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Chapter 8

Airlines

In 1946 domestic airlines furnished about six billion passenger-miles, compared with 59 billion for all railroad travel (other than commutation), or 20 billion for parlor and sleeping car travel only. In the same year American-flag international air carriers supplied a further billion passenger-miles; American-flag international waterway traffic is not available for 1946, but amounted to under a billion passenger-miles in 1939.[1] The industry has grown rapidly in output and employment, and also in output per worker (Table 37 and Charts 23 and 24). However, growth in productivity has been somewhat halting, particularly on the international lines. Because domestic operations are on a larger scale than international (see Appendix Table I-1) indexes for all airlines do not differ greatly from those for domestic only. In domestic operations (Chart 23) output grew steadily with no setback, rising roughly tenfold each decade; the growth in employment was somewhat less regular. International traffic (Chart 24) grew about as fast as domestic, but underwent setbacks in 1931 and 1936, and failed to advance appreciably in 1938 and 1943; except in 1942-43 employment expanded rather regularly.

This contrast suggests that international traffic is more subject to chance disturbances, and perhaps also to business cycle influences, than domestic. It suggests also that — in peacetime at least — the working force is somewhat less flexible, and less easily adjusted to traffic needs, in the case of international than in the case of domestic carriers. Perhaps this difference is connected with the smaller share of office workers, and the greater relative impor-

[1] Air traffic statistics quoted in this chapter cover scheduled or common-carrier operations only, and neglect unscheduled or contract flights. The latter are of unmeasured, but — as this is written — obviously substantial importance in the domestic field.

Table 37

AIRLINES: OUTPUT, EMPLOYMENT, AND PRODUCTIVITY, 1926-1946[a]

1939 : 100

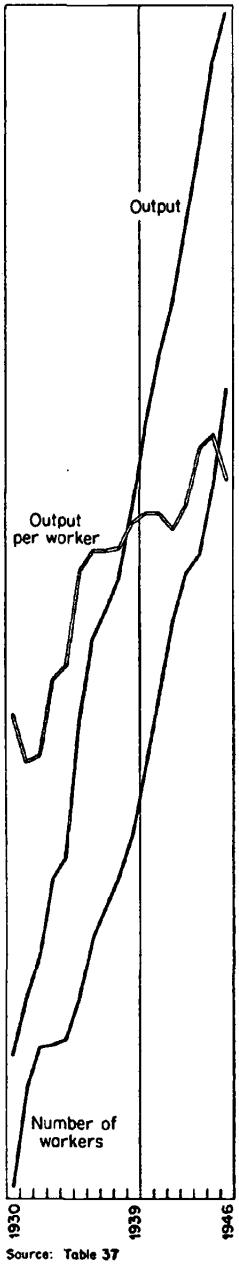
	DOMESTIC			INTERNATIONAL, AMERICAN-FLAG			DOMESTIC AND INTERNATIONAL COMBINED		
	Output	*No. of workers*	*Output per worker*	*Output*	*No. of workers*	*Output per worker*	*Output*	*No. of workers*	*Output per worker*
1926	.16	....	....	....	....	....	....	....	....
1927	.25	....	....	....	....	....	....	....	....
1928	1.4	....	....	1.1	....	....	1.3	....	....
1929	4.6	....	....	8.9	....	....	4.9	13.2	37
1930	11.0	24.1	46	25.6	11.4	225	12.0	19.9	60
1931	13.8	36.1	38	19.5	21.5	91	14.0	31.3	45
1932	16.4	42.4	39	28.6	30.9	93	17.0	38.6	44
1933	22.5	42.7	53	34.4	36.9	93	23.1	40.8	57
1934	24.5	43.6	56	50.7	44.0	115	26.1	43.8	60
1935	42.5	51.6	82	63.4	49.1	129	43.8	50.8	86
1936	59.3	66.3	89	57.6	55.8	103	59.2	62.9	94
1937	66.7	74.6	89	74.0	72.5	102	67.2	73.9	91
1938	76.0	84.5	90	74.1	86.6	86	75.9	85.2	89
1939	100.0	100.0	100	100.0	100.0	100	100.0	100.0	100

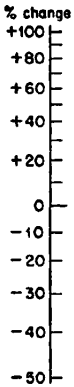
1940	141.0	135.5	104	138.9	118.9	117	140.9	130.1	108
1941	185.5	179.2	104	227	139.4	163	188.1	166.2	113
1942	227	235	97	330	210	157	234	227	103
1943	309	288	107	340	235	145	311	271	115
1944	420	310	135	432	220	196	421	281	150
1945	591	415	142	624	308	203	593	380	156
1946	723	608	119	1,532	475	323	774	565	138

[a] Data cover scheduled (i.e. common carrier) airlines only. Based on Appendix Table I-1. Output data for domestic airlines were combined using 1939 revenues (Civil Aeronautics Administration, *Statistical Handbook of Civil Aviation,* 1948 issue):

Passengers	$34.8 million
Express and freight	1.6 million
Mail	18.5 million

Chart 23
DOMESTIC AIRLINES:
OUTPUT, EMPLOYMENT,
AND PRODUCTIVITY

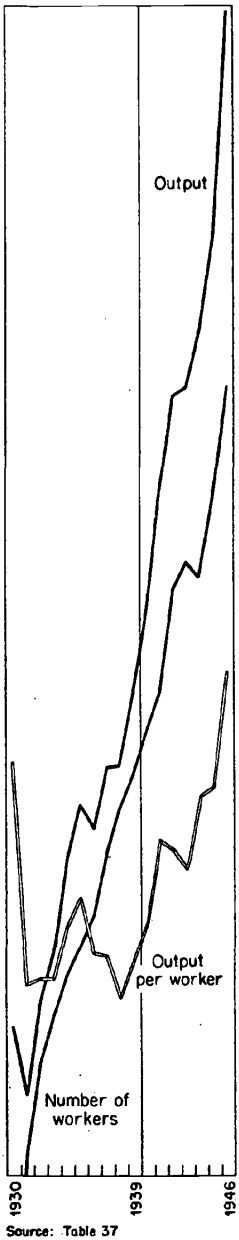




Ratio scale

Source: Table 37

Chart 24
AMERICAN-FLAG
INTERNATIONAL AIRLINES:
OUTPUT, EMPLOYMENT,
AND PRODUCTIVITY



Source: Table 37

Table 38

DOMESTIC AIRLINES: PASSENGER-MILES, SEAT-MILES, AND PLANE-MILES PER WORKER, 1929-1946[a]

1939 : 100

	Revenue Passenger-miles	*Passenger-miles per Worker*	*Passenger Seat-miles*	*Seat-miles per Worker*	*Revenue Plane-miles*	*Plane-miles per Worker*
1930	10.7	44	n.a.	n.a.	39.4	163
1931	13.4	37	n.a.	n.a.	52.0	144
1932	16.0	38	25.0	59	55.3	131
1933	21.9	51	30.8	72	59.4	139
1934	23.8	55	30.3	69	50.1	115
1935	39.6	77	47.6	92	67.4	131
1936	55.0	83	56.5	85	77.5	117
1937	60.3	81	68.8	92	80.5	108
1938	70.3	83	78.3	93	82.7	98
1939	100.0	100	100.0	100	100.0	100
1940	154.1	114	149.5	110	132.8	98
1941	203	113	192.7	108	162.1	90
1942	208	89	161.6	69	134.3	57
1943	239	83	152.8	53	127.0	44
1944	319	103	201	65	167.3	54
1945	492	119	314	76	252	61
1946	871	143	622	102	374	62

n.a.: not available.

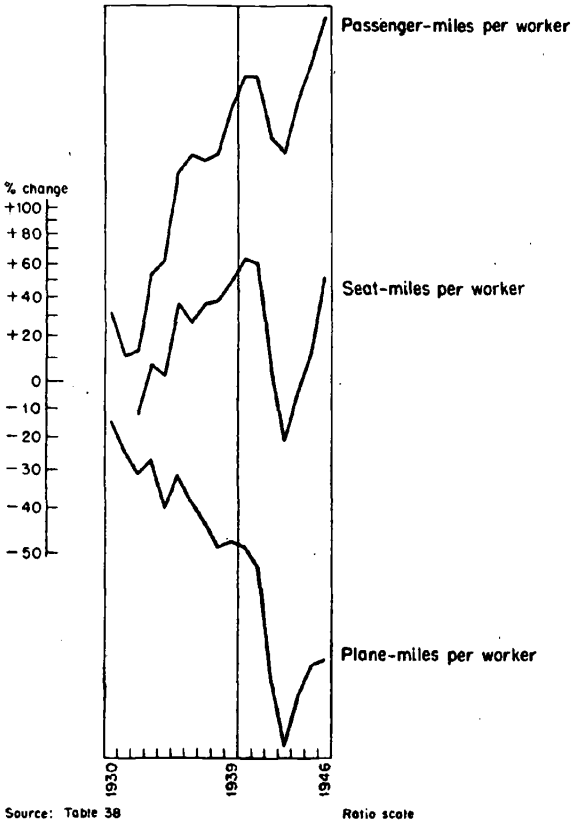
[a] All data from Civil Aeronautics Administration, *Statistical Handbook of Civil Aviation,* 1948 issue. For passenger-miles and workers, see Appendix Table I-1. Data cover scheduled (i.e., common carrier) airlines only.

tance of ground crews, among employees of international lines.[2] But reclassifications of the employment data make it impossible to substantiate this hypothesis.

The difference between domestic and international operations is further illustrated by figures for annual passenger-miles per employee — 100 thousand for domestic, 49 thousand for international, in 1946. The greater efficiency of the domestic carriers was exhibited despite a shorter average journey — 487 and 1,057 miles, respectively. We are apt to think that in transportation long hauls lead to economies not attainable with short; but long transocean flights require much fuel, and fuel cuts pay load.

[2] For instance, in 1940 for international and domestic carriers, ratios of office to all workers were 30 and 37 percent, and of all other ground employees to all workers 62 and 45 percent, respectively. See Civil Aeronautics Administration, *Statistical Handbook of Civil Aviation,* 1948 issue.

Chart 25
DOMESTIC AIRLINES:
PASSENGER-MILES, SEAT-MILES,
AND PLANE-MILES PER WORKER



The fairly rapid rise in output per worker on domestic airlines can be analysed further. The indexes of output and output per worker (Table 37 and Chart 23), in the case of these carriers, include express, freight and mail ton-miles, as well as passenger-miles. Indeed transportation of property accounted for about one-third of total revenues in 1939, and its movement has a corresponding influence upon the index. Passenger-miles per worker (Table 38 and Chart 25) moves roughly in the same manner as total output per worker. We have also computed seat-miles per worker and plane-miles per worker.[3] It is evident that a large

[3] Plane-miles need no explanation; seat-miles are obtained by multiplying plane-miles by average seating capacity.

part of the rise in passenger-miles per worker between 1932 and 1941 is associated with a rise in seat-miles per worker. The average seating capacity of planes rose from 7 in 1932 to 18 in 1941, and the average journey increased from 268 to 360 miles. The remaining rise in passenger-miles per worker we may associate with an improved load factor (i.e., percentage of seats occupied).

On the other hand, between 1941 and 1946 seat-miles per worker declined on balance, despite a further rise in average plane capacity (to 25 seats) and a further lengthening of average journey (to 487 miles). The entire expansion in passenger-miles per worker over this period must be imputed to a further improvement in load factor (from 64 to 80 percent).

In fact, the rather steady *decline* in plane-miles per worker was no doubt partly due to the advent of larger planes which not only require larger crews, but also more manhours for servicing. The ratio of seat-miles per plane-mile is a function of the increasing size of plane, just as the ratio of passenger-miles per seat-mile is a measure of load factor. However, the extent to which passenger-miles per worker can continue to rise without a corresponding rise in seat-miles per worker is strictly limited by the impossibility of overloading: *average* load factor reached 91 percent in 1944, was 80 percent in 1946 and declined to 67 percent in 1947. Presumably the practically attainable load factor will be lower in peacetime than in wartime. At any rate it is obvious that appreciable further expansions in passenger-miles (and therefore in total output) per worker must reflect improvements in seat-miles per worker. Whether the latter ratio can be further increased through the adoption of larger planes remains to be seen. Certainly in the past the effects of increased seating capacity (i.e., larger planes) has been largely swamped by the rather steady decline in plane-miles per worker.

No doubt some of the decline in plane-miles per worker has come about — as suggested — through the heavier air and ground crew requirements of bigger planes. The remainder may have been associated partly with the introduction of labor-consuming safety devices, and partly with a reduction of hours of work. But the statistics needed to pursue this inquiry are not available.