Urban Transportation Deregulation in Arizona

ROGER TEAL, MARY BERGLUND, and TERRY NEMER

ABSTRACT

On July 1, 1983, privately provided common carriage urban transportation was completely deregulated in Arizona. Deregulation did not directly affect subsidized public transit, but in all other respects the former regulatory framework was abolished. The impacts of deregulation in the first year are reported. All urban transportation industries are included in the analysis, although the primary impacts occurred to the taxi, airport limousine, and demand-responsive transit contract industries. The study focused on entry, exit, prices, service innovation, market growth (or decline), and productivity and profitability of the various industries. An adaptation of the industrial organization methodology was used to focus attention on the key economic factors influencing the outcome of the issues of concern. In general, results of the first year of deregulation conformed to those that were hypothesized. There was no significant impact on the overall urban transportation system or on the modal preferences of travelers. No unsubsidized competitors to public transit appeared in the form of jitneys or commuter buses. The major effects were felt within the taxicab and airport limousine industries, in which significant new entry occurred. Prices in the taxi market increased substantially, resulting in a reduction in demand. Productivity and profitability declined in both the taxi and airport limousine industries. Any major benefits to consumers were eliminated when the Phoenix airport authorities prohibited passenger soliciting inside the terminals, which had led to lower ground transportation prices. Prices to consumers are now almost uniformly higher than before deregulation. The prime beneficiaries of deregulation are entrepreneurs, who previously were denied entry to the common carriage market, and public agencies who contract for local transit service and have seen contract rates drop because of increased competition.

Among the most widely discussed policy issues in transportation is that of economic deregulation and its impacts. Regulatory change (in the form of total or partial deregulation of rates, entry, and other service aspects) at the federal, state, and local levels of government has affected all transportation industries within the past decade.

Recent legislation in Arizona ended all state regulation of the motor carrier industries effective July 1, 1982. This affected industries moving both passengers and freight within the state. Research conducted to determine the impacts of deregulation on urban passenger transportation for the first year following implementation of the legislation is reported. Major tasks of the Arizona project were (a) extensive review of the transportation literature pertaining to deregulation, (b) development of a methodology to form predictive hypotheses about impacts of deregulation, and (c) collection and analysis of empirical data from Arizona for the first year following deregulation.

The initial hypotheses used in the deregulation study and the results of the empirical work are discussed. The literature review and methodology are discussed in detail in a working paper along with the background of the previous Arizona regulatory environment and its judicial interpretation. In the first section of this paper some background material on the Arizona urban transportation environment is provided, in the second the methodology and the predictive hypotheses are briefly described, in the third results of data collection are presented, and in the fourth conclusions and policy implications are presented.

THE ARIZONA ENVIRONMENT

Regulatory Changes

The previous regulatory framework in Arizona had been one of "regulated monopoly"; its legislative intent had been to protect existing motor carrier operators from further competition. The state had the authority to prevent "unnecessary duplication of service." No new certificates could be issued if the existing carrier showed a "willingness" to provide the service proposed by a new applicant.

Deregulation was accomplished through a legislative bill and a subsequent referendum passed by a two-to-one majority. Effective July 1, 1982, motor carriers were no longer regulated by the state, permitting freedom of entry, exit, pricing, and service levels. In place of the former certificate of public convenience and necessity, common carriers now obtain an operating license from the Motor Vehicle Division (MVD) of the Arizona Department of Transportation (ADOT). The MVD requires only that the applicant is fit and proper, meets financial responsibility for insurance, and that the proposed service not endanger the public. Rates are no longer subject to state regulation. The regulatory revision, however, did not alter the environment of subsidized public transit in the larger Arizona cities nor the practice of exclusive city and county contracts for dial-a-ride and other specialized transportation services.

Before the change, Arizona was one of only three states in the United States where taxis were regulated at the state level. Although several large U.S. cities (San Diego, Seattle, Portland, and Milwaukee) and some smaller cities (Oakland, Berkeley, and Fresno) have instituted taxi regulatory change at the local government level, Arizona is the first state to have complete economic deregulation of taxi rates and entry in all urban areas. The Arizona case differs from other taxi deregulation studies because the entire common carriage urban transportation market was relieved of legal restrictions on entry, pricing, and types of services offered, and thus the markets potentially affected are large.

Urban Travel

Urban transportation deregulation affects only a small portion of Arizona urban travelers because the vast majority move either by private automobile or subsidized public transit. The urban travel market affected by deregulation in Arizona consists of taxi, private bus, and airport limousine (point-to-point shared-ride service) operators, as well as all other demand-responsive and fixed-route services available to the public on a common carriage basis. These modes collectively comprise less than 1 percent of all urban motorized travel, because the other 99 percent travel by automobile or public transit (1).

In Arizona urban travel is dominated by the private automobile; the state has the third highest rate of household automobile availability (approximately 94 percent) of all states (2). Among standard metropolitan statistical areas (SMSAs) of more than 1 million population, Phoenix has the third lowest rate of transit used for work trips (2 percent) and only about 1 percent of all travel in the region moves by transit (3). Within Arizona, only the Phoenix and Tucson metropolitan areas have significant public transit operations.

Because urban travel in Arizona is almost totally dominated by user-operated transportation, the state is not an ideal test case for the economic impacts of urban passenger deregulation in large metropolitan areas. On the other hand, the urban transportation environment in Arizona probably bears important similarities to that of many low-density, automobile-oriented regions or other smaller metropolitan regions. For example, in 15 of the 38 large metropolitan areas in the United States, less than 5 percent of all workers use public transit and in the smaller SMSAs an average of only 2 percent of all workers use transit.

METHODOLOGY

Critical Factors Affecting Deregulation Impacts

Specific short-run adjustments in the urban transportation industries were hypothesized for Arizona based on specific aspects of the demand for and supply of urban transportation in the state. From a review of the deregulation literature and microeconomic analysis based on principles of industrial organization (4), critical variables affecting the outcome of deregulation were identified. Hypotheses were then generated on the basis of this framework and of the transportation situation in Arizona. Empirical work included the collection and analysis of data from Arizona. Results were then compared with the predictive hypotheses for short-run impacts.

Because the dynamic element of deregulation is caused principally by the presence of new competitors in markets, the most important factors are those that affect the entry of these new competitors. Two factors appear to be of primary importance in this regard: entry barriers and growth in demand (or lack of it).

Entry Barriers

Entry barriers affect the supply of transportation service because they constitute impediments that may deter firms from entering markets or industries. When regulatory monopoly barriers to entry were removed in Arizona urban markets, the number of firms entering was limited only by certain economic barriers to entry: (a) capital requirements to enter the various industries and (b) subsidies given to public transit agencies, which keep transit fares artificially low.

Market Growth

The second critical element affecting entry is market growth, a demand factor. Obviously, new entry in the absence of growing demand causes the total quantity supplied in any transportation market to be apportioned among more suppliers, affecting the pricing strategy of firms and their profitability. The pertinent aspect of growth in demand (i.e., an upward shift in the demand curve) is that there has been little or none in the case of common carriage urban transportation. In such circumstances, the opportunities for new competitors are much less attractive than in growing markets.

Hypotheses: Expected Impacts in Arizona

To generate hypotheses about deregulation impact, assumptions about the relative values of entry barriers (high or low) and growth rates (growing, stable, or declining) were used to formulate possible combinations of competitive conditions. The expected configuration of competition in the Arizona deregulated environment was derived from those combinations and resulted in the following hypotheses:

1. Deregulation impacts will be at the industry level, not the urban transportation system level. Although industry impacts will be apparent, system results are likely to be limited; market conditions are not appropriate, in the context of demand and supply characteristics, to support major changes in modal preferences or price-quality combinations.
2. Deregulation will result in new entry into markets and industries with low entry barriers by firms with versatile equipment. Industry lines will become less distinct as diversification in services occurs to (a) take advantage of existing overhead and (b) use existing equipment (by companies that have lost market share). This will include van, limousine, and some taxi companies.
3. Deregulation will result in increased competition in the taxi industry because of the ease of entry, despite lack of market growth. The taxi industry will undergo changes similar to those observed in San Diego and Seattle: many new entrants concentrated at airport markets, price instability with overall rising prices, a trend to independents, market specialization, and a decrease in industry concentration ratio (5,6). Changes will be focused on the biggest potentially profitable markets in Phoenix and Tucson, because new entrants will seek out existing markets rather than explore new ones. Entrants will be small businessmen or independents, and larger companies will seek more secure revenues in contract markets.
4. Deregulation will not stimulate new competition in the fixed-route transit industry because new entrants cannot compete with subsidized service at the low-price end of the market. Prices are prohibitive for better quality service, given the characteristics of the captive transit market. If lucrative, specialized markets develop, jitney-type operations may appear to take advantage of any economies of density. Otherwise, declining demand and transit subsidization discourage new entrants.
5. Deregulation will result in increased competition in contract markets; this results from a desire for secure revenues in an uncertain economic environment of price competition and declining

demand, plus the need to put to work equipment of companies that have lost market share.

Data Collection and Analysis

Urban transportation impacts were studied in both the metropolitan Phoenix and Tucson areas, as well as the small cities of Arizona. The Phoenix airport (Sky Harbor International), the state's single largest market for private common carrier urban transportation, was also a major focus of the analysis. Entry, exit, prices, productivity, and profitability were included in the analysis as were service innovation, changes in market size, effects on competing modes, and implications for public transportation. All existing modes affected by deregulation (taxis, airport limousines, private buses, and so on) were considered, as well as any new modes that might be initiated after deregulation, such as jitneys.

Because complete economic deregulation has meant that no public records are kept on transportation firms and their service offerings, data collection was a problem in the Arizona study. Economic data were collected from airport permits and directly from the providers via personal interviews and data forms. In addition, a Phoenix airport data collection effort provided a means of verifying the self-reports from taxi and limousine operators. The largest taxi company in Phoenix and Tucson provided detailed information on its operations before and after deregulation.

Elsewhere in the state, as well as for the private bus industry in the metropolitan areas, inventories compiled by local governments served as the starting point for data collection. Telephone surveys of providers and local governments were the source of much information about small cities and private buses (some personal interviews were necessary for large companies or unusual local cases).

Limitations of the data collection must be emphasized. Researchers were forced to rely on estimates by providers to a much greater extent than desirable. Also, some errors may be introduced by the seasonality factor. Most before-and-after comparisons reported in this paper use the summer months as a base because deregulation was implemented on July 1, 1982. Thus, the 1-year benchmark for examining deregulation effects meant that data on the year's impacts were collected in June and July of 1983.

CHANGES IN THE TAXI INDUSTRY IN METROPOLITAN PHOENIX

Entry, Exit, and Turnover

Before deregulation, the metropolitan Phoenix area was served essentially by two companies. Yellow/Checker Cab served the city of Phoenix with the 300 taxis it owned (about 225-250 were in service) and had service rights in some of the suburbs as well. Village Cab, a radio-dispatching company, had service rights in the Scottsdale area and provided dispatching service for approximately 15 cabs. Both companies were full-service taxi operations; they served the telephone market, hotels, resorts, and the airport.

Deregulation led to an immediate surge of entry into the taxi business, especially in the airport markets. As the data in Table 1 indicate, both the number of taxis owned and those in active service increased more than 50 percent in the first year following deregulation. About 50 of the owner-drivers previously affiliated with Yellow/Checker left the company to become independents, to start new companies, or to affiliate with another of the new companies. In addition, another 150 taxi vehicles entered the industry, either with new companies or as independents. The majority of the new operators focused on the airport market, because it was the single largest source of taxi patrons in Phoenix and could be served without radio-dispatching capability. Few of the new operators had the equipment needed to serve the telephone order market, and in any case they could not match the name recognition of Yellow/Checker. Only one new entrant has made a concerted effort to compete in the telephone market and to become a full-service taxi company.

TABLE 1 Taxicabs in the Phoenix Area

	FY 1981-1982	FY 1982-1983	July 1983
Yellow/Checker	300 (225)[a]	250 (150)	220 (135)
Village	15 (15)	25 (25)	25 (25)
Other	0	200[b] (200)	300[b] (290)
Total	315 (240)	475 (375)	545 (440)

[a]Numbers in parentheses are estimated active vehicles.
[b]Estimate based on airport permits to serve Sky Harbor Airport and taxi company reports of vehicles owned.

A majority of the new taxi operations are small (Table 2). Many operate only a single vehicle and virtually all the small operators are based at the airport. At present, only five new entrants of significant size (10 or more vehicles) are serving the market. These firms are trying to capture some of the telephone order business in Phoenix previously monopolized by Yellow/Checker, but with limited success. None of the companies is generating more than 150 telephone orders per day in the summer compared to 1,800-2,000 calls per day for Yellow/Checker. The latter firm and Village Cab still control at least 80 percent of the telephone market, which also includes package delivery.

TABLE 2 Fleet Size of Phoenix Taxi Operations

	Before 7/1/82		7/1/82 - 6/30/83		July-August 1983	
Fleet Size	No.	Percentage	No.	Percentage	No.	Percentage
1-3	0		54	78	32	71
4-9	0		7	10	6	13
10 or more	2	100	8	12	7	15
Total	2		69		45	

Although only two companies controlling four or more vehicles have failed since deregulation, there has been substantial turnover among the small operators. The data in Table 2 indicate that more than 40 percent of the operations with three or fewer vehicles were no longer active as of July 1983. These were companies or independents that served the airport during 1982-1983 but did not purchase an airport permit for the first quarter of 1983-1984. As the data in Table 3 reveal, the number of airport taxi permits declined precipitously between those two periods. Much of this decline was due to the decision by Yellow/Checker to abandon airport service except for passenger drop-offs (for which no permit is needed). Yellow/Checker took this course of action because taxis serving the airport now spend an average of 2 to 3 hours waiting for passengers and the company could not afford to use its fleet so unproductively. In addition, there was a decrease of more than 40 percent in permits purchased by new entrants, paralleling the decline in the number of companies that service the airport. (If a company did not purchase an airport permit, it was assumed not to be active in the industry,

TABLE 3 Taxicab Permits at Sky Harbor International Airport

	FY 1981	FY 1982	July-August 1983
Yellow/Checker	300	114	6
Village	15	16	6
Other	0	191	111
Total	315	321	123

because none but the largest companies were able to rely solely on telephone orders.) Some of these operators are probably waiting to reenter the market in the fall or winter when taxi business improves significantly, but many apparently have left the industry. Of the operators who exited (at least temporarily), 29 had but a single vehicle. This indicates substantial instability among the independent operator segment of the taxi industry. (Note that entry increased in the fall, but it remains undetermined whether the entrants are new or former taxi operators.)

Prices

Taxi fares increased substantially with deregulation. Previously, Yellow/Checker's fares were $0.85 per flag drop, $0.85 per mile, and $7.50 per hour waiting time. These fares were well below the level that prevailed in other large western cities, so an increase was probably inevitable. After deregulation, Yellow/Checker increased its fares to $1.20 per mile (retaining the $0.85 drop charge) and $12.00 per hour waiting time. This represents an increase of 33 percent for the average 4-mile trip. These fares, however, were the lowest in Phoenix after deregulation. Operators who served only the airport charged considerably more, with the majority of rates between $1.40 and $1.60 per mile and some as high as $2.00 per mile. Many cabs serving the airport did not have taximeters, moreover, and fares had to be estimated from the odometer, charged on a destination-by-destination basis, or negotiated with passengers. In addition, when the airport authorities forced taxi drivers into a holding lot to mitigate congested conditions at terminal entrances, many companies and drivers instituted minimum fares for airport trips regardless of length. Those minimums ranged from $10 to $20 in an effort to avoid short hauls. Although the minimums were gradually eliminated after the holding lot scheme was abandoned, a diversity of prices continued to characterize the industry during the first year of deregulation.

Airport taxi prices stabilized in July 1983, partly as the result of regulations imposed by the airport authorities requiring that all taxi vehicles have a taximeter and post fares on the vehicle doors. The majority of airport taxi operators worked out an agreement to charge identical fares because the new airport regulations also prohibited drivers leaving vehicles to enter passenger terminals for the purpose of soliciting business, which often involved competitive price bargaining. With the first in, first out taxi queue arrangement that now prevails at the airport terminals, there is little incentive to compete on the basis of price. Most airport fares are now $1.40 per mile plus $0.85 per drop, although the range is from $1.20 to $1.50 per mile. Four of the five major new entrants also charge $1.40 per mile, with the exception charging $1.20 per mile. The fare for an average 6-mile airport trip has thus increased significantly, up 55 percent since deregulation (from $5.95 with Yellow/Checker to $9.25 with a new operator). Airport taxi operators are willing to price bargain for lengthy trips, but even these are likely to be significantly more expensive than they were before deregulation.

Service Innovations

There has been essentially no service innovation by the Phoenix taxi industry since deregulation. No shared-ride operations have been established, nor have any jitney services been initiated. About one-quarter of the airport taxi drivers stated that they would do shared riding from the airport on an ad hoc basis with negotiated fares, but 3 days of observation did not reveal a single instance of this practice actually occurring. Formal shared-ride schemes on an areawide basis appear to be infeasible with the prevailing taxi demand densities in Phoenix (less than 1 passenger trip per square mile per hour).

Market Growth

Data obtained from Phoenix area taxi operators and at Sky Harbor Airport indicate that taxi patronage has declined since deregulation in spite of the substantial increase in the number of cabs. Table 4 gives estimates of the number of passenger trips (not passengers) per month for summer conditions immediately before deregulation and 1 year later. A range is given for the airport estimates because they were generated from 1 day's field observation. The decrease in demand for taxis almost certainly resulted from the higher fares that have accompanied deregulation (Yellow/Checker's patronage had been gradually increasing before deregulation.)

TABLE 4 Taxi Passenger Trips Before and After Deregulation in Phoenix

	June 1982	June-July 1983
Yellow/Checker	86,000	52,000
Village	4,500	3,000
New entrants (nonairport trips)		13,500-14,500
New entrants (airport trips)		9,000-12,000
Total	90,500	77,500-81,500

Productivity and Profitability

By any measure, the productivity of the Phoenix taxi industry has declined significantly since deregulation. As the data in Table 5 indicate, the number of passenger trips per active taxi per day has declined by about one-third for the entire industry, and the number of trips per shift has decreased by about one-quarter (the difference reflects lower use of taxis by operators after deregulation). Yellow/Checker, for which detailed data are available, suffered a 14 percent drop in trips per shift from the spring before to the spring after deregulation, despite a decline in shifts per day of nearly 30 percent in response to reduced patronage. The productivity of the new entrants appears to be substantially less than that of Yellow/Checker. This is due to their concentration at the airport, where empirical data indicate that taxis average one trip every 2 to 3 hours, and to the much lower volume of telephone orders that new-entrant companies serving this market receive.

These productivity levels have squeezed the income of taxi drivers and management. Drivers at the airport report an average gross revenue of $68 per day in the summer, from which they net about $30 per day after lease payments and gasoline purchases. Em-

TABLE 5 Taxi Productivity in Phoenix

Company	Trips per Shift per Day		
	Prederegulation[a]	Postderegulation[b]	Change (%)
Yellow/Checker	9.8[c]	8.4[d]	-14
Yellow/Checker	8.2	7.8	-5
All taxi operations	8.1	6.2	-23
Airport operations (empirical data)		5-6	NA[e]
Airport operations (driver self-report)		7	NA
	Trips per Cab per Day		
All taxi operations	12.8	8.5	-34
New companies (self-report)		5-8	NA

[a]June 1982.
[b]June 1983.
[c]March 1982.
[d]March 1983.
[e]NA = not applicable.

pirical data indicate that as low as these estimates are, they are probably optimistic with net revenues more likely to approximate $20-$25 per day in the summer. Drivers for the large companies apparently do somewhat better because these companies serve the telephone market and tend to have higher vehicle productivity. Overall, drivers work an average of 10 to 14 hours per day, 6 days a week for a meager income, averaging only about $2-$4 per hour worked. During the winter months, income increases with drivers reporting that they can net at least $25 more per day. (Taxi drivers, however, tend to be optimistic about estimates of their income.)

How taxi companies are faring economically in the deregulated environment is more difficult to determine. Two of the large new companies are reported to be in financial difficulty and Yellow/Checker has suffered a 30 percent decline in leasing and dispatching fees, with a less than proportional decrease in expenses. Despite the fare increases that accompanied deregulation, the average monthly fare revenue per cab (based on summer months) is estimated to be 10 percent lower than in 1981-1982. Whether management or the drivers are bearing most of the burden of this reduction in income is unclear. In the short run, management is better able to maintain revenues than drivers because of the driver leasing arrangements that prevail in the industry.

IMPACTS ON THE AIRPORT LIMOUSINE INDUSTRY IN PHOENIX

The impact of deregulation on the airport limousine industry in Phoenix has been similar to the effects on the taxi industry. Two types of point-to-point transportation services are provided at Sky Harbor Airport: prearranged transportation and unscheduled demand-responsive service. Before deregulation, three limousine companies with a combined fleet of 47 vehicles operated out of the airport. (The number of vehicles actually in service was smaller.)

In the first year of deregulation, seven new companies and independent operators, with a combined fleet of 15 vehicles, entered the airport limousine market. They concentrated on the unscheduled service market. One of the existing providers expanded its fleet from 9 to 13 vehicles, but the other two prederegulation companies reduced their fleet size because of increased competition and loss of market share. By July 1983 one of these companies had reduced its active fleet to four vehicles (from at least 12 vehicles during 1981-1982) because eight more companies had entered the market. The 25 vehicles operated at the airport by the new entrants now exceed the number of vehicles operated by the preexisting companies. Most of the new entrants have three or fewer vehicles, and several are one vehicle operations.

The effect of the new entries has been to divert business from the established companies. Competition for passengers is intense, and many drivers will bargain over rates. This is particularly prevalent among the new entrants. One reason for price bargaining is that fares are based on a zone system, with a minimum of two passengers to a destination. When business is slow, however, some drivers will take a single passenger to a destination for a negotiated fare that is less than the comparable taxi fare. The established companies are reluctant to engage in this practice and, as a consequence, have lost market share. Their revenues have declined 20 to 30 percent since deregulation. The frequent price bargaining prevents any accurate comparison of the actual fares charged before and after deregulation. Consumers have benefited from the price and service choices offered by the Phoenix airport limousine industry, which is an alternative to the more expensive deregulated taxi services.

Airport rules have had a critical impact on the rates and patronage of Phoenix airport limousine operators. During the first year following deregulation, both limousine and taxi drivers with airport permits were allowed to enter terminals to solicit business and bargain for rates. The unscheduled limousine operators often had signs offering cheap shared rides to downtown or resort locations, which were much lower than taxi fares. According to several company owners, this practice resulted in increased business that was probably diverted from taxis.

This situation changed July 1, 1983, when new airport rules prohibited drivers entering terminals to solicit. In addition, taxis and limousines were physically separated at the busiest Phoenix terminal, with limousines located at a door infrequently used by departing passengers seeking ground transportation. Limousine operators report a drastic decline in patronage that reportedly has been captured by taxis. The unfortunate consequence of these airport rules, which effectively restrict bargaining opportunities, is to limit consumers' choices. It is now difficult to obtain information about price-service options (inadequate signs compound this problem).

Figures indicate that the prearranged airport limousine market shrank (estimates ranged from 5 to 16 percent) while unscheduled service registered a 10 to 20 percent increase in passengers before the July 1983 rule change at the airport. With more vehicles serving the airport market, however, driver productivity is less than before deregulation, with obvious adverse impacts on profitability. This factor, when combined with the higher daily revenues needed for profitability compared with taxis, accounts for the willingness of many operators to function like taxicabs and to bargain over price even for low-fare trips.

IMPACTS ON OTHER TRANSPORTATION SERVICES IN THE PHOENIX AREA

There has been a small amount of new entry into the charter bus industry in Phoenix, but rates have not been altered significantly. No fixed-route bus or van services have appeared. The private bus industry does not believe there is a market for regular-route or commuter bus services, at least at fares neces-

sary for them to be self-sustaining. No jitney services have been established in the metropolitan area. The only privately provided commuter bus service involves workers traveling to the Palo Verde nuclear plant west of Phoenix, but this is a company-subsidized contract operation that was in existence before deregulation.

Two specialized demand-responsive transit (DRT) companies have begun service in Phoenix since deregulation. One company provides many-to-one contract service from certain locations to a Phoenix hospital. The service is subsidized by the hospital and free to customers. Otherwise, the company provides home pickup services to the hospital for $2.50 per pickup and $0.50 per mile. Another company expanding into DRT following deregulation is a division of a paramedic and ambulance company. It provides prearranged service with five wheelchair-equipped vans for elderly and handicapped people. These DRT services are provided by companies that are diversifying into other markets to improve the usage rate of versatile equipment.

Three public agencies that contract for local demand-responsive transit have benefited from deregulation because it has generated intense competition for DRT contracts and led to price reductions. Mesa, Scottsdale, and Sun City have all selected new contractors for their DRT systems at significantly lower rates than under regulation. Contracts are now changing hands with every rebid as companies are apparently willing to reduce profits drastically (and to charge short-run marginal, rather than fully allocated, costs) in order to obtain guaranteed revenues. Eventually, however, contract prices must reflect true (long-run marginal) costs, so it is uncertain how long public agencies will enjoy benefits of lower rates.

IMPACTS ON URBAN TRANSPORTATION IN TUCSON

Deregulation has had impacts in Tucson that are similar to but more limited than those in Phoenix. New entry has occurred in both the taxicab and airport limousine markets, contract prices for DRT services have declined, and no new jitney or transit-like services have been established. Subsidized fixed-route bus transportation continues to be provided by Suntran, which has a management contract to run the city-owned buses. The major impacts of deregulation thus have been within established taxi and limousine industries.

Before deregulation, the only taxi company in Tucson was Yellow Cab, which operated 60 vehicles. When regulatory barriers were eliminated in July 1982, Allstate Cab Company entered the market with 20 taxis. (Allstate was in the car rental business and had attempted unsuccessfully to obtain a Tucson taxi certificate before deregulation.) In addition, 13 other taxi operations with a total of 17 vehicles have been started in the year since deregulation. These small independents, most of whom operate a single vehicle, rely on the Tucson airport for business. The two larger companies compete in the telephone order market and also serve the airport, where competition is not yet as fierce as in Phoenix. Airport permits in Tucson are $3.00 per vehicle per month, in contrast with the Phoenix charge of $75 per quarter (initially $300 per year). No taxi operations have left the Tucson market since deregulation even though 60 percent more vehicles are now involved in the industry.

Taxi fare increases were more modest than in Phoenix, in large part because fares were already much higher under regulation ($1.10 drop charge plus $1.40 per mile), having been raised several months before deregulation. After deregulation, only the waiting time charge increased (as a result, Yellow Cab's average fare per trip has risen 16 percent). There has been no price competition. Because of the small price increases, deregulation has had no adverse effect on the demand for taxi service in Tucson. Patronage estimates indicate that ridership has at least remained at the same level.

The competition from new entrants has cut into the market share of the previous monopoly operator. Yellow Cab has lost 27 percent of its passengers and 15 percent of its revenues while maintaining its service level. At the same time, competition has prevented new operators from making much money. Independent operators report net income of only $35 per day for approximately 10 hours of work.

New competition has had similar effects on the airport limousine market. Two new companies, which together operate 8 vehicles, have entered the market. Arizona Stagecoach, the existing operator under regulation, has increased its fleet from 5 to 15 vehicles, although not all are in active service. (The owner of this firm has diversified into a variety of transportation services in a number of geographic locations in the Phoenix-Tucson areas, providing limousine, van, and DRT services.) Airport limousine fares are based on zones with rates differentiated for residential and hotel or resort pickups. Posted rates have remained the same since deregulation, although special rates for tours and long trips are available.

In the Tucson area deregulation has had major impacts on the city and private providers of DRT. Following deregulation, Yellow Cab was able to enter the market and underbid the previous holder of the city DRT contract (Handi-Car). In response, Handi-Car shifted vehicles to the Phoenix area and underbid Yellow/Checker (same owner as Tucson Yellow Cab) on its previous contract for the Mesa Dial-A-Ride service. In recent rebidding for the Tucson DRT contract, Handi-Car's bid (less than $9.00 per vehicle service hour, including provision of vehicles) represented a 40 percent reduction from its prederegulation city contract price in 1981-1982. (Yellow Cab retained the contract because of other contract disagreements.) The city of Tucson has thus benefited from the price competition.

IMPACTS ON LOCAL TRANSPORTATION IN SMALL CITIES

Deregulation apparently has affected the local transportation situation in only two of Arizona's small cities. In Yuma, four independent taxis have entered the market, although all these drivers previously drove for Yuma Yellow Cab, which remains in business. In Prescott, a one-vehicle taxi company has initiated operations and a new private local bus service has begun since deregulation. There had been both private bus and taxi service in Prescott before deregulation. In all other cities surveyed, deregulation has had no discernible impact on transportation, except for enabling taxi companies to increase fares easily without regulatory approval. The extent of such rate changes is not precisely known.

Prescott has been the small city that experienced the largest impacts of the removal of regulatory barriers. Before deregulation, one company provided all common carriage local transportation in the city, owning both taxis and buses (Ace City Cabs with five taxis and Prescott Whipple Stage with two 22-passenger buses on fixed routes). Following deregulation, fares were increased for both taxi and bus service. Following the rate increase and the new taxi entrant, Ace City Cabs had a 21 percent decline in taxi revenues. Doubling the bus fare from $0.50

to $1.00 led to a 40 percent reduction in ridership while revenues increased by 20 percent.

At the same time, another private bus company entered the market (the Prescott Trolley System sponsored by the Downtown Prescott Association). This service uses a single bus resembling a trolley and operates on routes and headways similar to those of Whipple Stage. Advertising on the bus and in the Whipple Stage schedule, plus a $0.50 fare apparently have made the service self-sustaining in the summer tourist season. Ridership is about 120 passengers per day, 85 percent of whom are tourists. Local patronage (about 20 passengers per day) on the trolleybus was undoubtedly diverted from Whipple Stage because of lower fares.

CONCLUSIONS AND POLICY IMPLICATIONS

Predictive Hypotheses

The six hypotheses advanced previously have largely been confirmed by the first year of experience with urban transportation deregulation in Arizona.

As expected, deregulation impacts have been felt at the industry level rather than the urban system level. Most impacts have occurred in the taxicab and limousine industries. Individual entrepreneurs have benefited from the freedom to enter markets and the transportation industries, but this freedom is constrained by unfavorable market conditions (lack of market growth) in most cases.

According to the evidence, no significant changes in modal preferences or price-quality combinations have taken place in the Arizona urban transportation markets. In the state's two major metropolitan areas, no innovative services have been initiated other than some small shared-ride van services. Consequently, deregulation has had virtually no effect on automobile users and transit-dependent travelers. The portion of urban travelers affected by deregulation still remains small, and the impacts of removing regulatory barriers have not significantly altered urban transportation at the system level (when the relevant system is defined as common carriage urban transportation).

Since the removal of regulatory restrictions, there has been diversification of services in industries with versatile equipment, making industry lines less distinct in the small-vehicle industries (taxis, limousines, vans, and minibuses). Providers have tended to deploy equipment wherever they could find a market or a contract, irrespective of previous geographic service areas or type of services offered. The evidence from Phoenix and Tucson shows vans offering taxi-like services and single companies providing taxi, limousine, and contract services, moving vehicles from one geographic market to another or to entirely different services. Firms are able to reduce overhead by managing a variety of services from a single base.

Despite deregulation, opportunities to provide innovative services in markets and industries once closed by the regulated monopoly restrictions have probably not been totally exploited in the short run. Instead, most new entrants try to capture a share of existing markets, reducing revenues for companies and drivers in those markets.

As expected, there has been increased competition and a reduction in the concentration of the taxi industry in Phoenix. This is similar to results in San Diego and Seattle. There has been the predicted entry by independents, and the airport markets are the primary focus for new owner-operators. Prices have been unstable for a time, and there has been an overall increase in rates. Until new Phoenix airport rules were instituted, there had been some price competition between taxis and limousines.

The major impacts from new taxi entry have been decreases in the market shares of the largest metropolitan Phoenix company (90 percent to approximately 65 percent) and the largest Tucson company (100 percent to about 67-70 percent). In Phoenix, however, the market has also declined in size as the result of about a 35 percent increase in fares, leaving fewer patrons whose business must be spread among more providers. The result has been a reduction in company and driver profitability and some exit from the industry by independent drivers. The limousine industry has experienced similar declines in profitability.

The situation shows few signs of being self-correcting. Moreover, the ease of entry into small-vehicle urban transportation services is likely to result in continual turnover in this market. Entry requirements such as the 10-vehicle minimum company size, radio-dispatch capability, and 24-hour service, which were imposed in Portland, would probably eliminate many of the new entrants in Phoenix as it did in Portland. Opportunities for part-time employment and the recent economic recession have exacerbated the problems of taxi supply, particularly at the airport.

Instead of forcing prices down in the airport taxi markets, new competition has had the reverse impact. The productivity declines caused by new entry have encouraged operators to increase prices in order to generate sufficient revenues to make a profit. New Phoenix airport rules prohibiting solicitation have limited consumer information on price-service options and adversely affected limousine patronage. The taxi queue at the airport, which facilitates first in, first out service, effectively limits price competition. Competition meanwhile has greatly lowered prices in contract markets. The distributive effects mentioned previously are common when markets are adjusting to different institutional rules affecting the flow of resources into the industry.

Taxi service and productivity improvements are unlikely to occur in the Arizona metropolitan areas. Shared-ride services require greater demand densities than currently exist in the general Phoenix and Tucson taxi markets and are feasible only from the airport, where they already exist in the form of limousine service.

There has been no new competition for fixed-route bus transit in the two major metropolitan areas in Arizona and service continues to be provided by the local transit agencies, which are subsidized. The most significant nonmetropolitan impact has been in Prescott, where a second local bus service has been initiated. There have been no jitney-type services developed in Arizona urban areas, indicating a lack of lucrative specialized markets in the state's major cities. The absence of growing market demand plays a critical role in the entry of such new competitors to a market or industry. Despite the removal of regulatory barriers to transit-like services, entry will not occur unless profitable market opportunities exist, and this is effectively precluded by the presence of subsidized public transit already serving the market.

Increased competition caused substantial price reductions in the contract markets (dial-a-ride) as predicted. Evidence in Arizona shows deployment of equipment from one geographic area to another to capture secure revenues from public agency contracts. One of the most active competitors in this market is the state's major taxi company whose market share was significantly eroded after deregulation. Under regulation, this company had been pre-

cluded from competing in other specialized markets (e.g., for the Tucson DRT contract). Contract rates, however, may not remain as low in the long run.

Advantages and Disadvantages of Deregulation

The economic rationale for transportation deregulation is that of efficient resource allocation. Regulation of pricing, entry, and operating practices in the transportation industries impedes the optimal distribution of scarce resources among alternative uses in the economy. The economic and social benefits of deregulation, therefore, are not strictly linked to direct consumer benefits. In the Arizona case, consumer benefits resulted from the increased competition between taxis and limousines at metropolitan airports and the reduction in contract rates to local governments. Positive benefits from deregulation also have been realized by the providers of the service; their new opportunities include competing in transportation markets on an unrestricted basis, starting up innovative new services, exiting from unprofitable services and markets, and increased flexibility in equipment use. A final benefit of deregulation has been the incentives for efficiency created by the potential of competition in various markets and industries, which acts as a deterrent to excessive rates and to service deterioration except where new rules prevail (airport markets).

These advantages must be weighed against the disadvantages of deregulation. In some areas, consumers are worse off because of higher taxi fares without any significant service improvements, although van and limousine services are providing some cheaper substitutes in some markets. Taxi fare increases were inevitable in Phoenix, but the price rise since deregulation is probably greater than would have occurred under the regulated system, particularly at the airport. A modest decline in the level of taxi service may also have resulted from deregulation because the number of vehicles serving the telephone market seems to have declined. A third adverse impact has been the airport problems generated by attempts to control ground transportation competition. New rules have restricted both intermodal competition and consumer choice. Finally, although not actually worsening Arizona conditions, deregulation has not produced innovative services to alter the predominantly negative economic trends of the urban common carriage transportation industries.

Policy Implications

The important policy lesson to be learned from the Arizona experience is that favorable impacts do not necessarily follow the removal of institutional barriers to competition in the transportation industries. When transportation demand is stable or declining and attractive substitutes to the deregulated modes exist, the impacts of deregulation may be largely confined to increased competition within existing industries with few or no corollary benefits to consumers and providers. The Arizona results are in striking contrast with the numerous consumer benefits that have resulted from airline deregulation, a second example of complete economic deregulation of a transportation passenger industry. The difference between the two experiences is primarily a function of the rate of growth of demand and the size of the market. The air travel market is expanding and providers have little competition from user-operated transportation, whereas the demand for unsubsidized common carriage urban transportation has been declining for more than 30 years. As this research indicates, a number of economic variables affect the outcome of deregulation and these must be identified in a systematic way.

In addition, the Arizona experience illustrates that a major impediment to more widespread positive impacts on the deregulated industries is the continued presence of subsidized public transit in the otherwise deregulated urban environment. Further barriers to competition and service innovation are created by the new ground transportation rules at the Phoenix airport.

Another policy implication relates to the distinction between the urban experience and that of other transportation industries regarding productivity improvements. In other deregulated industries, deregulation led to significant gains in efficiency, which resulted in lower costs for producers and lower rates for consumers and shippers. Opportunities for productivity improvements in urban common carriage transportation are limited by the basic economics of the industries inasmuch as costs for most factor inputs can hardly to reduced. The lack of market growth, in the context of increased entry, also works against productivity improvements.

Although impacts at the level of the entire urban transportation system have been minor, impacts at the industry and market level demonstrate some merit for urban transportation deregulation as a public policy. New entry into small-vehicle urban markets and industries, price competition between taxis and limousines before the establishment of restrictive airport rules, lower contract rates to public agencies, and some new specialized demand-responsive operations indicate that removing regulatory barriers provides a positive environment for the provision of urban services, subject to the economic and institutional constraints discussed previously. It cannot be concluded from the single significant adverse impact to date, increased taxi fares, that deregulation is an unsatisfactory public policy.

A final policy implication relates to the generalizability of results from Arizona to other geographic areas. Because of the state's transportation characteristics, Arizona's deregulation experience is limited in its applicability to other urban transportation environments. It is clearly not indicative of what would occur in large, densely populated metropolitan areas where transit is stronger and the private automobile less dominant. Nonetheless, in those urban areas where population densities are relatively low, where transit is used only by a small transit-dependent population, and where virtually all other travel is by automobile, the Arizona experience does appear to be applicable.

The lesson for these areas from Arizona would appear to be that deregulation has both advantages and disadvantages, but that both are quite limited in their magnitude and scope. There is little likelihood of deregulation having any significant impact at the urban system level (e.g., major new services or substantial diversion of travelers to deregulated modes), and impacts at the industry level have not been dramatic. At the same time, the rationale for continued regulation of these markets is not particularly compelling. In short, urban transportation deregulation in Arizona has been neither a disaster nor a panacea for the affected markets and industries; a similar outcome might be expected in similar environments elsewhere.

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Feasibility of Profitable Transit Service in Radial Urban Corridors

EDWARD K. MORLOK and PHILIP A. VITON

ABSTRACT

In view of the rapid escalation of deficits in urban public transit operations and of the increased interest of private firms in providing transit services, this research investigates the possibility of profitable provision of service in a particular but highly significant market. A model is constructed in which a private carrier, competing with the automobile, chooses capacity, service quality, and price to maximize profits. The general conclusions of the study are that profitable operation is possible in corridors that have a wide range of market and automobile competitive conditions. This is true for corridors with volumes as small as approximately 1,000 persons per peak hour.

Results of research on the question of the feasibility of operating conventional fixed-route, scheduled bus transit service at a profit are presented. This question is important at present because of the rapid escalation of transit costs and deficits. Governments at all levels are resisting further increases in subsidies from general tax monies, and the federal government is planning to eliminate operating subsidies. This naturally raises the question of whether at least some transit service might be operated at a profit, with passenger revenues exceeding costs by an appropriate margin, thereby obviating the need for any government funding.

The specific question addressed in this paper is whether it is possible to operate for profit fixed-route, scheduled bus services in radial urban corridors. These services are envisioned as connecting central business districts (CBDs) and outlying areas that are predominantly residential. The study also focuses on relatively long trips in which a portion of each bus run could be operated essentially as an express, making few or no stops. Although this represents only one type of transit service, it is a type found in almost all medium and large metropolitan areas and hence is important.

Because discussions of profitability in urban transit often become highly emotional, it is important to note that the present discussion is focused exclusively on the question of the possibility of a profit. Even if a profit is possible, that does not mean that services designed to be profitable should replace existing services. The question of desirability is quite distinct and cannot be settled by analysis alone. Some aspects about which analysis can provide guidance are covered in Viton et al. (1).

APPROACHES TO THE PROFITABILITY QUESTION

There are basically two approaches to the question of whether a profit can be made in transit service: (a) examination of actual systems in case studies and (b) mathematical modeling of transit markets. Each of these approaches has certain desirable features and certain weaknesses.

Case studies are particularly attractive because they represent results achieved in the real world. They are not subject to the problem of misleading outcomes of modeling efforts, which result from poor or unrealistic assumptions, incorrectly estimated model parameters, and so forth. Case studies are also usually persuasive to decision makers. However, to yield generalizable results, the cases must be