MARYLAND INTERINDUSTRY FORECASTING PROJECT

Research Memorandum No. 14

RAILROAD SECTOR INVESTMENT AND OUTPUT STATISTICS

by

Fredrick Peacock

While the Forecasting Project was based on the 1958 Input-Output table published by the Office of Business Economics, we had only one column and one row for the whole transportation sector. In the expanded model based on the 1963 table, six sectors will deal with transportation. One of these is railroads. To take advantage of this new detail, we need investment and output series for the new sectors. This memorandum describes the sources and methods used in making up these historical series on equipment investment and output for the railroad sector.

The railroad sector as defined in our model is basically the same as SIC Major Group 40. The only difference is that the private car lines (companies engaged in the rental of railroad cars--e.g. Fruit Growers Express) SIC 474 are taken out of miscellaneous transportation services and placed in the railroad sector.

The basic source for all railroad statistics is an annual report of the Interstate Commerce Commission, Transport Statistics in the United States.[1]

I. EQUIPMENT INVESTMENT SERIES

Three groups of data were gathered: depreciation expense, equipment balances or stocks, and expenditures for new equipment.

The ICC breaks down road and equipment investment of railroads into approximately 50 accounts. Since we are interested in equipment investment, we have to decide which accounts should be allocated to equipment and which should be treated as land or construction. Most of the accounts fit clearly into one or another of these categories. The most difficult account to allocate was Communication Systems, which contains microwave towers (construction) as well as radio transmitters (equipment). We decided to treat this entire account as equipment. The other ten ICC equipment accounts[2] were aggregated into five accounts for our series as follows: Shop Machinery, Power Plant Machinery, Roadway Machines and Roadway Small Tools go into our Machinery and Small Tools account; Floating Equipment, Work Equipment and Miscellaneous Equipment into Other Equipment. Locomotives, Freight-Train Cars and Passenger-Train Cars each have their own accounts in our tables.

A. Depreciation Expense

We do not really need depreciation expense statistics for our investment series, but we use them along with equipment balances to test our method of generating investment series for other parts of the railroad sector where actual investment figures are not available. The basic method tested takes the change between two years in the value of the stock of equipment and adds depreciation expense for each year to give an annual figure for the value of investment.

The depreciation expense for each account is allocated to freight and passenger expense[3] and is recorded in Table 1. This division

of depreciation expense can be used to provide weights with which to allocate investment between freight and passenger service if this allocation is desired. These weights are list in Table 4.

B. Equipment Balances - January 1st

The beginning of year equipment balances for each account are recorded in Table 1.[4] This balance figure is not corrected for depreciation. It is the sum of the original costs of the equipment in use. When a piece of equipment is sold, abandoned or otherwise retired, its original cost is subtracted from the balance.

C. Expenditure for New Equipment

The actual gross investment figures are obtained by summing the expenditures for additions and betterments on owned and leased property and expenditures for new lines and extensions for each account. These sums appear in Table 1. Care is taken not to add in expenditures for purchase of existing lines, reorganizations, and such like, because they represent purchases by Class I line-haul railroads of equipment from other existing railways and not gross investment by the railroad sector.

We wanted to see if it was feasible to predict investment expenditures in other parts of the railroad sector using the change in stock of equipment (STOCK) between two years and depreciation expense (DEP). We tried this with Class I railroad statistics so that we could compare the predicted value with the actual value of investment. An equation in the following form was used to provide the predicted value:

$$STOCK_{t+1} - STOCK_t + DEP_t = Investment_t \text{ (for beginning of year STOCK}$$

figures). The errors, as percentages of actual investment, ranged from
a 47.90% overestimate to a 42.92% underestimate with an average devia-
tion from the actual value of 15.02%. This method would probably be a
good predictor of investment over a period of a decade or more even
though it is not highly reliable for individual years.

The detailed breakdown in the three data series above is for
Class I line-haul railroads only. The investment series must be in-
flated to provide a value for equipment investment in all railroads
including Class II line-haul and switching and terminal companies. To
inflate, we used distributions showing the percentage of all locomotives,
freight-train cars, passenger-train cars and total railway property
held by Class I line-haul railraods.[5] For simplicity, we used the aver-
age overtime of each of these percentages. (They varied less than 1%
from year to year.) The percentages are shown in Table 4. These
percentages were divided into the value of Class I line-haul investment
for the appropriate type of equipment to obtain total investment for
all railroads in that type equipment. Locomotive, freight-train car,
and passenger-train car investment are multiplied by their respective
reciprocals. The other equipment accounts are summed and multiplied
by the reciprocal of the mean percentage of all railway property held
by Class I line-haul railroads. This method assumes that new investment
made by a class of railroads is in proportion to the fraction of equipment
held by that class.

D. Investment in Other Parts of the Railroad Sector

Investment statistics must also be provided for the other
parts of the railroad sector: the Pullman Company, Railway Express
Agency, electric railways, and private car lines. These figures are
recorded in Table 2. Data are not so plentiful in these areas as
they are for railroads proper. Often a proxy series must be con-
structed and used for a variable when the proper data is not available.

Among the data available for the Pullman Company[6] are Carrier
Operating Property Less Accrued Depreciation (COPLAD) and Depreciation
Expense (DEP). The investment series is produced using: $COPLAD_t$ -
$COPLAD_{t-1}$ + DEP_t = $Investment_t$.

The Railway Express Agency statistics include Depreciation
Expense (DEP) and cost figures for the stock of equipment (STOCK)
broken down into ten equipment categories.[7] These are aggregated into
five categories in our Tables: Cars (railroad cars), Automobiles,
Trucks, Office Equipment, Furniture and Safes, and Other Equipment.
Probably the best estimate of investment for REA is: $STOCK_t$ - $STOCK_{t-1}$ +
DEP_t = $Investment_t$. As mentioned above, this form worked fairly well
when tested with Class I equipment investment. The time subscripts
in the equation are different from those in the Pullman equation
because the REA stocks are end-of-year instead of beginning-of-year
figures.

The electric railways are a small and declining part of the
railroad sector. Their investment is very erratic and it has proved

impossible to get a reasonable investment series using the change-in-stock-plus-depreciation method, so we tried another. We took positive changes in the number of pieces of various types of equipment held to be gross investment.[8] We reasoned that since the industry was small and declining it would tend to hold on to old equipment rather than retire it and replace it with new. Average prices for each type of equipment were estimated from prices of railroad and highway equipment. The prices settled on are: locomotive, $122,000; passenger coach, $131,600; freight car, $14,000; maintainance equipment car, $30,000;[9] bus, $4,400; truck, $4,000; other highway equipment, $4,200.[10] For each year the number of pieces of each type of equipment added was multiplied by the estimated prices above to give an approximate value for electric railway investment.

Private car lines are companies engaged in renting railroad cars and performing services connected with their use. The majority of cars owned by these companies are either refrigerator or tank cars; the Fruit Growers Express is an example of such a company. The statistics available for the private car lines include cost figures for their entire stocks of cars. Again, no actual investment data and no depreciation figures are available, so we must provide a proxy depreciation series and use the change-in-stock-plus-depreciation method of approximating an investment series. Here, however, since we do not have a depreciation expense series, but only the value of stock series. We took depreciation expense as a percent of stock of

freight cars in Class I railroads and multiplied the stock of the private car lines by it to create a depreciation series. This percentage was used because freight cars should depreciate at about the same rate no matter who owns them. The percentage varied little from year to year, so for simplicity we used the average value of 3.072%.

II. OUTPUT OR OPERATING REVENUE SERIES

Now we treat the value of the output of services of the railroad sector. This value is measured in current dollar terms by operating revenue. Unlike investment data, operating revenue statistics are usually clearly identified and exact in their meaning. The only real danger lies in using a figure which does not represent as large an aggregate as is supposed, thereby leaving out part of the railroad sector.[11] The operating revenue statistics are recorded in Table 4.