A CROSS SECTIONAL COMPARISON AND ANALYSIS OF PRODUCTIVITY FOR 21 NATIONAL POSTAL ADMINISTRATIONS

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Introduction

Economic comparisons of national postal systems are rare owing to a lack of good quality cross sectional data. Consequently, postal economics has relied primarily on studies of single national postal administrations. Because postal administrations are monopolies, they frequently defy comparison with other firms in the country they serve. Efforts to develop cross sectional data should pay high dividends by allowing us to view postal administrations with some perspective and by improving our understanding of the economics of national posts. In particular, cross sectional data should make it possible to analyze the effect of scale on the post.

This paper compares some basic economic statistics from postal administrations of 21 industrial nations. An econometric model is developed to analyze labor productivity differences among the 21 administrations, and it explains about 60 percent of the differences. Universal postal union (UPU) data from 1988 is used and considerable effort has been devoted trying to ensure that consistent things were being measured by the different postal administrations in their UPU data submissions. The data are presented in formats which facilitate comparisons, and the paper describes how the data were made suitable for cross sectional comparison and analysis.

Volume and Cost Data

The data presented can be divided into basic and calculated. The former consists of mail volumes (by categories), total labor cost, number of employees, and total expenses. Other data are calculated using the basic data. For this paper we have calculated: (1) volume per capita by category; (2) expenses per capita; (3) expenses as a percent of GDP; (4) average annual labor cost; (5) weighted mail volume; (6) unit labor cost (ULC); (7) unit operating expenses (UOE); (8) average annual hours worked; (9) labor productivity; (10) hourly compensation; and (11) wage premium.

The preponderance of the data used in this paper come from the UPU's Postal Statistics Year Book for 1988. UPU data for 1988 were available from 21 of the 23 countries listed as industrial by the IMF.[1] [2] Work on this paper began in 1993 and data for the year 1988 was used because it was relatively complete and could be supplemented, when appropriate, using data contained in the *Green Paper* for twelve European countries.[3] It was necessary to obtain supplementary data where UPU data elements were absent or ambiguous. UPU data were supplemented by data from the annual reports of Austria and Japan. Additional statistics and occasionally estimates, where data were not available, were provided by the following postal administrations: Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Netherlands, Norway, Sweden, Switzerland and United Kingdom.[4] Supplemental data for the U.S. came from several sources which are cited below.

The Organization for Economic Cooperation and Development (OECD) and International Monetary Fund (IMF) are the sources of the 1988 national macro economic and demographic data used in the paper.

Prices of goods and services vary greatly among countries, and commercial market exchange rates do not reliably indicate relative differences in prices. Purchasing power parities (PPPs) are the number of currency units required to buy goods and services equivalent to what can be purchased with one U.S. dollar (or one unit of some other base-country currency). They are used here for comparisons of costs.[5] PPPs have been computed by the OECD.[6] Discussion of the data is in terms of PPPs. However, data are also presented using market exchange rates. Appendix A presents national currency unit exchange rates in

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[1] International Financial Statistics, International Monetary Fund, November, 1993.
[2] Data were not available for Iceland or New Zealand.
[3] *Green Paper* data did not differ greatly from the UPU data.
[4] Wissenschaftliches Institut für Kommunikationsdienste (WIK) assisted us with German and Austrian data.
[5] The 1988 market exchange rates have been calculated by IMF and are published in International Financial Statistics. They are monthly commercial rates averaged over the year.
[6] National Accounts, Main Aggregates, Volume I (1960-1991), OECD, Paris, 1993.

terms of gold francs, ECUs, U.S. dollars, and PPPs for 1988. Appendix B presents additional data of interest.

Total Volumes

Table 1 displays volumes for the 21 postal administrations included in this study.[7] The scale of volumes differs by three orders of magnitude. The lowest volume administration, Luxembourg, has only 153.10 million pieces, while the largest, the United States, has 160.4 billion pieces. Consequently, the composition of the volumes are of far more interest than the magnitudes. An average of 59 percent of the total volume is LC (*Lettres et Cartes*), 40 percent is AO (*Autres Objets*), and one percent is parcels.

There is a surprisingly large variation in the proportions of LC and AO mail within the 21 countries. Figure 1 displays the LC volume share (i.e., percent of total volume) for each administration. It ranges from a high of 95 percent for the United Kingdom to less than 21 percent for Austria. Because parcel shares are so low, AO shares are the virtual complement of LC shares. The ranges of LC and AO volume shares are so large that it might be said that these postal administrations are in different businesses. It is surprising that countries as similar as Sweden and Norway have such large differences. We believe that countries with very high percentages of AO mail handle disproportionately large quantities of periodicals (especially newspapers). It would be useful if the UPU collected separate statistics on the categories of periodicals and advertising which are now collected under the rubric of printed papers. These are very different postal products.

For the U.S., printed papers consist of 63 billion pieces of advertising mail and 10 billion pieces of periodicals.[8] Spending on advertising mail (also called "direct mail" in the U.S.) comprised 18 percent of total advertising expenditures in

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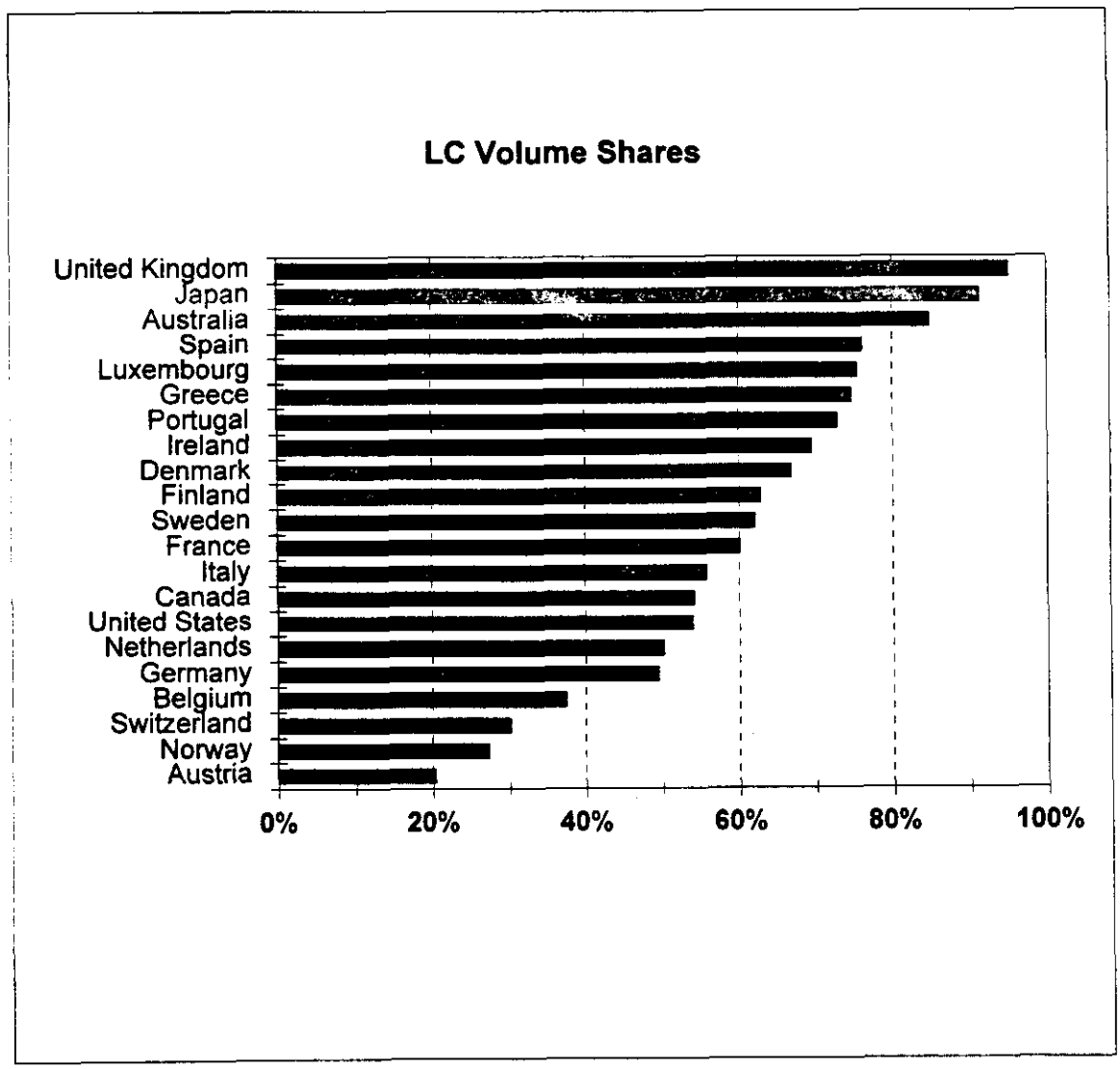
[7] Only inward international volumes are included so that statistics developed below on productivity and unit costs would not be distorted.

[8] Revenue, Pieces and Weight (RPW) Report for FY 88, U.S. Postal Service.

FIGURE 1


LC Volume Shares
United Kingdom
Japan
Australia
Spain
Luxembourg
Greece
Portugal
Ireland
Denmark
Finland
Sweden
France
Italy
Canada
United States
Netherlands
Germany
Belgium
Switzerland
Norway
Austria
0%
20%
40%
60%
80%
100%

the U.S. in 1988 and 20 percent in 1993.[9] [10] Thus, assuming there are no inherent barriers, postal services of industrial countries are potentially major advertising mediums. Because AO volume shares differ so greatly, it is probable that the proportions of advertising mail varies widely among the 21 postal administrations.[11]

As shown in Table 1, the Japanese LC composition is anomalous in that cards constitute half the LC total. We understand that in Japan, post cards are widely used as New Year's greeting cards which are extraordinarily popular and constitute 16 percent of total annual volume. Post cards are also used extensively for billing in Japan. Austria is the only other country where cards are as much as 30 percent of LC mail. Finally, Switzerland had the greatest percentage of parcels, over 4 percent. In no other country do parcels amount to more than 1.6 percent of total volume. The UPU data do not indicate the postal administration's share of the total parcel market in each country.[12] Presumably competition varies widely from country to country.

Per Capita Volumes

Table 2 displays per capita mail volume. Figures 2, 3 and 4 display the data graphically. Switzerland has the highest total mail pieces per capita and AO pieces per capita. It has 45 percent more per capita AO mail than Norway, which has the second largest number of pieces. The U.S. has the highest per capita LC mail. It has 14 percent more than Luxembourg, the next largest. Switzerland has by far the largest number of per capita parcels.

The range of per capita total pieces is large. If we exclude the two least developed countries, Greece and Portugal, the range is a factor of five. The range

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[9] Robert Coen, McCann Erickson, New York.

[10] This has grown from less than 14 percent in 1980 when the U.S. Postal Service began an aggressive program of cost based worksharing discounts for advertising mail. They include discounts for presorting, carrier walk sequencing, dropshipping and barcoding.

[11] Obviously some LC mail is advertising mail. For example, in the U.S., 6 percent of First Class (LC mail) is pure advertising. See 1991 Household Diary, U.S. Postal Service.

[12] In the U.S., it is estimated that the Postal Service has less than 10 percent of the total one pound and over small parcel market (excluding books, records and catalogs).

FIGURE 2

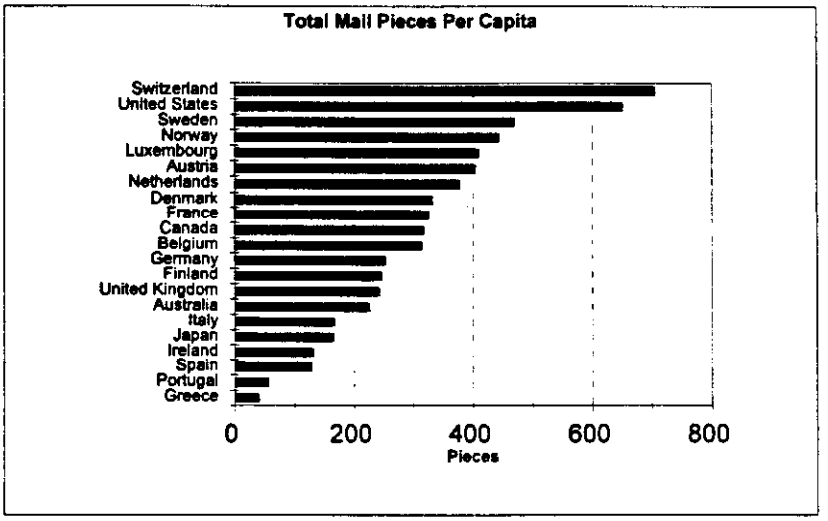


FIGURE 3

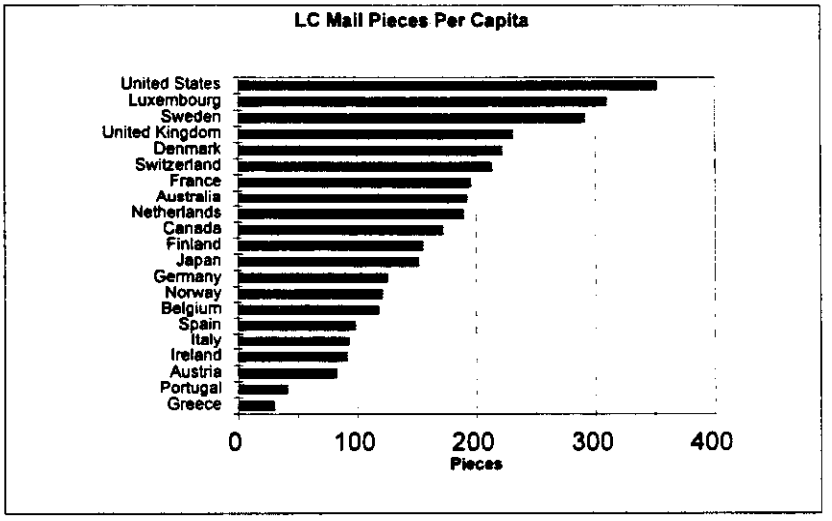
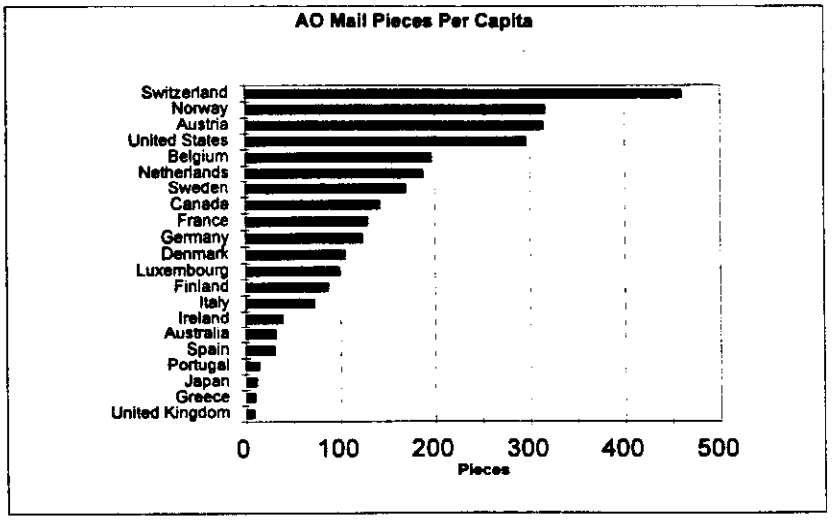


FIGURE 4



for AO mail pieces per capita is even larger. For LC mail, the range is a factor of four. Even such similar countries as the U.S. and Canada have wide differences. As expected, total volume per capita is highly correlated with GDP per capita (.77). Total volume per capita is more highly correlated with AO volume per capita (.88) than with LC volume per capita (.70). See Table 12. This reflects the greater dispersion of AO volume.

From the per capita data, we can infer that the composition of LC mail varies greatly among the industrial countries. In the U.S., bills to and payments by households constitute 30 percent of the LC mail.[13] LC volumes appear to be heavily influenced by the prevalence of checks used in the payment system in each country.[14] The U.S. has by far the largest number of checks.[15] An econometric analysis of First-Class Mail volumes in the U.S. found the following variables important: real price, real GDP per capita, size of the presort discount relative to business unit labor costs, a proxy for the number of financial accounts per household, and the volume of advertising mail.[16]

The 21 postal administrations deliver very different amounts of periodicals and advertising per capita. Obviously the role each post office plays in the delivery of periodicals depends on many diverse factors including the quality of service and alternative means of distribution.[17] Differences in advertising mail volume per capita depend on a variety of factors including the price charged by the postal administration, availability of mailing lists (which may be affected by privacy laws), amount of direct competition, whether the postal administration delivers unaddressed advertising, and the size of the catalog industry. The amount of advertising mail per capita carried by the United States Postal Service is importantly

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[13] 1991 Household Diary, U.S. Postal Service.
[14] "On the Structure of Inter-Firm Postal Demand," Toru Azumi, Commercialization of Postal and Delivery Services: National and International Perspectives. Ed. Michael A. Crew and Paul R. Kleindorfer, Kluwer Academic Publishers.
[15] Ibid., p. 204.
[16] "An Econometric Study of the Demand for First-Class Letters and Cards," Lester Taylor (Professor of Economics, University of Arizona), U.S. Postal Rate Commission, October, 1989.
[17] Few daily newspapers and less than half the weeklies are primarily distributed through the U.S. Postal Service. Most periodicals carried by the U.S. Postal Service are magazines.

affected by the so-called mail box law which forbids anyone other than the Postal Service to use a household mail box.[18]

We believe that all postal administrations seek to promote volume growth because a large part of delivery costs are fixed. The higher the volume, the lower the delivery cost per piece. The data on the 21 administrations raise the question why LC, AO, parcel and total mail volumes per capita vary so greatly?

Total Expenses

Table 3 displays total expenses disaggregated into labor costs and all other costs for each postal administration using market exchange rates and PPPs. It can be seen that the mean labor cost share for all the postal administrations is 77.3 percent. Excluding Luxembourg, whose postal cost data include telecommunications services, only three administrations vary by more than 10.2 percentage points from the average. The Dutch Postal Service appears to be the least labor intensive (at 56 percent), while the Danish is the most (at 93 percent). Countries at different ends of the income spectrum have similar labor cost shares. An explanation of the differences in labor cost shares between the different postal administrations would be useful.

Average annual labor costs per employee are presented below. It is not surprising that total expenses for each postal administration is fairly well correlated with annual labor cost (.55).

It would be informative if the UPU would collect a breakdown of labor and nonlabor costs.[19] [20] It would be especially helpful to have a measure of total capital

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[18] A firm can be fined by the Postal Service if they place any matter in a household mail box. Direct mail competitors to the Postal Service, thus, must hang plastic bags containing their advertisements on household doorknobs or leave the material on the porch or ground.

[19] In the U.S., nonlabor costs include transportation (6.6 percent of total), supplies and services (4.1 percent), building occupancy (2.3 percent), depreciation (1.4 percent), and other (1.8 percent).

[20] Labor costs in the U.S. consist of compensation (64.4 percent) and benefits (19.3 percent). The Postal Service has no unfunded liability for pension costs and, beginning in 1991, is on a pay as you go basis for cost of living increases for retirees' pensions and health insurance costs. The U.S. Postal Service receives no subsidies from the Federal Government.

employed by each administration. From the data now collected, it is not known if the size of nonlabor cost share is an indicator of capital employed. Much of the U.S. Postal Service's capital for recent plant and equipment purchases has been borrowed and shows up in nonlabor cost as depreciation. Even so, the depreciation as a percent of total expenses is not large in spite of the fact that the U.S. Postal Service has invested heavily in plant and equipment.

Expenses Per Capita

Table 4 displays total expenses per capita and total expenses as a percent of GDP for each of the postal administrations. Postal services are clearly important economic institutions in all the industrial countries. However, the countries spend a wide ranging portion of GDP on postal services. Luxembourg has the largest expense per capita, but this may be because of telecommunications data being included in the total expense data. Next is Switzerland, Norway and the United States. Greece, Spain and Portugal have the smallest expense per capita. Postal expenses range from a quarter of one percent to one and a half percent of GDP — a factor of 6. Sixteen (16) administrations spend less than one percent of GDP on postal services, while five spend more. As expected, GDP per capita is highly correlated with total volume per capita (.77).

Number of Employees

Table 5 displays the number of full-time and part-time employees. Some administrations state explicitly on the UPU data forms that they are using full-time equivalents when stating the number of part-time employees. Most, however, simply list the number of part-time employees. The authors contacted many of the administrations to get full-time equivalents. Data for Greece, Italy, Japan,[21] Luxembourg, Portugal and Spain were not checked. Italy, apparently, employs no part-time employees. Greece and Portugal employ few. To the extent that part-

[21] The Japanese postal administration was contacted, but could not supply the information.

time employees listed in the data are not full-time equivalents, average annual labor cost calculations (below) will be in error. That is because the denominator will be too large (reflecting total number of part-time employees rather than full-time equivalents). Thus, average annual labor costs may be understated for the administrations with large percentages of part-time employees not listed in terms of full-time equivalents. Moreover, the employment statistics cover all categories of employees, some of whom may be paid substantially less than the average wage. For example, the U.S. figures contain 8 percent casual and part-time employees, whose costs are only 44 percent of the U.S. average. The number of employees is more highly correlated with LC volume per capita (.46) than it is with total volume per capita (.36).

Average Annual Labor Costs

Table 6 displays average annual labor costs at market exchange rates and in Purchasing Power Parities. Japan has the highest annual labor costs and the U.S. has the second highest. Spain, Finland and Greece have the lowest. The figure for Spain might be affected by not having its part-time employees expressed as full-time equivalents. The figure for Luxembourg may be affected by including data for telecommunications services.

Figure 5 displays average annual labor costs graphically. The range is very large. At the extreme, the costs differ by a factor of two and a half. The correlation with GDP per capita is high (.69). Additional research which would explain the large differences in labor costs would be of great interest.[22]

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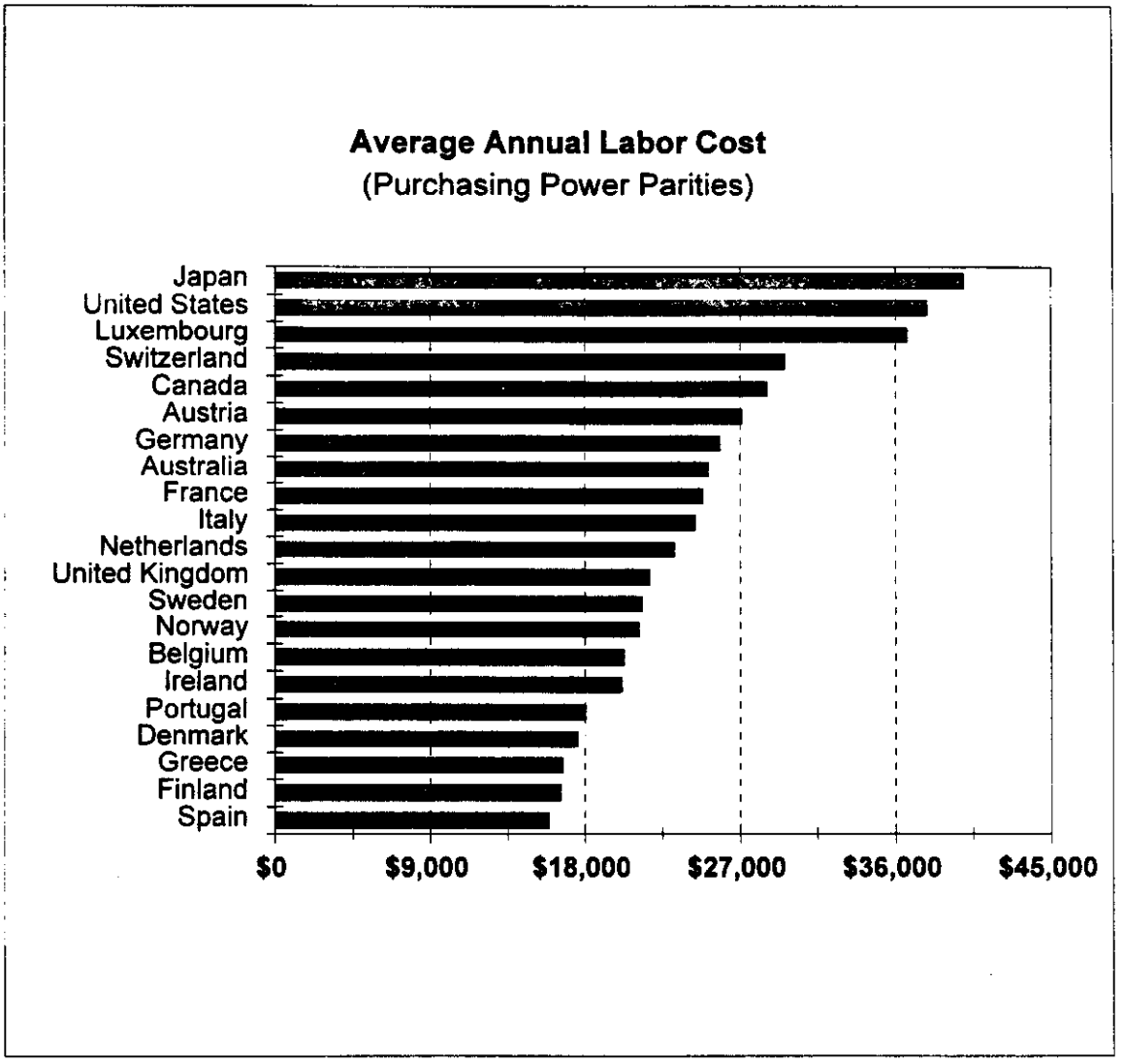
[22] The average U.S. postal worker wage was equal to 80 percent of the U.S. median family income in 1988. The fringe benefits of postal workers are much better than the average blue collar worker. Postal wages and benefits are set through collective bargaining and there is compulsory arbitration when the sides cannot come to an agreement.

FIGURE 5


Average Annual Labor Cost
(Purchasing Power Parities)
Japan
United States
Luxembourg
Switzerland
Canada
Austria
Germany
Australia
France
Italy
Netherlands
United Kingdom
Sweden
Norway
Belgium
Ireland
Portugal
Denmark
Greece
Finland
Spain
$0
$9,000
$18,000
$27,000
$36,000
$45,000

Unit Labor Cost

Before developing unit labor costs (i.e., labor cost per piece of mail), it is necessary to develop weighted output to normalize the mix of LC, AO and parcels among the postal administrations.

Weighted Mail Volumes. To make unit labor cost comparisons between countries meaningful, the mail volume figures for each country are adjusted to reflect the composition of that country's mailstream. Some countries have a greater proportion of high work content mail (such as parcels), while other countries have a greater proportion of low work content mail (such as cards). Using unweighted volume as the output measure might erroneously show a particular country as having high or low unit cost in relation to other countries simply because its mailstream had proportionately more low or high cost pieces.

We adjust for this potential bias by weighting the various mail categories by the relative amount of labor resources required to handle each mail category. We have used United States Postal Service unit (per piece) attributable (causally related) labor costs to weight output.[23] U.S. postal system costs were used because they were available. Further, it is believed the U.S. has the most detailed cost information by mail category available for all countries examined. U.S. attributable labor costs represent about two-thirds of total labor costs, and include all the labor costs that can be causally traced to mail categories. The weighting factors are in cents as follows: letters — 15.22, cards — 10.12, printed papers — 8.68, small packets — 8.68, parcels — 137.84.[24]

Table 7 displays weighted mail volume for the 21 postal administrations. Comparing them to Table 1, it can be seen that the index of weighted mailpieces rose for 14 countries relative to the U.S. volume. The U.S. weighted volume is only 82 percent of its unweighted volume indicating that it had a relatively less costly mailstream. France and Norway also have relatively less costly mailstreams.

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[23] USPS Cost and Revenue Analysis (CRA) Report, FY 1989.
[24] These weights are influenced by the amount of presortation for each category.

Weighted volumes rose relative to unweighted volumes for Austria, Switzerland and the United Kingdom. Swiss weighted volumes rose relative to unweighted because of its large volume of parcels. Weighting the mail volumes changes the volume rankings by at most two places.

Table 8 displays unit labor costs in terms of PPPs. Spain has the lowest cost per weighted piece, while Italy has the highest. The average unit labor cost is 29 cents. Figure 6 shows the wide dispersion of unit labor costs. Only five administrations have unit labor costs more than twice that of the U.S. (23 cents). Unit labor costs are negatively correlated with labor productivity (-.79) and positively correlated with the basic postage rate (.69).

Unit Operating Expenses

Table 9 displays the operating expense per weighted pieces in terms of PPPs. Spain again has the lowest UOE followed by the U.S. It can be seen that the rankings in Table 8 differ somewhat from the rankings in Table 9. Figure 7 displays the UOE data graphically. Seven administrations exceed the UOE of the U.S. by a factor of two or more.

Unit operating expenses to be compared properly would have to be adjusted for differences in service levels and factor prices. Nonetheless, they provide a rough measure of economic efficiency. Unit operating expenses are negatively correlated with labor productivity (-.69) and positively correlated with the basic rate (.63) and the average revenue per piece (.55). The latter two correlation coefficients could be affected by the degree to which the postal administrations receive subsidizes or achieve profits or suffer losses.[25]

[25] It should be noted that both inhabitants per post office and post office density have little impact on UOE. The two correlation coefficients are: .25 for inhabitants per post office and UOE, and .04 for post office density and UOE.

FIGURE 6

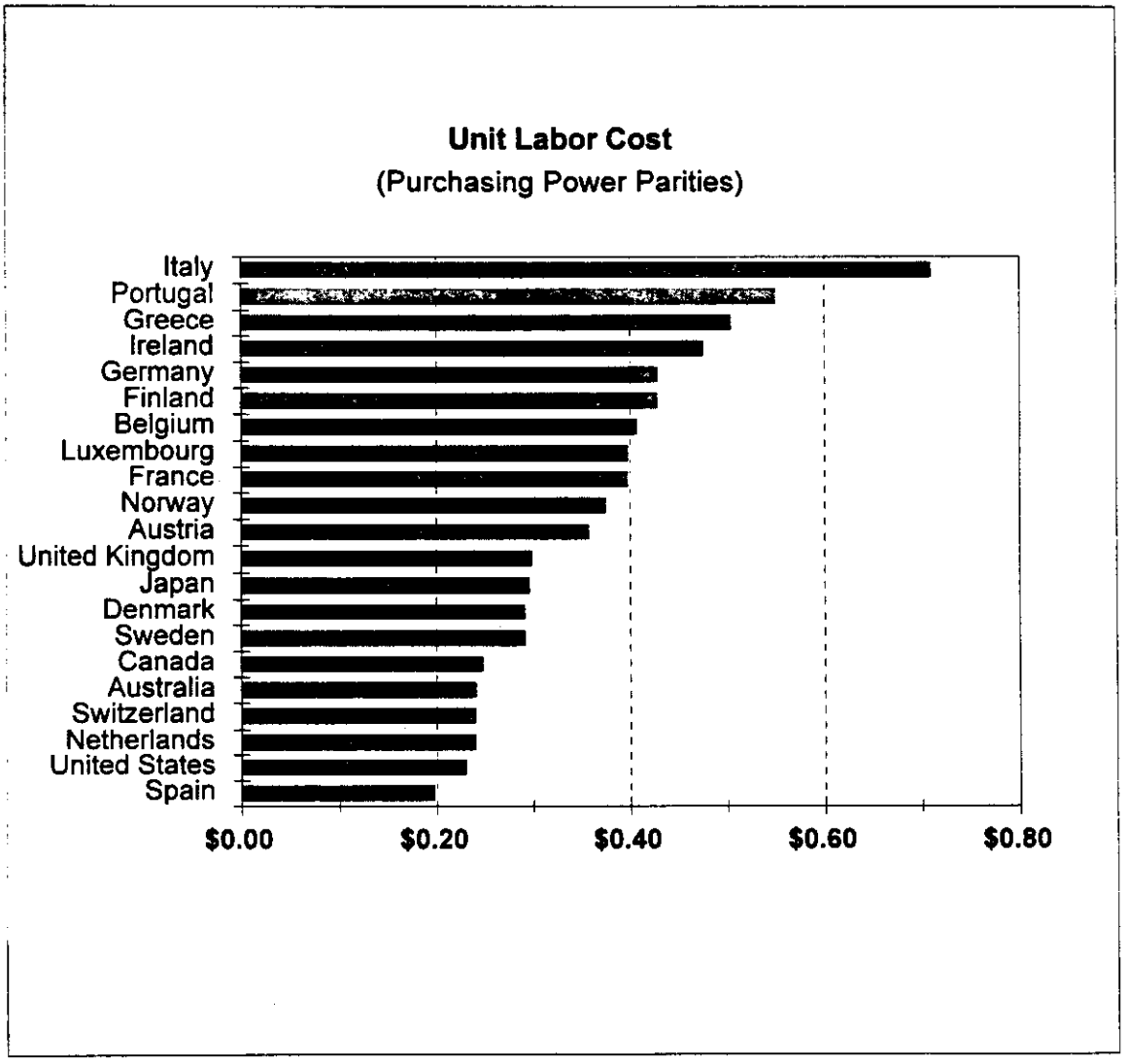
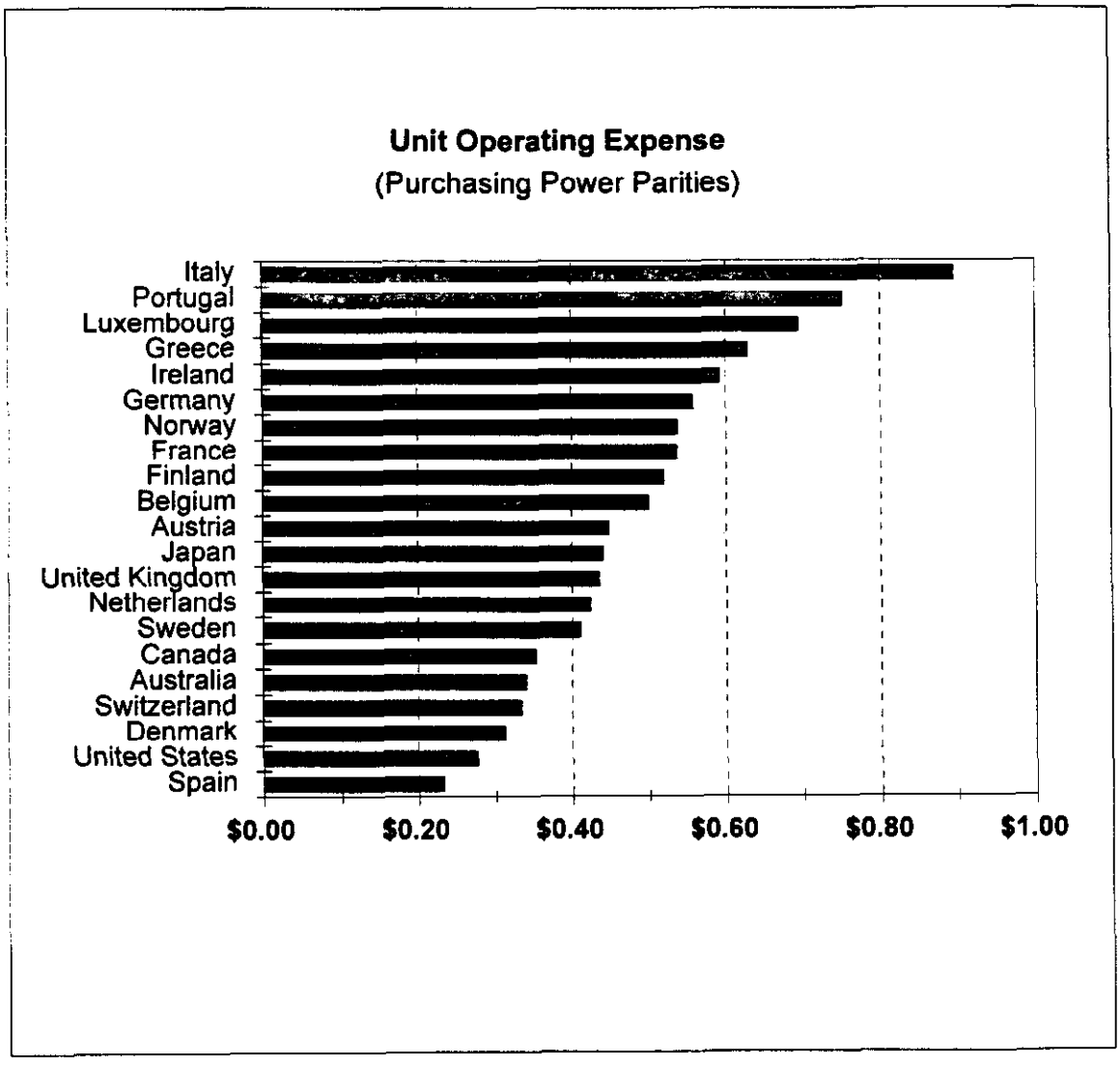

Unit Labor Cost
(Purchasing Power Parities)
Italy
Portugal
Greece
Ireland
Germany
Finland
Belgium
Luxembourg
France
Norway
Austria
United Kingdom
Japan
Denmark
Sweden
Canada
Australia
Switzerland
Netherlands
United States
Spain
$0.00
$0.20
$0.40
$0.60
$0.80

FIGURE 7


Unit Operating Expense
(Purchasing Power Parities)
Italy
Portugal
Luxembourg
Greece
Ireland
Germany
Norway
France
Finland
Belgium
Austria
Japan
United Kingdom
Netherlands
Sweden
Canada
Australia
Switzerland
Denmark
United States
Spain
$0.00
$0.20
$0.40
$0.60
$0.80
$1.00

Labor Productivity

Table 10 displays labor productivity for the 21 postal administrations in terms of weighted pieces per hour worked. For all countries except the United States, the annual number of hours worked by postal employees is estimated by averaging the annual working time for all employees in a country with the annual hours worked in manufacturing in that country. See Appendix B, Table B1. For the United States, we use actual hours worked by postal employees. The U.S. has the highest labor productivity followed by Switzerland and Japan. The range is large, varying by a factor of more than four. To an extent, labor productivity varies with weighted pieces per capita. This can be seen in Figure 8 where labor productivity is plotted against weighted mailpieces per capita. The latter variable was selected because it was felt that it captured the fixed cost inherent in the delivery network. The correlation of labor productivity with total volume per capita is high (.68).

Analysis of Productivity Differences

The performance of the different postal systems vary widely. Table 10 presents labor productivity for each of the 21 postal systems. Labor productivity, measured as the total mail pieces per employee hour, ranges from about 18 pieces per employee hour in Portugal to about 89 pieces per employee hour in the United States.[26] In this section, we attempt to explain the labor productivity difference using an econometric model.

Examination of the international data points to two variables, labor cost and volume, as the most important variables in explaining postal performance. Labor cost is important because it accounts for a significant share of the total cost. The labor cost share of the total cost average around 77 percent, and ranges from about 57 percent in Luxembourg to almost 93 percent in Denmark. See Table 3.

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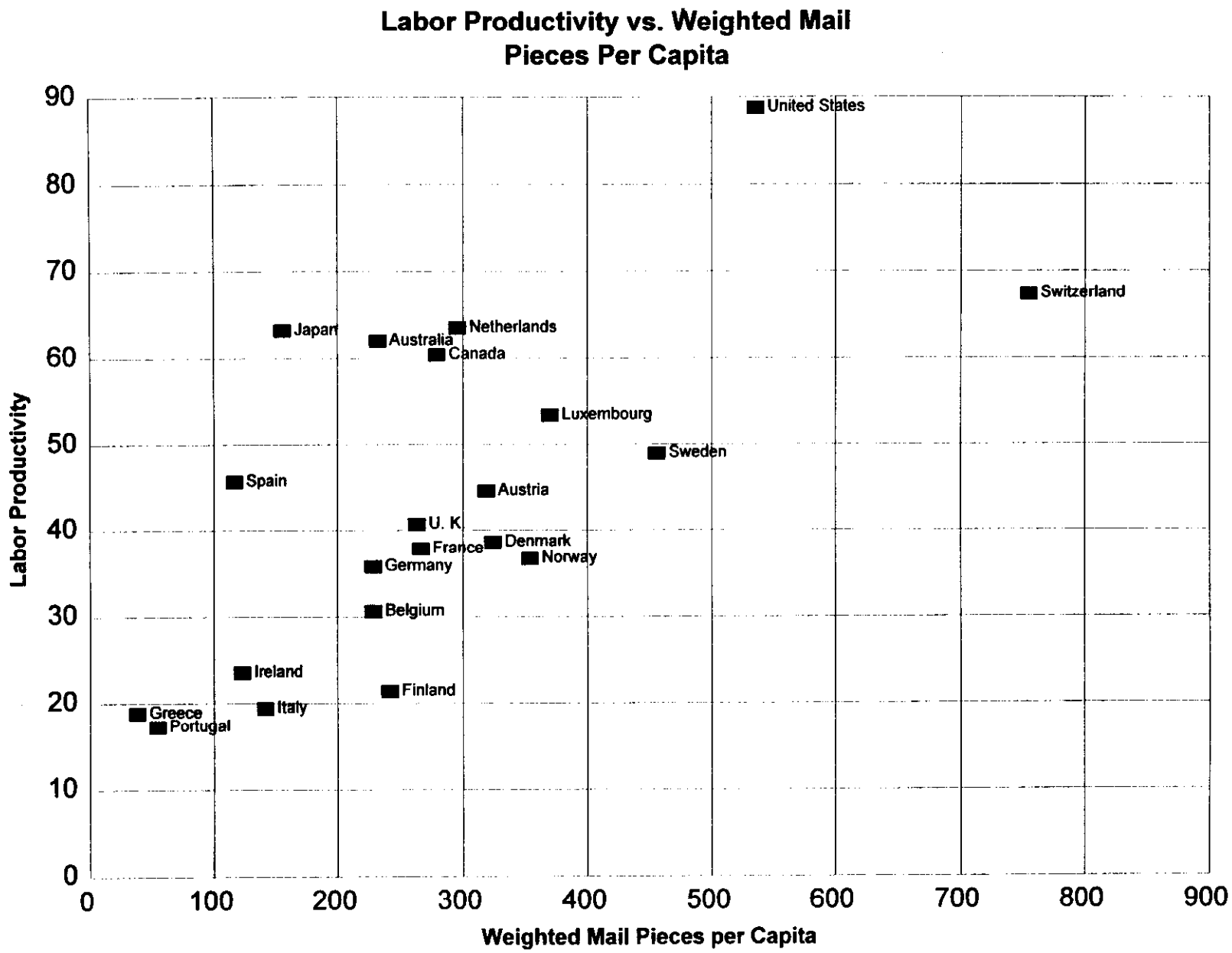
[26] Labor productivity used for the econometric analysis has been adjusted for the differences in the number of deliveries per week.

FIGURE 8


Labor Productivity vs. Weighted Mail Pieces Per Capita
Labor Productivity
Weighted Mail Pieces per Capita
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
500
600
700
800
900
United States
Switzerland
Japan
Netherlands
Australia
Canada
Luxembourg
Sweden
Spain
Austria
U. K.
Denmark
France
Norway
Germany
Belgium
Ireland
Finland
Greece
Italy
Portugal

Labor cost would likely affect performance in two ways. First, higher labor cost (in comparison to the private sector labor cost) may reflect the higher quality of workers hired by the postal systems that, in turn, may result in higher efficiency. In addition, higher wages may result in higher efficiency by encouraging postal system to substitute capital for labor.[27] The scale of the postal systems, as measured by volume per capita, may also have a significant impact on labor productivity because a large portion of delivery costs, and in turn total costs, are fixed.[28] Therefore, larger systems (i.e., higher volume systems) are likely to experience higher efficiencies.

Econometric Model

We developed a simple linear regression model to test the relationship between labor cost, system size, and performance. Our model tests the hypothesis that postal systems with higher labor cost and higher volume would realize greater efficiencies that, in turn, offset some negative effects of a higher labor cost to postal customers. We use labor productivity as an indicator of postal efficiency and relate it to the size of the system and labor cost. For the modeling effort, we use the total weighted volume per employee hour as a measure of labor productivity; the weighted volume per capita as a measure of system size;[29] and the difference between the postal wage and the average private sector wage as a measure of labor cost.[30] See Table 11.

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[27] Although no information about the degree of mechanization is available for all the postal systems in our data set, some indirect evidence shows that there are some shifts away from labor toward mechanization as relative labor cost rises. For example, postal systems with a higher wage premium tend to have lower proportion of labor cost.

[28] Moreover, a volume threshold may be an economic prerequisite for certain mechanization and automation investments. This may especially affect postal administrations with small volumes such as Greece and Portugal.

[29] Volume per capita serves as a proxy for volume per possible stops. Volume per possible stops is considered the true cost driver for delivery cost but it was not included in the UPU data set.

[30] The postal wage premium is the proportion of the average hourly postal wage to the average hourly manufacturing wage for each country.

We estimate the following log-linear model:

$$\ln LP = a + b1 * \ln VC + b2 * \ln WP$$

where,

LP = Labor productivity = Weighted volume per employee hour

VC = System size = Volume per capita

WP = Postal wage premium = Proportion of postal to private wages

If our hypothesis is correct, we would expect coefficients b1 and b2 to be positive. In other words, higher volume per capita would lead to greater labor productivity. Similarly, a larger postal wage premium would lead to greater labor productivity through higher quality workers and/or greater degree of mechanization. Any increase in labor productivity, whether attributable to changes in wage premium or volume per capita, would lower costs to postal customers. The results of the regression analysis are as follows:

$$\ln LP = 0.732 + 0.520 \ln VC + 0.606 \ln WP$$
$$(5.239) \qquad (2.137)$$

The regression results are statistically significant.[31] Both the adjusted (0.57) and the unadjusted (0.61) R-square for the equation is very good for a small cross-sectional data set (n=21). As the t-statistics in parentheses show, the estimated coefficients are significant at the 95 percent level. The results seem to confirm the two expected relationships between wage premium and labor productivity, and volume per capita and labor productivity. The high R-square statistics show that

[31] Although heteroskedasticity is a common problem in cross-sectional data, statistical tests show that heteroskedasticity is not a significant factor in the evaluations of this model. For example, the R-square for a regression of the absolute value of the residuals on the ln(LP) variable was close to zero and the parameter estimates were not significantly different from zero. Tests also show absence of multicollinearity in this model.

this model specification explains over 60 percent of the difference in postal system performance. In other words, system size and wage premium are the primary indicators of labor productivity. Other unknown factors account for less than 40 percent of the difference in labor productivity.

The log-linear model specification allows easy interpretation of the estimated coefficients. Each estimated coefficient represents the percentage change in labor productivity with a 1 percent change in either the volume per capita or the wage premium. For example, a 1 percent increase in the hourly wage premium would cause a 0.606 percent increase in labor productivity. A 1 percent increase in volume per capita would result in a 0.52 percent increase in labor productivity.

Results

Table 13 shows a comparison of actual and predicted labor productivity for each country. The last column in Table 13 also shows how much higher or lower the actual labor productivity is when compared with the predicted labor productivity. Nine countries (Spain, Netherlands, United States, Japan, Australia, Canada, Greece, Germany, and United Kingdom) are more efficient than expected given their size and the wage premium that they pay.

Comparison of the percentage difference between actual and predicted labor productivity show that Spain, whose actual labor productivity is about 90 percent greater than expected from our model appears to be the most efficient postal system in our sample. Next is the Netherlands with actual labor productivity about 50 percent greater than expected.

Concluding Remarks

This paper has three main objectives. The first is to develop basic economic statistics for the 21 postal administraitons that are consistent. Such statistics allow a comparison of the essential features of postal administrations (e.g., share of

GDP, labor cost, mail mix, unit operating expense, etc.). The second objective is to encourage greater uniformity in data collection to enable additional comparisons and to facilitate cross sectional analysis. The third objective is to conduct a cross sectional analysis relating the affects of scale and wages on labor productivity. This is a first step toward a more comprehensive cross sectional analysis of postal administrations. It is hoped that these data will encourage others to perform additional analysis, and encourage the UPU and the several postal administrations to collect comparable statistics.

Table 1
Year 1988 \1
Mail Volume of Postal Administrations

Data from Universal Postal Union (UPU)

	Lettres et Cartes (LC)		Autres Objets (AO)					
Country	Letters (Millions)	Postcards (Millions)	Printed Papers (Millions)	Small Packets (Millions)	Postal Parcels (Millions)	Total Mail Pieces (Millions)	Index of Total Mail Pieces	Ranking by Total Mail Pieces (Higher To Lower)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Australia	3,172.80	14.40	65.10	461.90	39.70	3,753.90	0.0234	12
Austria	495.80	132.80	2,387.00	2.80	52.80	3,071.20	0.0191	14
Belgium	1,116.60	54.60	1,914.70	34.30	-	3,120.20	0.0194	13
Canada	4,479.00	--- \2	3,626.40	66.30	74.30	8,246.00	0.0514	7
Denmark	1,111.20	28.60	510.90	28.60	25.00	1,704.30	0.0106	16
Finland	755.20	14.40	432.60	0.24	20.60	1,223.04	0.0076	17
France	10,997.00	--- \3	6,974.30	308.80	1.00	18,281.10	0.1140	3
Germany	6,991.10	742.20	7,371.30	268.20	245.10	15,617.90	0.0974	4
Greece	306.70 \5	1.30 \5	100.80 \5	1.20 \5	2.00	412.00	0.0026	20
Ireland	325.30	--- \3	139.40	--- \4	4.00	468.70	0.0029	19
Italy	5,153.00 \5	219.20 \5	4,087.50 \5	116.70 \5	51.20	9,627.60	0.0600	6
Japan	9,383.30	9,352.60	1,473.10	3.00	299.90	20,511.90	0.1279	2
Luxembourg	108.80 \5	6.90 \5	35.60 \5	1.40 \5	0.40	153.10	0.0010	21
Netherlands	2,638.10	163.70	2,632.50	141.40	4.70	5,580.40	0.0348	8
Norway	511.50	--- \3	1,333.40	--- \4	25.10	1,870.00	0.0117	15
Portugal	381.50	26.60	142.80	2.00	5.90	558.80	0.0035	18
Spain	3,835.70	--- \3	1,190.20	--- \4	8.80	5,034.70	0.0314	9
Sweden	2,462.00	--- \3	1,433.00	--- \4	67.00	3,962.00	0.0247	11
Switzerland	1,288.60	137.60	3,069.60	1.90	210.30	4,708.00	0.0293	10
United Kingdom	12,801.70	411.10	11.50	479.70	188.90	13,892.90	0.0866	5
United States	82,606.60	4,143.80	73,131.00	--- \4	543.80	160,425.20	1.0000	1
Total	150,921.50	15,449.80	112,062.70	1,918.44	1,870.50	282,222.94		

1/ Data for Japan are from Year 1989.
2/ No data available
3/ Included in Letters
4/ Included in Printed Papers
5/ Adjusted based on CEC - Green Paper, Year 1989.

Table 2
Year 1988 \1
Mail Volume Per Capita

Data from Universal Postal Union (UPU)

Country	Letters and Postcards Per Capita	Printed Papers and Small Packets Per Capita	Postal Parcels Per Capita	Total Mail Pieces Per Capita	Index of Mail Pieces Per Capita	Ranking by Mail Pieces Per Capita (Higher To Lower)
	(1)	(2)	(3)	(4)	(5)	(6)
Australia	193	32	2	227	0.3485	15
Austria	83	315	7	404	0.6208	6
Belgium	118	197	0	315	0.4838	11
Canada	173	142	3	318	0.4881	10
Denmark	222	105	5	332	0.5101	8
Finland	156	88	4	247	0.3797	13
France	196	130	0	326	0.5002	9
Germany	126	124	4	254	0.3902	12
Greece	31	10	0	41	0.0632	21
Ireland	92	39	1	132	0.2034	18
Italy	94	73	1	168	0.2573	16
Japan	152	12	2	167	0.2558	17
Luxembourg	310	99	1	410	0.6302	5
Netherlands	190	188	0	378	0.5805	7
Norway	122	317	6	444	0.6821	4
Portugal	42	15	1	57	0.0879	20
Spain	99	31	0	130	0.1992	19
Sweden	292	170	8	470	0.7211	3
Switzerland	214	460	32	706	1.0834	1
United Kingdom	232	9	3	243	0.3738	14
United States	352	297	2	651	1.0000	2
Total	217	148	2	367		

1/ Data for Japan are from Year 1989.

Table 3
Year 1988 \1
Total Expenses
of Postal Administrations
Data from Universal Postal Union (UPU)

	Market Exchange Rates			Purchasing Power Parities (PPPs)			
Country	Total Labor Costs (Million $)	Other Cost (Million $)	Total Expenses (Million $)	Total Labor Costs (Million $)	Other Cost (Million $)	Total Expenses (Million $)	Labor Cost Share (Percent)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Australia	981.26	403.14	1,384.40	926.88	380.80	1,307.68	70.88
Austria	1,019.24	257.61	1,276.85	867.97	219.38	1,087.35	79.82
Belgium	1,002.51	231.32	1,233.83	921.50	212.63	1,134.14	81.25
Canada	1,917.94	807.83	2,725.77	1,801.84	758.93	2,560.77	70.36
Denmark	692.70	53.10	745.80	485.25	37.20	522.45	92.88
Finland	758.44	161.74	920.18	513.34	109.47	622.81	82.42
France	6,764.43	2,363.47	9,127.91	5,960.81	2,082.69	8,043.49	74.11
Germany	7,342.32	2,224.33	9,566.65	6,025.51	1,825.41	7,850.91	76.75
Greece	154.26	38.41	192.66	193.66	48.21	241.87	80.07
Ireland	230.93	56.91	287.85	207.29	51.09	258.38	80.23
Italy	6,036.68	1,587.75	7,624.43	5,790.23	1,522.93	7,313.16	79.18
Japan	8,173.28	4,022.08	12,195.36	5,666.26	2,788.37	8,454.63	67.02
Luxembourg	59.24 \2	44.37 \2	103.61	55.01 \2	41.20 \2	96.20	57.18
Netherlands	1,201.19	930.01	2,131.19	1,045.93	809.80	1,855.74	56.36
Norway	821.45	357.64	1,179.09	559.40	243.55	802.94	69.67
Portugal	179.11	65.40	244.51	294.66	107.60	402.25	73.25
Spain	797.90	139.08	936.98	894.59	155.93	1,050.52	85.16
Sweden	1,580.17	651.21	2,231.38	1,120.60	461.82	1,582.42	70.82
Switzerland	1,796.35	717.70	2,514.05	1,205.78	481.75	1,687.53	71.45
United Kingdom	4,636.98	2,128.77	6,765.76	4,511.26	2,071.06	6,582.32	68.54
United States	30,478.64	6,057.05	36,535.69	30,478.64	6,057.05	36,535.69	83.42
Total	76,625.03	23,298.93	99,923.97	69,526.40	20,466.85	89,993.25	77.26

1/ Data for Japan are from Year 1989.
2/ It includes costs of telecommunications services

Table 4
Year 1988 \1
Total Postal Expenses Per Capita and As a Percent of GDP
Data from Universal Postal Union (UPU)

	Purchasing Power Parities (PPPs)					
Country	Total Expenses (Million $)	Population (Thousands)	Total Expenses Per Capita ($)	Ranking by Total Expenses Per Capita (Lower To Higher)	Total Expenses as a Percent of GDP (Percent)	Ranking by Expenses as a Percent of GDP (Lower To Higher)
	(1)	(2)	(3)	(4)	(5)	(6)
Australia	1,307.68	16,538	79	6	0.52	4
Austria	1,087.35	7,595	143	15	1.01	17
Belgium	1,134.14	9,902	115	9	0.81	11
Canada	2,560.77	25,938	99	7	0.56	5
Denmark	522.45	5,130	102	8	0.69	7
Finland	622.81	4,946	126	12	0.87	13
France	8,043.49	56,118	143	16	0.95	16
Germany	7,850.91	61,449	128	14	0.80	9
Greece	241.87	10,005	24	1	0.36	2
Ireland	258.38	3,538	73	5	0.86	12
Italy	7,313.16	57,441	127	13	0.91	14
Japan	8,454.63	123,120	69	4	0.42	3
Luxembourg	96.20	373	258	21	1.52	21
Netherlands	1,855.74	14,760	126	11	0.92	15
Norway	802.94	4,209	191	19	1.32	19
Portugal	402.25	9,761	41	3	0.59	6
Spain	1,050.52	38,809	27	2	0.27	1
Sweden	1,582.42	8,436	188	18	1.23	18
Switzerland	1,687.53	6,672	253	20	1.37	20
United Kingdom	6,582.32	57,065	115	10	0.81	10
United States	36,535.69	246,307	148	17	0.75	8
Total	89,993.25	768,112	117		0.72	

1/ Data for Japan are from Year 1989.

Table 5
Year 1988 \1
Employees of Postal Administrations

Data from Universal Postal Union (UPU)

Country	Full-Time Employees (Thousands)		Part-Time Employees (Thousands)		Total Number of Employees (Thousands)
	(1)		(2)		(3)
Australia	34.80		1.96	\3	36.76
Austria	32.00	---		\3	32.00
Belgium	40.70		4.80	\3	45.50
Canada	63.00	---		\3	63.00
Denmark	27.60	---		\3	27.60
Finland	20.90		10.00		30.90
France	233.30		6.00	\3	239.30
Germany	232.60	---		\3	232.60
Greece	11.50		0.10		11.60
Ireland	10.00		0.30		10.30
Italy	237.10		0.00		237.10
Japan	141.60	---		\5	141.60
Luxembourg	1.20		0.30		1.50
Netherlands	45.00	---		\3	45.00
Norway	21.87		4.52	\3	26.39
Portugal	16.10		0.20		16.30
Spain	47.60	\2	8.50	\2	56.10
Sweden	38.00		14.60	\3	52.60
Switzerland	40.70	---		\3	40.70
United Kingdom	185.00		22.00	\3	207.00
United States	647.20		158.60	\3	805.80
Total	2,127.77		231.88		2,359.65

1/ Data for Japan are from Year 1989.
2/ The figure includes the employees of telecommunications services.
3/ Part-Time employees have been converted to full-time equivalent.
4/ Included in full-time employees
5/ No data available

Table 6
Year 1988 \1
Average Annual Labor Cost
of Postal Administrations
Data from Universal Postal Union (UPU)

	Market Exchange Rates					Purchasing Power Parities (PPPs)				
Country	Total Labor Costs (Million $)	Total Number of Employees (Thousands)	Average Annual Labor Cost ($)	Index of Annual Labor Cost	Ranking by Annual Labor Cost (Lower To Higher)	Total Labor Costs (Million $)	Total Number of Employees (Thousands)	Average Annual Labor Cost ($)	Index of Average Annual Labor Cost	Ranking by Annual Labor Cost (Lower To Higher)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Australia	981.26	36.76	26,694	0.7057	11	926.88	36.76	25,214	0.6666	14
Austria	1,019.24	32.00	31,851	0.8421	17	867.97	32.00	27,124	0.7171	16
Belgium	1,002.51	45.50	22,033	0.5825	4	921.50	45.50	20,253	0.5354	7
Canada	1,917.94	63.00	30,444	0.8049	14	1,801.84	63.00	28,601	0.7561	17
Denmark	692.70	27.60	25,098	0.6635	8	485.25	27.60	17,581	0.4648	4
Finland	758.44	30.90	24,545	0.6489	7	513.34	30.90	16,613	0.4392	2
France	6,764.43	239.30	28,268	0.7473	12	5,960.81	239.30	24,909	0.6586	13
Germany	7,342.32	232.60	31,566	0.8346	16	6,025.51	232.60	25,905	0.6849	15
Greece	154.26	11.60	13,298	0.3516	2	193.66	11.60	16,695	0.4414	3
Ireland	230.93	10.30	22,421	0.5928	6	207.29	10.30	20,125	0.5321	6
Italy	6,036.68	237.10	25,460	0.6731	9	5,790.23	237.10	24,421	0.6456	12
Japan	8,173.28	141.60	57,721	1.5260	21	5,666.26	141.60	40,016	1.0579	21
Luxembourg	59.24 \2	1.50	39,496	1.0442	19	55.01 \2	1.50	36,672	0.9695	19
Netherlands	1,201.19	45.00	26,693	0.7057	10	1,045.93	45.00	23,243	0.6145	11
Norway	821.45	26.39	31,127	0.8230	15	559.40	26.39	21,197	0.5604	8
Portugal	179.11	16.30	10,988	0.2905	1	294.66	16.30	18,077	0.4779	5
Spain	797.90	56.10	14,223	0.3760	3	894.59	56.10	15,946	0.4216	1
Sweden	1,580.17	52.60	30,041	0.7942	13	1,120.60	52.60	21,304	0.5632	9
Switzerland	1,796.35	40.70	44,136	1.1669	20	1,205.78	40.70	29,626	0.7833	18
United Kingdom	4,636.98	207.00	22,401	0.5922	5	4,511.26	207.00	21,794	0.5762	10
United States	30,478.64	805.80	37,824	1.0000	18	30,478.64	805.80	37,824	1.0000	20
Total	76,625.03	2,359.65	32,473			69,526.40	2,359.65	29,465		

1/ Data for Japan are from Year 1989.
2/ It includes costs of telecommunications services

Table 7
Year 1988 \1
Weighted Mail Volume of Postal Administrations

Data from Universal Postal Union (UPU)

Country	Weighted Total Mail Pieces (Millions)	Index of Weighted Total Mail Pieces	Ranking by Weighted Mail Pieces (Higher To Lower)
	(6)	(7)	(8)
Australia	3,842.47	0.0291	12
Austria	2,425.19	0.0184	13
Belgium	2,264.42	0.0172	14
Canada	7,257.85	0.0550	7
Denmark	1,664.31	0.0126	15
Finland	1,198.19	0.0091	17
France	14,978.99	0.1135	4
Germany	14,061.17	0.1065	5
Greece	383.85	0.0029	20
Ireland	435.68	0.0033	19
Italy	8,160.11	0.0618	6
Japan	19,159.85	0.1452	2
Luxembourg	138.11	0.0010	21
Netherlands	4,371.47	0.0331	10
Norway	1,490.86	0.0113	16
Portugal	535.20	0.0041	18
Spain	4,531.17	0.0343	9
Sweden	3,845.59	0.0291	11
Switzerland	5,036.36	0.0382	8
United Kingdom	15,065.95	0.1141	3
United States	131,993.57	1.0000	1
Total	242,840.36		

1/ Data for Japan are from Year 1989.

Table 8
Year 1988 \1
Unit Labor Cost of Postal Administrations
Data from Universal Postal Union (UPU)

	Market Exchange Rates					Purchasing Power Parities (PPPs)				
Country	Total Labor Costs (Million $)	Weighted Total Mail Pieces (Millions)	Unit Labor Cost ($)	Index of Unit Labor Cost	Ranking by Unit Labor Cost (Lower To Higher)	Total Labor Costs (Million $)	Weighted Total Mail Pieces (Millions)	Unit Labor Cost ($)	Index of Unit Labor Cost	Ranking by Unit Labor Cost (Lower To Higher)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Australia	981.26	3,842.47	0.26	1.1059	3	926.88	3,842.47	0.24	1.0446	5
Austria	1,019.24	2,425.19	0.42	1.8201	12	867.97	2,425.19	0.36	1.5499	11
Belgium	1,002.51	2,264.42	0.44	1.9173	15	921.50	2,264.42	0.41	1.7624	15
Canada	1,917.94	7,257.85	0.26	1.1444	4	1,801.84	7,257.85	0.25	1.0751	6
Denmark	692.70	1,664.31	0.42	1.8025	11	485.25	1,664.31	0.29	1.2627	8
Finland	758.44	1,198.19	0.63	2.7413	20	513.34	1,198.19	0.43	1.8554	16
France	6,764.43	14,978.99	0.45	1.9557	16	5,960.81	14,978.99	0.40	1.7234	13
Germany	7,342.32	14,061.17	0.52	2.2614	17	6,025.51	14,061.17	0.43	1.8558	17
Greece	154.26	383.85	0.40	1.7404	9	193.66	383.85	0.50	2.1849	19
Ireland	230.93	435.68	0.53	2.2955	18	207.29	435.68	0.48	2.0605	18
Italy	6,036.68	8,160.11	0.74	3.2038	21	5,790.23	8,160.11	0.71	3.0730	21
Japan	8,173.28	19,159.85	0.43	1.8474	13	5,666.26	19,159.85	0.30	1.2807	9
Luxembourg	59.24 \2	138.11	0.43	1.8577	14	55.01 \2	138.11	0.40	1.7248	14
Netherlands	1,201.19	4,371.47	0.27	1.1900	5	1,045.93	4,371.47	0.24	1.0362	3
Norway	821.45	1,490.86	0.55	2.3862	19	559.40	1,490.86	0.38	1.6249	12
Portugal	179.11	535.20	0.33	1.4493	7	294.66	535.20	0.55	2.3843	20
Spain	797.90	4,531.17	0.18	0.7626	1	894.59	4,531.17	0.20	0.8550	1
Sweden	1,580.17	3,845.59	0.41	1.7795	10	1,120.60	3,845.59	0.29	1.2620	7
Switzerland	1,796.35	5,036.36	0.36	1.5447	8	1,205.78	5,036.36	0.24	1.0368	4
United Kingdom	4,636.98	15,065.95	0.31	1.3329	6	4,511.26	15,065.95	0.30	1.2968	10
United States	30,478.64	131,993.57	0.23	1.0000	2	30,478.64	131,993.57	0.23	1.0000	2
Total	76,625.03	242,840.36	0.32			69,526.40	242,840.36	0.29		

1/ Data for Japan are from Year 1989.
2/ It includes costs of telecommunications services

Table 9
Year 1988 \1
Unit Operating Expense of Postal Administrations
Data from Universal Postal Union (UPU)

	Market Exchange Rates					Purchasing Power Parities (PPPs)				
Country	Total Expenses (Million $)	Weighted Total Mail Pieces (Millions)	Unit Operating Expense ($)	Index of Unit Operating Expense	Ranking by Unit Operating Expense (Lower To Higher)	Total Expenses (Million $)	Weighted Total Mail Pieces (Millions)	Unit Operating Expense ($)	Index of Unit Operating Expense	Ranking by Unit Operating Expense (Lower To Higher)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Australia	1,384.40	3,842.47	0.36	1.3016	3	1,307.68	3,842.47	0.34	1.2295	5
Austria	1,276.85	2,425.19	0.53	1.9021	11	1,087.35	2,425.19	0.45	1.6198	11
Belgium	1,233.83	2,264.42	0.54	1.9685	12	1,134.14	2,264.42	0.50	1.8094	12
Canada	2,725.77	7,257.85	0.38	1.3568	4	2,560.77	7,257.85	0.35	1.2747	6
Denmark	745.80	1,664.31	0.45	1.6189	5	522.45	1,664.31	0.31	1.1341	3
Finland	920.18	1,198.19	0.77	2.7745	19	622.81	1,198.19	0.52	1.8779	13
France	9,127.91	14,978.99	0.61	2.2015	14	8,043.49	14,978.99	0.54	1.9400	14
Germany	9,566.65	14,061.17	0.68	2.4580	17	7,850.91	14,061.17	0.56	2.0171	16
Greece	192.66	383.85	0.50	1.8133	10	241.87	383.85	0.63	2.2765	18
Ireland	287.85	435.68	0.66	2.3869	16	258.38	435.68	0.59	2.1425	17
Italy	7,624.43	8,160.11	0.93	3.3756	21	7,313.16	8,160.11	0.90	3.2378	21
Japan	12,195.36	19,159.85	0.64	2.2995	15	8,454.63	19,159.85	0.44	1.5942	10
Luxembourg	103.61 \2	138.11	0.75	2.7103	18	96.20 \2	138.11	0.70	2.5165	19
Netherlands	2,131.19	4,371.47	0.49	1.7613	8	1,855.74	4,371.47	0.42	1.5336	8
Norway	1,179.09	1,490.86	0.79	2.8572	20	802.94	1,490.86	0.54	1.9457	15
Portugal	244.51	535.20	0.46	1.6505	7	402.25	535.20	0.75	2.7153	20
Spain	936.98	4,531.17	0.21	0.7471	1	1,050.52	4,531.17	0.23	0.8376	1
Sweden	2,231.38	3,845.59	0.58	2.0963	13	1,582.42	3,845.59	0.41	1.4866	7
Switzerland	2,514.05	5,036.36	0.50	1.8034	9	1,687.53	5,036.36	0.34	1.2105	4
United Kingdom	6,765.76	15,065.95	0.45	1.6224	6	6,582.32	15,065.95	0.44	1.5784	9
United States	36,535.69	131,993.57	0.28	1.0000	2	36,535.69	131,993.57	0.28	1.0000	2
Total	99,923.97	242,840.36	0.41			89,993.25	242,840.36	0.37		

1/ Data for Japan are from Year 1989.
2/ It includes costs of telecommunications services

Table 10
Year 1988 \1
Labor Productivity of Postal Administrations

Data from Universal Postal Union (UPU)

Country	Weighted Total Mail Pieces (Millions)	Total Number of Employees (Thousands)	Average Annual Hours Worked \3	Total Number of Hours Worked (Thousands)	Labor Productivity (Pieces Per Hour Worked)	Index of Gross Labor Productivity	Ranking by Gross Labor Productivity (Higher To Lower)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Australia	3,842.47	36.76	1,687.20	62,021.47	61.95	0.6979	5
Austria	2,425.19	32.00	1,702.26	54,472.32	44.52	0.5015	10
Belgium	2,264.42	45.50	1,624.90	73,932.95	30.63	0.3450	16
Canada	7,257.85	63.00	1,870.70	117,854.10	61.58	0.6937	6
Denmark	1,664.31	27.60	1,593.80	43,988.88	37.83	0.4262	12
Finland	1,198.19	30.90	1,816.00	56,114.40	21.35	0.2405	18
France	14,978.99	239.30	1,687.60	403,842.68	37.09	0.4178	14
Germany	14,061.17	232.60	1,656.30	385,255.38	36.50	0.4111	15
Greece	383.85	11.60	1,795.70	20,830.12	18.43	0.2076	20
Ireland	435.68	10.30	1,803.30	18,573.99	23.46	0.2642	17
Italy	8,160.11	237.10	1,776.90	421,302.99	19.37	0.2182	19
Japan	19,159.85	141.60	2,142.50	303,378.00	63.16	0.7114	3
Luxembourg	138.11	1.50	1,726.70	2,590.05	53.32	0.6006	7
Netherlands	4,371.47	45.00	1,546.60	69,597.00	62.81	0.7075	4
Norway	1,490.86	26.39	1,509.80	39,843.62	37.42	0.4215	13
Portugal	535.20	16.30	1,865.95	30,414.99	17.60	0.1982	21
Spain	4,531.17	56.10 \2	1,770.85	99,344.69	45.61	0.5138	9
Sweden	3,845.59	52.60	1,494.90	78,631.74	48.91	0.5509	8
Switzerland	5,036.36	40.70	1,838.70	74,835.09	67.30	0.7581	2
United Kingdom	15,065.95	207.00	1,788.75	370,271.25	40.69	0.4583	11
United States	131,993.57	805.80	1,845.10	1,486,781.58	88.78	1.0000	1
Total	242,840.36	2,359.65	36,544.51	4,213,877.28	57.63		

1/ Data for Japan are from Year 1989.
2/ The figure includes the employees of telecommunications services.
3/ Appendix B, Table B1.

Table 11
Year 1988 \1
Wage Premium
of Postal Administrations

Country	Average Annual Labor Cost ($) \2	Estimated Annual Working Time in Postal Administrations \3	Hourly Compensation Costs of Postal Administrations ($)	Hourly Compensation Costs in Manufacturing ($) \4	Purchasing Power Parities (PPPs)		
					Wage Premium ($)	Index of Wage Premium	Ranking by Wage Premium (Lower To Higher)
Australia	25,214	1,687.20	14.94	10.72	4.23	0.6413	17
Austria	27,124	1,702.26	15.93	12.38	3.55	0.5390	15
Belgium	20,253	1,624.90	12.46	14.55	(2.08)	(1.3161)	1
Canada	28,601	1,870.70	15.29	12.73	2.56	0.3879	12
Denmark	17,581	1,593.80	11.03	10.66	0.38	0.0570	5
Finland	16,613	1,816.00	9.15	10.65	(1.50)	(1.2278)	2
France	24,909	1,687.60	14.76	11.42	3.34	0.5075	14
Germany	25,905	1,656.30	15.64	15.01	0.63	0.0950	6
Greece	16,695	1,795.70	9.30	6.56	2.74	0.4157	13
Ireland	20,125	1,803.30	11.16	8.99	2.17	0.3299	10
Italy	24,421	1,776.90	13.74	13.41	0.33	0.0502	4
Japan	40,016	2,142.50	18.68	8.69	9.98	1.5150	21
Luxembourg	36,672	1,726.70	21.24	12.80	8.44	1.2800	20
Netherlands	23,243	1,546.60	15.03	13.79	1.24	0.1875	7
Norway	21,197	1,509.80	14.04	12.58	1.46	0.2218	8
Portugal	18,077	1,865.95	9.69	4.58	5.11	0.7747	18
Spain	15,946	1,770.85	9.00	9.60	(0.59)	(1.0897)	3
Sweden	21,304	1,494.90	14.25	11.95	2.30	0.3494	11
Switzerland	29,626	1,838.70	16.11	12.10	4.02	0.6095	16
United Kingdom	21,794	1,788.75	12.18	10.31	1.87	0.2840	9
United States	37,824	1,845.10	20.50	13.91	6.59	1.0000	19

1/ Data for Japan are from Year 1989.
2/ Table 6.
3/ Appendix B, Table B1.
4/ Appendix B, Table B2.

Table 12
Year 1988
Correlation Coefficients for Selected Variables of Postal Administrations
Data from Universal Postal Union (UPU)

	LC Volume/ Capita	AO Volume/ Capita	Total Volume/ Capita	Total Expenses	Expenses/ Capita	Expenses as % of GDP	No of Employees	No of Employees/ Capita	Anual Labor Cost	ULC	UOE	Wage Premium	Labor Productivity	GDP/ Capita	Revenue Per Piece	Basic Letter Rate
LC Volume/Capita	1.00															
AO Volume/Capita	0.29	1.00														
Total Volume/Capita	0.70	0.88	1.00													
Total Expenses	0.46	0.21	0.38	1.00												
Expenses/Capita	0.61	0.70	0.82	0.08	1.00											
Expenses as % of GDP	0.43	0.61	0.67	-0.10	0.94	1.00										
No. of Employees	0.46	0.18	0.36	0.99	0.08	-0.09	1.00									
No. of Employees/Capita	0.36	0.60	0.62	-0.10	0.74	0.77	-0.07	1.00								
Anual Labor Cost	0.53	0.28	0.47	0.55	0.43	0.23	0.48	-0.07	1.00							
ULC	-0.54	-0.31	-0.50	-0.17	-0.14	0.07	-0.11	0.02	-0.26	1.00						
UOE	-0.42	-0.30	-0.44	-0.22	0.02	0.22	-0.17	-0.01	-0.10	0.94	1.00					
Wage Premium	0.34	0.00	0.17	0.33	0.18	0.08	0.24	-0.32	0.79	-0.16	0.03	1.00				
Labor Productivity	0.70	0.45	0.68	0.53	0.36	0.10	0.45	-0.04	0.72	-0.79	-0.68	0.51	1.00			
GDP/Capita	0.75	0.55	0.77	0.46	0.68	0.42	0.45	0.48	0.69	-0.47	-0.40	0.25	0.72	1.00		
Revenue Per Piece	-0.12	0.03	-0.05	-0.21	0.29	0.42	-0.19	0.05	0.21	0.44	0.55	0.26	-0.26	-0.07	1.00	
Basic Letter Rate	-0.29	-0.20	-0.29	-0.02	-0.04	0.07	0.06	0.09	-0.06	0.69	0.63	-0.25	-0.47	-0.06	0.37	1.00

Table 13
Actual and Predicted Labor Productivity

Country	Actual Productivity	Predicted Productivity	Difference
Australia	59.67	42.20	17.47
Austria	43.03	47.54	-4.51
Belgium	33.88	33.89	-0.01
Canada	59.44	42.53	16.92
Denmark	37.83	42.87	-5.04
Finland	20.58	32.17	-11.59
France	38.26	45.16	-6.91
Germany	36.50	35.91	0.59
Greece	18.43	17.10	1.33
Ireland	25.78	30.63	-4.86
Italy	19.37	27.74	-8.37
Japan	63.16	45.57	17.59
Luxembourg	51.62	56.45	-4.83
Netherlands	62.81	42.19	20.62
Norway	37.42	46.97	-9.56
Portugal	17.75	26.38	-8.63
Spain	44.70	23.46	21.25
Sweden	47.45	54.75	-7.29
Switzerland	70.70	79.83	-9.13
United Kingdom	44.80	44.25	0.55
United States	88.78	68.95	19.83

Appendix A
Year 1988 \1
Exchange Rates and Purchasing Power Parities (PPPs)

Country	National Currency (NC)	Exchange Rates (NCU/GFR) \2	Exchange Rates (NCU/ECU) \3	Market Exchange Rates (NCU/$) \3	Exchange Rates (ECU/GFR) \5	Exchange Rates ($/ECU) \5	Exchange Rates ($/GFR) \5	PPPs for GDP (NCU/$) \6	National Currency Over/(Under) Valuation Against US Dollar (Percent) \7
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Australia	**Australian dollar**	0.5400	1.5097 \4	1.2752	0.3577	1.1839	0.4235	1.3500	5.87
Austria	**Austrian schilling**	5.7171	14.6188 \4	12.3480	0.3911	1.1839	0.4630	14.5000	17.43
Belgium	**Belgian franc**	16.4100	43.4270	36.7680	0.3779	1.1811	0.4463	40.0000	8.79
Canada	**Canadian dollar**	0.5243	1.4570 \4	1.2307	0.3599	1.1839	0.4260	1.3100	6.44
Denmark	**Danish krone**	3.0220	7.9517	6.7320	0.3800	1.1812	0.4489	9.6100	42.75
Finland	**Finnish markka**	1.8389	4.9520 \4	4.1828	0.3713	1.1839	0.4396	6.1800	47.75
France	**French franc**	2.5785	7.0361	5.9569	0.3665	1.1812	0.4329	6.7600	13.48
Germany	**Deutsche mark**	0.7827	2.0744	1.7562	0.3773	1.1812	0.4457	2.1400	21.85
Greece	**Greek drachma**	56.4000	167.5500	141.8600	0.3366	1.1811	0.3976	113.0000	(20.34)
Ireland	**Irish pound**	0.2900	0.7757	0.6553	0.3739	1.1838	0.4426	0.7300	11.41
Italy	**Italian lira**	574.0608	1,537.3000	1,301.6000	0.3734	1.1811	0.4410	1,357.0000	4.26
Japan	**Japanese yen**	60.0000	163.3308 \4	137.9600	0.3674	1.1839	0.4349	199.0000	44.24
Luxembourg	**Luxembourg franc**	15.9000	43.4270	36.7680	0.3661	1.1811	0.4324	39.6000	7.70
Netherlands	**Netherlads guilder**	0.8790	2.3343	1.9766	0.3766	1.1810	0.4447	2.2700	14.84
Norway	**Norwegian krone**	2.8700	7.7155 \4	6.5170	0.3720	1.1839	0.4404	9.5700	46.85
Portugal	**Portuguese escudo**	63.2700	169.1900	143.9500	0.3740	1.1753	0.4395	87.5000	(39.22)
Spain	**Spanish peseta**	51.9928	137.9125 \4	116.4900	0.3770	1.1839	0.4463	103.9000	(10.81)
Sweden	**Swedish krona**	2.7360	7.2439	6.1272	0.3777	1.2752	0.4465	8.6400	41.01
Switzerland	**Swiss franc**	0.6500	1.7324 \4	1.4633	0.3752	1.1839	0.4442	2.1800	46.98
United Kingdom	**Pound sterling**	0.2400	0.6641	0.5614	0.3614	1.1831	0.4275	0.5770	2.79
United States	**US dollar ($)**	0.4396	1.1839	1.0000	0.3713	1.1839	0.4396	1.0000	0.00

1/ Data for Japan are from Year 1989.
2/ Postal Statistics (1988), International Bureau, Universal Postal Union (UPU), Berne, Switzerlant.
3/ Average annual exchange rates. International Financial Statistics (November, 1993), Statistics Department, International Monetary Fund (IMF), Washington D.C., USA.
4/ They are calculated as the product of two exchange rates:(NCU / $) and ($ / ECU).
5/ Calculated rates.
6/ Purchasing Power Parities (PPPs) are the rates of currency conversion that equalise the purchasing power of different currencies. National Accounts, Main Aggregates, Volume I (1960 - 1991), Organization for Economic Co-operation and Development (OECD), Paris, France (1993).
7/ (COL. 8 / COL.4)*100

Abbreviations: NCU = National Currency Unit
GFR = Gold Franc
ECU = European Currency Unit
$ = US Dollar

Table B1
Year 1988 \1
Average Annual Hours Worked

Country	Estimated Actual Annual Working Time of Employees \2	Annual Holidays in Days			Average Annual Hours Worked in Manufacturing \3	Estimated Annual Working Time in Postal Administrations	Index of Average Annual Hours Worked	Ranking by Annual Hours Worked (Higher To Lower)
		Public \2	Annual \2	Total				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Australia					1,687.20 \4	1,687.20	0.9144	15
Austria					1,702.26 \4	1,702.26	0.9226	13
Belgium	1,625.60	10.00	25.00	35.00	1,624.20	1,624.90 \5	0.8807	17
Canada					1,870.70	1,870.70	1.0139	2
Denmark	1,572.90	7.50	25.00	32.50	1,614.70	1,593.80 \5	0.8638	18
Finland					1,816.00 \4	1,816.00	0.9842	6
France	1,719.10	10.00	25.00	35.00	1,656.10	1,687.60 \5	0.9146	14
Germany	1,672.40	9.00	30.20	39.20	1,640.20	1,656.30 \5	0.8977	16
Greece	1,795.70	9.00	25.00	34.00		1,795.70	0.9732	8
Ireland	1,803.30	8.00	20.00	28.00		1,803.30	0.9773	7
Italy	1,692.50	15.00	22.70	37.70	1,861.30	1,776.90 \5	0.9630	10
Japan					2,142.50	2,142.50	1.1612	1
Luxembourg	1,726.70	10.00	28.00	38.00		1,726.70	0.9358	12
Netherlands	1,477.20	6.00	22.50	28.50	1,616.00	1,546.60 \5	0.8382	19
Norway					1,509.80	1,509.80	0.8183	20
Portugal	1,862.90	11.00	23.80	34.80	1,869.00 \4	1,865.95 \5	1.0113	3
Spain	1,777.70	14.00	23.50	37.50	1,764.00 \4	1,770.85 \5	0.9598	11
Sweden					1,494.90	1,494.90	0.8102	21
Switzerland					1,838.70 \4	1,838.70	0.9965	5
United Kingdom	1,703.40	8.00	25.00	33.00	1,874.10	1,788.75 \5	0.9695	9
United States					1,951.10	1,845.10 \6	1.0000	4

1/ Data for Japan are from Year 1989.
2/ Statistics in Focus, Population and Social Conditions, Manuscript Completed on 5/15/1995, Eurostat, L-2920 Luxembourg.
3/ Average Annual and Average Weekly Hours Worked in Manufacturing 12 Countries, 1960-1994, U.S. Department of Labor, Bureau of Labor Statistics, September 1995.
4/ Estimated from draft data provided by the Bureau of Labor Statistics, Office of Productivity and Technology, March 1996.
5/ Average of figures in Columns (1) and (5).
6/ U.S. Postal Service Average Anual Hours Worked. U.S. Postal Service Total Factor Productivity, Annual Data Tables, 1994 Edition, L. R. Christensen Associates.

Table B2
Year 1988 \1
Hourly Compensation Costs for Production Workers in Manufacturing

Country	Hourly Compensation Costs in National Currency (NCUs) \2	Market Exchange Rates: Hourly Compensation Costs ($)	Market Exchange Rates: Index of Hourly Compensation Costs	Market Exchange Rates: Ranking by Hourly Compensation (Lower To Higher)	Purchasing Power Parities (PPPs): Hourly Compensation Costs ($)	Purchasing Power Parities (PPPs): Index of Hourly Compensation Costs	Purchasing Power Parities (PPPs): Ranking by Hourly Compensation (Lower To Higher)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Australia	14.47	11.35	0.8158	6	10.72	0.7706	9
Austria	179.54	14.54	1.0453	13	12.38	0.8902	13
Belgium	581.89	15.83	1.1377	16	14.55	1.0458	20
Canada	16.68	13.55	0.9744	9	12.73	0.9154	15
Denmark	102.40	15.21	1.0935	14	10.66	0.7660	8
Finland	65.81	15.73	1.1311	15	10.65	0.7656	7
France	77.17	12.95	0.9313	8	11.42	0.8207	10
Germany	32.13	18.30	1.3153	20	15.01	1.0794	21
Greece	741.00	5.22	0.3755	2	6.56	0.4714	2
Ireland	6.56	10.01	0.7197	4	8.99	0.6460	4
Italy	18,201.00	13.98	1.0053	12	13.41	0.9642	17
Japan	1,730.00	12.54	0.9015	7	8.69	0.6250	3
Luxembourg	507.00	13.79	0.9913	10	12.80	0.9204	16
Netherlands	31.31	15.84	1.1388	17	13.79	0.9916	18
Norway	120.37	18.47	1.3278	21	12.58	0.9042	14
Portugal	400.97	2.79	0.2003	1	4.58	0.3294	1
Spain	997.00	8.56	0.6153	3	9.60	0.6898	5
Sweden	103.24	16.85	1.2113	18	11.95	0.8590	11
Switzerland	26.37	18.02	1.2955	19	12.10	0.8696	12
United Kingdom	5.95	10.60	0.7620	5	10.31	0.7413	6
United States	13.91	13.91	1.0000	11	13.91	1.0000	19

1/ Data for Japan are from Year 1989.

2/ Compensation costs include pay for time worked; other direct pay; employer expenditures for legally required insurance programs and contractual and private benefit plans; and, for some countries, other labor taxes. International Comparisons of Hourly Compensation Costs for Production Workers in Manufacturing, 1993, U.S. Department of Labor, Bureau of Labor Statistics, Report 873, June 1994.

Table B3
Year 1988 \1
Inhabitants Per Post Office
and Post Office Density
Data from Universal Postal Union (UPU)

Country	Number of Post Offices	Inhabitants Per Post Office	Index of Inhabitants Per Post Office	Ranking by Inhabitants Per Post Office (Lower To Higher)	Post Office Density (Post Offices Per 100 Square Kilometres)	Index of Post Office Density	Ranking by Post Office Density (Higher To Lower)
	(2)	(3)	(4)	(5)	(3)	(4)	(5)
Australia	4,489	3,684	0.6000	12	0.06	0.1364	21
Austria	2,676	2,838	0.4623	7	3.19	7.4562	9
Belgium	1,838	5,387	0.8775	17	6.02	14.0727	6
Canada	14,982	1,731	0.2820	4	0.15	0.3509	20
Denmark	1,270	4,039	0.6579	15	2.95	6.8891	12
Finland	2,926	1,690	0.2753	3	0.87	2.0283	16
France	16,949	3,311	0.5393	9	3.10	7.2388	10
Germany	17,410	3,530	0.5749	11	7.00	16.3631	4
Greece	1,296	7,720	1.2574	20	0.98	2.2949	15
Ireland	2,103	1,682	0.2740	2	2.99	6.9910	11
Italy	14,373	3,996	0.6509	13	4.77	11.1476	7
Japan	23,871	5,158	0.8401	16	6.32	14.7654	5
Luxembourg	106	3,519	0.5731	10	4.08	9.5397	8
Netherlands	2,624 \2	5,625	0.9162	18	7.03	16.4224	3
Norway	2,728	1,543	0.2513	1	0.84	1.9658	17
Portugal	1,107	8,818	1.4361	21	1.20	2.8088	14
Spain	12,985	2,989	0.4868	8	2.57	6.0100	13
Sweden	2,110	3,998	0.6512	14	0.47	1.0956	18
Switzerland	3,763	1,773	0.2888	5	9.11	21.2922	1
United Kingdom	21,030	2,714	0.4420	6	8.59	20.0689	2
United States	40,117	6,140	1.0000	19	0.43	1.0000	19
Total	190,753	4,027			0.62		

1/ Data for Japan are from Year 1989.
2/ CEC - Green Paper, Year 1989.

Appendix B

Table B4
Year 1988
Basic Letter Rate of Postal Administrations
Data from Commission of the Europian Communities (CEC)
Green Paper

Country	Basic Letter Rate (ECUs)	Basic Letter Rate (NCUs)	Market Exchange Rates: Basic Letter Rate ($)	Purchasing Power Parities (PPPs): Basic Letter Rate ($)
	(1)	(2)	(3)	(4)
Australia	0.25	0.37	0.29	0.27
Austria	0.34	5.00	0.40	0.34
Belgium	0.33	14.33	0.39	0.36
Canada	0.25	0.37	0.30	0.28
Denmark	0.47	3.74	0.56	0.39
Finland	0.36	1.80	0.43	0.29
France	0.31	2.20	0.37	0.33
Germany	0.50	1.04	0.59	0.48
Greece	0.17	28.48	0.20	0.25
Ireland	0.36	0.28	0.43	0.38
Italy	0.50	768.65	0.59	0.57
Japan	0.37	60.00	0.43	0.30
Luxembourg	0.28	12.16	0.33	0.31
Netherlands	0.32	0.75	0.38	0.33
Norway	0.35	2.70	0.41	0.28
Portugal	0.18	30.45	0.21	0.35
Spain	0.15	20.69	0.18	0.20
Sweden	0.30	2.20	0.36	0.25
Switzerland	0.29	0.50	0.34	0.23
United Kingdom	0.28	0.19	0.33	0.32
United States	0.21	0.25	0.25	0.25

Table B5
Year 1988 \1
Revenue Per Piece of Postal Administrations
Data from Universal Postal Union (UPU)

	Market Exchange Rates					Purchasing Power Parities (PPPs)				
Country	Total Revenue (Million $)	Weighted Total Mail Pieces (Millions)	Revenue Per Piece ($)	Index of Revenue Per Piece	Ranking by Revenue Per Piece (Lower To Higher)	Total Revenue (Million $)	Weighted Total Mail Pieces (Millions)	Revenue Per Piece ($)	Index of Revenue Per Piece	Ranking by Revenue Per Piece (Lower To Higher)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Australia	1,420.35	3,842.47	0.37	1.3723	5	1,341.64	3,842.47	0.35	1.2963	5
Austria	3,469.70	2,425.19	1.43	5.3116	21	2,954.75	2,425.19	1.22	4.5233	21
Belgium	1,307.34	2,264.42	0.58	2.1434	11	1,201.70	2,264.42	0.53	1.9702	13
Canada	2,850.90	7,257.85	0.39	1.4583	6	2,678.33	7,257.85	0.37	1.3700	6
Denmark	993.37	1,664.31	0.60	2.2159	12	695.88	1,664.31	0.42	1.5523	7
Finland	598.60	1,198.19	0.50	1.8548	9	405.15	1,198.19	0.34	1.2553	4
France	13,002.43	14,978.99	0.87	3.2227	19	11,457.72	14,978.99	0.76	2.8398	19
Germany	9,528.91	14,061.17	0.68	2.5159	16	7,819.94	14,061.17	0.56	2.0647	14
Greece	170.76	383.85	0.44	1.6516	7	214.37	383.85	0.56	2.0734	15
Ireland	290.41	435.68	0.67	2.4747	15	260.68	435.68	0.60	2.2214	17
Italy	5,799.97	8,160.11	0.71	2.6388	17	5,563.19	8,160.11	0.68	2.5311	18
Japan	12,315.57	19,159.85	0.64	2.3864	14	8,537.97	19,159.85	0.45	1.6544	10
Luxembourg	170.55	138.11	1.23	4.5847	20	158.36	138.11	1.15	4.2568	20
Netherlands	2,187.14	4,371.47	0.50	1.8575	10	1,904.45	4,371.47	0.44	1.6174	8
Norway	1,151.13	1,490.86	0.77	2.8666	18	783.90	1,490.86	0.53	1.9521	12
Portugal	185.61	535.20	0.35	1.2876	3	305.36	535.20	0.57	2.1182	16
Spain	697.75	4,531.17	0.15	0.5717	1	782.29	4,531.17	0.17	0.6410	1
Sweden	2,390.93	3,845.59	0.62	2.3082	13	1,695.57	3,845.59	0.44	1.6369	9
Switzerland	1,828.73	5,036.36	0.36	1.3481	4	1,227.52	5,036.36	0.24	0.9049	2
United Kingdom	6,973.84	15,065.95	0.46	1.7185	8	6,784.76	15,065.95	0.45	1.6719	11
United States	35,552.99	131,993.57	0.27	1.0000	2	35,552.99	131,993.57	0.27	1.0000	3
Total	102,886.98	242,840.36	0.42			92,326.49	242,840.36	0.38		

1/ Data for Japan are from Year 1989.