*Estimating Regional per Capita Income: Italy, 1861-1914**

Alfredo Giuseppe Esposto

Eastern Michigan University, Ypsilanti

This paper examines the strengths and weaknesses of three methods of estimating the economic disparity between the sixteen regions which made up nineteenth-century Italy. The first is a Quality of Life Index constructed by Federico and Toniolo.[1] It is not, of course, an estimate of regional per capita income. It does, on the other hand, offer an approach for dealing with poor-data cases like nineteenth-century Italy. The Quality of Life Index method uses proxy variables to produce a quantified image of the relative levels of development. As such the method is a prime suspect for a way to study uneven regional development, assuming that it is impossible to construct estimates of regional per capita income. However, given how irreplaceable per capita income is as an indicator of economic development, we may not want to jump too quickly at the Quality of Life Index, even when the data are substandard.

N.F.R. Crafts has shown that proxy variables can also produce estimates of per capita income.[2] He estimated national per capita income, but the same method can and has been used to estimate regional per capita income.[3] It is a relatively easy method. A basic OLS regression derived from independent variables of available data of income proxies form the base. Of course, one has still to contend with the pathological problems that arise in any econometric endeavour. And there is also the problem of finding proxy

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[1] Giovanni Federico and Gianni Toniolo, "Italy," *Patterns of European Industrialization: the Nineteenth Century,* (eds.) Richard Sylla and Gianni Toniolo, (New York: Routledge, 1991), pp. 197-217.

[2] N.F.R. Crafts, "Gross National Product: 1870-1910: Some New Estimates," *Explorations in Economic History* 20, 1983, pp. 387-401.

[3] In particular, there is the project "the Political Economy of Uneven Regional Development: Past and Present" under the direction of David F. Good and sponsored by the National Bank of Austria in which a number of studies on uneven regional development within national economies have used the Crafts method.

variables that mirror income growth and not some non-income related phenomena. Yet, the works of Crafts and others have shown that the method offers an approach for the regional analysis of nineteenth-century cases, like Italy, where income and output data are heavily suspect. The second set of estimates I introduce below are my construction of regional per capita income values, using the Crafts's method.

Of course, there is no substitute for estimates based on standard, national-income accounting methods. Though the effort can be difficult, the pay-off from squeezing out estimates from the meagre available data can be enormous — even when the data are suspect. The process provides important sectoral analyses and information useful for non-income studies. And even if the veracity of the underlying data is questionable, estimates from a national-income accounting method can be an important step leading toward better data or methods. In the final part of this paper I attempt such an estimation of regional per capita income from the available data. The results and the picture it draws of pre-World War I Italy are then compared with those drawn by the other methods and the received view of Italian uneven regional economic development.

Using Proxy Variables to Construct Estimates for Earlier Years

In a case like nineteenth-century Italy, where regional output data are extremely limited, the first, logical approach would be to estimate the income gap from various proxy variables. One form of this approach was attempted by Federico and Toniolo. They followed a method developed by Morris which generates what he calls the Physical Quality of Life Index. Morris chose three indicators of development: life expectancy, infant mortality, and literacy.[4] These are simple to interpret, allow international and regional comparisons, and measure socio-economic phenomena typically associated with economic development. Each indicator was ranked from 0 to 100 based on its relative position with respect to those of the other countries in the sample. Zero went to the lowest value and 100 to the highest. He then constructed a composite index of the unweighted mean of these indicators. The value each country received indicates its position relative to others. More complex versions of this approach, where the index is based on the cross-correlation of the indicators, have also been developed.[5]

Frederico and Toniolo applied the Physical Quality of Life Index to Italy, both nationally and regionally, in a nineteenth-century comparison with England and Wales, France, and Belgium. Table 1 reproduces their results for the three regional zones. As Frederico and Toniolo point out, there appears to

[4] D.M. Morris, *Measuring the Conditions of the World's Poor: The Physical Quality of Life,* (New York: Pergamon Press, 1979).

[5] Donald McGranahan, Eduardo Pizzaro, and Claude Richard, *Measurement and Analysis of Socioeconomic Development,* (Geneva: U.N. Research Institute, 1985).

have been a "welfare gap" from the time of unification. The Northwest was ten years ahead of the Northeast-central and thirty years ahead of the South. Substantial gains, however, were made by the Northeast-central and the South. The index number for the South, for example, almost tripled from 1870 to 1910. Yet, even by 1910 the South was still some thirty years behind the Northwest. Frederico and Toniolo conclude from their results that it is difficult to discuss Italy's economic development in aggregate terms. They do not elaborate the theme, but it is apparent that there was not a uniform Italian economy in the nineteenth century.

The Frederico and Toniolo work, however, does not support the standard view of Italian regional development since it shows the gap narrowing prior to 1910. The fault may lie with the method. Despite the advantage of the Quality of Life Index over a simple observation of the differences in the regional value of one or more proxy variables, there remain several problems with it. First, what is really being measured is society's effectiveness in raising life expectancy and reducing infant mortality and illiteracy. These may or may not reflect economic development. Second, there is no justification for giving equal weights to each indicator in computing the overall index. Finally, this method does not produce — and in all fairness it does not claim to produce — estimates of regional per capita income, which is the key indicator of economic development most lacking from the study of Italian uneven regional development.

N.F.R. Crafts offers a method that takes account of these shortcomings. He estimated per capita national incomes for nineteenth-century European countries for which there were insufficient data to construct formal GNP estimates. Working in the tradition of Beckerman and Bacon, he estimated a regression equation from nineteenth-century data where per capita income is a function of several proxy variables: letters posted per capita, persons aged 15-64 as a ratio of the total population, coal consumed per person, and infant

TABLE 1 - A quality of life index for Italy

Year	*Italy*	*Northwest*	Northeast -*central*	*South*
1870	26.9	40.5	27.1	17.6
1880	36.9	47.0	41.2	28.4
1890	n.a.	n.a.	n.a.	n.a.
1900	56.7	66.8	62.1	46.0
1910	62.0	70.5	68.9	49.4

Note: Northwest includes the regions of Piedmont, Liguria, and Lombardy; Northeast-central includes the regions of Veneto, Emilia, Tuscany, Marches, Umbria, and Latium; South includes the regions of Abruzzi, Campania, Apulia, Basilicata, Calabria, Sicily, and Sardinia.
Source: Giovanni Federico and Gianni Toniolo, "Italy," *Patterns of European Industrialization: the Nineteenth Century*, Richard Sylla and Gianni Toniolo (eds.) (New York: Routledge, 1991), pp. 197-217.

mortality.[6] For his income values he used the per capita incomes of ten European countries with relatively good GNP data from the decennial years of 1850 to 1910. By applying the estimated regression coefficients to values of the independent variables from countries with poor GNP data, he was able to calculate their per capita income for the same benchmark years.[7]

I tried to estimate Italian regional per capita income by using a variant of the Crafts approach. I estimated my equation from the sixteen regional values of per capita income in 1911 estimated by Zamagni.[8] I had attempted to build a larger sample, first by using twentieth-century regional data and then nineteenth-century national data. Unfortunately, due to technological and structural changes, variables which were available and had a strong correlation with income in the nineteenth century had little or no correlation with income in the twentieth century. In some cases, they even demonstrated the opposite relationship. For example, letters posted was positively correlated with income in the nineteenth century but became negatively correlated in the twentieth century with the advent of the telephone. An equation based on a time-series analysis of national data did not work out because of the lack of reliable national income figures for the nineteenth century. As for my independent variables I choose the percentage of six to twelve year olds in school, letters posted per capita, and real savings deposits per capita.[9] I looked at other economic and social phenomena which have non-stochastic relationships to income but these had low correlations and did not always exist for the years I wanted. This also prevented me from using Crafts's original equation.

The equation I ended up with was a simple linear regression with regional per capita income a function of the three proxy variables:

$$\begin{array}{lll} PCI = 97.784 + 3.167\ EDU + .5457\ SAV + 6.435\ LTP \\ \qquad\qquad (3.0968)^{**} \quad (2.5716)^{*} \quad (2.6750)^{*} \end{array}$$

R = 0.944; N = 16; t-statistics are in parentheses; *significant at .05 level, **significant at .01 level

EDU is the percentage of children 6-12 in school

[6] Wilfred Beckerman and Robert Bacon. "International Comparisons of Income Levels: A Suggested New Measure." *Economic Journal*, 76, 1966, pp. 519-536.

[7] Variants of this method are beginning to appear in other works on regional economic development. See David F. Good, "Regional Inequalities in Developing Economies: The Nineteenth-Century Habsburg Empire." Paper prepared for the PARSS Seminar on Work and Population. University of Pennsylvania, March 30, 1989.

[8] Vera Zamagni, *Industrializzazzione e squilibri regionali in Italia: Bilancio dell'eta giolittiana*, (Bologna: Mulino, 1978).

[9] The data for my independent variables came from various years of *Annuario Statistico Italiano*. From these I took the regional totals of public and private primary school students, which I divided by the number of children age six to twelve, for my eduction variables. I used both letters and postcards in my letters posted variable. My regional estimates of savings deposits includes all banks.

SAV is real bank savings deposits per capita
LTP is letters posted per capita

Source: Income: Vera Zamagni, *Industrializazzione e squilibri regionali in Italia: Bilancio dell'eta giolittiana,* (Bologna: Mulino, 1978), pp. 198-9); Independent variables: *Annuario Statistico Italiano* (various years).

The estimated equation has a relatively high R^2 = .944 and all variables are statistically significant.

I next applied the regression coefficients from my estimated equation to regional values of the independent variables from the decennial years of 1861 to 1911.[10] The estimates of real per capita income in 1911 lire and their

TABLE 2 - Per capita income estimates Crafts method
(1911 Lire; Index Numbers are in Parentheses)

Year:	*1861*	*1871*	*1881*	*1891*	*1901*	*1911*	Annual Growth rate[a] *1861-1911*
Region:							
Piedmont	416 (183)	424 (165)	456 (147)	484 (142)	509 (137)	640 (137)	0.87
Liguria	288 (127)	338 (131)	438 (141)	484 (142)	541 (145)	692 (148)	1.77
Lombardy	401 (178)	431 (167)	465 (150)	508 (149)	557 (149)	641 (137)	0.94
Northwest	391 (173)	417 (162)	457 (147)	495 (145)	535 (144)	647 (139)	1.01
Veneto	245 (103)	272 (106)	381 (113)	403 (118)	428 (115)	488 (105)	1.39
Emilia	236 (104)	260 (101)	338 (109)	387 (113)	422 (113)	538 (115)	1.66
Tuscany	239 (106)	284 (110)	311 (100)	351 (103)	397 (106)	507 (109)	1.52
Marches	190 (84)	226 (88)	270 (80)	315 (92)	342 (92)	430 (92)	1.65
Umbria	177 (78)	211 (82)	258 (83)	314 (92)	337 (91)	426 (91)	1.77
Latium	308 (120)	392 (126)	448 (131)	481 (129)	610 (131)	1.73	
Northeast -central	229 (101)	270 (105)	344 (111)	385 (113)	416 (111)	507 (109)	1.55
Abruzzi	178 (78)	210 (82)	248 (80)	263 (77)	285 (76)	368 (79)	1.47
Campania	203 (90)	227 (88)	276 (89)	303 (89)	319 (86)	386 (83)	1.30
Apulia	174 (77)	179 (70)	218 (70)	240 (70)	271 (73)	351 (75)	1.42
Basilicata	153 (68)	176 (68)	212 (68)	239 (70)	256 (69)	334 (72)	1.58
Calabria	168 (74)	173 (67)	215 (69)	219 (64)	235 (63)	325 (70)	1.34
Sicily	149 (65)	182 (71)	211 (68)	239 (70)	282 (76)	384 (82)	1.91
Sardinia	188 (83)	219 (84)	271 (87)	277 (81)	300 (80)	348 (75)	1.29
South	171 (76)	193 (75)	235 (76)	256 (75)	286 (77)	365 (78)	1.63
Italy[b]	227 (100)	257 (100)	310 (100)	342 (100)	373 (100)	467 (100)	1.45
Coeff. of Variation	.37	.32	.29	.29	.28	.27	

[a]For each region the growth rate is a fitted trend of the six-point estimates.
[b]Based on an unweighted average of regional per capita incomes.

[10] I chose the census years for the ready access to the population figures I would need for the independent variables. The exception was 1891. I had to extrapolate growth rates of regional population from the censuses of 1881 and 1901 to estimate population in 1891 because no census occurred in that year.

corresponding index numbers appear in Table 2. They indicate substantial income disparities among the regions as early as 1861. Piedmont and Lombardy appear to have had a large lead at the time of unification. According to the index numbers, their per capita income was approximately 80 percent higher than the national average. However, the relative income levels in these two high-income regions fall to just 40 percent over the national average by 1911. The per capita income of Liguria and Latium, on the other hand, exceed the national average by increasing levels through 1911. Veneto, Emilia, and Tuscany began and ended at about the national average. The other regions remain well below the national average at roughly the same relative income level. The exception is Sicily which converges toward the national average, though never reaching it.

There are two other indications in these estimates implying that there was a general trend towards convergence. First, the aggregate per capita incomes in 1911 lire for the zones of the Northwest, Northeast-central, and South move closer. For 1861 they claim that per capita incomes in the South and Northeast-central were 44 percent and 59 percent of that of the Northwest. The estimates, however, show for 1911 a Southern per capita income equal to 56 percent of that of the Northwest. In addition, the estimate of the per capita income of the Northeast-central in 1911 equals 76 percent of per capita income in the Northwest. Gains by the South and Northeast-central, in relative terms, imply that they were growing at a faster rate than the Northwest. This is confirmed by the annual growth rates — approximately 1.6 percent in the South and Northeast-central and only 1.01 percent in the Northwest. Second, the coefficient of variation implies that there was some significant narrowing of incomes at the regional level, particularly in the first twenty years (see Table 2).[11] The reason seems to be that several regions partially closed the income gap between them and Piedmont and Lombardy, for while income in Piedmont and Lombardy increased at an annual rate of less than one percent, from 1861 to 1911, those of Liguria, Emilia, Tuscany, Marches, Umbria, Basilicata and Sicily increased at a rate of over 1.5 percent.

Like the Federico-Toniolo estimates, these results are difficult to accept. Except for the wide gap in 1861, they are at odds with the received view of Italian economic development, which says that the gap widened. Given the evidence, I can only conclude that the results of the estimation equation

[11] The coefficient of variation is the standard deviation of regional incomes divided by the mean, in this case national per capita income. In contrast to the unadjusted standard deviation, the coefficient of variation provides a standardized measure of variation that allows comparison between samples that have large differences in their means: The higher the coefficient of variation, the larger the relative variation.
1[4]Giovanni Vigo, *Istruzione e sviluppo economico in Italia nel secolo xix*, (Torino: Industria Liberaria, 1971).

reflect institutional changes that frequently occur after political unification but which are not necessarily accompanied by changes in per capita income. As Vigo indicates, from 1863 to 1881 the largest increases in the numbers of state schools occurred in the South. This reflects the extension of the strong Piedmontese tradition of state education to the rest of the peninsula.[12] At unification nearly a quarter of all state schools were in Piedmont. This rush to push standard, northern infrastructures into the south would also explain the increase in the number of letters posted. Partly due to the expansion of the railway system, Southern Italy received mail services which were non-existent outside of Naples before 1870. This can be seen by the large increase in the number of post offices during this period. This may also explains the increase in the size of savings deposits per capita, since the dominate type of savings bank in Southern Italy, well into the twentieth century, was the postal savings banks.[13]

Estimates of Per Capita Income based on Sectoral Output

I believe that the Crafts method can provide a useful vehicle for estimating per capita income if better proxy variables can be uncovered. But given the suspicion surrounding the proxy methods and their results, I decided next to try to squeeze out estimates from the meagre output data available and get a more straight-forward, national income accounting result. Specifically, starting with regional estimates of agricultural output for 1871 and 1911 and regional estimates of industrial output for 1863-65 and 1889-93, I constructed regional estimates of per capita output for 1871 and 1891 (see Appendix). These estimates for 1871 and 1891 I next combined with Zamagni's (1978) estimates for 1911 to create a picture of regional per capita output in Italy before 1914.

Before moving to the discussion of my estimates of per capita income, let us look at the individual sectoral output estimates. In particular, my estimates of industrial and agricultural output appear to support the position that key sectors in the South stagnated. Beginning with the industrial sector it appears that after little change from the 1860s to the 1890s the gap in industrial output exploded as industry in the Northwest expanded (see Table A-1). Piedmont

[12] *Annuario Statistico Italiano 1912.*

[13] These are based on my estimates of the growth rate of major crops calculated from four points: 1871-74, 1879-83, 1891-94, and 1909-13. The crops included in the sample are cereals, legumes, industrial (tobacco, hemp, flax, cotton, and sugar beets), potatoes, chestnuts, olive oil, wine, and citrus fruits. My sources were: 1870-74: MAIC, *Condizioni dell'agricoltura in Italia, 1870-74,* (Roma: Barbera, 1876-9), v.1; 1879-83: MAIC, *Notizie di statistica agraria,* (Roma: Bertero, 1891), pp. 52-8; 1891-94: (these are averages of the years 1891 and 1894) *Annuario Statistico Italiano 1892,* pp. 376-83; 1895, pp.346-53; tobacco (1889): MAIC, ibid, pp. 63; 1909-13: Zamagni, op. cit., pp. 68-9; chestnuts for this period were from *Annuario Statistico Italiano 1915,* pp. 127. Prices are in 1911 lire.

led with a 4.4 percent annual growth rate of per capita industrial output. Liguria with a 4.1 percent rate and Lombardy with a 3.3 percent rate followed. The Northwest zone increased its share of total output from 41 percent to 54 percent. The per capita output and the share of total output of the Northeast-central zone remained about the same. Individually only Veneto, Emilia, and Tuscany experienced significant growth in per capita output, but their shares of total output changed little under the weight of the Northwest expansion. For most regions per capita output moved very little and in some regions there was a decrease. As a zone, the Southern regions' share of total output fell from 28 to 17 percent because per capita industrial output increased by just two lire (in 1911 prices).

From my estimates of agricultural output it appears that at the time of the industrial expansion in the Northwest, southern agriculture experienced slower rates of growth of output compared to the North. According to these estimates, from the early 1870s to the 1890s all regions saw declines or little growth in output, as Italian agriculture underwent a crisis from 1878 to 1883. Over the next twenty years there was significant growth nearly everywhere. In the North, the gross output of major crops in Piedmont, Lombardy, Veneto, Emilia

TABLE A-1 - Per capita regional industrial output
(1911 Lire)

Regions	*1871*	*1891*	*1911*
Piedmont		93	190
Liguria		129	245
Lombardy		115	219
Northwest	55	105	204
Veneto		65	94
Emilia		56	82
Tuscany		75	113
Marches		57	52
Umbria		82	71
Latium		62	78
Northeast-central	32	64	85
Abruzzi		47	22
Campania		72	73
Apulia		48	56
Basilicata		36	17
Calabria		37	29
Sicily		56	41
Sardinia		68	51
South	27	55	43
Italy[a]	38	68	90

[a]Unweighted average of the regional values.

and Latium grew at an annual rate of over two percent — significantly above the national rate of 1.8 percent.[14] The average rate for the group (2.8) placed it in the upper end of industrializing countries in the nineteenth century.[15] In the South, on the other hand, only two regions achieved comparable rates: Abruzzi and Campania. The others experienced increases of only one percent or less, and the rate for the zone as a whole was just 0.9 percent.

Of course, my output estimates play their most important role as the foundation for my estimates of regional per capita income. Table 3 shows the

TABLE 3 - Estimates of per capita income: national accounting method
(1911 Lire; Index Numbers are in Parentheses)

Regions	*1871*	*1891*	Annual Growth Rate *1871-1891*	*1911*	Annual Growth Rate *1891-1911*
Piedmont		396 (103)		624 (132)	2.3
Liguria		541 (141)		715 (151)	1.4
Lombardy		456 (119)		678 (144)	2.0
Northwest	349 (108)	434 (113)	1.1	664 (141)	2.1
Veneto		352 (92)		437 (93)	1.1
Emilia		410 (107)		564 (119)	1.6
Tuscany		420 (109)		494 (105)	0.8
Marches		378 (98)		433 (92)	0.7
Umbria		423 (110)		444 (94)	0.2
Latium		494 (129)		619 (131)	1.1
Northeast -central	341 (106)	406 (106)	0.9	498 (106)	1.0
Abruzzi		267 (70)		342 (72)	1.2
Campania		301 (78)		401 (85)	1.4
Apulia		415 (108)		424 (89)	0.1
Basilicata		269 (70)		340 (72)	1.2
Calabria		289 (75)		299 (63)	0.1
Sicily		357 (93)		344 (73)	-0.2
Sardinia		378 (99)		393 (83)	0.2
South	280 (87)	331 (85)	0.8	369 (78)	0.5
Italy	319 (100)	385 (100)	0.9	493 (100)	1.0
Coefficient *of variation*					
Regions		0.20		0.27	
Zones	0.10	0.11		0.24	

[14] This is based on a comparison with the estimates of Yujiro Hayami and Vernon W. Ruttan, *Agricultural Development: an International Perspective*, (Baltimore: Johns Hopkins Press, 1971), pp. 327-9.

[15] Alfredo G. Esposto, "Italian Industrialization and the Gerschenkronian 'Great Spurt': A Regional Analysis," *Journal of Economic History*, 52, pp. 353-362.

estimates of per capita income I produced by combining my regional estimates of sectoral output. They divide Italy in 1871 into a high-income zone in the North and a low-income zone in the South. It implies that the three-zone scenario, used to describe Italy in the twentieth century, had not yet emerged. The per capita income estimates for the northwest are not distinct from the other regions in the northern half of the peninsula. The estimates for the Northwest and the Northeast-central regions are nearly equal at about 7 percent above the national average. These per capita estimates are, nevertheless, 23 percent greater than those for the South, which my estimates say had a per capita income of only 87 percent of the national average. The figure is at the higher end of the Eckaus estimate of a 15 to 25 percent difference between per capita income in the North and South, but it seems to confirm the general census of the literature that the South was already a relatively low-income area at the time of unification.

The 1891 estimates show only slight change. Income in the Northwest zone is shown growing at a rate somewhat better than the national rate and increasing its relative position to 12 percent over the national average. With per capita incomes growing at rates nearly equal to the national rate, the estimates for the Northeast-central and the South remain in the same positions relative to the national average as those for 1871. Of course, this would mean that they had fallen slightly behind the Northwest. But the increase in the gap is barely noticeable, as indicated by the insignificant change in the coefficient of variation for the three zones from 0.10 to 0.11. The estimates continue to imply that there were only two income-zones in 1891. With the exception of the estimates for Liguria and Latium, most of the per capita incomes of the regions in the northern half fall within a fairly narrow range. The same is true for the majority of the regions of the southern mainland, but their range of per capita incomes is only 62 to 70 percent of the average regional per capita income in the North. The one exception is Apulia. If indeed there was a third zone it appears to have been insular. The income estimates for Sicily and Sardinia puts them in a middle-income category. Much of this can be explained by the presence of large mining industries in both and the high shares of the Italian output of animal products in Sardinia and citrus fruits in Sicily.

For the period 1891 to 1911 the income estimates draw a new picture. There are large increases in the estimates of per capita income in 1911 for the regions of Piedmont and Lombardy. The 1911 estimates claim that they grew at over twice the national rate. Along with Liguria, whose per capita income estimate indicates an annual rate of 1.4 percent, my estimates claim that they had an average per capita income that was 41 percent greater than the national average. For the Northeast-central, only the estimates for Emilia indicate significant growth. On average the rate of growth for the Northeast-central regions is measured at just equal to the national rate, keeping the zone in the same relative position it is in for the estimates of the two earlier periods. In contrast, the estimates of per capita incomes for all of the southern regions are

at most 89 percent of the national value and, though Abruzzi, Campania, and Basilicata have growth rates slightly above the national rate, for most southern regions the rate of growth is far below the national average.

My output-based estimates of per capita income suggest then that while there was for some time a North-South gap which grew from unification to World War I, the disparity took on a clearly defined three-zone characteristic after 1891. Primarily, this implies that the Northwestern regions experienced income growth which simply left the rest of the nation behind. Southern income stagnated and the northeast-central grew at a rate just equal to the national average, all of which led to the now familiar pattern of a high-income zone in the Northwest, a middle-income zone in the Northeast-central, and a low-income zone in the South. This is further reflected by the coefficients of variation for the three zones. The value for 1871 is a low .10 and rises only slightly to .11 by 1891. It then more than doubles by 1911 to reach .24. It is, of course, not surprising that the period 1891 to 1911 saw such growing regional disparity. This period included what Gerschenkron labelled Italy's first industrial "spurt."[16] My estimates, however, indicate that most of it occurred in the Northwest.

Whether any of this should be believed, of course, depends on the underlying data sources and the methodology used to extract estimates of value-added output from these. As for the data sources, they have been shown to lack much credibility, especially for the years before 1890. Federico has shown that there are two classes of problems with data sources of agricultural output. First, the methods used to calculate crop production varied from year to year, none of which were very accurate.[17] Second, the personnel responsible for performing the surveys, collecting the results, and checking them were rarely capable of the tasks. Lungonelli and Missaggia point out that similar problems occurred in the production of industrial statistics.[18] As for the methodology used to extract estimates of value-added output from the data sources, I can only say that I tried to follow Fenoaltea's advice that "where guesses cannot be avoided they should be explicit, and as reasonable as possible: rooted in the economic reality of input-output relationships...."[19] Generally this meant compensating for poor data by, for

[16] Giovanni Federico, "Per una valutazione critica della statistiche della produczione agricola italiana dopo l'Unita'," *Società e storia,* 15, 1982, pp. 94-97

[17] Michele Lungonelli, "Tra industria e burocrazia: Gli esordi della statistica industriale in Italia," *Studi storici,* 28, 1987. Maria Giovanna Missaggia, "Nota sulle statistiche ufficiali per l'"industria in Italia: 1885-1903," *Rivista di storia economica,* 5, 1988, pp. 234-254.

[18] Stefano Fenoaltea, "The Extractive Industries in Italy, 1861-1913: General Methods and Specific Estimates," *Journal of Economic History,* 48, 1988, p. 118.

[19] Angus Maddison, *Dynamic Forces in Capitalist Development,* (Oxford: New York, 1991). Ornello Vitale, "La stime del valore aggiunto a prezzi costanti per rami di attività," (ed.) G. Fuà, *Lo sviluppo in Italia,* (Angeli: Milano, 1975), vol. 3, pp. 463-477.

example, using input or output proxies. However, the question still remains whether this has produced results any more credible than those of the previous two methods. As with those the answer depends on how they fit in with the received view of Italian economic history.

For example, as also identified by the estimates from the Federico-Toniolo and Crafts methods, my national accounting based estimates confirm that the sixteen regions started their political union with a development gap between the northern and southern halves. But, unlike the Federico-Toniolo estimates and my estimates based on the Crafts method, they indicate that after unification the gap continued to widen. In particular, they show a dramatic shift beginning in the 1890s in which the South was left behind. They claim that the Northwest experienced substantial increases in per capita income through greater industrial output and rising agricultural productivity and the Northeast-central maintained growth rates at least equal to the national average. This would not only have widened the gap between the Northwest regions and the South, but it also would have produced a new gap between the Northwest regions and those of the Northeast-central zone. This appears to fit neatly within the known trend (see Table 4).

An additional piece of evidence that lends some credibility to my output-based estimates is where they stand relative to well known estimates of national per capita income. Table 5 compares my estimates' values of national

TABLE 4 - A century of uneven regional development
(Index Numbers; National Income = 100)

Region	*1871*	*1891*	*1911*	*1928*	*1938*	*1951*	*1959*	*1970*	*1979*
Northwest	108	113	141	147	152	161	164	131	131
Northeast -Central	106	106	106	91	92	101	92	105	111
South	87	86	78	69	66	53	65	70	66
Coeff. of Variation	.09[a]	.20	.27	.39	.43	.51	.48	.30	.32

[a] Based on only the 3 zones.
Sources: Table 3; Svimez, *Un secolo di statistiche italiane: nord e sud 1861-1965,* (Roma, 1965; ISTAT, *Annuario Statistico Italiano.* (Roma: Istituto Poligrafico dello Stato, various years).

TABLE 5 - A comparison of 3 estimates of national per capita income
(1911 LIRE)

	1870	*1890*	*1910*
Esposto	319	385	493
Maddison	460	593	861
Vitale	383	388	523

Sources: see text.

per capita income with those by Vitale and Maddison.[20] The impression is mixed. The growth rate, especially from 1871 to 1891, is similar to that of Maddison's estimates, but are much lower in nominal terms than his. On the other hand, my estimate for 1891 is very close to that by Vitale while my estimate for 1871 is significantly lower than his.

To break through this inconclusiveness I compare my income estimates for the Northwest, the Northeast-central, and the South with Crafts estimates for nineteenth-century industrializing economies (see Table 6). If my estimate

TABLE 6 - A comparison of the 3 zones with other European countries
(1970 U.S. Dollars)

	1870	*1890*	*1910*
Great Britain	904	1130	1302
Belgium	738	932	1110
Denmark	563	708	1050
Switzerland	589	750	992
Germany	579	729	958
Netherlands	591	768	952
France	567	668	883
Austria[a]	450	539	810
Sweden	351	469	763
Norway	441	548	706
NW Italy	373	464	710
Hungary[a]	362	434	616
Finland	390	458	561
Portugal	483	550	
Spain	391	464	547
NEC Italy	364	434	532
Greece	312	380	455
Russia	252	276	398
Southern Italy	299	354	394

[a] Austria and Hungary refers to the pre-World War I territories of the Hapsburg Empire and not the smaller present-day nations.
Sources: N.F.R. Crafts, "Gross National Product: 1870-1910: Some New Estimates," *Explorations in Economic History* 20 1983, pp. 389 and 394; David F. Good, "Regional Inequalities in Developing Economies: The Nineteenth-Century Habsburg Empire," paper prepared for the PARSS Seminar on Work and Population, University of Pennsylvania, March 30, 1989, Table 2, (Austria and Hungary); and Table 3 (Northwest (NW) Italy, Northeast-central (NEC) Italy and Southern Italy).
Note: For my estimates of zonal per capita income in 1970 dollars I first computed the levels in 1911 by applying Zamagni's regional incomes relative to the figure for Italy reported by Crafts for 1910. I then estimated 1890 and 1870 levels from the growth rates of my estimates of per capita output from 1891 to 1911 and from 1871 to 1891.

[20] For additional details on my methodology see Alfredo G. Esposto, *Institutions and Regional Disparities in the Italian Economy, 1861-1914,* Ph.D. diss., (Temple University, 1990). The estimates of this paper, however, represent improvements on the earlier work.

for a particular region is close to that of a nation that had a level of development that one would also expect in the Italian region at that time then my regional estimates may not be as far off as might be implied by the comparison with the estimates by Maddison. Thus, Table 6 has the income estimates of the Northwest similar to those of Norway and Hungary. The estimates for the Northeast-central are about the same as Spain's which would indicate, since the per capita income of the zone was typically equal to the national value, that Italy was as economically developed as her Mediterranean sister. The income estimates for the South in 1871 and 1891 barely exceed and for 1910 only matches that of Russia — a likely scenario since both were far from modernization in the nineteenth-century. Norway, of course, was not a major industrial power in the nineteenth century, but it did begin modern economic growth prior to 1914 as did Northwestern Italy. My estimates also give Northwestern Italy in 1890 a per capita income equal to only 42 percent of that of Great Britain, again not out of line with the received view of Italian economic development.

Conclusion

I have constructed two new estimates of regional per capita income for nineteenth-century Italy: one based on the Crafts method of estimating per capita income for nations with poor data and one based on more standard, national-income accounting procedures. Assuming that our goal is to construct estimates of per capita income and thus putting the Quality of Life index out of consideration, I have tried to show the elements behind one's choice of methods for quantifying uneven regional development. As I noted, the results of the estimates of per capita income based on the Crafts method are difficult to accept. Both the wide initial gap and the subsequent narrowing seem implausible when compared to the received view of southern stagnation and regional estimates of industrial and agricultural output. I concluded that the results are unreliable because they reflect institutional changes that naturally occur after political unification but which are not necessarily accompanied by changes in per capita income. The Piedmontese government which now found itself responsible for all of Italy would have been inclined to provide the same level of educational and postal services to the rest of the peninsula that it had provided in Piedmont, Lombardy, and Liguria before 1861. Yet all of this could have occurred without a substantial increase of income in the South. Unless proxies can be found that are not effected by institutional variations across space and time, it appears as if the Crafts method is inappropriate for the Italian case. On the other hand, the estimates of per capita income based on national-income accounting procedures are somewhat more straight-forward in their methodology and appear to be very plausible when compared to the received view of Italian economic development and, in turn, confirm the general perception of Italian uneven regional development. However, the

industrial and agricultural data they are based on suffer serious weaknesses and as new data and better methodology appear the estimates will need revision. All of which further demonstrates that the difficulty of balancing poor data sources and available methodology continues to be an occupational hazard of the economic historian.

Appendix

The per capita income estimates for 1871 and 1891 in Table 3 are extrapolated from estimates I have made of total agricultural output in 1871, partial agricultural output in 1891, and industrial output in 1863-65 and 1889-93.[21] Thus the regional estimates of the output of all crops I extrapolated from

TABLE A-4 - Regional Population
(millions)

Regions	*1871*	*1891*	*1911*
Piedmont	2.90	3.19	3.42
Liguria	0.84	0.98	1.20
Lombard	3.46	3.97	4.79
Northwest	7.20	8.14	9.41
Veneto	2.64	2.97	3.53
Emilia	2.11	2.31	2.68
Tuscany	2.14	2.37	2.69
Marches	0.92	1.00	1.09
Umbria	0.55	0.62	0.69
Latium	0.84	1.04	1.30
Northeast-central	9.20	10.31	11.98
Abruzzi	1.28	1.38	1.43
Campania	2.75	3.03	3.31
Apulia	1.42	1.75	2.13
Basilicata	0.51	0.51	0.47
Calabria	1.21	1.31	1.40
Sicily	2.58	3.22	3.67
Sardinia	0.64	0.73	0.85
South	10.39	11.93	13.26
Italy	26.80	30.41	34.67

Sources: MAIC, *Censimento del populazione,* (Roma: Barbera, various years). Since there was no census for 1891, I had to extrapolate estimates.
[a]Unweighted average of the regional values.

[21] The national values, taken from ISTAT, "Indagine statistica sullo sviluppo del reddito nazionale dell'Italia dal 1861 al 1956," *Annali di Statistica* serie viii, v.9. (Roma: Istituto Poligrafico dello Stato, 1957), represent construction, land and water transportation, communications, commerce and various services, domestic services, professionals and artists, housing, and public administration.

the Zamagni estimate of the total value of all crops sold in 1911 using the growth rate from 1891 to 1911 of a large group of major crops on which data were available. The value of animal products for 1891 was extrapolated from my 1871 estimate and Zamagni's 1911 estimate. Finally, since my industrial output estimates are for 1863-65 and 1889-93, I had to extrapolate an estimate for 1871 from these.

The tertiary sectors raised an additional problem, because there are no data on regional output. I, therefore, estimated the output of tertiary activities by following similar procedures used by Zamagni for her 1911 estimates. Principally, this involves allocating a national estimate of value-added output according to an estimate of the regional share of taxes collected from the activity.[22] The exceptions are rail and water transportation and communications. Regional output estimates are available for rail and water transportation, which I used to assign regional shares of a national value-

TABLE A-3 - Per capita output of tertiary sector
(1911 Lire)

Regions	*1871*	*1891*	*1911*
Piedmont		131	199
Liguria		335	130
Lombard		197	279
Northwest	149	183	272
Veneto		137	145
Emilia		130	201
Tuscany		173	183
Marches		105	133
Umbria		88	111
Latium		262	312
Northeast -central	108	150	179
Abruzzi		48	77
Campania		93	140
Apulia		82	70
Basilicata		50	83
Calabria		60	71
Sicily		94	113
Sardinia		122	108
South	78	83	119
Italy[a]	112	132	147

[a]Unweighted average of the regional values.

[22] Pietro Maestri, *L'Economie de Italie en 1867*, (Florence: Barbera, 1867), and *L'Italia economica nel 1868*, (Firenze: Barbera, 1868).

added estimate. For regional estimates of value added by the communication sector I allocated a national estimate based on regional estimates of letters posted. When I began estimating regional output in 1871 I found that the data on regional shares of taxes were not always available for the years before 1890 and so I occasionally had to turn to alternative methods to allocate the regional shares of a national figure of value-added output. Thus, for the regional share of the output of domestic servants, artists, and professionals I used the regional distribution of employment reported in the 1871 population census. The regional share of the output of land transportation I based on the regional share of horses. Finally, I used the regional share of public spending as a proxy for a region's share of the output of the public sector.

My primary sources of output data for the 1863-65 industrial output estimates were *L'Economie de Italie en 1867* and *L'Italia economica nel 1868*, both by Pietro Maestri.[23] They cover most major industries and contain geographically disaggregated output data. The disaggregation, however, is not always at the regional level. For example, the southern regions are almost always aggregated into "provincie Napolitane." Thus I could derive output estimates for only the three major zones: the Northwest, the Northeast-central, and the South. Details on the methods and sources behind the data are missing, which raises doubts about their reliability. Another shortcoming is that the studies do not contain a survey for all industries. Of the missing industries, I was able to locate data in other sources for milling, engineering, and cotton.[24] I derived value-added percentages from several sources. When input information was available, value added equals the difference between the values of raw inputs and final output. In Maestri's works such information appears for cotton, steel and iron, copper, lead, ceramics and glass, wine, flour, and salt refining. Giordano also provided input information for engineering. In cases where the information was not available, I generally used value-added proportions for Hungary in 1898.[25]

Since the available output data do not include all industries, an aggregation of industrial output by sectors, as I did for 1889-93, was not possible for the 1863-65 estimates. I, instead, apportioned a reliable national value of total industrial output to each zone by using its share of the output reported in the available data. For example, if the Northwest produced 70% of

[23] MAIC, "Statistica Industriale," *Annali di Statistica* serie iv, n. 4-91, 103, fasciolo I-LXIII, LXV; Felice Giordano, *Industria del ferro in Italia*, (Torino: Cotta e Capellino, 1864).

[24] Nachum Gross, *Industrialization in Austria in the Nineteenth Century*, Ph.D. diss., (University of California, Berkeley, 1966).

[25] ISTAT, "Indagine statistica sullo sviluppo del reddito nazionale dell'Italia dal 1861 al 1956," *Annali di Statistica* serie viii, v. 9, (Roma: Istituto Poligrafico dello Stato, 1957). Stefano Fenoaltea, "Railways and the Development of the Italian Economy to 1913," *Railways and the Economic Growth of Western Europe*, (ed.) Patrick O'Brien, (London: Macmillan, 1983), pp. 49-120.

the industrial output listed in the available data I assumed that it produced 70% of all industrial output. There are two indices which contain estimates for 1863-65: ISTAT and Fenoaltea.[26] The low growth which ISTAT claims for the first 25 years after unification contradicts the increases in exports, domestic demand and input consumption acknowledged by numerous other sources. Therefore, I used the more plausible Fenoaltea index of industrial output as the basis of my estimates for 1863-65 national industrial output.

For the industrial output estimates of 1889-93, my primary source of data was a series of industrial surveys by the Ministry of Agriculture, Industry and Commerce published from 1885 to 1902.[27] There are 68 provincial surveys and studies of the cotton, silk, wool, paper and milling industries.[28] Many of the industry studies provide enough information for estimating regional output, in addition to data on the regional distribution of labor and installed horsepower. The provincial surveys are divided into four main sections: manufacturing (mining, metallurgy, engineering, construction materials and earthenware, and chemicals), textile, foodstuffs, and "others." Each section subdivides the main sectors into industrial branches. The surveys identify factories and workshops by commune, the smallest political division in Italy, and provide data on the number of employees, the amount of installed horsepower and, in many cases, output. Occasionally the surveys report output only in physical quantity. I converted these to their lira value with prices I estimated from establishments in the same region which reported both the physical quantity and lira value of output. Otherwise, I used 1889-93 prices from Barberi, Cianci, ISTAT.[29] Finally, since I intended to compare my results with those by Zamagni for 1911, I converted my estimates of value added into 1911 prices. I used the Cianci price indices of industrial products. Because the first Italian industrial survey to provide information on value-added proportions did not appear until the industrial census of 1935-37 — which probably reflected too advanced technology — I used estimates of value-added proportions from the U.S. censuses of manufacturing of 1850 and 1860.

[26] MAIC, "Statistica industriale," *op. cit.* Despite the wide range of publication dates, most of the surveys appeared in 1889-93. Of the 68 provincial surveys, 33 appeared from 1889 to 1893. Eleven provinces were surveyed twice, once before and once after 1889-93. I used averages of the two for my estimates of provincial industry in 1889-93. All others appeared within three years of 1889-93 except Messina (1897) and Rome (1903). For the one major exception, Rome, I adjusted the output estimates to 1891.

[27] There were actually 69 provinces but the two Sardinian provinces were covered in one survey.

[28] B. Barbieri, *Il consumi nel primo secolo dell'Unità d'Italia, 1861-1960.* (Milano: Giuffre, 1961); E. Cianci, "La dinamica dei prezzi delle merci in Italia dal 1870 al 1929," *Annali di Staistica,* s. vi, vol xx, (Roma: MAIC, 1933); ISTAT, *Sommario di statistiche storiche dell'Italia, 1861-1965,* (Roma: Istituto Poligrafico dello Stato, 1968).

[29] MAIC, *Condizioni dell'agricoltura in Italia, 1870-74,* (Roma: Barbera, 1976-79).

My primary source of information on crops production in 1871 was MAIC's *Condizioni dell'agricoltura in Italia, 1870-74*.[30] It includes regional data on the output of many agricultural products as well as information on agrarian contractual arrangements, farm worker salaries and working conditions, and land use. There were, however, some large discrepancies between some of the 1871 crop estimates for Piedmont, Liguria, Tuscany, Umbria, Abruzzi, and Campania and those of other years which made the 1871 estimates for these regions less credible. I, therefore, made some adjustments using estimate of outputs in the late 1870s.[31] For animal products I used the 1869 regional distribution of livestock in the 1881 and 1871 national estimates of animal products.[32] The later work, in addition, supplies

TABLE A-2 - Per capita agricultural output
(1911 Lire)

Regions	*1871*	*1891*	*1911*
Piedmont	174	172	235
Liguria	221	77	105
Lombard	143	144	180
Northwest	165	145	188
Veneto	175	150	198
Emilia	248	224	281
Tuscany	202	172	198
Marches	249	216	350
Umbria	312	253	262
Latium	165	170	229
Northeast-*central*	208	192	226
Abruzzi	201	172	243
Campania	136	136	188
Apulia	218	285	297
Basilicata	209	183	240
Calabria	217	192	199
Sicily	198	207	191
Sardinia	235	188	234
South	203	193	207
Italy[a]	206	196	221

[a]Unweighted average of the regional values.

[30] MAIC, *Notizie di statistica agraria*, (Roma: Bertero, 1891).

[31] MAIC, *Censimento del bestiame del 1881*, (Roma: Barbera, 1883). ISTAT, *Sommario di statistiche storiche dell'Italia, 1861-1955*, (Roma: Istituto Poligrafico dello Stato, 1958).

[32] ISTAT, *Fonti statistiche e metodi di calcolo del reddito nazionale*, (Roma: Istituto Poligrafico dello Stato, 1969).

prices of agricultural products. The regional distribution of national values was also the basis of my regional estimates for some fruit and vegetable outputs. Estimates of the percentage of crops reemployed, and thus not part of output estimates, were from ISTAT's *Fonti statistiche e metodi di claolo del reddito nazionale*.[33]