data tend to report deliveries rather than output, and to the weight losses in seasoning, which introduce heterogeneity to the extent the production was not consistently measured at the same point of the production process. On occasion, too, the same source inexplicably reports different figures for the apparently identical item.

The series in cols. 4 - 8 refer to the State works at Barletta (Margherita di Savoia), Cervia, Comacchio, Corneto, and Portoferraio. All five series transcribe the figures reported by the *Relazione gabelle* (in comprehensive tables, or in the text devoted to the various works, e.g., *1873*, p. 80, *1879*, pp. 395-396, *1886-87*, p. 109) for (calendar) 1873-74, 1876-77, and 1879-86, and for 1887-1913 by the *Relazione sali* (e.g., *1887-88*, p. 158, *1902-03*, p. 39, *1909-10*, p. 99, *1913-14*, p. 111); the only exception is the figure for Comacchio in 1879, obtained from the total reported for these five works and the salt mine in Lungro and the separately reported outputs of Lungro and the other four sea-salt works (*Relazione gabelle 1879*, pp. 375-376). Cols. 4 - 6 and 8 further include the output figures reported for 1866-68 (cols. 4 - 5, 8), or for 1867-68 (col. 6), by the *Relazione gabelle 1867-1868-1869*, pp. 113-114, 119. The missing observations for 1869-72, 1875, and 1878 are obtained by geometric interpolation of the data for 1867 and 1873, 1877, and 1879; the years 1868, 1874, and 1876 are considered exceptional. Cols. 4 - 6 and 8 are extrapolated back to 1861 from 1866 (cols. 4 - 5, 8) or 1867 (col. 6) using the aggregate series in col. 3 as the index of production; the extrapolation of col. 7 instead assumes a constant output at the Corneto works from 1861 through 1873, and further allows 750 tons per year from 1861 through 1868 for the Miliscola works, which closed in the latter year (*Relazione gabelle 1867-1868-1869*, p. 45). The *Statistica mineraria*, pp. 94-95, reports just 14,498 tons for these continental works: it assigns 6,000 tons to Cervia (in 1861) and 8,498 tons to Comacchio (in 1865), and does not so much as mention the other producers.

Col. 9 refers to the San Felice works, near Venice. These were high-cost, state-owned works farmed by Baron Rothschild; they appear to have produced only for the State monopoly, and were shut down when the contract ran out at the end of 1907 (*Relazione sali 1907-08*, p. 31). Because the works were farmed, the data in the sources typically refer to the quantities delivered rather than to those actually produced. From 1887 on, the figures in col. 9 transcribe the fiscal-year data for 1887-88 to 1907-08 in the tables detailing the monopoly's purchases (e.g., *Relazione sali 1887-88*, p. 105, *1893-94*, p. 31, *1904-05*, p. 87); a further 3,802 tons were delivered in fiscal 1908-09, but these were the residual in the works' warehouses (*Relazione sali 1908-09*, p. 9), and are here ignored.

Of the earlier figures, those 1863-65 are taken from the Corpo delle miniere (*Relazioni minerarie*, p. 151, *Statistica mineraria*, p. 95), and refer apparently to output; those for 1867-68 are again apparently output data, from a table in the *Relazione gabelle 1867-1868-1869*, p. 119; those for 1870-79 are from the *Annuario finanze*, e.g., *1875*, p. 117, or the *Relazione gabelle*, e.g., *1876*, p. 426, and again refer to the quantities delivered. The figure for 1880 appears to refer to output, that for 1881 to deliveries (*Relazione gabelle 1880*, p. 328, *1881*, p. 984). The

figure for 1882 is that reported in the text as both output and deliveries--allowing 5% for seasoning losses--though a lower figure (11,904 tons) is later given for the quantity delivered (*Relazione gabelle 1882*, pp. 1107-1108). The 1883 figure is again that indicated as output, delivered in part the following calendar year (*Relazione gabelle 1883*, pp. 144, 145). The 1885 and 1886 figures again refer to the quantities delivered, and acquired by the public monopoly; the quantity produced is in 1885 is separately indicated as 6,400 tons, but these are here taken to be gross of seasoning losses (*Relazione gabelle 1885-86*, p. 95, *1886-87*, p. 113). No figure for 1884 appears in the fiscal sources, which indicate only that that year's output was roughy half that of 1883, and close to that for 1885 (*Relazione gabelle 1884/1884-85*, p. 71, *1885-86*, p. 95); the present figure is taken from the *Rivista mineraria 1884*, p. XXVIII. Production in 1869 is estimated by geometric interpolation; and production in 1861 and 1862 is estimated from that in 1863, again using col. 3 as the output index.

Cols. 10 and 11 report the preliminary, and final, estimates for Sardinia. The Sardinian works at Cagliari and Carloforte were also farmed, until the end of the century, but they were low-cost centers which, like Sicily, exported substantial quantities of salt; the reported purchases by the public monopoly, analogous to those from San Felice, are accordingly of little use (e.g., *Relazione gabelle 1885-86*, p. 95). Fortunately, production data are also relatively abundant, at least for the later years.

Col. 10 transcribes, for 1889-1913, the output data (for fiscal 1889-90 to 1913-14) in the retrospective tables of the *Relazione sali*, e.g., *1899-1900*, p. 29, *1909-10*, p. 99, *1913-14*, p. 111. These tables normally report output measured at the second weighing, when the salt was brought into the warehouse; exceptionally, the Sardinian figures for 1889-99 refer to output at the first weighing, in the pans (*Relazione sali 1902-03*, p. 39). The *Relazione sali 1913-14* reports output in 1909-13 at the first weighing (pp. 140-141) as well as at the second (p. 111); aggregating the Sardinian figures over the quinquennium, the second measure averages 95.2% of the first.

Col. 10 also transcribes the output data for 1881-85 that appear in the *Relazione gabelle*, e.g., *1881*, p. 983, *1883*, p. 144, *1885-86*, p. 95; these refer to unseasoned salt, measured presumably, as later, at the first weighing. The *Relazione gabelle 1886-87*, p. 113, indicates for 1886 an output of 107,537 tons of seasoned salt, against 121,070 the previous year; given the 1885 unseasoned-salt output figure of 156,056 tons, a ton of seasoned salt apparently derived from 1.289 tons of unseasoned salt (similar figures are implied by the *Relazione gabelle 1882*, p. 1107, *1883*, p. 144, which forecast 132,109 tons of seasoned salt from the current harvest of 165,131 tons, and approximately 120,000 tons of seasoned salt from the current harvest of 149,249 tons; the seasoning period apparently lasted two years, *Relazione gabelle 1882*, p. 1106). The figure for 1886 in col. 10 is 1.289 times the reported output of 107,537 tons of seasoned salt.

For 1887 and 1888, the fiscal sources appear not to provide output data. The Corpo delle miniere report for Sardinia 154,938 tons in 1887, 132,164 tons in 1888, 142,721 tons in 1889, and 178,397 in 1890 (e.g., *Rivista mineraria 1888*, p. LIII). The first of these figures appears to relate to calendar 1887; the last is essentially the figure already in col. 10 for 1889, lagged one year; the two intervening figures presumably both refer to 1888, the first net, the second gross, of double-counted processed salt. Col. 10 accordingly includes the first two of these figures, for 1887 and 1888; these too are presumed to refer to unseasoned salt, measured at the first weighing.

Prior to 1881, the only Sardinian output data appear to be those for 1867 (118,756 tons) and 1868 (115,660 tons) in the *Relazione gabelle 1867-1868-1869*, p. 119; the *Statistica mineraria*, p. 94, reports 134,003 tons (including 1,500 tons of ground salt) in the table labeled "1865," but the notes all refer to 1861, and the major component of the regional total, for the

Cagliari works, repeats the figures that appear for 1860 in the *Relazioni minerarie*, p. 386.

Sardinian output figures are however included in the totals reported by the Corpo delle miniere for Italy less Sicily in 1861-79 (col. 3), and all Italy in 1880 (col. 1). On the assumption that the 1880 figure incorporated the preceding observation for Sicily, the non-Sicilian total in 1880 works out to 166,171 tons. The figures in col. 10 for 1861-80 are obtained by deducting from the non-Sicilian totals (col. 3 to 1879, and 166,171 tons in 1880) the continental estimates in cols. 4 - 9 (excluding col. 7 in 1861-68). These figures average very near 120,000 tons per year, and accordingly appear to refer to seasoned salt; indirect confirmation is provided by the *Relazione sali 1887-88*, pp. 51-52, which suggests that mean production did not increase after the new contractor took over in 1882. The figures so obtained for 1867 and 1868 are not very different from those reported at the time; the latter are not used here, as the present estimates derive from presumably updated figures, and tend in any case to offset the errors in the estimates fro the continental works.

The final estimates of Sardinian output appear in col. 11. In 1900-13, they simply reproduce the figures in col. 10, which measure output at the second weighing and are accordingly analogous to those for the other works. In 1881-99, they are the figures in col. 10, which reportedly or presumably measure output at the first weighing, times .952. In 1861-80, they are the figures in col. 10, which presumably refer to seasoned salt, multiplied by 1.289 and again by .952. The resulting series shows a peak in 1877 that will be surpassed only in 1913. The latter year was marked by exceptionally favorable, rainless weather (*Relazione sali 1913-14*, pp. 140-141, *Sommario*, p. 29); the present estimates implicitly assume that 1877 was equally exceptional. Mild confirmation is obtained from the (national) export figures, which show a spike, to a new high, in 1878 (*Notizie minerarie*, p. 300). Further confirmation cannot be obtained from the Cagliari rainfall figures, which begin in 1879; but a second exceptional year in a half-century seems marginally less unlikely than the alternative, which is that the series which the fiscal authorities compiled at the request of the Corpo delle miniere was itself composed of heterogenous measures.

Col. 12 presents the estimates for Sicily. From 1881 to 1913, it simply reproduces the *Rivista mineraria* figures in col. 2: the Corpo delle miniere then included sea salt among the products it monitored (e.g., *Rivista mineraria 1884*, p. XXVIII), and no alternative figures seem to be available. No regional figure is available for 1880, when only a national total was provided, in the comparison to imports and exports (*Rivista mineraria 1880*, p. XXX). The figures for 1861-79 in col. 2 are from the *Notizie minerarie*, pp. 300-301: those for 1878-79 are an annual average, apparently directly estimated, but well below the levels recorded in later years; those for 1862-77, are a much lower annual average, calculated as a residual from recorded (legal) consumption and public production; and no figure is given for 1861, when the national total in col. 1 omits Sicily altogether. The *Statistica mineraria*, pp. 94-95, reports detailed estimates attributed to 1865; the Sicilian sea-salt figures sum to 129,057 tons (for 44 of the 46 reported works), well above the amount calculated in the *Notizie minerarie*, and altogether more consistent with the later figures from the *Rivista mineraria* (which fluctuate around a steady trend). The estimates of Sicilian production are presented in col. 4: these reproduce the data from 1881, and replace the earlier figures by a simple exponential trend that interpolates the *Statistica mineraria* figure for 1865, increased to 134,900 tons to allow for the omitted works, and an estimate for 1880 obtained as an average of the reported figures for 1881 and 1882. If these estimates are correct, those in the *Notizie minerarie* display a significant downward bias; its most likely source is the failure to allow for output smuggled out of Sicily, possibly for export (to avoid duty of up to 1 lira per ton; e.g., *Movimento commerciale 1873*, p. 85), certainly to the mainland (where the public monopoly kept prices at approximately one hundred times the cost of production; e.g., *Notizie minerarie*, p. 34).

The value added estimate is obtained with little difficulty: the primary input is value-less, and the conventional measure of value added is again correct. According to the *Rivista mineraria 1911* (pp. LVI-LVII), sea-salt extraction employed 3,460 blue-collar workers (2,855 of them adult men) and 1,003 horsepower; the *Censimento industriale* lists 2,391 *operai*, 151 white-collar workers, and 873 horsepower in category 2.31, though more may have been counted in ω.21; and the *Censimento demografico* lists a labor force of 3,082. Because of the short busy season (which was just beginning at the census date), however, these data are not a reliable basis for estimates of actual factor use and value added. On the other hand, precisely because no depletion was involved, value added can readily be approached as the value of the results of activity. The *Rivista mineraria 1911* (p. XXXVIII) quotes a total value of 3.55 million lire, or 7.72 lire per (reported) ton; a reduction of this to 7.40 lire per ton should represent an appropriate allowance for the fuel bill (reduced by the brevity of the busy season, and the sea-side location of the works) and other deductible expenses. The export price given in the *Movimento commerciale* is admittedly even lower (7 lire per ton); but it does not reflect the relatively high cost of production on the Continent. Given the output estimate for calendar 1911, total value added works out to 3.210 million lire.

B02.16 Peat

The peat output series is presented in Table B.16, col. 1. It incorporates the *Rivista mineraria* figures for 1880-82 and 1885-1913, also reported in the *Rivista mineraria 1899* (p. LXXIV) and the *Sommario* (p. 123), correcting the reported totals in 1887 e 1908. In 1887, the reported total is 60,500 tons, reportedly mined in the Torino, Milano, and Vicenza districts (*Rivista mineraria 1887*, LXXVIII). No figure is given for the first; the Milano district figures (which report quintals as tons) sum to 13,010 tons (p. 208); the Vicenza district figures (which seem correct at the local level, as they imply round-number unit values) sum to 49,500 tons, rather than the indicated 45,500 tons. The present figure for that year sums the apparently correct district figures, and allows a further 2,000 tons for the Torino district (the reported figure for the following year). In 1908, the reported national figure of 33,325 tons allows the Vicenza district a round 24,000 tons; the present total is calculated with the reported district total of 24,700 tons.

Col. 1 further includes the figure in the *Rivista mineraria 1879* (p. 26), but it ignores the claim of the *Rivista mineraria 1899* (p. CIII) that that same output level had been maintained since 1860. The large fluctuations in 1908-10 and 1885-88 seem real enough, even though the 1885 figure was presented -- like those for 1880-82 -- as a very crude estimate (e.g., *Rivista mineraria 1880*, p. XXVIII, *1885*, pp. LXVII-LXVIII; but compare *1885*, p. 268, *1886*, p. 229, *1887*, p. 352, and *1888*, p. 421; also *1909*, p. CVII, and *1910*, p. CXXXII). On the other hand, the time series is heir to the usual distortions: peat is intrinsically heterogeneous, and it could be subjected to varying amounts of processing (mere air-drying, steam-drying, compressing, pulping, etc.; e.g., *Notizie minerarie*, pp. 217 ff., *Rivista mineraria 1897*, p. 113, *1898*, p. 383, *1904*, pp. 494-495, *1910*, p. 74; note also the range of output prices, e.g., *Rivista mineraria 1911*, p. XCIV).

The other figures in col. 1 are obtained as follows. The output figure in the *Statistica mineraria* (p. 92) is here attributed to 1865 and (in the absence of earlier evidence) to earlier years as well; its breakdown is Lombardy, 49,186 tons; Piedmont, 12,695 tons; Veneto, 4,450 tons; and Emilia, 500 tons. The *Notizie minerarie* (pp. 217-219) indicate that output data were collected every five years, and quote the following figures: Lombardy, 70,000 tons in 1875; Piedmont, 9,381 tons in 1870, 3,897 tons in 1875; Veneto, 60,000 cubic meters (equivalent to 7,500 tons, at .125 tons per cubic meter: *Rivista mineraria 1886*, p. LXX) "secondo l'ultima statistica" (presumably 1875); and central Italy, no output, yielding the (rounded) total of 81,400

tons in 1875. The estimates for 1866-74 in col. 1 are obtained by summing over the regional estimates in cols. 2 - 5, themselves obtained by a simple linear interpolation of these regional data for 1865 and 1875 for Lombardy and the Veneto, and for 1865, 1870, and 1875 (rounded up, to reproduce the reported national total) for Piedmont; production in Emilia is assumed to have ended by 1870, as the *Notizie minerarie*, p. 219, do not refer to any production in central Italy in recent memory.

The estimates for 1876-79 are in turn a simple linear interpolation of the national aggregate figures for 1875 and 1879; the representative figure of 100,000 tons p. a. in the *Notizie minerarie* (p. 32), though in principle obtained as an average for 1875-79, is presumed to refer in the main to the time of writing (1880-81). Finally, the gap between the 1882 and 1885 data is similarly filled by linear interpolation. In view of its later volatility, peat output may well have exhibited significant departures from these smooth time paths between the available benchmarks; but no indices of short-term movements appear to be available (in later years, there is no apparent correlation between peat output and the price of cheap New Pelton coal as reported in Cianci, 1933, pp. 303 ff.; this is of course perfectly normal for a good obtained from limited reserves).

According to the *Rivista mineraria 1911* (p. XCIV), peat extraction employed 378 blue-collar workers (327 of them adult males) and 24 steam horsepower, though gas engines which used peat as the basic fuel and whose exhaust was used to dry the peat are also mentioned (pp. 82-83); the *Censimento industriale* lists 283 workers (249 of them *operai*) and 314 horsepower (54 steam, 260 gas) in category 2.32; and the *Censimento demografico* lists a labor force of 268. Once again, however, the extreme seasonality of production (according to the *Censimento industriale*, half the firms were idle over three months of the year; also *Rivista mineraria 1886*, p. 292) limits the usefulness of these figures as guides to industrial value added. On the other hand, peat was a marginal fuel, and surplus cannot have been considerable; according to the *Rivista mineraria 1886* (p. 280), in the Torino district a ton of peat that sold for 14 lire after air drying cost 12 lire to extract, for a value added/value ratio of 86%. In 1911, output was worth .306 million lire, or 12.481 lire per ton; deducting some 15% of that as a rough allowance for fuel and surplus, industrial value added can be crudely estimated to have been close to 10.610 lire per ton, or .260 million lire in all. Conventional value added is estimated by deducting a small allowance from gross value; it is here set at 12.260 lire per ton, or .301 million lire in all.

B02.17 Mineral water

The *ISIC* seems not to mention the extraction of mineral water, which the 1911 censuses instead consider a separate *sotto-classe* (2.33).

The time series is presented in Table B.16, col. 6; it is a rough estimate, which makes use of the very limited available information. The first comprehensive output data appear to be those in the *Censimento i. e c.*, vol. 3, p. 47; the reported totals equal 3.706 million tons of mineral waters (for drinks or baths), from 829 sources, with a value of 20.560 million lire.

These figures are here extrapolated back to an initial benchmark for 1911. Italy's population in 1911 was (within the borders of the day) some 80% of its population in 1937; assuming that per capita consumption in 1911 was some 85% of what it would be in 1937, total consumption (production) in 1911 is estimated at 68% of its 1937 equivalent, or 2.520 million tons.

A second benchmark is calculated for 1868, deriving it from the 1911 figure much as the latter was itself derived from the later census data. Allowing for 1868 a population (within constant borders) equal to some 75% of its 1911 level, and a per-capita consumption equal to some 60% of the 1911 figure (to allow for the pre-war boom in "taking the waters": *Acque*

minerali 1907, p. V), total production in 1911 is estimated at 45% of the 1911 figure, or 1.134 million tons.

Within current borders -- excluding Latium, in 1868 -- the Kingdom's population was only some 73% of its 1911 level, for a corrected output estimate nearer 44% of the 1911 level, or 1.104 million tons. Against that, the *Acque minerali 1868*, pp. XIV-XV, reported 1,629 sources within the Kingdom (more, oddly, than were counted in 1937, but the criteria may have been different), of which 713 had daily yields in excess of two tons, 146 yields between one and two tons, and 165 yields of under one ton; another 605 appear to have been largely unused. Allowing 1.5, 0.5, and 0 tons per day for the sources in these last three groups, one obtains a total of just over 300 tons per day, or 110,000 per year. The present estimate leaves .994 million tons per year for the Kingdom's other 713 sources, equivalent to an average of just over 3.8 tons per day; since these were described as yielding two tons per day and up, the present estimate for 1868 seems compatible with the available evidence for that year.

The present time series is derived from these two benchmarks, and an index derived from the aggregate 1911-price value added series for the utilities. That series is chosen because it grows monotonically, with a cycle in the growth rate that reflects the varying intensity of investment in fixed plant (and also, presumably, in the fixed plant of the mineral-water industry). The utilities of course grew much faster than the mineral-water industry (from 1868 to 1911 production grew over ten-fold); to pick up the growth cycle without losing monotonicity the annual rate of growth of mineral-water output is calculated as a constant fraction of the corresponding growth rate of the utilities, with the fraction (near .282) so chosen as to force the resulting series through the above benchmarks for 1868 and 1911.

The 1911-price value added estimate is analogous to that for boric acid: the conventional measure is again correct, as production did not draw down a finite stock, and value added virtually coincides with the value of output. In the case of mineral water, however, prices varied over a broad range (*Censimento i. e c.*, vol. 3, p. 47; *Atti C.C.V.D. 1913*, p. 90), and no direct measure of average value is available. Value added per ton in 1911 is accordingly estimated, very simply, from the average value in 1937 (5.548 lire per ton), deflated on the basis of the *Sommario* wholesale price index (equal in 1911 to 21% of its 1937 level); the resulting value and value added figure for 1911 is estimated at 1.165 lire per ton, for a total value of 2.936 million lire. Most of that value appears to have been scarcity rent, as even the *Censimento demografico* listed just 170 people in the industry.

B02.18 Aggregate rent and value added in mining

The above estimates of industrial value added in 1911 sum to 65.2 million lire, of which 61.2 million are in mining proper, exclusive of sulfur processing. The corresponding conventional measures of value added sum to 91.1 million lire (87.1 in mining proper); the surplus included by the latter but not the former equals 25.9 million lire. Not illogically, the biggest rent earners (sulfur ore, 8.8 million; iron ore, 4.8 million; lead and zinc ores, 4.1 million; mercury ore, 3.3 million) appear to have been precisely those mines that had long made Italy an international source of supply.

B03. Quarrying

B03.01 Introduction

From the perspective of the available statistical information, the quarrying industry (*classe* 2.2) must be considered together with the non-metallic mineral products industry (*classe* 5.1) and the construction industry (*classi* 5.2, 5.3). Construction as such was altogether outside the purview of the Corpo delle miniere; quarrying and the first transformation of quarry products were not, but output statistics were collected only in exceptional circumstances. The only major time series refers to the extraction of marble in the Alpi Apuane (Carrara, Massa, etc.), where such activity was very big business indeed; and comprehensive surveys of quarries (*cave*) and kilns (*fornaci*) were prepared for the *Statistica mineraria* and the *Rivista mineraria 1890* and *1901*, with some partial information appearing in the *Notizie minerarie* as well. In addition, the national reports in the *Rivista mineraria* include aggregate quarry output figures from 1896 (disaggregated by product from 1898), and disaggregated kiln output figures in 1901-1912; but these hardly warrant the recent claim that they are "continuous and reliable" series (*Rilevazioni statistiche*, vol. 7, pp. 317, 374; also *Reddito nazionale*, pp. 74-75, 90). The earlier sources warn that the only systematic data were compiled in 1890 and 1901 (e.g., *Annuario 1912*, p. 122, and *Rivista mineraria 1896*, p. 23; the claim in the *Rivista mineraria 1912*, p. CXCIV, that 1890 marked the last such survey is contradicted in the *Rivista mineraria 1901*, p. C). The figures for other years are heterogeneous sums of old data and partial revisions. Many observations are simply repeated from year to year; most recorded changes are spuriously small, as only a minor component of the total was in fact revised, and others are spuriously large, reflecting the variation that actually accumulated over a much longer time span (Tables B.17 and C.01). In addition, the *Rivista mineraria* quarrying statistics exclude the output (though they include the labor force) of the quarries that supplied the kilns with their major inputs (stone for cement, lime, and plaster, and clay for bricks and tiles; e.g., *Rivista mineraria 1909*, pp. XLIX, LV, LVI, 175, 444. Siliceous sand for glass-works seems to have been excluded from the output figures through 1910: after that, it is no longer grouped with other kiln materials in the quarry-employment tables, and reported output was much higher than before, though employment was not; compare *Rivista mineraria 1910*, pp. LXXIII, LXXIV and *1911*, pp. XCI-XCII).

The production of kiln materials can of course be readily estimated from that of the kilns themselves; and the output of other quarry products can similarly yield estimates of the corresponding processing (the data on "mineralworking" -- *officine mineralurgiche* -- in the *Rivista mineraria* are here of little help: with trivial exceptions, they refer to industries that both the 1911 censuses and current practice classify elsewhere). The expansion of the available benchmarks into annual series, on the other hand, appears considerably more difficult. While the available marble output series has been used as a proxy for other quarry products as well (*Reddito nazionale*, pp. 76, 90), it does not appear to be a valid one. Italian marble is rare and precious, and was produced very largely for export (the *Notizie minerarie*, pp. 228, 230 notes the European and transoceanic markets for Verona marble; the *Rivista mineraria 1885*, p. XCII, notes that no less than 78% of the year's output of "Carrara" marble was exported in one form or another). Neither does marble consumption appear to provide a useful proxy for that of other quarry products, since other materials provide ready substitutes for marble; as with other export industries, moreover, the estimates of final domestic consumption (availabilities) may be seriously distorted by inventory movements. Because marble is thus *sui generis*, the marble production data in the sources are here used to estimate national marble output only.

With only minor exceptions, the production movements for the other quarrying and processing industries are instead estimated by extrapolating the available benchmarks on the

basis of the construction series estimated in section K below. A handful of kiln products (and the corresponding inputs) will be distinguished, to incorporate significant partial data provided by the Corpo delle miniere; but a single large residual will cover the rest of the industry both in extraction and in processing.

Table B.18 transcribes the 1911 labor force and employment in these industries, as reported by that year's censuses and *Rivista mineraria*. The discrepancies between the two sets of employment figures are obvious; and as will be seen in greater detail below neither set seems consistently to represent actual employment levels. The *Rivista mineraria* figures are subject to opposing biases: a downward bias, to the extent that the employment figures, like the output data, tend to reproduce those for earlier years and (on balance) neglect growth; and an upward bias, which is at times overwhelming, from the fact that the listed workers were often employed only for very short years (e.g., *Rivista mineraria 1890*, pp. 243, 486-513). In addition, the *Rivista mineraria* quarrying data include workers employed in processing (e.g., *Rivista mineraria 1901*, pp. LVII, 17, 136). The *Censimento industriale* neglects often conspicuous numbers of artisans; and both censuses appear at times to distort the distribution of employment between extracting and processing in favor of the latter activity. One likely reason is that many integrated works which sold only processed goods listed themselves simply as producers of such goods, and not as producers also of the stone or clay they worked; another is that at the census date a disproportionate share of the workers who spent part of their time quarrying and part of it processing were then engaged in processing (for example, the *Notizie minerarie*, p. 248, notes that the extraction of kaolin took place between November and March; the *Annuario 1904*, p. 317, notes that brick and tile kilns worked from April through October). In so far as possible, then, value added will here be estimated as the value of the results of activity, rather than as the value of activity itself.

B03.02 Marble

The present estimates of marble extraction are derived in Table B.19.

The largest and most reliable component of the national aggregate refers to the output of the Alpi Apuane, which was always monitored by the relevant district office (Firenze through 1892, Genova in 1893, Carrara from 1894). Aggregate output figures were published from 1894, covering Massa, Carrara, and the Versilia (plus the Garfagnana from 1902, with the start of production; *Rivista mineraria 1901*, p. 139, *1902*, pp. 132, 161); these are here transcribed in Table B.19, col. 7. It is clear from the sources that these aggregates were calculated from data on the output of block (*grezzo*, *greggio*) and worked (*segato e lavorato*) marble for each of these three (then four) centers of production, by assuming a standard weight loss in processing (19% for *segato*, 60% for *lavorato*, 25% for the two together); and that through the mid-1890s at least the Versilia production figures actually referred to shipments from the area's port and railway stations (e.g., *Rivista mineraria 1894*, pp. 78, 99, *1909*, pp. 123-125). Since these very same component figures are available in earlier years as well (*Notizie minerarie*, pp. 220-225; *Rivista mineraria 1884*, pp. 116, 119, and *1885* ff.; Table B.19, cols. 1 - 6), the aggregate series can be extended back without loss of continuity. From 1867 to 1893, then, the figures in col. 7 are the sum of the "block" data (cols. 1, 3, 5) plus four-thirds the sum of the "worked" data (cols. 2, 4, 6). The 1884 Carrara and 1890 Massa figures are estimates, obtained by disaggregating the reported sums of block and worked marble (159,192 and 19,775 tons, respectively) on the basis of distributions (69.7% - 30.3% and 69.9% - 30.1%) obtained as geometric interpolations of those calculated for the immediately neighboring years; the 1861-68 Massa and 1867-77 Versilia figures are similarly obtained by disaggregating the reported sums of block and worked marble (*Notizie minerarie*, pp. 221, 224) on the basis of the corresponding distributions (71.5% - 28.5% and 16.4% - 83.6%) calculated for 1869 and 1878 respectively. In

1861-66, the available figures refer to Carrara and Massa only; on the simple and here reasonable assumption that in those years the Versilia's share of the total was the same as in 1867, the early figures in col. 7 are here obtained by inflating the weighted sum of cols. 1 - 4 by a factor of 1.228.

This time series is here accepted, without further manipulation, as the estimate of marble production in the Alpi Apuane; in particular, no correction is made to allow for double counting, though the opportunity for such overstatement was certainly present. In 1896-1904, the *Rivista mineraria* includes annual statistics on the *segato* produced in one center (e.g., Massa) from *greggio* extracted in another (e.g., Carrara); while the data are not always unambiguous (e.g., *Rivista mineraria 1900*, p. 114), they suggest that some 5,000 to 10,000 tons of *greggio* were thus handled each year. From 1906, the reports (e.g., *Rivista mineraria 1910*, p. 50) include data on block and worked marble moving between the local railway stations; these range between 11,000 and 20,000 tons (9,000 to 17,000 for *greggio* alone) p. a. By the mid-1890s, however, the Corpo delle miniere had apparently mastered the problem of double-counting (note the comment about copper production in the *Rivista mineraria 1894*, p. LXVII), and the published figures must be presumed free of distortion from this source. In earlier years, on the other hand, the Carrara and Massa figures appear to have avoided the problem by being compiled at the quarries or on their access roads (*Notizie minerarie*, p. 220), to the neglect therefore of the processing (of both local and imported marble) that occurred in the coastal plain (whence, presumably, the much greater share of worked marble in reported shipments than in reported production; *ibid*., pp. 220-224). The early Versilia figures, however, refer to shipments rather than output, and were known to include some processing of Carrara marble. The report in the *Notizie minerarie* (pp. 224-225) estimated this duplication at between 1,000 and 2,000 tons of worked marble (if one disregards the ambiguous reference to weight loss) in the later 1870s; the estimate in the *Rivista mineraria 1890* (pp. 210-211, 305-306) of 240,600 tons of *greggio* for the Alpi Apuane as a whole -- 2,000 tons below that obtained here -- may reflect a similar allowance. These corrections could readily be incorporated into the present estimates for those years, and extrapolated to the rest of the series (most plausibly on the basis of road shipments from Carrara, reported for 1872-93); the present assumption that they are in fact unwarranted is based on the evidence that this double-counting was essentially offset by the downward bias in recorded shipments. This bias was noted by the Corpo delle miniere only somewhat later (*Rivista mineraria 1896*, p. LXXVI; compare *1894*, pp. 98-99); it may have been brought to their attention by the fact that in 1895 the worked marble production figures for the Versilia (presumably net of double-counting, as noted above) were very close to, and if anything slightly above (18,985 tons v. 18,280 tons) the corresponding shipments from Pietrasanta, Seravezza, and Forte dei Marmi (*Rivista mineraria 1895*, pp. 89-90; also *1896*, pp. 94-95). In retrospect, the Corpo delle miniere seem to have considered the net bias due to the use of shipments as a proxy for output as essentially negligible; despite the apparent shift in the Versilia data from shipments to actual production, year-to-year differences in total production of block and worked marble of only 5,000 to 10,000 tons were considered significant in each of these years (*Rivista mineraria 1894*, p. 98, *1895*, p. 103, *1896*, p. 111).

The marble output estimates for the rest of Italy are reported in Table B.19, col. 16. From 1890, these are obtained as the aggregate of district-specific figures, excluding of course the Alpi Apuane; the occasional changes in the district boundaries are not a problem, as the provinces that changed jurisdiction were not marble producers at the relevant time. The district figures (cols. 8 - 15) are here reproduced from the *Rivista mineraria*, but with a number of modifications. The most pervasive of these is the replacement of data that merely repeat those of earlier years by a simple linear interpolation of the first such entry and the first new one; the largest absolute change appears in the Milano district, where the sources repeat the 1901 figure

through 1912, and then show an 8,000-ton increase in 1913. With the exceptions to be noted, linear interpolations similarly fill the gaps between 1890 and 1896, when the *Rivista mineraria* did not publish such figures at all (it did publish a national output figure, in the comparisons of production and international trade; the difference between this figure and that for the Alpi Apuane is the same in 1894 and 1895 as in 1890, though it wanders in 1891-93, e.g., *Rivista mineraria 1894*, p. XLIII; also *1891*, pp. 100, 118). As to the individual series, it may be noted that the estimates of Sicilian production (col. 8) in 1891-1900 make no attempt to follow the output cycle that obtained elsewhere, on the grounds that this was not necessarily universal (compare col. 10); the 1901 figure is repeated through 1913, since that reported for 1914 (3,700 tons) indicates no change of any significance. The Carrara district reports do not mention (non-Apuan) marble before 1901 (p. 136), when seven quarries were counted as active; the early figures in col. 9 simply assume that this production was built up over five years. Those after 1904 are taken as reported, rather than interpolated with the 1912 figure; since the latter was obtained as the difference between the figures given for the Alpi Apuane and for the district as a whole, there is some question as to its exact significance. In col. 10, the simple interpolation of the early district figures is rather unsatisfactory, since the further disaggregation available in 1890, 1896, and 1898 shows that the only changes in those years (besides the loss of Lucca and its 130 tons) were in Siena, while the Grosseto and Pisa figures (1,034 tons) were simply repeated; but the lack of a similar breakdown in 1901 makes an alternative approach difficult. The early Napoli district figures (col. 12) reflect the assumption that the output listed in 1890 disappeared over five years; since the 1896-1900 reports indicate considerable updating of older information (compare *Rivista mineraria 1896*, p. 242, *1898*, p. 250, and *1900*, p. 270), the lack of a marble output figure in those years is accepted as evidence that none was in fact produced. The Torino district figures (col. 14) interpret the sources in a similar way; since production was already so small in 1890, it is assumed to have disappeared within two years. The Roma district series (col. 13) seems to repeat the 1890 figure until 1912, but the change in 1913 was negligible. Finally, col. 15 reports the output of the Vicenza district, which included Italy's second largest marble-producing center. The present figures for 1896-98 include the reported output of *lastami* (marble obtained directly as slabs) as well as of *marmo* (except that the 1897 *lastami* figure, which repeats that of 1896, is here increased by 100 tons to interpolate those for 1896 and 1898); in other years, *lastami* were already included in the marble production reported by the *Rivista mineraria* (e.g., *1890*, p. CX, *1896*, p. 332, *1899*, p. 368, *1914*, p. 194). In 1911-13, on the other hand, the present figures are those reported in the sources with the exclusion of crushed marble (15,100 tons in 1911, 15,000 tons in 1912-13), on the grounds that this was obtained from the chips off the marble reduced to blocks rather than from marble quarried *ad hoc* (e.g., *Rivista mineraria 1911*, p. 175, *1912*, pp. XLV, 172).

Before 1890, the evidence of marble output outside the Alpi Apuane is limited and ambiguous. The *Statistica mineraria* is particularly disappointing: it reports detailed figures on active and inactive quarries, employment, and output (pp. 62-76), but closer inspection suggests that the figures are entirely unsystematic. Excluding the provinces of Massa-Carrara and Lucca, which covered the Alpi Apuane, the national totals are 32 active quarries with 86 workers producing 3,532 cubic meters (and 40 "blocks," p. 64), or, at 2.7 tons per cubic meter (*Notizie minerarie*, pp. 232, 234), at least 9,500 tons. But these figures do not include the marble of the Verona area, not separated from other building stone (p. 72). Piedmont is assigned 10 active quarries with 14 workers (p. 71), including one quarry in Novara with eight workers and nine in Cuneo with six workers between them (p. 64); this suggests that the tables simply transcribe whatever the firms reported, and that the quarries that failed to report workers were attributed no workers at all. If the output figures were similarly compiled, the reported aggregate (excluding Verona) is in the nature of an uncertain lower bound.

The *Notizie minerarie*, pp. 36-37, reports 1875-79 annual averages for the Alpi Apuane and for "the Verona area and elsewhere"; the former are set at 132,000 tons of block and worked marble worth 92 lire per ton, the latter at 45,000 tons of marble worth just 20 lire per ton. The Verona output figure is surprisingly high -- above the reported figure for 1890, and close to that for 1901 -- and its unit value, next to the figure for the Alpi Apuane, surprisingly low (by way of comparison, the *Rivista mineraria 1890*, p. CX, allows Vicenza-district marble a unit value about three quarters that of Firenze-district marble). The *Notizie minerarie*, p. 236, also reports figures for "Verona marble" alone, but the table explicitly includes stone other than marble proper. Total output was worth 899,000 lire for 23,276 cubic meters, with each cubic meter weighing perhaps 2.7 tons (pp. 232, 234), and local average values range from 10 to 100 lire per cubic meter. All this suggests that the "marble" attributed to "Verona and elsewhere" included far more than marble from Verona, and next to nothing from anywhere else. A tentative estimate for Verona marble proper may be obtained by counting only the figures for the stone worth 100 lire per cubic meter; these sum to 4,026 cubic meters, suggesting an output near 11,000 tons -- perhaps including more than marble proper, as even 100 lire per cubic meter is just 37 lire per ton.

The Vicenza district report in the *Rivista mineraria 1888*, p. 413, reports 335 workers producing 2,620 cubic meters worth 327,500 lire plus 248 workers producing 20,450 square meters of slabs worth 245,400 lire; these suggest an aggregate output of some 4,600 cubic meters, or, at 2.7 tons per cubic meter, perhaps 12,400 tons. Unit values are again much lower than in 1890, however, and this output figure may again include more than marble proper.

On the other hand, when the data are relatively comprehensive the relative marble output of the Alpi Apuane (col. 7) on the one hand and the rest of Italy on the other (col. 16) remained relatively stable: the ratio of col. 16 to col. 7 barely drifted up from .1452 in 1890 to .1500 in 1901, and .1586 in 1913. In the circumstances, col. 16 is here extrapolated back from 1890 to 1861 on the simple assumption that its ratio to col. 7 drifted up by .0005 per year from .1307 in 1861 to .1452 in 1890. The resulting estimates for 1865 (some 14,500 tons) and 1875-79 (some 21,800 tons p. a.) are loosely compatible with the limited data described above. Col. 17 is again the sum of cols. 7 and 16.

Value added in marble quarrying is here estimated by components. The most detailed figures are those reported for the Alpi Apuane in the *Rivista mineraria 1911*, p. 44. Wage costs are there listed at 12.821 million lire for 12,479 workers (in the quarries alone, exclusive of another 4,970 men in the processing works and 1,515 in transport); salaries may be estimated at perhaps 2.5 million lire for 1,250 white-collar workers (the 10% ratio to blue collar employment being preferred to the 28% and 15% of census categories 2.21 and ω.11, respectively, on the grounds that the census data reflect the high proportion of managers in small enterprises producing stone other than marble). Allowing capital costs of 500 lire per horsepower (as in other extractive industries), the 1,297 horsepower listed in the *Rivista mineraria* raise the industrial value added estimate for the Alpi Apuane to 15.970 million lire; this is equivalent to 37.20 lire per ton of output, and to 1,280 lire per blue-collar worker. The value of output at the quarries is reported at 21.418 million lire. Fuel and ancillary costs are estimated at 350 lire for each of the 1,292 non-hydraulic horsepower, or .450 million lire in all, equivalent to 36 lire per blue-collar worker. The conventional estimate of value added works out to 20.968 million lire, or 48.84 lire per ton.

The Vicenza district report (*Rivista mineraria 1911*, p. 175), in turn, lists 724 workers producing 27,680 tons of marble; assuming the same industrial value added per blue-collar worker as obtained in the Alpi Apuane yields an estimate of 927,000 lire, or 33.49 lire per ton of output. The value of output is reported at 1.355 million lire. Allowing 36 lire per worker for fuel and ancillary costs, again as in the Alpi Apuane, these work out to .026 million lire; the

resulting conventional estimate of value added equals 1.329 million lire, or 48.01 lire per ton of output.

Production elsewhere is estimated at 32,069 tons. Allowing these the unit value added calculated for Vicenza marble, one obtains an industrial value added estimate of 1.074 million lire and a conventional value added estimate of 1.540 million lire.

The resulting national totals correspond to an industrial value added of 17.971 million lire, or, on average, 36.743 lire per ton, and a conventional value added of 23.837 million lire, or 48.737 lire per ton. The aggregate surplus included in the conventional estimate is near 5.9 million lire, placing marble second only to sulfur among Italy's extractive industries.

B03.03 Kiln materials

The extraction of kiln materials (Table B.20) is here estimated on the basis of kiln-products output, as estimated in section C02 below. Gypsum output is estimated as 1.5 times the output of plaster (Table C.04, col. 5), and limestone output as 1.65 times the combined output of lime and cement (Table C.04, cols. 6 and 7); the sources of these input coefficients are described in section C02.05. The clay and sand output series is estimated as 1.6 times the output of bricks and tiles (Table C.04, col. 8) and terra cotta (Table C.07, col. 7), plus 1.0 times the output of ceramic and glass (Table C.07, cols. 8 and 9); the source of the former coefficient is described in section C02.05 below, while the latter is obtained by reducing the actual materials-consumption coefficients utilized in section C02.06 below (1.4 for ceramic, 1.25 for glass) to allow for the imports of relatively scarce materials (e.g., *Rivista mineraria 1911*, pp. CII-CIV) on the one hand, and the share of other industries' output in the materials consumed to make glass (Hodkin and Cousen, 1925, p. 145) on the other.

The value added estimates similarly draw on the evidence and estimates described in sections C02.05 and C02.07. Gypsum is there allowed a unit value, none of it scarcity rent, of 1.50 lire per ton; this figure is the present estimate of (industrial and conventional) value added, for a total of 1.58 million lire.

Limestone is there allowed a price of 1.55 lire per ton, none of it scarcity rent, if for fat lime, and of 2.00 lire per ton, including .20 lire per ton scarcity rent, if for hydraulic lime or cement. Given the lime and cement output estimates in Table C.04, cols. 5 and 6, and the (86/60) ratio of fat lime to hydraulic lime suggested the reported figures (Table C.01, cols. 1 and 2), some 41% of limestone is attributed to fat lime, and 59% to hydraulic lime and cement. Applying these weights to the above prices and scarcity rents, and again neglecting minor cost items, limestone is here attributed an average industrial value added of 1.70 lire per ton, and a conventional value added of 1.80 lire per ton, for totals equal respectively to 9.91 and 10.49 million lire.

Clay and sand are easily extracted materials; industrial value added is set equal to 1.00 lire per ton (from the price of ordinary sand in the *Rivista mineraria 1911*, p. LXXXI), or 22.23 million lire in all. Conventional value added is estimated as follows. Of the total output in Table B.20, col. 3, as calculated, 97.94% is clay for bricks and tiles, attributed a price of 1.00 lire per ton (none of it scarcity rent); 0.97% is clay for terra cotta, attributed a price of 10 lire per ton (consistent with the estimated materials cost in terra cotta production, section C02.07); 0.36% clay and other materials for ceramic, attributed a price of 30 lire per ton (from the price of kaolin in the *Rivista mineraria 1911*, p. LXXXV); and 0.73% is sand for glass, attributed a price of 1.2 lire per ton (from the price of siliceous sand, *ibid.*). Combining these unit values with those percentage shares one obtains an average near 1.20 lire per ton; this figure is adopted here as the estimate of conventional value added, for a total of 26.68 million lire.

Multiplied by the corresponding output estimates in Table B.20, these coefficients yield an aggregate industrial value added in the extraction of kiln materials of approximately 33.7

million lire in 1911. As noted above, this figure and its counterparts developed in section C02 suggest that the 1911 census figures seriously misrepresent the (average) distribution of employment between the extraction of these quarry products and their subsequent transformation.

B03.04 Other quarry products

All other quarrying is here grouped in a single residual. The present production estimates include benchmarks for 1890 and 1901, and otherwise reflect the consumption of construction materials suggested by the construction series, and construction cost structures, estimated in section K below.

The calculated consumption of low-grade construction materials is presented in Table B.21, col. l. It is obtained as a weighted sum of the various construction series (measured in 1911-price value added), where the weights are the ratios of the share of low-grade materials costs to the share of labor and capital costs (value added) specific to each type of construction activity; the resulting series thus measures the consumption of low-grade materials by their total cost at 1911 prices. As estimated in section K05.04, low-grade materials accounted for 12%, 10%, and 25% of the cost of public maintenance, buildings, and other non-railway public works, respectively. They are here assumed to account for 12% of the cost of maintaining private buildings and railways as well, and for 10% of the cost of building railways (as suggested by the breakdown of railway construction costs reported in section K06.04, allowing low-grade materials 10% of the cost of bridges, tunnels, and buildings, and 20-25% of unspecified materials and construction). Using the typical ratios of value added to value estimated through section K (60% in all maintenance, 34% in the construction of new buildings, and 51% in railway construction and other new construction), Table B.21, col. 1 is obtained as (.12/.60) times the sum of Table K.05, col. 4, K.10, col. 24, and K.58, col. 8, plus (.10/.34) times the sum of Table K.05, col. 6 and K.58, col. 5, plus (.10/.51) times Table K.10, col. 21, plus (.25/.51) times Table K.05, col. 10.

The calculated consumption of high-grade construction materials is presented in Table B.21, col. 2. It is obtained just like col. 1, save that the shares of low-grade materials costs are replaced by the shares of high-grade materials costs (themselves equal to unity less the sum of the shares attributed to value added and to low-grade materials costs, less a further 5% in the case of new railways to allow for the land costs included in their total cost). Col. 2 thus equals (.28/.60) times the sum of Table K.05, col. 4, K.10, col. 24, and K.58, col. 8, plus (.56/.34) times the sum of Table K.05, col. 6 and K.58, col. 5, plus (.34/.51) times Table K.10, col. 21, plus (.24/.51) times Table K.05, col. 10.

The output of other quarry products in 1890 and 1901 is estimated from data provided by the Corpo delle miniere. The *Rivista mineraria 1890*, p. CXVIII, reports 814,119 tons of building stone (excluding marble), 11,290,229 tons of other construction materials, and 127,677 tons of other products (excluding quartz and feldspar, kaolin, magnesian earth, and refractory material, here considered kiln materials). The *Rivista mineraria 1901*, p. LI, reports corresponding figures equal to 766,553 tons, 8,778,174 tons, and 144,610 tons, respectively (Table B.17, cols. 2 - 13, 14 - 20, and 21 - 34 plus 37 and 41 - 42, respectively). Since the building stone data, in particular, reflect a certain amount of processing (*Rivista mineraria 1901*, pp. XLVIII, 17, 136), actual quarry output in those years is estimated as the sum of the reported figures plus a further 20% of the reported output of building stone. The estimates so obtained equal 12.395 million tons in 1890 and 9.843 million tons in 1901.

Excluding the consumption of limestone in the production of pig iron, estimated as half the weight of the pig iron produced (Table E.02, col. 1 and section E02.04), one obtains net (construction-related) benchmarks equal to 12.388 million tons in 1890 (7.9% of them building

stone) and 9.835 million (9.4% of them building stone) in 1901.

These net benchmarks are extrapolated with the aid of a weighted sum of the materials-consumption series in cols. 1 and 2. Col. 2, of course, covers all sorts of products beyond building stone; but its weights (which emphasize the new construction of buildings) appear to yield an acceptable if rough index of building stone use. Since building stone represented some 7.9% of net quarry output in 1890, and 9.4% in 1901, the implied share of col. 2 to be added to col. 1 equals .03567 in 1890 and .03884 in 1901. The consumption of quarry products (col. 3) is here calculated as col. 1 plus those shares of col. 2 in the benchmark years, constant shares of col. 2 in 1861-90 and 1901-13, and arithmetically interpolated shares in 1891-1900.

In the event, the ratio of the above benchmark net output estimates to this consumption series is quite similar in 1890 (12.388/132.0 tons per lira) and 1901 (9.835/106.4 tons per lira). For simplicity, those net estimates are extrapolated on the assumption of a constant ratio to col. 3 in 1861-90 and again in 1901-13, and a geometrically interpolated ratio in 1891-1900. The final estimates of other quarry output (Table B.21, col. 4) are the figures so obtained, plus the estimated consumption of limestone in pig iron production (half of Table E.02, col. 1). No deductions are made to reflect the surge in net imports of unspecified stones and earths in the last years before the World War, as these imports plausibly offset the neglected growth in (other) industrial consumption of quarry products.

An output figure for 1865 can also be obtained from the data in the *Statistica mineraria* (pp. 64-76). The latter measure output in a variety of different units; they are here reduced to tonnage figures, as follows.

Alabaster output is estimated at 678 tons, obtained on the assumption that the unit value of the 643 reported tons (54,873 lire) applied as well to the output recorded only as a value figure (2,956 lire).

Other building stone (*pietra da taglio e ornamento*) is reported to have been worth 2,982,549 lire. That total includes 85,670 lire for Verona, all but 23,000 of which were probably accounted for by marble (the latter figure being obtained by dividing the reported wage bill according to the distribution of the Verona labor force assumed in section B4.2 above, thus attributing all the surplus to marble); the value of output excluding marble can thus be set at approximately 2.92 million lire. The detailed figures on pp. 64-65 list 159,682 cubic meters (excluding Verona), equivalent to 367,269 tons (at 2.3 tons per cubic meter: Brady, 1944, p. 348), worth 2,506,900 lire; at the average value implied by these partial figures, the estimated total value corresponds to 427,789 tons of stone.

The value of common construction stone is reported at 2,946,818 lire. A subtotal of 1,233,621 cubic meters (equivalent to 2,814,328 tons, at 2.3 tons per cubic meter) was worth 2,671,616 lire; at the unit value implied by this subtotal, total output equaled 3,104,231 tons.

Slate production was not even partially recorded in units of volume or weight; active quarries numbered 145. In 1890, 173 quarries produced 40,485 tons; assuming average output per quarry remained constant, slate output in 1865 may be estimated at 33,933 tons.

The output of broken stone was reported at 83,694 cubic meters; at 2.3 tons per unit, these are equivalent to 192,496 tons.

The output of pozzolana and lapilli was reported at 100 tons plus 65,765 cubic meters; at 2.07 tons per cubic meter (*Notizie minerarie*, p. 241), these are equivalent to a total of 136,234 tons.

The value of grindstone production totaled 121,006 lire; a subtotal of 360 cubic meters (828 tons, at 2.3 tons per unit) were worth 12,000 lire, suggesting that total output amounted to 8,349 tons.

The output of talc, barite, tripoli, fuller's earth, magnesian earth, and coloring earths

totaled 1,149 tons plus 533 cubic meters; at an average of perhaps 4 tons per cubic meter (Brady, 1944, pp. 65, 607), these are equivalent to 3,281 tons.

Pumice output was 9,000 cubic meters; these are equivalent to perhaps 5,400 tons (*Dizionario enciclopedico italiano*, vol. IX, p. 610).

Whetstone and potstone production are estimated on the basis of reported employment (1,100 and 40 men, respectively), assuming productivities equal to those prevailing in 1890 (.84 and 18 tons per man, respectively): the total output so obtained in 1,644 tons.

Sand production is reported at 17 tons plus 90,643 cubic meters; at 1.7 tons per cubic meter (Brady, 1944, p. 530), these are equivalent to 154,110 tons.

The sum of the above estimates is 4.07 million tons. This output was obtained from 2,177 quarries (with another 541 producing marble and 1,020 kiln materials); an additional 310 quarries (plus 633 for marble and 277 for kiln materials) are listed as inactive or not reporting (*Statistica mineraria*, p. 76). In all, therefore, the *Statistica mineraria* points to an aggregate output in 1865 of 4 to 5 million tons, or far below the present figure of over 9 million tons. The latter estimate seems relatively robust, particularly since the rising consumption of bricks and tiles (per unit of construction) and the rising relative cost of labor (and therefore of relatively labor-intensive quarry products) noted in section C below suggest that the present estimate for 1865 is more likely to be too low than too high. The number of relevant quarries listed by the *Statistica mineraria* also seems relatively low (2,487, against 5,280 in 1890; the numbers of kilns, at 11,660 and 12,678, respectively, are altogether closer). On balance, therefore, it does not appear unreasonable to assume that this early survey of Italy's quarries and their output was in fact quite incomplete, even apart from the omission of Latium, not yet part of the Kingdom.

Value added in 1911 is estimated very crudely. The *Rivista mineraria 1911*, pp. LXXXI, LXXXV reports, net of marble (separately counted), quartz and feldspar, kaolin, magnesian earth, refractory material, and siliceous sand (here considered kiln materials), and bauxite (here considered a metal ore), some 12.28 million tons of output worth 36.00 million lire. Allowing .36 million lire for fuel and other costs (for 1,024 non-hydraulic horsepower, at 350 lire each: *Rivista mineraria 1911*, pp. XCI-XCII), conventional value added works out to 2.90 lire per ton, or 64.93 million lire for the present output estimate.

Industrial value added is estimated from the breakdown of those output data. Again excluding marble and the industrial materials listed above, the reported total includes 1.581 million tons of building stone, worth 11.31 lire per ton; 10.626 million tons of other construction materials, worth 1.43 lire per ton; and .077 million tons of industrial materials, worth 37.65 lire per ton. Industrial value added per ton of building stone is estimated at 8.5 lire per ton, allowing, as in marble, a ratio to the reported average value near 75%; per ton of other (and relatively easily quarried) materials it is estimated directly at 1.2 lire per ton (20% more than clay and sand). Weighted by the corresponding quantities these yield an average of 2.14 lire per ton, or 47.92 million lire for the present output estimate.

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Table B.01
Reported Labor Force and Factor Employment in Mining in 1911

Census category	Product	*Censimento demografico* (labor force) Blue-collar	*Censimento demografico* (labor force) Total	*Censimento industriale* Employment Blue-collar	*Censimento industriale* Employment Total	*Censimento industriale* Unduplicated HP in use Primary	*Censimento industriale* Unduplicated HP in use Electric	*Rivista mineraria* Blue-collar workers	*Rivista mineraria* Installed HP Primary	*Rivista mineraria* Installed HP Electric	Sector
2.11	Lead, zinc, silver	(23,172)	(24,537)	14,194	14,858	6,813	223	15,105	6,134	537	Mining
2.12	Other metal ores			7,174	7,812	3,224	447	7,687	928	1,439	Mining[a]
2.13	Sulfur ore	32,043	32,829	2,324	2,608	399	19	19,612	3,403	1,586	Mining
2.14	Mineral fuels[b]	3,444	3,636	3,240	3,385	818	1,690	4,096	3,004	736	Mining[c]
2.15	Other mine products	2,911	3,181	2,279	2,442	1,717	47	3,062	55	27	Mining[d]
2.31	Sea salt	2,854	3,082	2,391	2,542	873	0	3,460	764	243	Mineralworking
2.32	Peat	241	268	249	283	314	0	378	24	0	Peat
2.33	Mineral water	154	170	68	92	67	0				
ω.21	(2.1 and 7.1[e])			20,640	21,999	5,029	423	3,355	407	0	Sulfur[f]

[a]includes bauxite from the quarrying sector.
[b]excludes natural gas.
[c]includes natural gas.
[d]includes some processing of salt and asphalt rock.
[e]chemicals.
[f]initial processing of sulfur ore (production of fused sulfur or ground sulfur ore).

Sources: *Censimento demografico*, *Censimento industriale*, *Rivista mineraria 1911*.

Table B.02
Estimated Output of Iron Ore, 1861-1913[a] (tons)

Year	(1) Reported aggregate output of iron ore	(2) Reported output of manganiferous ore	(3) Public Elban mines Reported output	(4) Public Elban mines Estimated output	(5) Sardinian mines Reported output	(6) Sardinian mines Estimated output	(7) Estimated aggregate output of iron ore[a]
1861	82,719	0	40,687	52,118	87	87	94,150
1862	105,228	0	63,548	81,498	300	300	123,178
1863	137,447	0	99,447	98,958	2,750	2,750	136,958
1864	134,482	0	98,468	101,573	1,974	4,708	140,321
1865	142,145	0	104,678	107,573	5,467	9,639	149,212
1866	154,467	0	110,467	96,667	13,810	16,982	143,839
1867	141,210	0	82,867	68,709	20,153	22,365	129,264
1868	116,816	0	54,550	56,632	24,576	20,806	115,128
1869	111,739	0	58,713	56,086	17,036	8,518	100,594
1870	89,248	0	53,458	52,130	0	0	87,920
1871	85,517	0	50,801	85,424	0	2,192	122,332
1872	163,339	0	120,046	160,569	4,383	12,400	211,879
1873	259,418	0	201,091	212,115	20,417	20,984	271,009
1874	279,583	3,500	223,138	208,731	21,550	16,406	263,532
1875	227,547	20,000	194,324	195,932	11,262	11,481	249,374
1876	231,790	23,245	197,540	196,880	11,700	12,500	255,175
1877	229,732	8,000	196,220	175,688	13,300	16,820	220,720
1878	189,721	6,470	155,155	164,166	20,339	10,170	195,033
1879	186,857	1,388	173,177	223,750	0	0	238,818
1880	289,058	20,471	274,323	338,769	0	0	373,975
1881	421,065	35,000	403,215	305,324	0	6,581	364,755
1882	242,083	35,000	207,432	185,855	13,161	12,842	255,187
1883	203,582	9,000	164,277	172,260	12,522	12,581	220,524
1884	225,368	0	180,243	177,652	12,640	6,320	216,457
1885	200,955	0	175,060	180,699	0	275	206,869
1886	209,082	0	186,337	197,214	550	275	219,684
1887	230,575	0	208,090	181,460	0	0	203,945
1888	177,157	0	154,830	154,164	0	0	176,491
1889	173,489	0	153,497	171,625	0	0	191,617
1890	220,702	0	189,752	183,266	0	5,095	219,311
1891	216,486	0	176,779	181,730	10,190	9,095	220,342
1892	214,487	4,622	186,681	182,038	8,000	4,000	210,466
1893	191,305	8,805	177,395	175,812	0	200	198,727
1894	187,728	5,810	174,229	173,534	400	200	192,643
1895	183,371	0	172,838	187,051	0	0	197,584
1896	203,966	10,000	201,264	199,790	0	0	212,492
1897	200,709	21,262	198,316	190,984	0	0	214,639
1898	190,110	11,150	183,652	204,116	0	583	222,307
1899	236,549	29,874	224,579	227,483	1,166	583	268,744
1900	247,278	26,800	230,386	223,308	0	0	267,000
1901	232,299	24,290	216,230	222,964	0	20	263,343
1902	240,705	23,113	229,698	297,237	40	20	331,337
1903	374,790	4,735	364,776	381,346	0	0	396,095
1904	409,460	0	397,916	376,897	0	0	388,441
1905	366,616	0	355,877	361,301	0	0	372,040
1906	384,217	20,500	366,724	405,536	0	3,407	446,936
1907	517,952	18,874	444,348	453,127	6,814	4,810	543,601
1908	539,120	17,812	461,906	463,719	2,805	5,648	561,588
1909	505,095	25,380	469,159	469,159	8,490	9,355	531,340
1910	551,259	25,700	532,671	532,671	10,220	11,574	578,313
1911	373,786	6,482	335,346	335,346	12,928	14,542	381,882
1912	582,066	0	513,704	513,704	16,155	13,919	579,830
1913	603,116	0	548,672	548,672	11,682	10,427	601,861
1914			649,561		9,172		

[a]including manganiferous iron ore.

Sources: cols. 1 - 3, 5: *Notizie minerarie*, *Rivista mineraria*.
cols. 4, 6: see text.
col. 7: col. 1 + col. 2 - col. 3 + col. 4 - col. 5 + col. 6, less 100 tons in 1883.

Table B.03
Estimated Output of Copper Ore, 1861-1913 (tons)

Year	(1) Reported aggregate output	(2) Other reported output[a]	(3) Sardinian mines Reported output[a]	(4) Sardinian mines Estimated output	(5) Reported Vicenza district output[b]	(6) Estimated other output	(7) Estimated aggregate output
1861	29,540	2,441	0	0	18,971	2,450	15,460
1862	22,937	2,505	0	0	18,858	2,578	9,162
1863	12,693	2,066	0	0	10,859	2,996	6,896
1864	20,258	1,384	0	0	11,318	2,910	13,234
1865	22,853	1,204	0	0	18,857	2,534	7,734
1866	25,859	0	0	0	17,039	0	8,820
1867	25,856	0	0	0	17,762	0	8,094
1868	25,115	0	0	0	16,214	0	8,901
1869	24,298	0	0	0	16,022	0	8,276
1870	25,078	0	0	38	15,877	0	9,239
1871	27,476	0	75	75	17,481	0	9,995
1872	26,370	0	75	38	15,907	0	10,426
1873	26,763	0	0	0	15,129	0	11,634
1874	26,823	0	0	0	15,636	0	11,187
1875	26,649	0	0	0	14,954	0	11,695
1876	23,330	0	0	0	12,291	0	11,039
1877	24,173	0	0	0	12,622	0	11,551
1878	22,682	0	0	0	11,498	0	11,184
1879	20,751	0	0	0	11,039	0	9,712
1880	30,181	0	0	0	14,872	2,114	17,423
1881	26,257	0	0	0	12,194	772	14,835
1882	24,065	34	0	2	11,438	602	13,265
1883	23,947	22	4	202	10,613	2,303	15,857
1884	27,482	412	400	450	10,599	5,333	22,678
1885	27,236	505	500	406	12,034	4,771	20,384
1886	25,162	311	311	173	13,475	7,626	19,486
1887	43,826	35	35	18	11,672	0	32,172
1888	47,088	0	0	0	12,060	0	35,028
1889	48,214	0	0	0	11,620	0	36,594
1890	50,378	0	0	0	10,521	0	39,857
1891	53,059	0	0	0	8,780	0	44,279
1892	102,427	0	0	0	8,248	0	94,179
1893	96,299	0	0	0	7,575	0	88,724
1894	92,886	0	0	0	13,843	0	79,043
1895	83,670	0	0	0		0	83,670
1896	90,408	0	0	0		0	90,408
1897	93,377	220	0	0		0	93,597
1898	95,128	83	0	0		0	95,211
1899	94,764	1,083	0	0		0	95,847
1900	95,644	1,515	0	0		0	97,159
1901	107,750	3,808	0	6		0	111,564
1902	101,142	6,000	11	18		0	107,149
1903	114,823	786	24	46		0	115,631
1904	157,503	984	68	84		0	158,503
1905	149,035	117	100	71		0	149,123
1906	147,132	26	42	61		0	147,177
1907	167,619	0	79	78		0	167,618
1908	106,629	2,870	77	40		0	109,462
1909	90,272	0	3	45		0	90,314
1910	68,369	0	86	45		0	68,328
1911	68,136	0	4	202		0	68,334
1912	86,001	0	400	609		0	86,210
1913	89,487	0	818	1,034		0	89,703
1914			1,249				

[a]includes the estimated share of reported mixed ore output: see text.
[b]to 1894.

Sources: cols. 1 - 3, 5: *Notizie minerarie*, *Rivista mineraria*.
cols. 4, 6: see text.
col. 7: col. 1 + col. 2 - col. 3 + col. 4 - col. 5 + col. 6.

Table B.04
Estimated Output of Lead Ore, 1861-1913 (tons)

Year	(1) Reported aggregate output	(2) Estimated lead ore in mixed ores	(3) Sardinian and (through 1908) Elban mines: Reported ore output[a]	(4) Work lead (1884-91): Output (1884-91)	(5) Work lead (1884-91): Ore input (1887-91)[b]	(6) Elban mines: Estimated ore output	(7) Estimated aggregate output
1861	15,493	0	14,138			14,138	15,493
1862	16,134	0	14,632			14,632	16,134
1863	17,458	0	15,804			15,804	17,458
1864	10,524	0	8,909			16,885	18,500
1865	17,248	0	15,952			18,093	19,389
1866	21,594	0	20,233			23,683	25,044
1867	28,350	0	27,133			28,387	29,604
1868	31,019	0	29,640			29,642	31,021
1869	31,063	0	29,643			27,322	28,742
1870	26,352	0	25,000			23,200	24,552
1871	22,454	0	21,400			23,150	24,204
1872	25,716	0	24,900			23,370	24,186
1873	22,814	0	21,839			23,841	24,816
1874	27,120	0	25,842			27,464	28,742
1875	30,681	0	29,086			29,876	31,471
1876	32,404	0	30,666			33,017	34,755
1877	36,910	0	35,367			35,307	36,850
1878	36,512	0	35,247			37,737	39,002
1879	41,301	0	40,226			38,184	39,259
1880	37,153	0	36,142			36,967	37,978
1881	39,533	0	37,791			41,547	43,289
1882	46,334	34	45,302			44,879	45,945
1883	46,051	22	44,456			44,227	45,844
1884	46,116	444	43,997	1,613		41,595	42,545
1885	40,184	537	39,193	1,145		38,770	39,153
1886	39,841	311	38,347	1,030		39,394	40,169
1887	38,221	35	35,699	961	4,742	38,764	40,360
1888	35,178	0	33,826	637	3,260	38,348	39,063
1889	36,894	0	35,585	946	4,025	36,315	36,678
1890	32,187	0	31,120	585	1,900	31,413	31,895
1891	30,233	0	29,803	1	3	31,366	31,795
1892	33,310	0	32,926			30,412	30,796
1893	29,004	0	27,897			27,811	28,918
1894	29,822	0	27,725			29,014	31,111
1895	30,632	392	30,303			31,799	32,520
1896	33,546	80	33,294			34,391	34,723
1897	36,200	220	35,488			34,421	35,353
1898	33,930	83	33,353			31,976	32,636
1899	31,046	1,083	30,599			32,650	34,180
1900	35,103	1,335	34,700			38,801	40,539
1901	43,419	3,438	42,901			42,466	46,422
1902	42,330	6,000	42,031			42,153	48,452
1903	42,443	786	42,274			42,503	43,458
1904	42,846	984	42,731			40,712	41,811
1905	39,030	107	38,693			39,686	40,130
1906	40,945	23	40,679			41,622	41,911
1907	43,037	340	42,565			44,157	44,969
1908	46,649	3,150	45,749			41,731	45,781
1909	37,945	145	37,572			36,999	37,517
1910	36,540	150	36,425			37,207	37,472
1911	38,458	275	37,988			39,401	40,146
1912	41,680	150	40,814			42,179	43,195
1913	44,654	252	43,544			43,211	44,573
1914			42,878				

[a]includes the estimated share of reported mixed ore output: see text.
[b]in 1891, estimated.

Sources: cols. 1, 3 - 5: *Notizie minerarie*, *Rivista mineraria*.
cols. 2, 6: see text.
col. 7: col. 1 + col. 2 - col. 3 - col. 4 + col. 6.

Table B.05
Estimated Output of Zinc Ore, 1861-1913 (tons)

Year	(1) Reported aggregate output	(2) Estimated zinc ore in mixed ores	(3) Sardinian mines Reported output[a]	(4) Sardinian mines Estimated output	(5) Estimated aggregate output
1861	168	0	0	0	168
1862	157	0	0	0	157
1863	265	0	0	0	265
1864	202	0	0	225	427
1865	732	0	449	2,373	2,656
1866	4,492	0	4,296	5,258	5,454
1867	6,443	0	6,219	28,521	28,745
1868	51,012	0	50,822	65,498	65,688
1869	80,524	0	80,174	86,087	86,437
1870	92,833	0	92,000	73,794	74,627
1871	56,426	0	55,587	67,624	68,463
1872	80,861	0	79,661	78,040	79,240
1873	79,036	0	76,418	67,683	70,301
1874	64,716	0	58,947	58,556	64,325
1875	61,969	0	58,165	59,711	63,515
1876	66,034	0	61,256	71,462	76,240
1877	88,844	0	81,668	69,264	76,440
1878	62,703	0	56,859	59,949	65,793
1879	73,411	0	63,039	65,294	75,666
1880	85,287	0	67,549	61,235	78,973
1881	72,176	0	54,921	64,578	81,833
1882	91,366	34	74,235	81,573	98,738
1883	100,574	22	88,910	90,885	102,571
1884	104,974	415	92,860	93,929	106,458
1885	107,887	508	94,998	93,706	107,103
1886	107,548	311	92,414	88,211	103,656
1887	93,143	35	84,008	81,077	90,247
1888	87,310	0	78,145	82,034	91,199
1889	97,059	0	85,922	92,661	103,798
1890	110,926	0	99,400	103,213	114,739
1891	120,685	0	107,026	111,583	125,242
1892	129,731	0	116,140	116,022	129,613
1893	132,767	0	115,904	113,073	129,936
1894	131,777	0	110,241	106,995	128,531
1895	121,197	392	103,749	103,883	121,723
1896	118,171	80	104,017	104,939	119,173
1897	122,214	220	105,860	109,723	126,297
1898	132,099	83	113,585	120,650	139,247
1899	150,629	1,083	127,714	119,612	143,610
1900	139,679	1,335	111,510	114,098	143,602
1901	135,784	3,438	116,686	113,856	136,392
1902	131,965	6,000	111,025	122,308	149,248
1903	157,521	786	133,591	129,133	153,849
1904	148,365	984	124,675	127,067	151,741
1905	147,834	107	129,458	133,535	152,018
1906	155,751	23	137,611	137,596	155,759
1907	160,517	340	137,580	133,981	157,258
1908	152,254	3,150	130,381	119,919	144,942
1909	129,899	145	109,456	119,001	139,589
1910	146,307	150	128,546	124,714	142,625
1911	139,719	275	120,882	124,378	143,490
1912	149,776	150	127,873	133,994	156,047
1913	158,278	252	140,115	137,083	155,498
1914			134,050		

[a]includes the estimated share of reported mixed ore output: see text.

Sources: cols. 1, 3: *Notizie minerarie*, *Rivista mineraria*.
cols. 2, 4: see text.
col. 5: col. 1 + col. 2 - col. 3 + col. 4.

Table B.06
Estimated Output of Silver, Gold, and Manganese Ores, 1861-1913 (tons)

Year	(1) Silver ore: Reported aggregate output	(2) Silver ore: Estimated aggregate output	(3) Gold ore: Reported aggregate output	(4) Manganese ore: Reported aggregate output	(5) Manganese ore: Sardinian mines: Reported output	(6) Manganese ore: Sardinian mines: Estimated output	(7) Manganese ore: Estimated aggregate output
1861	0	0	2,288	523	0	0	523
1862	0	0	2,030	1,742	0	0	1,742
1863	0	0	4,022	725	0	0	725
1864	0	0	10,381	723	0	0	723
1865	0	0	4,797	580	0	0	580
1866	0	0	9,190	722	0	0	722
1867	0	0	9,190	688	0	0	688
1868	0	0	9,190	672	0	0	672
1869	0	0	9,190	770	0	0	770
1870	0	8	9,190	640	0	118	758
1871	15	15	10,947	792	235	368	925
1872	15	76	8,847	1,143	500	800	1,443
1873	137	202	5,789	3,153	1,100	950	3,003
1874	266	330	1,788	3,220	800	831	3,251
1875	394	322	2,704	3,811	861	1,431	4,381
1876	249	455	6,253	6,909	2,000	2,500	7,409
1877	661	851	7,453	6,812	3,000	3,600	7,412
1878	1,041	1,225	8,804	7,055	4,200	4,200	7,055
1879	1,409	1,605	9,700	5,705	4,200	4,850	6,355
1880	1,801	1,623	11,757	6,475	5,500	6,750	7,725
1881	1,444	1,447	12,190	8,767	8,000	7,075	7,842
1882	1,449	1,480	12,202	6,978	6,150	8,351	9,179
1883	1,510	1,568	10,486	11,384	10,552	5,276	6,108
1884	1,626	1,556	15,037	885	0	500	1,385
1885	1,485	1,562	11,106	1,802	1,000	2,541	3,343
1886	1,639	1,766	10,759	5,561	4,082	2,972	4,451
1887	1,892	1,949	11,134	4,434	1,862	2,131	4,703
1888	2,005	2,001	10,638	3,630	2,400	2,021	3,251
1889	1,997	1,874	10,932	2,203	1,641	1,506	2,068
1890	1,750	1,878	8,296	2,147	1,371	1,486	2,262
1891	2,006	1,843	7,729	2,429	1,600	1,200	2,029
1892	1,680	1,458	6,612	1,243	800	420	863
1893	1,236	1,170	7,393	810	40	95	865
1894	1,103	987	7,748	760	150	460	1,070
1895	870	755	7,099	1,569	769	785	1,585
1896	640	523	7,659	1,891	800	975	2,066
1897	405	420	10,723	1,634	1,150	840	1,324
1898	435	488	9,549	3,002	530	765	3,237
1899	540	562	11,859	4,356	1,000	1,000	4,356
1900	584	548	5,840	6,014	1,000	750	5,764
1901	511	466	890	2,181	500	756	2,437
1902	421	413	1,215	2,477	1,012	881	2,346
1903	405	274	5,734	1,930	750	880	2,060
1904	143	157	6,746	2,836	1,010	1,705	3,531
1905	170	109	1,200	5,384	2,400	2,200	5,184
1906	48	55	6,543	3,060	2,000	2,002	3,062
1907	62	58	13,475	3,654	2,004	1,376	3,026
1908	53	49	14,671	2,750	747	989	2,992
1909	44	38	2,890	4,700	1,230	1,623	5,093
1910	32	28	2,147	4,200	2,015	1,881	4,066
1911	24	26	2,080	3,515	1,747	1,499	3,267
1912	27	14	3,638	2,641	1,251	987	2,377
1913	0	0	5,011	1,622	722	457	1,357
1914	0				191		

Sources: cols. 1, 3 - 5: *Notizie minerarie*, *Rivista mineraria*.
cols. 2, 6: see text.
col. 7: col. 4 - col. 5 + col. 6.

Table B.07
Estimated Output of Antimony Ore, 1861-1913 (tons)

Year	(1) Reported aggregate ore output	(2) Crudum and oxide reported as ore	(3) Estimated district ore output: Caltanissetta	(4) Estimated district ore output: Firenze	(5) Iglesias district: Components of the reported aggregate: Ore	(6) Iglesias district: Components of the reported aggregate: Yield	(7) Iglesias district: Reported liquated ore[a]	(8) Iglesias district: Estimated output	(9) Estimated aggregate output
1861	76	0	0	76	0	0		0	76
1862	0	0	0	0	0	0		0	0
1863	0	0	0	0	0	0		0	0
1864	0	0	0	0	0	0		0	0
1865	0	0	0	0	0	0		0	0
1866	250	0	250	0	0	0		0	250
1867	250	0	250	0	0	0		0	250
1868	250	0	250	0	0	0		0	250
1869	250	0	250	0	0	0		0	250
1870	250	0	250	0	0	0		0	250
1871	250	0	250	0	0	0		0	250
1872	250	0	250	0	0	0		0	250
1873	250	0	250	0	0	0		0	250
1874	250	0	250	0	0	0		0	250
1875	200	0	200	0	0	0		0	200
1876	200	0	200	0	0	0		75	275
1877	490	0	140	200	150	0		75	415
1878	600	0	200	400	0	0		0	600
1879	470	0	140	330	0	0		0	470
1880	540	0	140	400	0	0		80	620
1881	600	0	140	300	160	0		406	846
1882	1,450	0	500	298	652	0		500	1,298
1883	2,027	0	573	1,106	348	0		489	2,168
1884	1,714	391	573	820	630	191	526	1,105	2,498
1885	2,887	507	573	403	1,579	457	1,508	1,400	2,376
1886	1,738	417	107	363	1,221	290	1,061	935	1,405
1887	848	175	325	390	88	138	560	377	1,092
1888	507	0	32	370	105	0	0	150	552
1889	563	31	99	360	73	31	122	571	1,030
1890	891	140	264	483	326	115	620	923	1,670
1891	782	93	177	453	340	93	560	1,131	1,761
1892	621	327	30	501	97	327	1,264	1,204	1,735
1893	1,193	0	0	441	1,046	0	1,020	1,206	1,647
1894	1,504	0	15	466	1,365	0	1,318	1,726	2,207
1895	2,241	0	30	426	2,087	0	2,040	3,344	3,800
1896	5,086	0	343	429	4,600	0	4,500	3,272	4,044
1897	2,150	0	62	432	1,944	0	1,944	1,777	2,271
1898	1,931	0	174	441	1,610	0	1,547	1,633	2,248
1899	3,791	0	71	2,024	1,656	0	1,642	1,423	3,558
1900	7,609	0	24	6,380	1,190	0	1,170	1,286	7,705
1901	8,818	0	42	7,395	1,381	0	1,340	1,485	8,922
1902	6,116	0	20	4,507	1,589	0	1,570	1,481	6,008
1903	6,927	0	0	5,555	1,372	0	2,136	1,074	6,629
1904	5,712	0	120	4,816	776	0	776	899	5,835
1905	5,083	0	25	4,037	1,021	0	1,021	1,797	5,859
1906	5,704	0	61	3,070	2,573	0	2,500	2,946	6,077
1907	7,892	0	170	4,404	3,318	0	2,860	2,487	7,061
1908	2,821	0	45	1,120	1,656	0	430	1,353	2,518
1909	1,077	0	0	27	1,050	0	0	1,622	1,649
1910	2,194	0	0	0	2,194	0	0	2,318	2,318
1911	2,441	0	0	0	2,441	0	0	2,160	2,160
1912	1,878	0	0	0	1,878	0	0	1,850	1,850
1913	1,822	0	0	0	1,822	0	0	1,189	1,189
1914					555	0	0		

[a]from 1884; in 1886 and 1892, estimated: see text.

Sources: cols. 1 - 2, 5 - 7: *Notizie minerarie*, *Rivista mineraria*.
cols. 3 - 4, 8: see text.
col. 9: col. 3 + col. 4 + col. 8, plus 40 tons in 1899 and 15 tons in 1900.

Table B.08
Estimated Output of Mercury Ore and Pyrite, 1861-1913 (tons)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mercury ore					Pyrite		
	Firenze district		Vicenza district					
Year	Reported metal output	Estimated ore output[a]	Reported metal output	Estimated ore output[a]	Estimated aggregate ore output[b]	Reported aggregate pyrite output	Other pyrite output	Estimated aggregate pyrite output
1861	3.5	467	20.0	6,260	6,727	2,200	18,971	21,171
1862	3.5	467	22.7	7,105	7,572	5,000	18,730	23,730
1863	3.5	467	18.3	5,728	6,195	4,600	10,313	14,913
1864	3.5	467	22.4	7,011	7,478	4,750	10,858	15,608
1865	3.5	467	23.0	7,200	7,667	2,169	18,773	20,942
1866	3.0	400	17.1	5,246	5,646	2,281	17,039	19,320
1867	5.3	633	10.0	3,360	3,993	2,281	17,762	20,043
1868	5.3	567	12.8	4,457	5,024	2,564	16,214	18,778
1869	5.9	565	18.4	6,637	7,202	2,692	16,022	18,714
1870	15.6	1,338	31.2	11,663	13,001	2,702	15,877	18,579
1871	20.4	1,567	16.1	6,236	7,803	3,956	17,481	21,437
1872	20.6	1,417	6.7	2,689	4,106	4,254	15,907	20,161
1873	25.0	1,540	5.9	2,453	3,993	5,380	15,129	20,509
1874	30.3	1,673	1.7	732	2,405	3,350	15,636	18,986
1875	79.5	3,935	2.2	982	4,917	4,190	14,954	19,144
1876	97.4	4,314	2.0	925	5,239	4,460	12,291	16,751
1877	105.5	4,650	5.0	1,243	5,893	5,090	12,622	17,712
1878	120.6	5,475	3.1	771	6,246	3,242	11,498	14,740
1879	129.6	6,065	2.5	622	6,687	3,355	11,039	14,394
1880	115.9	5,586	0.0	100	5,686	4,663	14,872	19,535
1881	128.0	6,362	0.0	0	6,362	5,785	12,194	17,979
1882	139.7	7,153	0.0	0	7,153	6,521	11,438	17,959
1883	206.0	10,877	0.0	0	10,877	6,620	10,613	17,233
1884	267.0	14,525	0.0	0	14,525	7,948	10,599	18,547
1885	237.0	13,272	0.0	0	13,272	11,372	12,034	23,406
1886	251.0	14,483	0.0	0	14,483	17,149	13,475	30,624
1887	244.0	14,518	0.0	0	14,518	18,470	11,672	30,142
1888	339.0	20,781	0.0	0	20,781	14,633	12,060	26,693
1889	385.0	24,332	0.0	0	24,332	17,022	11,620	28,642
1890	449.0	29,230	0.0	0	29,230	14,755	10,521	25,276
1891	330.0	22,143	0.0	0	22,143	19,868	8,780	28,648
1892	325.0	22,458	0.0	0	22,458	27,670	8,248	35,918
1893	273.0	19,450	0.0	0	19,450	29,460	7,575	37,035
1894	258.0		0.0		15,022	22,638	13,843	36,481
1895	199.0		0.0		10,504	38,586	0	38,586
1896	186.0		0.0		14,305	45,728	0	45,728
1897	192.0		0.0		20,659	58,320	0	58,320
1898	173.0		0.0		19,201	67,191	0	67,191
1899	205.0		0.0		29,322	76,538	0	76,538
1900	260.0		0.0		33,930	71,616	0	71,616
1901	278.0		0.0		38,614	89,376	0	89,376
1902	259.0		0.0		44,261	93,177	0	93,177
1903	312.0		0.0		55,528	101,455	0	101,455
1904	352.0		0.0		60,403	112,004	0	112,004
1905	369.0		0.0		63,378	117,667	0	117,667
1906	417.0		0.0		80,638	122,364	0	122,364
1907	434.0		0.0		76,561	126,925	0	126,925
1908	684.0		0.0		82,534	131,721	0	131,721
1909	771.0		0.0		97,592	132,234	600	132,834
1910	894.0		0.0		87,129	165,688	0	165,688
1911	955.0		0.0		97,803	165,273	0	165,273
1912	1,000.0		0.0		88,200	277,585	0	277,585
1913	1,004.0		0.0		109,379	317,334	0	317,334

[a]to 1893.
[b]from 1894, reported output.

Sources: cols. 1, 3, 6: *Notizie minerarie*, *Rivista mineraria*.
cols. 2, 4, 7: see text.
col. 5: 1861-1893, col. 2 + col. 4; 1894-1913, *Rivista mineraria*.
col. 8: col. 6 + col. 7.

Table B.09
Estimated Output of Solid Mineral Fuel, 1861-1913 (tons)

Year	(1) Reported aggregate output	(2) Other reported output[a]	(3) Partial Firenze district output: Reported dried	(4) Partial Firenze district output: Reported moist[b]	(5) Sardinian mines: Reported output	(6) Sardinian mines: Estimated output	(7) Estimated aggregate output
1861	33,531	250	0	0	0	0	33,781
1862	43,381	250	0	0	20	20	43,631
1863	36,189	250	0	0	350	350	36,439
1864	38,210	2,150	0	0	0	450	40,810
1865	37,490	4,100	0	0	900	1,315	42,005
1866	50,319	400	0	0	1,730	1,595	50,584
1867	42,476	0	0	0	1,460	1,555	42,571
1868	51,386	0	0	0	1,650	1,361	51,097
1869	56,201	0	0	0	1,071	1,051	56,181
1870	58,770	0	0	0	1,030	515	58,255
1871	80,336	0	0	0	0	1,155	81,491
1872	93,555	0	0	0	2,309	4,036	95,282
1873	116,884	808	0	0	5,763	7,996	119,925
1874	127,473	450	0	0	10,228	11,163	128,858
1875	116,955	653	0	0	12,098	9,110	114,620
1876	116,399	388	0	0	6,121	8,734	119,400
1877	120,588	73	0	0	11,346	12,288	121,603
1878	124,117	32	0	0	13,230	14,054	124,973
1879	131,318	53	0	0	14,878	15,511	132,004
1880	139,369	0	0	0	16,144	14,574	137,799
1881	134,582	0	0	0	13,004	11,545	133,123
1882	164,737	0	0	0	10,085	10,852	165,504
1883	214,421	0	0	0	11,619	12,436	215,238
1884	223,322	4,633	0	0	13,253	11,592	226,294
1885	190,413	0	0	0	9,930	10,400	190,883
1886	243,325	4,940	0	0	10,869	12,225	249,621
1887	327,665	13,500	0	0	13,580	15,363	342,948
1888	366,794	11,065	14,117	21,176	17,146	18,405	386,177
1889	390,320	4,832	0	0	19,664	17,683	393,171
1890	376,326	13,447	0	0	15,701	14,950	389,022
1891	289,286	7,593	152,036	188,776	14,199	13,996	333,416
1892	295,713	6,536	158,414	196,433	13,792	13,504	339,980
1893	317,249	5,066	188,544	233,795	13,216	14,021	368,371
1894	271,295	4,144	152,225	188,759	14,826	14,649	311,796
1895	305,321	5,645	167,593	207,274	14,472	15,035	351,210
1896	276,197	5,991	119,690	143,988	15,597	16,948	307,837
1897	314,222	8,528	120,233	148,330	18,299	20,795	353,343
1898	341,327	3,052	170,969	216,714	23,290	25,076	391,910
1899	388,534	0	199,264	252,409	26,862	30,353	445,170
1900	479,896	9,559	288,136	372,409	33,843	36,610	576,495
1901	425,614	13,398	219,762	327,773	39,377	34,520	542,166
1902	413,810	13,458	227,909	318,451	29,663	27,551	515,698
1903	346,887	11,858	172,659	251,066	25,439	22,732	434,445
1904	362,151	11,347	185,223	266,144	20,024	18,143	452,538
1905	412,916	13,949	229,400	320,312	16,262	16,240	517,755
1906	473,293	10,242	269,700	438,137	16,218	17,180	652,934
1907	453,137	8,384	271,651	413,530	18,141	17,528	602,787
1908	480,029	8,975	291,305	411,324	16,915	19,047	611,155
1909	555,073	8,040	372,503	484,137	21,179	21,297	674,865
1910	562,154	7,899	384,287	486,512	21,414	22,997	673,861
1911	557,137	0	337,435	453,002	24,579	25,008	673,133
1912	663,812	0	400,872	526,015	25,437	25,361	788,879
1913	701,081	9,132	425,647	543,023	25,285	26,613	828,917
1914					27,941		

[a]in 1861-65, 1892 and 1894, estimated: see text.
[b]in 1888-94, estimated: see text.

Sources: cols. 1 - 5: *Notizie minerarie*, *Rivista mineraria*.
col. 6: see text.
col. 7: col. 1 + col. 2 - col. 3 + col. 4 - col. 5 + col. 6.

Table B.10
Estimated Output of Sulfur Ore, Ground Sulfur Ore, and Fused Sulfur, 1861-1913 (tons)

Year	(1) Reported aggregate output of crude sulfur	(2) Estimated aggregate output of ground ore	(3) Esti-mated aggregate output	(4) Estimated output of fused sulfur: Regional estimates, 1861-1895: Sicily	(5) Emilia	(6) Marches	(7) Tuscany and Latium	(8) Campania	(9) Calabria
1861	165,883	0	165,989	160,000	2,261	3,568	54	0	0
1862	165,485	0	165,550	160,000	2,118	3,343	24	0	0
1863	182,571	0	182,624	175,000	2,937	4,634	0	0	0
1864	180,610	0	180,670	172,618	3,100	4,892	0	0	0
1865	171,587	0	171,638	162,905	3,368	5,314	0	0	0
1866	198,204	0	198,244	190,123	3,369	4,712	0	0	0
1867	199,072	0	199,112	189,733	4,163	5,176	0	0	0
1868	201,333	0	201,373	189,344	5,683	6,288	18	0	0
1869	200,719	3,500	197,259	180,086	8,620	8,494	19	0	0
1870	203,874	4,000	199,914	180,199	10,469	9,186	20	0	0
1871	199,728	5,000	194,768	176,504	10,226	7,982	16	0	0
1872	239,167	6,500	232,707	218,863	8,134	5,640	30	0	0
1873	274,201	7,000	267,241	246,815	12,263	7,533	590	0	0
1874	251,259	7,500	243,799	214,442	18,621	10,096	600	0	0
1875	207,420	8,000	199,460	173,423	17,271	8,226	500	0	0
1876	276,041	8,300	267,781	239,221	20,144	8,376	0	0	0
1877	260,325	8,160	252,205	217,947	25,086	9,032	100	0	0
1878	305,142	10,000	295,182	255,025	29,817	9,200	50	800	250
1879	376,316	11,500	364,856	329,984	24,841	8,132	159	1,000	700
1880	359,663	13,500	346,203	312,921	22,662	7,858	222	1,000	1,500
1881	373,160	15,000	358,200	323,151	22,254	9,425	40	1,000	2,290
1882	445,918	17,000	428,958	394,093	20,806	8,959	0	1,000	4,060
1883	446,508	14,500	432,048	391,689	18,772	9,017	0	1,000	11,530
1884	411,037	10,100	400,977	367,712	19,066	8,509	0	1,000	4,650
1885	425,547	13,500	412,087	377,194	19,652	6,874	500	1,000	6,827
1886	374,343	14,000	360,377	326,657	16,407	6,867	0	1,000	9,412
1887	342,215	12,700	329,536	300,802	13,026	8,637	0	1,000	6,050
1888	376,538	15,300	361,264	322,042	10,065	9,189	0	1,050	18,892
1889	371,494	12,800	358,719	327,672	6,958	11,908	0	1,160	10,996
1890	369,239	12,500	356,754	328,024	8,532	12,901	0	1,150	6,132
1891	395,528	18,600	376,932	347,568	8,664	13,876	0	1,150	5,670
1892	418,555	15,500	403,057	374,359	8,132	13,267	129	1,100	6,068
1893	417,671	16,300	401,371	374,840	8,789	12,263	92	600	4,787
1894	405,781	13,850	391,931	366,185	7,601	13,450	15	0	4,680
1895	370,766	13,340	371,857	352,908	3,943	11,161	110	0	3,735
1896	426,353	13,500	427,081						
1897	496,658	18,500	500,442						
1898	502,351	20,600	506,305						
1899	563,697	30,100	567,591						
1900	544,119	24,534	549,466						
1901	563,096	25,820	566,168						
1902	539,433	22,820	541,498						
1903	553,751	17,400	555,720						
1904	527,563	24,900	529,352						
1905	568,927	25,123	568,927						
1906	499,814	28,777	499,814						
1907	426,972	19,467	426,972						
1908	445,312	18,910	445,312						
1909	435,060	19,590	435,060						
1910	430,360	21,297	430,360						
1911	414,161	17,561	414,161						
1912	389,451	18,416	389,451						
1913	386,310	20,096	386,310						

Table B.10 (continued)

Year	(10) Sicily	(11) Emilia	(12) Marches	(13) Tuscany and Latium	(14) Campania	(15) Calabria	(16) Estimated aggregate output
	Estimated output of sulfur ore						
	Regional estimates, 1861-1895						
1861	1,229,624	19,854	25,523	540	0	0	1,275,541
1862	1,229,624	18,598	23,914	240	0	0	1,272,376
1863	1,344,901	25,789	33,149	0	0	0	1,403,839
1864	1,326,595	27,221	34,994	0	0	0	1,388,810
1865	1,244,123	29,574	38,013	0	0	0	1,311,710
1866	1,442,914	29,375	34,049	0	0	0	1,506,338
1867	1,430,953	36,044	37,782	0	0	0	1,504,779
1868	1,419,092	48,860	46,366	180	0	0	1,514,498
1869	1,341,268	73,592	63,269	190	3,500	0	1,481,819
1870	1,333,719	88,751	69,119	200	4,000	0	1,495,789
1871	1,298,205	86,083	60,671	160	5,000	0	1,450,119
1872	1,599,696	67,993	43,305	300	6,500	0	1,717,794
1873	1,792,723	101,789	58,428	5,900	7,000	0	1,965,840
1874	1,547,849	153,481	79,103	6,000	7,500	0	1,793,933
1875	1,243,948	141,356	65,107	5,000	8,000	0	1,463,411
1876	1,705,184	163,715	66,968	0	8,300	0	1,944,167
1877	1,543,830	202,452	72,947	1,000	8,160	0	1,828,389
1878	1,865,259	238,946	75,059	416	13,330	2,650	2,195,660
1879	2,354,070	200,067	65,720	1,590	16,200	7,420	2,645,067
1880	2,177,368	183,432	62,906	2,220	18,200	15,900	2,460,026
1881	2,163,397	181,032	74,738	400	19,700	24,274	2,463,541
1882	2,527,822	170,101	70,372	0	21,700	43,036	2,833,031
1883	2,531,387	154,240	70,160	0	19,200	122,218	2,897,205
1884	2,335,285	157,441	65,582	0	14,800	49,290	2,622,398
1885	2,548,840	163,093	52,481	5,000	18,200	72,366	2,859,980
1886	2,303,774	136,845	51,932	0	18,700	99,767	2,611,018
1887	2,077,268	109,189	64,702	0	17,400	64,130	2,332,689
1888	2,268,841	84,792	68,187	0	20,235	200,255	2,642,310
1889	2,354,669	58,911	87,530	0	18,252	116,558	2,635,920
1890	2,367,559	72,599	93,934	0	17,905	64,999	2,616,996
1891	2,569,849	74,092	100,080	0	24,005	60,102	2,828,128
1892	2,672,532	69,890	94,784	1,290	20,670	64,321	2,923,487
1893	2,696,049	75,916	86,785	920	19,120	50,742	2,929,532
1894	2,484,778	65,983	94,287	150	13,850	49,608	2,708,656
1895	2,203,856	34,400	77,502	1,844	13,340	50,447	2,381,389
1896							2,738,057
1897							3,314,051
1898							3,362,841
1899							3,763,206
1900							3,628,643
1901							3,726,916
1902							3,581,671
1903							3,690,532
1904							3,539,444
1905							3,760,534
1906							3,273,901
1907							2,787,765
1908							2,847,943
1909							2,827,455
1910							2,815,511
1911							2,682,766
1912							2,504,408
1913							2,452,474

Sources: col. 1: *Notizie minerarie*, *Rivista mineraria*.
cols. 2 - 15: see text.
col. 16: 1861-1894, sum of cols. 10 - 15; 1895-1913, *Rivista mineraria*.

Table B.11
Reported Output of Rock Salt, Brine Salt, Crude Oil, and Natural Gas, 1861-1913 (tons)

Year	(1) Reported aggregate output of rock salt	(2) Reported aggregate output of brine salt	(3) Reported aggregate output of crude oil[a]	(4) Reported aggregate output of natural gas[b]
1861	13,800	8,275	4	0
1862	13,500	9,347	4	0
1863	14,040	9,157	8	0
1864	14,200	9,196	10	0
1865	14,100	8,524	315	0
1866	14,000	11,084	138	0
1867	13,600	8,900	110	0
1868	13,100	8,900	51	0
1869	13,600	8,900	20	0
1870	13,486	8,900	12	0
1871	13,725	8,900	38	0
1872	13,440	8,900	46	0
1873	12,733	11,400	65	0
1874	13,258	11,600	84	0
1875	12,943	10,000	113	0
1876	14,700	8,616	402	0
1877	14,516	10,109	408	0
1878	14,234	11,163	602	0
1879	17,737	10,427	402	0
1880	15,892	10,781	283	0
1881	19,523	11,744	172	0
1882	18,800	10,255	139	0
1883	18,900	9,937	225	0
1884	17,600	10,227	397	0
1885	17,204	10,678	524	0
1886	18,394	10,881	346	0
1887	18,788	10,412	259	0
1888	18,424	11,325	174	0
1889	18,475	10,015	177	0
1890	17,098	9,879	417	0
1891	31,285	9,258	1,155	0
1892	15,504	8,217	2,398	0
1893	16,790	8,602	2,652	0
1894	19,467	11,326	2,854	12
1895	18,710	10,605	3,556	25
1896	17,300	11,974	2,496	297
1897	19,801	11,725	1,909	298
1898	18,199	11,546	2,016	465
1899	17,821	11,021	2,242	753
1900	18,331	10,890	1,683	1,400
1901	23,054	10,690	2,246	1,351
1902	23,677	10,581	2,633	1,520
1903	25,911	10,962	2,486	2,256
1904	18,638	11,878	3,543	2,551
1905	19,669	12,756	6,123	3,092
1906	19,007	13,171	7,452	5,723
1907	31,540	19,238	8,327	5,710
1908	24,033	15,180	7,088	6,738
1909	28,026	15,081	5,895	8,268
1910	39,197	16,600	7,069	8,840
1911	43,763	17,251	10,39	9,021
1912	39,954	18,775	7,479	6,800
1913	41,323	17,727	6,572	6,015

[a]in 1882, 1885-87, 1892, and 1895-97, estimated: see text.
[b]thousand cubic meters.

Sources: *Notizie minerarie*, *Rivista mineraria*.

Table B.12
Estimated Output of Asphalt Rock, 1861-1913 (tons)

Year	(1) Reported aggregate output asphalt rock, mastic, and bitumen (to 1889)	(2) asphalt rock (from 1890)	(3) Reported output of asphalt rock, mastic, and bitumen Roma district[a] (to 1889)	(4) Chieti province[b] (to 1889)	(5) Estimated Chieti output of asphalt rock (to 1889)	(6) Estimated aggregate output of asphalt rock
1861	5,500		100	0	0	5,525
1862	5,100		100	0	0	5,125
1863	5,400		100	0	0	5,425
1864	5,200		100	0	0	5,225
1865	5,600		100	0	0	5,625
1866	5,300		100	0	0	5,325
1867	5,500		100	0	0	5,525
1868	5,800		500	0	0	5,925
1869	7,100		500	1,500	1,500	7,225
1870	5,600		400	0	0	5,700
1871	7,000		400	1,000	1,000	7,100
1872	8,500		200	2,500	2,500	8,550
1873	3,520		520	3,000	3,000	3,650
1874	551		51	500	500	564
1875	1,327		35	1,292	1,292	1,336
1876	3,197		100	3,097	24,752	24,877
1877	7,384		100	1,684	4,845	10,570
1878	6,979		100	6,879	19,628	19,753
1879	12,173		50	6,163	29,431	35,454
1880	6,260		450	1,660	11,470	16,183
1881	9,380		500	3,380	17,360	23,485
1882	8,332		400	3,662	11,500	16,270
1883	6,739		233	2,156	20,000	24,641
1884	17,350		250	9,100	24,300	32,613
1885	13,728		280	3,998	16,740	26,540
1886	17,943		500	5,143	17,638	30,563
1887	18,507		100	4,907	17,971	31,596
1888	20,064		173	6,077	26,773	40,803
1889	29,844		4	15,162	19,736	34,514
1890		44,225				62,225
1891		27,600				39,200
1892		33,980				48,980
1893		25,500				35,100
1894		60,000				69,860
1895		46,093				59,253
1896		44,905				56,485
1897		54,647				68,947
1898		92,941				109,121
1899		81,107				98,707
1900		100,775				120,035
1901		104,111				119,371
1902		64,245				79,425
1903		89,078				101,318
1904		111,390				121,590
1905		106,586				115,146
1906		130,825				141,105
1907		161,126				171,406
1908		134,163				144,783
1909		111,067				120,487
1910		162,212				171,352
1911		188,133				199,093
1912		181,397				192,377
1913		171,097				178,957

[a]excludes Chieti, 1887-89.
[b]includes 44 tons of oil in 1882, 36 tons in 1883, and 4 tons in 1888.

Sources: cols. 1 - 4: *Notizie minerarie*, *Rivista mineraria*.
cols. 5 - 6: see text.

Table B.13
Estimated Output of Boric Acid, Graphite, Alunite, and Bauxite, 1861-1913 (tons)

Year	(1) Boric acid Reported aggregate output	(2) Boric acid Estimated aggregate output	(3) Graphite Reported aggregate output	(4) Alunite Reported aggregate output	(5) Bauxite Reported aggregate output
1861	1,678	1,800	500	3,800	0
1862	1,207	1,800	500	3,627	0
1863	1,294	1,800	500	3,684	0
1864	515	1,800	500	3,694	0
1865	6	1,800	500	3,700	0
1866	622	1,800	728	3,025	0
1867	2,551	1,800	728	3,415	0
1868	6,804	1,800	728	3,694	0
1869	2,405	2,300	728	3,235	0
1870	1,615	2,300	728	3,193	0
1871	3,732	2,400	600	3,045	0
1872	2,749	2,400	3	3,300	0
1873	1,847	2,400	600	3,320	0
1874	1,868	2,600	50	3,663	0
1875	2,461	2,600	30	3,966	0
1876	2,546	2,600	886	5,340	0
1877	2,697	2,900	861	4,132	0
1878	3,444	2,900	800	2,335	0
1879	2,505	2,900	1,327	3,864	0
1880	3,087	2,900	1,327	4,936	0
1881	2,659	2,900	3,443	8,068	0
1882	3,025	2,900	4,147	10,840	0
1883	3,158	2,900	4,200	8,530	0
1884	2,517	2,900	4,000	1,650	0
1885	1,761	2,900	4,000	6,000	0
1886	3,063	2,900	4,000	6,000	0
1887	2,879	2,900	1,572	6,000	0
1888	2,603	2,900	1,390	6,050	0
1889	2,473	2,900	1,531	5,600	0
1890	1,874	2,900	1,735	5,000	0
1891	1,775	2,900	2,415	4,000	0
1892	1,089	2,900	1,645	4,000	0
1893	2,847	2,847	1,465	4,200	0
1894	2,746	2,746	1,575	6,000	0
1895	2,633	2,633	2,657	7,000	0
1896	2,616	2,616	3,148	6,000	0
1897	2,704	2,704	5,650	6,500	0
1898	2,650	2,650	6,435	7,000	0
1899	2,674	2,674	9,990	5,800	0
1900	2,491	2,491	9,720	5,200	0
1901	2,558	2,558	10,313	4,900	0
1902	2,763	2,763	9,210	8,200	0
1903	2,583	2,583	7,920	8,100	0
1904	2,624	2,624	9,765	8,000	0
1905	2,700	2,700	10,572	8,500	1,050
1906	2,561	2,561	10,805	7,500	1,050
1907	2,305	2,305	10,989	7,600	3,500
1908	2,520	2,520	12,914	6,165	7,000
1909	2,431	2,431	11,583	5,636	3,943
1910	2,502	2,502	12,510	6,081	4,595
1911	2,648	2,648	12,621	6,100	5,690
1912	2,309	2,309	13,170	6,002	6,702
1913	2,410	2,410	11,145	5,976	6,952

Sources: cols. 1, 3 - 5: *Notizie minerarie*, *Rivista mineraria*.
col. 2: see text.

Table B.14
Estimated Output of Other Metal Ores, 1861-1913 (tons)

Year	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Reported output of other metal ores					Sardinian mines		
	nickel ore	tin ore	arsenic ore	wolfram ore	mixed ores	Reported aggregate output	Estimated aggregate output	Estimated aggregate output
1861	257	0	0	0	0	0	0	257
1862	60	0	0	0	0	0	0	60
1863	0	0	0	0	0	0	0	0
1864	7	0	0	0	0	0	0	7
1865	700	0	0	0	0	0	0	700
1866	58	0	0	0	0	0	0	58
1867	58	0	0	0	0	0	0	58
1868	58	0	0	0	0	0	0	58
1869	58	0	0	0	0	0	0	58
1870	58	0	0	0	0	0	0	58
1871	90	0	0	0	0	0	0	90
1872	220	0	0	0	0	0	9	229
1873	1,264	0	0	0	0	17	19	1,266
1874	970	0	0	0	0	20	28	978
1875	2,489	0	0	0	0	36	26	2,479
1876	1,476	22	0	0	0	16	8	1,490
1877	1,065	63	0	0	0	0	0	1,128
1878	130	31	0	0	0	0	0	161
1879	0	2	0	0	0	0	0	2
1880	0	16	0	0	0	0	0	16
1881	0	20	0	0	0	0	0	20
1882	0	10	0	0	0	0	0	10
1883	0	0	0	0	0	0	0	0
1884	0	0	0	0	0	0	0	0
1885	0	0	0	0	0	0	0	0
1886	0	0	0	0	0	0	0	0
1887	0	0	0	0	0	0	0	0
1888	0	0	0	0	0	0	0	0
1889	0	0	0	0	0	0	0	0
1890	0	0	0	0	0	0	0	0
1891	0	0	0	0	0	0	0	0
1892	0	0	0	0	0	0	0	0
1893	0	0	0	0	0	0	0	0
1894	0	0	0	0	0	0	0	0
1895	0	13	0	0	0	0	0	13
1896	0	0	0	0	0	0	17	17
1897	0	0	34	0	0	34	17	17
1898	0	0	0	0	0	0	2	2
1899	3	0	0	0	0	3	5	5
1900	0	0	6	0	0	6	6	6
1901	0	0	6	0	0	6	3	3
1902	0	0	0	0	0	0	25	25
1903	0	0	50	0	0	50	65	65
1904	0	0	80	0	0	80	40	40
1905	0	0	0	0	0	0	20	20
1906	0	0	15	25	0	40	65	65
1907	0	0	73	16	0	89	70	70
1908	0	241	451	0	0	51	26	667
1909	0	140	0	0	12	0	8	160
1910	0	170	16	0	0	16	8	178
1911	0	20	0	0	0	0	0	20
1912	0	350	0	0	2	0	0	352
1913	0	274	0	0	0	0	0	274
1914						0		

Sources: cols. 1 - 6: *Notizie minerarie*, *Rivista mineraria*.
col. 7: see text.
col. 8: col. 1 + col. 2 + col. 3 + col. 4 + col. 5 - col. 6 + col. 7.

Table B.15
Estimated Output of Sea Salt, 1861-1913 (tons)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Reported by the Corpo delle miniere			Estimated output			
Year	Total	Sicilian	Other	Barletta	Cervia	Comacchio	Corneto[a]
1861	201,046		201,046	26,379	12,780	17,486	5,173
1862	213,233	43,382	169,851	22,286	10,797	14,773	5,173
1863	258,056	43,382	214,674	28,167	13,646	18,672	5,173
1864	208,449	43,382	165,067	21,658	10,493	14,357	5,173
1865	244,582	43,382	201,200	26,399	12,790	17,500	5,173
1866	206,876	43,382	163,494	21,452	10,393	14,220	5,173
1867	206,035	43,382	162,653	20,453	9,267	14,147	5,173
1868	192,268	43,382	148,886	6,194	4,677	5,874	5,173
1869	172,271	43,382	128,889	23,350	8,876	13,226	4,423
1870	219,809	43,382	176,427	24,949	8,687	12,365	4,423
1871	244,883	43,382	201,501	26,657	8,502	11,560	4,423
1872	222,281	43,382	178,899	28,483	8,321	10,807	4,423
1873	217,536	43,382	174,154	30,433	8,144	9,446	4,423
1874	196,620	43,382	153,238	17,299	8,144	6,967	4,255
1875	213,125	43,382	169,743	33,343	9,259	9,240	4,515
1876	216,117	43,382	172,735	42,090	1,613	1,247	3,802
1877	264,750	43,382	221,368	36,531	11,149	9,039	4,608
1878	312,039	102,000	210,039	39,411	10,137	9,822	4,779
1879	304,770	102,000	202,770	42,519	9,217	10,672	4,956
1880	268,171			26,185	3,151	13,948	5,437
1881	358,292	145,000	213,292	38,545	11,821	17,979	7,004
1882	401,811	177,000	224,811	32,645	10,460	23,741	7,172
1883	376,477	177,000	199,477	28,295	10,815	22,198	5,290
1884	338,653	183,600	155,053	32,771	3,514	9,919	6,923
1885	410,255	179,000	231,255	36,139	5,634	18,255	7,123
1886	353,852	170,000	183,852	31,397	5,759	16,525	6,606
1887	391,548	146,350	245,198	40,037	13,767	18,303	6,980
1888	382,593	150,000	232,593	40,755	16,023	22,337	6,256
1889	420,625	167,310	253,315	29,734	15,680	10,616	5,057
1890	448,827	198,100	250,727	43,159	18,277	26,370	4,943
1891	347,274	166,800	180,474	39,173	14,252	14,495	5,782
1892	395,269	164,542	230,727	33,776	9,693	14,639	5,065
1893	397,506	131,055	266,451	32,698	16,491	12,964	3,902
1894	402,515	157,000	245,515	45,469	25,237	18,399	6,096
1895	448,335	186,381	261,954	46,899	13,971	11,919	4,878
1896	422,555	159,700	262,855	34,583	6,342	4,814	4,949
1897	429,253	178,193	251,060	38,985	4,281	14,164	4,398
1898	451,426	243,050	208,376	39,160	3,202	4,501	4,811
1899	363,826	182,470	181,356	40,066	11,354	16,489	4,427
1900	338,034	143,150	194,884	38,531	3,151	10,605	2,597
1901	401,443	159,850	241,593	44,657	8,632	7,110	3,283
1902	424,239	176,150	248,089	46,686	12,965	13,355	3,322
1903	451,633	185,960	265,673	57,787	20,203	16,245	4,067
1904	433,810	177,740	256,070	44,977	13,511	14,711	4,531
1905	405,274	170,400	234,874	34,174	2,216	2,291	3,148
1906	496,872	222,000	274,872	49,270	8,259	7,086	4,238
1907	454,454	195,000	259,454	53,924	9,630	12,071	4,524
1908	473,857	208,000	265,857	78,324	21,911	16,475	2,530
1909	421,362	181,200	240,162	43,601	14,814	20,605	3,851
1910	447,440	197,000	250,440	41,982	5,704	6,914	3,142
1911	460,439	205,100	255,339	72,420	10,362	10,279	4,213
1912	466,220	192,000	274,220	84,247	10,549	12,862	4,560
1913	585,028	224,000	361,028	85,116	1,265	1,816	4,034

Table B.15 (continued)

Year	(8) Porto-ferraio	(9) San Felice	(10) Sardinia est. A	(11) Sardinia est. B	(12) Sicily	(13) Total
			Estimated output (cont.)			
1861	2,147	11,706	130,548	160,199	128,700	364,570
1862	1,814	9,890	110,291	135,341	130,200	330,274
1863	2,293	12,500	139,396	171,057	131,800	383,308
1864	1,763	5,000	111,796	137,188	133,300	328,932
1865	2,149	13,358	129,004	158,304	134,900	370,573
1866	1,746	9,000	106,683	130,914	136,500	329,398
1867	1,778	11,924	105,084	128,952	138,100	329,794
1868	2,137	12,520	117,484	144,168	139,800	320,543
1869	2,028	10,495	66,491	81,593	141,400	285,391
1870	2,166	8,798	115,039	141,168	143,100	345,656
1871	2,314	13,960	134,085	164,539	144,800	376,755
1872	2,471	3,886	120,508	147,879	146,500	352,770
1873	2,639	4,182	114,887	140,981	148,200	348,448
1874	2,201	7,001	107,371	131,758	150,000	327,625
1875	2,680	6,670	104,036	127,665	151,800	345,172
1876	1,769	1,707	120,507	147,878	153,600	353,706
1877	2,722	1,139	156,180	191,653	155,400	412,241
1878	2,401	2,869	140,620	172,559	157,200	399,178
1879	2,118	3,299	129,989	159,513	159,100	391,394
1880	931	1,682	114,837	140,920	161,000	353,254
1881	2,640	9,927	156,714	149,192	145,000	382,108
1882	3,995	14,689	165,131	157,205	177,000	426,907
1883	2,084	10,795	149,249	142,085	177,000	398,562
1884	2,433	6,153	93,340	88,860	183,600	334,173
1885	1,999	6,048	156,056	148,565	179,000	402,763
1886	1,658	1,908	138,615	131,961	170,000	365,814
1887	2,965	8,438	154,938	147,501	146,350	384,341
1888	3,117	10,128	132,164	125,820	150,000	374,436
1889	2,550	1,502	178,400	169,837	167,310	402,286
1890	2,821	2,106	71,560	68,125	198,100	363,901
1891	3,639	6,261	145,600	138,611	166,800	389,013
1892	3,701	2,837	180,300	171,646	164,542	405,899
1893	3,267	7,706	184,700	175,834	131,055	383,917
1894	4,221	11,917	129,350	123,141	157,000	391,480
1895	3,267	14,814	140,300	133,566	186,381	415,695
1896	1,386	4,744	171,650	163,411	159,700	379,929
1897	4,101	2,379	167,750	159,698	178,193	406,199
1898	2,586	4,126	127,450	121,332	243,050	422,768
1899	3,959	3,863	95,130	90,564	182,470	353,192
1900	0	4,870	119,108	119,108	143,150	322,012
1901	0	1,050	157,296	157,296	159,850	381,878
1902	0	2,876	147,004	147,004	176,150	402,358
1903	0	7,748	142,919	142,919	185,960	434,929
1904	0	10,979	136,569	136,569	177,740	403,018
1905	0	836	140,337	140,337	170,400	353,402
1906	0	6,635	163,119	163,119	222,000	460,607
1907	0	9,947	143,135	143,135	195,000	428,231
1908	0	0	140,248	140,248	208,000	467,488
1909	0	0	124,727	124,727	181,200	388,798
1910	0	0	140,867	140,867	197,000	395,609
1911	0	0	131,473	131,473	205,100	433,847
1912	0	0	131,681	131,681	192,000	435,899
1913	0	0	203,410	203,410	224,000	519,641

[a]includes Miliscola, 1861-68.

Sources: cols. 1 - 3: *Notizie minerarie*, *Rivista mineraria*.
cols. 4 - 12: see text.
col. 13: sum of cols. 4 - 9, 11 - 12.

Table B.16
Estimated Output of Peat and Mineral Water, 1861-1913 (tons)

Year	(1) Estimated aggregate output	(2) Peat Estimated regional output, 1865-75 Piedmont	(3) Peat Estimated regional output, 1865-75 Lombardy	(4) Peat Estimated regional output, 1865-75 Veneto	(5) Peat Estimated regional output, 1865-75 Emilia	(6) Mineral water
1861	66,831					1,075,000
1862	66,831					1,081,000
1863	66,831					1,088,000
1864	66,831					1,095,000
1865	66,831	12,695	49,186	4,450	500	1,104,000
1866	68,454	12,032	51,267	4,755	400	1,113,000
1867	70,078	11,369	53,349	5,060	300	1,124,000
1868	71,702	10,707	55,430	5,365	200	1,134,000
1869	73,326	10,044	57,512	5,670	100	1,144,000
1870	74,949	9,381	59,593	5,975	0	1,164,000
1871	76,239	8,285	61,674	6,280	0	1,184,000
1872	77,530	7,189	63,756	6,585	0	1,196,000
1873	78,819	6,092	65,837	6,890	0	1,207,000
1874	80,110	4,996	67,919	7,195	0	1,218,000
1875	81,400	3,900	70,000	7,500	0	1,228,000
1876	86,050					1,240,000
1877	90,700					1,250,000
1878	95,350					1,263,000
1879	100,000					1,276,000
1880	100,000					1,292,000
1881	100,000					1,311,000
1882	100,000					1,328,000
1883	80,000					1,347,000
1884	60,000					1,369,000
1885	40,000					1,405,000
1886	70,820					1,443,000
1887	64,510					1,472,000
1888	29,925					1,495,000
1889	30,095					1,517,000
1890	42,185					1,545,000
1891	39,272					1,571,000
1892	29,444					1,593,000
1893	27,848					1,620,000
1894	34,911					1,625,000
1895	21,699					1,651,000
1896	13,577					1,682,000
1897	14,634					1,706,000
1898	18,327					1,759,000
1899	30,228					1,798,000
1900	25,125					1,819,000
1901	28,233					1,857,000
1902	25,448					1,897,000
1903	20,922					1,956,000
1904	16,048					2,027,000
1905	17,823					2,078,000
1906	18,439					2,136,000
1907	39,440					2,219,000
1908	34,025					2,299,000
1909	88,275					2,371,000
1910	39,715					2,437,000
1911	24,552					2,520,000
1912	28,410					2,597,000
1913	23,710					2,674,000

Sources: col. 1, 1885-1913: *Rivista mineraria*.
col. 1, 1861-84, cols. 2 - 6: see text.

Table B.17
Reported Output of Quarry Products, 1898-1913 (tons)

A. Building stone

Year	(1) marble	(2) ala-baster	(3) lime-stone	(4) traver-tin	(5) sand-stone	(6) slate	(7) granite	(8) serpen-tine	(9) gneiss	(10) trachyte	(11) peperino	(12) lava	(13) other freestone
1898	271,725	3,000	73,282	37,300	163,410	26,369	59,587	200		32,630	2,000		106,982
1899	313,744	3,000	53,410	33,750	161,335	26,369	57,193	200		228,570	2,000		131,185
1900	310,336	3,000	126,270	33,750	146,368	26,369	55,624	200	42,708	33,700	2,000		57,140
1901	334,146	2,714	180,419	39,260	230,208	30,336	67,014	860	75,889	22,322	4,835	1,802	110,894
1902	363,463	2,500	180,419	40,500	218,854	30,336	76,084	860	76,400	19,636	4,835	1,802	134,446
1903	374,975	2,500	180,899	40,500	218,854	30,336	164,274	860	76,400	18,686	4,835	1,802	139,332
1904	390,118	2,500	180,869	34,330	218,854	30,380	199,484	860	76,400	18,686	4,835	244,116	148,313
1905	389,869	2,500	183,033	34,330	218,854	30,380	271,030	860	92,300	14,870	4,835	244,116	148,324
1906	430,202	2,500	183,643	34,330	218,854	30,880	264,050	860	73,470	14,870	4,835	244,116	148,324
1907	434,612	2,500	183,679	34,330	213,854	32,672	264,220	860	89,503	14,870	4,835	244,116	238,234
1908	425,600	2,400	184,933	33,530	233,724	37,672	266,065	600	101,870	14,870	4,835	244,116	294,855
1909	391,295	2,400	184,947	33,530	234,724	42,672	259,390	600	106,500	14,486	4,835	244,116	298,855
1910	427,274	2,800	184,725	34,130	251,724	37,672	401,815	550	98,324	14,986	12,335	244,116	299,310
1911	497,741	2,800	186,383	34,130	214,724	42,672	401,906	550	99,300	14,986	12,335	244,116	326,712
1912	522,088	3,160	185,520	61,530	239,724	42,672	377,015	600	84,550	15,486	4,835	244,116	362,208
1913	509,342	3,910	(a)	129,650	(a)	43,562	289,295		79,240	(b)	(b)	(b)	(c)

(a) 1913: other non-volcanic stone: 660,377.
(b) 1913: other volcanic stone: 1,146,041.
(c) 1913: porphyry: 99,720.

Table B.17 (continued)

B. Sundry building and road construction materials

Year	(1) lime-stone	(2) sand-stone	(3) lava	(4) volcanic tufa	(5) sundry stone	(6) sand	(7) pozzolana, la-pilli, cinder
1898	2,278,215		561,187	1,225,700	2,086,444	167,843	435,459
1899	1,276,154		607,149	1,378,590	3,054,451	167,843	678,439
1900	1,319,135		607,151	1,452,200	2,294,238	167,843	721,079
1901	2,001,069	432,286	565,330	1,336,515	2,841,417	719,122	882,435
1902	1,948,158	432,786	572,570	1,340,515	2,894,635	719,122	898,635
1903	1,779,966	432,786	593,212	1,393,515	3,030,596	719,122	931,955
1904	1,731,066	432,786	397,850	1,548,775	3,001,307	727,694	989,815
1905	1,720,966	432,786	487,850	1,652,775	2,961,239	735,094	993,524
1906	1,723,666	432,786	607,850	1,760,000	2,960,247	736,094	1,017,524
1907	1,733,666	432,786	637,850	2,080,000	3,108,925	736,094	1,017,524
1908	1,736,891	496,196	677,850	2,130,000	3,091,150	730,755	1,017,524
1909	1,754,891	497,196	697,850	2,130,000	3,160,638	730,855	1,014,460
1910	1,916,091	502,196	597,850	2,136,500	3,309,638	738,895	1,061,960
1911	3,074,091	512,196	597,850	2,201,500	2,439,638	739,145	1,061,960
1912	3,144,240	512,196	617,850	2,890,000	2,385,038	746,395	1,220,760
1913	(d)	(d)	(e)	(e)	(d,e)	777,463	1,287,976

(d) 1913: other non-volcanic materials: 7,720,204.
(e) 1913: other volcanic materials: 1,615,954.

Table B.17 (continued)

C. Sundry industrial materials

Year	(1) lithographic stone	(2) grindstones	(3) sharpening stones	(4) whetstones	(5) pot-stone	(6) pumice	(7) tripoli	(8) infusorial earth	(9) asbestos	(10) talc	(11) barite	(12) calcium carbonate	(13) coloring earths
1898		5,196	1,979	611	250	2,766	130		131	12,760	12,400	1,400	6,031
1899		5,216	1,979	611	140	7,300	100		81	11,000	12,545	6,000	6,311
1900		5,215	1,979	611	40	7,000	100		126	14,415	14,003	10,000	6,870
1901		4,057	1,025	730	165	8,300	100		243	11,770	13,245	4,050	8,350
1902		4,055	1,025	730	165	8,300	100		243	10,100	13,245	4,050	7,950
1903		3,860	1,025	730	75	8,300	100		202	7,150	12,420	11,250	8,740
1904		3,865	933	730	75	11,600	50		182	7,000	12,290	11,250	8,740
1905		3,865	933	730	82	11,300	55		220	6,490	12,670	11,250	8,490
1906	270	3,865	933	730	75	16,366	55		209	8,731	12,020	11,250	8,490
1907	200	3,865	933	730	45	18,640	20		359	12,314	15,532	11,250	7,490
1908	200	4,289	933	730	45	19,500	20		359	10,930	15,732	11,250	9,038
1909	60	4,759	933	730	43	20,100	20		190	12,000	16,240	11,250	8,590
1910	130	4,366	933	730	41	12,900	20	257	175	12,453	14,420	11,250	8,090
1911	1,003	4,366	933	730	38	16,430	20	150	167	15,620	13,620	15,000	6,896
1912	849	4,366	913	730	36	17,386	20	3,000	169	16,240	13,420	15,650	7,005
1913	757	3,701	913	850	25	14,973	20	3,000	175	24,001	12,970	15,650	7,513

Table B.17 (continued)

C. Sundry industrial materials, cont.

Year	(14) jasper	(15) quartz, feldspar	(16) kaolin	(17) leucite	(18) bauxite	(19) magnesian earth	(20) refractory material	(21) siliceous sand	(22) selagite
1898		20,015	3,650			4,170	6,270	65,270	70
1899		19,940	7,750			3,880	6,270	65,270	70
1900		21,190	11,550			4,030	7,470	65,270	70
1901		14,600	15,450			4,700	10,190	92,575	
1902	100	15,600	15,450			3,863	10,190	92,575	
1903	50	15,600	11,650	1,900		1,000	8,990	87,775	
1904	50	15,600	10,750	2,600		830	8,990	93,875	
1905	100	15,600	12,500	6,000	1,050	625	8,990	133,575	
1906	200	29,000	9,550	4,000	1,050	1,330	9,040	133,775	
1907		26,100	8,350	4,000	3,500	1,200	9,040	133,775	
1908		25,900	8,350	2,000	7,000	1,200	8,890	133,375	
1909		31,730	8,250	1,800	3,943	1,020	8,890	133,375	
1910		27,100	5,400	1,540	4,595	920	8,900	169,875	
1911		35,759	5,930	1,600	5,690	360	8,800	369,875	
1912		33,944	7,650		6,702	400	8,860	369,875	
1913		32,268	11,920	1,600	6,952	600	5,560	378,875	

Source: *Rivista mineraria*.

Table B.18
Reported Labor Force and Factor Employment in Quarrying and in the Manufacture of Non-metallic Mineral Products in 1911

Census category	Product	*Censimento demografico* (labor force)		*Censimento industriale*				*Rivista mineraria*			
				Employment		Unduplicated HP in use					
		Blue-collar	Total	Blue-collar	Total	Primary	Electric	Blue-collar workers	Installed HP Primary	Installed HP Electric	Sector
2.21	Building stone	27,847	33,192	14,837	18,916	1,174	662	43,518	814	979	Quarrying
2.22	Kiln materials[a]	4,838	5,672	3,634	4,258	325	293	22,201	238	366	Quarrying[b]
2.23	Other industrial m.	1,983	2,608	1,547	2,105	172	20	2,283	105	25	Quarrying
2.24	Sand and gravel[b]	3,214	4,103	2,329	2,915	278	268	2,705	0	0	Quarrying[a]
5.11	Crushed stone	3,677	4,702	352	412	137	217				
5.12	Ground minerals	1,122	1,396	720	903	1,681	272	724	1,271	279	M'working[c]
5.13	Cut stone	27,292	42,039	9,356	13,082	3,954	1,584				
5.14	Worked stone	10,174	13,798	4,880	6,108	164	315				
5.15	Plaster, lime, cement	16,229	20,184	13,413	16,504	11,971	5,792	22,185	12,691	5,622	Kilns
5.16	Bricks and tiles	79,696	90,419	76,197	85,459	17,423	8,416	56,988	4,793	1,272	Kilns[d]
5.17	Terra cotta, ceramic	15,974	20,412	12,485	15,459	1,654	1,838	8,961	1,349	115	Kilns[e]
5.18	Glass	20,593	22,974	17,754	19,171	1,952	1,317	11,217	1,594	184	Kilns
5.19	Other kiln products	13,778	16,584	12,491	14,971	2,471	2,237	186	232	134	M'working[c]
5.1ω	(5.11-5.19)			9,333	10,632	3,977	977				
ω.11	(2.2 and 5.11-5.14)			9,828	11,270	1,362	742				
ω.12	(2.2 and 5.15-5.19)			2,471	2,877	898	116				
ω.71	(4[f] and 5.1, 5.2[g]-5.3[g])			3,607	4,371	3,062	520				

[a]includes sand for glass.
[b]excludes sand for glass.
[c]includes half of asphalt processing.
[d]includes terra cotta.
[e]excludes terra cotta.
[f]metalmaking, engineering.
[g]construction

Sources: *Censimento demografico*, *Censimento industriale*, *Rivista mineraria 1911*.

Table B.19
Estimated Output of Marble, 1861-1913 (tons)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Alpi Apuane marble output						
	Carrara output		Massa output		Versilia output		Estimated
Year	block 1861-1893	worked 1861-1893	block 1861-1893	worked 1861-1893	block 1861-1893	worked 1861-1893	total 1861-1913
1861	47,016	20,534	3,932	1,568			98,752
1862	33,681	24,359	3,671	1,463			88,147
1863	47,412	25,076	4,981	1,985			108,646
1864	44,037	22,336	4,655	1,855			99,403
1865	49,327	23,427	5,308	2,116			108,914
1866	53,339	24,673	3,923	1,564			113,276
1867	62,040	29,567	7,233	2,883	3,296	16,804	138,241
1868	71,479	28,593	7,952	3,170	3,411	17,389	148,378
1869	74,975	33,545	11,136	4,444	3,690	18,810	165,533
1870	65,824	36,610	6,402	4,120	3,542	18,058	154,152
1871	70,083	20,342	10,755	4,207	4,395	22,405	147,838
1872	66,632	27,579	10,437	4,055	4,133	21,067	151,470
1873	93,090	20,673	12,347	5,398	5,724	29,176	184,824
1874	103,676	17,382	12,667	4,960	4,128	21,044	178,319
1875	82,181	24,717	10,300	7,200	4,044	20,617	166,570
1876	70,467	25,893	9,650	6,500	3,305	16,847	149,095
1877	74,367	32,737	5,775	5,325	3,312	16,884	156,715
1878	71,073	26,933	4,419	6,460	3,085	15,750	144,401
1879	79,741	35,539	7,118	7,365	5,024	15,142	169,278
1880	92,635	39,698	9,670	12,375	5,066	30,172	217,031
1881	95,200	42,834	5,649	15,486	4,832	20,978	211,412
1882	101,694	39,984	5,003	16,905	5,014	22,271	217,258
1883	109,481	44,733	6,163	13,216	4,647	25,694	231,815
1884	110,957	48,235	12,816	6,765	5,023	23,012	232,812
1885	103,877	48,011	10,150	6,003	3,782	28,077	227,264
1886	89,297	50,516	9,786	6,459	3,324	24,640	211,227
1887	82,301	52,251	11,976	7,665	4,019	25,098	211,648
1888	83,084	55,501	11,913	6,433	8,642	20,274	213,250
1889	88,456	58,448	12,723	5,300	6,636	25,862	227,295
1890	108,761	55,334	13,823	5,952	5,586	24,546	242,613
1891	99,277	52,439	12,400	5,530	3,546	19,493	218,506
1892	112,770	56,423	12,351	5,106	5,258	19,194	238,010
1893	110,883	53,199	14,800	5,296	3,854	17,821	231,292
1894							220,087
1895							211,147
1896							209,428
1897							236,958
1898							245,213
1899							279,112
1900							275,929
1901							290,570
1902							319,887
1903							334,272
1904							344,504
1905							342,132
1906							382,395
1907							386,200
1908							369,900
1909							325,700
1910							362,377
1911							429,347
1912							447,584
1913							426,677

Table B.19 (continued)

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Other marble output						
Year	Caltanis. district 1890-1913	Carrara district 1890-1913	Firenze district 1890-1913	Milano district 1890-1913	Napoli district 1890-1913	Roma district 1890-1913	Torino district 1890-1913
1861							
1862							
1863							
1864							
1865							
1866							
1867							
1868							
1869							
1870							
1871							
1872							
1873							
1874							
1875							
1876							
1877							
1878							
1879							
1880							
1881							
1882							
1883							
1884							
1885							
1886							
1887							
1888							
1889							
1890	858	0	1,734	14,382	1,491	1,400	284
1891	1,108	0	1,857	13,581	1,193	1,400	142
1892	1,358	0	1,981	12,780	895	1,400	0
1893	1,608	0	2,104	11,979	596	1,400	0
1894	1,858	0	2,227	11,178	298	1,400	0
1895	2,108	0	2,351	10,377	0	1,400	0
1896	2,358	0	2,474	9,576	0	1,400	0
1897	2,608	440	2,354	10,538	0	1,400	0
1898	2,858	880	2,234	11,500	0	1,400	120
1899	3,108	1,320	2,357	14,340	0	1,400	400
1900	3,358	1,760	2,479	14,918	0	1,400	175
1901	3,610	2,200	2,602	15,495	54	1,400	755
1902	3,610	2,300	2,401	16,141	56	1,400	729
1903	3,610	2,400	2,200	16,786	57	1,400	703
1904	3,610	2,500	2,000	17,432	59	1,400	677
1905	3,610	2,500	2,125	18,077	60	1,400	652
1906	3,610	2,500	2,250	18,723	130	1,400	626
1907	3,610	2,500	2,375	19,368	890	1,400	600
1908	3,610	2,500	2,500	20,014	600	1,400	765
1909	3,610	2,500	2,150	20,659	300	1,400	930
1910	3,610	2,500	1,800	21,305	150	1,400	1,082
1911	3,610	2,500	1,550	21,950	150	1,400	909
1912	3,610	2,322	3,550	22,596	150	1,400	1,427
1913	3,610	2,500	3,664	23,241	150	1,350	2,150

Table B.19 (continued)

Year	(15) Other output (cont.) Vicenza district 1890-1913	(16) Other output (cont.) Estimated total 1861-1913	(17) Estimated total output 1861-1913
1861		12,907	111,659
1862		11,565	99,712
1863		14,309	122,955
1864		13,141	112,544
1865		14,453	123,367
1866		15,088	128,364
1867		18,483	156,724
1868		19,912	168,290
1869		22,297	187,830
1870		20,841	174,993
1871		20,062	167,900
1872		20,630	172,100
1873		25,265	210,089
1874		24,465	202,784
1875		22,937	189,507
1876		20,605	169,700
1877		21,736	178,451
1878		20,101	164,502
1879		23,648	192,926
1880		30,428	247,459
1881		29,746	241,158
1882		30,677	247,935
1883		32,848	264,663
1884		33,106	265,918
1885		32,431	259,695
1886		30,248	241,475
1887		30,414	242,062
1888		30,751	244,001
1889		32,890	260,185
1890	15,080	35,229	277,842
1891	14,104	33,385	251,891
1892	13,128	31,542	269,552
1893	12,151	29,838	261,130
1894	11,175	28,136	248,223
1895	10,199	26,435	237,582
1896	9,223	25,031	234,459
1897	9,530	26,870	263,828
1898	9,890	28,882	274,095
1899	15,400	38,325	317,437
1900	16,430	40,520	316,449
1901	17,460	43,576	334,146
1902	16,024	42,661	362,548
1903	14,587	41,743	376,015
1904	19,800	47,478	391,982
1905	21,917	50,341	392,473
1906	24,276	53,515	435,910
1907	26,636	57,379	443,579
1908	28,995	60,384	430,284
1909	38,860	70,409	396,109
1910	33,270	65,117	427,494
1911	27,680	59,749	489,096
1912	31,550	66,605	514,189
1913	31,000	67,665	494,342

Table B.19 (continued)

Sources: cols. 1 - 2: 1861-83, 1885-93: *Notizie minerarie*, *Rivista mineraria*;
1884: see text.

cols. 3 - 4: 1869-89, 1891-93: *Notizie minerarie*, *Rivista mineraria*;
1861-68, 1890: see text.

cols. 5 - 6: 1878-93: *Notizie minerarie*, *Rivista mineraria*;
1867-77: see text.

col. 7: 1861-66: 1.228(col. 1 + col. 3 + (4/3)(col. 2 + col. 4));
1867-93: col. 1 + col. 3 + col. 5 + (4/3)(col. 2 + col. 4 + col. 6);
1894-1913: *Rivista mineraria*.

col. 8: 1890, 1901-13: *Rivista mineraria*;
1891-1900: see text.

col. 9: 1890, 1904-13: *Rivista mineraria*;
1891-1903: see text.

col. 10: 1890, 1896, 1898, 1901, 1904, 1908, 1910-13: *Rivista mineraria*;
1891-95, 1897, 1899-1900, 1902-03, 1905-07, 1909: see text.

col. 11: 1890, 1896, 1898-99, 1901, 1913: *Rivista mineraria*;
1891-95, 1897, 1900, 1902-12: see text.

col. 12: 1890, 1901, 1905-13: *Rivista mineraria*;
1891-1900, 1902-04: see text.

col. 13: 1890, 1896-1913: *Rivista mineraria*;
1891-95: see text.

col. 14: 1890, 1898-1901, 1907, 1909-13: *Rivista mineraria*;
1891-97, 1902-06, 1908: see text.

col. 15: 1890, 1896, 1898-99, 1901, 1903-05, 1908-09, 1911-13: *Rivista mineraria*;
1891-95, 1897, 1900, 1902, 1906-07, 1910: see text.

col. 16: 1861-89: see text;
1890-1913: sum of cols. 8 - 15.

col. 17: col. 7 + col. 16.

Table B.20
Estimated Output of Kiln Materials, 1861-1913
(thousand tons)

Year	(1) Gypsum	(2) Lime-stone	(3) Clay and sand
1861	129	680	2,801
1862	156	759	3,591
1863	150	830	3,446
1864	164	833	3,647
1865	162	1,008	3,511
1866	153	762	2,841
1867	162	749	2,817
1868	158	777	2,649
1869	170	772	2,872
1870	171	843	2,871
1871	191	868	3,320
1872	200	955	3,619
1873	228	1,069	4,481
1874	252	1,109	5,008
1875	231	1,026	4,003
1876	227	1,033	3,678
1877	236	1,109	3,795
1878	239	1,163	3,698
1879	242	1,214	3,702
1880	257	1,328	4,019
1881	279	1,373	4,470
1882	308	1,586	5,254
1883	318	1,726	5,540
1884	335	1,813	5,842
1885	362	1,888	6,292
1886	378	1,993	6,520
1887	356	2,063	5,835
1888	341	2,219	5,376
1889	357	2,203	5,408
1890	398	2,186	5,966
1891	414	2,193	6,258
1892	405	2,148	5,961
1893	417	2,105	6,385
1894	434	2,165	6,418
1895	428	1,952	5,967
1896	437	1,949	5,957
1897	426	2,028	6,050
1898	450	2,066	6,215
1899	467	2,160	6,502
1900	473	2,275	6,899
1901	513	2,426	7,699
1902	558	2,678	8,902
1903	594	2,848	9,992
1904	639	3,000	10,917
1905	687	3,270	12,023
1906	686	3,571	12,551
1907	720	3,805	13,439
1908	773	4,120	14,656
1909	867	4,719	17,731
1910	984	5,400	20,828
1911	1,056	5,829	22,232
1912	1,082	6,227	22,800
1913	1,083	6,422	22,529

Sources: col. 1: 1.50 (Table C.04, col. 5)
col. 2: 1.65 (Table C.04, col. 6 + col. 7)
col. 3: 1.60 (Table C.04, col. 8 + Table C.07, col. 7) + (Table C.07, col. 8 + col. 9).

Table B.21
Estimated Output of Other Quarry Products, 1861-1913

Year	(1) Estimated consumption of construction materials (million 1911 lire) Low-grade	(2) High-grade	(3) Quarry products	(4) Estimated output of other quarry products (thousand tons)
1861	74.4	198.9	81.5	7,662
1862	84.6	243.2	93.3	8,770
1863	90.5	239.7	99.1	9,312
1864	90.5	242.7	99.2	9,320
1865	94.5	236.4	102.9	9,666
1866	77.9	196.9	84.9	7,978
1867	70.9	184.4	77.5	7,284
1868	71.5	174.5	77.7	7,302
1869	69.5	177.0	75.8	7,123
1870	75.0	180.5	81.4	7,649
1871	75.4	197.0	82.4	7,741
1872	82.7	209.7	90.2	8,477
1873	92.5	245.1	101.2	9,512
1874	93.8	264.2	103.2	9,700
1875	81.7	218.4	89.5	8,414
1876	79.9	205.1	87.2	8,193
1877	85.1	208.3	92.5	8,689
1878	86.7	206.3	94.1	8,841
1879	86.0	209.6	93.5	8,781
1880	92.2	227.1	100.3	9,422
1881	92.9	243.9	101.6	9,549
1882	106.0	281.7	116.0	10,899
1883	114.1	297.0	124.7	11,715
1884	119.6	305.1	130.5	12,256
1885	122.5	320.1	133.9	12,574
1886	127.3	325.9	138.9	13,042
1887	129.8	300.9	140.5	13,192
1888	131.4	287.3	141.6	13,295
1889	126.7	280.2	136.7	12,836
1890	121.6	292.4	132.0	12,395
1891	115.3	294.4	125.9	11,805
1892	106.3	277.7	116.4	10,900
1893	101.7	277.9	111.9	10,462
1894	99.8	275.4	109.9	10,262
1895	88.3	237.5	97.1	9,055
1896	85.6	227.4	94.1	8,762
1897	86.5	228.5	95.1	8,843
1898	85.9	227.4	94.5	8,777
1899	88.0	230.6	96.8	8,982
1900	91.7	239.0	100.9	9,351
1901	96.4	257.5	106.4	9,843
1902	105.6	287.4	116.8	10,812
1903	111.6	310.6	123.7	11,472
1904	115.9	333.2	128.8	11,950
1905	126.3	360.1	140.3	13,040
1906	137.9	375.7	152.5	14,164
1907	145.8	398.8	161.3	14,966
1908	156.0	428.0	172.6	16,011
1909	181.2	502.9	200.7	18,655
1910	206.1	577.8	228.5	21,298
1911	216.9	610.0	240.6	22,391
1912	222.4	620.4	246.5	22,975
1913	220.2	609.9	243.9	22,758

Table B.21 (continued)

Sources: col. 1: (.12/.60) (Table K.05, col. 4 + Table K.10, col. 24 + Table K.58, col. 8) + (.10/.34) (Table K.05, col. 6 + Table K.58, col. 5) + (.10/.51) (Table K.10, col. 21) + (.25/.51) (Table K.05, col. 10)

col. 2: (.28/.60) (Table K.05, col. 4 + Table K.10, col. 24 + Table K.58, col. 8) + (.56/.34) (Table K.05, col. 6 + Table K.58, col. 5) + (.34/.51) (Table K.10, col. 21) + (.24/.51) (Table K.05, col. 10)

cols. 3, 4: see text.

Summary Table B.1
The extractive industries: physical output, 1861-1913

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Mining						
	Solid fuels		Crude oil and gas		Metal ores		
	Solid mineral fuel (tons)	Peat (tons)	Crude oil (tons)	Natural gas (thousand cubic meters)	Iron ore (tons)	Copper ore (tons)	Lead ore (tons)
code:	baa01	baa02	bab01	bab02	bac01	bac02	bac03
source:	b09c07	b16c01	b11c03	b11c04	b02c07	b03c07	b04c07
note:	(a)	(b)	(a)	(a)	(a)	(a)	(a)
1861	33,781	66,831	4	0	94,150	15,460	15,493
1862	43,631	66,831	4	0	123,178	9,162	16,134
1863	36,439	66,831	8	0	136,958	6,896	17,458
1864	40,810	66,831	10	0	140,321	13,234	18,500
1865	42,005	66,831	315	0	149,212	7,734	19,389
1866	50,584	68,454	138	0	143,839	8,820	25,044
1867	42,571	70,078	110	0	129,264	8,094	29,604
1868	51,097	71,702	51	0	115,128	8,901	31,021
1869	56,181	73,326	20	0	100,594	8,276	28,742
1870	58,255	74,949	12	0	87,920	9,239	24,552
1871	81,491	76,239	38	0	122,332	9,995	24,204
1872	95,282	77,530	46	0	211,879	10,426	24,186
1873	119,925	78,819	65	0	271,009	11,634	24,816
1874	128,858	80,110	84	0	263,532	11,187	28,742
1875	114,620	81,400	113	0	249,374	11,695	31,471
1876	119,400	86,050	402	0	255,175	11,039	34,755
1877	121,603	90,700	408	0	220,720	11,551	36,850
1878	124,973	95,350	602	0	195,033	11,184	39,002
1879	132,004	100,000	402	0	238,818	9,712	39,259
1880	137,799	100,000	283	0	373,975	17,423	37,978
1881	133,123	100,000	172	0	364,755	14,835	43,289
1882	165,504	100,000	139	0	255,187	13,265	45,945
1883	215,238	80,000	225	0	220,524	15,857	45,844
1884	226,294	60,000	397	0	216,457	22,678	42,545
1885	190,883	40,000	524	0	206,869	20,384	39,153
1886	249,621	70,820	346	0	219,684	19,486	40,169
1887	342,948	64,510	259	0	203,945	32,172	40,360
1888	386,177	29,925	174	0	176,491	35,028	39,063
1889	393,171	30,095	177	0	191,617	36,594	36,678
1890	389,022	42,185	417	0	219,311	39,857	31,895
1891	333,416	39,272	1,155	0	220,342	44,279	31,795
1892	339,980	29,444	2,398	0	210,466	94,179	30,796
1893	368,371	27,848	2,652	0	198,727	88,724	28,918
1894	311,796	34,911	2,854	12	192,643	79,043	31,111
1895	351,210	21,699	3,556	25	197,584	83,670	32,520
1896	307,837	13,577	2,496	297	212,492	90,408	34,723
1897	353,343	14,634	1,909	298	214,639	93,597	35,353
1898	391,910	18,327	2,016	465	222,307	95,211	32,636
1899	445,170	30,228	2,242	753	268,744	95,847	34,180
1900	576,495	25,125	1,683	1,400	267,000	97,159	40,539
1901	542,166	28,233	2,246	1,351	263,343	111,564	46,422
1902	515,698	25,448	2,633	1,520	331,337	107,149	48,452
1903	434,445	20,922	2,486	2,256	396,095	115,631	43,458
1904	452,538	16,048	3,543	2,551	388,441	158,503	41,811
1905	517,755	17,823	6,123	3,092	372,040	149,123	40,130
1906	652,934	18,439	7,452	5,723	446,936	147,177	41,911
1907	602,787	39,440	8,327	5,710	543,601	167,618	44,969
1908	611,155	34,025	7,088	6,738	561,588	109,462	45,781
1909	674,865	88,275	5,895	8,268	531,340	90,314	37,517
1910	673,861	39,715	7,069	8,840	578,313	68,328	37,472
1911	673,133	24,552	10,390	9,021	381,882	68,334	40,146
1912	788,879	28,410	7,479	6,800	579,830	86,210	43,195
1913	828,917	23,710	6,572	6,015	601,861	89,703	44,573

Summary Table B.1 (continued)

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Mining (continued)						
	Metal ores (continued)						
	Zinc ore (tons)	Silver ore (tons)	Gold ore (tons)	Manganese ore (tons)	Antimony ore (tons)	Mercury ore (tons)	Pyrite (tons)
code:	bac04	bac05	bac06	bac07	bac08	bac09	bac10
source:	b05c05	b06c02	b06c03	b06c07	b07c09	b08c05	b08c08
note:	(a)	(a)	(a)	(a)	(a)	(c)	(a)
1861	168	0	2,288	523	76	6,727	21,171
1862	157	0	2,030	1,742	0	7,572	23,730
1863	265	0	4,022	725	0	6,195	14,913
1864	427	0	10,381	723	0	7,478	15,608
1865	2,656	0	4,797	580	0	7,667	20,942
1866	5,454	0	9,190	722	250	5,646	19,320
1867	28,745	0	9,190	688	250	3,993	20,043
1868	65,688	0	9,190	672	250	5,024	18,778
1869	86,437	0	9,190	770	250	7,202	18,714
1870	74,627	8	9,190	758	250	13,001	18,579
1871	68,463	15	10,947	925	250	7,803	21,437
1872	79,240	76	8,847	1,443	250	4,106	20,161
1873	70,301	202	5,789	3,003	250	3,993	20,509
1874	64,325	330	1,788	3,251	250	2,405	18,986
1875	63,515	322	2,704	4,381	200	4,917	19,144
1876	76,240	455	6,253	7,409	275	5,239	16,751
1877	76,440	851	7,453	7,412	415	5,893	17,712
1878	65,793	1,225	8,804	7,055	600	6,246	14,740
1879	75,666	1,605	9,700	6,355	470	6,687	14,394
1880	78,973	1,623	11,757	7,725	620	5,686	19,535
1881	81,833	1,447	12,190	7,842	846	6,362	17,979
1882	98,738	1,480	12,202	9,179	1,298	7,153	17,959
1883	102,571	1,568	10,486	6,108	2,168	10,877	17,233
1884	106,458	1,556	15,037	1,385	2,498	14,525	18,547
1885	107,103	1,562	11,106	3,343	2,376	13,272	23,406
1886	103,656	1,766	10,759	4,451	1,405	14,483	30,624
1887	90,247	1,949	11,134	4,703	1,092	14,518	30,142
1888	91,199	2,001	10,638	3,251	552	20,781	26,693
1889	103,798	1,874	10,932	2,068	1,030	24,332	28,642
1890	114,739	1,878	8,296	2,262	1,670	29,230	25,276
1891	125,242	1,843	7,729	2,029	1,761	22,143	28,648
1892	129,613	1,458	6,612	863	1,735	22,458	35,918
1893	129,936	1,170	7,393	865	1,647	19,450	37,035
1894	128,531	987	7,748	1,070	2,207	15,022	36,481
1895	121,723	755	7,099	1,585	3,800	10,504	38,586
1896	119,173	523	7,659	2,066	4,044	14,305	45,728
1897	126,297	420	10,723	1,324	2,271	20,659	58,320
1898	139,247	488	9,549	3,237	2,248	19,201	67,191
1899	143,610	562	11,859	4,356	3,558	29,322	76,538
1900	143,602	548	5,840	5,764	7,705	33,930	71,616
1901	136,392	466	890	2,437	8,922	38,614	89,376
1902	149,248	413	1,215	2,346	6,008	44,261	93,177
1903	153,849	274	5,734	2,060	6,629	55,528	101,455
1904	151,741	157	6,746	3,531	5,835	60,403	112,004
1905	152,018	109	1,200	5,184	5,859	63,378	117,667
1906	155,759	55	6,543	3,062	6,077	80,638	122,364
1907	157,258	58	13,475	3,026	7,061	76,561	126,925
1908	144,942	49	14,671	2,992	2,518	82,534	131,721
1909	139,589	38	2,890	5,093	1,649	97,592	132,834
1910	142,625	28	2,147	4,066	2,318	87,129	165,688
1911	143,490	26	2,080	3,267	2,160	97,803	165,273
1912	156,047	14	3,638	2,377	1,850	88,200	277,585
1913	155,498	0	5,011	1,357	1,189	109,379	317,334

Summary Table B.1 (continued)

	(15)	(16)	(17)	(18)	(19)	(20)	(21)
	Mining (continued)						
	Metal ores (cont).		Other mine products				
	Bauxite (tons)	Other metal ores (tons)	Sulfur ore (tons)	Fused sulfur (tons)	Ground sulfur ore (tons)	Rock salt (tons)	Brine salt (tons)
code:	bac11	bac12	bad01	bad02	bad03	bad04	bad05
source:	b13c05	b14c08	b10c16	b10c03	b10c02	b11c01	b11c02
note:	(a)	(a)	(c)	(a)	(b)	(a)	(a)
1861	0	257	1,275,541	165,989	0	13,800	8,275
1862	0	60	1,272,376	165,550	0	13,500	9,347
1863	0	0	1,403,839	182,624	0	14,040	9,157
1864	0	7	1,388,810	180,670	0	14,200	9,196
1865	0	700	1,311,710	171,638	0	14,100	8,524
1866	0	58	1,506,338	198,244	0	14,000	11,084
1867	0	58	1,504,779	199,112	0	13,600	8,900
1868	0	58	1,514,498	201,373	0	13,100	8,900
1869	0	58	1,481,819	197,259	3,500	13,600	8,900
1870	0	58	1,495,789	199,914	4,000	13,486	8,900
1871	0	90	1,450,119	194,768	5,000	13,725	8,900
1872	0	229	1,717,794	232,707	6,500	13,440	8,900
1873	0	1,266	1,965,840	267,241	7,000	12,733	11,400
1874	0	978	1,793,933	243,799	7,500	13,258	11,600
1875	0	2,479	1,463,411	199,460	8,000	12,943	10,000
1876	0	1,490	1,944,167	267,781	8,300	14,700	8,616
1877	0	1,128	1,828,389	252,205	8,160	14,516	10,109
1878	0	161	2,195,660	295,182	10,000	14,234	11,163
1879	0	2	2,645,067	364,856	11,500	17,737	10,427
1880	0	16	2,460,026	346,203	13,500	15,892	10,781
1881	0	20	2,463,541	358,200	15,000	19,523	11,744
1882	0	10	2,833,031	428,958	17,000	18,800	10,255
1883	0	0	2,897,205	432,048	14,500	18,900	9,937
1884	0	0	2,622,398	400,977	10,100	17,600	10,227
1885	0	0	2,859,980	412,087	13,500	17,204	10,678
1886	0	0	2,611,018	360,377	14,000	18,394	10,881
1887	0	0	2,332,689	329,536	12,700	18,788	10,412
1888	0	0	2,642,310	361,264	15,300	18,424	11,325
1889	0	0	2,635,920	358,719	12,800	18,475	10,015
1890	0	0	2,616,996	356,754	12,500	17,098	9,879
1891	0	0	2,828,128	376,932	18,600	31,285	9,258
1892	0	0	2,923,487	403,057	15,500	15,504	8,217
1893	0	0	2,929,532	401,371	16,300	16,790	8,602
1894	0	0	2,708,656	391,931	13,850	19,467	11,326
1895	0	13	2,381,389	371,857	13,340	18,710	10,605
1896	0	17	2,738,057	427,081	13,500	17,300	11,974
1897	0	17	3,314,051	500,442	18,500	19,801	11,725
1898	0	2	3,362,841	506,305	20,600	18,199	11,546
1899	0	5	3,763,206	567,591	30,100	17,821	11,021
1900	0	6	3,628,643	549,466	24,534	18,331	10,890
1901	0	3	3,726,916	566,168	25,820	23,054	10,690
1902	0	25	3,581,671	541,498	22,820	23,677	10,581
1903	0	65	3,690,532	555,720	17,400	25,911	10,962
1904	0	40	3,539,444	529,352	24,900	18,638	11,878
1905	1,050	20	3,760,534	568,927	25,123	19,669	12,756
1906	1,050	65	3,273,901	499,814	28,777	19,007	13,171
1907	3,500	70	2,787,765	426,972	19,467	31,540	19,238
1908	7,000	667	2,847,943	445,312	18,910	24,033	15,180
1909	3,943	160	2,827,455	435,060	19,590	28,026	15,081
1910	4,595	178	2,815,511	430,360	21,297	39,197	16,600
1911	5,690	20	2,682,766	414,161	17,561	43,763	17,251
1912	6,702	352	2,504,408	389,451	18,416	39,954	18,175
1913	6,952	274	2,452,474	386,310	20,096	41,323	17,727

Summary Table B.1 (continued)

	(22)	(23)	(24)	(25)	(26)	(27)
	Mining (continued)					
	Other mine products (continued)					
	Asphalt rock (tons)	Boric acid (tons)	Graphite (tons)	Alunite (tons)	Sea salt (tons)	Mineral water (tons)
code:	bad06	bad07	bad08	bad09	bad10	bad11
source:	b12c06	b13c02	b13c03	b13c04	b15c13	b16c06
note:	(d)	(e)	(a)	(a)	(b)	(f)
1861	5,525	1,800	500	3,800	364,570	1,075,000
1862	5,125	1,800	500	3,627	330,274	1,081,000
1863	5,425	1,800	500	3,684	383,308	1,088,000
1864	5,225	1,800	500	3,694	328,932	1,095,000
1865	5,625	1,800	500	3,700	370,573	1,104,000
1866	5,325	1,800	728	3,025	329,398	1,113,000
1867	5,525	1,800	728	3,415	329,794	1,124,000
1868	5,925	1,800	728	3,694	320,543	1,134,000
1869	7,225	2,300	728	3,235	285,391	1,144,000
1870	5,700	2,300	728	3,193	345,656	1,164,000
1871	7,100	2,400	600	3,045	376,755	1,184,000
1872	8,550	2,400	3	3,300	352,770	1,196,000
1873	3,650	2,400	600	3,320	348,448	1,207,000
1874	564	2,600	50	3,663	327,625	1,218,000
1875	1,336	2,600	30	3,966	345,172	1,228,000
1876	24,877	2,600	886	5,339	353,706	1,240,000
1877	10,570	2,900	861	4,131	412,241	1,250,000
1878	19,753	2,900	800	2,335	399,178	1,263,000
1879	35,454	2,900	1,327	3,864	391,394	1,276,000
1880	16,183	2,900	1,327	4,936	353,254	1,292,000
1881	23,485	2,900	3,443	8,068	382,108	1,311,000
1882	16,270	2,900	4,147	10,840	426,907	1,328,000
1883	24,641	2,900	4,200	8,530	398,562	1,347,000
1884	32,613	2,900	4,000	1,650	334,173	1,369,000
1885	26,540	2,900	4,000	6,000	402,763	1,405,000
1886	30,563	2,900	4,000	6,000	365,814	1,443,000
1887	31,596	2,900	1,572	6,000	384,341	1,472,000
1888	40,803	2,900	1,390	6,050	374,436	1,495,000
1889	34,514	2,900	1,531	5,600	402,286	1,517,000
1890	62,225	2,900	1,735	5,000	363,901	1,545,000
1891	39,200	2,900	2,415	4,000	389,013	1,571,000
1892	48,980	2,900	1,645	4,000	405,899	1,593,000
1893	35,100	2,847	1,465	4,200	383,917	1,620,000
1894	69,860	2,746	1,575	6,000	391,480	1,625,000
1895	59,253	2,633	2,657	7,000	415,695	1,651,000
1896	56,485	2,616	3,148	6,000	379,929	1,682,000
1897	68,947	2,704	5,650	6,500	406,199	1,706,000
1898	109,121	2,650	6,435	7,000	422,768	1,759,000
1899	98,707	2,674	9,990	5,800	353,192	1,798,000
1900	120,035	2,491	9,720	5,200	322,012	1,819,000
1901	119,371	2,558	10,313	4,900	381,878	1,857,000
1902	79,425	2,763	9,210	8,200	402,358	1,897,000
1903	101,318	2,583	7,920	8,100	434,929	1,956,000
1904	121,590	2,624	9,765	8,000	403,018	2,027,000
1905	115,146	2,700	10,572	8,500	353,402	2,078,000
1906	141,105	2,561	10,805	7,500	460,607	2,136,000
1907	171,406	2,305	10,989	7,600	428,231	2,219,000
1908	144,783	2,520	12,914	6,165	467,488	2,299,000
1909	120,487	2,431	11,583	5,636	388,798	2,371,000
1910	171,352	2,502	12,510	6,081	395,609	2,437,000
1911	199,093	2,648	12,621	6,100	433,847	2,520,000
1912	192,377	2,309	13,170	6,002	435,899	2,597,000
1913	178,957	2,410	11,145	5,976	519,641	2,674,000

Summary Table B.1 (continued)

	(28)	(29)	(30)	(31)	(32)
	Quarrying				
	Kiln materials			Other materials	
	Gypsum (thousand tons)	Lime-stone (thousand tons)	Clay and sand (thousand tons)	Marble (tons)	Other (thousand tons)
code:	bba01	bba02	bba03	bbb01	bbb02
source:	b20c01	b20c02	b20c03	b19c17	b21c04
note:	(g)	(g)	(g)	(a)	(h)
1861	129	680	2,801	111,659	7,662
1862	156	759	3,591	99,712	8,770
1863	150	830	3,446	122,955	9,312
1864	164	833	3,647	112,544	9,320
1865	162	1,008	3,511	123,367	9,666
1866	153	762	2,841	128,364	7,978
1867	162	749	2,817	156,724	7,284
1868	158	777	2,649	168,290	7,302
1869	170	772	2,872	187,830	7,123
1870	171	843	2,871	174,993	7,649
1871	191	868	3,320	167,900	7,741
1872	200	955	3,619	172,100	8,477
1873	228	1,069	4,481	210,089	9,512
1874	252	1,109	5,008	202,784	9,700
1875	231	1,026	4,003	189,507	8,414
1876	227	1,033	3,678	169,700	8,193
1877	236	1,109	3,795	178,451	8,689
1878	239	1,163	3,698	164,502	8,841
1879	242	1,214	3,702	192,926	8,781
1880	257	1,328	4,019	247,459	9,422
1881	279	1,373	4,470	241,158	9,549
1882	308	1,586	5,254	247,935	10,899
1883	318	1,726	5,540	264,663	11,715
1884	335	1,813	5,842	265,918	12,256
1885	362	1,888	6,292	259,695	12,574
1886	378	1,993	6,520	241,475	13,042
1887	356	2,063	5,835	242,062	13,192
1888	341	2,219	5,376	244,001	13,295
1889	357	2,203	5,408	260,185	12,836
1890	398	2,186	5,966	277,842	12,395
1891	414	2,193	6,258	251,891	11,805
1892	405	2,148	5,961	269,552	10,900
1893	417	2,105	6,385	261,130	10,462
1894	434	2,165	6,418	248,223	10,262
1895	428	1,952	5,967	237,582	9,055
1896	437	1,949	5,957	234,459	8,762
1897	426	2,028	6,050	263,828	8,843
1898	450	2,066	6,215	274,095	8,777
1899	467	2,160	6,502	317,437	8,982
1900	473	2,275	6,899	316,449	9,351
1901	513	2,426	7,699	334,146	9,843
1902	558	2,678	8,902	362,548	10,812
1903	594	2,848	9,992	376,015	11,472
1904	639	3,000	10,917	391,982	11,950
1905	687	3,270	12,023	392,473	13,040
1906	686	3,571	12,551	435,910	14,164
1907	720	3,805	13,439	443,579	14,966
1908	773	4,120	14,656	430,284	16,011
1909	867	4,719	17,731	396,109	18,655
1910	984	5,400	20,828	427,494	21,298
1911	1,056	5,829	22,232	489,096	22,391
1912	1,082	6,227	22,800	514,189	22,975
1913	1,083	6,422	22,529	494,342	22,758

Summary Table B.1 (continued)

NOTES

(a) Production is estimated from the abundant data reported by the Corpo delle miniere.

(b) Comprehensive data are available from the mid-1880s; the earlier figures are rough estimates.

(c) From 1861 to the early or mid-1890s, production is estimated from the output data for the succeeding stage of production; from then on, direct production data are available.

(d) Production is estimated from the net output of the raw material and of processed goods.

(e) High-quality data are available from the mid-1890s; the earlier figures are very rough.

(f) The output of mineral water is estimated from indirect evidence.

(g) Production is estimated from that of the corresponding kiln products.

(h) Production is estimated from a very few benchmarks provided by the Corpo delle miniere, extrapolated on the basis of construction movements.

Summary Table B.2
The extractive industries: value added in 1911

Note: two sets of value added estimates are provided. The estimates of "industrial" value added are conceptually consistent with those for other industries, and therefore net of the value of the primary raw material processed be the industry at hand (the good in the ground, which extraction transforms into a good above ground). The estimates of conventional national-income "value added" are gross of that value; they are conceptually incorrect, and provided only to permit the calculation of conventional measures.

A1. Industrial value added, by product

(1)	(2)	(3)		(4)	(5)
Physical series		Value		Total value added	
series code	product	added per unit		million lire	series code
MINING					
Solid fuels					
baa01	solid min. fuel	5.804	lire/ton	3.907	baa01v
baa02	peat	10.610	lire/ton	.260	baa02v
Crude oil and gas					
bab01	crude oil	97.979	lire/ton	1.018	bab01v
bab02	natural gas	46.336	lire/thousand cu. m.	.418	bab02v
Metal ores					
bac01	iron ore	5.169	lire/ton	1.974	bac01v
bac02	copper ore	22.023	lire/ton	1.505	bac02v
bac03	lead ore	93.495	lire/ton	3.753	bac03v
bac04	zinc ore	93.495	lire/ton	13.416	bac04v
bac05	silver ore	615.000	lire/ton	.016	bac05v
bac06	gold ore	106.250	lire/ton	.221	bac06v
bac07	manganese ore	42.547	lire/ton	.139	bac07v
bac08	antimony ore	100.000	lire/ton	.216	bac08v
bac09	mercury ore	12.300	lire/ton	1.203	bac09v
bac10	pyrite	15.998	lire/ton	2.644	bac10v
bac11	bauxite	10.720	lire/ton	.061	bac11v
bac12	other metal ores	100.000	lire/ton	.002	bac12v
Other mine products					
bad01	sulfur ore	7.845	lire/ton	21.046	bad01v
bad02	fused sulfur	9.000	lire/ton	3.727	bad02v
bad03	ground sulfur ore	14.727	lire/ton	.259	bad03v
bad04	rock salt	7.113	lire/ton	.311	bad04v
bad05	brine salt	14.000	lire/ton	.242	bad05v
bad06	asphalt rock	6.660	lire/ton	1.326	bad06v
bad07	boric acid	370.000	lire/ton	.980	bad07v
bad08	graphite	28.050	lire/ton	.354	bad08v
bad09	alunite	3.410	lire/ton	.021	bad09v
bad10	sea salt	7.400	lire/ton	3.210	bad10v
bad11	mineral water	1.165	lire/ton	2.936	bad11v
QUARRYING					
Kiln materials					
bba01	gypsum	1.500	lire/ton	1.584	bba01v
bba02	limestone	1.700	lire/ton	9.909	bba02v
bba03	clay and sand	1.000	lire/ton	22.232	bba03v
Other materials					
bbb01	marble	36.743	lire/ton	17.971	bbb01v
bbb02	other	2.140	lire/ton	47.917	bbb02v

Summary Table B.2 (continued)

A2. Industrial value added, by industry

(1) Code	(2) Industry	(3) Value added (million lire)	(4) Component series
Mining			
baav	solid fuels	4.167	baa01v--baa02v
babv	crude oil and gas	1.436	bab01v--bab02v
bacv	metal ores	25.150	bac01v--bac12v
badv	other mine products	34.412	bad01v--bad11v
Quarrying			
bbav	kiln materials	33.725	bba01v--bba03v
bbbv	other materials	65.888	bbb01v--bbb02v

A3. Industrial value added, by industry group

(1) Code	(2) Industry group	(3) Value added (million lire)	(4) Component series
bav	mining	65.165	baav--badv
bbv	quarrying	99.613	bbav--bbbv
bv	extractive industries	164.778	bav-bbv

Note to Panel A1: the disaggregated value added series identified in col. 5 are the physical series identified in col. 1, weighted by the unit value added estimates in col. 3. The latter are variously obtained from evidence on output prices and per-unit raw material costs, or on (total or per-unit) labor and capital costs.

Note to Panels A2 and A3: the aggregate value added series identified in col. 1 are simple sums of the component series identified in col. 4.

Summary Table B.2 (continued)

B1. Conventional national-income "value added" in 1911, by product

(1) Physical series code	(2) product	(3) Value added per unit	(4) Total value added million lire	(5) series code
MINING				
Solid fuels				
baa01	solid min. fuel	7.143 lire/ton	4.808	baa01n
baa02	peat	12.260 lire/ton	.301	baa02n
Crude oil and gas				
bab01	crude oil	140.039 lire/ton	1.455	bab01n
bab02	natural gas	280.000 lire/thousand cu. m.	2.526	bab02n
Metal ores				
bac01	iron ore	17.759 lire/ton	6.782	bac01n
bac02	copper ore	13.756 lire/ton	.940	bac02n
bac03	lead ore	163.752 lire/ton	6.574	bac03n
bac04	zinc ore	102.237 lire/ton	14.670	bac04n
bac05	silver ore	1,000.000 lire/ton	.026	bac05n
bac06	gold ore	23.558 lire/ton	.049	bac06n
bac07	manganese ore	33.058 lire/ton	.108	bac07n
bac08	antimony ore	44.907 lire/ton	.097	bac08n
bac09	mercury ore	46.410 lire/ton	4.539	bac09n
bac10	pyrite	18.212 lire/ton	3.010	bac10n
bac11	bauxite	11.200 lire/ton	.064	bac11n
bac12	other metal ores	100.000 lire/ton	.002	bac12n
Other mine products				
bad01	sulfur ore	11.141 lire/ton	29.889	bad01n
bad02	fused sulfur	9.000 lire/ton	3.727	bad02n
bad03	ground sulfur ore	14.727 lire/ton	.259	bad03n
bad04	rock salt	9.000 lire/ton	.394	bad04n
bad05	brine salt	14.000 lire/ton	.242	bad05n
bad06	asphalt rock	15.254 lire/ton	3.037	bad06n
bad07	boric acid	370.000 lire/ton	.980	bad07n
bad08	graphite	30.425 lire/ton	.384	bad08n
bad09	alunite	14.000 lire/ton	.085	bad09n
bad10	sea salt	7.400 lire/ton	3.210	bad10n
bad11	mineral water	1.165 lire/ton	2.936	bad11n
QUARRYING				
Kiln materials				
bba01	gypsum	1.500 lire/ton	1.584	bba01n
bba02	limestone	1.800 lire/ton	10.492	bba02n
bba03	clay and sand	1.200 lire/ton	26.678	bba03n
Other materials				
bbb01	marble	48.737 lire/ton	23.837	bbb01n
bbb02	other	2.900 lire/ton	64.934	bbb02n

Summary Table B.2 (continued)

B2. Conventional national-income "value added" in 1911, by industry

(1) Code	(2) Industry	(3) Value added (million lire)	(4) Component series
Mining			
baan	solid fuels	5.109	baa01n--baa02n
babn	crude oil and gas	3.981	bab01n--bab02n
bacn	metal ores	36.861	bac01n--bac12n
badn	other mine products	45.143	bad01n--bad11n
Quarrying			
bban	kiln materials	38.755	bba01n--bba03n
bbbn	other materials	88.771	bbb01n--bbb02n

B3. Conventional national-income "value added" in 1911, by industry group

(1) Code	(2) Industry group	(3) Value added (million lire)	(4) Component series
ban	mining	91.093	baan--badn
bbn	quarrying	127.526	bban--bbbn
bn	extractive industries	218.619	ban-bbn

Note to Panel B1: the disaggregated value added series identified in col. 5 are the physical series identified in col. 1, weighted by the unit value added estimates in col. 3. The latter are variously obtained from evidence on output prices and per-unit raw material costs, or on (total or per-unit) labor and capital costs.

Note to Panels B2 and B3: the aggregate value added series identified in col. 1 are simple sums of the component series identified in col. 4.

Summary Table B.3
The extractive industries: value added at 1911 prices, 1861-1913
(million lire)

A. Industrial value added *(see head-note to Summary Table B.2)*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Mining					Quarrying			
	Solid fuels	Crude oil and gas	Metal ores	Other	Total	Kiln materials	Other	Total	Group total
code:	baav	babv	bacv	badv	bav	bbav	bbbv	bbv	bv
1861	.905	.000	3.011	16.395	20.311	4.151	20.499	24.650	44.961
1862	.962	.000	3.130	16.129	20.221	5.115	22.432	27.547	47.768
1863	.921	.001	3.290	17.718	21.929	5.082	24.445	29.527	51.456
1864	.946	.001	4.262	17.188	22.398	5.309	24.080	29.389	51.787
1865	.953	.031	4.036	16.813	21.833	5.468	25.218	30.686	52.519
1866	1.020	.014	5.206	18.323	24.562	4.366	21.789	26.155	50.717
1867	.991	.011	7.708	18.303	27.013	4.333	21.346	25.680	52.692
1868	1.057	.005	11.231	18.343	30.636	4.207	21.810	26.017	56.653
1869	1.104	.002	12.899	18.048	32.053	4.439	22.145	26.584	58.637
1870	1.133	.001	11.432	18.647	31.214	4.561	22.799	27.359	58.573
1871	1.282	.004	11.201	18.555	31.041	5.082	22.735	27.817	58.858
1872	1.376	.005	12.464	20.846	34.690	5.543	24.464	30.007	64.697
1873	1.532	.006	11.946	23.106	36.590	6.640	28.075	34.715	71.305
1874	1.598	.008	11.297	21.458	34.361	7.271	28.209	35.480	69.841
1875	1.529	.011	11.734	18.596	31.869	6.094	24.969	31.063	62.932
1876	1.606	.039	13.708	23.242	38.596	5.775	23.768	29.543	68.138
1877	1.668	.040	14.128	22.667	38.503	6.034	25.151	31.186	69.689
1878	1.737	.059	13.430	25.947	41.173	6.034	24.964	30.998	72.170
1879	1.827	.039	14.841	30.218	46.926	6.129	25.880	32.009	78.935
1880	1.861	.028	16.273	28.232	46.393	6.662	29.255	35.918	82.311
1881	1.834	.017	16.882	28.783	47.515	7.223	29.296	36.518	84.033
1882	2.022	.014	18.242	32.654	52.931	8.412	32.434	40.846	93.777
1883	2.098	.022	18.330	33.007	53.457	8.951	34.795	43.746	97.202
1884	1.950	.039	18.888	30.074	50.951	9.427	35.998	45.425	96.376
1885	1.532	.051	18.251	32.616	52.450	10.045	36.450	46.495	98.945
1886	2.200	.034	18.239	30.014	50.486	10.475	36.782	47.257	97.744
1887	2.675	.025	17.326	27.639	47.665	9.876	37.125	47.001	94.666
1888	2.559	.017	17.100	30.412	50.088	9.660	37.417	47.076	97.164
1889	2.601	.017	18.193	30.477	51.288	9.689	37.029	46.718	98.005
1890	2.705	.041	18.784	30.231	51.762	10.279	36.734	47.013	98.775
1891	2.352	.113	19.744	32.329	54.538	10.607	34.518	45.125	99.664
1892	2.286	.235	20.820	33.334	56.675	10.220	33.230	43.450	100.125
1893	2.433	.260	20.372	33.145	56.210	10.589	31.983	42.572	98.783
1894	2.180	.280	20.127	31.614	54.201	10.750	31.081	41.831	96.032
1895	2.269	.350	19.699	28.974	51.290	9.927	28.107	38.035	89.325
1896	1.931	.258	20.015	32.037	54.241	9.926	27.365	37.291	91.532
1897	2.206	.201	21.154	37.714	61.275	10.137	28.618	38.754	100.029
1898	2.469	.219	22.305	38.622	63.615	10.402	28.854	39.256	102.871
1899	2.904	.255	23.855	42.010	69.024	10.875	30.885	41.760	110.784
1900	3.613	.230	24.273	40.570	68.685	11.476	31.638	43.114	111.799
1901	3.446	.283	24.193	42.064	69.985	12.593	33.342	45.934	115.920
1902	3.263	.328	25.678	40.649	69.919	14.292	36.459	50.750	120.669
1903	2.744	.348	26.882	41.925	71.899	15.725	38.366	54.091	125.989
1904	2.797	.465	27.681	40.622	71.565	16.976	39.976	56.951	128.516
1905	3.194	.743	26.848	42.438	73.223	18.613	42.326	60.939	134.162
1906	3.985	.995	28.467	39.038	72.486	19.651	46.328	65.978	138.464
1907	3.917	1.080	30.728	34.576	70.301	20.988	48.326	69.313	139.614
1908	3.908	1.007	28.377	35.430	68.722	22.820	50.073	72.893	141.615
1909	4.854	.961	25.390	34.481	65.685	27.054	54.476	81.530	147.215
1910	4.332	1.102	25.772	34.991	66.197	31.484	61.285	92.769	158.967
1911	4.167	1.436	25.150	34.412	65.165	33.725	65.888	99.613	164.778
1912	4.880	1.048	29.838	32.747	68.513	35.009	68.059	103.068	171.581
1913	5.063	.923	31.025	32.932	69.942	35.071	66.866	101.937	171.879

Summary Table B.3 (continued)

B. Conventional national-income "value added" *(see head-note to Summary Table B2)*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Mining					Quarrying			
	Solid fuels	Crude oil and gas	Metal ores	Other	Total	Kiln materials	Other	Total	Group total
code:	baan	babn	bacn	badn	ban	bban	bbbn	bbn	bn
1861	1.061	.001	5.237	20.714	27.012	4.779	27.662	32.440	59.452
1862	1.131	.001	5.867	20.431	27.430	5.909	30.293	36.202	63.632
1863	1.080	.001	6.091	22.458	29.629	5.854	32.997	38.851	68.481
1864	1.111	.001	6.648	21.878	29.638	6.122	32.513	38.635	68.272
1865	1.119	.044	7.142	21.252	29.558	6.271	34.044	40.315	69.872
1866	1.201	.019	8.206	23.393	32.819	5.010	29.392	34.403	67.222
1867	1.163	.015	11.000	23.374	35.553	4.972	28.762	33.733	69.286
1868	1.244	.007	14.793	23.451	39.496	4.814	29.378	34.192	73.688
1869	1.300	.003	16.378	23.056	40.737	5.091	29.811	34.902	75.639
1870	1.335	.002	14.547	23.687	39.571	5.219	30.711	35.930	75.501
1871	1.517	.005	14.349	23.455	39.326	5.833	30.632	36.465	75.791
1872	1.631	.006	16.892	26.642	45.172	6.362	32.971	39.333	84.504
1873	1.823	.009	17.358	29.677	48.867	7.643	37.824	45.467	94.335
1874	1.903	.012	17.163	27.439	46.517	8.384	38.013	46.397	92.914
1875	1.817	.016	17.601	23.497	42.930	6.997	33.637	40.634	83.564
1876	1.908	.056	19.726	29.950	51.641	6.614	32.030	38.644	90.284
1877	1.981	.057	19.927	28.857	50.822	6.904	33.895	40.799	91.622
1878	2.062	.084	18.998	33.407	54.550	6.890	33.656	40.546	95.096
1879	2.169	.056	21.177	39.319	62.720	6.991	34.868	41.858	104.579
1880	2.210	.040	23.978	36.564	62.793	7.599	39.384	46.983	109.776
1881	2.177	.024	24.793	37.235	64.229	8.254	39.445	47.699	111.928
1882	2.408	.019	25.122	42.292	69.841	9.622	43.691	53.312	123.154
1883	2.518	.032	25.061	42.904	70.514	10.232	46.872	57.104	127.619
1884	2.352	.056	25.087	39.058	66.553	10.776	48.502	59.279	125.832
1885	1.854	.073	24.399	42.376	68.702	11.492	49.121	60.613	129.315
1886	2.651	.048	24.804	38.990	66.494	11.978	49.591	61.569	128.063
1887	3.241	.036	23.539	35.702	62.517	11.249	50.054	61.304	123.821
1888	3.125	.024	23.171	39.574	65.895	10.957	50.447	61.404	127.299
1889	3.177	.025	24.421	39.559	67.183	10.991	49.905	60.896	128.078
1890	3.296	.058	25.437	39.481	68.272	11.691	49.487	61.178	129.449
1891	2.863	.162	26.254	42.095	71.373	12.078	46.511	58.589	129.962
1892	2.789	.336	26.744	43.467	73.336	11.627	44.747	56.374	129.710
1893	2.973	.371	25.793	43.182	72.320	12.077	43.066	55.143	127.463
1894	2.655	.403	25.409	41.246	69.713	12.250	41.857	54.107	123.820
1895	2.774	.505	24.766	37.448	65.494	11.316	37.839	49.155	114.648
1896	2.365	.433	25.339	41.651	69.788	11.312	36.837	48.149	117.937
1897	2.703	.351	26.642	49.349	79.045	11.549	38.503	50.052	129.097
1898	3.024	.413	27.874	50.768	82.078	11.852	38.812	50.664	132.742
1899	3.550	.525	30.271	55.381	89.727	12.391	41.519	53.910	143.636
1900	4.426	.628	31.500	53.674	90.227	13.083	42.541	55.624	145.851
1901	4.219	.693	32.146	55.494	92.551	14.375	44.830	59.205	151.756
1902	3.996	.794	35.094	53.291	93.174	16.340	49.024	65.364	158.538
1903	3.360	.980	36.676	55.113	96.129	18.008	51.595	69.602	165.732
1904	3.429	1.210	36.981	53.476	95.097	19.459	53.759	73.218	168.315
1905	3.917	1.723	36.441	55.974	98.056	21.344	56.944	78.288	176.344
1906	4.890	2.646	39.321	51.183	98.040	22.518	62.321	84.839	182.879
1907	4.789	2.765	42.104	45.403	95.062	24.056	65.020	89.076	184.138
1908	4.783	2.879	40.775	46.202	94.639	26.163	67.403	93.565	188.204
1909	5.903	3.141	38.450	44.976	92.470	31.072	73.405	104.477	196.946
1910	5.300	3.465	39.375	45.912	94.052	36.190	82.599	118.789	212.841
1911	5.109	3.981	36.861	45.143	91.093	38.755	88.771	127.526	218.619
1912	5.983	2.951	44.031	42.825	95.790	40.192	91.688	131.879	227.669
1913	6.212	2.605	46.296	42.721	97.833	40.219	90.091	130.310	228.143