Entry Controls in Taxi Regulation:

Implications of US and Canadian experience for taxi regulation and deregulation

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Abstract

This paper assesses the effects of entry regulation on taxicab availability and service quality based on the experiences of 43 communities in the United States and Canada. The analysis shows that entry controls have quite different impacts in the two basic markets served by taxicabs: the telephone order (dispatch) market and the cab stand/street hail market. Without entry controls, the cab stand and street hail market experiences an oversupply of cabs, leading to deterioration of vehicle and driver quality. Applied to the dispatch market, however, entry restrictions often lead to deficiencies in taxicab availability. A major challenge for officials charged with regulating taxi entry is to address the disparate needs of dispatch and cab stand/street hail markets in cities with substantial trip volumes in both markets. Approaches to this challenge include two-tier systems, flexible forms of entry control, company-level entry qualifications, geographic restrictions and service requirements. These approaches and implications for regulation are discussed.

1. Introduction

Local, state and provincial controls governing entry to the taxi industry, which range from open entry to strict numerical limits, are a fertile area of policy change and innovation in the United States and Canada. Some communities have experimented with eliminating or relaxing entry restrictions. Others have adopted formulas to guide expansion of industry size, toughened licensing qualifications for cab companies, revised entry-review processes and established geographic and service restrictions on taxi licenses. Officials have also grappled with the impact of entry controls on service availability, companies' and drivers' economic viability, the vitality of competition within the industry and escalating increases in license values.

Although a sizeable majority of cities in the United States and Canada limit entry to the taxi business, (Gilbert et. al. 2002) entry controls are criticized by free market advocates (Lephardt and Bast 1985; Boroski and Mildner 1998; Keller 2003) and many economists (Moore and Balaker 2006). Their arguments are fortified by the clear consumer benefits brought by deregulation in the airline, trucking, interstate bus and railroad industries, (GAO 2006; Winston 1998) as well as by American society's aversion to governmental restraints on pricing and entry. (Dempsey 1996)

The purpose of this paper is to assess the effects of different forms of entry control in North America and the lessons of experience for regulatory policy. Several key questions are addressed: What are the effects of entry control on cab service? What issues have arisen with different entry policies? What policies have been adopted in response to these issues? What policy implications can be drawn from these experiences?

The paper shows that the impact of entry controls is affected by characteristics of the market for taxi service and the qualifications applied to entry. Entry policies have quite different effects when applied in dispatch markets than in cab stand markets. Entry policies may also have quite different effects when combined with strict qualifications for entry than when combined with relaxed qualifications for entry.

2. Methodology

This analysis is based on the experiences of 43 American and Canadian cities and counties. These jurisdictions constitute 32 of the 50 largest taxi regulatory systems in North America as measured by the number of taxicabs, and 28 of the 50 largest cities or counties (where regulation is applied at the county level) as measured by population. These jurisdictions exhibit a broad range of approaches to entry control and a variety of regulatory systems. This paper is thus based on experiences that are more representative of the full range of North American cities and counties than previous studies by Frankena and Pautler (1984), Teal and Berglund (1987), PriceWaterhouse (1993) and Dempsey (1996). These earlier studies largely focused on about two dozen mid-size and smaller cities, principally in the western and southwestern United States, that experimented with deregulation in the 1970s and 1980s. The analysis in this paper should thus yield more robust conclusions on the effects of entry policy in the taxi industry.

The paper utilizes published papers from academic sources and reports compiled for regulatory agencies and industry groups. These

sources are supplemented with unpublished information from interviews and surveys of government officials, industry and customer groups and analysis of data on taxicab response times and user complaints. Information about specific localities that is not referenced in the text is based on these unpublished sources, as detailed in Appendix A.

3. Rationale for regulation

Discussions of entry regulation in the taxi industry often cite economic arguments for and against regulatory intervention in the market. These economic arguments are important to any discussion of entry policy.

Free market theory holds that free markets lead to the most efficient use of resources and optimal price and service combinations for consumers. (Gilbert and Samuels 1982) While limited regulations might be justified to protect public safety, economists have predicted that in competitive taxi markets, unfettered entry and fares for taxi providers will produce lower fares, a higher level of service to customers and service innovations such as shared ride service as new firms enter the market. (Frankena and Pautler 1984) Open entry will "open the way for a rich mix of new services to penetrate urban transportation markets." (Cervero 1985, p. 236) Availability of cab service will improve, even in low-density areas, as "small taxi companies and private individuals who are currently denied entrepreneurial freedom" will be able to service "marginal markets abandoned by large fleets". (Cervero 1985, p. 226-227)

These arguments have had a substantial impact on taxi regulatory policy. The goals of encouraging competition and service innovation were primary motivations for changes to entry restrictions that were adopted in 19 cities from 1965 to 1983. (Shaw et. al. 1983) Advocates of deregulation in recent years have continued to emphasize consumer benefits of lower fares and shorter waiting times for cabs, as well as entrepreneurial opportunities, particularly for minorities and immigrants. (Lephardt and Bast 1985; Boroski and Mildner 1998; Keller 2003)

Economists recognize that the benefits of free markets can be derailed in the absence of the conditions assumed by the textbook model of perfect competition. The rationale for government regulation is that regulation is necessary to correct market imperfections. What are the market imperfections that would call for regulation of the taxi industry?

First, economies of scope and scale may lead to uncompetitive conditions in the dispatch market. Within a given geographic area, a large taxi company can pick up telephone order trips more quickly than a small company because the larger company, with more cabs in operation, is likely to have a cab nearby the customer's location. These economies of scope provide larger companies with a strong competitive advantage, which can lead in turn to market power and an uncompetitive telephone order market. (Gilbert and Samuels 1982; Frankena and Pautler 1984)

Cab companies serving the dispatch market may also enjoy economies of scale from lower "per passenger overhead costs of marketing, advertising, dispatching, accounting and cab maintenance". (Dempsey 1996, p. 97) Pagano and McKnight (1983), however, found that economies of scale do not operate for all but the smallest cab companies, although they did not consider the effect of economies of scope and the study predates the advent of sophisticated and more expensive computerized dispatch systems.

Taxis in regulated markets are generally required to provide service to an entire geographic area with the same rate of fare. Thus, "dense markets cross-subsidize low-density and impoverished areas; peak traffic cross-subsidizes off-peak service." (Dempsey 1996, p. 96) Without regulation, service to low-density and off-peak trips may decline or not be available at all.

Another market imperfection stems from imperfect information. Many aspects of taxi service cannot be examined prior to consumption. (Gilbert and Samuels 1982) Thus, it is "doubtful whether taxi consumers possess the information on price and service offerings needed to establish a truly competitive market for the telephone order portion of the taxi industry." (Teal and Berglund 1987, p. 50) The problem is even greater in the cab stand market given that consumers almost invariably take the first cab in line.

Finally, open entry may induce an excessive influx of independent operators. These drivers are attracted by low entry costs, the opportunity to service "guaranteed" trips at a cab stand and the opportunity to work for oneself. Ignorance of true market conditions and lack of alternative employment opportunities may lead to persistent oversupply. (Teal and Berglund 1987)

4. Taxi customer markets

Market characteristics as well as market imperfections critically shape the impact of different entry policies. The key distinction for analysis of entry controls is between the dispatch market in which customers pre-arrange a trip through a cab company, and the "walk-up" market that consists of taxi stand and street hail (or "flag") trips.

The nature of the dispatch market creates the conditions necessary for meaningful competition. Provided that there are two or more companies that could service their trip, customers can choose which company to call. Because many customers use a cab several times a month, customers build a base of experience from which they can choose the better service provider. Customers who are unhappy with their service from one company can switch to another company.

The nature of dispatch trips also means that drivers and cab companies must work together for mutual benefit. Aside from drivers who service "personal" customers via cell phone, drivers cannot earn a living without the company. Likewise, cab companies depend on drivers to help attract and retain customers through good service.

By contrast, the conditions for competition are absent in walk-up markets. Customers generally take the next cab in line at a taxi stand or enter the first cab to stop in the case of street hail. (Gilbert and Samuels 1982) The competitive dynamic that may arise in the dispatch market is thus absent in the cab stand/street hail market.

There are important differences between street hail and cab stand trips. Pick-up activity at high-volume locations such as airports and rail terminals is very concentrated. From a regulatory perspective, there is an opportunity for control over which cabs are allowed into the queue and driver behavior while in the queue. For example, dispatchers can enforce a no-refusal rule fairly readily in this environment and can evict vehicles in poor condition. By contrast, street hail trips originate over a broad area and are not subject to this level of first-hand oversight.

The customer market can be diagrammed based on the relative number of dispatch, cab stand and street hail trips as shown in Figure 1.

Markets with exclusively dispatch trips are at point A, as might occur in a low-density residential area. Markets with exclusively cab stand trips would be at point B, as at an airport. Markets with exclusively street hail trips, as along Fifth Avenue in Manhattan, would be at point C.

Most cities are served by a combination of dispatch, stand and sometimes street hail trips. As illustrated for selected cities in Figure 1, cities such as San Francisco, Calif., where cabs primarily pick up in the downtown area and at the airport, are predominantly composed of stand and hail trips, and thus relatively close to the base of the triangle. New York City, N.Y., represents the extreme case; medallion cabs do not serve any dispatch trips and most of their trips are via street hail.

Dispatch trips predominate in lower-density jurisdictions such as San Diego, Calif., San Jose, Calif., and Montgomery County, Md. Most walk-up trips originate at cab stands with lower levels of street hail activity in these communities.

5. Entry control and regulatory systems

Whether entry is open or limited, a person or company authorized to operate a taxicab must comply with licensing requirements. These can range from background checks to minimum fleet sizes to a demonstration of the need for the service. The nature and strictness of these requirements shape the effects of entry policy in any given locale.

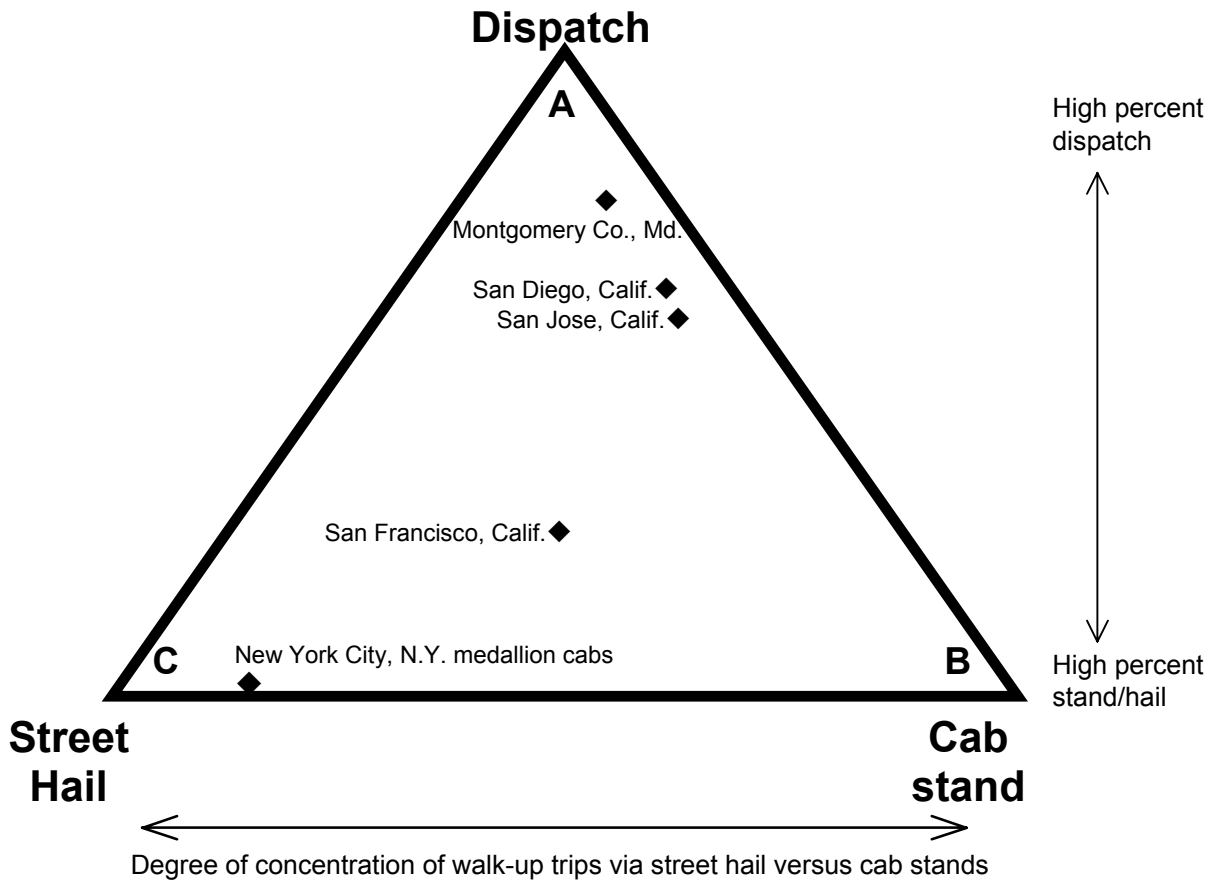
Four types of regulatory systems can be identified based on whether there are entry limits (e.g., numerical caps) and whether entry qualifications can be met by drivers operating independently of cab companies or only by companies. The matrix in Table 1 identifies the four types of regulatory systems that result from this two-by-two categorization.

In open entry systems (type A), the authority to operate a taxicab is issued to anyone who satisfies a basic set of licensing requirements for such things as

Table 1. Schematic classification of taxicab regulatory systems

Entry qualifications	Entry controls	
	No numerical limit	Numerical limit
Qualifications met by drivers independently of cab companies	Type A. Open entry	Type C. Medallion/plate and permit systems
Company-level qualifications	Type B. Open entry with company-level qualifications	Type D. Franchise and certificate systems

FIGURE 1. Schematic diagram of taxi customer market segments



background checks, vehicle insurance and periodic vehicle inspections. Individual drivers as well as companies are able to satisfy these requirements. Individual drivers may be required to affiliate with a cab company that provides dispatch service. Because they hold the vehicle permit, these drivers retain the opportunity to move between companies if they so desire.

System type C also sets licensing standards at a level that individual drivers can meet, but limits the number of licenses issued. These systems are sometimes called medallion or in Canada plate systems, a name derived from the metal plate affixed to the vehicle signifying the vehicle permit. Vehicle licenses (medallions, plates or permits) are typically transferable, often at substantial values. The medallion or vehicle permit may be held by individual drivers, by companies that operate a fleet of vehicles, or by former drivers or others such as investors who then contract with drivers, fleets or management companies to operate the taxicab for them. As in open entry systems, medallion and permit holders may be required to affiliate with a company that provides dispatch service.

In system types B and D, company-level licensing requirements allow entry only by cab companies. Licensing requirements may include minimum fleet sizes, maintaining a central place of business, provision of dispatch services, meeting service standards, high levels of auto insurance coverage, driver training and drug and alcohol testing. The requirements may foster cab companies that provide dispatch service throughout the community and a high level of accountability.

In practice, entry controls and qualifications for entry occupy a spectrum of policies rather than a set

of binary choices. Entry controls can take the form of a legislatively determined numerical cap on the number of licenses, but they can also be subject to administrative adjustment based on a periodic review or in response to applications submitted by drivers or companies. Company-level entry qualifications can require that applicants demonstrate the need for additional cab service and that a public body make a finding of "public convenience and necessity" after a public hearing at which other parties may formally intervene to contest this claim. On the other hand, company-level entry qualifications can simply involve showing compliance with requirements for fleet size, place of business and dispatch system.

Entry controls and qualifications can also be combined in a variety of ways. While most cities that require a showing of public convenience and necessity also limit the number of authorized cabs, it is also possible to allow authorized companies to add vehicles without further regulatory review.

Table 2 categorizes each city and county considered in this paper as one of these four types of regulatory systems. The table also summarizes key features of the regulatory system in each city.

6. Effects of entry policy in cab stand/street hail and dispatch markets

This section examines the impact of entry control policies in dispatch markets and in the "walk-up" markets consisting of cab stands and street hails. This assessment focuses on the effects on entry control on the availability and quality of taxi service. Issues of industry financial impacts and regulatory burden are also examined, particularly as they relate to availability and service quality considerations. Because of the importance of competition, the discussion also examines the impact of entry controls on entry of new companies and development of competitive conditions between strong dispatch service providers.

6.1 Open entry in the cab stand/street hail market

When implemented in walk-up markets, open entry has consistently led to an oversupply of taxis. Oversupply has resulted in fare revenues being spread too thinly among cab drivers to support quality vehicles, acceptable driver incomes and industry accountability for service. With a few notable exceptions, cities and airports with open entry policies in sizeable walk-up markets have abandoned open entry in favor of entry restrictions.

These impacts are documented in detail for cities such as San Diego, Seattle, Wash., Sacramento, Calif., Phoenix, Ariz., Tucson, Ariz., Kansas City, Mo., Cincinnati, Ohio, and Indianapolis, Ind., that have deregulated since the 1970s. These cities, which generally issued taxi vehicle permits to drivers who operated independently of cab companies, experienced a sharp influx of individual owner-operators who primarily if not exclusively worked taxi stands at airports and large hotels. (Teal and Berglund 1987, Frankena and Pautler 1984, ITRE 1998 and La Croix et. al. 1992) The arrival of additional drivers did not improve taxi availability since prior to deregulation there was no shortage of taxi service at these stands. Proliferation of cabs did result in drivers waiting a longer time for their next trip. This led to "a reduction in drivers' productivity and real earnings" (Teal and Berglund 1987, p. 53). The financial pressures in turn resulted in upward pressure on fares and "aggressive solicitation of passengers and confrontations among drivers" as drivers sought to obtain the most lucrative trips and avoid unprofitable short trips. (PriceWaterhouse 1993, p. 15) Open airport systems were found to be "unworkable," with "price gouging, dirty drivers, unsafe cabs, and unfair competition." (La Croix et. al. 1992)

Other cities with open entry policies such as Dallas, Tex. (prior to 2003) and San Jose combined open entry with company-level entry requirements. It is notable that, even with the inclusion of company-level entry requirements, Dallas and San Jose also experienced an oversupply of cabs at airport cab stands. Driver incomes, service quality and accountability suffered as a result of oversupply conditions. As long as drivers are willing to pay lease fees to companies for use of their permits, companies have little incentive to limit the number of cabs in their company. The requirement that drivers go through companies to gain entry to the industry did not stem the flow of drivers into the industry.

As a result of oversupply and deteriorating service, most cities that were deregulated at one time or another have adopted entry restrictions. Entry restrictions were adopted in New York City, Chicago, Ill., Boston, Mass., Baltimore, Md., Toronto, Ont., Montreal, Quebec, Winnipeg, Manitoba, and Vancouver, B.C., when these cities experienced oversupply in the 1920s and 1930s. (Gilbert and Samuels 1982; Davis 1998) PriceWaterhouse (1993) found that 14 of 18 cities that removed entry limits from the mid-1960s to the mid-1980s later restricted entry at airports or

TABLE 2. Key characteristics of entry-related policies in selected cities and counties

City or county	# of cabs	Numerical limits	All cabs authorized to pick up throughout jurisdiction (possibly excepting airport)	All cabs authorized to pick up at airport cab stands	Independents (a)		Provisions for entry of new companies
					Substantial number of independents	Independents must be affiliated with dispatch service provider	
Open entry jurisdictions (Type A)							
Washington DC	6,500	No	Yes	No (g)	Yes	No	Open entry (o)
Phoenix, AZ	Approx. 1300	No	No (c)	No (h)	Yes	No	Open entry (o)
Indianapolis, IN	Approx. 600	No	Yes	No (r)	Yes	No (l)	Open entry (o)
Orange County, FL	Unknown	No	No (c) (d)	See Orlando	Yes	No	Open entry (o)
Sacramento, CA pre-2003*	353	No	Yes	No (h)	Yes	Yes	Open entry (o)
Open entry with company-level qualifications (Type B)							
New York City, NY livery	33,000	No	No (e)	No (e)	Yes	Yes	Open entry (o)
Dallas, TX pre-2003*	2,000	No	Yes	Yes (i)	No	Not applicable	Open entry (o)
Newark, NJ livery	750	No	Yes	No	Yes	Yes	Open entry (o)
Orange County, CA	600	No	No (d)	No (h)	No	Not applicable	Open entry (o)
San Jose, CA	475	No	Yes	No (h)	No	Not applicable	Open entry (o)
Medallion and permit systems (Type C)							
New York, NY	13,087	Yes	Yes	Yes	Yes	No (prohibited)	None (p)
Chicago, IL	6,803	Yes	Yes	Yes	Yes	No	None (p)
Toronto, Ontario	4,950	Yes	Yes	No (h)	Yes	No	None (p)
Houston, TX	2,245	Yes	Yes	Yes	<5%	No (l)	(q)
Miami-Dade, FL	2,042	Yes	No (f)	No	Yes	No	(q)
Boston, MA	1,825	Yes	Yes	Yes	Unknown	Yes (m)	None (p)
Philadelphia, PA	1,600	Yes	Yes	Yes	Yes	Yes	None (p)
San Francisco, CA	1,381	Yes	Yes	Yes	Yes	Yes	None (p)
Calgary, Alberta	1,311	Yes	Yes	Yes	Yes	Yes	None (p)
Ottawa, Ontario	1,025	Yes	Yes	No (h)	Yes	Yes	None (p)
San Diego, CA	990	Yes	Yes	No (h)	Yes	Yes	None (q)
Seattle/King Co., WA	842	Yes	No (f)	No (h)	Yes	Yes	None (p)
San Antonio, TX	754	Yes	Yes	Yes	Yes	Yes	Applications must be approved administratively subject to limitations on number of cabs
Newark, NJ	600	Yes	Yes	Yes	Yes	No	None (p)
Mississauga, Ontario	592	Yes	Yes	No (h)	Yes	No (n)	None (p)
Montgomery County, MD	580	Yes	Yes	Not applicable	Yes	Yes	Applications must be approved administratively subject to limitations on number of cabs
Vancouver, BC	477	Yes	Yes	Yes	Yes	Yes	None (p)
Orlando, FL	477	Yes	Yes	No (j)	No	Not applicable	(q)
Minneapolis, MN	390	Yes	Yes	Yes	Yes	Yes	(q)
Windsor, Ontario	211	Yes	Yes	Yes	Yes	Yes	None (p)

continued on next page

TABLE 2. Key characteristics of entry-related policies in selected cities and counties (continued)

	# of cabs	Numerical limits	All cabs authorized to pick up throughout jurisdiction (possibly excepting airport)	All cabs authorized to pick up at airport	Independents (a)		Provisions for entry of new companies
					Substantial number of independents	must be affiliated with radio service provider	
Franchise and certificate systems (Type D)							
Los Angeles, CA	2,303	Yes	No (f)	Yes (k)	No	Not applicable	New companies may apply in franchising process
Clarke County (Las Vegas), NV	2,024	Yes	No (f)	No (j)	No	Not applicable	Applications must be approved by Taxicab Authority.
Atlanta, GA	1,600	Yes	Yes	Yes	No	Not applicable	No (p)
St. Louis County, MO	1,000	Yes	Yes	No (h)	No	Not applicable	Applications must be approved by Taxicab Comm.
Denver, CO	912	Yes	Yes	Yes	No	Not applicable	Applications must be approved by state Public Utilities Commission.
Arlington County, VA	655	Yes	Yes	No (g)	No	Not applicable	Applications must be approved by County Board
Alexandria, VA	645	Yes	Yes	No (g)	No	Not applicable	Applications must be approved by city manager
Kansas City, MO	605	Yes	Yes	Yes	No	Not applicable	Applications must be approved administratively, subject to limit of 600 cabs
Austin, TX	598	Yes	Yes	Yes	No	Not applicable	Applications must be approved by City Council
Hillsborough Co. (Tampa), FL	566	Yes	Yes		No	Not applicable	Applications must be approved administratively subject to limitations on number of cabs
Fairfax County, VA	525	Yes	Yes	No (g)	No	Not applicable	Applications must be approved by County Board
Pittsburgh, PA	325	No (b)	Yes	Yes	No	Not applicable	Applications must be approved by state Public Utilities Commission.
Fort Worth, TX	255	Yes	Yes	Yes (i)	No	Not applicable	Applications must be approved by City Council
Madison, WI	151	No (b)	Yes	Yes	No	Not applicable	Applications must be approved by City Council
Anaheim, CA	230	Yes	Yes	Not applicable	No	Not applicable	New companies may apply in franchising process

* Dallas and Sacramento allowed open entry prior to 2003, when the number of cabs was capped. In Dallas, each company was required to reduce its fleet by 10%.
(a) Independents are defined as drivers holding vehicle permit separately from cab company. "Substantial" is defined as more than about 5%.
(b) Authorized companies are not limited as to number of cabs operated.
(c) Trip generators such as hotels and convention center limit access through contracts or concessions.
(d) City within jurisdiction limits access through franchise, certificate, medallion or permit system
(e) NYC livery cars not permitted to pick up street hails or at cab stands but may pick up by pre-arrangemen
(f) Some cabs are geographically restricted.
(g) Dulles airport cab stand access by concession. Reagan National airport cab stands are open to cabs in the DC area that meet certain requirements.
(h) Airport restricts access through franchise, concession or permit system.
(i) Provided cabs meet specified requirements.
(j) City allows only a subset of cabs to pick up at airport taxi stands.
(k) Five-day rotation system
(l) Can have cell phone in lieu of radio dispatch
(m) Except for 64 cabs that are exempted from affiliation requirement
(n) Not required but virtually all are affiliated.
(o) Subject to meeting licensing requirements.
(p) New companies can be formed through purchase or affiliation of medallions or permits.
(q) New companies have been formed on occasion through issuance of new medallions or permits to companies making application.
(r) Limited to 178 cabs as of July 2006, the number with airport access at that time.

throughout the jurisdiction. Other cities such as Dallas and Sacramento have also closed entry in recent years.

Contrary to free market expectations, oversupply at cab stands is not a transitory step toward a market equilibrium. The persistence of oversupply conditions is attributed to low entry costs, lack of information, low skill levels of drivers and lack of other employment opportunities which lead drivers to be "willing to accept subsistence level earnings in order to be self-employed." (Teal and Berglund 1987 p. 53) At airport cab stands, drivers "who often speak poor English and have little experience with radio dispatch work, find it easier to wait in line at the airport for a fare than to work the radio dispatch business in town." (La Crois et. al. 1992) Officials in Dallas and Indianapolis have offered similar explanations for the oversupply of drivers at airports in those cities.

Consistent with the experience of cities that deregulated and re-regulated, four open entry localities report unsatisfactory experiences. Indianapolis has experienced an oversupply of cabs at the airport, with drivers waiting three to four hours for their next passenger. State of Arizona officials report that cabs lack proper liability insurance and fail to obtain vehicle and meter inspections, and report the presence of many unlicensed and uninsured cabs in the Phoenix and Tucson areas. In Orange County, Fla., cabs fail to meet acceptable service and vehicle standards. These jurisdictions experience a high turnover of drivers and vehicles and lack of accountability for service problems.

Washington D.C. is the one city in North America with open entry in a dense downtown cab stand and street hail market. As a result of open entry, cabs are readily available in downtown Washington and in the Capitol area. However, concerns about service quality have led city officials to consider changing the system to a closed entry medallion system or some other type of system that would effectively limit entry. No actions have been taken, however, and Washington remains the only large open entry city with dense cab stand and street hail activity.

Oversupply appears to occur only in areas with active cab stand and street hail markets. PriceWaterhouse (1993, p. 19) notes that four smaller cities (Spokane, Wash.; Tacoma, Wash., Berkeley, Calif. and Springfield, Ill.) retained "fully-deregulated system[s.]"

6.2 Open entry in the dispatch market

While open entry has affected walk-up markets in similar ways across different cities, the effects on dispatch service depend on whether open entry is applied across-the-board or is limited to the dispatch portion of the market.

Open entry shows negative effects on dispatch service where it has been applied in both dispatch and walk-up markets. This was the case in most of the cities that deregulated approximately a quarter century ago. Cities such as San Diego and Seattle experienced a decline in the quality of dispatch service as new entrants focused on airport and downtown taxi stands. (Teal and Berglund 1987) Under open entry in Atlanta, Ga., service to minority neighborhoods decreased despite a doubling in the number of cabs; most new entrants focused on the airport. (Frankena and Pautler 1984) Prior to the city's closing entry in 2003, the main dispatch company in Sacramento reported an average response time of 30 minutes. (Nelson/Nygaard 2004)

Because of the long waits experienced by drivers at cab stands, open entry weakened the financial viability of cab companies and drivers who provide dispatch service. Prior to deregulation, these drivers worked a combination of dispatch and cab stand trips. Under open entry, these drivers avoided the long lines at cab stands and focused more exclusively on dispatch trips, losing 10 to 25 percent of their customer base in the process (Teal and Berglund 1987 p 54). These drivers had difficulty making up for the loss of cab stand trips with additional dispatch trips. In San Diego, "the real earnings of drivers in the largest company in the city have fallen 30 percent since deregulation" (Teal and Berglund 1987 p 46).

Washington D.C. follows a pattern similar to the experience in cities that deregulated. The District has only three major dispatch companies despite having one of the largest taxi industries in the country. There are chronic complaints about dispatch response times, particularly in minority neighborhoods. (Lyons 1983; Georges 1993; Pearlstein 2004) Dispatch companies have difficulty attracting drivers to work dispatch trips due to their easy access to cab stand and street hail business. Fear of crime in some neighborhoods also discourages drivers from switching from hail and stand trips to dispatch trips.

Jurisdictions that controlled access to walk-up but not dispatch markets show more positive results. Through franchise or permit systems, San Jose and

Orange County, Calif. limit access to airports cab stands. Access to cab stands at major convention hotels in Anaheim (which is part of Orange County) is limited by that city's franchise system. Open entry thus applies to areas that have relatively few walk-up trips and are served primarily through telephone orders. Neither jurisdiction has experienced a proliferation of drivers and both have cab companies that provide reliable dispatch service with relatively good dispatch response times. Many drivers have access to cab stand trips through company franchises or driver airport access permits. These drivers benefit from being able to combine dispatch trips with fares from cab stands without enduring excessively long waits in line.

Notably, dispatch companies may thrive even though conditions in walk-up markets are such that drivers for dispatch-oriented companies rely solely on dispatch trips. Drivers for three dispatch-oriented companies in Dallas, for example, rarely pick up at the Dallas-Fort Worth airport cab stands due to long wait times in the taxi hold, the product of years of open entry. Three cab companies have built and sustained healthy dispatch operations by focusing on dispatch trips mixed with hotel cab stands. In a similar vein, livery industries in New York City and Newark, N.J., provide good quality dispatch service despite being barred by law from serving walk-up trips, which are reserved for medallion cabs. Liveries operate essentially as cab companies in the dispatch market, and are regulated in both cities under a system of open entry with company-level standards, as were Dallas cab companies until 2003.

Proponents of deregulation hoped that open entry would lead to creation of new cab companies that provided better service and offered innovative services. Entry of new fleets in deregulated cities was uncommon, however. Only one new company with more than 25 taxis entered the industry in Seattle, San Diego and Kansas City (Teal and Berglund 1987). In Oakland, Calif., the two new fleets that formed took the place of one large fleet that had closed. (Frankena and Pautler 1984) Two new fleets were established in Phoenix after deregulation. (Teal and Berglund 1987)

The low rate of new company formation in deregulated cities has been explained by the high barriers to entry for cab companies that offer meaningful dispatch services. Entry for such companies requires accumulation of considerable capital that may be difficult to attract to an industry with "marginal financial status." (Teal and Berglund 1987, p. 52) New dispatch companies must advertise heavily to attract customers. They must quickly build the size of their fleets in order to achieve the economies of scope necessary to provide competitive response times for telephone requests for service. Another factor was that demand in the telephone dispatch market was either stable or declining in the cities that deregulated (Teal and Berglund 1987), so new entrants would have had to dethrone existing companies with large fleets and well-established name recognition. This proved difficult if not impossible.

Ironically, in cities such as San Diego that deregulated and later re-regulated, new radio services were created after entry limits were re-established. The proliferation of driver-operators during deregulation created favorable conditions as new dispatch companies or driver associations could be formed out of aggregations of individually held taxi permits.

The picture for new-company formation is considerably brighter in jurisdictions that established company-level entry qualifications. New dispatch companies have been established in Orange County, Calif., San Jose, Dallas (under open entry) and the New York City livery industry. In some cases, these start-ups have grown to be among the largest cab operators in their area. Growth in population, employment and visitation in these areas has undoubtedly contributed to the success of new companies.

The impact of economic conditions is illustrated by the experience of New York City's black car industry, a variant of livery that serves Manhattan corporate accounts. The black car industry was known for high quality service through a period of growth for both corporate clients and black car firms in the 1980s. New companies were established and incumbent companies added vehicles. But the industry experienced oversupply that led to deteriorating quality when corporate clients reduced trip volumes during economic downturns in the early 1990s and again in the early 2000s. In each case, renewed economic growth helped move the industry back toward a balance between supply and demand though only after several economically painful years.

6.3 Entry restrictions in the cab stand market

With most cities that deregulated approximately two decades ago later adopting entry restrictions, nearly every city or county in the United States and Canada with a significant volume of cab stand or street hail trips restricts entry to these markets. Entry restrictions have not, however, impeded the

availability of service in walk-up markets. Indeed, the restrictions have in some cases improved service quality.

In large cities with dense business, commercial and entertainment areas, cabs are generally plentiful either by street hail or at cab stands with the possible exception of peak times and poor weather. A hallmark of cities such as New York, San Francisco, Chicago and Las Vegas, Nev., is the ease of obtaining cab service in downtown office and entertainment districts as well as at airports and other transportation hubs. Stand and hail trips account for over 70 percent of all taxi trips in these and other large cities.

Despite entry limits and growing trip volumes, large, dense cities have maintained ready availability in the walk-up market. When demand increases, drivers increasingly concentrate in these dense areas. Cabs thus remain readily available for stand and hail trips even if service availability suffers in the dispatch market, as discussed below.

High trip densities combined with entry restrictions provide a foundation for achieving high quality stand and hail service. High trip densities generate relatively high fare revenues for each cab which in turn make feasible strict vehicle age limits, higher levels of auto insurance coverage, extensive driver training regimens and other requirements for a high quality of service. Service also benefits because, with less waiting or cruising between trips, drivers have less reason to refuse short trips. Regulators can also leverage large medallion values to ensure a high level of accountability by cab owners and drivers.

As demand for walk-up service increased in recent years, numerous medallion cities have issued additional medallions, plates or vehicle permits. Since the mid 1980s, the number of licensed cabs has increased by over 40 percent in Chicago, San Francisco and Toronto; about one-third in Miami, Fla.; 20 percent in Boston, and 10 to 15 percent in New York City and Philadelphia, Pa. Drivers of the additional cabs joined existing drivers in primarily focusing on walk-up trips. Strong political pressures overcame industry resistance to expanding the industry, in some cases spurred by cities' interest in generating revenue from auctions of new medallion licenses.

In less dense locales such as San Diego, Montgomery County, and Fort Worth, Tex., 20 percent to 30 percent of cab trips originate at cab stands. The stands are in commercial areas, at hotels and near transportation hubs such as rail and bus stations. In these locales, most drivers concentrate on serving dispatch trips while a smaller number of drivers focus on cab stands. Dispatch-oriented drivers often mix cab stand and dispatch work as trip volumes fluctuate in the course of the day.

Airport cab stands may experience oversupply despite the application of numerical limits. Oversupply has occurred primarily in cities with somewhat less-dense downtown stand and hail markets. Drivers who prefer walk-up trips over dispatch trips due to inexperience, lack of geographic knowledge or rudimentary English language skills flock to airport cab stands despite long waits in the taxi queues. Airports in San Diego, Seattle, Los Angeles, Calif., Ottawa, Ont., Mississauga, Ont., St. Louis, Mo., and Orlando, Fla., restrict the number of cabs allowed access to airport cab stands to prevent oversupply.

6.4 Entry restrictions in the dispatch market

One of the central criticisms of entry controls is their potential to lead to shortfalls in dispatch service availability. Dispatch customers who encounter difficulty obtaining cab service are more likely to be city residents taking short trips for medical, work and social purposes. Entry restrictions may thus harm groups that rely on dispatch and are often among the city's most vulnerable residents.

This problem occurs most often in large cities with dense walk-up markets and long-standing caps on the number of taxicabs. Deficiencies in dispatch service occur as drivers cluster in the more lucrative downtown and airport markets rather than wait for dispatch calls in outlying neighborhoods. The financial incentive for concentrating in the core is strengthened by drivers' desire to avoid the risk of "dead-heading" to pick up a passenger who may not be waiting when the driver arrives or who may yield a small fare from a "grocery run" trip.

Deterioration in dispatch service was abetted in some cities by a failure to issue new medallions or permits as demand for service increased. In the face of strong industry opposition, major medallion cities such as New York, Boston and Chicago did not issue new medallions between the Great Depression and the 1980s, even when demand for cab service increased with the growth of employment, population and leisure activity in city centers. As progressively more cabs focused on the city center, fewer served residential and other outlying locations.

Lack of cab availability in the dispatch market, and at times at cab stands in outlying areas, has been a major issue in medallion cities. The inadequacy of dispatch service in San Francisco was documented

in a study that found that only 53 percent of test calls resulted in a cab appearing within 15 minutes, even excluding a substantial number of cases in which callers were not able to connect with a call-taker or were told that no cab was available. (Q2 Research Group 2006)

A few medallion cities appear to have a satisfactory balance of service levels in cab stand and dispatch markets. An active downtown stand and hail market in Toronto has not appeared to undercut dispatch companies' ability to attract and retain drivers to service their calls. A strong tradition of neighborhood-based dispatch service "brokers" who control the leasing of large blocks of medallions has supported good neighborhood service in Toronto.

Cities with less-dense cab stand and street hail markets have fared better in meeting the need for good dispatch service. Computerized dispatch data show that 78 percent to 87 percent of dispatch customers were picked up within 20 minutes in Dallas, San Jose and San Diego. In Alexandria, Va., 84 percent were picked up within 15 minutes of phoning to request a trip.

In these predominantly dispatch markets, cab companies have strong incentive to develop efficient dispatch operations in order to attract drivers, who choose companies at least in part based on their volume of calls, and to attract customers with quick pickups. The companies are often in franchise or certificate regulatory systems that provide financial and operational stability for investment in staff and equipment for large, technologically sophisticated and effective dispatch operations.

Vibrant demand for dispatch and the company-centric structure of franchise and certificate systems do not, however, prevent drivers from clustering at high-volume cab stands. Although companies control all vehicle authorizations (in contrast to the numerous independents in many medallion and permit systems), companies may not be able to ensure a geographic balance in service. Geographic restrictions are thus used to assure service to outlying areas in Los Angeles, Las Vegas and other cities.

Cities with predominately dispatch trips have increased the number of cabs as demand grows, preventing deterioration in dispatch service seen in cities with dense walk-up markets. Since the mid 1980s, regulators have approved increases in the number of licensed cabs of over 40 percent in Montgomery County, Fairfax County, Va., and San Antonio, Tex.; about one-third in Mississauga; and 10 to 15 percent in San Diego and Vancouver. Cab companies are likely to support industry expansion provided that they receive the newly issued taxi permits and provided that the companies believe that additional cabs are needed. Companies benefit by adding cabs to their fleets and by being able to maintain satisfactory response times for customer pickup.

Another approach is seen in Pittsburgh, Pa., and Madison, Wis., certificate and franchise systems that allow authorized companies to add (or subtract) cabs from their fleets without regulatory approval. The approach removes the need for regulators to determine the number of cabs needed by each company.

Whether to add new vehicles is often interwoven with the issue of authorizing additional cab companies. Incumbent companies may oppose both the applications of prospective entrants and any increase in industry size. Ultimately the decision rests with a city council, public utilities commission or taxicab authority, which must weigh the applicant's case against arguments made by incumbent companies, drivers and possibly other interested parties.

Approval processes for new companies form a substantial barrier to entry. It may be difficult for new applicants to convincingly demonstrate the need for additional vehicles or that they will improve the quality of taxi service in the community. Through both formal intervention and political muscle, incumbent companies may successfully argue that entry of additional competitors will dilute their trip volumes and undermine their ability to provide good service. Nevertheless, new companies have gained franchises in Los Angeles and Anaheim and been granted newly issued permits or operating certificates in Miami, Las Vegas, Pittsburgh, Orlando, Fort Worth, Denver, Colo., Houston, Tex., Austin, Tex., and Minneapolis, Minn.

It should be noted that formation of new companies does not necessarily lead to improved dispatch service. While some new companies have provided effective dispatch service for their communities, in other cases drivers have focused on airport and cab stand trips, with little if any new dispatch service provided.

7. Entry policy: major issues and policy responses

From the range of experiences with different entry policies in the United States and Canada, several common threads stand out relating to the impacts of entry policies and the interactions among entry control, entry qualifications and customer markets.

7.1. Oversupply of cab stand and street hail markets under open entry

One of the clearest effects of entry policy is seen in cities with large cab stand and street hail markets. In these cities, open entry has consistently led to an oversupply of cabs and deterioration in service quality. Proliferation of cabs creates a dysfunctional taxi system that spreads fare revenues too thinly across the industry to support quality drivers, vehicles and dispatch systems and creates incentives for drivers to shun less profitable trips. Because of these problems, with the notable exception of Washington D.C., no major North American city has retained a blanket open entry policy, although many smaller cities that lack active cab stand and street hail markets continue with open entry policies.

A potential alternative to entry control is to apply stringent requirements on cab companies with the hope that cab companies can effectively control the number of cabs serving walk-up markets as they often do for dispatch trips. Even with company standards, however, the presence of large open entry cab stand markets leads to oversupply of cabs, as occurred at airports in Dallas and San Jose. In an open entry system, companies have the incentive to put as many cabs on the street as there are drivers willing to pay lease fees and thus fail to act as a gateway control to entry.

7.2 Geographic imbalances in service in cities with dense cab stand/street hail markets, regardless of entry policy

Because of these problems with open entry, the number of cabs must be controlled through regulation in cities that have substantial cab stand and street hail trip volumes. Regulatory controls on entry, however, have often resulted in the opposite problem: a lack of cab availability, particularly in outlying areas.

Geographic imbalances in service tend to arise whenever higher trip densities prompt drivers to cluster in downtown business and commercial districts and airports in preference over outlying areas. Geographic imbalances were seen in cities that deregulated as well as cities that control entry. Geographic imbalances also arise in different types of closed systems – both in medallion cities with large numbers of independent drivers and historically company-centric systems such as in Los Angeles and Las Vegas. Thus, market characteristics rather than regulatory policies underlie the problem of geographic imbalances.

7.3 Entry policies to address geographic imbalances

A central challenge of taxicab regulatory policy is to apply entry controls to walk-up markets without producing the inverse problem of lack of service availability in outlying areas. One solution to this dilemma is to use a combination of entry policies. A case in point is two-tier systems in which separately licensed industries are authorized for cab stands and for dispatch. The medallion cab and livery industries in New York City and Newark, N.J., and the comparable system in London illustrate this approach. Medallion caps maintain control on the number of cabs serving walk-up trips, while companies providing dispatch trips are regulated under a system of open entry with company-level standards.

A second approach is to restrict the number of cabs granted access to nodes of cab stand activity such as airports, hotels and convention centers while allowing open entry elsewhere. The two Orange Counties (California and Forida), Phoenix, Tucson and San Jose illustrate this approach. Node-oriented entry controls are applied more readily where walk-up trips are highly localized and access is more easily controlled, as at airports and convention hotels. This approach has shown better results when combined with company-level qualifications. Licensing of individual drivers, as in Orange County, Fla., Phoenix and Tucson, has led to a proliferation of cabs that has degraded service quality and made enforcement of safety requirements difficult.

Both of these approaches give regulators a way to regulate the number of cabs in walk-up markets more strictly than is necessary in dispatch markets. Regulators can thus avoid oversupply at cab stands without artificially limiting service levels for dispatch trips. These approaches rely on cab companies' balancing the supply of service (i.e., number of cabs and shifts worked) with their dispatch call volumes. Companies have strong incentive to do so in order to attract and retain a

qualified driver workforce that provides good service. Due to the barriers created by economies of scale and scope in the dispatch market, there is little chance of oversupply from a proliferation of companies.

Cities and counties that use a combination of entry policies are unusual – most large and mid-size cities employ closed entry systems throughout their jurisdiction. Regulators in closed entry locales have addressed geographic service imbalances by geographically restricting the operations of certain cabs. Examples are zone-specific franchises in Los Angeles and geographically restricted medallions in Las Vegas, Miami and Chicago. Geographic restrictions may create substantial enforcement challenges but may effectively channel service to outlying areas. Another approach to this issue are service requirements, such as the requirement for citywide service found in many cities and Chicago's directive that all cabs pick up at least one dispatch call per day in underserved areas.

7.4 Fostering effective dispatch operations

Another key regulatory challenge is to promote the development of cab companies that provide dispatch service over a wide geographic area. These are generally companies with computerized call centers and a sufficient number of cabs to provide prompt dispatch service throughout the community, from business and commercial districts to low-density residential areas.

Entry policy can help to foster dispatch operations in three ways. First, entry controls that prevent oversupply at cab stands provide drivers with the opportunity to supplement dispatch trips with cab stand trips. Particularly in markets with relatively low levels of dispatch demand, the opportunity to serve both types of trips can be critical to the financial viability of providing dispatch service.

Second, entry qualifications can help create a level playing field among different cab operators. Requirements for minimum fleet sizes, dispatch service levels, technology requirements and so forth, if enforced, prevent companies that have not made investments in dispatch systems from undercutting others with lower driver lease fees.

A third step is for entry policies to allow cab companies to adjust fleet sizes as trip volumes increase or decrease. This can be accomplished through periodic regulatory reviews of industry size, or by allowing authorized companies to add (or subtract) cabs from their fleets without regulatory approval.

These policies increase the likelihood of developing companies that provide citywide dispatch service. The biggest catalyst to the development of such companies is not regulation, however, but the centrality of dispatch trips in the overall taxicab market. Cities with few walk-up trips but substantial dispatch trip volumes tend to have strong dispatch companies since companies and drivers depend on attracting telephone orders. Conversely, weak dispatch operations are most often found in locales weighted toward walk-up trips. In these cities, use of a combination of entry policies, geographic restrictions or strictly enforced service requirements are likely to be needed.

7.5 Competition and entry of new companies

An issue closely related to the quality of dispatch is the level of competition in the industry. Noncompetitive situations arise in several circumstances. In small markets, the volume of telephone orders may not readily support two or more dispatch companies. In small and midsize markets, economies of scope may produce a dominant dispatch operation. Open entry may lead to oversupply for walk-up trips and thus weaken the financial viability of dispatch companies and drivers, particularly in small and midsize markets. Finally, in markets of all sizes, entry controls may impair competition by barring entry of new companies.

Entry policy can facilitate competition in the industry by limiting access to cab stand and street hail trips (and thus improve the financial status of the industry) while providing clear avenues for entry and growth of cab companies with dispatch operations. A variety of policies are available toward this end. Open entry systems with strict entry qualifications provide entry to any operator able to meet the requirements. Certificate and franchise systems can also allow entry to companies meeting regulatory requirements after a review process. In a medallion system, cab companies can acquire medallion licenses through purchase or lease or affiliation arrangements to serve a dispatch operation.

New dispatch companies are most likely to be established in areas experiencing growth in urban population, employment, and convention and leisure activity since new companies can attract a share of a growing market. New entrants have overcome the barrier of economies of scope by focusing (at least initially) on a restricted geographic area. Marketing

to repeat customers, both private individuals and business accounts, can help overcome possible information imperfections in the dispatch market.

7.6 The importance of local factors in designing entry policies

While this discussion has emphasized commonalities between cities, the kaleidoscopic diversity of entry policies, entry qualifications and other elements of taxicab regulatory systems is equally notable. Even cities that are quite similar in terms of customer markets, industry characteristics and geography often show wide differences in entry-related policies.

The diversity of policies stems in part from different values and priorities expressed in the policy making process. For example, some cities are more likely to choose a set of policies that require substantial administrative and enforcement effort for effective regulation. Other cities are more likely to choose market-based and incentive-based mechanisms. Some cities show a preference for overseeing changes in the taxi industry such as adding companies or changing the number of cabs through the political process. Other cities prefer to keep those decisions out of the hands of elected officials.

Differences may also arise from different reactions to the risks involved in policy choices. In some cases officials shy away from the risk of failing to adjust industry size as the market changes or the risk of dampening competition by being inhospitable to new entrants. Others may shy away from the risk of creating an unstable economic environment for cab companies and drivers.

Industry capability also affects the development of regulatory policy. Less regulatory oversight and control is needed if the industry has a strong tradition of dispatch service, cab companies have capable management and drivers and companies have a healthy and productive relationship. Industries with weak management, poor driver/company relationships and a poor history of serving dispatch markets require a greater regulatory role.

Differences between cities mean that entry policies need to be adapted to each city's unique characteristics and needs. The diversity of regulatory systems reflects the simple fact that in this area of transportation policy, one size does not fit all.

7.7 Overall patterns and practices

While recognizing the diversity among U.S. and Canadian cities, entry policies tend to be similar in cities with similar market characteristics, as summarized in Figure 2. The peak of the triangle represents jurisdictions with a predominance of dispatch trips and few if any cab stand trips. These jurisdictions have generally migrated toward the use of company-level standards, reflecting the market's orientation toward dispatch trips. The number of cabs operated by each authorized company may or may not be regulated. If it is, and if the area is experiencing a growth of demand, the number of cabs is usually adjusted regularly to keep pace with increased demand.

The middle section of the triangle represents the majority of cities under consideration. These cities have varying mixes of dispatch and walk-up trips. A range of entry policies are evident, including two-tiered systems, company-level entry qualifications combined with limits on access to cab stands, and closed entry with possibly service and geographic requirements and restrictions. The overall objective for this group of cities is to find the blend of entry policies and entry qualifications that best meets the diverse needs of dispatch and walk-up trips, taking into account market size, geography, industry characteristics and other relevant factors. Some cities have been more successful than others in arriving at an effective set of policies.

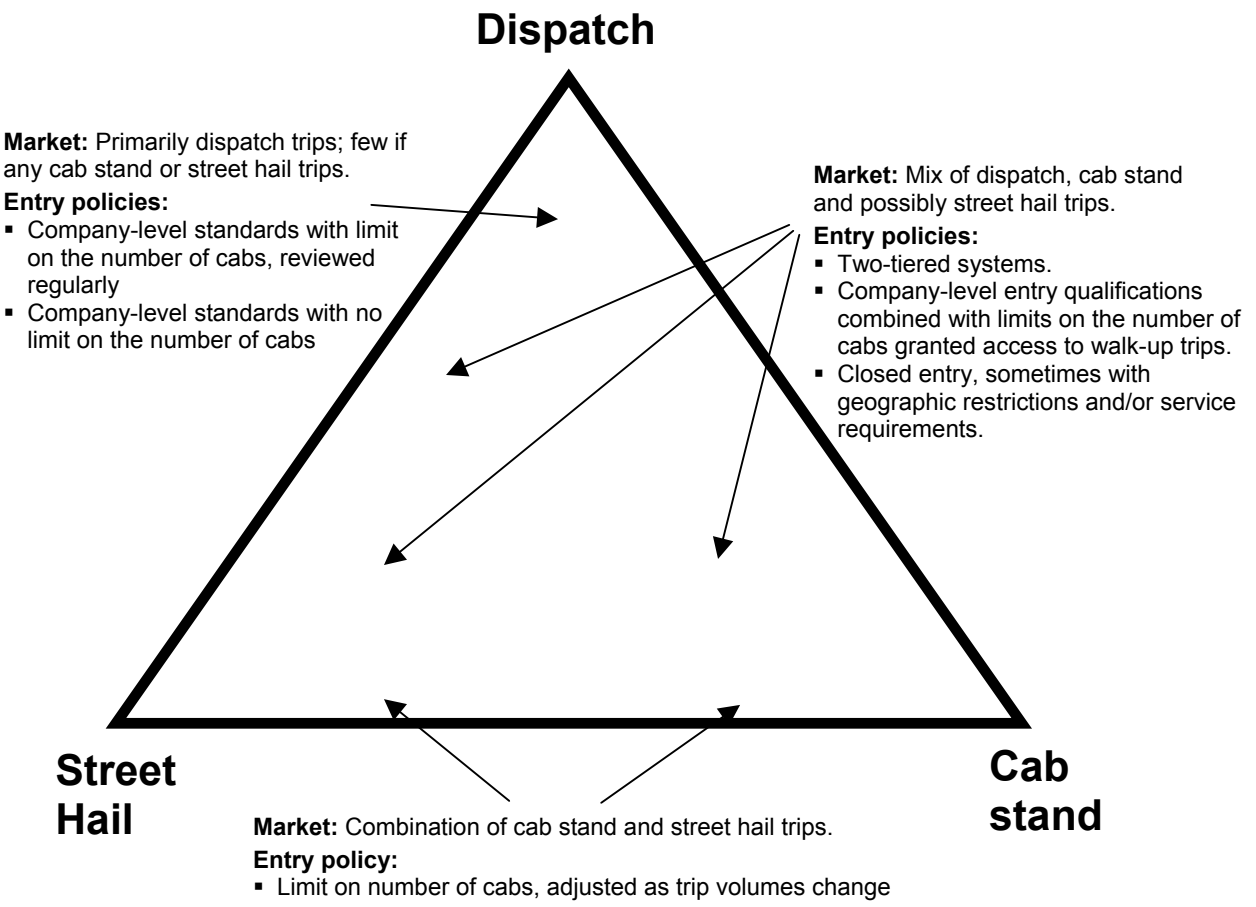
At the base of the triangle are jurisdictions with exclusively walk-up trips, either at cab stands or via street hail. The pure example is the airport cab stand. This part of the triangle is also relevant to the street hail segment of two-tier systems. At the base of the triangle the primary objectives are to limit the number of cabs to prevent oversupply and to adjust the number of cabs as trip volumes change. Licensing practices range from exclusive franchises to medallion systems.

8. Conclusion

While discussions of entry controls are often framed in terms of open entry versus closed entry, a spectrum of entry policies are evident in the 43 cities and counties examined in this study. This spectrum includes the two extremes as well as a broad middle ground in which some entry is allowed but under varying conditions and subject to varying processes.

The effects of entry policies depend on market characteristics. Open entry has had negative effects on the availability and quality of cab service when implemented in cities with a large number of cab

Figure 2. Typical entry policies for taxi customer market segments



stand and street hail trips. Limits on entry, while benefiting cab stand and street hail markets, have led to deficiencies in service to outlying areas when implemented in cities with large walk-up trip volumes.

Entry qualifications as well as entry controls affect service outcomes. Company-level entry qualifications involving dispatch operations, service standards, technology requirements and minimum fleet sizes can promote the development of effective dispatch operations. Entry qualifications do not address the major problem experienced in walk-up markets, however, that of oversupply.

The central policy challenge in communities with a diversity of customer markets is to find the most effective blend of entry policies that produces satisfactory service levels for both walk-up and dispatch trips. One approach is to focus entry controls on walk-up markets. This has been done through combinations of entry policies such as two-tier systems and by limiting access to cab stands while providing more relaxed entry controls in dispatch-oriented geographic areas that have few walk-up trips. Other approaches focus on directing cabs to outlying areas using geographic restrictions and service requirements.

A final conclusion is that entry policies must be carefully tailored to market needs and local conditions. A myriad of factors in addition to entry policies affect the availability and quality of taxi service in any given locale. Thus, while there is much to learn from the experiences of other cities and counties, taxicab regulatory decisions also give heavy weight to each jurisdiction's unique attributes.

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10. Appendix A. Sources for unpublished information

Note: Unpublished information is based on (a) site visits to selected cities that include interviews with regulators, cab operators, taxi drivers, taxi user groups, airport officials and other stakeholders and analysis of data on trips, response times and complaints, conducted as part of consulting projects for regulatory agencies; (b) a survey conducted for this paper in 2006 of regulatory officials covering regulatory practices and issues; and (c) personal communications with regulatory and industry representatives. Sources for each city are as follows:

Alexandria, VA: 2004-05 site visits and personal communications with regulatory personnel.

Anaheim, CA: 1999-2000 site visits and personal communications with regulatory and taxi industry personnel.

Arlington County, VA: Personal communications with regulatory personnel.

Atlanta, GA: 2006 survey and personal communications with regulatory personnel.

Austin, TX: personal communications with regulatory and industry personnel.

Boston, MA: 2006 survey and personal communications with regulatory personnel.

Calgary, Alberta: 2006 survey.

Chicago, IL: 2006 survey and personal communications with regulatory and industry personnel.

Clarke County (Las Vegas), NV: Personal communications with regulatory personnel.

Dallas, TX: 2005 site visits.

Denver, CO: Personal communications with regulatory personnel.

Fairfax County, VA: Personal communications with regulatory personnel.

Fort Worth, TX: 2005 site visits.

Hillsborough County, FL: 2006 survey.

Houston, TX: 2006 survey and personal communications with regulatory personnel.

Indianapolis, IN: Personal communications with regulatory and airport personnel.

Kansas City, MO: Personal communications with regulatory and industry personnel.

Los Angeles, CA: 1997 site visits and personal communications with regulatory and industry personnel.

Madison, WI: Personal communications with regulatory and industry personnel.

Miami-Dade, FL: 2006 survey and personal communications with regulatory personnel.

Minneapolis, MN: 2006 survey and personal communications with regulatory personnel.

Mississauga, Ontario: 2006 survey and personal communications with regulatory and airport personnel.

Montgomery County, MD: 2006 survey, 2001 site visits and personal communications with regulatory and industry personnel.

New York, NY: Personal communications with regulatory and industry personnel.

Newark, NJ: Personal communications with regulatory personnel.

Orange County, CA: 1999-2000 site visits and personal communications with regulatory, airport and industry personnel.

Orange County, FL: 2006 survey and personal communications with regulatory and airport personnel.

Orlando, FL: 2006 survey and personal communications with regulatory and industry personnel.

Ottawa, Ontario: 2006 survey and 2004 site visits.

Philadelphia, PA: 2006 survey and personal communications with regulatory personnel.

Phoenix, AZ: Personal communications with regulatory personnel.

Pittsburgh, PA: 2006 survey and personal communications with regulatory personnel.

San Antonio, TX: 2006 survey and personal communications with regulatory personnel.

San Diego, CA: 2006 survey, 2000-01 site visits and personal communications with regulatory personnel.

San Francisco, CA: 2003 and 2006 site visits and personal communications with regulatory and airport personnel.

San Jose, CA: 2003-04 site visits and personal communications with regulatory and airport personnel.

Seattle/King Co., WA: 2006 survey and personal communications with regulatory personnel.

St. Louis County, MO: Personal communications with regulatory personnel.

Toronto, Ontario: Personal communications with regulatory personnel.

Vancouver, BC: 2006 survey.

Washington D.C.: Personal communications with regulatory and airport personnel.