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July 2018

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2018

ABSTRACT

This paper presents revised expenditure-side constant-price historical national accounts for Italy from Unification to 1913. The extant estimates at 1911 prices by the present author on the one hand and Alberto Baffigi on the other are both derived from the better-documented production side, but with significantly different algorithms and results. The new estimates are based on the new, extensively revised production-side accounts; the underlying methodology remains the present author's, arguably altogether sounder than Baffigi's.

*The author gratefully thanks Alberto Baffigi and Alfredo Gigliobianco for extended, illuminating discussion and, for their comments and suggestions, the participants at seminars at the Fondazione Luigi Einaudi (Turin), the Università Politecnica delle Marche (Ancona), the Scuola Superiore Sant'Anna (Pisa), and the Bank of Italy (Rome).

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What you cannot as you would achieve,
You must perforce accomplish as you may.
William Shakespeare, *Titus Andronicus*

1. The road we have traveled

The evolution of Italy's historical accounts is well known. For Italy's centenary (1961) Istat (then the Istituto Centrale di Statistica) produced a full set of current-price accounts from 1861 to the then present, and a 1938-price expenditure side (Istat 1957). The complementary constant-price production side would be provided by Ornello Vitali, the statistician of Giorgio Fuà's "Ancona Group" (Fuà 1969). These estimates were informed by the international standard methodology: they acritically incorporated historical data, good and bad; they were built up from relatively aggregated series, that masked composition effects; they mindlessly attributed to unobserved production the time path of observed production ("of the same [arbitrary] sector"); and they were wedded to the wrong-headed "double-deflation" approach to "real value added" (Fenoaltea 2010).[1]

The conceptual and empirical weaknesses of these "first-generation" estimates were soon pointed out (Fenoaltea 1969, 1972, 1976), and work started over. Many years and much effort later, the first revised national accounts began to appear: sponsored by the Bank of Italy and coordinated by Guido Rey, a team that included Giovanni Federico, Ornello Vitali, Vera Zamagni, and the present author produced full current-price accounts for the "benchmark" years 1891, 1911, 1938, and 1951 (Rey 1992, 2000, 2002). Next to appear were new 1911-price series by Giovanni Federico for aggregate agriculture and by the present author for the various major components of industry and of the services (these last extrapolating the 1911 "benchmark" figures with suitable real indices), and these together yielded a preliminary "second-generation" production-side account for the period of concern here (Federico 2003, Fenoaltea 2003, 2005). A matching 1911-price expenditure side began to circulate some years later, but it would travel a long and bumpy road to publication (Fenoaltea 2012).

In the interim, Italy's sesquicentenary (2011) rolled around, and things got complicated. Together, the Bank of Italy and Istat (now the Istituto Nazionale di Statistica) sponsored a broad-gauged reevaluation of Italy's economic history. Gianni Toniolo was selected as project leader, and would edit the resulting essays (Toniolo 2013a). The Bank's Alberto Baffigi took on the task of reconstructing current- and constant-price national accounts from 1861 to 2011, to provide the empirical framework for the analytical efforts; of the "benchmark" group only Vera Zamagni was called upon, to furnish new current-price series for the services (Baffigi 2011, 2013, 2015, 2017).[2]

Baffigi used what material was available to reestimate first the much-better-documented

[1] On "double deflation" see Fenoaltea (1976). The later estimates all abandoned "double deflation," and no more will be said about it here.

[2] Baffigi (2017) here identifies the corpus of Excel files documenting Baffigi's estimates, and, most usefully, their derivation, available on the website of the Bank of Italy, dated September 30, 2015: http://www.bancaditalia.it/statistiche/tematiche/stat-storiche/stat-storiche-economia/index.html (downloaded November 2017).

production side, and then, derivatively, the expenditure side. On the production side, for the period at hand (to 1911), he took as given the current-price "benchmark" estimates for 1891 and 1911 (plus a purpose-built new set for 1871). His other building blocks were for agriculture the Federico (2003) current- and constant-price aggregate series; for industry the four major-group constant-price series in Fenoaltea (2005) and the corresponding "centennial" deflators in Fuà (1969); and for the services the new series at current prices by Patrizia Battilani, Emanuele Felice, and Vera Zamagni (Battilani, Felice, and Zamagni 2014), and new series at constant prices he himself (with Istat's Alessandro Brunetti) derived by recovering the "quantity" components of the Zamagni group's reconstruction. Baffigi's constant-price series, from 1861 to 1911, are at the prices of 1911 itself.

In the event, the constant-price production side in Baffigi (2011) much resembled that in Fenoaltea (2005). Both were at 1911 prices; both anchored their series to the "benchmark" current-price estimates for that year; both used the 1911-price series for agriculture by Federico, and for industry by Fenoaltea. Baffigi's series for the services were new, as Battilani, Felice, and Zamagni rebuilt theirs from scratch, never so much as acknowledging the existence of the quantity indices in Fenoaltea (2005); service-activity-specific discrepancies abound, but the group aggregate was not much affected. At the end of the day Baffigi's 2011 1911-price *GDP* series for the years 1861−1911 differed little from the earlier one by the present author: as can be seen in Figure 1, panel A (borrowed wholesale from Fenoaltea 2017a, Figure 4), the only material differences are over the first decade, when Baffigi's current-border series excludes Venetia in 1861−66 and Latium in 1861−70, and the present author's constant (1871−1913)-border series does not.[3]

Because very little of the expenditure side can be documented directly, both subsequent expenditure-side estimates took as given, and proceeded to disaggregate, the production-side *GDP* series. The disaggregation that eventually appeared in Fenoaltea (2012) was conceptually straightforward. The 1911-price production-side estimates of value added were broken down into 22 components. These production series and net indirect taxes were attributed to investment *I*, private consumption *C*, and public consumption *G* with series-specific, time-invariant coefficients; deflated exports and imports were similarly allocated with year-specific coefficients that reflected their composition. The 1911-price expenditure-side estimates thus incorporated evidence of changes in the mix of goods produced and of goods traded, and were consistent by construction with the corresponding production side. The resulting expenditure-side aggregates are illustrated, together, in Figure 1.[4]

Baffigi's algorithms were more complex. No doubt because the present author's reconstruction was still circulating privately, Baffigi made no use of it. Some expenditure-side series he borrowed some from the earlier literature, the others he estimated using readily-available proxies. As he retells it (Baffigi 2011, pp. 60–63), he consistently used the 1871-1891-1911 expenditure-side benchmarks (consistent, by construction, with his similarly-anchored production side), as necessary forcing his current-price series through them. That apart, from the "centennial" corpus (Fuà 1969) he took the public consumption series at constant and current prices.[5] From the

[3] Baffigi also provided full estimates at present-day borders; his current-border estimates are preferred here, as from 1871 to 1913 they coincide with the constant borders of the present author's estimates.

[4] The title of Fenoaltea (2012) refers to the deconstruction, as well as the reconstruction, of the expenditure side. The former showed how the Istat/Vitali (and Maddison) reconstructions were made to tell (in quantitative terms) the story their proponents believed to be true, *ex ante*. The logic of the story overrode both evidence and logic *tout court*; it takes considerable *naïveté* to consider economics a science, and economic "data" (which they in fact are not) as objective "observations" rather than culture (and prejudice)-bound constructs (Fenoaltea 2011, p. xix).

[5] The constant-price public-consumption series reflects the corresponding production-side government services series, apparently badly distorted by a very poor deflator (Fenoaltea 2005, pp. 292–296). The complaint is not that Baffigi borrowed a series from the "centennial" corpus – that would be a stone thrown from a glass house (Fenoaltea 2005, p. 310) – but more specifically that he borrowed one that was known to be grossly distorted.

present author (Fenoaltea 1987) he took the constant-price "value of new construction" series (which does not include maintenance), mated it to the "centennial" deflator (Fuà 1969) to generate the corresponding current-price series, and pressed these into service to represent "investment in construction."

The other consumption and investment series were new estimates, indexed by proxies and then jointly rescaled to maintain consistency with the (here given) production-side estimates of *GDP*. Private consumption at current prices was indexed directly by the imports of consumption goods, from the Federico *et al.* (2011) database, and then deflated by Istat's cost-of-living index. Investment in plant, machinery, and transport equipment was similarly indexed to 1880 by the net imports of the appropriate goods from the Federico *et al.* (2011) database, and then by the import-quantity series in Warglien (1985), using the Fuà (1969) machinery price index for the appropriate conversions (Baffigi 2015, pp. 142–143).[6] Residual investment (some 20 percent of the total in 1861 and from 1885, but with an intervening peak of 35 percent in 1875) includes ("agricultural") investment in horses for urban services (indexed by the transport and communication production series), but its dominant component refers to (industrial) "investment goods produced by other sectors," that is, all save engineering and construction. This last appears to have been estimated first in current terms, as a percentage (linearly interpolated between the benchmark figures) of that in plant, machinery, and equipment, and then deflated by the Istat cost of living index (ibid., pp. 145–146).

With these algorithms Baffigi obtained, from a production side very similar to the present author's, an expenditure side that is at times very different (again, Figure 1); but the differences appear to be distortions rather than improvements. One source of weakness is Baffigi's use of the "centennial" price indices, which are as noted of questionable quality.[7] A more general concern stems from his use of consumption- and investment-good imports to proxy for the corresponding, much larger, expenditure aggregates.[8] The procedure assumes, or at least hopes, that imports and domestic production essentially moved together: ideally in lock-step (as if shocks were demand shocks and world and domestic supply elasticities were much the same), or at least in similar proportions across sectors (as the common error would then be appropriately corrected by the final, joint rescaling). Given the swings in the openness of the Italian economy over the period at hand (Federico *et al*. 2011, p. 5; Fenoaltea 2012, p. 293), and their differentiated causes, that assumption seems weak, that hope forlorn. Between the late 1870s and the mid-1890s a series of tariff hikes represented sector-specific relative-supply shocks, that tended to move imports and domestic production in opposite directions; over most of the 1880s, the "grain invasion" was a major consumption-specific supply shock, and domestic grain production, at least, surely fell as imports surged and prices dropped; over the early 1900s the surge in demand for investment goods was *initially* met very largely by imports, as the short-run import-supply curve was significantly more elastic than its domestic counterpart, and after 1908 imports fell as domestic production continued

[6] With respect to 1881–1911 Baffigi (2011), p. 62 refers only to the "Warglien (1985) quantity index"; Baffigi (2015), p. 142 confirms that the reference is to Warglien's net-import-tonnage series (Warglien's Table 1, cols. 3 and, in index form, 4), and not to his constant-price-apparent-consumption-of-machinery series (his Table 7, col. 3), which varies altogether less (with a peak in 1908 just 1.20, as opposed to 1.78, times the 1911 benchmark). Warglien's apparent-consumption series reflects the present author's work in progress at that time; in the light of more recent work, between 1881 and ca. 1895 its time path too is seriously distorted (Fenoaltea 2017b).

[7] The cost-of-living index in particular seems to understate the fall in the cost of living in the early 1880s (Fenoaltea 2002a, p. 285); also above, footnote 5.

[8] The figures in Baffigi (2015), pp, 178–180, 185–187 have imports varying, over the period at hand, between 8 and 14 percent of total resources (*GDP* plus imports), and between 10 and 19 percent of (mis-labeled) private consumption plus non-construction investment: the extrapolation from a small part to the whole is akin to attempting the reconstruction of an entire skeleton from a handful of bones.

to increase (Fenoaltea 1967, 2017b; also Warglien 1985, above, footnote 6).

The most seriously distorted estimates would appear to be the investment series. After the turn of the century, the distortion is inherited directly from the machinery-import-series proxy, for the reasons noted: the final investment series much overstates the investment boom to 1908, and introduces a subsequent bust, because the initial import-based investment series does so.[9] Over the early 1880s, in contrast, the import proxies much overstate the growth of *consumption*; but consumption is much the largest component of the expenditure side, and whatever the vagaries of the initial estimates the rescaling of the figures to meet the *GDP* constraint reduces their final error to a relatively small one. But that rescaling is applied to the investment series as well: the overstatement of consumption is reabsorbed in part by reducing the overstatement of consumption itself, and in part by understating investment. Baffigi's investment estimates show a quantum jump around the turn of the century, but it would seem to be the product of their shift from a downward bias over the preceding years to an upward bias over the later ones.[10] The present author's preliminary expenditure-side estimates were simply constructed, and lack the investment breakdown of Baffigi's; but because they also reflect the domestic production of consumption and investment goods – and not just, as his do, the path of imports – they appear to be intrinsically sturdier.

But all this is prologue. The "benchmark" production-side estimates for 1911 and the entire "second-generation" production side have been revised, far more extensively than might have been expected (Fenoaltea 2017a).[11] The very similar production-side *GDP* series in Fenoaltea (2005) and Baffigi (2015) turn out to be badly distorted (Figure 1, panel A); both the extant expenditure-side estimates have been stripped of their foundation, both are dead. This paper comes to bury them, not to praise either one; a new set of expenditure-side estimates, consistent with the revised production-side estimates, is offered as their epitaph.

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[9] Because the short-run elasticity of the world investment-goods supply curve exceeded that of the domestic supply curve, imports were far more volatile than domestic production; they fell after 1908 not because demand fell, but because the growth in demand decelerated.

[10] The public-consumption and construction-investment series were not rescaled; but that simply increased the necessary rescaling of the residual (consumption, investment) series, and the point stands. Baffigi's investment series does not appear to be referenced in Toniolo (2013b), but its turn-of-the-century step change is clearly grist for Toniolo's neo-gerschenkronian/neo-rostowian mill (Fenoaltea 2017b, pp. 23–25).

[11] The series for all three major production sectors have been amended: by doing some things Baffigi could have done but may not have time to do, some that he could not then have done at all, and some – the most significant – that should have been done long ago. The revised estimates for agriculture improve the Federico series of the earlier reconstructions by eliminating some double-counting, by remedying an omission, and most significantly by incorporating year-to-year harvest fluctuations; the extant sector and *GDP* series are no longer spuriously smooth (Baffigi 2015, p. 99). The revised estimates for industry incorporate the accumulated new results since the 2003/2005 provisional synthesis, including in particular the recently compiled estimates for the engineering industry; these improvements raise the sector aggregate's long-term growth rate, albeit by very little. The series for the services are the most extensively revised. The quantity indices are often markedly improved, and the long swing (in construction) now appears in the services-sector aggregate altogether more sharply than before. The most significant improvement, however, is to the series' anchors, the benchmark estimates of value added in 1911 (by Zamagni in Rey 1992, partly revised by Zamagni and Battilani in Rey 2000), which the extant production-side reconstructions had simply accepted at face value, *et mea culpa*. The long-available description of those benchmarks' derivation has finally received a careful reading; a number of gross distortions are evident, and these have at last been removed. The upshot is that the sector aggregate in 1911 is markedly reduced, and so too, derivatively, are the constant-price estimates of Italy's service-sector value added and *GDP* from Unification to the Great War.

2. The new expenditure-side estimates: on method

The expenditure-side aggregates suggested by, and consistent with, the new production side are constructed here. Methodologically, their derivation from the production side and the trade series is close kin to the present author's earlier effort: in general and in principle, aggregate investment and consumption are estimated as before by allocating to these the production-side estimates of value added (and the value of exports and imports), and not, as would seem more natural, the apparent consumption of final investment and consumer goods. The latter approach is in fact impracticable: the breakdown of final goods and services cannot be calculated directly because the (large) fabricated-metal and wood-products industries both produce a mix of final goods (e.g., tools) and intermediate goods (e.g., elements of buildings), and the composition of the mix is unknown. But we do know that all fabricated-metal products, for example, are (final or intermediate) investment goods, and that aggregate investment therefore includes the entire value added of that industry (and that contributed, supplier by supplier, to its raw materials).[12] The calculation of the expenditure-side aggregates is based on this simple intuition.

Some changes to the method have been introduced. In the first place, the estimates are no longer constrained by the "benchmark" expenditure-side estimates for 1911 (in Rey 1992, 2000, 2002): the latter were based on the "benchmark" production side-estimates, and are therefore, like those, altogether superseded.

Second, the joint constraint imposed on *C* (private consumption), *I* (gross investment), and *G* (public consumption) by *GDP* (from the production side), *X* (exports), and *M* (imports) is amended. The already emphasized revision to the *GDP* series is the essential driver of the new estimates, but the *X* and *M* series are here also improved, to allow for some miscounted items and for the international freights earned by Italian ships.

Third, the estimates of *C*, *I*, and *G* are obtained sequentially rather than together. Public consumption *G* is a gimme: it is estimated first, simply by scaling up the production-side figures for government services to allow for the consumption of materials. Fixed investment I_f is estimated next, by identifying, as before, the components of the here elementary (1911-price value added) production and trade series that are investment goods, or enter their production; private consumption *C* and inventory investment I_i are then obtained as a large joint residual, disentangled as explained below.[13]

Fourth, the time-invariant allocation of the elementary series to (fixed) investment is here refined: in Fenoaltea (2012) the elementary series were 22 production-group series, the present estimates rely where useful on the author's product-specific series, of which there are hundreds. The impact of this refinement is however perforce a modest one, as it captures only the changing composition of what are, in the present perspective, minor industries; the big-ticket items are the large durable-goods industries like construction and engineering, and these continue to dominate the aggregate (fixed) investment series.

Fifth, the estimating algorithms are at times simplified (bastardized, if one will) by abandoning the allocation (to the expenditure categories) of production value added and of import and export values, uniformly applied in Fenoaltea (2012). In the case of the industries that processed agricultural products, in particular, the investment component is calculated directly in

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[12] This of course to a first approximation, to clarify the concept. The consumer-durable component is in fact non-trivial, but it can be estimated and deducted.

[13] The new ordering of the estimates, from small (*I*) to large (*C*), is itself a methodological improvement, as in the presence of an overarching constraint as one moves from sector to sector the derivative errors tend thus to be reduced rather than magnified. An example may be clearer than an abstract explanation. Imagine that $C + I = 100$, and that our direct estimates of *C* and *I* will be off by 8 percent. Say $C = 75$ and $I = 25$. If we estimate *C* first, and get 69, $I = 100 - C = 31$: the 8 percent error in *C* yields a 24 percent error in *I*. If instead we estimate *I* first, and get 27, $C = 100 - I = 73$: the 8 percent error in *I* yields a less-than-3 percent error in *C*.

value terms, including the cost of the raw materials; the (agricultural) production of the latter, and the corresponding international trade, do not therefore need to be considered. Similarly, the investment-good consumption of (other) agricultural goods is estimated directly in aggregate terms, again obviating the need to deal separately with (agricultural) production and imports.

A sixth and final modification is the calculation of a separate inventory-investment series, which Fenoaltea (2012) omitted altogether. To a first approximation inventory movements are not documented at all, and can be reconstructed only by inference; and the quantitative historiography is not encouraging. In the centennial corpus, it may be recalled, the inventory-investment series was absurd in its own right, and in fact the slack variable that reconciled the production-side story shaped by the sources and the expenditure-side story shaped by the conventional wisdom of the day (Fenoaltea 2012 and above, footnote 4). In the sesquicentennial corpus, the main purpose of the "inventory investment" series appears to be to smooth the fixed-investment series: a quixotic endeavor, if our priors do not particularly limit the short-term fluctuations of stock-adjusting flows, and reject the notion that a fifth or so of the machinery produced *and imported* in 1907 and 1908 could have been left idle (as implied by Baffigi 2017: industrial firms would surely not buy equipment just to store it, absent a reason to expect unusual price increases, and merchants burned by over-ordering in one year would hardly order even more the next).

Here, there appears to be scope for a meaningful inventory-investment series. The estimating algorithm described above identifies fixed investment alone, and leaves in the residual ($GDP - I_f - G - X + M$) the sum of consumption and inventory movements (including not least those due to fluctuations in the annual harvest, to the extent that they were not absorbed by international trade). Because consumption-smoothing is to be expected, actual private consumption C can reasonably be estimated as a smoothed version of that residual, and the discrepancies between the raw and smoothed residual can then serve as estimates of inventory (dis)investment I_i, to be added to fixed investment I_f to obtain total investment I.

The difficulty here is that the smoothing of $(C + I_i)$ itself yields essentially offsetting movements in I_i, that cumulate to practically nothing. Over the half-century at hand, however, Italy's economy experienced substantial growth; and since production and distribution both take time, the stock of goods-in-process and finished goods awaiting sale surely increased. The solution adopted here is to estimate "normal" production-and-distribution stocks directly, to deduct them from $(C + I_i)$ to obtain a net residual that includes only consumption and consumption-smoothing inventory investment, and to identify C with the smoothed version of that net residual. By construction, therefore, the estimates of C are reasonably smooth, and the estimates of (total) inventory investment I_i cumulate to a reasonable positive total. To be sure, as in the earlier literature the present inventory-investment series contains no direct evidence at all. It is again a slack variable; but it here serves to generate a private consumption series more reasonable than the one obtainable in its absence, and the estimated inventory movements might just possibly bear some relation to the actual ones.

The description of the derivation of the new expenditure-side aggregates makes for tedious reading; it is confined to Appendix A. The new estimates themselves are instead presented here, in Table 1.[14]

3. The new expenditure-side estimates: an overview

The new aggregate estimates are also illustrated, and compared to their predecessors, in Figure 1; Figure 2 takes a closer look at the investment and consumption series.

The *GDP* series appear in Figure 1, panel A. The estimates in Fenoaltea (2012) and Baffigi (2017) were as noted very similar; the revised estimates are sharply lower, again as noted, due to

[14] To avoid insignificant but annoying discrepancies, all the subaggregates and aggregates reported in the tables are obtained by summing over the appropriate series as also reported, rounded, in the tables.

the removal of conspicuous errors in the production-side estimates (Fenoaltea 2017a).

The trade series appear in Figure 1, panels E and F. The export series (panel E) in Fenoaltea (2012) and Baffigi (2017), and the new estimates, are all very similar, as one would expect, given that all three incorporate the data in Federico *et al*. (2011); the perceptible differences are over the early decade, and tied to the allowances, if any, for border changes.

The import series (panel F) reveal surprising differences: not between the present author's successive estimates (where the only material difference is tied to the new allowance for border changes), but, over the early decades, between these and Baffigi's. The initial decade is affected by border changes; but Baffigi's figures are over 25 percent above the new estimates in 1871, and gradually approach the latter over the ensuing two decades or so. The bulk of the discrepancy seems traceable to Baffigi's forcing of the sesquicentennial series through the current-price 1871 benchmark produced within the sesquicentennial project itself, reported in Baffigi's worksheets as 1,190.7 million lire, against 961.47 million lire reported by Federico *et al*. (2011, p. 88).

The public-consumption series appear in Figure 1, panel D; they are almost embarrassingly different. All three are derived from the public-administration component of the corresponding production side. As recalled above, Baffigi incorporated the incongruous Istat/Vitali series obtained by applying to the current-price public-administration series an obviously distorted deflator (above, footnote 5). The series in Fenoaltea (2012) was dominated by a simple interpolation of census benchmarks, with added wartime peaks; these apart, it essentially avoided spurious movements by avoiding movement altogether. The new series is again based on a deflated current-price public-administration series, but its deflator was carefully constructed to avoid introducing spurious cycles (Fenoaltea 2017a).

The private-consumption series appear in Figure 1, panel B. All three capture the new (*rectius* revived) conventional wisdom, to the effect that the 1880s were a period of rising consumption, like the *belle époque*, rather than a period of crisis, as claimed by the post-war historiography (Fenoaltea 2002, 2011, ch. 3). The curves resemble each other, but their levels differ. Baffigi's correction to the Fenoaltea (2012) series essentially shifted it up; the present revision suggests that the proper correction was actually in the opposite direction. It must be kept in mind, however, that the reduction in the (constant-price) *value* of consumption stems from a reduction in the estimated cost of the attendant services, of the *distribution* of consumption goods (above, footonote 11); there is no downward revision in the estimated *quantities* of goods consumed, and the reduction in *C* does not imply, as it might seem to, a lower standard of living.

Private consumption is also the subject of Figure 2, panels A and B. Panel A compares the estimated consumption series to the consumption-plus-inventory investment series from which it is derived, illustrating the impact of the selected smoothing algorithm. Panel B illustrates the per-capita consumption series obtained from the new consumption estimates and the population series in Fenoaltea (2005), Table 1, col. 1. To the present author's eyes, its most suspect feature is the relative modesty of the increase over the decade to 1887, compared to that over the *belle époque*, in the face of real-wage increases that appear to have been of very similar magnitude (Fenoaltea 2011, p. 126). The problem may be traced to the agricultural-production series, which incorporates demand-side estimates obtained with a wage series that itself understates growth over the 1880s (Federico 2003, p. 376 and footnote 41).

The investment series appear in Figure 1, panel C: they are perhaps the most significant, as the interpretation of Italy's post-Unification economic progress turns on our understanding of the path of capital accumulation, and of the forces that shaped it (Fenoaltea 2017b). In this case the revised series is more volatile than that in Fenoaltea (2012), because it (alone) includes inventory movements. But as can be seen in Figure 2, panel C the inventory movements estimated here are quickly self-annulling to a reasonable residual (unlike those of the centennial corpus, which for that very reason were patently absurd, Fenoaltea 2012, pp. 294–296), and apart from a small trend difference estimated total investment is essentially a "noisy" version of estimated fixed investment. The fixed-investment series itself much resembles its predecessor: almost inevitably so, because they are both dominated by the path of domestic investment-goods production, relatively well-

established a number of years ago.[15] Baffigi's very different series, obtained through the algorithm described above, is instead dominated by the path of imports alone; imports were a relatively small residual subject to idiosyncratic shocks, and his proxy turns out to be a poor one.

In the 1860s, Baffigi's series yields very low values: his algorithm apparently led him significantly to underestimate investment over that decade − and to overstate the subsequent growth in investment to the cyclical peak of the early 1870s.[16] His series also seems to overstate the decline to the subsequent trough, in the late 1870s: not surprisingly so, if as seems likely imports were more elastically supplied than domestic investment goods. Over the run-up from that trough to the late-1880s peak his series seems to grow at an approximately correct rate (as the greater elasticity of import supply was offset to a nicety by increases in tariffs), but the series starts and ends much below the apparently appropriate level. In later years, with essentially unchanged nominal tariffs, Baffigi's series is again plagued by excess volatility, essentially registering local peaks (or troughs) in *levels* when they were only in the growth rates: the most obvious distortion is the notable overstatement of the investment boom to 1907−08, and the suggestion of a subsequent bust where the evidence points to a mere deceleration.

4. The new expenditure-side estimates: the burden of the evidence

The revision of the production-side estimates suggested that from Unification to the Great War Italy's *GDP* was rather lower than we had thought.

The derivative revision of the expenditure-side estimates suggests a parallel advance on one front, and a retreat on another. The advance concerns private consumption: it too, like *GDP*, is revised downward (albeit, as noted, without welfare implications). The retreat concerns aggregate investment: the step-wise growth attributed to it by the sesquicentennial series is a figment generated by unfortunate algorithms, and the earlier view that it followed a (Kuznets-cycle) long swing is emphatically reaffirmed.

[15] The modification to the production side in Fenoaltea (2017a) has little effect on the fixed-investment estimates, as the production figures for the producers of durable goods (and the import series) are little changed. The significant revision to the *GDP* series is tied essentially to the estimates for agriculture and the services, little involved with investment goods, and thus shows up essentially in the consumption and inventory-investment estimates.

[16] Baffigi's series is at current borders, but his series at today's borders has investment in 1874 2.3 times that in 1870, not much below the comparable ratio (2.4) obtained from his current-border series: the latter should not be taken to suggest that in the 1860s investment in Italy at its post-1870 borders was concentrated in Latium and (to 1866) Venetia.

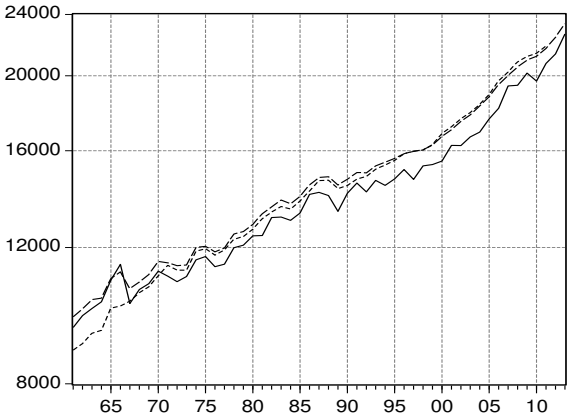
Table 1. Revised expenditure-side estimates,1861-1913
(million lire at 1911 prices)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		I					
	C	fixed	total	*G*	*X*	*M*	*GDP*
1861	7,552	1,001	975	1,092	470	629	9,460
1862	7,620	1,088	1,141	1,143	544	650	9,798
1863	7,805	1,114	1,043	1,260	614	712	10,010
1864	8,066	1,105	1,043	1,301	565	764	10,211
1865	8,322	1,101	1,397	1,358	548	730	10,895
1866	8,425	1,025	1,315	1,744	613	685	11,412
1867	8,340	960	606	1,247	604	636	10,161
1868	8,378	940	887	1,309	653	636	10,591
1869	8,492	988	1,086	1,192	668	663	10,775
1870	8,623	1,027	1,236	1,337	631	642	11,185
1871	8,632	1,023	1,047	1,170	857	688	11,018
1872	8,649	1,080	992	1,212	772	782	10,843
1873	8,747	1,251	1,079	1,227	748	793	11,008
1874	8,973	1,247	1,513	1,257	700	876	11,567
1875	9,122	1,191	1,385	1,242	823	888	11,684
1876	9,152	1,225	1,050	1,235	835	937	11,335
1877	9,230	1,225	1,125	1,252	712	897	11,422
1878	9,381	1,267	1,395	1,280	905	969	11,992
1879	9,541	1,290	1,457	1,290	954	1,156	12,086
1880	9,669	1,368	1,451	1,306	1,039	1,042	12,423
1881	9,758	1,454	1,308	1,386	1,141	1,159	12,434
1882	9,936	1,608	1,873	1,355	1,159	1,203	13,120
1883	10,075	1,664	1,762	1,405	1,201	1,306	13,137
1884	10,240	1,783	1,578	1,459	1,140	1,411	13,006
1885	10,527	1,812	1,897	1,486	1,030	1,644	13,296
1886	10,828	1,931	2,249	1,546	1,141	1,709	14,055
1887	10,973	1,912	2,282	1,610	1,194	1,925	14,134
1888	10,918	1,846	1,620	1,694	1,138	1,363	14,007
1889	10,865	1,744	1,337	1,690	1,066	1,600	13,358
1890	11,025	1,754	1,903	1,656	982	1,463	14,103
1891	11,233	1,673	1,924	1,621	1,035	1,275	14,538
1892	11,305	1,672	1,475	1,610	1,121	1,356	14,155
1893	11,424	1,621	1,862	1,608	1,141	1,388	14,647
1894	11,477	1,609	1,412	1,606	1,298	1,359	14,434
1895	11,623	1,562	1,699	1,629	1,279	1,516	14,714
1896	11,751	1,590	1,856	1,659	1,334	1,470	15,130
1897	11,770	1,614	1,349	1,646	1,423	1,493	14,695
1898	11,894	1,644	1,926	1,649	1,526	1,700	15,295
1899	12,019	1,704	1,729	1,654	1,715	1,759	15,358
1900	12,218	1,921	1,791	1,662	1,611	1,764	15,516
1901	12,506	1,967	2,296	1,659	1,704	1,909	16,253
1902	12,721	2,088	2,094	1,659	1,829	2,054	16,246
1903	12,972	2,155	2,332	1,665	1,827	2,119	16,673
1904	13,189	2,251	2,229	1,667	1,896	2,067	16,910
1905	13,560	2,486	2,629	1,675	2,039	2,309	17,590
1906	14,011	2,887	2,939	1,703	2,155	2,648	18,155
1907	14,656	3,224	3,821	1,749	2,073	2,895	19,399
1908	15,095	3,521	3,619	1,763	1,987	3,023	19,436
1909	15,490	3,453	3,996	1,798	2,108	3,226	20,160
1910	15,618	3,708	3,315	1,841	2,195	3,279	19,683
1911	16,028	3,840	3,949	1,961	2,221	3,413	20,739
1912	16,513	4,032	4,071	1,974	2,434	3,651	21,334
1913	17,200	3,988	4,500	2,021	2,505	3,577	22,644

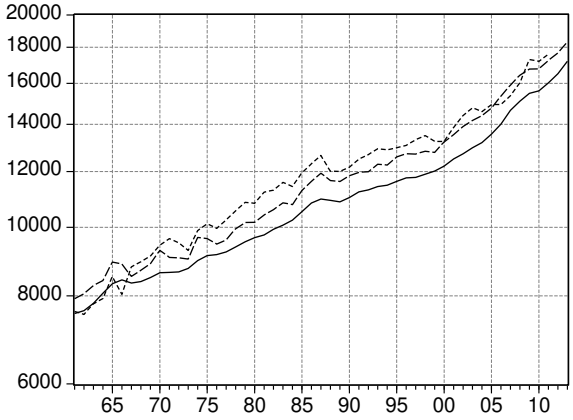
Source: see text.

Figure 1. Expenditure-side estimates at 1911 prices

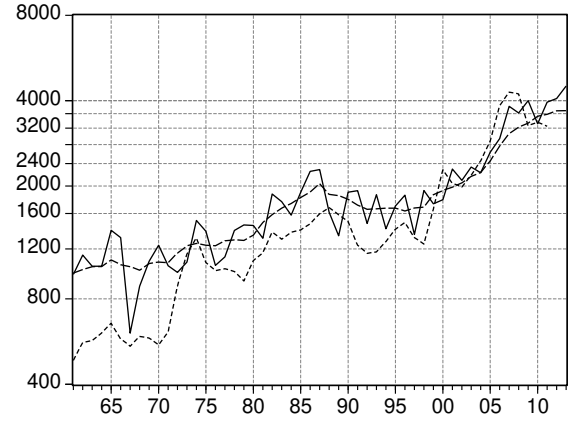
A. *GDP* (from the production side)



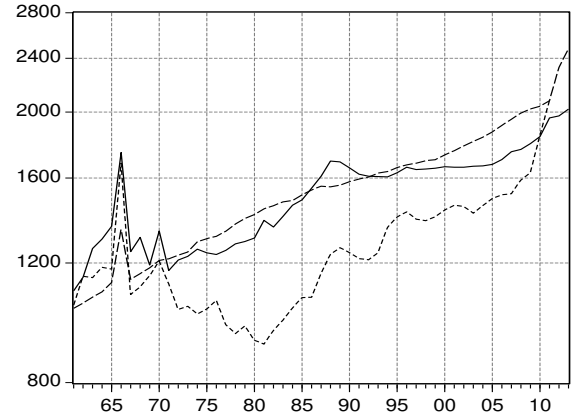
B. Private consumption



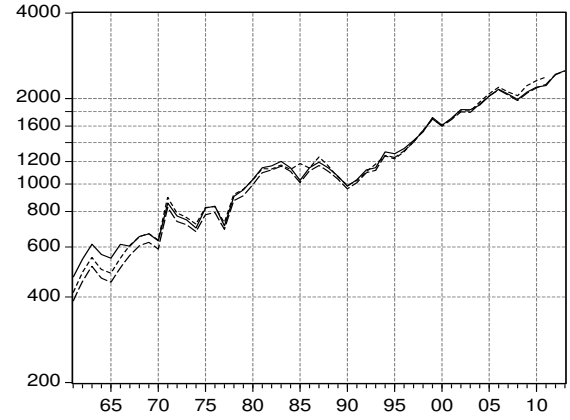
C. Investment



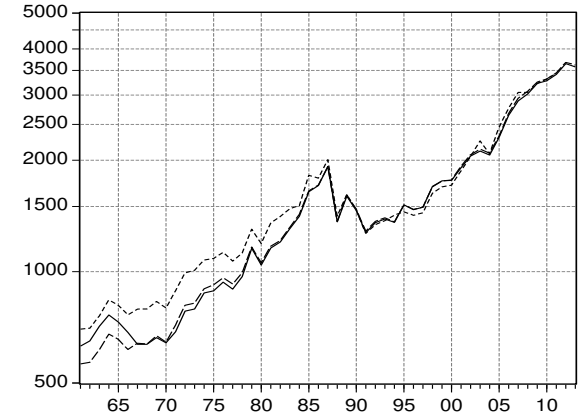
D. Public consumption



E. Exports



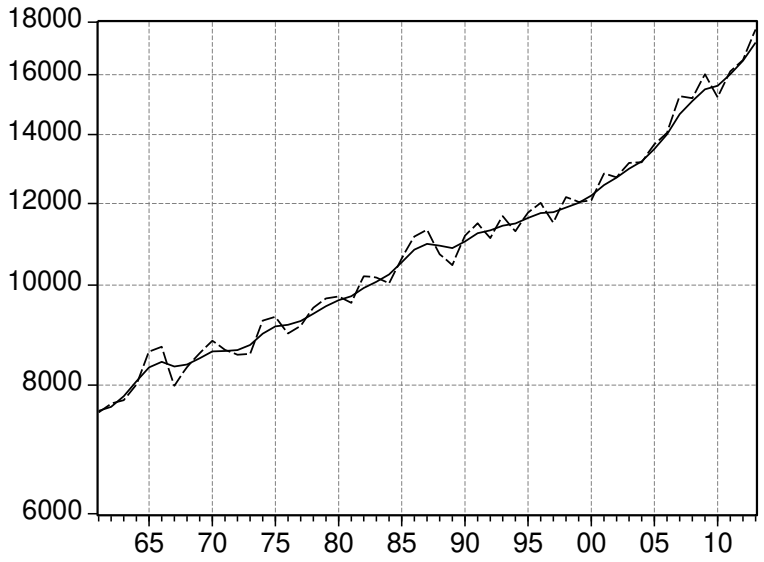
F. Imports



——— revised estimates — — — Fenoaltea (2005) -------- Baffigi (2011)

Figure 2. Private consumption and investment at 1911 prices: a closer look

A. Private consumption and private consumption plus inventory investment (million lire)



——— private consumption — — — private consumption plus inventory investment

B. Per-capita private consumption (lire)

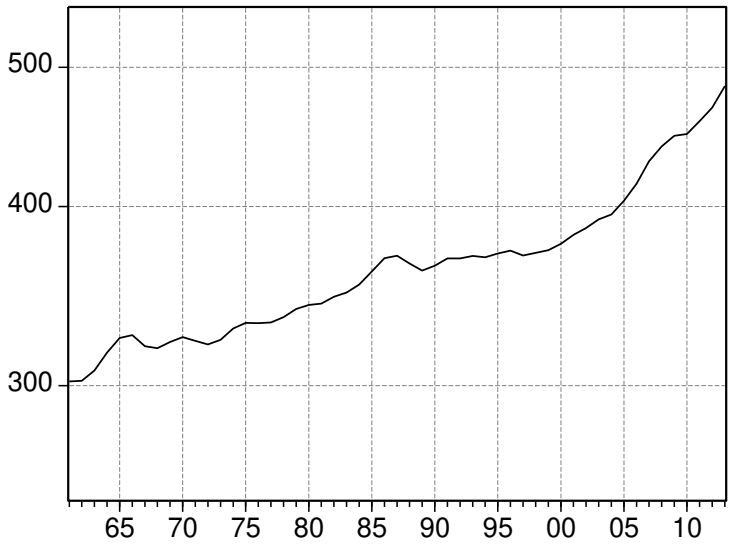
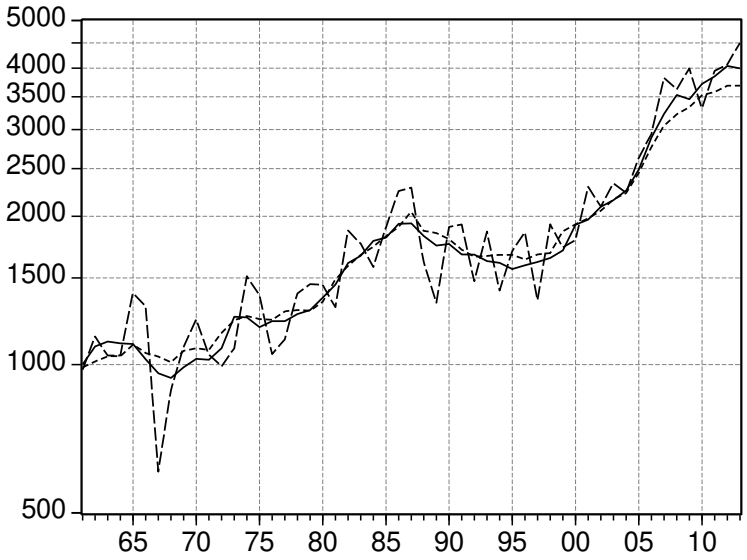


Figure 2 (continued)

C. Total investment and fixed investment (million lire)



——— revised estimates (fixed investment) — — — revised estimates (total investment)
-------- Fenoaltea (2012) estimates ("total investment," *de facto* fixed investment)

Appendix A. The revised expenditure-side aggregates

A1. GDP

As noted, the nature of the sources for the period at hand is such that *GDP* can only be estimated from the production side. The *GDP* series in Table 1, col. 7 is transcribed from Fenoaltea (2017a), Table 1, col. 28.

A2. Exports and imports

The aggregate export and import series transcribed in Table 1, cols. 5 and 6 are constructed in Table A1.

In Table A1, cols. 1 and 6 refer to 1911-price exports and imports, as derived, from 1862 to 1913, from the Federico *et al.* (2011) database. These differ slightly from their preceding versions (Fenoaltea 2012, Table 1, cols. 4 and 5): where the latter were obtained by deflating total exports on the one hand and total imports on the other by the corresponding price indices, the present export and import series are obtained by separately deflating primary products and manufactures by their specific price indices (Federico *et al.* 2011, pp. 226, 228), and then summing the results. The Federico *et al.* (2011) database excludes 1861; the present figures for that year in cols. 1 and 6 are obtained from those for 1862, using as indices the corresponding 2012 estimates (and, indirectly, Istat series, Fenoaltea 2012, p. 304).

Cols. 2 and 7 are very tentative corrections for border changes.[17] In 1871, of the national male population over 15, Latium accounted for 3.5 percent, Venetia for 9.8 percent (Fenoaltea 2011, p. 206); on this simple basis, the exports and imports of the missing regions are estimated, in the first instance, as 15.3 percent of the Kingdom's figures in 1861–66 and 3.6 percent in 1867–70. But these initial estimates attribute to Latium and Venetia the same reduced exports, and bloated imports, that the Kingdom owed to its massive capital imports. Those regions' trade was presumably far more nearly balanced; here, for simplicity, the initial estimates of their exports and imports are simply averaged together, and that average is transcribed in both cols. 2 and 7.

Cols. 3−5 and 8−10 tentatively correct the data in the *Movimento commerciale* itself. Before 1881 that source appears to omit seagoing ships (but to count trivial quantities of vessels for internal navigation, at least in 1862−76), while in later years it apparently continues to omit imports of naval vessels, and to count poorly what it does count (Fenoaltea 2018); the Federico *et al.* (2011) database inherits these apparent errors and omissions.[18] Cols. 3 and 8 are the ship-related *Movimento commerciale* value figures in the database (Fenoaltea 2018, Table 6, cols. 3 and 6), deflated by the appropriate Federico *et al.* (2011) manufactured-goods price indices. Cols. 4−5 and 9−10 are estimates based on high-quality ship-specific sources, taken from Fenoaltea (2018): cols 4 and 9 from Table 1, respectively cols. 54 and 55 (from 1861), cols. 5 and 10 from Table 5, respectively col. 10 and col. 11 (from 1865; both are extrapolated back to 1861 in proportion to net imports, col. 12 minus col. 9 in that same Table 5).

Col. 11 is a further correction, of a different order, applied to the import series alone. Because imports are valued c.i.f., the import figures include the value of the transportation services

[17] Reckoning by indivisible years, the Kingdom included Venetia only from 1867, and Latium only from 1871. Baffigi (2015, 2017) appears to have scaled up the Kingdom's total exports and total imports by some 5 percent in 1867–70, to allow for Latium, and 16 percent in 1861–66, to allow for both Latium and Venetia.

[18] That data base also misidentifies the physical units of the ships it does count, as ships' tons (units of internal volume) are taken to be units of weight: the reported quantities are multiplied by 10, and said to be in quintals.

as well as the (embarkation) value of the goods themselves; and those services were in fact imported only if performed by foreign-flag carriers. Fenoaltea (2015F), Table F.26, transcribes reported port movements; despite their faults (ibid., section F02.05), they are here taken at face value. The net tonnage of Italian-flag arrivals is reported there, distinguishing sail and steam (cols. 6 and 8), as is that of Italian-flag international arrivals (cols. 10 and 12).[19] The sail and steam figures are summed to obtain total tonnages for Italian-flag total and international arrivals, whence total domestic-arrival tonnages are obtained as a residual. The international- and domestic-arrival tonnages are then summed with weights of 10 and 1, respectively (at a guess, the relative trip lengths). The international share of that sum is calculated (it equals near 70 percent in the 1860s and '70s, and then nearer 60 percent), and applied to the estimated value added in maritime transportation (Fenoaltea 2017a, Table 3, col. 6). The figures in col. 11 are the resulting estimates of value added in Italian-flag international navigation, here identified, for simplicity, directly with the relevant value.[20]

Aggregate 1911-price exports and imports, transcribed in Table 1, cols. 5 and 6, are obtained from Table A1: the export series as col. 1 + col. 2 − col. 3 + col. 4 + col. 5, the import series as col. 6 + col. 7 − col. 8 + col. 9 + col. 10 − col. 11.

A3. Public consumption

Public consumption is here identified, as logic requires, with the absorption by the public sector of non-durables; the acquisition of durable goods by the public sector, as by firms, is here considered investment.[21]

The earnings of public employees are the largest component of public consumption, and the residual consumption of goods and services is plausibly tied to their number. The public-consumption series in Table 1, col. 4 is simply the government-services value added series in Fenoaltea (2017a, Table 1, col. 24), suitably scaled up.

The 1911 government-services value added estimate incorporated there, 1,239 million lire, comes from Battilani, Felice, and Zamagni (2014); comfortingly, it is closely confirmed by the centennial-corpus estimate of 1,217 million lire, derived from the same public budgets (Istat 1957, pp. 149–154, 238). The corresponding purchases of (consumption) goods and services are less easily ascertained. Zamagni presented an estimate for 1911 of 831 million lire (Rey 1992, p. 233; also Rey 2000, p. 369), without, however, a single word to clarify its content. More usefully, Istat (1957) includes an estimate of the value of public goods and services (1,939 million lire), which is explicitly said to be the sum of public-sector labor costs (in essence, value added) and the cost of currently consumed materials (*materiali di servizio*), clearly excluding investment goods (ibid., pp. 152−153, 240).[22] Here, the cost of current materials is set equal to the difference between Istat's goods-and-services figure (1,939 million lire) and their value added estimate (1,217 million lire), or

[19] The missing data for 1897−1900 in cols. 10 and 12 are here estimated. The 1896 figures are extrapolated in proportion to total arrivals (col. 8), with the annual growth of the latter series so rescaled, in each case, as to interpolate the reported figures for 1901.

[20] Materials costs, notably fuel costs for steam transportation, were significant, but coal was of course imported.

[21] Vitali's estimates, apparently informed by the standard conventions, count the increment in public roads, for example, as investment, and the increment in other public durables as consumption (Vitali in Rey 1992, pp. 314−315), an absurdity up with which one cannot put. The convention that attributes consumer durables to consumption rather than to investment is equally absurd, but here accepted, albeit with a bad conscience.

[22] Following the Italian conventions of the day, which made more sense than those since imposed by the hegemonic powers, Istat (1957) distinguished between intermediate and final public goods and services, and excluded the former from public consumption and *GDP*; and this is why the estimate of *G* (827 million lire, p. 261) falls short, as the present estimate cannot, of the corresponding public-sector value added estimate.

722 million lire.

The present public-consumption series in Table 1, col. 4 accordingly scales up the production-side value added series by a factor of ((1,239 + 722)/1,239).

A4. Fixed investment

Fixed investment − simply "investment," through the rest of this section − is here estimated by summing the investment-good components of production, activity by activity, and the analogous components of international trade; all components are measured at 1911 prices, the production figures (normally) in terms of value added, exports and imports in terms of value. The order in which these are considered reflects the logical sequencing of the estimates themselves.

A4.1 Investment goods: industry

The (fixed) investment component of value added in industry is presented, by industry group, in Table A2.

A4.1.1 The extractive industries

Table A2, col. 1 refers to the extractive industries. The annual physical product of each of the 32 identified goods (Fenoaltea 2015B, Summary Table B.1) is weighted by the conventional 1911-price unit value added (ibid., Summary Table B.2, panel B1).[23] Of the resulting value added, the investment-good share is set equal to 50 percent for the mineral fuels (ibid., Summary Table B.1, cols. 1−4), 100 percent for the non-precious metal ores excluding mercury and pyrite (ibid., cols. 5−8, 11−12, and 15−16), again 100 percent for asphalt rock (ibid., col. 22) and all quarry products (ibid., cols. 28−32), and zero otherwise.[24] Over the period at hand quarry products dominate the resulting total, with a 71 percent share of the cumulative total; the main metal ores accounted for another 25 percent.

A4.1.2 The manufacturing industries: food and tobacco

The food and the tobacco industries are here assumed to have produced only consumer goods, and do not appear in Table A2.

A4.1.3 The manufacturing industries: textiles and apparel

Table A2, col. 2 refers to the textile and apparel industries together; this series is derived in Table A3. These too are essentially consumer-goods industries, with, however, some here relevant exceptions, notably within the hemp industry. The investment goods considered here are (hemp) rope, sailcloth, and tarpaulins; for simplicity (so that the agricultural-investment-good estimates below can simply ignore hemp), the entire value of these final products is counted here in col. 2.

The rope component is obtained easily enough: the output series is ready-made (Fenoaltea 2002b, Table 2, col. 32, transcribed in Table A3, col. 1), and at 1911 prices rope is valued at 1,250 lire per ton (ibid., p. 33).

The sail component is altogether more tentative, at every stage. First, output is estimated in proportion to domestic demand alone, as if international trade were negligible. Demand was presumably both for new ships and for replacement, but the relevant coefficients are not easy to pin down. The *Enciclopedia italiana*, vol. 24, p. 360 reports some figures for large metal-hulled sailing

[23] In another absurdity, the national accounts conventionally measure the "value added" of the extractive industries by the value of output, excluding minor items (e.g., purchased fuel for the pumps) but not the value of the principal raw material (the goods below ground that are extracted); see Fenoaltea (1988). Here, the conventional measure is conveniently close to a value measure (excluding as noted purchased fuel, here counted elsewhere).

[24] This is of course an approximation. Most retained sulphur (from sulphur ore and pyrite) was used for sulphuric acid and thence fertilizer; comparatively small quantities, here neglected, entered the manufacture of explosives and thus (again in part) mining and quarrying.

vessels; the *Melbourne* is attributed 1,953 square meters of sail and a displacement of 3,500 tons, the *Preussen* 11,580 displacement tons and 5,080 gross register tons, whence, assuming everything scales, some 1.3 square meters of sail per gross register ton (and per net ton as well: in the case of sailing ships net tons are only a few percentage points under gross tons, and the present margin of error is greater than that).

The weight of sailcloth is also uncertain. The *Movimento commerciale* does not identify hemp cloth by weight per unit area, but it does suggest that the heaviest yarn was of the order of 7,000 meters per kilogram (tariff category 143a), and that a square piece of cloth 5 mm. on the side might contain some 30 threads (tariff category 151a1). One square meter would thus contain 6,000 linear meters of yarn, or (6/7) = .86 kilograms of cloth; assuming seagoing vessels carried a full set of spare sails, a 1,000-gross-register-ton sailing vessel would come equipped with 2,600 square meters of sails weighing some (2.6)(.86) = 2.2 tons. Table A3, col. 2 transcribes the estimated weight of the sails for new ships, obtained simply as 2.2 (tons of sail per thousand gross tons) times the gross tonnage constructed (Fenoaltea 2015F, Table F.21, col. 4); the 25,000 gross tons constructed in 1861, for example, correspond to just 55 tons of sails. Table A3, col. 3 transcribes the estimated weight of the replacement sails. Assuming that a (double) set of sails lasted 4 years, on average, the production of replacement sails for the extant fleet is calculated from the total (net) tonnage of the latter (ibid., Table F.24, col. 6) by deducting the above (gross) tonnage of the new vessels and multiplying the residual by .25 times 2.2 (tons of sail per thousand gross tons). In 1861, for example, the (517,000 − 25,000 =) 492,000 tons of old ships are taken to have been reequipped with some 271 tons of sails. Sailcloth is here valued at 4,000 lire per ton (from the export prices for hemp cloth, *Movimento commerciale* tariff category 151a1).

Table A3, col. 4 transcribes the estimated weight of the tarpaulins produced, essentially for carters, again neglecting international trade. In 1911, the *Censimento demografico* reports some 234,000 men (and a handful of women) in category 8.31, "road transportation," which includes drivers of animals and (all) vehicles, and stable hands; the *Censimento 1901* reported in category XVII.10 some 125,000 carters, muleteers, and stable hands. Here, very tentatively, the number of carters is set equal to 100,000 in 1900, and attributed and average of 3 kilograms of tarpaulins (4 square meters at 1 kilogram each, for 75 percent of the carters), for a tarpaulin stock of some 300 tons in 1900. That stock is further assumed to have increased 2.5-fold from 1861 to 1911 (the approximate increase in the road-transport series, Fenoaltea 2017a, Table 3, col. 5, ignoring the cyclical movements tied to construction materials that did not, in the main, need to be covered); the estimated stock in 1900 is accordingly extrapolated at the corresponding growth rate (near 1.85 percent p. a.). Annual tarpaulin production (Table A3, col. 4) is estimated very simply as the annual increment in the stock plus (assuming a ten-year life) one tenth of the previous year's stock; reassuringly, the quantities involved seem trivial. Tarpaulins are here valued at 3,800 lire per ton (*Movimento commerciale*, tariff category 153a).

Table A2, col. 2 is the sum of the four series in Table A3, weighted by, respectively, 1,250, 4,000, 4,000, and 3,800 lire per ton. Again (perhaps) reassuringly, the first component (ropes) always accounts for at least nine-tenths of the total.

A4.1.4 The manufacturing industries: leather

Table A2, col. 3 refers to the leather industry. The latter has yet to be properly researched, and the extant production series simply interpolates a handful of census-year benchmarks (Fenoaltea 2017a); the estimates of its investment component cannot be anything but crude. The good news is that the evidence points here to small values, so even large relative errors remain small in absolute terms and not overly disturbing in the larger scheme of things. In 1911, the leather industry is attributed a value added of 300 million lire, on the strength of an overwhelmingly male labor force of some 377,000 individuals (Rey 1992, pp. 141−143). The *Censimento demografico* (vol. 4, p. 11) lists in category 3.62 ("belting and saddlery") a mere 14,200 individuals, or some 4 percent of the industry total, and a good share of their product went no doubt to households rather than businesses. An investment-good value added of 10 million lire in 1911,

including an allowance for the initial tanning, is selected here; it cannot claim more than single-digit accuracy. Absent useful evidence, half is attributed to belting, half to harnesses for the transportation industry.

The harness component is extrapolated using the road-transport series (Fenoaltea 2017a, Table 3, col. 5). Assuming a ten-year life, the index of harness demand in year *t* is calculated as the increment in that series from $t - 1$ to *t*, plus 10 percent of its value in $t - 1$; the missing figure for 1861 is simply set equal to that obtained for 1862. The resulting index is then rescaled to set 1911 = 5 (million lire at 1911 prices). The extrapolation of the belting series is similarly adventurous. The *Censimento industriale*, vol. 4, p. 522 lists a total of 1.6 million primary horsepower in use (in the part of industry it covered), of which 1.0 million converted to electricity; excluding categories 3 (where power use was dominated by milling, which did not use belting) and 8 (dominated by the utilities), these figures fall to .53 and .19 million horsepower, suggesting that in 1911 some 36 percent were converted to electricity, a figure comparable to the 39 percent obtained for category 6 (textiles) alone. Fenoaltea (2015F), Table F.51, col. 15 reports annual efficiency-corrected estimates of coal (or coal-equivalent) used to raise steam to drive industrial and agricultural machinery; to allow for the replacement of belting by wiring, that series is here reduced by 2 percent in 1894, 4 percent in 1895, and so on through 36 percent in 1911 to 40 percent in 1913. Proceeding as before but assuming a six-year life, the index of beltings demand in year *t* is calculated as the increment in that amended series from $t - 1$ to *t*, plus one sixth of its value in $t - 1$; the missing figure for 1861 is simply set equal to that obtained for 1862. The resulting index is then again rescaled to set 1911 = 5 (million lire at 1911 prices). The sum of these two indices is the present tentative estimate of 1911-price value added in leather-investment-good production.

For simplicity, to obviate the need for more complex calculations, the series in Table A2, col. 3 is the estimate of the corresponding value, including that of the hides (produced by domestic agriculture, or imported). The *Movimento commerciale 1911* reports the following export values, per ton: fresh cowhides (category 616), 1,750 lire; common tanned hides (627, 630), ca. 4,000 lire; industrial belting (651), 9,000 lire. Allowing for plausible weight losses and the cost of ancillary materials, value added per ton of output would appear to have been not far from 4,500 lire, or approximately 50 percent of output value; the leather-investment-good value estimates in Table A2, col. 3 are accordingly obtained very simply as twice the value added estimates obtained as just described.

A4.1.5 The manufacturing industries: wood

Table A2, col. 4 refers to the wood industry: a largely artisanal, poorly documented, inadequately researched industry, like the leather industry, but, unlike it, not dominated by the new production and maintenance of consumer durables. It is taken to coincide with 1911-census categories 3.1 ("wood") and 3.2 ("wood-like materials"), excluding 3.22 "straw ware" (essentially braid and hats, here included in the apparel industry). In 1911, it is attributed a value added of 386 million lire, of which 344 million for its labor force (over 415,000, again overwhelmingly male) and 42 million to capital (Rey 1992, pp. 143−145).

Two basic stages of production are usefully distinguished: the production of lumber from timber, and that of the industry's final products from lumber. The first stage corresponds to census category 3.11, "initial processing of wood" (sawmills and more, *Censimento demografico*, vol. 4, p. 8), with some 19,000 workers. The analogous data in the *Censimento industriale* (vol. 4, pp. 508−509, 520−521) attribute to that category over 40 percent of the wood industry's horsepower, but implicitly, given the simplicity of the machinery, a lower share of the return to the industry's capital. On this slim evidence, the production of lumber is here attributed a value added of 30 million lire, leaving 356 million to that of wood products from lumber.

The consumer-good component of the latter may be gauged from the detailed labor-force figures in the *Censimento demografico* (vol. 4, pp. 8−9). The labor force in categories 3.12 (small ware, mostly consumer goods: 16,700), 3.17 (furniture: 60,100), 3.18 (musical instruments: 3,200), 3.21 (caneware: 19,800), and 3.25 (brooms: 2,300) totals 102,000. These figures suggest

that in 1911 a quarter or so of wood-products value added, or some 89 million lire, was generated in the production of consumer durables (which are also investment goods, of course, but not so recognized by the standard conventions to which this paper reluctantly conforms), and 267 million lire in that of producer durables ("investment goods").

As luck would have it, the *Movimento commerciale* suggests that trade in wood and wood products was overwhelmingly in timber and lumber (and firewood), and that trade in finished products was, in comparison, negligible; the investment content of wood-products consumption can accordingly be estimated from domestic production alone. With accuracy *ultra vires*, the present estimates aim at least for simplicity: domestic production is here estimated directly in value terms, so that the value added in producing the raw materials need not be considered in its own right.

Cianci (1933) reports the price of pine beams in 1911 as 65 lire per cubic meter, or some 110 lire per ton (Colombo, 1919, p. 61).[25] In 1911, the *Movimento commerciale* assigns a price of 650 lire per ton to generic wood products (category 560), 800 lire per ton to spools (561), 850 lire per ton to ordinary vehicle parts (559) , 1,050 lire per ton for flooring (542) and 1,600 lire per ton to ordinary wood furniture (543). Tentatively allowing a 900-lire-per-ton average and 25 percent weight losses, and using Cianci's lumber price, a ton of output may have consumed lumber worth near 150 lire, whence, with a further small allowance for other costs, a value added in the neighborhood of 720 lire per ton of output, or 80 percent of value. The 1911 benchmark estimate of the value of investment-goods production (and consumption) in 1911 is accordingly 125 percent of the corresponding value added estimate, or some 334 million lire; the corresponding estimate of the value of consumer goods equals 111 million lire. For future reference, in quantitative terms the total value of 445 million lire corresponds to some .49 million tons of output, consuming .66 million tons of lumber worth an estimated 72.5 million lire.

In principle, of course, the consumption- and investment-good value benchmarks should be differently extrapolated; but there is little useful evidence with which to distinguish their time paths, not least because the cyclical movements of the consumer-goods component may well have been dominated by the alternating fortunes of the wealthy classes, and the path of luxury-good consumption (e.g., that of precious-metal products, Fenoaltea 2015F, Table F.54, col. 4) much resembles that of the wood industry's estimated aggregate product (Fenoaltea 2017a, Table 1, col. 8). The assumption that the two components moved together seems as good as any, and the above investment-good benchmark is accordingly extrapolated in direct proportion to the production series itself. The resulting estimates are transcribed in Table A4, col. 1.

These estimates of the 1911-price value of the finished investment goods produced by the wood industry are to be complemented by estimates of the lumber consumed as such by other investment-good industries, notable engineering and construction.[26] The engineering-industry component is practically ready-made, as that industry's lumber consumption (for ships and railway vehicles) has been estimated. Table A4, col. 2 is the sum of those tonnage estimates (Fenoaltea 2015F, Table F.20, col. 10, Table F.38, col. 5, Table F.41 col. 6, Table F.42, col. 9), simply multiplied by the above-cited price of lumber (110 lire/ton). For future reference, in 1911 the total tonnage is just over 68,000 tons, for a value of some 7.5 million lire.

The construction-industry component is instead very tentatively estimated here, starting with a quantity figure for 1911. As noted above, the census data point to a value added in lumber production near 30 million lire; a quantity estimate is derived from that figure, and an estimate of value added per ton of output. The price of lumber is set, as above, at 110 lire/ton. The difficulty is that part of the lumber was derived from rough-hewn logs, which the *Movimento commerciale* valued at 65 lire per ton (category 524), and part from imported squared-off or cut logs, valued at 95

[25] The *Sommario*, p. 181, reports the price of railway ties at an incongruously low 56.2 lire per ton; one suspects an inappropriate conversion from volume units to weight units.

[26] The construction industry also consumed lumber in the form of finished wood products (e.g., doors and window frames incorporated in buildings), which are covered by col. 1.

lire per ton. In producing lumber from rough-hewn logs, allowing a 20 percent weight loss, the margin between the price of lumber and the cost of the raw material was some 29 lire per ton of lumber; deducting one-fifteenth of that for energy and other costs value added can be estimated at some 27 lire per ton. In producing lumber from squared-off logs, on the other hand, allowing a 3 to 4 percent weight loss, the margin between the price of lumber and the cost of the raw material was near 12 lire per ton of lumber, pointing to a value added of perhaps 11 lire per ton.

Imports of squared-off logs rose significantly, from .9 million tons 1904 to 1.2 million tons in 1913, but the length of time they were left to season in unknown; here, in round figures, the resulting lumber output in 1911 is estimated to have been near 1.1 million tons, for a value added near 12 million lire. This estimate leaves a residual value added of 18 million lire for lumber from rough-hewn logs; at the 27 lire per ton estimated above, the implied output is some .7 million tons, for a total of 1.8 million tons, with an aggregate value of 198 million lire.[27]

Of that, from the preceding estimates, wood products are estimated to have consumed lumber worth some 72.5 million lire, the engineering industry lumber worth another 7.5 million lire; the value of the implied residual consumed by the construction industry was accordingly some 118 million lire. For simplicity, this benchmark is here extrapolated in direct proportion to the value added of the construction industry (here transcribed in Table A2, col. 10); the resulting figures are transcribed in Table A4, col. 3.

The value of the wood industry's investment goods, transcribed in Table A2, col. 4, is simply the rounded sum of Table A4, cols. 1−3.

A4.1.6 The manufacturing industries: metalmaking and engineering

Table A2, cols. 5 and 6 refer to the metalmaking and the engineering industry, respectively. Like the wood industry, the engineering industry produced durables − including consumer durables, which are here to be (artificially) excluded; the metal industry supplied the raw material. Unlike the wood industry, the metal and engineering industries have been extensively researched (Fenoaltea 2015E, 2015F), but not with an eye to the distinction between consumption and investment goods. Table A2, cols. 5 and 6, must accordingly be constructed; the estimates of the industry aggregates are given (Fenoaltea 2017a, Table 1, cols. 9 and 10), those of the consumer-goods components are collected in Table A5.[28]

The engineering group comprised the (investment-good) shipbuilding and rolling-stock industries, and four further major subgroups, respectively the fabricated metal ("hardware"), general equipment ("ordinary" machines, structural components), precision equipment, and precious-metal-products industries. The structure of the industry in 1911 is documented by the census data, here collected in Table A6 (extracted from Fenoaltea 2015F, Table F.1); as argued elsewhere, the best guide to actual employment (at the peak of the boom) is provided by the labor-force totals in col. 2.[29] The detailed description of each category's content (e.g., *Censimento demografico*, vol. 4, pp.

[27] The quantity estimate sits well with the evidence that the State railways handled 1.7 million tons of lumber in 1911 (Fenoaltea 1983, p. 79).

[28] The engineering-industry estimates in Table A2 include value added in new production, and in maintenance; Vitali's estimates, apparently informed by the standard conventions, exclude maintenance (Vitali in Rey 1992, pp. 314−315). New production takes a good with certain physical characteristics and transforms it into a good with more desirable ("valuable") physical characteristics, maintenance takes a good with certain physical characteristics and transforms it into a good with more desirable ("valuable") physical characteristics: one fails to detect a meaningful difference between the two. Be that as it may, the estimates in Fenoaltea (2015F) are sufficiently detailed to allow alternative calculations.

[29] See Fenoaltea (2015a). The industrial-census totals in col. 4 are much lower, as they tabulate only the questionnaires sent to workshops (with at least two workers) separate from the owner/manager's residence, and correspondingly exclude much artisanal production; they remain useful, as the horsepower data are a guide to capital intensity. It may be noted that the two censuses used the same categories, save that the industrial census placed vertically integrated shops in separate categories (with an ω in the appropriate

12−14) is an invaluable guide to the goods actually produced, albeit not always, for present purposes, an adequate one. In the case of fabricated metal, for example, the largest categories refer to blacksmiths (4.31) and other smiths (4.32); they are said to cover those employed doing what those smiths do, which is of little help.

A4.1.6.1 Fabricated metal

Consumer-good fabricated-metal maintenance is estimated as follows. For 1911, the *Censimento demografico*, vol. 4 reports some 9 million persons over age 10 working in agriculture, under 5 million working in industry, and 27 million persons in all; of these last, those engaged in "family production" were perhaps 40 percent (a woman and a girl in a family of 5 over age 10). Daily hours spent handling metal tools averaged perhaps near 8 for agricultural workers (allowing for the time spent tending animals and the like), as many again for industrial workers (allowing for the factory workers that tended machines), and just 1 for family workers; and an index of roughness of use set equal to 1 for family production (cooking) may equal 3 for industry, and say 120 percent of that, or 3.6, for agriculture. Together, these coefficients point to a relative maintenance burden per person over age 10 equal to 72 per person in agriculture and 60 per person in industry, against 1 per person at large; together with the census figures recalled above, they suggest that of total fabricated metal maintenance activity some 66 percent was devoted to agricultural tools, 31 percent to industrial tools, and just 2.8 percent to household equipment. Similar calculations using the same weights and the corresponding data from the earlier censuses yield shares equal to 71, 27, and 2.6 percent, respectively, in 1901, and 73, 25, and 2.3 percent, respectively, in 1871.[30]

The successive shares of the maintenance total thus attributed to agriculture (73, 71, and 66 percent) are very close to corresponding shares attributed to blacksmiths (73, 70, and 68 percent, from Fenoaltea 2015F, Summary Table F.1); this sits well with the assumption that the blacksmiths' maintenance activity and the maintenance of agricultural tools essentially coincided (Fenoaltea 2017, §1.3). At the same time, the successive consumer-goods shares of all fabricated-metal maintenance (2.3, 2.6, and 2.8 percent), applied to the corresponding totals (140.67, 177.12, and 195.05 million 1911 lire, Fenoaltea 2015F, Summary Table F.3), yield shares of fabricated-metal maintenance excluding blacksmiths (37.87, 52.64, and 62.37 million 1911 lire, ibid., Summary Table F.1) that grow only from 8.54 to 8.75 and finally 8.76 percent. For simplicity, the estimates of consumer-good value added in fabricated-metal maintenance transcribed in Table A5, col. 1 are obtained by linearly interpolating these last percentage shares, and applying them to aggregate fabricated-metal maintenance, net of blacksmiths.

The corresponding consumer-good new production shares are even more tentative. Excluding smithing, the fabricated-metal group is here identified with category 4.3 net of 4.31 and 4.32, plus 4.52 (weights and scales, mostly traditional steelyards rather than machines). Using the labor-force figures in Table A6 and allocating to consumer goods 100 percent of categories 4.36 (base-metal medals and coins), 4.37 (base-metal tableware, kitchenware) and 4.39 (knife-grinding, presuming that those who used knives professionally sharpened their own), 90 percent of 4.33 (metal furniture and metal signs), 50 percent of 4.35 (cables, springs, tin cans) and 4.38 (cutting tools from knives to sickles and swords), 10 percent of 4.34 (general hardware, covering everything from nails to hairpins), and 5 percent of 4.311 (a residual that includes plating and enameling), and 4.52 (weights and scales), one obtains an overall consumer-goods share of the fabricated-metal group, excluding smiths, equal to 48 percent of the labor force and, by extension, of value added. The value added estimates for this sub-group equal 62.83 million lire in all, of which 8.65 in maintenance (Fenoaltea 2015F, Tables F.03, F.46) and, implicitly, 54.18 million lire in new production; consumer goods are attributed 48 percent of the total, or some 30.2 million lire in all.

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position). Not included in Table A6 are the workers the industrial census attributed to shops integrated across the major branches of engineering (14,321), engineering and metalmaking (29,286), metal-processing and wood-working (10,980), and metal-processing and construction or construction materials (4,371).

[30] The 1881 census notoriously overcounted female employment, and was not used (Vitali 1970, pp. 31−43).

Allowing consumer-goods maintenance 8.76 percent (as above) of the 8.65 million lire maintenance figure, or some .8 million lire, the residual attributed to this group's value added in the new production of consumer goods equals some 29.4 million lire, or a not unreasonable 54 percent of the sub-group's new-good total.

Blacksmithing (4.31) and other smithing (4.32) are attributed a value added of 216.66 and 68.18 million lire, respectively, of which 132.68 and 53.72, respectively, in maintenance (ibid., Tables F.03, F.46) and, implicitly, 83.98 and 14.46 million lire in new production. Blacksmiths' new production would appear to have involved very few consumer goods, other smiths' perhaps rather more; here, very tentatively, consumer goods are attributed 3 percent of blacksmiths' new production and 10 percent of other smiths', or another 4.0 million lire. The total value added in the new production of fabricated-metal consumer goods in 1911 is accordingly set equal to 33.4 million lire.

The corresponding time series is transcribed in Table A5, col. 2. The new-production figure for 1911 is here extrapolated in proportion to total fabricated-metal value added, including maintenance (ibid., Summary Table F.3, col. 14): that series shares the cyclical movements of new production, but with the cycle, essentially related to new construction (Fenoaltea 2017b), damped by the maintenance component. Reasonably enough, next to the population figures in the *Sommario* (p. 39, col. 1), it implies a per-capita value added rising from .61 1911 lire in 1871 to .66 in 1881, .68 in 1901, and .96 in 1911, the only census year that was in fact a long-cycle peak.

A4.1.6.2 General equipment

Table A5, col. 3 and 4 refer in turn to the general equipment component of the engineering industry (ordinary machinery and structural components); in Table A6 this group corresponds to all of the industries in category group 4.4, plus those in categories 4.54, 4.55, 4.57, and 4.58 (Fenoaltea 2015F, chapter F01). The only category producing consumer goods of any significance would appear to be 4.43, bicycles and automobiles; the production of sewing machines, in particular, appears to have been negligible (ibid., p. 118), but the stock of such machines was obviously maintained.[31] The estimates for group 4.4 excluding ships and railway vehicles total 79,900 workers, 32,750 horsepower, and a value added of some 162 million lire, of which 96 million labor costs and 66 million capital costs (ibid., Tables F.02 and F.03). In category 4.43 alone the censuses counted near 16,800 workers (none of them artisans, oddly, given those engaged in our own day in bicycle assembly and repair) and some 4,100 horsepower (Table A6); these figures suggest that bicycles and automobiles accounted for some 21.0 percent of the above labor cost and 12.5 percent of the above capital cost, for a total value added of some 28 million lire. The "large" shops (with over 10 employees) alone employed approximately 8,900 persons and 3,400 horsepower (Fenoaltea 2015F, Table F.01), pointing to a value added near 18 million lire; assuming that new production occupied all the large shops and a fifth of the residual, 20 million lire are here attributed to the new production, and 8 million lire to the maintenance, of cars and bicycles.

These figures are here extrapolated as follows. In 1911, the circulating stock of metal road vehicles can be estimated, in units of weight, near 17,300 tons of bicycles, and 11,400 tons of automobiles and motorcycles (Fenoaltea 2015F, p. 119). The annual tonnage of circulating bicycles is estimated, allowing 20 kilograms per bicycle, from the number taxed (ibid., Table F.51, col. 21), smoothed and shifted by calculating the stock in year t as the sum of .25 times that taxed in years t and $t - 2$ and .5 times that number in year $t - 1$. The annual tonnage of circulating motor vehicles is instead estimated on the simple assumption that that stock increased by a third from year to year (so that, working backwards, the stock becomes negligible around the turn of the century). The sum of these two tonnage series is used to extrapolate the 8-million-lire maintenance benchmark. The 20-million-lire new-production benchmark is instead extrapolated using the sum of the annual

[31] All ships (seagoing vessels), including naval ones, are here considered (private or public) investment goods (above, footnote 22). Once again, the estimates in Fenoaltea (2015F) are sufficiently detailed to allow alternative calculations (for ships; other armaments are not distinguished). Trucks, apparently few in number (ibid., p. 119) are not here explicitly considered.

increments in those circulating-stock tonnages, reduced by the corresponding net imports (ibid., Table F.45, col. 11). The annual new-production estimates so obtained are transcribed in Table A5, col. 4; the maintenance series in col. 3 sums over these estimates for cars and bicycles, and separate estimates for the maintenance of sewing machines, obtained as follows.

The national production estimates allow sewing-machine maintenance in 1911 one third the maintenance burden of bicycles, or some 1.6 million lire (= 8 million lire × .33 × (17,300/(17,300 + 11,400)), and extrapolate that benchmark in proportion to the estimated stock (ibid., section F04.10 and Table F.51, col. 20). As noted there sewing machines appear to have been largely household goods, but the smaller share (perhaps a quarter?) of the apparel industry was surely used far more intensively (by a factor of 10?), suggesting that household accounted for something near a quarter of the overall maintenance burden. Table A5 accordingly includes an allowance for the maintenance of household sewing machines equal to .4 million lire in 1911, again extrapolated in proportion to the estimated stock.

A4.1.6.3 Precision equipment

Table A5, cols. 5 and 6 refer to precision equipment; in Table A6 this group corresponds to the industries in categories 4.51, optical and precision instruments, 4.53, clocks and watches, and 4.56, metal musical instruments. To a first approximation clocks and watches can be considered consumer goods (ignoring tower clocks), metal musical instruments investment goods (of bands and orchestras); optical and precision instruments involved a mix, as they include eyeglasses as well as specialized investment goods.

The clock-and-watch value added series are ready-made: Fenoaltea (2015F), Summary Table F.1, cols. 24 and 25, times 8,000 and 15,000 lire per ton, respectively, cover new production, and col. 45 covers maintenance. In 1911, estimated value added equals 3.6 million lire in new production, and 10.6 million lire in maintenance.

The eyeglasses series must instead be teased out. The ready-made estimates are for categories 4.51 and 4.56 together; in 1911 they are attributed labor costs of 3.56 million lire and capital costs of 2.37 million lire, for a value added of 5.93 million lire, of which 4.57 in new production and 1.36 in maintenance (ibid., Tables F.03, F.46). The labor-force and horsepower figures for categories 4.51 and 4.56 in Table A6 (cols. 2, 5 and 6) suggest that the former category accounted for some 60 percent of the labor costs and 80 percent of the capital costs, for a total of some 4.0 million lire. Absent useful evidence, eyeglasses are tentatively allowed a value added of 1.5 million lire in new production, and .5 million lire in maintenance. There is no reason to attribute to the new production (maintenance) of eyeglasses the violent (growth) cycle attributed to all precision instruments (ibid., cols. 23 and 44); for simplicity, both the new production and the maintenance value added attributed to eyeglasses are extrapolated at the 1861-to-1911 growth rate attributed to the maintenance of all precision instruments.[32]

The sums of these estimates of value added in the maintenance, and in the new production, of clocks and watches on the one hand and eyeglasses on the other are transcribed in Table A5, cols. 5 and 6.

A4.1.6.4 Precious-metal products

Table A5, col. 7 refers to consumer-goods precious-metal products. The aggregate value added estimates appear in Fenoaltea (2015F), Summary Table F.3, col. 6 (attributed entirely to new production); at a guess, the consumer-good component is calculated as a constant 80 percent of that aggregate, leaving the balance as investment goods for Church and State.

A4.1.6.5 All engineering

[32] That growth rate (the fiftieth root of 1.36/.23, near 3.6 percent p.a.) is a multiple of the demographic growth rate, implying a rapid diffusion of eyeglasses among the poorer strata as incomes grew. The precision-instrument maintenance estimates may well grow excessively rapidly, but the absolute figures are too small to be worth revising.

The investment-good value added attributed to the engineering industry, transcribed in Table A2, col. 6 is of course the industry aggregate (Fenoaltea 2017a, Table 1, col. 10) less the sum of Table A5, cols. 1−7.

A4.1.6.6 Metalmaking

The investment-good value added attributed to the metalmaking industry, transcribed in Table A2, col. 5 is the corresponding industry aggregate (Fenoaltea 2017a, Table 1, col. 9) less the consumer-good component, here estimated as if it came entirely out of domestic metal output (and imported metal went entirely into investment goods). The metalmaking component of precious-metal ware is ignored: the raw material came presumably from stock, and was of course conserved in the final product.

For non-precious metals the ratio of metalmaking value added to engineering value added in any particular branch of new production can be expressed as the product of two coefficients, metalmaking value added per ton of metal and tons of metal per ton of engineering product (the input-output ratio), divided by a third one, engineering value added per ton of output. At 1911 prices ferrous metalmaking value added per ton of metal, including the reduction of the ore, equaled some 100 lire per ton (Fenoaltea 2015E, section E02.04). The standard coefficients in Fenoaltea 2015F, Table F.46 for fabricated metal, general equipment, and precision instruments, respectively, are input-output ratios of 1.35, 1.25, and 2.5, and values added per ton of output of 415, 900, and 16,500 lire. Together, these yield metalmaking value added to engineering value added ratios equal to some .325, .139, and .015, respectively.

The ratio of metalmaking value added to engineering value added in maintenance is similarly obtained, again using 100 lire per ton of metal, and, directly, the ratio of tons of metal consumed in maintenance to the corresponding engineering-industry value added. Again using the ready-made estimates (ibid., Table F.46, cols. 1 and 3, rows 5, 11, and 14), one obtains metalmaking value added to engineering value added ratios equal to .003 in the maintenance of fabricated metal, .012 in the maintenance of general equipment, and .001 in the maintenance of precision instruments.

The consumer-goods component of metalmaking value added in Table A5, col. 8 is accordingly obtained as the sum of cols. 1−6, weighted by .003, .325, .012, .139, .001, and .015, respectively.[33] The investment-good value added attributed to the metalmaking industry, transcribed in Table A2, col. 5 is thus the industry aggregate (Fenoaltea 2017a, Table 1, col. 10) less Table A5, col. 8.

A4.1.7 The manufacturing industries: non-metallic mineral products

Table A2, col. 7 refers to the non-metallic mineral products industry. The production estimates distinguish eight kiln products − plaster, lime, cement, bricks and tiles, terra cotta, ceramic, glass, and other products (essentially cement and plaster objects) − and two other products − cut/carved marble, and other processed stone, sand, and earth (Fenoaltea 2015C).

The investment component of the industry's aggregate 1911-price value added is here calculated in three parts. The first includes all the value added attributed to plaster, lime, cement, and bricks and tiles (ibid., Summary Table C.1, cols. 1−4 and Summary Table C.2). The second includes a part of that attributed to terra cotta, ceramic, and glass calculated as 22.5 percent of their 1911 total, or 13.15 million lire, extrapolated with the corresponding construction-related index (ibid., section C02.06 and Table C.07, col. 1). The value added attributed to the other kiln products is excluded altogether; the third part of the investment component includes all the value added attributed to the other (non-kiln) products (ibid., Summary Table C.3, col. 2).

The sum of these three components is transcribed in Table A2, col. 7. The tonnages of terra cotta, ceramic, and glass were a minuscule share of the total (under one percent in 1911, ibid.,

[33] The precision-instrument figures could be increased to reflect the use of non-ferrous metals, but the effect of that correction would be trivial.

Summary Table C.1), and the corresponding extractive-industry value added is here neglected.

A4.1.8 The manufacturing industries: chemicals

Table A2, col. 8 refers to the chemical industry. The chemical industry was small but complex, and its non-traditional, non-artisanal component was quite well documented, especially over the later part of the period at hand; the reconstruction of its production (Fenoaltea, 2015D) distinguishes 98 separate products. Most of these, however, including both traditional components (soaps) and modern ones (fertilizer), were or flowed into consumer goods; for simplicity, only a limited subset is here attributed to investment, and measured as usual by 1911-price value added (calculated from the physical units, ibid., Summary Table D.1, and the unit value added weights in Summary Table D.2).

Specifically, the value added of the chemical industry here attributed to investment is that attributed to the following products and product groups: of the principal acids group, soda nitric acid (Summary Table D.1, col. 2), used largely for explosives; the entire explosives group (ibid., cols. 10−13); the entire coloring-materials group, excluding only natural dyestuffs (ibid., cols. 14−20 and 22); of the electrochemicals and gases group, arc nitric acid (ibid., col. 25) and carbon electrodes (ibid., col. 44); of the other inorganic chemicals group, saltpetre (ibid., col. 64); and all of the coal and petroleum products group, excluding only briquettes (ibid., cols. 89 and 91−97). The resulting estimates run from some 7 million lire p. a. in the 1860s to a peak of some 41 million in 1913.

A4.1.9 The manufacturing industries: rubber

Table A2, col. 9 refers to the rubber industry. The rubber industry was a very small industry, with an estimated peak value added of under 13 million lire in 1912 (ibid., Summary Table D.3, col. 15), but it produced a complex mix of consumer and investment goods (*Censimento demografico*, vol. 4, p. 19, category 7.111). The present very tentative estimates of its investment component assume that the latter equaled two thirds of the industry's value added, net (from the 1890s) of that attributable to bicycle and motor-vehicle tires.

The circulating stock of circulating bicycles and motor vehicles was calculated above (para. A4.1.6.2), in units of weight. Annual tire consumption in units of weight is here calculated, in the case of bicycles, at 10 percent of the weight of the bicycles themselves (allowing for example 20 kg per bicycle, 2 kg for the tires, and replacement once a year); in that of motor vehicles, at 2.4 percent of the weight of the motor vehicles (allowing for example one ton per automobile, 16 kg for a set of tires, and replacement 1.5 times per year). These estimates imply a tire consumption of some 2,000 tons in 1911, and 2,700 tons in 1913, here attributed, like other rubber products, a value added of 1,780 lire/ton (Fenoaltea 2015D, Summary Table D.2).

Again to obviate more complex calculations, Table A2, col. 9 is directly the estimate of the value of those investment goods, rather than their value added. The prices of rubber goods varied widely; an average of 10,000 lire per ton seems reasonable (ibid., section D05.03), and Table A2, col. 9 is simply two thirds of the industry's value added excluding that attributed to tires, scaled up by (10,000/1,780).

A4.1.10 The manufacturing industries: paper and printing and sundry manufacturing

The paper, printing and sundry manufacturing industries are here assumed to have produced negligible quantities of investment goods, and do not appear in Table A2.

A4.1.11 The manufacturing industries: aggregate manufacturing

Table A2, col. 10 transcribes the estimated investment content of the entire manufacturing group's product; it is simply the sum of cols. 2−9.

A4.1.12 Construction

Table A2, col. 11 refers to the construction industry. Its entire value added (including that

in maintenance, above, footnote 28) is attributed to investment; the present series accordingly reproduces the corresponding production series (Fenoaltea 2017a, Table 1, col. 16).

A4.1.13 Utilities

Table A2, col. 12 refers to the utilities. The water and gas industries appear to have supplied, in essence, consumer goods; the product of the electric utilities needs instead to be allocated. The investment component would appear to consist in the main in the power supplied to the durable-goods industries. The *Censimento industriale*, vol. 4, reports the power of the electric motors in use running on purchased power; the figures reported for categories 2.1 (mining), 2.2 (quarrying), 3.1 (wood products), 4 (metal and metal products), and 5 (construction and construction materials) total approximately 150,000 horsepower. Most of these presumably operated intermittently, suggesting that a mean of 2,000 hours per year should not be far wrong; total power consumption in durable-goods production thus works out to some 300 million kWh. In 1911 the electric utilities generated just over 1,000 million kWh (Fenoaltea 2015J, Summary Table J.1, col. 1 and 2); here, the electric utilities' investment component is simply estimated as a constant 30 percent of their total value added (ibid., Summary Table J.3, col. 1).

Neglecting gas and water, as indicated, the resulting figures are attributed directly to the utilities as a whole, and transcribed in Table A2, col. 12.

A4.1.14 All industry

Table A2, col. 13, reports the total for industry (the sum of cols. 1 and 10−12). Col. 14 reports, as a *curiosum*, the share of industrial value added (Fenoaltea 2017a, Table 1, col. 18) represented by the investment component estimated here (Table A2, col. 13, for this purpose slightly swollen by the inclusion of agricultural raw materials); interestingly, it was near 50 percent at the long-investment-cycle peaks (1865, 1874, 1888, 1911−12), and nearer 45 percent in "normally" poor years (1868−71, 1875−80), but fell to near 40 percent during the worst of the end-of-the-century crisis (1896−97).

A4.2 Investment goods: agriculture

Table A7 transcribes the contribution of agriculture to (fixed) investment: estimated, for the reasons noted, not as a share of domestic production, to which net imports must then be added, but directly as the aggregate value of investment-goods consumed.

Agriculture produces, in the main, consumer goods. There are, on the face of it, five (first-order) exceptions: the raw materials (such as timber) entering the production of industrial investment goods, which can here be ignored as they have been included in the industrial estimates above; the fuels (firewood, charcoal) used notably in the processing of metallic and non-metallic minerals; the animals sold off-farm to the transportation sector (and the military); investment in on-farm improvements; and the increments in the herds of livestock.

A4.2.1 On-farm improvements

The least troublesome component is the value added in on-farm improvements, estimated as such on the production side (Fenoaltea 2017a, Table 2, panel A, col. 5); it here transcribed in Table A7, col. 1.

A4.2.2 Fuel

Charcoal was something of a specialty fuel, used where its chemical purity was of value. Firewood was instead the main traditional source of inanimate energy (surpassed by coal early in the twentieth century, Bardini 1998, pp. 21−23); but it was used overwhelmingly for domestic heating and cooking, so for present purposes the aggregate figures are essentially useless.

A more useful guide to the appropriate orders of magnitude is provided by the detailed fuel-consumption data for 1865 in the *Statistica mineraria.* These are collected in Table A8, ignoring mineral fuels (and, in one case, straw); the occasional volume figures are converted at the rate of .4

tons per cubic meter of firewood, and .2 tons per cubic meter of charcoal (Colombo 1919, pp. 60−61). The totals come to some .80 million tons of firewood (almost all in kilns), and .09 million tons of charcoal (all in metal-processing). The source's coverage is partial, as some industries are omitted (and others, like the bronze industry, appear covered very partially); but even allowing for that the totals in 1865 are small next to Federico's domestic-production totals for 1911 (7.5 million tons of firewood and .42 million tons of charcoal, Rey 2000, p. 17, converted as above).

The present investment-firewood series takes the 1865 benchmark of .80 million tons, and values it at Federico's 1911 average value (177 million lire/7.5 million tons), for a total of 19 million lire at 1911 prices. This figure is extrapolated using the product of two indices. One is simply the 1911-price value added of the kiln products industry (Fenoaltea 2015C, Summary Table C.3, col. 1), converted to set 1865 = 1. The second is an *ad hoc* index, also with 1865 = 1, that aims to capture the displacement of wood by mineral fuels, presumably as the local price of the latter was reduced by the development of inland railways and tramways (but not by the water-competing coastal routes). Since the inland secondary lines were built mainly between 1880 and 1895, and the (less important) tramways spread mostly from the turn of the century, this second index is tentatively so constructed as to decline by 2 percent p. a. in the 1860s and 1870s, then by 5 percent p. a. from 1880 to 1895, and then by 3 percent p. a. The resulting series is transcribed in Table A7, col. 2.

The investment-charcoal series is similarly constructed. The 1865 benchmark is calculated as .09 million tons valued at Federico's 1911 average value (18.5 million lire/.42 million tons), for a total of 4 million lire at 1911 prices. Ignoring minor consumers, 84 percent of that is attributed to the iron industry, and 16 percent to the copper industry, and specifically, again for simplicity, to the reduction of the corresponding ore. The pig iron and ingot copper series are those in Fenoaltea (2015E), Summary Table E.1, cols. 1 and 8, respectively. Both series display a long period of stasis, and then a tenfold and more increase in production that seems to correspond to the transition from traditional charcoal-based techniques to modern coal-and-coke-based techniques. Here, charcoal-based pig iron production is assumed to equal total production from 1861 (26,551 tons) through 1901 (15,819 tons), and then to have declined by 10 percent p. a. (to under 4,500 tons in 1913); charcoal-based ingot copper production is assumed to equal total production from 1861 (947 tons) through 1886 (408 tons), and then to have declined by 10 percent p. a. (to under 25 tons in 1913). These last two series are rescaled to set 1865 = 1, weighted by 4 million lire times .84 and .16, respectively, and summed. The resulting series is transcribed in Table A7, col. 3.

A4.2.3 Off-farm animals

Baffigi (2015), p. 145 considers investment in agricultural goods dominated by that in animals, mainly horses, for urban services. His 1911 benchmark is taken from Vitali, whose flow estimate refers back to Federico's stock estimate of "441,000" private animals; drawing on a near-contemporary animal census, Federico actually counted 328,100 "urban" horses (only 272,100 of them working horses, the rest foals or at stud) and 115,800 donkeys and mules, plus 52,000 (mostly horses) belonging to the State (Rey 2000, pp. 50, 316).

There are in fact three reasons to consider the private stock figures in the literature much overstated. First, Federico appears to have counted all the animals in the major *municipalities*, including their rural areas (whence the significant share of colts and stud horses, presumably not "urban" at all). Second, there is no allowance for the saddle and coach horses of the urban well-to-do. According to the *Censimento demografico*, vol. 4, p. 26, some 240,000 of Italy's males above age 10 declared themselves too rich to work (category 11.11). This moneyed aristocracy was based in urban *palazzi* with still-visible stables and coach houses: the number of horses that were private "consumption" goods, and irrelevant to "investment" (which conventionally excludes consumer durables) easily exceeded 100,000. Third, the *Censimento demografico* (ibid., p. 20) reports just 234,000 workers, almost all male, in category 8.31, "road transportation," which includes drivers of animals and vehicles, and stable hands; deducting perhaps 4,000 drivers of motor vehicles, 46,000 stable hands (20 percent of the residual), and 40,000 coachmen in private service (one for every six

"rich" males), the number of public-transport horse (and other equine) drivers falls to some 144,000.[34] They can hardly have averaged significantly more than one horse each, for an estimated stock of transport-sector working animals of perhaps 150,000.

Here, that 1911 stock figure is extrapolated in proportion to the estimated tonnage moved by road (Fenoaltea 2017a, Table 4, col. 18), and the annual intake is estimated in year *t* as the increment in the stock from *t* − *1* to *t* (for expansion) plus .15 times the stock in *t* − *1* (for replacement, tentatively assuming a 7-to-8-year working life, Federico in Rey 1992, p. 58, footnote 254), with the intake obtained for 1862 attributed to 1861 as well. The 1911-price value of that intake is calculated allowing 800 lire per animal (from the export price of horses, *Movimento commerciale 1911*, category 1055). The resulting private-horse investment series is transcribed in Table A7, col. 4; fortunately, it too does not exceed low double-digits.

State-owned horses are public capital goods, and the corresponding flow is not to be excluded from investment.[35] The estimates of the State-purchased component are even more tentative. As noted, Federico estimated a stock of 52,000 horses (and other equines) belonging to the State. Most were presumably in the military, a presumption confirmed by the figures for the Army's theoretical establishment: 40,410 in 1907, 43,824 in 1912, 45,424 in 1913 (*Annuario 1905-07*, p. 1015, *1912*, p. 337, *1913*, p. 401). The readily-available *Annuario* provides additional data only in the earliest editions, in the *Annuario 1878* (part 1, p. 88) and *1884* (p. 291), which report annual purchases from 1873 to 1881 (an average of 3,700 p. a., ranging from under 1,500 to over 10,700).[36] Without using further information, the present estimates of the horses purchased by the State is very tentatively obtained as follows. From 1861 to 1872, the number is set at a constant 4,000 p. a.; from 1873 to 1881, as the number of military purchases (*Annuario 1884*, p. 291), augmented by 600 p. a. for other services; from 1882 to 1907, 4,700 p. a.; from 1908 to 1912, 5,400 p.a., and in 1913, 6,300, with these last figures capturing the expansion suggested by the *Annuario 1905-07*, *1912*, and *1913*, cited above. These figures are then weighted as before by 800 lire per animal.

The resulting public-horse investment series, a mere single-digit affair, is transcribed in Table A7, col. 5. Given its poor quality, it is more of a tentative allowance to be added to the private-horse series in col. 7 than a separate estimate in its own right; the two series are here kept separate only to facilitate the exclusion from investment of its public component, by those who may wish to do so.

A4.2.4 Herd increments

Investment in herd increments is here estimated very roughly, from the first differences in the herd-stock estimates for sheep, bovines, goats, and pigs transcribed in Table A7, cols. 8−11; horses, rabbits, and barnyard fowl are simply ignored. The sheep-herd series is that estimated by the present author (Fenoaltea 2000, Table 1, col. 6); the other three were kindly provided by Giovanni Federico, a gift horse for which one can only be grateful.

The first differences are weighted by the unit prices indicated or suggested by the *Movimento commerciale 1911*: 25 lire each for sheep and goats (categories 1064 and 1065), 450 for bovines (against 710 for oxen, 460 for cows, and 250 for calves, categories 1059,1061, and

[34] This estimate is broadly confirmed by the here more detailed *Censimento 1901* (p. 144): some 64,000 coachmen (and other, minor groups, category XVII.9) and some 125,000 carters, muleteers, and stable hands (category XVII.10), from which private coachmen and stable hands are to be deducted.

[35] See above, footnote 31. Here too, the provision of separate estimates allows recalculation with different criteria.

[36] A second table reports, by breed, what appear to be exceptional replacement purchases. These averaged some 900 in 1874 and 1875 but 2,400 in 1874−81; they are here presumed to be a specification of, rather than an addition to, the cited reported purchases.

1063, respectively), and 100 lire for pigs (against 28 to 165 lire per animal, depending on its weight, categories 1066−1070).

The resulting series is transcribed in Table A7, col. 6. Its outlier in 1908 comes from the jump in the bovine herd; it may be correlated with that year's massive return migration from the United States.

A4.2.5 All agriculture

Table A7, col. 7 transcribes the aggregate estimate of agricultural value added flowing into investment; it is the simple sum of cols. 1−6. As noted, these estimates include the relevant import component.

A4.3 Investment exports and imports

The investment content of exports and imports is derived in Table A9, again improving on the algorithms used in Fenoaltea (2012). Table A9 is organized, like the Federico *et al.* (2011) database, by *SITC* category. *SITC* categories 0 and 1 refer to food, drink, and tobacco, and are here irrelevant. Categories 4, 5 and 9 refer to animal and vegetable oils, to chemicals, and to a residual, respectively; their investment-good content is assumed negligible.

A4.3.1. The investment content of SITC category 2

SITC category 2 refers to crude (non-fuel) materials, agricultural and mineral. The agricultural (inputs to) investment goods, relevant in principle, are here ignored, as they have already been allowed for above. The mineral (inputs to) investment goods are instead to be counted; because fuel-poor Italy was a high-cost processor of ores (its own, and a fortiori anybody else's), only the export side is considered here.

Table A9, cols. 1−4 transcribe the exported quantities of mineral ores (of iron, lead, copper, and zinc, ignoring minor items), as reported from 1862 by the *Movimento commerciale*; these are here valued directly at their 1911 export prices (respectively 18, 180, 80, and 140 lire per ton, categories 654, 656, 657, and 660).[37] Cols. 5−8 transcribe the reported exports of marble, respectively in blocks, thick slabs, thin slabs, and unspecified products (worth respectively 80, 105, 112.5, and 550 lire per ton in 1911, categories 890, 892, 895b, and 895c; minor items are again ignored).[38] The difficulty here is that cols. 6 and 8 go back only to 1874 (and that in the five-year retrospective in the *Movimento commerciale 1878*, adapted to the new tariff), and col. 7 to 1883; before 1888 col. 8 includes marble tiles (later separately counted, and worth 80 lire per ton in 1911, category 895a; some 3,800 tons were exported in 1888), and before 1883 it includes thin slabs as well. The upshot is that the estimated 1911-price value of these marble exports is the simple 1911-price-weighted sum of the reported quantities only from 1888; in earlier years, a measure of chaining is introduced, as follows. In 1888, unspecified marble products and tiles together totaled 13,700 tons and, at 1911 prices, 5.749 million lire; in 1883−87, therefore, the tonnages in col. 8 are attributed a unit value reduced to 420 lire per ton. In 1883, again, unspecified marble products (including tiles) and thin slabs together totaled 55,100 tons and, at 1911 prices, 15,516 million lire; in 1874−82, therefore, the tonnages in col. 8 are attributed a unit value further reduced to 282 lire per ton. In 1874, the estimated 1911-price value of these marble exports equaled 15,587 million lire; *faute de mieux*, this figure is extrapolated back to 1862 in proportion to col. 5, in effect assuming a constant mix of block and variously processed marble.

The estimated 1911-price value of the *SITC* category 2 exports covered by cols. 1−8 is of course the sum of the separate figures for metal ores and for marble, obtained as just described. Neglecting imports, as noted, from 1862 Table A9, col. 9 simply reports these exports, with a negative sign, as net imports. The 1861 figure is estimated directly as 80 percent of that calculated for 1862.

[37] The apparently small quantities of pyrite included to 1900 by the iron-ore figures are here ignored.

[38] Category 910b, stone and ores n.e.c., is also ignored: exports were significant, but largely offset by imports.

A4.3.2. The investment content of SITC category 3

SITC category 3 refers to mineral fuels; its investment content is here estimated directly, relying on recently compiled estimates of mineral-fuel (coal or coal-equivalent, henceforth simply "coal") tonnages used, by sector, in Fenoaltea (2015F), Table F.51.

An estimate of coal used for steam power to drive (non-transport) machinery *CSM* is obtained as the sum of Table F.51, cols. 1 (net imports of coal) and 2 (other mineral fuels), less the sum of cols. 3, 4, 6, 8, 10−12, and 14 (in order, railway consumption, gas-works' consumption, consumption not for steam in kilns, chemical works, metalmaking, engineering, and sugar refining, respectively, and consumption for electric lighting).[39] In 1911, judging from the horsepower data, the investment-good categories (3.1, 4, and 5) used some 44 percent of the steam power in use, net of the utilities (category 8.1); that share falls to 39 percent if one allows consumer goods 13 percent of category 4 (metalmaking and engineering, from Table A2, cols. 5 and 6 and Fenoaltea 2017a, Tab1e 1, cols. 9 and 10). For simplicity, *ICSM* (the investment component of *CSM*) is here obtained as *CSM* times an estimated investment share equal to .39 in 1911, and extrapolated in proportion to Table A2, col. 14 (approximately, as noted, the investment share of industrial production). The investment coal used directly for heat *ICDH* is estimated in turn as the sum of Table F.51, col. 6 (kilns) and, again allowing for consumer goods, 87 percent of cols. 10 (metalmaking), and 11 (engineering). Finally, the investment component of the coal consumed by railways *ICRR* is calculated as the total in Table F.51, col. 3 times the investment share of railway transportation (rising from .25 in 1861−71 to .28 in 1881−1913) estimated in §A4.4.1.1 below. In 1911, coal used for investment *IC* = *ICSM* + *ICDH* + *ICRR* equals some 4.17 million tons, against net imports of 9.77 million tons (Table F.51, cols. 1 + 2).

In 1911, according to Federico *et al.* (2011, pp. 86, 94), *SITC* category 3 net imports were worth 323.9 million lire. Investment net imports are estimated from the above tonnages as (4.17/9.77) of that, or some 138 million lire. Table A9, col. 10, is that benchmark, extrapolated in proportion to *IC*.

A4.3.3. The investment content of SITC category 6

SITC category 6 refers to manufactures other than machinery and transport equipment, including consumer goods such as textiles. For simplicity, the investment component is here identified directly with metals and simple metal products ("hardware"), and its 1911-price value is estimated from physical net imports, weighted by 1911 unit values taken from the *Movimento commerciale.* The tonnage series are taken from Fenoaltea (2015E), Table E.03, cols. 1−7 (ferrous metals), Table E.04, col. 2 (aluminum), Table E.06, col. 4 (copper), Table E.09, col. 1 (lead) and col. 2 (antimony), Table E.11, col. 2 (tin), Table E.12, col. 2 (zinc), and Fenoaltea (2015F), Table F.45, cols. 2−9 (semi-finished non-ferrous metals, metalware).[40] The seven ferrous metal products (Table E.03) are assigned lire-per-ton values of 90 (category 664), 85 (663), 325 (665a), 650 (668), 125 (674), 150 (683), and 170 (675/676), respectively; as for the other metals (Tables E.04 to E.12), aluminum is assigned 1,550 lire per ton (category 774), copper 145 (730), lead 370 (757), antimony 760 (780), tin 4,800 (762), zinc 650 (769). The semi-finished non-ferrous metals (Table F.45, cols. 2−5) are assigned lire-per-ton values of 2,350 (category 775), 1,900 (731/732), 3,600 (752), and 750 (770); the four metalware groups (Table F.45, cols. 6−9), lire-per-ton values of 1,150 (category 708), 950 (721/724), 840 (716b), and 3,250 (746).

The resulting net-import totals are transcribed in Table A9, col. 11; to allow for purchases in anticipation of the 1888 tariff hike, imports worth 20 million lire are here transferred from 1887 to 1888.

[39] Table F.51, col. 15 ("net coal for steam") is not used directly, as it is corrected for the growing fuel economy of steam engines, and the declining incidence of transmission losses.

[40] Net exports of tin cans are not ignored, as they would otherwise inflate domestic investment.

A4.3.4. The investment content of SITC category 7

SITC category 7 refers to (non-precision) machinery and transport equipment. Net imports of investment goods are calculated directly as the sum of partial figures for ships, rail- and tramway vehicles, and other machinery. Net imports of ships are taken from Table A1, as the difference between imports (cols. 9 and 10) and exports (cols. 4 and 5). Net imports of railway vehicles are obtained by summing the tonnages of locomotives, passenger cars, and freight cars, each weighted by the corresponding unit value in 1911 (respectively 1,640, 1,402.5, and 690 lire per ton: Fenoaltea 2015F, Table F.34, cols. 2, 5, and 8, and section F03.08). Net imports of other machinery sum separate 1911-price-weighted tonnage series for machine parts and assembled machines. The tonnage series are those in Fenoaltea (2017b), Table 2, cols. 2 and 3 (which transfer some imports from 1887 to 1888, to allow for inventory accumulation in anticipation of the increases in tariffs, Fenoaltea 2015F, section F04.09), with the latter reduced by the tonnage of consumer goods: road vehicles (ibid., Table F.45, col. 11), and an estimated 75 percent (above, §A4.1.6.2) of sewing-machine imports (ibid., Table F.51, col. 19). The 1911 value weights equal 1,000 and 1,300 lire per ton, respectively (ibid., section F04.06).

The resulting net-import totals are transcribed in Table A9, col. 12.

A4.3.5. The investment content of SITC category 8

SITC category 8 includes precision equipment. For simplicity, net imports of investment goods are identified directly with the tonnages in Fenoaltea (2017b), Table 2, col. 4, and valued at 22,000 lire per ton (Fenoaltea 2015F, section F04.06). Precious-metal products are ignored, on the presumption that Church and State were supplied from (long-established) domestic sources.

The resulting net-import totals are transcribed in Table A9, col. 13.

A4.3.6. The investment content of trade

Table A9, col. 14 transcribes the estimated investment content of Italy's external trade; the aggregate is the simple sum of the partial figures in cols. 9−13.

A4.4 Investment services

The estimated investment component of value added in the services is presented, by activity group, in Table A10.

A4.4.1 Transportation and communications

Table A10, col. 1, refers to the investment component of the transportation-and-communications sector; it is the sum of the partial estimates transcribed in Table A11, cols. 1−4.

A4.4.1.1 Railway and tramway transportation

Table A11, col. 1, refers to rail- and tramways. The railway component is estimated by multiplying estimated value added (Fenoaltea, 2017a, Table 3, col. 1) by a coefficient that equals .25 in 1861−71, then rises by .003 p. a. to .28 in 1881, and then again remains constant. This coefficient is itself obtained from other, data-based coefficients. The first refers to the split between passenger and freight revenue (and, by assumption, value added). Freight is here taken to have accounted for a share equal to 50 percent in 1861−71, by assumption; to have grown by one percentage point p. a. to 60 percent in 1881, closely mimicking the shares yielded by the annual data for 1872−81 for passenger revenue and total revenue (whence freight revenue is obtained as a residual) in the *Annuario 1884*, pp. 661, 667; and thence to have maintained a 60 percent share, as suggested by the comparable data in the *Annuario 1886*, pp. 414−415, for 1884, the *Annuario 1900*, pp. 688−691, for 1897, and the *Annuario 1913*, p. 235, for 1911. The investment-good share in freight traffic is courageously assumed constant, and equal to 40 percent; this round figure is derived from the tonnages transported in 1911 (Fenoaltea 1983, Table 3.9), allowing investment 100 percent of the building-materials and metal tonnage, plus 20 percent of the fuel tonnage, and

none of the food, fertilizer, textile, chemical, and paper tonnages.[41] The overall coefficient for railways proper allows investment a uniform 10 percent of the passenger share (from 1881, 4 percent of the total), plus 40 percent of the freight share (from 1881, 40 percent of 60 percent, or another 24 percent of the total, whence the overall 28-percent coefficient). The tramway component is calculated as a simple 12-percent share of their estimated value added (Fenoaltea, 2017a, Table 3, cols. 2 plus 3), on the assumption that they were always primarily, but not exclusively, people-movers.

A4.4.1.2 Other inland transportation

Table A11, col. 2, refers to other inland transportation, in essence road transport; the investment-good road transport estimates parallel the aggregate road-transport estimates (Fenoaltea 2017a, §3.2.4).

Table A12 transcribes the estimates of the investment-good tonnages actually moved.

Table A12, col. 1, which refers to agricultural goods, concerns in fact only firewood, charcoal, and timber. The firewood and charcoal estimates are obtained simply as the benchmark tonnages of .80 and .09 million tons, respectively, in 1865 (above, §A4.2.2), extrapolated using the corresponding constant-price value added series (Table A7, cols. 2 and 3, respectively). The timber series is itself the sum of three components, based on the estimates derived above in §A4.1.5. The lumber used to produce investment wood goods is estimated as the 1911 benchmark of (.75 × .66) million tons, extrapolated in proportion to Table A4, col. 1; the lumber used by the engineering industry is estimated as above; and the lumber used by the construction industry is the implicit 1911 benchmark (118 million lire, divided by 110 lire/ton), extrapolated in proportion Table A4, col. 3. These lumber-tonnage estimates are summed, and scaled up by 12 percent to approximate a mix of rough-hewn and squared-off logs. Table A12, col. 1 transcribes the sum of these firewood, charcoal, and timber estimates.

The investment-good series for industry are calculated like those in Table A2, albeit in tonnage rather than value-added terms. Table A12, col. 2, for the extractive industries, thus sums 50 percent of the tonnages of mineral fuels, here excluding natural gas (Fenoaltea 2015B, Summary Table B.1, cols. 1−3), 100 percent of those of the non-precious metal ores excluding mercury and pyrite (ibid., cols. 5−8, 11−12, and 15−16), again 100 percent for asphalt rock (ibid., col. 22) and all quarry products (ibid., cols. 28−32). The food and tobacco industries are ignored, as before; here, the textile and apparel industries are also ignored, as the relevant tonnage (Table A3) is, in the present context, insignificant. Similar considerations apply to the leather industry. Its investment value was estimated above at some 20 million lire in 1911 (Table A2, col. 3); with belting worth some 9,000 lire per ton (above, §A4.1.4), the implied tonnage is again negligible.

Table A12, col. 3 transcribes the estimates of the wood industry's investment-good tonnage. Here, that tonnage is estimated as the sum of the lumber tonnage calculated as described above (with reference to col. 1) and, assuming a separate shipment, the wood-products tonnage obtained as the 1911 benchmark (.75 × .49) million tons extrapolated in proportion to Table A4, col. 1.

Table A12, cols. 4 and 5 refer to the metal and engineering industries' investment tonnages; both are obtained as the corresponding aggregate tonnage (Fenoaltea 2017a, Table 4, cols. 9 and 10) less the consumer-good component (explicitly or implicitly) estimated above (§A4.1.6). The deducted consumer-good metal tonnage is simply the consumer-good value added in Table 5, col. 8, divided by 100 lire per ton. The deducted consumer-good engineering tonnage is in turn calculated as the sum of a fabricated-metal new-production component and a general-equipment new-production component (ignoring the here trivial quantities related to maintenance, precision equipment, and precious metal products); the two components are simply the value added series in

[41] The fuel moved by rail was overwhelmingly coal, some 40 percent of which, on the above estimates, served investment production. That percentage is here halved, on the assumption that the most coal-intensive commodity-producing industries chose coastal locations to minimize their fuel costs; a disproportionate share of the railways' coal ton-kilometers presumably served urban gas lighting plants, here considered producers of consumption goods.

Table A5, cols. 2 and 4, divided by 415 and 900 lire (of value added) per ton, respectively.

Table A12, col. 6 refers to the investment tonnage of non-metallic mineral products. The series, calculated analogously to the corresponding value added series described above (§A4.1.7), is the sum of two components. One component, taken directly from the production estimates, sums the tonnage estimates for plaster, lime, cement, bricks and tiles, and non-kiln products (Fenoaltea 2015C, Summary Table C.1, cols. 1−4 and 9−10). The other takes 22.5 percent of the 1911 tonnage of terra cotta, ceramic, and glass (ibid., cols. 5−7), or about .085 million tons, and extrapolates it in proportion to the corresponding construction-related index (ibid., Table C.07, col. 1).

Table A12, col. 7 refers to the investment tonnage of chemical and rubber goods together, again calculated analogously to the corresponding value added series described above (§A4.1.8−9). The chemical component thus sums, from the output estimates in Fenoaltea 2015D, Summary Table D.1, the estimates for soda nitric acid (col. 2), the entire explosives group (cols. 10−13), the entire coloring-materials group, excluding natural dyestuffs (cols. 14−20 and 22), arc nitric acid (ibid., col. 25), carbon electrodes (col. 44), saltpetre (col. 64); and all of the coal and petroleum products group, excluding only briquettes (cols. 89 and 91−97). The (tiny) rubber component is correspondingly calculated as two thirds of the industry's product net of the tire component, estimated as above.

The investment tonnage of other industries is zero or negligible.

Table A12, col. 8 refers to imports, specifically those not already counted. For simplicity, their tonnage is approximated as the estimated total tonnage of imports using road haulage (Fenoaltea 2017a, Table 4, col. 17), times the ratio of the 1911-price value of investment-good net imports in Table A9, cols. 10−13 to the 1911-price landed value of all imports (Table 1, col. 6 plus Table A1, col. 11).

Table A12, col. 9, the total investment-good tonnage, is the simple sum of cols. 1−8; in 1911, it equals 66.7 percent of the aggregate tonnage (Fenoaltea 2017a, Table 4, col. 18).

As in the case of the production-side estimates (Fenoaltea 2017a), this aggregate-tonnage series is accompanied by an aggregate-value series obtained as the sum of the domestic products in Table A12, cols. 1−7 with value weights (respectively 180, 4, 1,000, 400, 1,200, 8, and 600 lire per ton) and the imported-investment-good value estimates (Table A9, cols. 10−13). In 1911, the value of these investment goods equals 23.4 percent of the corresponding aggregate value, calculated as described in Fenoaltea (2017a, §3.2.4).

The production-side estimates associate half the road-transport value added with the goods' weight, and half with their value. Maintaining that assumption, the investment-good road-transport value added series in Table A11, col. 2 is obtained as the sum of two components: one equal in 1911 to 66.7 percent of half the aggregate road-transport value added estimate of 313.0 million lire (Fenoaltea 2017a, Table 3, col. 5) and extrapolated in proportion to the aggregate-tonnage series (Table A12, col. 9), the other equal in 1911 to 23.4 percent of (the other) half of 313.0 million lire and extrapolated in proportion to the corresponding investment-good aggregate-value series.

A4.4.1.3 Maritime transportation

Table A11, col. 3, is the estimated investment component of maritime transportation. Col. 3 is obtained as the sum of separate estimates for international and domestic navigation, both obtained as shares of the corresponding value added calculated as described in §A2 above, with reference to Table A1, col. 11.

In the case of domestic navigation, the investment share of value added is estimated equal to that in road transport net of imports (the ratio of Table A12, col. 9 − col. 8, to Fenoaltea 2017a, Table 4, col. 18 − col. 17).

In the case of international navigation, the relevant share is again that of the investment goods not already included in the production figures; it is here set equal to the ratio of the 1911-price value of investment-good imports (Table A9, col. 15) to the 1911-price landed value of all imports (Table 1, col. 5 plus Table A1, col. 11), as in the derivation of Table A12, col. 8 (§4.4.1.2).

A4.4.1.4 Communication

Table A11, col. 4, is the estimated investment component of communication. On the presumption that agriculture was relatively little involved with modern communication, and more generally for lack of a better idea, it is calculated as a share of the estimated value added in communication (Fenoaltea 2017a, Table 3, col. 7) equal to the (approximate) share of investment in industrial production (Table A2, col. 14).

A4.4.2 Commerce

Table A10, col. 2, refers to the investment component of the commerce sector; it is here estimated very tentatively. The production-side commerce estimates (Fenoaltea 2017a, §3.3) extrapolate a 1911 benchmark of 1,446 million lire, based on an estimated merchants' intake, in that year, of goods worth 10,933 million lire.

A series estimating the merchants' annual intake of investment goods is calculated here as the sum of the investment goods estimated above, excluding those presumably not handled by merchants. The agricultural component thus takes from Table A7 the sum of cols. 2−5 (to the exclusion, therefore, of on-farm improvements and herd increments). The industrial component is derived from the aggregate investment estimates, with suitable adjustments. The estimates for mining include Table A2, col. 1 in full. The estimates for textiles and apparel are derived from Table A3, like those in Table A2, col. 2, but exclude sails (presumably custom-made) and, to allow for other direct sales by artisans, 25 percent of the residual. The estimates for leather and wood are similarly obtained as 75 percent of the aggregates in Table A2, cols. 3 and 4, respectively. The estimates for metals are the aggregates in Table A2, col. 5, reduced by the value added in rail production (Fenoaltea 2015E, Summary Tables E.1 and E.2), on the presumption that rails were ordered directly from the factory. On similar grounds, assuming that merchants were not involved in maintenance or in selling new ships or railway vehicles, the estimates for the engineering industry include only the new-production estimates for fabricated metal, general equipment, precision instruments, and precious-metal products (Fenoaltea 2015F, Summary Table F.3, cols. 1 and 4−6) less the corresponding consumer-good components (Table A5, cols. 2, 4, 6, and 7). The estimates for the non-metallic mineral products, chemical, and rubber industries include Table A2, cols. 7−9 in full. The import component is similarly conceived: the estimates equal the investment net-import aggregate in Table A9, cols. 10−13, less estimated net imports of ships (Table A1, cols. 9−10 minus cols. 4−5), of railway vehicles (as above, §A4.3.4), and of rails (the tonnages in Fenoaltea 2015E, Table E.03, col. 6, valued at the *Movimento commerciale* 1911 price of 150 lire per ton).

In 1911, these three components sum to 1,771 million lire, against a total intake, recalled above, of 10,933 million lire. Here, the investment component of value added in commerce (Table A10, col. 2) is estimated as (1,771/10,933) times the sector's value added of 1,446 million lire in 1911, or 234 million lire, and extrapolated using the annual-investment-good-intake series just described.

A4.4.3 Net banking and insurance

Table A10, col. 3, is the estimated investment component of net banking and insurance. For simplicity, and in the absence of obviously better indicators, it is here estimated as the sector's net value added (Fenoaltea 2017a, Table 1, col. 21), times the ratio of value added in investment-production (Table A2, col. 13 plus Table A7, col. 7) to value added in all commodity production (Fenoaltea 2017a, Table 1, col. 1 plus col. 18).

A4.4.4 Miscellaneous services

Table A10, col. 4, is the estimated investment component of miscellaneous services: difficult to gauge, but surely a small part of the total, as the listed professions point overwhelmingly to consumption. The *Censimento demografico*, vol. 4, category 10.92, lists 12,125 "engineers, architects, etc." (including 23 women, bless their hearts). Allowing each of them 4,000 to 4,500 lire

(including allowances for office space, assistants, etc.), their value added can be estimated at some 52 million lire. This point estimate is here tentatively extrapolated in proportion to the combined new-production value added in construction and, in the engineering industry, ships, railway vehicles, and general equipment (Fenoaltea 2015K, Summary Table K.1, cols. 4, 10, and 12; Id. 2015F, Summary Table F.3, cols. 2−4).

A4.4.5 Other services

The investment content of other services is considered nil. This makes perfect sense in the case of the services of buildings, as the estimates refer in fact only to residential space (while the value of commercial space was counted in the corresponding activity, Fenoaltea 2017a, section 3).

It makes less sense in that of government services, as the design and procurement bureaus of the military and public-works departments should logically be considered engaged in investment; but these were a minimal part of the public sector, and are neglected here as well, with (once more) a bad conscience but good precedent.

A4.4.6 All services

Table A10, col. 5, is the estimated investment component of all services; it is the simple sum of cols. 1−4. Col. 6 reports, as a *curiosum*, the share of services value added (Fenoaltea 2017a, Table 1, col. 25) represented by the investment component estimated here. That share was small; it too followed the construction cycle, rising, as measured, from some 4 percent in the 1860s and ’70s to 6 percent in the late 1880s, dropping back to 5 percent in the mid-1890s, and then surging to over 10 percent on the eve of the Word War.

A4.5 Total fixed investment

Total fixed investment is estimated as the sum of the separate estimates for agriculture (Table A7, col. 7), industry (Table A2, col. 13), the services (Table A10, col. 5), and international trade (Table A9, col. 14). The resulting series is transcribed in Table 1, col. 2.

A5. Private consumption and total investment

The estimates of private consumption and of total investment are transcribed in Table 1, cols. 1 and 3, respectively; they are derived as follows.

Deducting from total resources (*GDP* plus imports) their identified uses (public consumption, fixed investment, and exports), one is left with a residual that includes private consumption C and inventory investment I_i. Without a doubt, that residual is dominated by consumption; but it is relatively volatile, with a mean absolute change of some 3.4 percentage points (twice the end-to-end growth rate), and extreme changes that exceed 8 percentage points in both directions. This high volatility clearly suggests that our residual’s year-to-year movements were significantly affected by inventory flows: as one would in fact expect, despite the opportunities offered by international trade, in the presence of fluctuating harvests and, at times, anticipated tariff increases.

The obvious procedure, adopted here, is to take a smoothed version of the residual as its consumption component, and to attribute the residual variation to inventory investment. The practical problem here is that the residuals of the smoothing process approach a zero mean, implying negligible long-term inventory investment: an implication that seems reasonable enough for the inventories that are held to smooth consumption, but not for the inventories of goods held because production and distribution both take time. The present algorithm accordingly involves a direct estimate of production-and-distribution inventory investment I_{ipd}, and its subtraction from the residual ($C + I_i$) to obtain a net residual that includes only consumption C and consumption-smoothing inventory investment I_{ics}. Consumption is then estimated as the smoothed version of that net residual; identifying the residuals from that smoothing process as I_{ics}, I_i is estimated as $I_{ics} + I_{ipd}$,

and total investment I as $I_f + I_i$.[42]

Investment in the production inventory of goods-in-process is estimated, simply and no doubt simplistically, as follows. In the case of agriculture that (year-end) inventory is simply set to zero, as if the productive process were started and completed between January and December; the annual change in that inventory is also, therefore, set to zero. Inventory investment is also set to zero in the case of construction and the utilities; in the case of construction, it may be recalled, value added and therefore fixed investment already allow for the period of production, and count a half-completed road, for example, as half a completed road. In mining and manufacturing, the production process is taken to average half a year, so the average inventory of goods-in-process is estimated as a quarter of a year's output; the corresponding inventory (dis)investment is here calculated simply as a quarter of the annual change in value added. In 1861, absent information on 1860, this inventory investment is simply set to zero; in 1862−1913, it is estimated in year t as a quarter of Fenoaltea (2017a), Table 1, .25((col. 2 + col. 15)$_t$ − (col. 2 + col. 15)$_{t-1}$).

Investment in the distribution inventory of goods-for-sale (which includes imports) is in turn calculated from the annual estimate of the 1911-price value of the goods handled by merchants, obtained as described (ibid., §3.3.5). Since goods were there assumed to be held in stock an average of 4.5 months (ibid., §3.3.3), merchants' inventory investment is estimated, in 1862−1913, as (4.5/12) times the annual increment in the estimate of the 1911-price value of the goods they handled; in 1861 it is again set equal to zero.

The estimate of production-and-distribution inventory investment I_{ipd} is the sum of these two series. The cumulation of I_{ipd} equals some 3,700 million lire (80 percent of it attributed to merchants, 20 percent to industry); it equals some 28 percent of the end-to-end increment in *GDP*, which does not seem unreasonable.

The next step is the smoothing of the net residual ($C + I_i - I_{ipd}$). We lack strong priors, let alone shared ones, as to the appropriate volatility of consumption in post-Unification Italy (and presumably any priors at all concerning the volatility of inventory investment). Here, the selected algorithm applied to the net residual takes, where it can, a five-year moving average, with triangular weights (.4 on the current year, .2 on the immediately preceding and succeeding, and .1 on those twice removed); for the second and penultimate year, a three-year average (with the weights rescaled to .5 on the current year and .25 on each neighboring year); for the first and last years, an average with the only neighbor (with a weight of .75 on the current year and .25 on the neighbor).

The net residual, thus smoothed, serves as the consumption series transcribed in Table 1, col. 1. The extreme variations attributed to consumption do not seem unreasonable. On the down side, the greatest decline is 1.0 percent (in 1867), the next ones near 0.5 percent (in 1888 and 1889), against a mean demographic growth rate near 0.7 percent p. a. (between the censuses of 1871 and 1911, from the *Sommario*, p. 39, col. 1). On the up side, the peak increment is some 4.6 percent, in 1907 (a year marked not just by considerable prosperity, but by massive return migration from the United States); the next highest is 4.2 percent in 1913 (the end point, where the smoothing process essentially fails), the others do not exceed 3.3 percent.

As noted, the difference between the raw and smoothed net residual is taken as the estimate of consumption-smoothing inventory (dis)investment I_{ics}; it is added to production-and-distribution inventory investment I_{ipd} to obtain total inventory investment I_i (in Table 1, the difference between col. 3 and col. 2).

[42] To reabsorb the rounding error, total investment I (Table 1, col. 3) is actually obtained as $GDP - C - G - X + M$.

Table A1. Estimated exports and imports, 1861-1913 (million lire at 1911 prices)

	(1)	(2)	(3) exports	(4)	(5)
	reported total	Latium, Venetia	reported ships	naval ships	merchant ships
1861	396.8	72.7		.0	.5
1862	465.5	78.4	.0	.0	.5
1863	526.8	86.5	.0	.0	1.1
1864	476.9	87.6	.0	.0	.3
1865	462.6	84.7	.0	.0	.5
1866	525.9	86.6	.0	.0	.5
1867	580.8	21.8	.0	.0	1.5
1868	628.7	22.6	.0	.0	1.2
1869	643.0	23.3	.0	.0	1.6
1870	606.9	22.3	.0	.0	1.9
1871	855.1		.0	.0	1.4
1872	766.9		.0	.0	4.8
1873	744.9		.0	.0	3.2
1874	692.7		.0	.0	7.1
1875	820.6		.0	.0	2.7
1876	832.7		.0	.0	2.1
1877	710.4		.0	.0	1.6
1878	902.3		.0	.0	2.7
1879	951.6		.0	.0	2.4
1880	1,036.9		.0	.0	1.6
1881	1,139.0		.2	.0	1.9
1882	1,158.1		.1	.0	.7
1883	1,200.4		.2	.0	.8
1884	1,139.0		.3	.0	1.1
1885	1,031.1		3.6	.0	2.6
1886	1,139.0		.3	.0	2.0
1887	1,191.1		.3	.0	3.4
1888	1,133.9		.0	.0	3.7
1889	1,062.2		.6	.0	4.0
1890	980.4		.3	.0	2.3
1891	1,031.2		.0	.0	4.2
1892	1,117.4		.0	.3	3.4
1893	1,137.0		.0	1.2	2.9
1894	1,284.2		.0	6.7	7.2
1895	1,257.7		.6	18.4	3.0
1896	1,324.3		17.9	25.5	2.4
1897	1,418.1		23.8	25.0	4.0
1898	1,549.0		42.6	14.1	5.5
1899	1,704.0		3.7	7.9	6.8
1900	1,604.9		3.0	4.5	4.8
1901	1,693.2		2.0	7.4	5.8
1902	1,802.5		1.3	22.8	4.7
1903	1,796.6		1.7	25.3	6.6
1904	1,920.8		39.8	4.9	10.1
1905	2,048.9		22.2	4.7	7.3
1906	2,154.7		8.6	1.9	7.3
1907	2,064.1		.7	3.7	5.8
1908	1,976.2		1.0	7.1	4.8
1909	2,099.9		.9	6.8	1.9
1910	2,185.3		.7	6.9	3.2
1911	2,241.2		27.6	3.9	3.3
1912	2,426.6		6.7	1.2	12.6
1913	2,501.4		5.2	2.6	6.4

Table A1, continued

	(6)	(7)	(8)	(9)	(10)	(11)
	imports					
	reported total	Latium, Venetia	reported ships	naval ships	merchant ships	It.-flag freights
1861	553.5	72.7		9.3	3.1	9.7
1862	559.4	78.4	.0	20.1	3.1	10.7
1863	604.3	86.5	.0	25.6	6.7	10.8
1864	668.6	87.6	.1	18.0	1.7	12.1
1865	644.8	84.7	.0	10.6	3.4	13.1
1866	606.6	86.6	.0	4.6	1.1	14.3
1867	627.6	21.8	.0	.0	2.4	15.5
1868	627.7	22.6	.0	.0	1.5	16.0
1869	654.2	23.3	.0	.0	2.3	16.8
1870	633.6	22.3	.0	.0	4.4	18.4
1871	705.1		.0	.0	2.6	19.7
1872	799.2		.0	.0	3.5	20.5
1873	807.8		.0	.1	5.5	20.9
1874	893.2		.0	.0	2.8	20.3
1875	906.3		.0	.0	2.0	20.1
1876	956.5		.0	.0	1.7	21.5
1877	918.4		.0	.0	1.5	22.5
1878	989.3		.0	.0	2.4	23.2
1879	1,174.4		.0	.2	5.2	23.6
1880	1,060.3		.0	.3	4.7	23.3
1881	1,173.8		3.9	.5	10.1	21.1
1882	1,216.8		3.0	2.8	7.8	21.6
1883	1,320.0		4.3	4.2	8.2	22.1
1884	1,431.2		8.9	4.2	8.0	23.4
1885	1,661.1		7.0	7.7	4.9	23.2
1886	1,723.6		10.4	6.1	13.3	23.6
1887	1,925.5		2.2	15.8	10.0	24.6
1888	1,372.9		2.3	7.9	8.9	24.6
1889	1,620.8		4.3	1.8	6.4	25.1
1890	1,482.5		.7	.0	4.9	24.2
1891	1,292.0		.0	.0	6.4	23.3
1892	1,376.9		.1	.0	3.2	24.1
1893	1,407.8		.0	.0	4.5	24.3
1894	1,373.6		.1	.0	7.5	22.5
1895	1,526.8		2.5	3.8	11.5	23.6
1896	1,486.4		1.7	.0	11.6	26.0
1897	1,506.1		3.4	.0	18.0	27.6
1898	1,713.5		3.4	.0	19.3	29.5
1899	1,771.2		6.2	1.3	25.3	32.4
1900	1,775.9		10.3	4.4	31.2	37.1
1901	1,936.9		6.8	2.1	19.1	42.2
1902	2,088.7		4.3	.2	13.8	44.7
1903	2,158.4		2.9	.0	9.7	46.4
1904	2,100.1		2.3	2.2	12.6	45.6
1905	2,338.6		6.7	6.0	15.7	44.9
1906	2,682.6		11.2	1.8	22.5	47.4
1907	2,929.2		9.4	.0	24.8	49.9
1908	3,062.2		13.4	.0	26.9	53.2
1909	3,258.5		5.2	.0	31.0	58.4
1910	3,318.5		10.9	2.4	26.6	57.6
1911	3,443.8		9.7	.3	36.3	58.0
1912	3,677.9		13.8	6.1	46.7	66.2
1913	3,617.4		25.3	1.4	59.5	75.7

Source: see text.

Table A2. Industrial value added flowing into investment, 1861-1913
(million lire at 1911 prices)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		manufacturing							
	extrac-tive	textiles, apparel[a]	leather[a]	wood[a]	metal	engi-neer'g	non-met. min. pr.	chem.	rubber[a]
1861	38	20	4	185	5	171	40	7	0
1862	42	21	4	173	4	176	46	7	0
1863	45	22	4	171	2	180	48	7	0
1864	45	22	3	171	2	180	49	7	0
1865	47	22	4	197	1	184	50	7	0
1866	42	22	2	201	2	185	41	7	0
1867	45	22	2	189	2	189	39	7	0
1868	49	22	5	164	2	196	39	7	0
1869	51	22	4	168	3	201	40	7	0
1870	50	23	5	178	3	202	42	6	0
1871	51	23	5	170	3	198	43	7	0
1872	56	23	5	177	4	200	47	8	0
1873	63	26	5	184	3	207	55	8	0
1874	64	24	7	182	5	217	57	8	0
1875	58	24	4	178	4	220	49	7	1
1876	59	22	5	188	4	215	47	8	0
1877	60	23	6	188	4	214	50	8	1
1878	59	23	8	188	3	209	50	8	0
1879	62	22	8	176	7	214	50	8	1
1880	70	22	9	176	8	226	55	8	0
1881	72	22	10	191	10	242	58	9	1
1882	77	22	12	204	11	257	65	9	1
1883	81	22	12	208	14	268	70	10	1
1884	83	21	10	222	15	280	73	10	2
1885	84	21	14	241	17	290	76	10	2
1886	85	21	15	268	21	312	79	11	2
1887	84	22	15	275	26	336	77	11	3
1888	83	22	12	255	31	351	76	12	3
1889	84	22	14	228	33	350	75	11	4
1890	85	20	12	226	29	337	76	12	4
1891	83	19	10	224	24	317	75	12	2
1892	82	18	13	217	20	302	71	12	3
1893	80	16	11	214	23	303	71	12	4
1894	80	14	10	217	23	310	70	11	6
1895	74	14	11	212	26	322	64	11	6
1896	74	14	12	222	26	334	63	11	6
1897	77	13	9	232	28	345	65	13	7
1898	79	13	12	248	32	364	66	13	7
1899	84	14	12	266	37	399	69	14	7
1900	88	15	13	260	39	425	72	13	7
1901	92	14	14	275	37	414	77	13	6
1902	100	13	13	289	36	410	86	13	7
1903	105	13	15	305	41	420	93	16	6
1904	109	14	18	313	47	444	99	17	5
1905	114	14	20	338	57	489	108	19	6
1906	124	14	20	353	69	554	116	20	10
1907	131	13	23	375	72	606	123	21	7
1908	134	12	19	406	86	642	132	22	13
1909	142	12	20	443	97	662	154	26	12
1910	158	14	18	465	104	685	177	29	15
1911	164	16	20	460	104	718	189	32	21
1912	174	16	20	447	120	759	195	35	32
1913	173	16	20	441	114	757	195	41	16

Table A2, continued

	(10) total manuf.	(11) construc- tion	(12) utili- ties	(13) total	(14) investment share of industry[b]
1861	432	285	0	755	.47
1862	431	324	0	797	.49
1863	434	336	0	815	.50
1864	434	331	0	810	.49
1865	465	334	0	846	.50
1866	460	287	0	789	.48
1867	450	262	0	757	.47
1868	435	259	0	743	.46
1869	445	253	0	749	.46
1870	459	267	0	776	.46
1871	449	275	0	775	.46
1872	464	294	0	814	.46
1873	488	325	0	876	.48
1874	500	336	0	900	.48
1875	487	293	0	838	.46
1876	489	284	0	832	.46
1877	494	292	0	846	.46
1878	489	297	0	845	.46
1879	486	305	0	853	.46
1880	504	329	0	903	.46
1881	543	340	0	955	.47
1882	581	387	0	1,045	.49
1883	605	412	0	1,098	.50
1884	633	423	0	1,139	.50
1885	671	434	0	1,189	.50
1886	729	444	0	1,258	.51
1887	765	437	0	1,286	.51
1888	762	439	0	1,284	.50
1889	737	423	0	1,244	.49
1890	716	418	0	1,219	.48
1891	683	410	0	1,176	.47
1892	656	389	1	1,128	.46
1893	654	375	1	1,110	.45
1894	661	374	1	1,116	.44
1895	666	321	1	1,062	.42
1896	688	307	1	1,070	.41
1897	712	311	1	1,101	.41
1898	755	308	2	1,144	.42
1899	818	313	3	1,218	.42
1900	844	323	4	1,259	.43
1901	850	339	5	1,286	.42
1902	867	368	6	1,341	.43
1903	909	386	7	1,407	.43
1904	957	405	10	1,481	.44
1905	1,051	433	11	1,609	.44
1906	1,156	460	13	1,753	.45
1907	1,240	484	17	1,872	.45
1908	1,332	513	20	1,999	.46
1909	1,426	586	24	2,178	.47
1910	1,507	661	27	2,353	.49
1911	1,560	697	32	2,453	.50
1912	1,624	713	37	2,548	.49
1913	1,600	707	42	2,522	.48

[a]value
[b]ratio of col. 12 to col. 13; the numerator is swollen by the value of the raw materials included in cols. 2, 4, and 9.

Source: see text.

Table A3. Estimated hemp-industry investment-good products, 1861-1913
(thousand tons)

	(1) rope	(2) sails for new vessels	(3) replace-ment sails	(4) tarpau-lins
1861	15.2	.055	.271	.017
1862	15.8	.071	.274	.017
1863	16.1	.084	.279	.018
1864	16.3	.107	.281	.018
1865	16.3	.128	.301	.018
1866	16.1	.141	.328	.019
1867	15.9	.171	.345	.019
1868	15.8	.195	.369	.019
1869	15.7	.198	.399	.020
1870	16.2	.170	.434	.020
1871	16.4	.143	.460	.021
1872	16.6	.139	.468	.021
1873	18.5	.158	.461	.021
1874	17.2	.185	.456	.022
1875	16.8	.178	.468	.022
1876	15.9	.125	.499	.022
1877	16.4	.078	.517	.023
1878	16.1	.056	.518	.023
1879	15.7	.040	.512	.024
1880	15.7	.029	.503	.024
1881	15.6	.031	.492	.025
1882	15.5	.035	.481	.025
1883	15.7	.033	.473	.026
1884	14.8	.027	.465	.026
1885	15.0	.024	.455	.027
1886	15.5	.019	.444	.027
1887	15.9	.011	.419	.028
1888	16.5	.018	.389	.028
1889	16.3	.042	.358	.029
1890	14.9	.057	.337	.029
1891	14.1	.044	.336	.030
1892	13.4	.034	.331	.030
1893	11.9	.024	.323	.031
1894	10.4	.013	.316	.031
1895	9.7	.010	.308	.032
1896	10.0	.008	.296	.032
1897	9.3	.009	.288	.033
1898	9.4	.014	.290	.034
1899	10.2	.019	.297	.034
1900	11.0	.019	.305	.035
1901	10.0	.034	.306	.036
1902	9.3	.058	.301	.036
1903	9.5	.042	.307	.037
1904	10.3	.018	.313	.038
1905	10.1	.017	.302	.038
1906	10.0	.020	.288	.039
1907	9.2	.020	.277	.040
1908	8.5	.017	.269	.040
1909	8.9	.015	.263	.041
1910	10.4	.013	.259	.042
1911	11.6	.011	.251	.043
1912	11.6	.015	.234	.043
1913	12.2	.020	.218	.044

Source: see text.

Table A4. Estimated value of wood-industry investment-good products, 1861-1913
(million lire)

	(1) finished wood products	(2) lumber consumed: engi-neering	(3) lumber consumed: construc-tion
1861	134.1	2.6	48.2
1862	114.2	3.5	54.9
1863	109.9	4.0	56.9
1864	109.9	4.6	56.0
1865	135.0	5.5	56.5
1866	146.2	5.8	48.6
1867	138.4	6.3	44.4
1868	113.4	7.1	43.8
1869	117.7	7.3	42.8
1870	126.3	6.4	45.2
1871	117.7	5.5	46.6
1872	122.0	5.4	49.8
1873	122.9	6.1	55.0
1874	118.5	6.9	56.9
1875	122.0	6.7	49.6
1876	135.0	5.1	48.1
1877	135.0	3.6	49.4
1878	135.0	2.9	50.3
1879	122.0	2.5	51.6
1880	117.7	2.7	55.7
1881	130.7	3.1	57.6
1882	135.0	3.3	65.5
1883	135.0	3.1	69.8
1884	148.0	2.7	71.6
1885	164.4	2.7	73.5
1886	189.5	3.0	75.2
1887	197.3	3.3	74.0
1888	176.5	3.7	74.3
1889	152.3	3.7	71.6
1890	152.3	3.2	70.8
1891	152.3	2.7	69.4
1892	148.0	2.6	65.9
1893	148.0	2.4	63.5
1894	151.4	2.2	63.3
1895	155.8	2.2	54.3
1896	167.9	2.3	52.0
1897	176.5	2.5	52.7
1898	193.0	3.0	52.1
1899	209.4	3.5	53.0
1900	201.6	3.7	54.7
1901	213.7	4.1	57.4
1902	222.4	4.5	62.3
1903	235.4	4.3	65.3
1904	239.7	4.2	68.6
1905	260.5	4.3	73.3
1906	269.1	5.6	77.9
1907	286.4	7.0	81.9
1908	311.5	7.6	86.8
1909	336.6	6.9	99.2
1910	346.1	6.6	111.9
1911	334.0	7.5	118.0
1912	317.6	8.3	120.7
1913	313.2	8.1	119.7

Source: see text.

Table A5. Metalmaking- and engineering-industry consumer-good value added, 1861-1913
(million lire at 1911 prices)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				engineering				
	fabricated metal		general equipment		precision equip't		precious	metal-
	maint.	new p'n	maint.	new p'n	maint.	new p'n	metalw.	making
1861	2.9	15.3	.0	.0	3.6	.6	11.8	5.0
1862	3.0	15.3	.0	.0	3.9	.6	12.1	5.0
1863	3.0	15.3	.0	.0	4.1	.7	12.3	5.0
1864	3.0	15.3	.0	.0	4.5	.8	12.5	5.0
1865	3.0	15.3	.0	.0	4.9	.7	12.1	5.0
1866	3.1	15.2	.0	.0	5.1	.7	11.3	5.0
1867	3.1	15.5	.0	.0	5.3	.7	10.7	5.1
1868	3.2	15.8	.0	.0	5.5	.7	11.4	5.2
1869	3.2	16.0	.0	.0	5.8	.8	12.0	5.2
1870	3.2	16.4	.0	.0	6.0	.8	12.8	5.4
1871	3.2	16.3	.0	.0	6.2	.8	12.7	5.3
1872	3.3	16.4	.0	.0	6.4	.9	13.0	5.4
1873	3.3	16.3	.0	.0	6.6	.8	12.7	5.3
1874	3.3	16.6	.0	.0	6.8	.9	12.7	5.4
1875	3.3	17.1	.0	.0	6.9	.9	12.8	5.6
1876	3.4	17.1	.0	.0	7.2	1.0	13.0	5.6
1877	3.4	17.3	.0	.0	7.4	1.1	12.7	5.7
1878	3.5	17.2	.0	.0	7.6	1.1	12.2	5.6
1879	3.5	17.5	.0	.0	7.9	1.2	12.2	5.7
1880	3.6	18.1	.0	.0	8.1	1.2	12.9	5.9
1881	3.6	18.9	.0	.0	8.4	1.4	13.6	6.2
1882	3.6	19.6	.0	.0	8.7	1.5	14.2	6.4
1883	3.7	20.3	.0	.0	9.0	1.7	13.8	6.6
1884	3.7	21.1	.0	.0	9.4	1.7	14.3	6.9
1885	3.7	21.6	.0	.0	9.9	1.9	14.5	7.1
1886	3.8	22.6	.0	.0	10.4	2.1	15.5	7.4
1887	3.8	24.1	.0	.0	11.0	2.3	15.4	7.9
1888	3.9	24.7	.0	.0	11.5	2.1	15.1	8.1
1889	4.0	24.3	.0	.0	11.8	1.8	14.1	7.9
1890	4.0	23.0	.0	.1	11.9	1.9	13.8	7.5
1891	4.1	21.6	.0	.0	12.1	2.0	13.9	7.1
1892	4.1	20.6	.1	.2	12.2	2.1	14.4	6.8
1893	4.1	20.4	.1	.5	12.3	2.3	14.7	6.8
1894	4.2	20.6	.2	.6	12.4	2.0	14.7	6.8
1895	4.2	20.7	.3	.6	12.4	2.1	14.8	6.9
1896	4.3	20.7	.4	.5	12.3	2.0	15.2	6.9
1897	4.4	20.6	.5	.6	12.2	2.2	15.6	6.8
1898	4.4	20.9	.6	.9	12.1	2.3	16.2	7.0
1899	4.5	21.6	.8	1.2	12.1	2.6	16.3	7.3
1900	4.5	22.2	1.0	.9	12.1	2.8	17.0	7.4
1901	4.6	22.1	1.1	.6	11.9	2.6	16.8	7.3
1902	4.7	22.0	1.4	1.0	11.7	3.1	17.1	7.4
1903	4.7	22.4	1.6	1.4	11.6	3.1	17.0	7.6
1904	4.8	23.2	2.0	1.7	11.6	3.5	17.5	7.9
1905	4.9	24.3	2.3	1.7	11.5	3.6	17.9	8.2
1906	4.9	26.1	2.7	3.0	11.4	3.7	19.2	9.0
1907	5.0	28.0	3.3	5.3	11.3	3.9	20.7	10.0
1908	5.2	29.7	3.9	7.4	11.3	4.1	23.4	10.8
1909	5.2	31.4	4.8	10.2	11.2	4.3	23.7	11.8
1910	5.3	32.7	6.4	15.2	11.1	4.8	25.1	12.9
1911	5.5	33.4	8.4	20.0	11.1	5.1	25.5	13.8
1912	5.6	34.3	10.3	20.5	11.1	5.5	26.3	14.2
1913	5.8	34.6	12.3	19.8	11.1	5.6	24.6	14.3

Source: see text.

Table A6. Reported Labor Force and Factor Employment in Engineering in 1911

Census category Code	Content	(1) *Censimento demografico* (labor force) Blue-collar	(2) *Censimento demografico* (labor force) Total[a]	(3) *Censimento industriale* (total) Employment Blue-collar	(4) *Censimento industriale* (total) Employment Total	(5) *Censimento industriale* (total) Unduplicated horsepower in use Primary	(6) *Censimento industriale* (total) Unduplicated horsepower in use Electric
4.31	Blacksmiths, wrought iron work	86,879	150,582	20,230	50,302	3,653	1,218
4.32	Coppersmiths, tinsmiths, braziers	29,736	49,168	10,104	19,435	853	2,099
4.33	Metal furniture	5,717	7,318	5,064	6,085	44	357
4.34	General hardware	7,431	8,856	5,930	6,807	1,326	1,401
4.35	Cables, springs, tin cans	5,500	7,259	3,717	4,548	1,168	809
4.36	Ordinary-metal medals and coins	127	176	17	27		18
4.37	Ordinary table- and kitchen-ware	2,239	2,761	1,958	2,262	699	212
4.38	Knives, scissors, swords	1,871	3,027	1,272	1,996	535	245
4.39	Knife-grinders	1,710	3,922	275	812	34	202
4.3$\underline{10}$	Ordinary bullets, shot, fuses, cases	503	*551*	260	300	86	58
4.3$\underline{11}$	Enamelware, other metal objects	3,045	4,316	2,272	3,125	243	917
4.3ω	(4.31 - 4.3$\underline{11}$)			2,269	2,745	329	436
4.3	Fabricated metal products	144,758	237,936	53,368	98,444	8,970	7,972
4.41	Structural components, machinery	49,245	*61,692*	46,020	58,087	11,237	14,362
4.42	Rail-guided vehicles	44,120	*48,147*	42,049	45,747	17,889	15,284
4.43	Bicycles, automobiles	12,809	*16,781*	11,843	15,556	674	3,432
4.44	Shipyards and boatyards	28,932	*31,347*	26,151	28,227	8,407	8,566
4.45	Aircraft	1,286	*1,434*	403	460	61	118
4.4ω	(4.41 - 4.45)			7,348	7,925	1,325	2,831
4.4	Heavy equipment, machinery	136,392	*159,401*	133,814	156,002	39,593	44,593
4.51	Optical and precision instruments	1,226	1,722	734	1,002	92	260
4.52	Common weights and scales	1,980	2,995	1,537	2,275	39	162
4.53	Clocks and watches	3,861	8,801	1,468	2,417	161	218
4.54	Business machines	145	*226*	97	131	1	13
4.55	Electrical apparatus	7,717	*8,715*	7,157	7,884	259	2,753
4.56	Metal musical instruments	922	1,234	622	771	20	69
4.57	Firearms, grenades, torpedoes	9,551	*11,316*	8,093	9,244	4,196	3,564
4.58	Other apparatus and equipment	10,571	*13,453*	10,294	12,798	1,450	4,390
4.59	Goldsmiths and silversmiths	13,487	21,064	7,993	11,051	64	711
4.5$\underline{10}$	Precious-metal medals and coins	285	446	227	277	25	45
4.5ω	(4.51 - 4.5$\underline{10}$)			434	659		67
4.5	Light equipment, precious-metal products	49,745	69,972	38,656	48,509	6,307	12,252

[a]the italicized figures include no artisans.

Source: *Censimento demografico*, *Censimento industriale*.

Table A7. Agricultural production flowing into investment, 1861-1913
(million lire at 1911 prices)

	(1) on-farm improve-ments	(2) fire-wood	(3) char-coal	(4) off-farm horses private	(5) off-farm horses public	(6) herd incre-ments	(7) total
1860							
1861	17	17	6	8	3	34	85
1862	35	19	6	8	3	37	108
1863	35	19	5	7	3	27	96
1864	52	19	5	7	3	21	107
1865	0	19	4	7	3	35	68
1866	17	16	5	2	3	37	80
1867	0	16	5	4	3	24	52
1868	17	15	5	5	3	7	52
1869	35	15	4	6	3	17	80
1870	35	15	5	6	3	27	91
1871	17	16	4	7	3	30	77
1872	17	17	5	8	3	26	76
1873	70	20	6	9	3	44	152
1874	87	22	6	8	3	4	130
1875	105	18	6	3	3	15	150
1876	122	17	4	6	2	32	183
1877	122	18	3	7	9	0	159
1878	192	18	3	7	2	0	222
1879	157	18	3	8	2	38	226
1880	157	18	4	8	4	34	225
1881	140	19	6	9	4	27	205
1882	157	20	5	11	4	24	221
1883	105	20	5	10	4	57	201
1884	140	20	4	10	4	80	258
1885	122	20	4	11	4	59	220
1886	157	20	3	11	4	34	229
1887	35	18	3	10	4	39	109
1888	0	17	3	6	4	31	61
1889	0	17	3	9	4	3	36
1890	87	17	3	9	4	-10	110
1891	105	17	3	8	4	-4	133
1892	122	16	3	8	4	42	195
1893	70	16	2	9	4	58	159
1894	35	16	2	8	4	69	134
1895	105	14	2	7	4	17	149
1896	122	14	2	8	4	26	176
1897	105	14	2	10	4	24	159
1898	87	14	3	10	4	-7	111
1899	35	14	4	11	4	-43	25
1900	105	14	5	11	4	-22	117
1901	140	15	3	12	4	-8	166
1902	157	16	3	14	4	36	230
1903	87	18	3	14	4	77	203
1904	52	19	2	14	4	59	150
1905	122	20	2	17	4	20	185
1906	140	20	2	18	4	49	233
1907	157	21	2	17	4	71	272
1908	140	22	2	19	4	198	385
1909	105	25	1	24	4	13	172
1910	122	28	1	26	4	25	206
1911	105	29	1	22	4	25	186
1912	175	30	1	23	4	-4	229
1913	175	30	1	20	5	5	236

Table A7, continued.

	(8)	(9)	(10)	(11)
	herd stock estimates			
	sheep (Fenoaltea)	bovines (Federico)	goats (Federico)	pigs (Federico)
1860	6,268	4,011.4	1,473.5	921.9
1861	6,797	4,063.3	1,479.3	889.7
1862	7,430	4,112.9	1,492.0	879.8
1863	7,699	4,128.6	1,581.4	993.4
1864	7,704	4,174.3	1,689.9	971.5
1865	8,113	4,217.0	1,892.7	979.8
1866	8,606	4,259.5	1,910.0	1,026.2
1867	8,994	4,284.8	1,890.2	1,058.9
1868	9,211	4,293.1	1,821.9	1,051.6
1869	9,121	4,325.2	1,809.6	1,097.9
1870	9,030	4,354.1	2,059.1	1,199.0
1871	9,352	4,391.7	2,173.6	1,224.0
1872	9,549	4,441.8	2,190.5	1,208.5
1873	9,900	4,492.4	2,096.6	1,360.8
1874	9,510	4,483.6	2,063.2	1,543.5
1875	9,151	4,534.7	2,173.6	1,524.3
1876	9,159	4,602.8	2,289.6	1,505.6
1877	9,150	4,639.6	2,208.4	1,362.9
1878	8,633	4,688.0	2,061.5	1,314.8
1879	8,844	4,764.0	1,965.2	1,323.5
1880	9,130	4,783.0	2,016.0	1,492.4
1881	8,596	4,831.1	2,106.2	1,661.8
1882	8,343	4,917.0	2,139.8	1,572.2
1883	8,650	5,024.4	2,209.2	1,566.2
1884	9,061	5,154.9	2,271.1	1,662.4
1885	9,375	5,287.6	2,311.5	1,561.9
1886	9,566	5,371.8	2,294.0	1,484.4
1887	9,529	5,426.4	2,291.7	1,639.8
1888	9,764	5,453.0	2,297.9	1,770.9
1889	9,768	5,446.7	2,238.1	1,845.3
1890	9,344	5,471.3	2,152.8	1,765.9
1891	9,202	5,484.1	2,218.6	1,684.2
1892	9,454	5,524.9	2,335.3	1,825.9
1893	9,562	5,582.2	2,423.5	2,102.2
1894	9,721	5,694.5	2,410.2	2,249.4
1895	10,199	5,736.4	2,483.4	2,090.1
1896	10,862	5,811.7	2,515.4	1,835.9
1897	11,030	5,849.3	2,472.3	1,872.0
1898	10,502	5,829.8	2,325.1	2,059.4
1899	9,807	5,780.4	2,233.8	2,047.9
1900	9,452	5,772.2	2,233.6	1,953.7
1901	9,154	5,763.1	2,343.2	1,966.7
1902	9,028	5,809.5	2,480.0	2,114.1
1903	9,541	5,902.8	2,502.7	2,332.2
1904	9,991	5,990.5	2,484.4	2,415.0
1905	10,134	6,051.3	2,512.9	2,302.8
1906	10,533	6,134.2	2,664.3	2,281.2
1907	11,008	6,213.2	2,715.0	2,507.8
1908	11,163	6,607.4	2,671.0	2,689.8
1909	11,754	6,590.1	2,591.0	2,772.4
1910	12,252	6,628.2	2,582.0	2,723.9
1911	12,446	6,695.4	2,553.0	2,626.7
1912	12,257	6,687.1	2,536.8	2,671.8
1913	12,401	6,689.5	2,486.7	2,690.5

Source: see text.

Table A8. Firewood and charcoal investment-goods consumption data, 1865

Industry	source pages	firewood consumption (tons)	charcoal consumption (tons)
Metal industries			
iron	pp. 30-31	4,053	68,860
copper	pp. 42-43	1,040	12,873
lead	pp. 44-45	124	3,079
zinc	pp. 54-55	1,480	0
mercury	pp. 54-55	0	114
nickel	pp. 54-55	1,138	446
bronze	pp. 54-55	110	14
total		7,945	85,386
Construction-materials industries			
asphalt	pp. 56-57	256	0
binders and fired clays	pp. 82-83	695,327	0
ceramics	pp. 84-85	23,090	0
glass and glass beads	pp. 88-89	64,442	0
total		783,023	0
Grand total		790,968	85,386

Source: *Statistica mineraria.*

Table A9. Investment-good exports and imports, 1861-1913

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	exports of mine and quarry products (thousand tons)							
						marble slabs		
	iron ore	lead ore	copper ore	zinc ore	block marble	thick	thin	other worked marble
1861								
1862	5.1	3.7	1.7	.0	20.4			
1863	5.6	7.3	1.2	.0	39.6			
1864	6.9	17.9	1.8	.0	21.7			
1865	0.7	.7	1.0	.0	40.9			
1866	18.1	25.2	2.7	.0	49.6			
1867	31.6	22.7	3.5	18.7	56.6			
1868	24.5	23.4	4.5	6.9	69.3			
1869	54.1	24.7	3.1	72.0	49.7			
1870	40.6	16.0	8.2	71.3	54.5			
1871	45.3	14.5	6.0	50.7	57.4			
1872	168.5	17.0	4.2	60.4	53.3			
1873	161.9	21.4	4.7	56.6	63.4			
1874	203.4	17.8	7.9	63.1	73.1	3.9		18.9
1875	191.1	18.5	9.1	64.5	63.3	4.1		18.6
1876	197.7	28.5	8.1	66.6	48.1	4.3		15.5
1877	236.7	27.5	9.6	78.3	51.5	4.5		13.0
1878	162.4	29.2	12.1	53.4	46.4	4.5		19.8
1879	213.6	22.8	7.9	62.2	51.3	3.8		44.1
1880	399.7	18.0	11.3	85.3	71.6	3.4		33.6
1881	285.4	17.2	11.0	70.9	52.7	3.6		40.8
1882	206.0	19.0	8.3	102.4	66.6	2.6		41.0
1883	203.7	20.9	9.5	106.4	58.7	2.0	24.8	30.3
1884	166.6	15.9	12.9	89.6	61.0	2.5	26.4	24.1
1885	150.6	16.6	10.9	103.5	58.2	1.9	27.0	24.3
1886	123.5	5.9	9.2	82.1	52.1	1.3	33.3	20.7
1887	171.6	10.3	11.8	82.5	54.9	1.4	39.5	14.1
1888	130.7	7.7	9.9	90.1	53.1	1.4	37.4	9.9
1889	183.3	7.4	9.0	107.1	61.8	1.6	44.0	13.1
1890	136.7	8.2	9.9	80.8	68.4	.9	40.7	10.2
1891	202.3	7.3	10.1	104.7	69.4	.6	32.6	13.7
1892	124.8	6.7	12.7	119.3	77.8	1.3	42.3	8.0
1893	156.3	5.6	12.7	113.2	72.8	1.1	38.6	9.8
1894	159.2	6.4	7.9	123.3	78.8	1.0	35.4	8.8
1895	164.4	6.6	5.9	111.2	75.5	.8	42.4	9.0
1896	187.1	4.7	3.6	115.5	80.8	1.3	49.6	11.0
1897	207.6	4.7	2.4	133.1	83.1	1.6	46.5	11.8
1898	217.6	4.5	2.4	130.1	88.4	4.0	45.2	13.1
1899	234.5	3.1	1.1	140.1	98.5	6.2	51.9	15.0
1900	170.3	4.0	1.2	111.3	91.7	4.5	45.2	16.1
1901	121.6	4.0	.0	103.0	96.6	3.7	47.2	15.5
1902	209.1	3.3	.0	114.9	113.0	2.4	54.0	18.8
1903	98.3	5.0	.0	116.4	130.3	3.9	58.5	16.9
1904	2.6	5.5	.0	126.4	131.1	3.9	58.1	16.0
1905	11.4	4.3	.1	117.8	132.8	5.1	67.7	16.4
1906	1.8	8.4	.2	144.2	148.6	4.7	67.2	16.7
1907	26.0	3.2	.2	142.3	164.5	4.2	81.2	16.7
1908	35.7	2.0	.2	122.5	155.4	3.0	72.9	16.3
1909	.0	1.0	.2	123.9	156.9	3.0	76.4	12.7
1910	8.9	4.1	1.0	127.3	169.4	4.2	91.3	16.0
1911	24.9	15.8	.1	133.5	180.5	2.7	104.5	16.4
1912	12.3	17.1	.2	152.8	200.0	2.3	110.9	16.0
1913	9.7	17.0	.3	144.6	182.9	1.9	105.8	14.2

Table A9, continued

	(9)	(10)	(11)	(12)	(13)	(14)
	net imports (million lire at 1911 prices)					
	SITC cat. 2	*SITC* cat. 3	*SITC* cat. 6	*SITC* cat. 7	*SITC* cat. 8	total
1861	-3.3	5.6	28.0	22.5	4.0	57
1862	-4.1	5.6	28.5	34.3	4.0	68
1863	-7.8	4.8	35.1	45.2	4.3	82
1864	-6.9	6.7	30.5	30.7	6.5	68
1865	-6.7	5.5	29.6	27.9	5.0	61
1866	-12.9	6.0	25.7	15.9	4.2	39
1867	-16.5	5.6	29.9	12.9	4.9	37
1868	-17.0	6.5	27.3	11.6	4.4	33
1869	-23.6	7.1	37.1	16.7	5.5	43
1870	-22.9	10.6	36.0	13.8	3.9	41
1871	-20.1	8.6	36.3	18.2	4.3	47
1872	-23.3	11.5	38.1	22.1	6.2	55
1873	-25.1	10.6	39.3	37.8	6.5	69
1874	-27.9	11.6	46.8	23.3	6.1	60
1875	-27.3	11.6	48.0	18.0	6.8	57
1876	-27.3	16.1	47.2	18.7	6.4	61
1877	-29.2	14.7	51.6	20.7	7.1	65
1878	-26.4	14.5	39.8	16.3	5.3	50
1879	-34.2	17.0	49.5	19.1	4.2	56
1880	-38.8	19.8	54.6	29.2	5.2	70
1881	-35.1	24.3	72.2	40.6	5.7	108
1882	-39.3	26.7	87.1	52.8	6.6	134
1883	-43.5	29.5	95.5	57.2	6.6	145
1884	-37.7	33.0	92.5	54.9	8.5	151
1885	-39.2	38.3	92.8	55.9	9.0	157
1886	-32.3	38.4	102.3	60.4	11.6	180
1887	-32.3	47.6	123.1	80.6	25.1	244
1888	-31.2	51.1	116.1	68.5	19.8	224
1889	-37.6	52.2	102.1	62.3	15.0	194
1890	-31.8	56.1	81.3	44.0	12.7	162
1891	-37.2	50.3	65.9	27.3	9.2	116
1892	-36.7	49.4	60.1	24.7	9.0	107
1893	-36.4	47.8	65.0	24.5	9.2	110
1894	-37.1	60.1	64.7	19.9	7.1	115
1895	-36.0	54.7	62.4	27.9	8.0	117
1896	-38.9	51.4	64.5	18.0	10.6	106
1897	-41.9	53.5	64.0	17.3	14.0	107
1898	-42.9	55.9	68.1	30.8	20.3	132
1899	-47.1	61.0	84.3	61.3	21.1	181
1900	-41.2	62.8	90.1	108.1	23.4	243
1901	-39.3	61.1	84.9	78.0	24.5	209
1902	-46.2	68.7	98.6	42.0	24.9	188
1903	-45.7	70.8	97.9	43.9	27.8	195
1904	-45.0	76.3	99.7	84.6	30.6	246
1905	-45.3	84.1	106.7	101.7	37.4	285
1906	-50.9	102.4	159.3	170.4	57.7	439
1907	-52.9	111.5	209.8	244.4	62.3	575
1908	-48.1	115.6	217.8	235.5	70.9	592
1909	-46.0	126.7	203.2	175.6	62.7	522
1910	-51.9	130.0	205.6	149.2	74.2	507
1911	-57.5	138.0	211.6	150.4	77.9	520
1912	-62.2	144.3	236.3	143.8	85.8	548
1913	-58.0	148.2	214.3	136.4	85.7	527

Source: see text.

Table A10. Services value added flowing into investment, 1861-1913
(million lire at 1911 prices)

	(1) trans-port.	(2) commerce	(3) net b'g and ins.	(4) misc. serv.	(5) total	(6) investment share of services
1861	43	45	3	13	104	.033
1862	50	45	4	16	115	.036
1863	53	46	5	17	121	.037
1864	53	45	6	16	120	.036
1865	56	48	5	17	126	.037
1866	51	45	7	14	117	.032
1867	49	45	8	12	114	.034
1868	50	43	7	12	112	.033
1869	51	46	7	12	116	.034
1870	55	47	5	12	119	.034
1871	59	47	6	12	124	.036
1872	63	51	8	13	135	.038
1873	72	55	11	16	154	.043
1874	74	57	9	17	157	.043
1875	71	53	8	14	146	.040
1876	72	55	9	13	149	.041
1877	75	57	10	13	155	.042
1878	74	54	9	13	150	.040
1879	77	55	10	13	155	.041
1880	83	60	12	15	170	.044
1881	90	68	12	16	186	.047
1882	101	74	14	19	208	.052
1883	107	79	13	21	220	.054
1884	115	83	15	22	235	.057
1885	118	88	17	23	246	.058
1886	125	96	19	24	264	.060
1887	123	105	22	23	273	.061
1888	129	103	21	24	277	.062
1889	127	98	22	23	270	.060
1890	128	93	20	22	263	.058
1891	125	85	17	21	248	.055
1892	124	81	18	19	242	.054
1893	126	80	18	18	242	.053
1894	128	83	15	18	244	.054
1895	123	82	13	16	234	.051
1896	125	84	14	15	238	.051
1897	130	86	15	16	247	.053
1898	135	92	14	16	257	.054
1899	145	103	14	18	280	.058
1900	156	110	16	20	302	.062
1901	163	108	15	20	306	.061
1902	176	114	18	21	329	.065
1903	189	120	18	23	350	.067
1904	202	129	18	25	374	.071
1905	212	144	23	28	407	.075
1906	231	173	25	33	462	.082
1907	248	195	26	36	505	.086
1908	266	211	29	39	545	.091
1909	293	217	28	43	581	.095
1910	327	230	36	49	642	.103
1911	354	234	41	52	681	.104
1912	364	244	45	54	707	.105
1913	374	235	41	53	703	.101

Source: see text.

Table A11. Transport and communications services value added flowing into investment, 1861-1913 (million lire at 1911 prices)

	(1) rail trans-port	(2) other inland transp.	(3) mari-time transp.	(4) com-muni-cation
1861	3	33	3	4
1862	3	38	4	5
1863	4	39	4	6
1864	4	39	4	6
1865	5	41	4	6
1866	6	35	4	6
1867	6	33	4	6
1868	7	32	5	6
1869	7	32	5	7
1870	8	34	6	7
1871	10	35	6	8
1872	11	38	6	8
1873	13	43	7	9
1874	13	45	8	8
1875	14	40	8	9
1876	16	39	8	9
1877	16	40	8	11
1878	16	39	7	12
1879	18	41	7	11
1880	20	43	8	12
1881	21	46	10	13
1882	23	52	11	15
1883	25	54	12	16
1884	28	58	12	17
1885	28	61	12	17
1886	30	64	13	18
1887	32	63	13	15
1888	35	63	15	16
1889	37	61	13	16
1890	38	60	14	16
1891	38	57	14	16
1892	39	55	13	17
1893	41	54	13	18
1894	42	54	14	18
1895	43	49	13	18
1896	45	49	13	18
1897	47	50	13	20
1898	49	51	14	21
1899	52	55	16	22
1900	55	58	19	24
1901	57	60	20	26
1902	61	66	21	28
1903	64	71	22	32
1904	69	75	25	33
1905	71	83	26	32
1906	78	91	28	34
1907	80	98	32	38
1908	87	105	33	41
1909	93	120	35	45
1910	100	135	40	52
1911	107	141	44	62
1912	113	146	43	62
1913	122	145	45	62

Source: see text.

Table A12. Non-rail inland transport of investment goods, 1861-1913 (million tons)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	agri-	industry							
	culture	extrac.	wood	metal	eng'g	n.m.m.p.	chem.[a]	imports	total
1861	1.6	11.6	.8	.0	.0	9.1	.0	.3	23.4
1862	1.7	13.6	.8	.0	.0	10.6	.0	.4	27.1
1863	1.7	14.1	.8	.0	.0	11.1	.0	.5	28.2
1864	1.7	14.3	.8	.0	.0	11.2	.0	.4	28.4
1865	1.7	14.7	.9	.0	.0	11.5	.0	.4	29.2
1866	1.6	12.1	.9	.0	.0	9.4	.0	.3	24.3
1867	1.5	11.4	.8	.0	.0	8.8	.0	.3	22.8
1868	1.5	11.3	.8	.0	.0	8.8	.0	.3	22.7
1869	1.4	11.4	.8	.0	.0	8.8	.0	.3	22.7
1870	1.5	12.0	.8	.0	.0	9.3	.0	.4	24.0
1871	1.5	12.6	.8	.0	.0	9.6	.0	.4	24.9
1872	1.6	13.8	.8	.0	.0	10.6	.0	.4	27.2
1873	1.8	16.0	.9	.0	.0	12.1	.0	.5	31.3
1874	1.9	16.7	.9	.1	.0	12.6	.0	.5	32.7
1875	1.7	14.3	.8	.0	.1	10.8	.0	.5	28.2
1876	1.6	13.8	.8	.0	.1	10.4	.0	.5	27.2
1877	1.6	14.5	.8	.0	.1	11.0	.0	.6	28.6
1878	1.6	14.6	.8	.0	.0	11.1	.0	.4	28.5
1879	1.6	14.7	.8	.1	.1	11.1	.0	.6	29.0
1880	1.6	15.9	.8	.1	.1	11.9	.0	.6	31.0
1881	1.8	16.6	.9	.1	.1	12.4	.0	.8	32.7
1882	1.9	18.9	1.0	.1	.1	14.2	.0	.9	37.1
1883	1.9	20.1	1.0	.1	.1	15.2	.0	1.0	39.4
1884	1.9	21.1	1.1	.2	.1	16.0	.0	1.0	41.4
1885	2.0	21.9	1.1	.2	.2	16.6	.0	1.1	43.1
1886	2.0	22.8	1.2	.2	.2	17.2	.1	1.2	44.9
1887	1.9	22.3	1.2	.2	.2	16.9	.1	1.5	44.3
1888	1.9	22.1	1.2	.3	.2	16.8	.1	1.4	44.0
1889	1.8	21.7	1.1	.3	.2	16.4	.0	1.4	42.9
1890	1.8	21.9	1.1	.2	.2	16.4	.1	1.2	42.9
1891	1.8	21.6	1.0	.2	.1	16.1	.1	.9	41.8
1892	1.7	20.4	1.0	.2	.1	15.0	.1	.9	39.4
1893	1.6	20.3	1.0	.2	.1	14.9	.1	.9	39.1
1894	1.6	20.2	1.0	.2	.1	14.8	.1	.9	38.9
1895	1.5	18.3	.9	.2	.1	13.3	.1	.9	35.3
1896	1.5	18.0	.9	.2	.1	13.0	.1	.9	34.7
1897	1.5	18.3	1.0	.2	.1	13.2	.1	.9	35.3
1898	1.5	18.6	1.0	.3	.1	13.3	.1	1.1	36.0
1899	1.6	19.3	1.1	.3	.2	13.7	.1	1.4	37.7
1900	1.6	20.3	1.1	.3	.2	14.4	.1	1.7	39.7
1901	1.7	21.8	1.1	.3	.2	15.4	.1	1.5	42.1
1902	1.8	24.3	1.2	.3	.2	17.2	.1	1.5	46.6
1903	1.9	26.3	1.2	.4	.2	18.6	.2	1.5	50.3
1904	2.0	28.0	1.3	.4	.2	19.7	.2	1.7	53.5
1905	2.1	30.5	1.4	.5	.2	21.6	.3	2.0	58.6
1906	2.2	32.7	1.5	.7	.3	23.1	.3	2.8	63.6
1907	2.3	34.8	1.5	.7	.4	24.5	.3	3.5	68.0
1908	2.4	37.3	1.7	.8	.4	26.4	.2	3.5	72.7
1909	2.7	43.7	1.8	.9	.5	31.1	.4	3.3	84.4
1910	3.0	50.3	2.0	1.1	.5	35.8	.5	3.2	96.4
1911	3.1	53.2	2.0	1.0	.5	38.0	.5	3.3	101.6
1912	3.1	55.1	2.0	1.2	.5	39.1	.6	3.5	105.1
1913	3.1	54.8	2.0	1.1	.5	38.9	.7	3.3	104.4

[a]includes rubber.

Source: see text.

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