

# Part-Time Public Transit Operators: Experiences and Prospects

KENNETH CHOMITZ, GENEVIEVE GIULIANO, and CHARLES LAVE

## ABSTRACT

Most U.S. transit agencies have begun to use part-time operators as a way to reduce operating cost. In this paper, based on five case studies, the cost savings and organizational impacts associated with this change are evaluated. Results indicate that cost savings have been small but significant in situations in which peak service expansion occurred. Where the schedule was static, contract protections for existing operators made it difficult to use part-time labor and hence savings were small or insignificant. It was found that in transit agencies with highly peaked schedules, part-time operators (PTOs) save money for two reasons: they improve schedule efficiency (the ratio of hours-paid to hours-worked) and their wages and fringe benefits are lower than those of full-time operators. In agencies with relatively flat schedules the only savings is from lower wages and fringe benefits, and it is possible that this kind of "two-tier" wage system may be bargained away over time. It was found that, for agencies with flat or static schedules, it may be more effective to concentrate on alternative strategies such as absenteeism control and extra-board staffing, which may be more beneficial and easier to implement. On the organizational side, no unusual costs associated with use of PTOs were identified. PTOs have proven to be as reliable as, or even more so than, full-time operators; they have not created unusual supervisory costs; and there have been relatively few problems between part-time and full-time operators. Instead of creating a permanent force of PTOs, as had been anticipated, most of the PTOs who were hired really wanted full-time work.

During the past decade the U.S. transit industry has made a concerted effort to contain ever-increasing operating deficits and halt the long-term decline in productivity. Faced with the alternatives of cutting service, increasing fares, or reducing service costs, transit agencies have developed and implemented a number of actions to achieve the latter. These actions have frequently focused on improving labor productivity because labor is the largest single component of transit operating costs.

The use of part-time operators (PTOs) has emerged as one of the most widely adopted, yet controversial, methods for improving productivity. Pioneered by a handful of transit agencies during the late 1970s, contract provisions allowing PTOs became nearly universal during the early 1980s. A recent American Public Transit Association (APTA) survey indicates that more than nine out of ten U.S. agencies have secured the right to employ PTOs, and the great majority currently exercise that right.

The purpose of using PTOs is to match operators to service patterns. PTOs can be assigned the short pieces of peak-period work that are extremely costly to operate with full-time operators (FTOs). Management attempts to use PTOs have met with significant opposition from transit unions, however. Unions claim that part-time labor enables management to circumvent hard-won work rules, and they fear that PTOs will replace FTOs and that this will lead to an actual loss of full-time jobs. Such opposition has resulted in strikes at several major transit agencies.

Despite the obvious importance of these issues, little is known about the actual consequences of using PTOs. The fiscal and organizational impact of the use of PTOs is examined in this paper, which is

based on a national survey of the use of PTOs and in-depth case studies of five representative transit agencies. These agencies range in size from 100 to 1,100 vehicles and are located in medium to large metropolitan areas. Two of the case study agencies are suburban systems; the others operate both local and downtown-oriented commuter services. Data on scheduling, expenses, and personnel were examined, and extensive interviews with transit managers, department heads, union leaders, and operators were conducted.

## WHY PART-TIME OPERATORS?

It is expensive for transit agencies to provide peak-period service because of its inherent inefficiency (1,2). The size of the transit agency (number of operators, vehicles, and garages) is determined by peak service requirements, but these resources remain underutilized during the rest of the day.

Labor is a prime example. It is inherently inefficient to assign peak service to an FTO because the operator is not needed during midday, though he is guaranteed a full day's pay. For instance, an operator responsible for two 3-hr peak assignments would also receive 2 hr of guarantee pay, along with 6 hr of pay for driving. In many cases the operator also receives an additional spread premium payment if there is a long interval between morning sign-on and evening sign-off. Consequently, there is an inefficient excess of pay-hours over driving-hours. PTOs have the potential for reducing this inefficiency because they are paid only for the hours they work; hence the cost of peak service falls. In situations in which the peak-to-base ratio is high and work

rules are restrictive, PTOs can offer substantial savings (2).

Transit agencies can use the cost-saving potential of PTOs in three ways. First, PTOs can replace FTOs (perhaps through natural attrition) on existing peak-hour runs, thus reducing the operating deficit. When subsidy constraints are severe, such cost reductions reduce the need for fare increases or service cutbacks.

Second, PTOs can be used to expand peak service. Additional peak service would be prohibitively costly if FTOs were used; it is relatively less expensive to expand with PTOs. Many transit agencies consider peak service their first priority and wish to expand it whenever possible. In addition, some transit agencies have an implied mandate to provide peak service by virtue of their subsidy arrangements. In many cases, earmarked local subsidies are aimed at providing better transit services for commuters.

Third, PTOs may enable transit agencies to reduce unproductive day-base service. Many transit agencies keep excess vehicles in service at midday because there is little additional cost involved: the peak-period operator is guaranteed 8 hr pay, so he might as well be driving even if the service is not needed. Thus PTOs enable transit agencies to tailor service to actual demand.

#### EXTENT OF USE OF PART-TIME OPERATORS

Given the apparent promise of PTOs, it is not surprising that their use has diffused rapidly throughout the industry. In 1971 Seattle Metro became the first large district to win the right to use PTOs. By 1981 more than half of the APTA member transit agencies had obtained a PTO provision, and by 1983 the right to use part-time labor was almost universal (Table 1) (3,4). However, Seattle remains unique in the proportion of PTOs allowed (100 percent of FTOs). Excluding Seattle Metro, this proportion ranged from 1 to 40 percent in 1983, with an average of 13 percent. Thus, although almost all agencies have the right to use PTOs, the number permitted is generally quite small.

TABLE 1 Extent of Use of Part-Time Operators<sup>a</sup>

	1981 (%)	1983 (%)
Part-time operators allowed (as percentage of survey total)	58	92
Part-time operators allowed (but not hired)	18	13
Number of part-time operators allowed (as percentage of full-time operators)		
Average	NA	13
Range <sup>b</sup>	< 1 to 100 N = 207	< 1 to 100 N = 182

<sup>a</sup>Compiled from APTA data (3,4).

<sup>b</sup>Includes Seattle Metro. Without Seattle the range is < 1 to 40 percent in 1981 and 1983.

In addition to limiting the number of PTOs, most contracts also restrict the amount and type of work they may do. To preserve the distinction between part-time and full-time operators, total work time is restricted: the limitation ranges from 15 to 40 hr, with an average of 28 hr. Where the limit is 40 hr, there are other restrictions that generally prevent the PTO from actually working 40 hr. PTOs are most commonly restricted to trippers (short pieces of work that cannot be paired together to create a full-time split run). Other assignments include charter, holiday, night, and weekend work.

To protect existing full-time jobs, many contracts (35 percent) require that PTOs be laid off first during any general cutbacks. Some contracts also require that all FTOs be rehired before any PTOs, and others require that the size of the full-time work force be guaranteed. As long as the agency is stable or expanding, these provisions cause no problem. However, if budget problems ever cause a service reduction, the agency must lay off its most productive operators, the part-timers, first.

#### FISCAL IMPACT OF PART-TIME OPERATORS

The use of part-time labor can reduce costs in two ways. First, substitution of part-time for full-time operators increases schedule efficiency (the ratio of pay-hours to vehicle-hours) by reducing guarantee and spread premium payments. Second, PTOs generally receive an effectively lower wage rate, and a significantly lower fringe benefit rate, than do FTOs. Against these savings must be balanced any cost-increasing bargaining concessions, such as increased wages or fringe benefits for FTOs, necessary to secure union acceptance of part-time labor provisions. These three issues are examined in turn.

##### Schedule Efficiency

Chomitz and Lave estimated that using PTOs could reduce operator cost by as much as 13 percent, depending on the service profile, spread limit and premium provisions, and the percentage of PTOs allowed (1). Given most "typical" work rule restrictions (spread limit of 13 hr; premium pay after 12 hr), estimated savings are 1 to 4 percent, depending on the particular peak-to-base ratio, if PTOs are limited to 10 percent of FTOs and 2 to 6 percent if PTOs are limited to 20 percent. Because operator compensation comprises about half of total costs, this translates into total cost savings of 0.5 to 3 percent.

The Chomitz and Lave estimates were based on experimental run cuts, using five actual transit schedules. The schedules were recut using the RUCUS automated run-cutting procedures, and savings estimates were based on the change in scheduled pay-hours resulting from using PTOs. The estimates assume everything else is held constant: the schedule remains unchanged; and no significant concessions, in the form of more expensive work rules, more fringe benefits, or wage increases, are given in return for the right to use PTOs.

How does actual experience compare with those experimental run cuts? It would be easy to measure the financial impact of PTOs if an agency's service schedule remained unchanged: Just calculate schedule efficiency before and after the introduction of PTOs. Unfortunately for the analyst, schedules do change--and to some extent they change as a direct consequence of the decision to employ PTOs. In many cases the motivation for adopting PTOs was a desire to expand peak service. In other cases, because the contract guarantees the jobs of existing FTOs, the agency must expand service in order to provide openings for the PTOs.

If an agency simultaneously introduces PTOs and alters the service schedule, it becomes difficult to even define, let alone measure, the savings from PTO implementation. Consider, for instance, a hypothetical transit agency that hires PTOs and changes to a more peaked service schedule at the same time. The data in Table 2 indicate that there are four possible combinations for work rules and schedules whose costs can be compared. Which comparison yields the

**TABLE 2 Hypothetical Operating Cost of Schedule and Work Rule Combinations**

Work Rules	Service Schedule	
	Old (flat) (\$)	New (peaky) (\$)
Old: pre-PTOs	10	20
New: post-PTOs	8	10

"true" value of cost savings? If the old rules and old schedule combination is compared with the new rules and new schedule combination, there is no change in costs. All the potential savings from PTOs have been spent on expanded service. To evaluate changes in labor productivity, the service schedule must be held constant (i.e., costs examined within a single column). But the left-hand column indicates a 20 percent saving, from \$10 to \$8, whereas the right-hand column shows a 50 percent saving, from \$20 down to \$10. Alternatively stated, under the old service schedule, use of PTOs could save 20 percent; under the new service schedule, if management were to give up use of PTOs, operating costs would double. (Note that columnwise comparisons require experimental run cuts, because the old/new and new/old combinations were never actually put on the street.) This is not an unreasonable example, nor is it a semantic game. The savings from part-time labor can be discussed only in the context of a given service schedule.

#### Case Study Results

For four of the five case study agencies, expansion of peak service was the primary motivation for using PTOs; it would have been prohibitively expensive to undertake the new service without PTOs. The fifth agency planned to expand base service. Only two of the case study agencies actually sustained the increased service. Financial problems, brought about by loss of subsidy money or by insufficient fare-box revenue, resulted in service cutbacks at the other three. The contracts at these three agencies specify that PTOs must be laid off first. Consequently, two agencies lost all their PTOs, but the third was able to keep some part-time positions through an aggressive early retirement program for PTOs.

In all cases the use of PTOs was one of several productivity improvement strategies being pursued by management during the period of this study. Other strategies included absentee reduction programs; changes in wage scales, cost-of-living adjustments, and vacation pay; reductions in extraboard staffing; work rule changes; and a host of minor policy changes. To isolate the impact of PTOs, it is necessary to take all of these other changes into account as well. Accordingly, a disaggregate approach was chosen. Cost impacts can be broken down into savings on scheduled costs and on fringe benefits. Each will be discussed in turn.

#### Impact on Schedule Efficiency

Schedule efficiency is expressed here as the ratio of pay-hours to platform-hours. This ratio is always greater than one because operators are paid for report and travel time. The minimum possible (e.g., if no make-up, premium, or overtime were paid) is about 1.04. There are two possible ways to estimate the impact of PTOs on schedule efficiency. One is to use actual "before" and "after" schedule data and attempt to control for service and other changes. Referring to Table 2, this is equivalent to moving diagonally from "Old/Old" to "New/New" while trying to estimate "Old/New." A second method is to use experimental run-cut data: take the new schedule, perform a run cut under the old rules, and compare the results. This gives the needed within-column comparison. However, because the new schedule would never have been adopted under the old rules, it could be argued that such a comparison may not be appropriate.

Both methods were used in this case study analysis, and the results are summarized in Table 3. Actual "before" and "after" schedule data were available from two agencies. Agency A increased service by about 40 percent, and the peak-to-base ratio increased from 2.25 to 2.65. Such increased peaking should have substantially reduced the schedule efficiency at this transit agency. However, the simultaneous adoption of PTOs, with their inherently higher productivity, overcame the negative effects of increased peaking. The overall result was a 5 percent improvement in the pay-to-platform-hour ratio, compared to the preexisting service.

Agency B reduced peak service and increased base service after hiring PTOs. The result was a decrease in the pay-to-platform-hour ratio of 2 percent. Assuming two part-time runs are equivalent to one split run and using the change in the ratio of straight to split runs resulting from the change in peak-to-base, it was estimated that about half of the pay-to-platform-hour reduction is due to PTOs.

Because of anticipated service cutbacks, two agencies had performed experimental run cuts to determine the impact of losing their PTOs. Agency C had a peak-to-base ratio of 3.5, and they were allowed 15 percent PTOs. Their run-cut simulation of the effects of losing PTOs showed a 2.9 percent decrease in schedule efficiency. This is substantially less than would have been expected for an agency with such a high peak-to-base ratio (1). The reason for the small change is that Agency C already had an exceptionally efficient schedule (1.19 pay-to-platform-hour ratio) because of pay calculation provisions that were quite favorable to management; thus PTOs could not make as much difference as might have been anticipated from their peaky schedule. Agency D had a peak-to-base ratio of 2.0, and 10 percent of its operators were PTOs. An experimental run cut was performed to see what would happen if the agency were to retain its existing service schedule while changing the labor force from 10 per-

**TABLE 3 Impact of Part-Time Operators on Schedule Efficiency**

Observed Data				Experimental Data			
	Service	Peak/Base	Change in Pay/ Platform-Hour (%)		Percentage Part Time	Peak/ Base	Change in Pay/ Platform-Hour (%)
Agency A	Increased	Peak, increased	-5.0 -1.7	Agency C	15	3.5	-2.9
Agency B	Stable	Flat, decreased	-2.0 total -1.0 due to PTOs	Agency D	10	2.0	-2.5

cent PTOs to no PTOs. The results showed a 2.6 percent decrease in schedule efficiency.

#### Wages and Benefits of Part-Time Operators

The rationale behind use of PTOs is their ability to increase schedule efficiency. In practice, most transit agencies gain additional savings by paying PTOs lower fringe benefits and (effectively) lower wages as well. Table 4 gives the data for fringe benefits: most agencies offer no sick, holiday, or vacation pay, no health insurance, and no retirement pay to PTOs. In cases in which these benefits are provided, they are most frequently provided at reduced rates.

TABLE 4 Part-Time Operator Fringe Benefits<sup>a</sup>

	Same as Full Time (%)	Reduced (%)	None (%)
Sick leave	10	13	77
Holiday pay	12	17	71
Vacation	13	23	64
Health insurance	15	17	68
Retirement	21	7	72

N = 112

<sup>a</sup>Compiled from APTA data (4).

Additional wage cost savings are generated by the wage rate progression. In most cases PTOs have the same pay scale and progression as FTOs. Because the wage progression is based on work hours, it requires more calendar time for a PTO to reach the top of the scale. For example, the 1983 U.S. average number of work hours to reach top rate was 4,938. In full-time equivalents (e.g., 2,080 work hours per year) this is about 2.4 years, but in part-time equivalents (national average of 28 hr per week = 1,456 hr per year) this is about 3.4 years. If the tenure of PTOs is 2 or 3 years (the case study data indicate less than 2 years), most PTOs never reach the top of the pay scale.

An example from an experimental run cut can be used to show the relative contribution of each of these factors to PTO cost savings. On the basis of data from the Agency D run cuts, a 10 percent complement of PTOs reduces pay hours by 2.6 percent. The lower wage rate of PTOs contributes an additional 2 percent reduction, raising the estimated savings from 2.6 to 4.6 percent. The savings from reduced fringe benefits brings the total reduction to 5.7 percent compared to an all-full-time operator schedule. This translates to 2.5 percent of total operating cost.

#### Cost of Part-Time Operators

A central issue in this research is the cost (in general terms) of winning the right to use PTOs. In view of staunch union opposition, it was anticipated that management would have to give up something in return for PTOs. Only one of the case study agencies specifically identified a bargained cost: an extremely small wage rate increase. In all other cases management had identified a set of possible bargaining issues, and the cost of PTOs was an "opportunity cost": other alternative means of reducing costs were not pursued, and attention was concentrated on gaining PTOs. In at least one case detailed analyses of the relative merits of these alternatives were con-

ducted; in other cases the choice was largely subjective. In any event, the actual outcome of using PTOs could not be accurately forecast by management because of the complexity of schedule characteristics and work rule provisions that affect PTO utilization and because of all the other changes affecting labor productivity that were implemented over the same time period.

An additional analysis of the impact of hiring PTOs on compensation rates is currently being conducted. Using data from 50 U.S. transit agencies, PTO compensation is being predicted as a function of environmental and service characteristics. By comparing predicted versus actual values, it can be determined whether agencies that obtained the right to use PTOs gave greater compensation increases. Preliminary results show that an initial increase in fringe benefits did occur, but under later contracts benefits returned to normal levels. A similar effect on wage rates was also found, though it was not quite statistically significant.

#### CONSTRAINTS ON USE OF PTOs

PTO cost-savings estimates are based on the schedule not the actual operating costs of the case study agencies. To the extent that constraints on the use of PTOs come into play, these savings may not be realized. The case studies revealed that the transit agency's ability to use PTOs can be significantly constrained by a variety of contract limitations. These limitations, together with the characteristics of the service schedule, can make it impossible for an agency to use the full number of PTOs the contract allows. For example, PTOs are often restricted to runs that begin and end at a bus depot, whereas FTOs can be relieved "on the road" without taking the bus out of service. In addition, there is almost always a maximum allowable time limit for part-time runs, and there is sometimes a minimum. Pieces of work smaller than the minimum are reserved as bid-dable overtime for FTOs. Another common provision is that the number (or proportion) of PTOs must be the same at each division. Because the service profile usually differs among divisions, this provision limits the total proportion of operators to the number that can be used in the division with the least peaky schedule. Two case study agencies also have a provision that prohibits the splitting up of two-piece runs in order to create part-time work. In practice, this provision is unenforceable because it is almost impossible to retain the identity of specific runs over several run cuts.

Contract provisions like these tend to reduce the potential efficiency gains from use of PTOs. Transit managers who have been involved in the contract bargaining process acknowledged that the full impact of such provisions is difficult to anticipate, hence savings from using PTOs are often much lower than had been anticipated. When subsequent contracts come up for renewal, these unanticipated restrictions become focal points for bargaining.

#### ORGANIZATIONAL AND OPERATIONAL ISSUES

When the part-time labor issue was first raised, unions predicted a number of serious negative consequences. It was feared that PTOs would be uncommitted and unprofessional, resulting in higher accident rates, absenteeism, turnover, and passenger complaints. To a large extent these fears have been unfounded. The unions were also concerned about the impact of PTOs on the job security and overtime opportunities of incumbent FTOs. There was concern



about the working conditions of the part-timers and apprehension about how well they could be integrated into the union. On these counts the record is mixed.

#### Impacts on Full-Time Operators

The right to use PTOs was not easily achieved by most agencies. FTOs perceived the issue as a threat to both their jobs and their working conditions. Whereas transit management has every incentive to replace FTOs with PTOs, union opposition is natural. A nearly universal compromise is to protect the jobs of incumbent FTOs. This is accomplished by requiring that no FTO be laid off until all PTOs have been dismissed or by guaranteeing a minimum number of FTOs or runs. At such agencies the only way to implement PTOs is to add new service.

A second effect on FTOs is a reduction in the types of runs available to them. Because management assigns the most costly runs (those with a high ratio of pay-hours to work-hours) to PTOs, there will be fewer runs with premium pay and overtime available to FTOs. FTOs can lose the chance to earn such pay in two ways. First, at some agencies, FTOs can volunteer to drive trippers in addition to their assigned runs. In the absence of a contractual agreement to the contrary, such trippers will generally be reassigned to PTOs. Second, FTOs can lose the chance to earn premium pay when split runs are reassigned to PTOs. (At agencies with a high peak-to-base ratio, split runs pay more than straight runs and can involve less actual driving time.) If there is a contractual minimum number of FTOs, however, the only way to reassign a split run is to add new base service, creating a new straight run for the displaced FTO.

This strategy was used at one of the agencies studied. Both peak and base service were increased; PTOs were assigned all the peak service and some of the old split runs; and the former holders of those split runs were assigned to new straight runs. Thus the number of full-time runs has remained constant, but their composition has been altered significantly: the proportion of split runs fell from 41 to 31 percent. Because the split runs had paid about 15 percent more than straight runs, this is a significant loss to the FTOs. On the other hand, the work available to FTOs is now more pleasant (e.g., a higher proportion of straight runs is available). Premium and overtime payments were originally begun as extra compensation for onerous assignments. Thus the loss of premium pay is now offset by better work.

FTOs may also end up with a less desirable selection of weekly schedules. The proportion of FTOs who can have the weekend off depends on the ratio of weekday runs to weekend runs. If PTOs, who are generally restricted to weekday peak service, supplant some FTOs, the remaining full-timers will face a lower probability of securing weekends off. On the other hand, it is hard to say how important this is to FTOs. In most instances in which management has asked to use PTOs on weekend runs, thus giving FTOs a regular weekday schedule, the unions have been adamantly opposed.

#### Status and Performance of Part-Time Operators

Three issues related to PTOs were explored during the case study visits: PTOs' perception of the job, relationships between part-time and full-time operators, and job performance of PTOs.

Both transit management and union members expected that those people who applied for PTO positions (e.g., college students, mothers of younger

children) would be interested in permanent part-time work, but it has turned out that most PTOs are seeking full-time work. As part-time work is now scheduled it is not surprising that few PTOs are permanent. Work hours are inconvenient for those who need child care, and work schedules change too frequently for students or people working other jobs.

Both union and management officials estimate that 60 to 80 percent of PTOs would really prefer full-time work. All of the case study transit agencies have contract provisions that give preference to PTOs when full-time jobs become available. In some cases a majority of PTOs move on to full-time positions, and most full-time positions are filled this way. Thus the part-time position has become a stepping-stone to full-time employment. It should be noted that the case studies took place during a period of economic recession and high unemployment. Given that most PTOs would prefer full-time work, it remains to be seen whether part-time recruitment will become more difficult as the economy improves.

Transit managers cited several indirect benefits of the part-time to full-time progression. In effect, the part-time position becomes a longer probation period, and managers and supervisors have more opportunity to evaluate operators before they are hired in full-time positions and thus managers believe they can make better choices. In addition, an already experienced operator is hired, lessening the need for training.

A major concern in bringing PTOs into the transit agency has been whether they would be accepted by full-time operators and whether a good working relationship between part-time and full-time people could be established. In spite of the initial opposition to part-time contract provisions, no hostility appears to have carried over to PTOs themselves. Discussions with operators indicated that PTOs are not treated differently than FTOs. Some part-time people thought that the union did not seem committed to them, but no specific problems were identified.

When the right to use PTOs was won, unions claimed that qualified people willing to take part-time jobs would be difficult to find and that safety problems and customer complaints would consequently increase, but the performance record of PTOs has been at least as good as that of FTOs. At the case study agencies no evidence could be found to indicate that PTOs behave any differently than do FTOs on the job. As one supervisor put it, "Once they have the uniform on, there's no way to distinguish a PTO from a full-time operator."

#### Absenteeism

Absenteeism is one aspect of job performance that is of great concern to transit management. Table 5 gives comparative sick rates for PTOs and FTOs for the five case study agencies. The rates are based on approximately 1 year of data at each agency, and they are computed as the percentage of workdays per year when an operator calls in sick. The FTO sick

TABLE 5 Comparative Sick Rates for Part-Time and Full-Time Operators (%)

	Agency				
	A	B	C <sup>a</sup>	D	E
FTO sick rate <sup>b</sup>	3.75	3.52	2.31	4.29	3.06
PTO sick rate	1.41	1.71	1.02	1.59	1.60

<sup>a</sup> Agency C is an unreliable small sample.

<sup>b</sup> Proportion of yearly work days an operator will call in sick.

rate exceeds the PTO rate at every agency and on average is 2.3 times higher.

Why do PTOs have lower sick rates? The most obvious explanation is that PTOs do not receive sick benefits. However, at two of the agencies it is possible to compare groups of drivers with identical sick benefits. Table 6 gives a comparison at Agency E where PTOs receive no sick benefits and FTOs receive no sick benefits during their first year of employment. The rates are expressed as the percentage of workdays the operators call in sick. In small samples like this, the presence of a few random instances of major illness can substantially bias the apparent rate. Hence, Rate 1 excludes any operator who was sick more than 40 days (8 weeks), and Rate 2 sets a tougher standard by excluding any operator who was sick for more than 6 weeks. (Neither Rate 1 nor Rate 2 screening ever exclude more than 10 percent of the sample.) Because the FTOs are on probation for much of this period, their sick rates should be biased downward. Despite this bias, the data in Table 6 indicate that the PTO sick rate is lower.

**TABLE 6 Comparison of Part-Time and Full-Time Operators when Neither Receive Sick Pay (percentage<sup>a</sup>)**

	Rate 1 (no sick >40 days)	Rate 2 (no sick >30 days)
Full time with no sick pay		
Hired in 1982, 1983 data, 18 operators	3.56	3.03
Hired in 1983, 1984 data, 18 operators	3.27	2.39
Part time with no sick pay		
Hired in 1982, 1983 data, 18 operators	1.67	1.67
Hired in 1983, 1983 data, 41 operators	1.64	1.64
Hired in 1983, 1984 data, 23 operators	1.52	1.52
Hired in 1984, 1984 data, 33 operators	1.58	1.58

<sup>a</sup>Proportion of yearly workdays.

Agency B has a class of PTOs who receive the same sick benefits as their FTOs. Using the Rate 2 definition, it was found that the absence rate was 3.52 percent for FTOs and 2.44 percent for PTOs. It was, therefore, concluded that PTOs have less absenteeism than do FTOs and that this effect is even true in those instances where both groups of operators receive identical sick benefits.

#### Accident Rates

The analysis in this section is still in progress and the results should be regarded as tentative. Table 7 gives comparative accident rates, PTO versus FTO, as a function of amount of experience for one of the case study agencies. The data show that the

**TABLE 7 Comparative Accident Rates for Part-Time and Full-Time Operators<sup>a</sup>**

	FTO	FTO	FTO	FTO	PTO	PTO
Years of experience	3.7	2.6	2.3	1.3	1.3	0.6
Accident rate						
Total	1.33	1.50	1.17	1.59	1.17	0.95
Chargeable	0.49	0.27	0.34	0.59	0.58	0.38
Nonchargeable	0.84	1.23	0.83	1.00	0.59	0.57
Sample size	9	28	18	18	23	33

<sup>a</sup>Accidents per year; total of all vehicle and passenger incidents. Rates are not standardized for driving exposure.

number of accidents per year declines with experience and that PTO accident rates are lower than those of FTOs. The table also breaks down the accidents into "chargeable" (i.e., the driver could have prevented the accident) and "nonchargeable."

Table 8 gives comparative accident rates at a different agency, and this time the data are structured by the type of work assignment. The PTO accident rate is higher than that of FTOs who do regular runs but lower than or equal to that of regular drivers who do relief runs or extraboard work. The accidents are also broken down as preventable and nonpreventable. The PTOs are judged to have a higher proportion of preventable accidents. This might be an indication that PTOs are worse drivers or that the drivers who evaluate the accidents are biased against PTOs and thus more likely to decide that PTOs were at fault.

**TABLE 8 Comparative Accident Rates, Agency D<sup>a</sup>**

	Regular Run	Regular Relief	Extra- board	Vacation Relief	Part-Time Run
Accidents per year	0.68	2.35	2.20	1.38	1.39

<sup>a</sup>Potential "reporting" bias against PTOs as percentage of total accidents judged "preventable": extraboard, 45; regular drivers, 51; and PTOs, 60.

Accidents per year is not a wholly adequate statistic for judging the quality of the two driver groups because it does not take into account other factors that may affect full-time and part-time accident rates. FTOs do more driving and thus might be expected to have more accidents. On the other hand, FTOs also have more experience, and experience should lower the rate. PTOs do more driving in congested conditions in which accidents are more likely to occur. Moreover, there may be substantial differences in the drivability of the vehicles (e.g., size, age) used by the two groups. Ideally, the accident rates should be standardized for all of these different exposure factors.

In their study of accident rates at the Massachusetts Bay Transportation Authority (MBTA) in Boston, Attanucci, Wilson, and Vozzolo (5) reported that standardized PTO accident rates were clearly higher during the PTO introductory period but appear to converge with the FTO rates thereafter. Given the unusual nature of the MBTA data and the tentatively positive evidence of the data in Tables 7 and 8, evidence on accident rates appears to be quite mixed. The tentative conclusion is that FTO and PTO accident rates are roughly similar.

#### CONCLUSIONS

The results of this research indicate that PTOs can be used to expand peak service economically. However, few transit agencies today are in a financial position that permits service expansion. Whether part-time labor can be used to reduce the cost of a static service schedule depends a great deal on contractual restrictions. Many apparently minor restrictions can prevent full or efficient use of the nominal quota of PTOs. Above all, the efficiency gains from part-time labor depend on the existing ratio of pay-hours to platform-hours; where this ratio is high (greater than 1.15), there are significant opportunities to increase productivity. The ratio itself depends on both schedule peaking and work rules: an agency with generous work rules may

have a low pay-hour-to-platform-hour ratio despite substantial peaking. Additional savings have been realized at many properties by restricting fringe benefits of PTOs. However, there is some evidence that unions are successfully pressing for increased PTO benefits: sick and vacation benefits have recently been granted to PTOs at two of the case study agencies.

Observed changes in schedule efficiency are consistent with the experimental run-cut predictions of Chomitz and Lave (1). Because the indirect effects of PTOs are negligible, experimental run cuts are an effective tool for exploring the potential cost effects of changes in labor provisions. A new generation of run-cutting software makes such experimentation feasible for transit districts with adequate computational resources.

There is no appreciable indirect effect of PTOs on absenteeism, supervision, hiring, or training costs. It may, however, become more expensive and difficult to recruit part-time workers as the burgeoning economy provides more alternatives for full-time work. There is no definitive evaluation of accident effects as yet.

Finally, there appears to be some opportunity to make better use of part-time drivers. First, the limitation of PTOs to weekday work seems to be unnecessarily restrictive. If PTOs were permitted to work weekends, FTOs would have proportionately more weekends off. In addition, PTOs would have the opportunity to work more hours, which would make the job more attractive. The weekend schedule might also be better suited to permanent part-time work. Two of the case study agencies have recently allowed a limited amount of part-time weekend work.

Second, the option to work part time on a temporary basis might be given to FTOs. Two of the case study agencies have such a provision. In one case, the distinction between full and part time was replaced with a two-class system. Class I operators can have up to 4 percent part-time positions. Class II operators are all part time and limited to 6 percent of the full-time force. Class I operators, whether full or part time, receive the same fringe benefits. The assignment of part-time work thus depends on the seniority roster. This system allows FTOs the option of choosing part-time work without losing seniority or benefits. Many FTOs took advantage of the opportunity and chose part-time runs at the summer shake-up. At the same time, low seniority PTOs were able to work full time. Both of these alternatives provide benefits to full-time as well as part-time operators.

Use of part-time labor has not been a panacea. Although it has permitted some agencies to expand peak service or increase efficiency, it has made

relatively little difference at others. Alternative strategies for increasing labor productivity may be more beneficial and easier to implement; two areas with particular promise are absenteeism control and extra-board staffing. Operator absenteeism is costly because a corps of standby operators (the extra-board) must be maintained to cover the absent operators' assigned work. Moreover, the costs of reducing absenteeism may be relatively low: improved record keeping coupled with increased supervision and counseling. The political costs of implementing an absentee control program may also be relatively small. Because a small number of operators account for a disproportionate number of absences, the majority of operators may be sympathetic to a more equitable enforcement of absence rules. Two of the case study agencies implemented absenteeism control programs with relative ease, decreasing absenteeism by 2 to 5 percent, which is more than they had saved by implementing part-time labor. The use of PTOs is thus just one of many possible strategies for increasing labor productivity.

#### ACKNOWLEDGMENT

This paper is based on work conducted for the Urban Mass Transportation Administration, Office of Service Methods and Demonstrations, under grant CA-06-0187, "Fiscal and Organizational Impacts of Part-Time Drivers in Public Transit." The views expressed herein are those of the authors.

#### REFERENCES

1. K.M. Chomitz and C.A. Lave. Part-Time Labor, Work Rules, and Transit Costs, Final Report. Report CA-11-0018-1. UMTA, U.S. Department of Transportation, 1981.
2. R.L. Oram. Peak Period Supplements: The Contemporary Economics of Urban Bus Transportation in the U.K. and the U.S.A. Progress in Planning, Vol. 12, No. 2, 1978, pp. 81-154.
3. Comparative Labor Practices: Report 7, Part-Time Operators. American Public Transit Association, Washington, D.C., July 1981.
4. Comparative Labor Practices: Report 4, Part-Time Operators. American Public Transit Association, Washington, D.C., April 1983.
5. J. Attanucci, N.H.M. Wilson, and D. Vozzolo. An Assessment of the Use of Part-Time Operators at the Massachusetts Bay Transportation Authority. In Transportation Research Record 961, TRB, National Research Council, Washington, D.C., 1984, pp. 21-28.